

# The **SHORT WAVE** Magazine

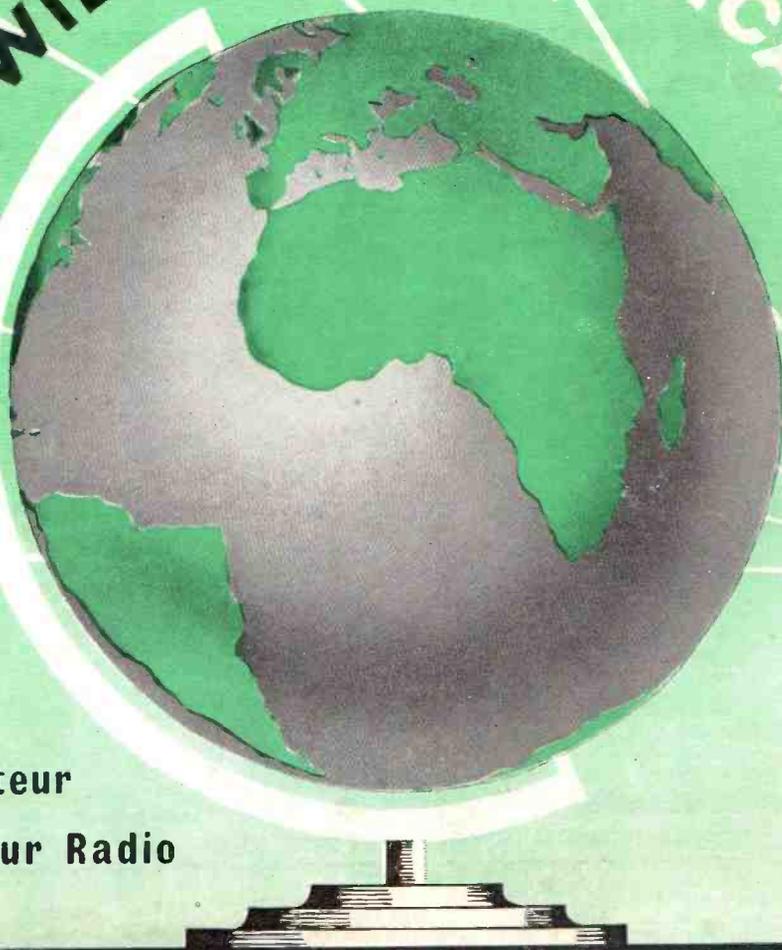
VOL. XVIII

APRIL, 1960

NUMBER 2

**WORLD WIDE COMMUNICATION**

For the  
Radio Amateur  
and Amateur Radio



# 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:

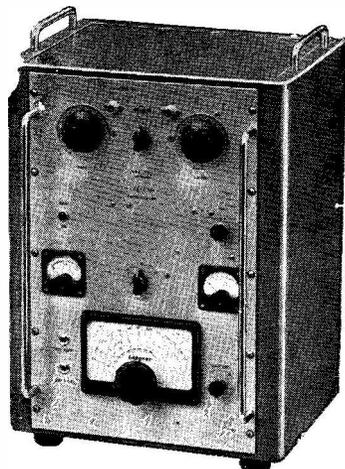
400 crystals in the range 7100 to 7150 kc/s inclusive. Brand new and unused post-war production. Specification: BT cuts, zero temperature co-efficient, gold plated electrodes, wired into FT 241 type holders with standard  $\frac{1}{2}$ " pin spacing. Accurately calibrated. Better than average activity, 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.

**ONLY £6. 18. 6 DEPOSIT**

plus 24 monthly payments of £2. 18. 6  
CASH PRICE 66gns.



Model  
LG300

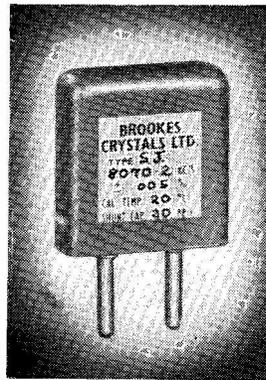
813  
P.A.

BRITAIN'S FINEST 150 WATT  
AMATEUR TRANSMITTER — BAR NONE

Now everyone can afford the transmitter  
with the written guarantee.

**Labgear Limited**

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



- Illustrated above is a Type SJ Crystal Unit from a range covering 3-20 mc/s and on the right is a Type SM Crystal Unit from a range covering 3-20 mc/s.

**BROOKES**

*Crystals*  
mean  
**DEPENDABLE**  
**frequency**  
**control**



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. GRGreenwich 1828

Grams: Xtals London, S.E.10

More

for less... with the

# MULTIMINOR



DESIGNED to offer the widest possible range of accurate and reliable measurements at the lowest possible price, the versatility and usefulness of the Multiminor is now further extended by specially designed leads.

These new leads, available at no extra cost, will accept crocodile clips or PRODCLIPS.

The Multiminor takes full advantage of the possibilities of printed circuit techniques to achieve outstanding compactness and economy of weight. The scale is clear and open. The fine red coloured pointer and effectively damped movement facilitate easy and rapid reading.

For use in Radio, TV, Electronics, Motor Vehicles, domestic appliances, workshop equipment, you'll find the Multiminor a great little meter.

Use **PRODCLIPS** (Pat. No. 748811) with the **Multiminor**

These cleverly designed spring-loaded insulated prods are the complete answer to a long-standing problem. Press the trigger to open, release to grip. Keep your hands free no matter how difficult of access your test points may be!

15/- per pair



### 19 Ranges



**D.C. Voltage**  
 0—100mV.  
 0—2.5 V.  
 0—10 V.  
 0—25 V.  
 0—100 V.  
 0—250 V.  
 0—1000 V.  
**Resistance**  
 0—20,000Ω  
 0—2MΩ

**A.C. Voltage**  
 0—10 V.  
 0—25 V.  
 0—100 V.  
 0—250 V.  
 0—1000 V.  
**D.C. Current**  
 0—100μA  
 0—1mA  
 0—10mA  
 0—100mA  
 0—1A

Reg. Trade Mark  
 List price: **£9.10s.**  
 complete with Test Leads and Crocodile Clips.  
 Leather Case if required 39/-  
 Size: 5½ x 3½ x 1½ in.  
 Weight: 1 lb. approx.

# MULTIMINOR

AVO LTD

FITS THE POCKET



FILLS THE BILL

Write now for illustrated literature to:—

Avocet House - 92-96 Vauxhall Bridge Rd. - London, S.W.1  
 VICTORIA 3404 (12 lines)

A MEMBER OF THE METAL INDUSTRIES GROUP OF COMPANIES

## TECHNICAL PUBLICATIONS

Available from stock

## Latest Issues

New and Greater Edition of the

**RADIO HANDBOOK** (15th Edition)Published by *Editors & Engineers*, W6-U.S.A. 800 pages, durable binding.  
Price 60s. post free, from stock.**RADIO AMATEUR CALL BOOK**Special Note: In future, the CALL BOOK will be published in two parts: *American* Section only, appearing quarterly, at 41s. 6d. post free; *Foreign* (non-American) Section half-yearly in March and September, at 25s. post free. Will include latest call sign/address listings for all countries, including much DX data. The only complete directory to the radio amateur stations of the world.**SPRING EDITION***American* Section, 41s. 6d. ; *Foreign* (non-American) Section, 25s. The two together at 60s. post free.**THE RADIO AMATEUR'S HANDBOOK****LATEST (1960) EDITION**

Published by the American Radio Relay League.

Price (standard binding) 34s. post free

(Bound in whole Buckram, *de luxe*, 44s.)**DX ZONE MAP** Latest Revision

Paper Edition, 9s. 3d. post free

Linen Backed (*de luxe*) 11s. 9d. post free

## Magazines by subscription

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

\*Binders for CQ 30s. 0d.

Post free, ordinary mail only

Subscription Service for all American Radio and Technical Periodicals

**SHORT WAVE MAGAZINE**

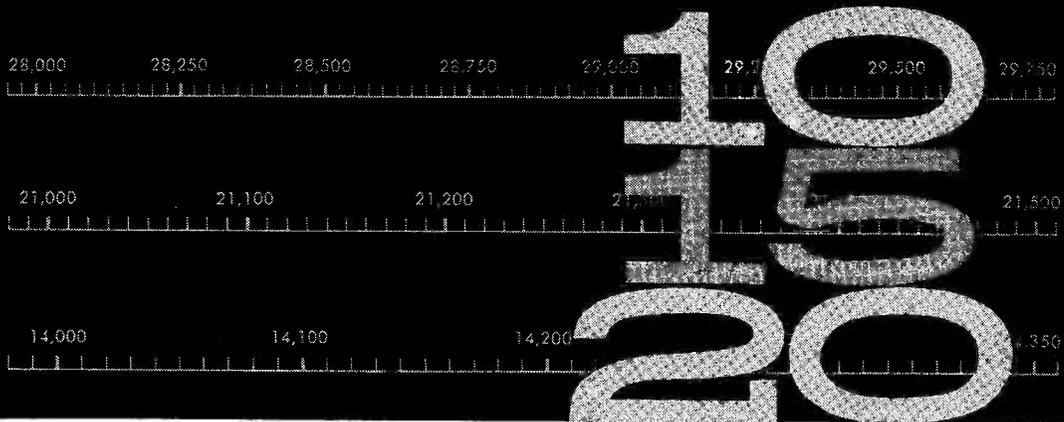
Publications Department

55 VICTORIA STREET · LONDON · SW1  
Abbey 5341

	Post Free
ANTENNA HANDBOOK ( <i>Published by A.R.R.L.</i> ) (8th Edition) .....	19s. 0d.
A COURSE IN RADIO FUNDAMENTALS ( <i>New Edition</i> ) .....	10s. 6d.
BASIC AUDIO COURSE .....	22s. 6d.
BASIC RADIO COURSE .....	19s. 0d.
BEAM ANTENNA HANDBOOK .....	22s. 0d.
BETTER SHORTWAVE RECEPTION COMMAND SETS ( <i>Published by CQ</i> ) Information on conversion of many Command Transmitters and Receivers .....	24s. 0d.
CQ ANTHOLOGY .....	12s. 6d.
DX GUIDE ( <i>New Edition</i> ) .....	16s. 9d.
ELECTRONICS MADE EASY .....	16s. 9d.
GUIDE TO BROADCASTING STATIONS ( <i>Twelfth Edition</i> ) pp.112 .....	6s. 6d.
HAMS INTERPRETER ( <i>Published by OH2SQ</i> ) .....	3s. 10d.
HIGH FIDELITY ( <i>Gernsback</i> ) .....	7s. 0d.
HIGH FIDELITY CIRCUIT DESIGN (302 pp.) ( <i>Gernsback</i> ) .....	12s. 6d.
HINTS AND KINKS, Vol. 5 .....	48s. 0d.
HOW TO BECOME A RADIO AMATEUR★ .....	11s. 0d.
HOW TO LISTEN TO THE WORLD. LEARNING THE RADIO TELEGRAPH CODE .....	4s. 6d.
LOG BOOKS Spiral bound ( <i>Published by A.R.R.L.</i> )★ .....	7s. 6d.
MOBILE HANDBOOK ( <i>Published by CQ</i> ) ( <i>Second Edition</i> ) .....	24s. 0d.
MOBILE MANUAL ( <i>Published by A.R.R.L.</i> ) .....	23s. 0d.
NEW SIDEBAND HANDBOOK ( <i>Published by CQ, latest issue</i> ) .....	25s. 6d.
NOVICE HANDBOOK .....	23s. 6d.
OPERATING AN AMATEUR RADIO STATION ( <i>Published by A.R.R.L.</i> )★ .....	2s. 8d.
QUAD ANTENNAS .....	23s. 0d.
RADIO AND TV HINTS .....	8s. 6d.
RADIO DESIGNERS HANDBOOK ( <i>4th Edition</i> ) 1,498 p.p. ( <i>F. Langford Smith</i> ) .....	50s. 0d.
RADIO VALVE DATA ( <i>Hilffe</i> ) .....	5s. 9d.
S—9 SIGNALS .....	8s. 6d.
SCATTER PROPAGATION THEORY AND PRACTICE ( <i>H. W. Sams</i> ) .....	25s. 0d.
SHORT WAVE RECEIVERS For The Beginner .....	6s. 6d.
SINGLE SIDEBAND FOR THE RADIO AMATEUR ( <i>A.R.R.L.</i> ) .....	14s. 6d.
SURPLUS CONVERSION MANUAL Volume 1 .....	21s. 0d.
Volume 2 .....	21s. 0d.
TECHNICAL DICTIONARY ( <i>H. W. Sams</i> ) .....	16s. 6d.
TELEVISION INTERFERENCE — ITS CAUSES AND CURES .....	15s. 6d.
THE OSCILLOSCOPE .....	18s. 6d.
THE RADIO AMATEUR OPERATOR'S HANDBOOK ( <i>Data Publications</i> ) .....	3s. 6d.
THE RECORDING AND REPRODUCTION OF SOUND ( <i>H. W. Sams</i> ) .....	64s. 0d.
TRANSISTORS— THEORY AND PRACTICE ( <i>New Edition</i> ) ( <i>Published by Gernsback</i> ) .....	23s. 0d.
TRANSISTOR THEORY AND PRACTICE ( <i>Published by World Radio Handbook</i> ) .....	9s. 6d.
TRANSISTOR TECHNIQUES ( <i>Gernsback</i> ) .....	12s. 6d.
UHF ANTENNAS, CONVERTERS AND TUNERS .....	12s. 0d.
VHF HANDBOOK .....	24s. 0d.
WORLD RADIO HANDBOOK, 1959 Edition, 180 pages .....	8s. 6d.
WORLD RADIO HANDBOOK, 1960 Edition, 198 pages .....	16s. 6d.

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

# WORK ALL 3 BANDS EQUALLY WELL



## WITH MOSLEY TRAPMASTER ANTENNAS

### NO MATCHING DEVICE NEEDED!

You don't have to be a roof-climber to get consistent, three-band operation from Mosley TRAPMASTER antennas.

TRAPMASTER antennas are designed and constructed to be fed with a 52-ohm coax line ... no additional tuning devices needed.

That's why American hams have made TRAPMASTER their favourite ... and Mosley the leading manufacturer of beam antennas in the USA.

Now you can have a TRAPMASTER antenna ... made in England. For full particulars, write

**O. J. Russell, G3BHJ, Manager**



15 Reepham Road, Norwich, Norfolk  
A subsidiary of MOSLEY ELECTRONICS, Inc.,  
St. Louis 14, Missouri, USA



**CARL MOSLEY**, "the Old Man Himself," WØFQY, always happy to contact English and continental hams on 10-15-20M.

**V-3 JR.** Vertical antenna. 10-15-20M. Rated to 300W.

**TA-32 JR.** Two-element rotary beam antenna. 10-15-20M. Rated to 300W.

**TA-33 JR.** Three-element rotary beam antenna. 10-15-20M. Rated to 300W.

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

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

**COSSOR 339 DOUBLE BEAM OSCILLOSCOPES.** Reconditioned, perfect order, £15 each. P/P 10/-.

**R.C.A. PLATE TRANSFORMERS.** 200/250v. primary, 2,000/1,500/0/1,500/2,000 volt 500 ma. sec. New, boxed, £6/10/- each. P/P £1.

**CRYSTAL MIC. INSERTS,** 4/6 each. P/P 6d.

**DEAF AID EARPIECES.** 250 ohm imp., 4/6; 1,000 ohm., 7/6. P/P 6d.

**12 VOLT AERIAL CHANGEOVER RELAYS.** Double pole, Leach type, 7/6 each. P/P 6d.

**50:1 POTTED MIC. INPUT TRANSFORMERS,** 4/6 each. P/P 6d.

**AMERICAN SUPER LIGHTWEIGHT HEADPHONES.** Res. 100 ohms., 15/- pr. P/P 1/6.

**AR.88 1st I.F. TRANSFORMER,** 3/6. P/P 6d.

**R.C.A. 8in. EXTENSION LOUD-SPEAKERS.** High quality speaker, 3 ohms, housed in black crackle metal case. Match AR.88, H.R.O., etc., 45/- each. P/P 3/6.

**ERSKINE 13A DOUBLE BEAM OSCILLOSCOPES.** Perfect order, £25 each. P/P £1.

**PARMEKO TRANSFORMER.** 230v. primary. 620/550/375/0/375/550/620 volts 250 ma. 5v. 3A., 5v. 3A. New boxed, 45/- P/P 5/-.

**AR.88 WAVECHANGE ASSEMBLY.** Complete ceramic switch with screens, 17/6. P/P 2/6.

**DOUBLE SPACED LARGE CERAMIC SWITCH.** 2 pole, 6-way, 5/6. P/P 9d.

**80 OHM 100 WATT CARBON RESISTORS.** 3/6. P/P 9d.

**BC.221 FREQUENCY METERS.** 125 kc/s. to 20 mc/s. As new, with instruction books but less calib. charts, £14/10/- each. P/P 10/-.

**AVOMETERS MODEL D.** Reconditioned, perfect order, £8/19/6 each. P/P 3/6.

**CR.100 SPARES KITS.** Contains valves, 2-U50, 2-DH63, 2-X66, 2-KT63, 6-KTW61, resistors, condensers, pots., output trans., etc. All new, 59/6. P/P 3/6.

**6 VOLT AC/DC BUZZERS,** 3/6. P/P 6d.

**R.1155 RECEIVERS.** Std. model B. Fitted with improved geared drive. Perfect order, fully tested, £7/19/6 each. P/P 7/6. Power pack and output stage, 85/- extra.

**NATIONAL H.R.O. RECEIVERS.** Senior type, table model. Complete with full set of 9 coils covering 50 kc/s. to 30 mc/s. Fully tested, first class condition, 21 gns. each. A.C. power packs, 69/6 extra.

**WESTON E.772 TESTMETERS.** Reconditioned, perfect order, £7/10/- each. P/P 3/6.

**COLLINS MODULATION TRANSFORMERS.** Push-pull to parallel 807, 20 watts, 12/6. P/P 1/6.

**EDDYSTONE POWER PACKS.** 200/250 volt input. Output 175 volts 60 ma. 12 volt, 2.5 amp. Fully smoothed, 5Z4 rect., 22/6 each. P/P 3/-.

**RADIO CITY TESTMETERS.** 1,000 ohms./volt. multi-range AC/DC, £3/19/6 each. P/P 3/-.

**R.1155 SUPER SLOW MOTION GEARED DRIVES,** 12/6 each. P/P 1/-.

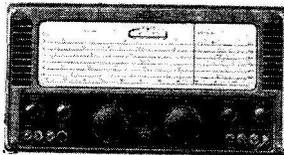
**6 VOLT VIBRATOR PACKS.** Output 120 volts 30 ma. Fully smoothed, 12/6 each. P/P 2/-.

**ROTARY TRANSFORMERS.** 2 types, either 6 or 12v. D.C. input. Output 250 volts 80 ma., 22/6 each. P/P 2/6.

**SOUND POWERED TELEPHONE HANDSETS.** No batteries required to operate, 15/- each. P/P 1/6.

**BARGAIN RECORDING TAPES.** All new, guaranteed. 1,800ft.—7in., 29/-; 1,200ft.—7in., 19/6; 1,200ft.—5½in., 19/6; 600ft.—5in., 12/- P/P 1/-.

## HOME RADIO OF MITCHAM



We can offer immediate or early delivery on all the EDDYSTONE communication receivers, 870, 840A 888A, and 680X. Special attention given to overseas enquiries and our export dept., can arrange packing, insurance, and freight to any part of the world.

### EDDYSTONE No. 898

**Geared Slow Motion Drive.** A really high grade movement giving smooth positive drive with a reduction ratio of 110 to 1. Pointer has 7 inch travel and the vernier scale gives 500 divisions. For receivers, test-gear, converters, or anything that requires the best. Complete with knob, escutcheon, fixing screws, etc. Post free U.K. Overseas add 7/6.



PRICE  
58/-

### COMPONENT CATALOGUE

Without doubt the best and most comprehensive catalogue ever offered to the radio amateur and constructor. 128 pages listing over 4,000 items with hundreds of illustrations. All items in catalogue normally in stock. Available only from us. PRICE 2/-, post 9d.

### MULLARD "DESIGNS FOR AUDIO AMPLIFIERS"

This latest book available from stock price 8/6d., post 1/-. Features 12 different designs for amplifiers, pre-amps, mixers, tape amps., stereo units etc. We can also supply all the parts for these designs, send 6d. stamp for detailed price lists.

Dept. S, 187, LONDON ROAD, MITCHAM, SURREY.  
Shop Hours: 9—6.30 p.m. (Weds. 1 p.m.) MIT. 3282

## PETER SEYMOUR

COMMUNICATION EQUIPMENT SPECIALISTS

	£	s.	d.
<b>EDDYSTONE 680X.</b> 480 Kc-30 Mc/s. 115-230 A.C. input	85	0	0
<b>EDDYSTONE 740.</b> 480 Kc-30 Mc/s. 115-230 A.C. input	85	0	0
<b>HALLICRAFTERS R44/ARRS.</b> 27-143 Mc/s. AM FM (P/P £1)	25	0	0
<b>HALLICRAFTERS S27.</b> 27-143 Mc/s. AM FM. 115-230 A.C. input	25	0	0
<b>NATIONAL "I-10"</b> 27-290 Mc/s. complete with power supply for 200-250 A.C. and all coils	13	10	0
<b>NATIONAL HRO senior spares:</b> Tuning cond. assembly, 37/6; IF transformers, 15/- each; Xtal filter units with xtal, 19/6; Mains transformers, 30/- All brand new plus postage.			
<b>AR88D</b> 540 Kc-32 Mc/s. 115-240 A.C. input	55	0	0
<b>AR88LF</b> 75-550 Kc and 1.5-30 Mc/s. in first class condition	45	0	0
<b>COLLINS TCS</b> receiver spares kits, set of IF transformers, BFO transformers and output trans.	1	10	0
<b>MINIMITTER MR37</b> receiver 80-10 Mtrs. with "O" multiplier for 230 A.C. input	27	10	0
<b>GELOSO</b> all band converter with power unit for 200-250 A.C.	15	0	0
<b>HALLICRAFTERS S76</b> double conversion receiver	60	0	0
<b>CLASS D</b> wavemeter	6	10	0
<b>COLLINS TCS</b> receiver 1.5-12 Mc/s. with power unit for 230 A.C. input	8	10	0
<b>BTH P58 UHF</b> receiver 280-650 Mc/s. direct calibration "S" meter power supply 200/250 A.C.	10	0	0
<b>One Only</b> of each: Woden UMI, 30/-; UM2, £2; UM3, £3 10s. Please add postage.			
<b>AR88</b> spares: D dials, 10/-; Dial windows D and LF, 12/6; Mains transformers, 30/-; Output transformers, £1; RF section trimmers, 1/- each. Plus postage.			
<b>POWER SELSYNS</b> 200-250 A.C. input. Per pair (P/P 5/-)	2	10	0
<b>RCA 460</b> 44 LF receiver 540-15 Kc.	5	0	0

PART EXCHANGES WELCOME. EXPORT ENQUIRIES INVITED

**URGENTLY REQUIRED.** R208 and R107 receivers. Eddystone S640, Panoramic adaptors for 450 Kc (mean) input. Please state price.

410 BEVERLEY ROAD, HULL, YORKSHIRE

Tel.: Hull Central 41938.

TAKE THE PROBLEMS  
OUT OF  
SOLDERING

RELIABLE  
SPEEDY  
LONG-LASTING

25 watt instrument model (Illustrated)

**HENLEY  
SOLON**

TRADE MARK

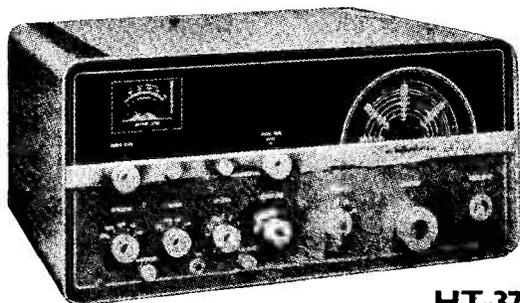
FOR 25 YEARS  
THE BEST ELECTRIC  
SOLDERING IRON

Leaflets on request from

**AEI** CABLE DIVISION  
Associated Electrical  
Industries Ltd.

Distribution Equipment Sales Dept.  
38-39 Upper Thames Street, London, E.C.4  
Telephone: CENTral 2332

**DALE** Stock ...  
hallicrafters



HT-37

SSB • AM • CW

The HT-37 is an entirely new S.S.B. transmitter combining the same production and engineering skills contained in the HT-32A but priced at a figure which the Amateur can now afford, particularly with the attractive H.P. terms available  
**FEATURES:** 100 watts plate input (P.E.P. two-tone). Five band output (80, 40, 20, 15, 10 metres). All modes of transmission—CW, AM, S.S.B. Carrier suppression down 50 db. Distortion products down 30 db. Both side bands transmitted on A.M. Precision V.F.O. Full voice control system built in. Excellent CW keying.

**CONTROLS:** Operation—power off, standby, Mox, Cal, Vox. Audio level, R.F. level. Final tuning 80, 40, 20, 15, 10 metres. Function—Upper side band, lower side band, DSB, CW. Carrier balance. Calibration level, metre range. Driver tuning. Band selector—80, 40, 20, 15, 10 metres. High stability, V.F.O. Microphone connector. Key jack.

**TUBES:** 15 tubes plus voltage regulator and two rectifiers. 5-12AT7, 2-12AX7, 2-6AH6, 6CB6, 12BY7, 6AL5, 5R4GY, 5V4G, OA2 and 2-6146 power output amplifiers.

**REAR CHASSIS:** Co-ax antennas connector. Line fuse. Control connector. -AC-power-line-cord.

**PHYSICAL DATA:** 9" high, 19½" wide, 15½" deep. Shipping weight—82 lbs.

**ONLY £43 DOWN**

Balance over 12, 24, 36 months      Cash Price £215

**OTHER HALLICRAFTERS GEAR  
IN STOCK**

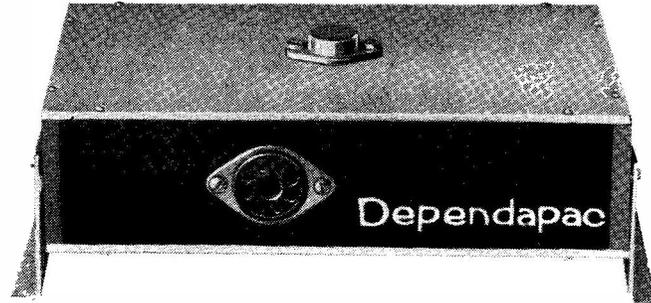
S-38E ... £28	SX-110 ... £78	SX-62A ... £172
S-95 ... £32	SX-111 ... £120	HT-32A ... £307
S-108 ... £61	SX-101A ... £187	HT-33A ... £357
S-107 ... £50	also HAMMARLUND, GONSET, NATIONAL, ETC.	

**DALE ELECTRONICS**

109 Jermyn Street, London, S.W.1  
Whitehall 4856

# ATTENTION MOBILEERS !

## this is what you've been waiting for...



It employs a system (patent applied for) of switching by relay the Transformer taps and bias enabling you to use it on your receiver at 90% efficiency and when the Transmit relay is actuated the efficiency is 85% at 150 watts. A typical supply for a 6146 in the final modulated by a pair of metal 6L6's, 807's or TT21's, 530 volts at 228 m/a and 265 volts at 110 m/a is easily

### STAR FEATURES

- \* Latest Texas Instruments Power Transistors.
- \* Perfect Waveform.
- \* Internal Relay Controls for both 'Receiver' and 'Transmitter.'

The only high powered transistorised D.C. conversion unit on the world market giving equal efficiency at 30 watts as at 150 watts !

obtainable from any 12 to 14 volts input. Any combination of these output voltages may be used, providing the drain does not exceed 150 watts.

Do NOT confuse the DEPENDAPAC with other more expensive units on the market rated at "120" watts but which cannot be used efficiently at 30 watts as current drain is much too heavy.

- \* Total size 8½" x 5" x 2¼".
- \* Full-sized ¼" plates for heat sinks.
- \* Adjustable mounting brackets.
- \* Withstands Mobile wear and tear. We are in full production for the 1960 Mobile Season, so place your orders now. Price 21 gns.

DEPENDABLE RELAY CO. LTD., 8a Ainger Road, Camden Town, N.W.3 — Telephone: PRI. 8161

# FREE TO AMBITIOUS ENGINEERS

— THE LATEST EDITION OF ENGINEERING OPPORTUNITIES

### Have you sent for your copy?

ENGINEERING OPPORTUNITIES is a highly informative 156-page guide to the best paid engineering posts. It tells you how you can quickly prepare at home for a recognised engineering qualification and outlines a wonderful range of modern Home Study Courses in all branches of Engineering. This unique book also gives full details of the Practical Radio & Electronics Courses, administered by our Specialist Electronics Training Division—the B.I.E.T. School of Electronics, explains the benefits of our Employment Dept. and shows you how to qualify for five years promotion in one year.

### We definitely Guarantee

**"NO PASS — NO FEE"**

Whatever your age or experience, you cannot afford to miss reading this famous book. If you are earning less than £20 a week, send for your copy of "ENGINEERING OPPORTUNITIES" today—FREE.

BRITISH INSTITUTE OF ENGINEERING  
TECHNOLOGY (Incorporating E.M.I. Institutes)  
(Dept. SE/24), 29 Wright's Lane, London, W.8

### WHICH IS YOUR PET SUBJECT ?

Mechanical Eng..  
Electrical Eng..  
Civil Engineering.  
Radio Engineering.  
Automobile Eng..  
Aeronautical Eng..  
Production Eng..  
Building, Plastics,  
Draughtsmanship,  
Television, etc.

### GET SOME LETTERS AFTER YOUR NAME!

A.M.I.Mech.E.  
A.M.I.C.E.  
A.M.I.Prod.E.  
A.M.I.M.I.  
L.I.O.B.  
A.F.R.Ae.S.  
B.Sc.  
A.M.Brit.I.R.E.  
City & Guilds  
Gen. Cert. of Education  
Etc., etc.

### PRACTICAL EQUIPMENT

Basic Practical and Theoretic Courses for beginners in Radio, T.V., Electronics, Etc., A.M.Brit.I.R.E. City & Guilds Radio Amateurs' Exam. R.T.E.B. Certificate P.M.G. Certificate Practical Radio Radio & Television Servicing Practical Electronics Electronics Engineering Automation

### INCLUDING TOOLS!

The specialist Electronics Division of B.I.E.T. (Incorporating E.M.I. Institutes) NOW offers you a real laboratory training at home with practical equipment. Ask for details.

### B.I.E.T. SCHOOL OF ELECTRONICS

### POST COUPON NOW!

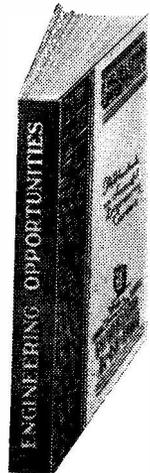
- Please send me your FREE 156-page "ENGINEERING OPPORTUNITIES"
- (Write if you prefer not to cut page)

■ NAME .....

■ ADDRESS .....

■ SUBJECT OR EXAM THAT INTERESTS ME .....

(SE/24)



**THE B.I.E.T. IS THE LEADING ORGANISATION OF ITS KIND IN THE WORLD**

**INDEX TO  
ADVERTISERS**

	PAGE
Anglin ... ..	107
Avo, Ltd. ... ..	57 & 111
B.I.E.T. ... ..	62
Brookes Crystals... ..	cover ii
Candler System ... ..	107
Communications (Air) Ltd. cover iii	
Dale Electronics... ..	61
Daystrom, Ltd. ... ..	cover iv
Dependable Relay Co., Ltd....	62
Forth Motor Co. ... ..	112
G3HSC ... ..	112
G.W.M. Radio ... ..	111
Harris, P. ... ..	108
Henley's ... ..	61
Home Radio ... ..	60
K.W. Electronics ... ..	109
Labgear ... ..	cover ii
Minimitter ... ..	64
Mosley Electronics, Ltd. ...	59
Norman Birkett, Ltd. ... ..	110
Peter Seymour ... ..	60
Rollet ... ..	112
R.T. & I. Service ... ..	108
Samsons ... ..	110
Small Advertisements	107-112
Smith & Co. (Radio) Ltd. ...	60
Southern Radio ... ..	64
Southern Radio & Elec. ...	112
S.W.M. Publications ... ..	58
Taylor Elec. ... ..	64
Tiger Radio, Ltd. ... ..	cover iii
Whitaker ... ..	cover ii
Young ... ..	cover iii

# SHORT WAVE MAGAZINE

Vol. XVIII

APRIL, 1960

No. 198

**CONTENTS**

	Page
<b>Editorial</b> ... ..	65
<b>Some Modifications for the CR-100, by B. M. Sandall, (G3LGK)</b> ...	66
<b>Converter for Radio Teleprinter Reception (Concluded)</b> <i>by J. B. Tuke, (G3BST)</i> ... ..	69
<b>CW Transmitter for Top Band</b> ... ..	73
<b>Sense About Power Packs</b> ... ..	76
<b>Electronic Change-Over Switch</b> ... ..	78
<b>DX Commentary, by L. H. Thomas, M.B.E. (G6QB)</b> ... ..	80
<b>Modulator Driver Unit, by G. T. Sassoon, (G3JZK)</b> ... ..	89
<b>VHF Bands, by A. J. Devon</b> ... ..	93
<b>Lecher Line Device for TVI Exploration, by R. L. Rooney, (W2CQI)</b>	97
<b>Longer Life for Dry Batteries, by J. B. Dance, M.Sc.</b> ... ..	99
<b>The Mobile Rally Programme</b> ... ..	100
<b>Nyasaland DX-Pedition, by M. Geddes, (ZE3JO/ZD6)</b> ... ..	101
<b>New QTH's...</b> ... ..	102
<b>The Month with the Clubs — From Reports</b> ... ..	103

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

*Advertisement Manager* : M. GREENWOOD

*Published on the first Friday of 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.*

© Short Wave Magazine Ltd.

**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.*



# OUTSTANDING METER

## MODEL 127A

### 20,000 o.p.v. POCKET SIZE!

Performance equal to a high priced instrument

#### OUTSTANDING FEATURES:

- ★ Sensitivity 20,000 o.p.v. D.C. 1,000 o.p.v. A.C.
- ★ 20 Ranges.
- ★ D.C. Current 50 $\mu$ A, to 1 Amp.
- ★ D.C. Volts 0.3 v. to 1,000 v. (25 kV. by probe).
- ★ A.C. Volts 10 v. to 1,000 v.
- ★ 3 Resistance Ranges from 0-20 megohms (self-contained).
- ★ Meter 40 $\mu$ A 3 $\frac{1}{4}$ " arc.
- ★ Accuracy D.C. 3%, A.C. 4%.
- ★ Dimensions 5 $\frac{1}{2}$ " x 3 $\frac{1}{4}$ " x 1 $\frac{1}{4}$ ".

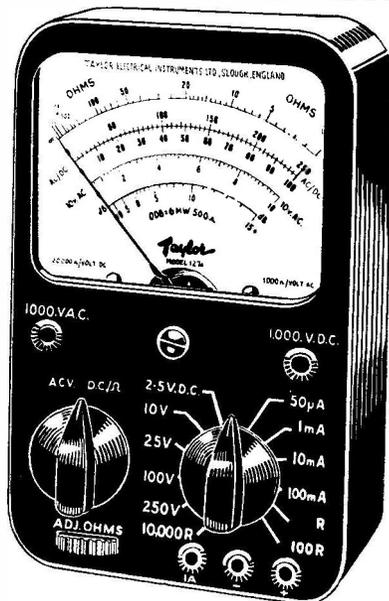
Credit Sale Terms available

9 monthly instalments of £1.44

Write for full details and catalogue

### Price £10.0.0

Complete with Instruction Manual and interchangeable test prods and clips. High quality leather case, if required, £2.18.0.  
H.V. Probe for 25 kV., £4.0.9



## TAYLOR ELECTRICAL INSTRUMENTS LIMITED

MONTROSE AVENUE, SLOUGH, BUCKS.

Telephone: Slough 21381.

Cables: Taylins, Slough.

Member of the METAL INDUSTRIES Group of Companies.

### SOUTHERN RADIO'S WIRELESS BARGAINS

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

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

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

REMOTE CONTACTOR. For use with above. 7/6

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

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

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

MORSE TAPPERS. Midget type, 2/8; Standard, 3/6; Heavy type on base, 5/6. ALL BRAND NEW.

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

QUARTZ CRYSTALS. Types F.T.241 and F.T.243, 2-pin,  $\frac{1}{2}$ " Spacing. Frequencies between 5675 Kcs. and 8550 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.

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

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

SPECIAL OFFER. 12 ASSORTED METERS. Slightly damaged. Mainly broken cases (perfect movements). Including 3 Brand New Aircraft Instruments 12 for 45/-

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

TI154 TRANSMITTERS. Complete in transit case. New condition £2/5/-

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

TRANSCEIVERS. Type "38" complete with 5 valves, etc. New condition untested by us but serviceable, no guarantee 22/6 each

ATTACHMENTS for Type "38" Transceivers. ALL BRAND NEW. PHONES, 15/6; THROAT MICROPHONES, 4/6;

JUNCTION BOXES, 2/6; AERIALS, No. 1, 2/6, No. 2, 5/-;

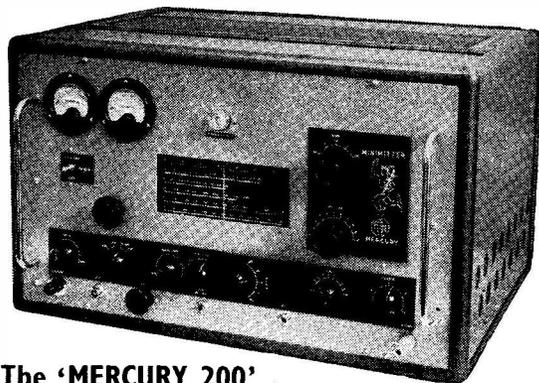
WEBBING, 4/-; HAVERSACKS, 5/-; VALVES, A.R.P. 12, 4/6;

A.T.P. 4, 3/6. Set of FIVE VALVES, 19/-, the set.

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



### The 'MERCURY 200'

Britain's finest Amateur Transmitter. For those who want the best. Using the very latest valves—latest circuit design—giving extremely high efficiency with great ease of operation. Price £110 complete.

The World Famous 'G4ZU MINIBEAM' with the 'Co-Axial Resonator.' This new model is now in use in all five Continents. Price £16 complete.

The NEW MR44 Communications Receiver. An outstanding instrument with operating facilities never before offered in this country at ANY price!! 6 Amateur Bands, A.M.—C.W.—S.S.B.—Crystal controlled oscillators—Audio A.V.C., etc., etc. Price £55 complete.

The Minimitter Telescopic Mast—with all tackle—Price £10.

For full details of these and all the other Minimitter equipment for the Amateur—please send S.A.E. to—

## The MINIMITTER Co Ltd

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

# The SHORT WAVE Magazine

## E D I T O R I A L

**Modes** *For most of 40 years there has been discussion, sometimes leading to hot argument, between the exponents of CW working and the protagonists for phone operation as to which is the better method of communication on the amateur bands.*

*Until a short time ago, the issues were fairly clear and came down to the better method being the one that suited the individual. In other words, the argument could never be satisfactorily resolved. The CW men would point to the fact that the real DX could only be worked on the key, while phone operators could argue that, because it was much harder to work it on telephony, their achievement was greater thereby. The telegraphists could then retort (with a well-bred smile, or an unconcealed grin, as the case might be) that of course it took a good deal more operating skill to use CW than simply to blast through on telephony. And to this the phone men's answer was that CW-only exponents (however clever they might be at working DX) could have no idea of the technical difficulty of producing a clean, well modulated signal on the HF bands. So the argument would ding-dong, with all the shades and variations of opinion provoked by such a topic.*

*The fact of the matter is that the AT operator who wants to make the most of his opportunities to communicate — since the whole concept of Amateur Radio rests upon the basic factor of individual communication — will aim to make himself proficient in both modes, as indeed many are, whether the gear used is simple or complex.*

*For the advanced radio amateur, who regards the whole world as his oyster, it seems clear that in the field of Amateur Radio communication the future lies with the techniques of SSB and radio T/P working, both of which call for a high degree of technical skill and operating ability. But it is fair to say that in the meantime there is ample scope for those who wish simply to indulge their desire to communicate, without bothering over-much about the relative merits of this or that method of communication.*

*Austin Fob/L  
G8FO.*

# Some Modifications for the CR-100

IMPROVING IT FOR  
AMATEUR BAND  
OPERATION

B. M. SANDALL (G3LKG)

These receivers can be obtained at very reasonable prices and, for a small expenditure, they can be considerably improved for amateur use. The basic circuit is good, selectivity characteristics excellent and, with slight changes, noise-level and sensitivity can be made to compare favourably with much more expensive types.

Many CR-100's — also known as the B.28 — have a high-impedance audio output; this can be changed to 3 or 15 ohms output simply by replacing the output transformer, located at the rear of the chassis, towards the centre. A standard type with a 6,000-7,000 ohm primary should be used to replace it. Before disconnecting the old one, check the anode and HT (primary) connections by running the set and checking the terminals for +300v. or so relative to chassis. It will be observed that several sets of wires go to the old transformer; among them are the leads to the panel head-phone output and, in some cases, 600-ohm line output leads to the rear terminal boards; these leads can easily be traced under the chassis. To enable the phone outlet points still to be used, a direct connection can be made from the output valve anode through a .001  $\mu$ F condenser, to the panel jack sockets. This makes provision for high impedance phones, but, if desired, one of the sockets may be wired across the actual loudspeaker terminals to provide a low-impedance output on the front panel (see Fig. 1). Then high or low impedance phones can be used at will.

## Output Stage

The output valve is normally a 6F6G or KT63, and a change to a modern high-slope type will give more gain in hand. In the writer's case, the available gain on strong stations was not quite sufficient fully to load the output stage with the AVC on. The circuit was accordingly changed to take a G.E.C. KT61, and the output stage is fully driven when the AF gain control is about half-way up. One circuit modification is required, namely

changing the cathode resistor (between pin 8 and earth) to a 120-ohm one-watt type, to provide correct bias for the KT61.

These modifications complete the AF section and, with a reasonable loudspeaker, excellent results are obtainable.

## Adding an S-Meter

The next modification undertaken was the addition of an S-meter. The CR-100 is very easily adaptable for this, provided that the front panel can be removed, and a suitable hole cut to accept the meter. In the writer's case, this is a 2-in. instrument placed in the top left-hand corner of the panel; if the set is of the series with an "R15" socket fitted, this can be removed when fitting the meter, as it plays no useful part in the operation of the receiver (for amateur purposes). The potentiometer associated with "R15" is utilised as the meter zeroing control; as the HT+ line comes to the top of the "R15" potentiometer, it is used for the HT+ line in the metering circuit, suitably connected. The original lead from the slider of the control is cut off. For those readers whose model does not have the "R15" components fitted, a hole should be drilled in the panel, to correspond symmetrically with the aerial trimmer, and a 100,000-ohm wirewound potentiometer put in. The S-meter itself is a 0-500  $\mu$ A type.

Whilst on the subject of S-meters, it is worth mentioning that if a moving-coil meter is shunted to reduce sensitivity, the movement is electrically damped, *i.e.*, the pointer will change position relatively slowly. This is a disadvantage where S-meters are concerned, because it means that the movement would be unable to follow rapid QSB, even with quick-acting AVC. This type of sensitivity control is used in some receiver S-meter circuits, and results in very sluggish movement. The

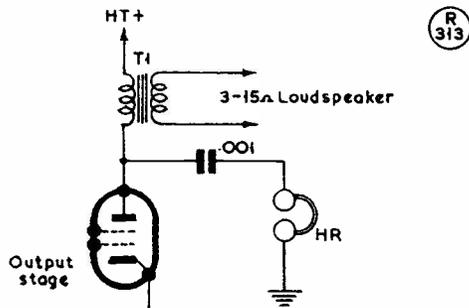


Fig. 1. Audio output circuit modifications for the CR-100, for HR phones and m/c speaker. T1 is an output transformer of the usual type.

alternative method for varying the meter sensitivity is to wire it as a voltmeter, with a variable series resistor for the adjusting control, instead of as a milliammeter with shunt; then the meter will be far less damped, and give a more lively indication of rapid signal strength variations. The circuit used by the writer in his CR-100 is shown in Fig. 2. It operates as follows:—

The second IF amplifier is one of the AVC-controlled stages, so as the signal increases, its anode current falls. The drop across the 2,200-ohm decoupling resistor R4 is less, and so point B increases in voltage towards HT+ line voltage. In operation, the meter is set to zero deflection with no input signal, by means of the potentiometer R1 which then means that points A and B are at the same potential. When a signal is received, there is a difference in voltage between points A and B, thus producing a voltage across the meter, and a corresponding deflection. The meter should then be adjusted to full-scale deflection by R2, with the strongest available amateur signal tuned in as reference; the meter is then ready for use. Any desired calibration may be put on the scale, to suit individual needs.

**Front End Modifications**

The original RF amplifiers were found to be very noisy, and relatively insensitive on the HF bands. They were therefore replaced with the better 6SG7. This valve was chosen because of its high gain and vary- $\mu$  characteristics. Sharp cut-off valves such as the 6AC7 and 6AB7 were tried, and gave good noise and gain performance, but were discarded due to their non-linearity producing cross-modulation. This effect causes strong unwanted signals to be superimposed on nearby weaker, and often wanted, stations, and the modulation from both is then heard at the same time — a very annoying defect of many otherwise good receivers.

The modification was started at the first RF stage. This was rewired in a circuit different from the original. In the old circuit, the cathode was returned to the RF gain control; this meant that, as the control was turned back, the gain of the first stage was reduced with that of several following stages. This results in the noise level of the receiver being higher than necessary, when using the RF gain control, especially when taking CW.

In the new circuit, the cathode has just the normal cathode bias resistor with a decoupling condenser, both returned directly to earth, and the value of bias resistor is chosen so that the

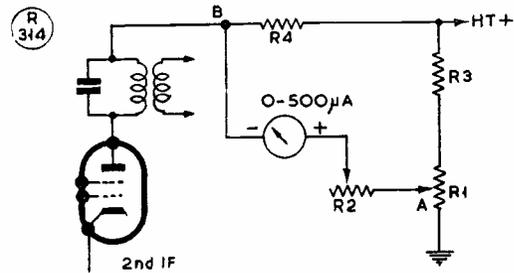


Fig. 2. S-meter circuit for the CR-100 suggested by G3LGG. R1 is the 100,000-ohm zero set potentiometer; R2 is 25,000 ohms for sensitivity control; R3 is 5,000 ohms; and R4 is 2,200 ohms.

valve runs continuously at maximum gain, until the signal reaches a certain level determined by the AVC delay; when this point is reached, the AVC takes control as normally intended. This means that noise is lowest on weak signals, just where this is most important under operating conditions, together with the fact that, as the full AVC takes control on strong signals, the overload capacity of the receiver is not degraded. On the constructional side, very little work is required, other than rewiring the valveholder. The change in connections can be worked out from the valve-base diagram, Fig. 3 and it will be seen that the old valve had a top cap grid connection, whereas the new one is a single-ended type. To get the grid lead through the chassis without drilling extra holes in a rather awkward position, one of the chassis-mounted decoupling condensers was unbolted from the chassis and replaced with a tubular type; the grid lead was then passed through the condenser bolt-hole. The cathode is returned to earth through a 180-ohm resistor, decoupled by a .01  $\mu$ F 150v. condenser; the original cathode lead should be taped up and left. Extra components are easily supported by their wiring, and the new

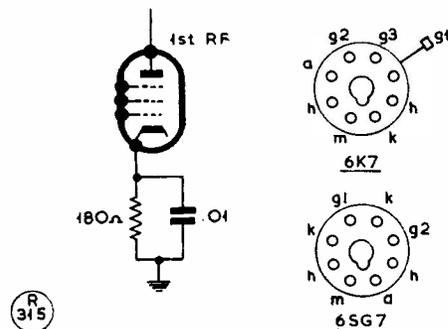


Fig. 3. Changing the first RF amplifier valve in the CR-100 — see text. The second stage is similarly modified.

circuit is given in Fig. 3.

Before modifying V2, it is preferable to check and align the set for operation. The trimmers of the aerial circuit (the set of coils nearest the back, underneath) should be adjusted as follows:— With the receiver switched to each band in turn, the coil core is adjusted for maximum noise at the LF end of the band with the aerial trimmer in the central (half-mesh) position. Coil numbers are marked for each band, on most sets, but Fig. 4 shows the coil pack layout under the chassis.

With all in order so far, the second stage may now be attacked. The procedure for V2 is simply to rewire the valve connections as for V1, this time making no circuit alterations other than removing another chassis mounting condenser (to be replaced by a .01  $\mu$ F tubular again) for the V2 grid lead. It will then be necessary to re-align the RF and mixer grid tuned circuits (second and third banks from the rear) and, once again, coils are normally numbered. The adjustment procedure is again to switch to each band in turn and peak the coil *cores* at the LF end. Where trimmers also are provided, they should be adjusted at the HF end of the appropriate band, all adjustments being made for maximum noise.

If the above procedures have been carried out correctly, the receiver should be very sensitive, even on 30 mc, and should not be unstable on any band. If instability appears after these modifications, the condition of the

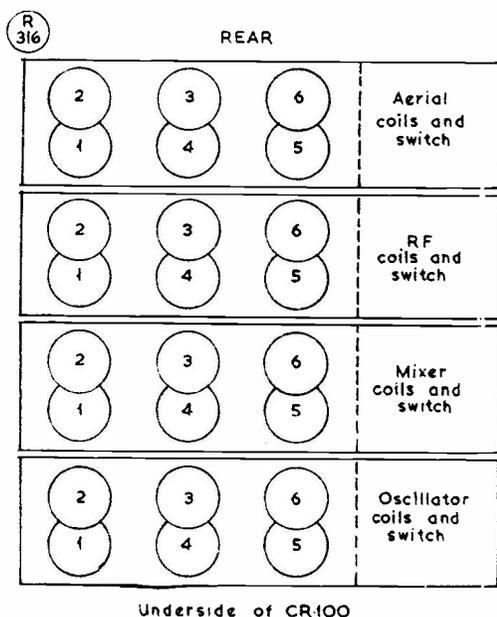


Fig. 4. Locating the coil and switch assembly in the CR-100.

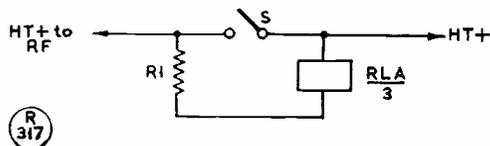


Fig. 5. Change-over relay for the CR-100, operated by the receiver HT when the stand-by switch is opened. With a Type 3000 relay (which can have as many contacts as may be necessary for transmitter switching) the series resistor R1 can be 33/47,000 ohms for a relay coil resistance of 6/7,000 ohms.

decoupling condensers in the RF section should be checked. Faulty capacitors here can cause many troubles, and, if there is *any* doubt, they should be replaced. In passing, it should be mentioned that the CR-100 is very tolerant as regards these suggested improvements and several individual sets have been modified with great success.

### Change-Over Control

The final modification will only interest transmitting operators and concerns the use of the standby switch (off position) for transmitter change-over control. An annoying point about the CR-100 is its lack of contacts on this switch, for changing over the transmitter relay circuits. This difficulty can easily be overcome. The standby switch disconnects the HT+ supply from the receiver front-end, and thus, when the receiver is on "standby-off," the HT+ line for the RF stages is at zero potential with respect to earth. If a 6,500-ohm Post Office relay is connected, in series with a 33,000-ohm resistor, between this line and the HT+ feed to the output stage, it will be energised when the control switch is in the "off" position. The current through the relay is not sufficient to affect the working of the receiver in any way, and contacts on this relay may then be used to control a large transmitter, or the circuits of a low-power, *e.g.*, 160-metre rig, directly. Numbers and types of contacts on the relay may be any to suit individual needs. The circuit is given at Fig. 5.

It is hoped that any or all of these suggested modifications — none of them difficult and all worthwhile — will assist CR-100 users to obtain better results from a basically good set.

### GETTING IT ON SUBSCRIPTION

If there is the slightest difficulty or delay in getting SHORT WAVE MAGAZINE to order through any local newsagent, you can obtain your copy by post each month direct from us: the subscription is 33s., post free, for a year of twelve issues. Orders, with remittance, to: Circulation Dept., *Short Wave Magazine, Ltd.*, 55 Victoria Street, London, S.W.1.

# Converter for Radio Teleprinter Reception

## PART II

### SETTING UP AND ALIGNMENT — GENERAL ADJUSTMENTS — OPERATION AND RESULTS

J. B. TUKE (G3BST)

*The first part of this article, of considerable interest and practical value to those contemplating radio teleprinter operation, appeared in our March issue, which should be referred to for continuity.—Editor.*

THE setting up of the converter may be considered in two separate parts—first the DC signalling part, and second the alignment of the frequency conscious audio amplifiers.

As a first step the three 12AT7's should be removed from their holders so that the circuits operating are restricted to 6AK5 and 6K6's only. Initially, one must ensure that the current through the printer coils is of the correct value, and the same for each direction. If a centre-zero meter is not permanently employed in this position then a test meter having a range 0-50 mA may be wired temporarily in series with the printer coils. The relay tongue should be held by means of a small insulated rod (such as a knitting needle) in the "up" position, the current measured, the relay then held in the down position, the meter terminals reversed and the current again noted. The two figures should not differ from each other by more than 1 or 2 mA, and should be within the range 18-23 mA. If these figures are not obtained then the cathode bias resistors should be adjusted until they are.

The second step is the setting of the relay. While doing this, power should not be applied to the printer motor, but the printer coils should be connected. The cathode bias control of the 6AK5 should be adjusted to a position where the standing current is around 9-10 mA — this will occur about mid-position on the control. The spring tension on the relay should be very carefully adjusted so that the relay is neutrally biased, *i.e.*, the tongue will remain on either stud. The spring tension

should then be *very slightly* increased so that the tongue will always come to rest on the upper stud — but this bias in favour of the upper contact should be as slight as possible. (The object of this adjustment is that in the absence of any signal, the printer coil will receive a continuous *Mark* current, preventing racing.)

On completion of the above, power should be applied to the printer motor, when it will either race or remain at rest. The latter is the correct condition of operation, and if the machine races, it is necessary to reverse the connections from the cathodes of the 6K6's to the teleprinter coils.

The printer should now be checked for operation on "local" by the application of a small positive and negative going voltage obtained from the keyboard as described earlier. The most satisfactory test signal is a repetition of the characters *RY*. Phrases such as "*The quick brown fox jumped over the lazy dog's back 1234567890 times*" will make sure that operation is completely satisfactory. There should of course be no errors whatsoever in the printed copy — providing the operator depresses the correct keys!

### AF Alignment

The 12AT7's should now be plugged in and the AF circuits aligned as follows: A roughly calibrated audio oscillator is needed, and a pair of high resistance telephones.

The telephones should be plugged into the jack used for connection to the top of the diode load — this enables one to hear the signals as applied from the *Mark* and *Space* amplifiers. The three-position switch which will short either diode to earth is turned to the position in which output from the *Space* amplifier is shorted, while that from the *Mark* amplifier remains. If the feedback control of the *Mark* amplifier is now advanced (resistance reduced), the amplifier will eventually break into oscillation which can be heard in the telephones. The correct setting for this control is just *below* the point of oscillation.

The audio oscillator should now be connected to the common grid connection of the 12AT7 (at the output side of the limiter), and its frequency swung around the range 600-700 c/s. When its frequency corresponds to that to which the *Mark* amplifier is tuned, a large volume of sound will appear in the telephones. This frequency should be noted.

The diode switch should now be turned to the position in which the *Mark* amplifier is shorted to earth, and the *Space* amplifier

operates normally. The audio oscillator should be raised in frequency by 800 c/s (or any other desired value of frequency shift), and the three variable resistors forming the bridge-T network of the *Space* amplifier adjusted until maximum output occurs at that frequency. The feedback control should then be advanced to a point just below oscillation, as with the *Mark* amplifier.

The telephones should now be removed from the jack, and the diode switch moved to the "normal" position in which the output of both *Mark* and *Space* amplifiers is effective. If the input from the audio oscillator is now set alternately on the *Mark* and *Space* frequencies, the anode current of the 6AK5 should vary downwards and upwards respectively from the standing figure. The variation should be equal in both directions, provided the audio input from the oscillator is limited to a value producing a change of anode current in the order of plus/minus 5 mA. Beyond this point the characteristic becomes curved and equal variations are not to be expected. As the *Mark* and *Space* tones are applied, one should be able to see the hi-speed relay working, and the printer magnet should follow its movement. If the variations of 6AK5 anode current are not equal, slight alteration of the feedback controls of the two amplifiers will correct this. One must not, however, operate at a setting too near the oscillation point.

There should not be much meter movement as a result of applying audio frequencies other than the *Mark* and *Space* tones. This is deliberate, so as to prevent interfering signals lying between the two frequencies from upsetting printer operation.

### Limiters Adjustment

The final item to adjust is the limiter. It will quickly be apparent that if an increasing signal from the audio oscillator on the *Space* frequency is applied, the 6AK5 anode current will increase in sympathy up to around 20 mA, but beyond this point the application of increased *Space* voltage input will result in a reduction of 6AK5 anode current due to overloading of previous stages. To adjust the limiter correctly, the input voltage on *Space* frequency which is just enough to cause overloading to commence must be measured at the grid of the first 12AT7 — although all that is required is a relative measurement, and not necessarily a definite value in milli-volts. To obtain this, a VTVM or oscilloscope should be connected to the grid of the 12AT7, the

oscillator output voltage steadily increased from zero, and the value noted which results in the 6AK5 anode current no longer increasing in sympathy with the increasing AF voltage. The oscillator should now be connected to the "input" side of the limiter, and its voltage output increased to the maximum possible — several volts if this is practicable. Still keeping the VTVM or 'scope connected as before, the potentiometer feeding the 12AT7's (R4) should be adjusted from zero until the original AF voltage reading is obtained. As a final check, the audio oscillator should now have its output varied from zero to the maximum possible, during which time the anode current of the 6AK5 should steadily increase up to its overload value, after which it should remain steady in spite of increasing the signal applied to the input side of the limiter.

It is absolutely essential that the limiter works properly, otherwise powerful signals from the receiver will intermittently overload the amplifier during *Space*, producing a decrease of 6AK5 anode current instead of an increase, with the result that a *Mark* signal will be applied to the printer in place of a *Space* — a clearly hopeless situation.

### Sensing the Tone

No mention so far has been made of the "Normal/Reverse" keying switch, which provides for reversing the connections between the 6K6's and the printer coils.

With the converter aligned in accordance with the above instructions, the lower frequency of the two tones from the receiver results in a decrease of 6AK5 anode current, movement of the relay tongue to the upper stud and an application of a *Mark* current to the printer coils, while the higher frequency tone produces increased 6AK5 anode current and a consequent *Space* current in the printer coils. This arrangement is deliberate, because on any teleprinter circuit which is not carrying continuous automatic traffic, there is bound to be much more *Mark* transmission than *Space*, and it is in the interests of long life that the dissipation of the 6AK5 is kept as low as possible. However, this arrangement does mean that the BFO in the receiver must be adjusted on the correct side of the signal so that the *Mark* frequency is always the lower of the two tones produced by the FSK signal. This may not always be convenient — perhaps one has carefully adjusted the receiver on a weak signal and it is disappointing to find the printer garbling just because one has inad-

vertently chosen the wrong side of the signal (and there is no definite standard laid down as to whether upper or lower radio frequency is Mark or Space, both systems being used in commercial practice), or perhaps QRM conditions are such that one side of the signal is jammed up badly while the other side can be copied in the clear — and the clear side is the wrong one! Under such conditions it is very useful to be able effectively to transpose the *Mark* and *Space* signals — and this can be done simply by using the Normal/Reverse switch. If one is copying commercial automatic traffic for test purposes, then there is no disadvantage in running the converter permanently in this manner, but it must be remembered that if the transmitter should run idle for any length of time (as is likely to be the case with amateur transmissions), then the 6AK5 anode dissipation will be rather above the normal ratings. It must be added that in practice this seems to be of little importance, since the writer's converter has idled for considerable periods of time in the reverse condition without any ill effects, but it is only right to point out that anode ratings are being exceeded under these conditions. If the signal being received should go off the air completely while the converter is being used in the "reverse" position a permanent *Space* current will be applied to the printer which will then race, in which case the switch must be returned to Normal.

Returning to the subject of alignment of the AF amplifiers, those who have an oscilloscope will be able to improve slightly on the method outlined earlier — although the simple alignment procedure can be relied upon to give perfectly satisfactory results.

It will quickly become evident to anyone handling the converter that the more the negative-feedback controls are advanced, the more selective becomes the converter and it is not difficult to reach an adjustment point where signals 100 c/s either side of *Space* or *Mark* tones produce little or no change in 6AK5 anode current from the standing value. This means that interference in between the two frequencies being used will not upset printer operation, and this would therefore seem to be a highly desirable condition — but unfortunately it is not quite as simple as that! If the feedback controls are advanced *just* below the point of oscillation it will be found that the circuits start to "ring" — which is really another way of saying that the transition from *Mark* to *Space* is being delayed. This effect can be seen quite easily on a 'scope if the

Y-input is connected to the common diode load, the time base set to around 40 mS, and an auto transmission with the correct frequency shift tuned in. Ignoring the effect on the printer for the moment, advancing the feedback controls will be seen to cause the almost vertical transition from *Mark* to *Space* condition to become sloping. The waveform on the face of the 'scope will be of a transient nature unless a triggered time base is used, but the effect is quite plainly visible. At this point telegraph-distortion is being introduced, a state of affairs which is most undesirable. Watching the 'scope, the feedback controls should be backed off to a point where the transition from *Mark* to *Space* is for all practical purposes vertical. If a triggered 'scope is in use, resulting in a stable picture on the tube, the time taken for transition from *Mark* to *Space* should not exceed 2 mS, *i.e.*, 10% distortion, and if possible should be kept below this figure. While alignment by ear produces quite satisfactory results, the extra check with the 'scope is both well worth while and very instructive. The converter can be adjusted to have the highest possible selectivity consistent with low distortion.

On-the-air tests will quickly reveal the high selectivity of the converter. It is, of course, essential that the frequency shift of the transmitter be identical to that for which the converter is aligned. It would appear that 800 c/s is a standard likely to be adopted for amateur use, and it is fortunate that this figure is the same as, or very close to, that used for most HF commercial transmissions. The high selectivity of the converter does have the disadvantage that the receiver in use must not suffer from drift — however, in the congestion on the amateur bands, receivers suffering from this complaint are of little use anyway!

### Printing Off

Possession of RTTY receiving equipment of this type will enable one to copy large numbers of commercial transmissions and great care must be taken to observe the licence regulations. There are numerous RTTY press broadcasts to which one may legitimately tune in, but it is obvious that in testing the equipment, or while searching for broadcasts, one is likely to intercept non-public traffic. Any copy of such signals must immediately be destroyed, in order to observe the rules about "secrecy of correspondence." The writer is of the opinion that this is of the utmost importance, and that any breaches of the security regulations might well place the whole

amateur RTTY system in jeopardy.

When copying commercial broadcasts for test purposes, it must be borne in mind that the Teleprinter Type 3 (G.P.O.), which most amateurs interested in RTTY now possess, is not strictly compatible with the page-copy machine normally used in commercial service. Particularly is this so, with regard to Letter Shift and Figure Shift. If meteorological broadcasts are copied, it will be found that the first group of each line of figures will be printed in figures, while the rest of the groups in that line will appear as letters. This is because the "space-bar" character sent after the first figure group actuates the "Letter-shift" of the Type 3 machine, resulting in all the rest of the groups appearing in letters. At the end of the line, the characters "Carriage-Return, Line-Feed, Figures-Shift" are sent, resulting in the next group appearing correctly in figures. There are other, less serious

incompatibilities, and these should be borne in mind before one decides whether the printer is printing correctly or not. Finally quite a number of commercial transmissions are made at a speed of 45.5 bauds, so do not be surprised if you cannot resolve every transmission you hear.

You will find large numbers of commercial transmissions running test messages for hours on end — such as RYRYRYRY, or repetitive messages about the cavortings of quick brown foxes over lazy dogs' backs, or mermaids in the sea. These are not such a waste of frequency as they appear to be. Commercial circuits must be kept open for immediate use, and the only way to be certain that an RTTY link is satisfactory, is to use it! This will quickly be agreed by any amateur who first starts "messing about" with this very interesting and highly efficient method of communication.

#### SPECIALISED AMATEUR FORMATIONS

In addition to the very many local Club groups up and down the country, there are a number of specialised formations with membership open (subject to their particular rules and conditions) to radio amateurs at large. Following is a listing of these special-activity organisations:

Amateur Radio Mobile Society (*A.R.M.S.*): For U.K. amateurs who are licensed for mobile operation. Apply: G. E. Storey, G3HTC, hon. secretary, A.R.M.S., 10 Avon Road, Sunbury-on-Thames, Middlesex.

Army Wireless Reserve Squadron (*A.W.R.S.*): Now known as 404 Signal Squadron AER (Press Communications); is an Army Reserve formation recruited largely from radio amateurs, who are trained as operators and technicians on Army equipment. Details from: Capt. J. A. Bladon, R.Sigs., G3FDU, 28 Jack Lane, Davenham, Northwich, Cheshire.

British Amateur Radio Teleprinter Group (*B.A.R.T.G.*): Publishes its own regular newsletter. Hon. secretary: A. C. Gee, G2UK, East Keal, Romany Road, Oulton Broad, Suffolk.

British Amateur Television Club (*B.A.T.C.*): For those interested in amateur TV transmission; membership about 600; publishes *CQ-TV* quarterly. Hon. secretary: D. S. Reid, M.A., 149 Ongar Road, Brentwood, Essex.

First-Class Operators' Club (*F.O.C.*): Membership about 340, open only to nominated amateurs licensed for not less than three years. Publishes monthly circular. Hon. secretary: L. Belger, G3JLB, 103 Whitehill Road, Gravesend, Kent.

International Ham-Hop Club (*I.H.H.C.*): Hospitality and holiday organisation for visiting or touring members who are radio amateurs; membership about 220, in several countries. Publishes *Ham-Hop News* quarterly. Hon. secretary: G. A.

Partridge, G3CED, 17 Ethel Road, Broadstairs, Kent.

Royal Air Force Amateur Radio Society (*R.A.F.A.R.S.*): Membership drawn from all ranks of the Royal Air Force, past and present; now in its 21st year, and has Air Ministry recognition and support; operates G8FC on the amateur bands. Publishes *QRV* twice a year. Apply: Hon Secretary, R.A.F. Amateur Radio Society, R.A.F. Station Locking, Weston-s-Mare, Somerset.

Royal Navy Amateur Radio Society: In process of formation; membership to be drawn from all ranks of the Royal Navy, past and present. Apply: R/S M. J. Matthews, R.N., G3JFF, Petty Officers' Mess, H.M.S. *Ganges*, Shotley, Suffolk.

Royal Naval Reserve, Radio Communication Branch. Reserve organisation for the Royal Navy, offering spare-time training facilities for communication ratings. Apply: Staff Communication Officer, Office of Admiral Commanding Reserves, Queen Anne's Mansions, London, S.W.1.

#### THE CONSTRUCTION COMPETITION

The rules and conditions under which we are offering prize-cheques of £25 in each of five different categories of home-constructed amateur-band equipment were given in full on p.485 of the January, 1960 issue of *SHORT WAVE MAGAZINE*, with a note extending the classes to Transistor and Mobile on p.520 of the February issue. The closing date for the receipt of manuscripts is April 15—but as this happens to be Good Friday, it would be as well to get them in before then.

#### HEATHKIT SHOW AND DEMONSTRATION

To coincide with the period of the Audio Fair, April 21-24, a full range of British Heathkit equipment will be shown and demonstrated at the Grand Hotel, Southampton Row, London, W.C.1 (near Russell Square). Readers will find much to interest them at this exhibition.

# CW Transmitter for Top Band

## CIRCUIT DETAILS FOR THE BEGINNER

Those radio amateurs who are without practical knowledge or experience of some particular band or operational activity at their time of licensing, *e.g.*, VHF or DX working, usually start up on Top Band — and they could hardly do better. With the light evenings coming along, plenty of U.K. contacts will be possible under minimum-QRM conditions so far as Coast stations are concerned. Apart from that, the 160-metre band always has been a happy hunting-ground at week-ends, when it carries its greatest volume of amateur traffic, the advantage being that due to the normal power and natural daylight range restrictions, local contacts can go on in all parts of the country with mutual interference (between AT stations) at a minimum — indeed, there are literally layers of local nets on any one frequency, with operators in a particular net aware only of comparatively slight heterodynes

on the loud locals they are working.

Thus, for the absolute beginner on the air, 160 metres is just about the ideal band on which to start up. The gear is easy to get going and it will bring over-the-air contact with most of the locals.

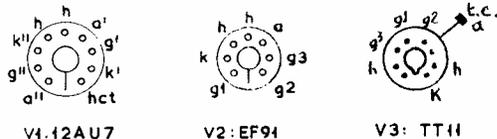
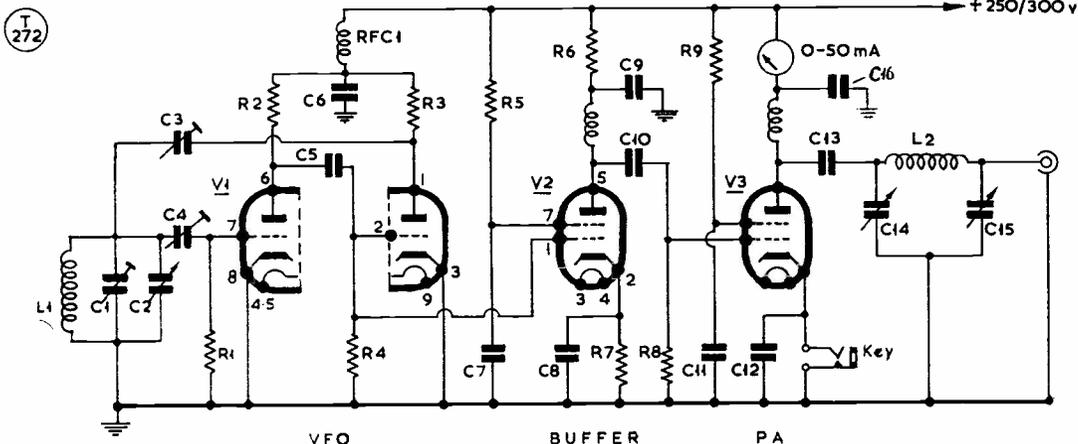
### CW Tx Circuit

The circuit shown here is of a CW transmitter — the phone side can come later; remember, we are thinking of the beginner — designed by G3NRX and shown, with some notes, in the North Kent Radio Society's "Newsletter." It is a three-stage job, starting

### Table of Values

Circuit of the Top Band CW Transmitter

C1 = 250 $\mu$ F, pre-set	R2, R3 = 47,000 ohms, 1w.
C2 = 50-60 $\mu$ F	R5, R6,
C3, C4 = 5 $\mu$ F Philips concentric trimmer	R8, R9 = 13,000 ohms, 1w.
C5, C10 = 100 $\mu$ F	R7 = 330 ohms, 1w.
C6, C7,	RFC1 = 2.5 mH
C8, C11,	RFC2 = 1.5 mH
C12 = .01 $\mu$ F	RFC3 = 2.5 mH
C9, C16 = .001 $\mu$ F	L1 = 30 $\mu$ H, 30t. 24g. en am. close wound on 1½-in. dia. former, ¾-in. long
C13 = .002 $\mu$ F, 600v. wkng (or rated twice HT), mica	L2 = 50t. 22g. enam. on 1½-in. dia. former
C14 = 50 $\mu$ F, BC type	V1 = 12AU7
C15 = .001 $\mu$ F, or 500 $\mu$ F, 500 $\mu$ F, BC twin gang	V2 = EF91 (EF50, SP61)
R1, R4 = 100,000 ohms, ½w.	V3 = TT11 (807)



Circuit of the 160-metre CW transmitter discussed in the text. The oscillator is the highly stable Franklin, which is a transatron type, with feed-back controlled by the small capacities C3, C4; once set to give a T9x beat with immediate pick-up, they should not require touching. There are various ways in which this transmitter can be built, apart from that suggested in the article. The form adopted by its designer, G3NRX, was a chassis 12 ins. by 7 ins. by 2½ ins. deep, fronted by a panel 7½ ins. high.  
 (Note: In this circuit, the winding in V2 anode is RFC2, and in V3 below meter RFC3.)

with the highly stable Franklin version of the transitron oscillator, the two halves being combined in a single twin-triode, V1. Though the Franklin gives a very good VFO result, its RF output is not sufficient to drive the PA direct, and a buffer stage V2 is used as the PA driver — this is in any event the right approach to transmitter design, as the VFO should always be isolated by a buffer stage. The PA, using a TT11 (a small transmitting type now in the “surplus” category) runs the full 10 watts with any available HT supply capable of giving 300v. or so at about 50-60 mA.

Valves actually used in the G3NRX version of the circuit are 12AU7-EF91-TT11. They could be substituted by other similar types, such as EF50 or SP61 for V2, and an 807 for the PA if a TT11 is not conveniently obtainable.

With PA cathode keying, as shown in the circuit, the locals will probably report a spacer, but this should not be evident at any great distance. The spacer could be eliminated by keying the cathode of V2, in which case the PA would have to be biased off to hold the plate current down under key-up conditions; this could be achieved by a resistor in the PA cathode lead sufficient to give a small (10-15 mA) standing current in the PA on key-up. Alternatively, the screens of V2, V3 could be taken through the key, with a small amount of cathode bias on the PA. These different methods of keying should in any case be tried for their experimental interest, the aim being to get a clean, sharp note with the minimum of, or a non-existent, spacer.

### Construction

For a beginner transmitter, the in-line layout on a box chassis is the simplest and, in the end, the best, as it enables the circuitry to be got at easily. The valves should be placed to allow enough, but not too much, room between them for getting in the inter-stage components, with the PA tank connections kept short and direct. As both the TT11 and 807 have anode top-caps, RFC3, C13, C14, C15 and L2 should be grouped above chassis and near the PA valve. The meter (which could just as well be in the cathode of the PA, where it will read grid current as well as screen and plate) can be mounted on a bracket on the chassis edge. The only complication is that if the meter is kept in the PA cathode, it will not be possible to determine the plate input with accuracy because the PA screen current (not to be taken into the plate input calculation) will have to be allowed for in the meter reading.

Hence, a tidy way of wiring in the meter is to mount three jacks on the chassis front drop, one for PA plate current, one for the screen, and the third for grid current, remembering to wire the latter the “other way round” as the bottom end of R8 is positive. Then, with a short plug-lead on the meter, readings can be taken as required.

Since the circuitry round V1 determines the stability of the whole transmitter, it should be solidly constructed and kept in the chassis sub-space; C2 is for VFO swing and if the condenser used is small enough it, too, can go in the sub-space. Alternatively, if a slow-motion drive is thought necessary, C2 can be mounted above chassis, with the shortest possible leads to L1, placed immediately underneath it and in the sub-space. With a small condenser and dial for C2, mounted sub-chassis, slow motion could also be arranged by a friction drive on the dial edge. These are points of individual preference, and depend upon the form of construction adopted, the condensers available and whether C2 is to have slow-motion control for accurate frequency shift. Provided the main requirements of solid construction, short leads and screening from the rest of the circuit are met, the actual layout is a matter of choice.

A power supply socket or terminal strip should be provided somewhere on the chassis, and an earth terminal (so much better than using a crocodile clip hanging on a bolt head) with a separately placed insulated terminal for the aerial connection.

### Setting Up

Here, the main point is the adjustment of the feed-back condensers C3, C4, the setting being that which, with minimum capacity, gives a stable T9x note, checked by listening to the beat on the receiver tuned to Top Band. With a value of 30  $\mu$ H for L1, condenser C1 should be pre-set such that C2 gives coverage of the band. This is best done by putting the receiver on about 1900 kc and then, with C2 at half-mesh, adjusting C1 to bring the VFO beat on to the receiver; the swing of C2 should then cover the 1800-2000 kc of the band.

There is nothing to tune or adjust in the buffer stage — it should just “buff” and give between 1 and 2 mA of drive through R8.

This point should be reached *without* HT on the PA, which has now to be set up. Put C15 to maximum capacity and then, applying HT, rotate C14 quickly to find minimum plate current reading, which will be the maximum dip; a loop lamp presented to L2 should glow

brightly. Next, connect the aerial, and work C15 towards minimum capacity against C14 until minimum plate current reading (or maximum dip) is about 30 mA if the HT is around 300v. In other words, use C15 to draw plate current and C14 to resonate on dip, up to the settings which give a minimum plate current of 30 mA or so.

By this time, the transmitter will be radiating on frequency, and a check on the receiver, or CW monitor, should show the note to be clean, sharp and absolutely T9. It is at this point, after a few reports from local stations, that the key position experiments mentioned earlier can be carried out.

### Aerial Feed

With aerials up to about 150 feet in length, the C14, L2, C15 combination should come to resonance without difficulty. As the length increases from 150 to 260 feet, the feed point impedance will rise rapidly, and it may be difficult to load the PA properly. The solution is to go over to current-feed for the aerial (if a 265ft. roof length is practicable) or to feed from the transmitter into an aerial tuning unit, link coupled to the PA; this ATU can consist of an inductance of about the size of the PA tank coil, with series and parallel tuning to bring the system to resonance against ground.

In most beginner cases, however, the aerial will be something up to 100 feet long, and it can be tuned by connection direct to L2, as already described. And don't forget that for best results, particularly on 160 metres, a really good earth is essential.

### NEW RADIOTELEPHONY SERVICE FOR OCEAN LINERS

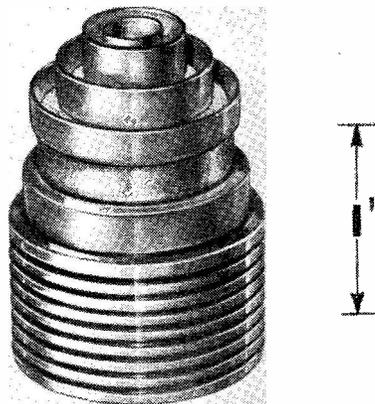
At Land's End Radio, GLD, equipment has been installed to provide three radio telephone channels for a new service to passenger liners. Initially, the equipment will give fully-duplex working using amplitude modulated double-sideband (AM-DSB) signals, occupying approximately half the bandwidth per channel necessary for double-sideband operation. Alternatively, the transmitters cater for independent sideband (ISB) working to provide two simultaneous telephony channels, one above and one below the carrier frequency. Each transmitter is set up for use on a specific frequency but can be operated on one other frequency. The three transmitters thus provide a reserve for each other so that should there be a failure on any channel the remaining equipment can be used to the best advantage. The transmitters are Redifon Type G.423, providing a power output of 1.5 kW p.e.p.

The fixed-tune, crystal-controlled receivers are Redifon Type R.151. As with the transmitters, they

are equipped to provide a reserve for each other. Each channel has its own voice-operated terminal unit for duplex working and is equipped for speech privacy ("scrambler") which can be switched in as desired. The pass-band of the receivers is wide enough to accept, without deterioration, signals from ships' transmitters operating within their allocated frequency tolerance. Redifon Type RA.10 adaptors are being provided for use with these receivers which will then be suitable for SSB or ISB as well as DSB reception.

All the radio and audio frequency apparatus is installed in an unattended outbuilding. A control panel at each telephony operating console in the main station enables the operator to select channels and provides all the switching, monitoring and call-timing facilities essential to handling calls extended into the inland telephone network.

A new type of transmitting aerial has been installed because land at a Coast Station site has to be more economically used as the number of services operated from the station increases. This aerial has a broadband characteristic over approximately the range of Coast Station radiotelephony frequencies in the MF band, 1.6-2.5 mc. The output of the three transmitters are fed via 75 ohm coaxial cables to a series of combining filters which also serve to isolate the transmitters from each other. The three combined transmissions are then fed over a single 75 ohm coaxial cable to a matching unit at the base of the main aerial.



RCA-7457

This is the new RCA 7457, suitable for use at frequencies up to 2,000 mc (15 cm) and capable of taking 180w. CW input at 1215 mc. It is a forced-air cooled beam tetrode designed for incorporation in coaxial or parallel-line circuits, rated at 6.3v. 3 amp. on the heater and 1,000v. on the plate; in continuous operation at 1215 mc it will give 40w. RF output for 5w. of grid drive with 900v. HT. The maximum plate dissipation is 115w. CCS (Continuous Commercial Service).

## SENSE ABOUT POWER PACKS

### DESIGN POINTS FOR AMATEUR CONSTRUCTORS

**P**ROBABLY as much from habit as anything else, it is usual for a smoothing choke to be included in almost any power supply unit constructed by an amateur. But a little thought on the subject will show that there are many cases where the omission of such a choke will do more good than harm.

No one will argue about the real necessity of having a smoothing choke, of fairly high inductance, in the HT supply to a receiver, an exciter unit, or a modulator pre-amplifier. In all these, a very low hum level is essential, and it is not uncommon to find two smoothing chokes. However, it has to be remembered that the direct current is comparatively steady and the smoothing choke is working under the conditions for which it was designed—to carry a *steady* direct current and to offer a high impedance to any variations in the current flow.

#### Cause and Effect

Now, when supplying the power amplifier of a CW transmitter, or the output valves of a modulator working other than in Class-A, the current varies violently and then the smoothing choke cannot do its original job properly. Surges are set up and their existence can often be seen by the peculiar unsteadiness in the glow of mercury vapour rectifier valves or perhaps in a neon stabiliser, whilst a moving coil voltmeter will show kicks over and above those caused only by the normal change in voltage due to regulation of the power unit. With a CW transmitter, that kick may be the cause of a chirp, click or tail on the keying which is known to exist but which has defied all efforts to eradicate.

The effect may not be so noticeable in the case of a modulator, but it is still there and is probably affecting stability, power output and quality.

#### Supplies for CW Transmitters

The note quality of a CW signal (and also the amount of hum in a telephony carrier, not due to the modulating equipment) is nearly always dependent on the purity of the DC supply to the *exciter* stages and on the voltage regulation of this supply. On all counts, it is better to use a separate power unit for the purpose, keeping the current flow as steady as possible. Some variation is unavoidable when a valve in the chain is keyed and, for preference, this stage should be the last before the PA.

There should be *no need at all* for a smoothing choke in the power supply feeding the PA stage itself, and it is immaterial whether the latter is single-ended or push-pull. Without the choke, the regulation is improved and a slightly greater output voltage will be available. The only exception to this rule is where the rectifiers are mercury-vapour type,

when it is necessary to use a swinging choke.

On hard-rectifier power packs supplying PA or modulator alone, the effect of the argument can be tested simply by shorting out the smoothing choke. Careful analysis of the RF beat, either CW or unmodulated carrier, will show that if there is any difference, it is an improvement rather than the reverse.

#### Modulator Power Supply

The same argument applies. Early stages must, of course, have a fully smoothed pure DC supply and again a separate HT unit should be provided for these low-voltage stages; in the ordinary way, voltages of 250-300v. will be required, and this should *not* be obtained by tapping down on a heavy-duty resistor across an HV supply. Another point to bear in mind here is that, with tetrode or pentode valves in the output stage, a separate steady screen voltage for them is desirable, and this can be taken from the LV pack feeding the early stages in the modulator.

From this we see that the HT anode power for the modulators can be provided to suit the requirement. There will be no amplification of any slight hum content in this supply, while if the modulator valves are in push-pull and truly balanced, the hum will, in any case, cancel out in the secondary of the modulation transformer. A third point is that an ordinary commercial modulation transformer is not designed for quality reproduction, and the response falls off quite a lot at 100 cycles, which is the usual hum frequency.

For these reasons, the smoothing can be elementary and a smoothing choke is certainly a "passenger." Providing the rectifier valve is not being run at or near its limits, the swinging choke can also be dispensed with and the circuit then becomes as in Fig. 2—and anything much simpler can hardly be devised. But it must be remembered that the voltage across the condenser will be higher than when chokes are included, which is good if the increase is acceptable, as it will result in greater power output—or, alternatively, the same power output but with a lower degree of distortion. Otherwise, steps must be taken to reduce the voltage, and one simple way possible in many cases (presuming the main transformer is supplying DC only as shown) is to move the primary tap up, say, from the 230-volt position to the 250-volt one.

The simple circuit of Fig. 2 will be found to have excellent regulation.

#### Value of Smoothing Condenser

In the applications envisaged, the combined capacity of C1 and C2 in Fig. 1, or the capacity of C1 in Fig. 2, will probably reduce the ripple voltage to a low enough figure. If not, some additional capacity may be placed in parallel, and this is desirable, anyway, if a swinging choke is used, or if comparatively low-value condensers—say 2 or 4  $\mu\text{F}$ —were previously employed. A maximum of 8  $\mu\text{F}$  will generally suffice, since otherwise the peak current rating of the rectifier valve may be exceeded, although only during deep modulation or key-down periods.

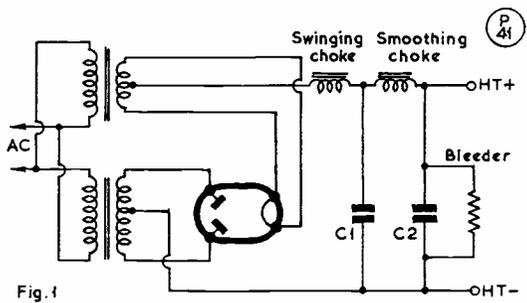


Fig. 1

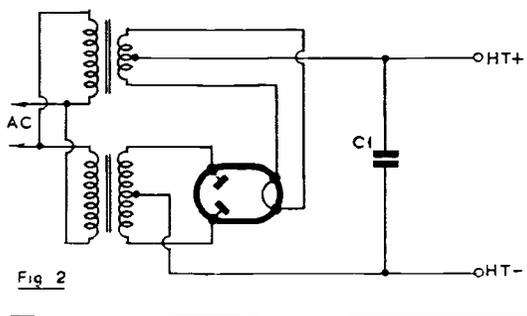


Fig. 2

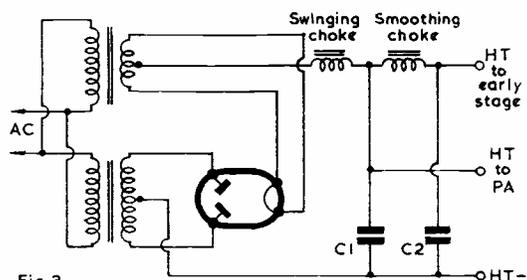


Fig. 3

The power supply circuits discussed in the text. For PA and modulator stages alone, Fig. 2 is entirely satisfactory. Fig. 3 shows an acceptable arrangement for obtaining different voltages off the same pack. In each case, the condensers should be paralleled by discharging resistors

The valve manufacturers generally give information on this point and their advice should be followed.

### AC Impedance of a Power Unit

When a power unit of poor regulation is delivering a varying DC current, it means that quite an appreciable AC impedance is introduced, and this can reflect back on the load. If this load is one stage only—the power output one—the ill-effects will be a reduction of power output and possibly a slight deterioration in quality, both of which may not be readily apparent. But if several stages are being supplied from this one source, the common impedance may easily cause instability which it will be found difficult to get rid of without extensive decoupling. Any improvement in the regulation reduces this AC impedance and pays dividends, hence the suggestions

made earlier towards this end.

The AC impedance of a power unit is not one to be measured directly, and the method adopted is to take the voltages and currents at the lower and upper limits. In the typical case of an amplifier/modulator using a pair of 807 valves, a power unit may, in the quiescent state, deliver 50 mA at 500 volts. At maximum output, the current may well be 200 mA with the voltage dropping to 400. The difference in voltage is 100, in current 150, equal to a resistance/impedance of 666 ohms, which is undesirably high. Modifying in the manner described will quite likely result in figures like 520 volts, 50 mA off load, 470 volts, 200 mA on load, and the AC impedance is then reduced to half its original value.

### Combined Power Unit

Some readers may well say "All very fine, this idea of a separate unit, but what if, for one reason or another, such an arrangement is impracticable?" The answer is to modify the existing power unit as shown in Fig. 3, so that two separate arms are formed, branching off close to the rectifier valve, and each filtered in a way to suit the load. This really amounts to decoupling *at the source*, and it may well remove difficulties caused by inadequate decoupling elsewhere. Cost and weight may also be reduced, since the smoothing choke can be smaller and lighter than if it had to carry the full current of the load.

### Parallel Resistor

When a swinging choke is included, about 10% of the full load current must flow under no-load conditions, else the regulation will suffer. In the case of a modulator, this minimum current is provided by the standing current taken by the output valves, but in CW work, a heavy-duty bleeder resistor (the value can be worked out by Ohm's Law) should be included as shown in Fig. 1. In *all* cases, it is a useful precaution to place in parallel a resistor of between 100,000 and 200,000 ohms, of suitable wattage rating, to ensure the discharge of the smoothing condenser when switching off. Any such resistor should be on the valve side of the smoothing choke and not on the load side.

### BOYS' CLUB STATION

The first Boys' Club in the U.K. to have its own AT station on the air is the Springfield, at 10A Big Hill, Mount Pleasant Lane, Clapton, London, E.5, their callsign being G3NHS. The on-the-air inauguration took place on March 4. It is hoped to maintain a full programme of Amateur Radio activity.

### JAPANESE AMATEUR ACTIVITY

It is reported that there are now nearly 6,000 licensed Japanese amateurs, of whom no less than 140 are YL's. At the last licence examination, on the same lines as our R.A.E., 70% of more than 100 girls taking it passed. The youngest was Noriko Sudo, of Tokyo, now JAICYA, who had reached the ripe old age of 14 when she qualified.

# Electronic Change-Over System

AUTOMATIC SEND-RECEIVE  
ACTUATED BY RECTIFIED  
RF

**F**ULL break-in working, with an instant change-over from the transmit to the receive condition, is the aim of the keen CW operator. The requirement is for a simple method of changing the aerial from the transmitter to the receiver *at keying speed* without having a relay clattering in and out in time with the key. It is also desirable that the same aerial and, if possible, the same aerial tuning unit, be used for both transmission and reception. The "box" described here allows both of these conditions to be met, the action being instantaneous.

Fig. 1 shows a typical arrangement of a transmitter connected to its tuning unit by means of a coax link. The receiver is connected in parallel with the transmitter, a switch S1 being opened during transmission, thus preventing RF from pumping into the receiver. The fact that the PA is in parallel with the receiver when listening is of no consequence because, although a certain amount of random noise may emanate from the PA stage, in practice this has not been found to be troublesome. An increase in the amount of PA bias will eliminate the trouble entirely. In any event, if the transmitter is not absolutely dead on key-up, there is something wrong with it, and this system will not work anyway. The switch S1 usually consists of a single pole relay which, like most things mechanical, is liable to give more trouble than its electronic counterpart.

## Operation of the Circuit

Fig. 2 shows the complete circuit of the electronic relay and the associated diode rectifier unit. The relay consists of a triode grounded-grid stage, the grid of which is at earth potential to RF through C1. A 2-megohm resistor R1 provides a load for a high value of negative bias which will appear as soon as transmission commences. During reception the stage acts as a low-noise amplifier of inherent stability, the output appearing across RFC. This anode load will provide a useful amount of gain on the LF amateur bands, but if the performance of the receiver

on 14 mc and above leaves something to be desired, then a tuned circuit covering the HF bands may be inserted between the choke and the valve anode. This arrangement will realise a *considerable increase* in the signal-to-noise ratio and will also improve the image ratio. R2 and C2 serve to bias the valve, and it will be noticed that the plate current return for the control valve is through the link coils of the coax line.

As soon as the transmitter output appears, about 200 volts of bias is applied to the triode grid and the gain of the stage falls to zero. The grounded grid forms an effective shield between the coax line to the aerial and the receiver input circuit, thus isolating it from the transmitter output. Stray coupling will allow a certain amount of signal voltage to appear at the receiver input but this will certainly be a lot less than would result from a separate receiving aerial not being switched out on "send"; the usual blocking bias will prevent heavy overloading of the receiver.

The DC bias for the triode grid is obtained from the diode D1, which is built in to the transmitter PA compartment. It will be seen that the diode is across the PA tank circuit and as soon as the stage operates the diode anode will rapidly take on a negative voltage equal to the peak value of the RF waveform. As this will be in the order of 80% of the transmitter HT it will be quite sufficient to cut off the triode stage; R3 and C3 form a simple filter to ensure that only DC is allowed to leave the transmitter, whilst R4 serves as the diode load.

In the sequence of operation, C4 is a vital item and must have a working voltage of four times the HT if anode modulation is used. If the plate of the PA runs at more than say, 500 volts, it would be advisable to "tap down" the diode connection so that only a part of the RF voltage is rectified, otherwise an excessive DC voltage will be developed at the diode anode. All the diode components can be mounted on the diode valveholder so that

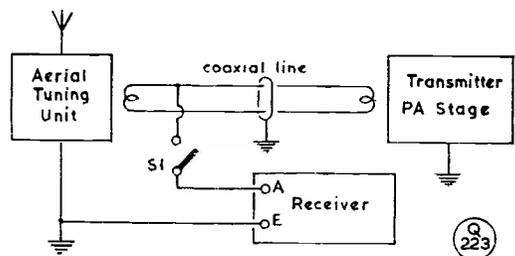


Fig. 1. At many stations, the transmitter-receiver-aerial tuning unit interconnection is as shown here, with the switch to isolate the receiver on "send."

**Table of Values**

Fig. 2. Circuit of the Electronic Switch

C1, C2,	R1 = 2 megohms
C3, C5,	R2 = 150 ohms
C6 = .001 $\mu$ F	R3, R4 = 100,000 ohms
C4 = 50 $\mu$ F	R5 = 10,000 ohms

installation is a simple matter. One unit for each transmitter in use will be necessary.

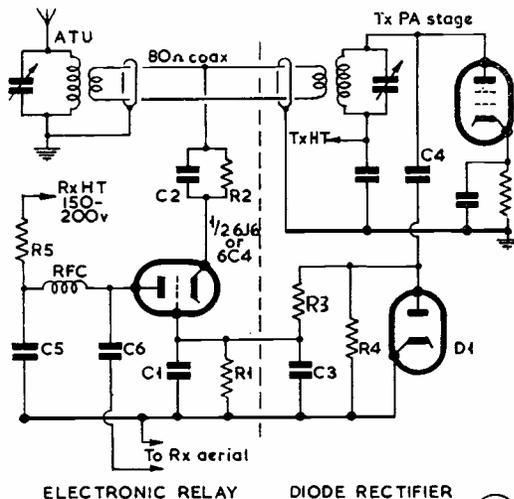
**Application**

The electronic relay side of the device derives its HT and LT supplies from the receiver and is permanently connected to it, being mounted on the rear of the receiver cabinet. It comes into operation as an amplifier whether the transmitter is alive or not. The coax line from the ATU passes straight through the relay chassis, a small section of the cable being opened up to permit the connection of C2 and R2 to the centre conductor.

**Results**

There are no adjustments necessary and no snags have been encountered during some years of operation with a low power transmitter on the LF bands. Heater chokes are not needed on these bands but may improve performance above 14 mc. If most operation is on the HF bands it is advisable to make sure that the length of coax from the relay chassis to the transmitter is short compared with a quarter-wavelength, otherwise trouble may occur due to the mis-match which exists when the transmitter is not in operation.

It should be added that the principles discussed here have not been applied to a high-powered (150-watt) transmitter, so that with



ELECTRONIC RELAY      DIODE RECTIFIER

Q 224

Fig. 2. Circuit to meet the requirement of Fig. 1 automatically. A small amount of RF taken off the tank and rectified by D1 cuts off the triode section and thus isolates the receiver when the key is down; perfect listening-through for BK working should be achieved without noise in the receiver. With high power, the diode can be tapped down the tank coil. It should be noted that this switch — which, of course, works in the same way for AM phone change-over — may not give complete receiver isolation with a high-power transmitter unless special precautions are taken.

PA's running at more than about 50 watts input (with which it has been tested) the method should be tried with due caution. With a QRO transmitter, the problems would be stray RF coupling into the receiver and the necessity to use much less coupling between PA tank and diode rectifier. Being RF operated, the system works just as well on phone.

**KEEPING A CHECK ON NUCLEAR RADIATION**

Looking like a white-painted bomb pointing skyward, 30 inches high and 9 inches in diameter, the Gammagraph, Model 65A, developed and manufactured by Electronic Instruments, Ltd., Richmond, Surrey, makes accurate and continuous measurement of gamma radiation in or out of doors. The instrument is ruggedly constructed and, except for one valve, fully transistorised. The measurements are continuously recorded.

Powered by a car battery and fully weather proofed, the total consumption is only half-a-watt, giving one month's operation from a 12v. 40 amp. hour battery. The Gammagraph is easily portable by car or van, and will enable meteorological stations and local authorities, which regularly gather weather information, to check on gamma or background radiation as simply as they have recorded temperature, barometric pressure, rainfall and hours of sunshine.

**CAPT. G. T. SMITH-CLARKE — G4RK**

It is with deep regret that we record the death, at the age of 75, of George Thomas Smith-Clarke, G4RK, of Coventry, a distinguished Midlands engineer, who was with Alvis, Ltd. for many years as chief engineer and works director; he was responsible for that famous firm's output of high-grade cars and aero-engines. Interested in all branches of engineering, he had a fine workshop of his own, in which he designed and built prototype electro-medical apparatus such as an angio-cardioscope for X-ray examination of the heart and a much-improved form of iron-lung; he also developed mechanism for the control of large telescopes. This work gained him international recognition. Licensed just before the last war, he had a fine station, largely home-built, and was fairly active on the air in his later years. G4RK's main interest, however, was in local hospital work, and he was chairman of the Coventry Hospitals Group Management Committee.

# DX COMMENTARY

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

**I**N appreciation of some of the complimentary remarks about "This Column," your commentator would like to return a few compliments, and to thank readers for the infinite variety of news, views, gossip and even pet-hates that come pouring in every month.

As we have said many times before, this is *your* feature; all we do is to get things into shape. But neither the news nor the views originate here at the Commentary Desk; all we aspire to do is to add a few remarks on occasions, which can either clear up some small matter—or add a certain amount of confusion to something that is already complicated.

The Contest discussion continues, but we have tactfully relegated it to the end of the Commentary, indicating (we hope) that it is on its way out. The DX Gossip increases in volume all the time. The Top Band and LF-bands news also seems to be on the increase, as one might expect.

The amount of compression all this entails rather depresses us at times; one would like to present readers, just for once, with an uncondensed reproduction of all the letters received—but that would fill the entire *Magazine*, to the exclusion of all else.

So, things being as they are, we must apologise if your long letter has shrunk down to a couple of lines in print; but please write again and be assured that all letters are greatly appreciated.

## DX Gossip

Rumour had it that OK7HZ would be on from Yemen, 4W1; now we gather that this one is *not* on . . . K6CQV/KS6 was to be on from Samoa at about the time of



G3L GK

## CALLS HEARD, WORKED and QSL'd

writing . . . Easter Island may be showing up again, a 500-watt job having been shipped over for the use of CEØAC.

New SSB emanations, either on or promised: DU7SV, LX1RK, LA2JE/P, SV1AE, KW6CL, AP2CR, EAØAC, GC5ZC, FF8AK, TA3GI, ZS9Q, ZK1BS, VU2RM, HS1B, XZ2AD, BV1USE and LA3SG/P. Before long, if you want phone DX, you'll need SSB or else . . .

VQ9HB is due to visit Chagos Island, and will take 20 watts' worth with him . . . FF7AG, mentioned last month as being in Mauritania, is now confirmed as indeed being there . . . ZL2GX offers to help on skeds with VK2FR (Lord Howe) and ZL3VB (Chatham).

9N1CJ has been very active on SSB . . . ZS5JY and ZS6TE have been operating both /ZS7 and /ZS8. Possibly /ZS9 has by now been heard as well. Again, almost

entirely SSB.

TI9SB promises activity from Cocos Island during mid-April . . . VP2SL expects a trip to the British Virgin Islands shortly . . . 9N1NV has been worked on 21 and 28 mc. AM . . . VQ6GM, rockbound on 7045, 14090 and 21135 kc, hoped to be VFO, all bands, by about now.

AP2Y (Box 4074, Karachi) promises to QSL . . . OK7HZ/YI, on SSB, replied to GI3IVJ's AM—told him Persia and Pakistan are next on the list . . . VR3Z (Christmas Island) was winkled out, also by GI3IVJ, on 14001 kc . . . FF7AB and FF7AG are *both* in Nouakchott, Mauritania.

Still further light on the FF position, from GW3AHN—he worked FF4AB (Box 1863, Abidjan, Republique Cote d'Ivoire) and received his QSL. The calls FF4AB to FF4AH have been issued in the Ivory Coast: Mauritania we already know

about (FF7); so it now seems possible that Middle Congo, Gabon, Tchad and Ubanghi-Shari (at present comprising FQ8) will come up with a new series of call-signs of their own.

UT5CA, worked by many readers, is in Kharkov, Ukraine—have they *really* exhausted all the UB5 calls? And there's G3ABG, who raised UL7IF and has now received his card, giving QTH as "20 miles East of Riga, Latvia." What goes on?

FD8AMS was worked by GW3AHN for his first U.K. contact; QSL *via* Box 524, Jos, Nigeria . . . VU2KV was expected to be active from AC3 during late March . . . AC3NC is reported to be on 14 mc . . . East Coast W's have been heard calling VU4A on 28 mc CW.

UAØKUV is in Chita, Zone 18—not Zone 19, as some people seem to think . . . VS9OM not only QSL's but does so very promptly—*via* bureaux.

VR1B will be on SSB shortly, with VK9AD's rig, which is on its way . . . VE3MR expects to go to Christmas Island and Cocos Island . . . ZK2AB is already on SSB . . . KG6NAA and KH6PD/KM6 are both SSB on *Forty*, and being worked by East Coast W's.

From SWL C. N. Rafarel (Poole): ZS6ASW will be operating /7 during Easter week-end, AM, 28, 21, 14 and perhaps 7 mc; KC6JB is on 21270 kc phone; VQ8AV was on 28 mc before the Mauritius cyclone; ZS8E also on 28 mc; and a comment that the CN8's were doing a wonderful job after the Agadir disaster, but without much co-operation from sundry "clots" around the frequencies, who seemed to be quite oblivious of the news about the tragedy.

And from SWL J. Wooden (Kingston): HZ1AB active on 7 mc; 15GN, KC4USA and OK7HZ/YI on 14 mc SSB; VP2LS, 2KW, 8DU and 8EH on 21 mc; 9K2AP, HKØAI and VU2PS on 28 mc phone.

**Top-Band DX**

It was rather late waking up, but this season did, after all, prove to be a good one compared

with the last three or four. From January 17 onwards each week-end seemed to be a little better than the previous one.

A quick summary runs like this: On January 17, W2EQS worked DL1FF; W4KFC got DJ1BZ and DL1FF; VP3AD heard several W's; SWL Powell in Gibraltar also heard many. On January 24, W1PPN worked G3PU, although W1BB couldn't hear him. W6's were heard on the East Coast and W2TR worked W6KIP.

January 31 was not too good; DJ1SP called W1BB, but he thinks it was a hoax and is still waiting. February 7 came up better, W1PPN working DL1FF and G3PU. SWL Powell logged W1BB, W1PPN, W2TR and W2GGL.

February 14 was much better, with many G's working W1BB, W2GGL, W2EQS, W2UWD and others. W1BB describes it as "the best morning for four years"—he should know. SWL P. Day (Sheffield) heard W1BB, W1PPN and W2GGL, the last being the best.

February 21 clashed with the ARRL Contest, but—as reported "Late Flash" in our last—was a red-letter day for listeners on this side, who heard VP1JH, VP5FP, KS4AZ and WØGBK! G3PU worked VE1HJ, VE1ZZ and W1PPN. SWL Day found this one the best for years, with VP5FP peaking 569 at 0700, and W1BB, W1PPN and VE1HJ reaching the same strength.

February 28 did not seem par-

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

Station	Points	3.5 mc	7 mc	14 mc	21 mc	28 mc	Countries	Station	Points	3.5 mc	7 mc	14 mc	21 mc	28 mc	Countries
G3FXB	829	76	133	226	224	170	266	G8VG	334	37	78	132	49	38	?
G2DC	815	87	118	239	204	167	267	G6TC	333	20	71	128	72	42	146
G5BZ	794	66	121	269	206	132	278	G2BLA	333	36	62	78	79	78	129
G3DO	694	25	51	250	188	180	277	G3DNR	303	11	30	90	87	85	131
GW3AHN	669	16	55	203	245	150	266	GB2SM	295	20	32	72	78	93	148
G3BHW	649	15	45	209	213	167	249	G3MCN (Phone)	291	4	8	62	142	75	178
G13IVJ	642	41	70	179	189	163	232	G3NOF (Phone)	283	8	15	29	118	113	150
G3ABG	600	56	89	190	138	127	214	G3BHJ	275	8	28	38	129	72	159
W6AM	567	40	68	297	96	67	297	VO2NA	274	19	38	113	67	37	121
G2YS	538	73	93	168	120	84	186	G2DHV	268	22	39	131	62	24	150
G3LET	513	40	111	189	120	53	206	G3WP	265	17	34	80	24	110	141
UR2BU	488	22	54	150	145	117	187	G2CWL	261	21	29	68	112	31	146
G3IGW	476	50	77	115	119	115	171	G3JVU	252	27	44	93	43	45	112
G6VC	466	40	60	159	120	87	191	W3HQO	240	3	8	79	114	32	164
GM2DBX (Phone)	433	34	31	162	105	101	178	G3JSN	223	31	41	43	59	49	88
W6AM (Phone)	428	23	62	283	49	31	283	VQ4GQ	212	1	24	77	73	37	115
G3JZK	421	17	62	95	143	104	192	G3MMP	193	5	26	45	57	66	93
G3JAF	410	33	24	112	183	58	210	G3NFV	184	12	21	26	44	81	107
G3DQO	393	18	52	181	101	41	190	G3NAC	184	6	21	50	74	33	94
MP4BBW (Phone)	390	1	5	179	125	80	193	G3LZF	173	11	19	53	42	48	111
UR2BU (Phone)	385	10	27	112	126	110	163	G3GHE	168	13	28	33	21	73	104
G13NPP	360	21	35	85	107	112	161	G4JA	166	32	28	59	33	14	102
G3LHJ	339	15	39	105	119	61	156	G3IDG	155	15	15	41	42	42	71
G8DI	337	35	66	99	74	63	132								

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

ticularly hot, but VE1ZZ, W1BB and W1KSH were all good signals over here, and W1BB was heard working W5KWL (not audible). SWL Day says the noise level was low, and he logged W1BB, W2GGL, W2TR and VE1ZZ.

### Top-Band Topics

In its normal guise of a local and medium-EDX band, One-Sixty has also been pretty good. HB9's, OK's and DL's have been around most of the time (we heard a cracking signal from HB9T as early as 1700 one Sunday). An interesting feature which is noted every year at this time has been the way the GDX persists until about 1000 GMT on Sunday mornings. While waiting for the local net to become activated, good phone signals can frequently be heard from distances up to 150 miles or more. On a recent Sunday, stations 100 miles away were actually causing noticeable QRM to locals within ten miles.

G3BHT (Liverpool) reports that some of *his* locals will be co-operating with a trip to Wales during the Easter week-end. The exact QTH has not been fixed, but the county will probably be Radnor, and the call-sign GW3BHT/A, phone and CW. G3NJQ (Norwich) promises to keep Norfolk on the air most nights at 2300, and to QSL all comers.

G3NBT (Sidcup) is quivering on the brink of WABC, but reports that Cumberland and Hereford are very elusive, and have never been heard on phone. Either of them appearing on that mode would be sure of a warm welcome. G3MYI (Leicester) joins the ladder with 60/82 and tells us that he heard most of the Trans-Atlantic DX on February 21.

G3HDQ (Chester) has returned to the fold after a long absence, and clocks up a score of 89/90. Having read that GM3NPM was active from Ayrshire, he came on the band—and GM3NPM was the very first station he heard and worked. Now he wants Nairn, Orkney, Selkirk and Roxburgh to do the same trick for him! G3HDQ tells us, also, that CN8FY (U.S. Navy) says he's coming on the band in the hope



Meeting of the Barbados group, VP6, a few weeks ago. Among those present, back row, standing (men only, left to right) were: VP6WR, VP6EB, VP6NW, VP6ZX, VP6FO, OA4H, G4NT (of Ernest Turner Electrical Instruments, High Wycombe), VP6HR and VP6PV. Seated, front row, left to right: VP6JK, VP6WD (ex-G2WD), VP6LT and VP6AM. In the back row, between VP6ZX and VP6FO, is Mrs. Gloria Corbin, OA4GU, of Lima. The photograph was taken by VP6AL. There are about 50 licensed AT stations in Barbados.

of working G's; he will be around 1825 to 1835 kc. G3NNO (Leeds) has heard a rumour that an overseas QSO counts as one point for WABC. Absolutely nothing in it! We can't start changing the rules at this stage!

G3NTU (Cannock) is one of our new correspondents, and he joins the WABC ladder with 15/36. With only 66 feet of wire out, he manages to get 559 from an OK, and 5-9 phone from a GI; he reports hearing a station on the band remark that he had worked an LX—and at lunchtime. No more details, though.

G3NNF (Wantage) also reports for the first time, with a score of 39/46; he has a 60-ft. base-loaded vertical aerial, which brought in VP5FP at 559 during the DX tests. An interesting daylight QSO was with G6NB, using a TTx rig running at *eight milliwatts!*

G2VV (Sunbury) raised HB9QA with a 579—new country for him . . . G3LZF (Todmorden) worked OK1VG and OK1KGG . . . G3ABG (Cannock) collected OK3EE and DL2AH . . . G2BLA (Welwyn) added HB9QA, DL2AH and OK3EE to his list.

G16TK (Co. Down) reports an extraordinary QSO on February 28 between 0945 and 1045 GMT, when *five countries* were in a daylight phone net! On One-Sixty! The stations were G3FNQ, GM2UU, GD3LXT, GW3FPF, GM3CEA and G16TK. They are hoping to rope in EI8J to make a six-country net of it—but even five is pretty good going! G16TK has been hearing the U.S.A.

stations well on Sunday mornings, and has also logged ZB1, ZB2 and 5A2 on the band, as well as working HB, DL, OK and the like. Being a rather rare GI6, he gets a lot of requests for "QSL's for WPX," and he hopes to be on the other bands soon.

G3APA (Coventry) remarks that if these county boundary changes come off, there may be quite a lot of people who never did, and never *will*, work Rutland! G3APA is another who worked HB9QA, and he says no one else seemed very keen, because they were all chasing GM3KHH (Banffshire).

### Eighty Metres

We're always saying that real DX *can* be worked on 3-5 mc if you have the energy and the patience. And here's G3IGW (Halifax) to prove it: in five consecutive QSO's between 0615 and 0740 GMT he raised VP5FP, VP1JH, T12CM, VP7NT and VP3YG! Furthermore, this was during the ARRL Contest, and they all had to be "dragged away" from working the W's. Fine going. During the same period G3IGW heard PJ2AE, KP4CC, YV5, W6 and 7 and ZL2. On phone he logged VP2DX and a YV5.

G3NTU, whose WPX score was compiled entirely on Eighty CW, worked UA9CM for his best one. He says "DX or not, it's DX for me!"

VO2NA writes that VO2AD is now on the air nightly on 3793 kc, SSB . . . G3JVU raised OX3BL and K2BZT, both around 0500 GMT . . . G3ABG worked

UA9CM . . . GM3NQB (Hawick) says that ZB2N is on the band most nights, with 50 watts and a 265-ft. wire. He calls many G's on both CW and phone but can't raise them.

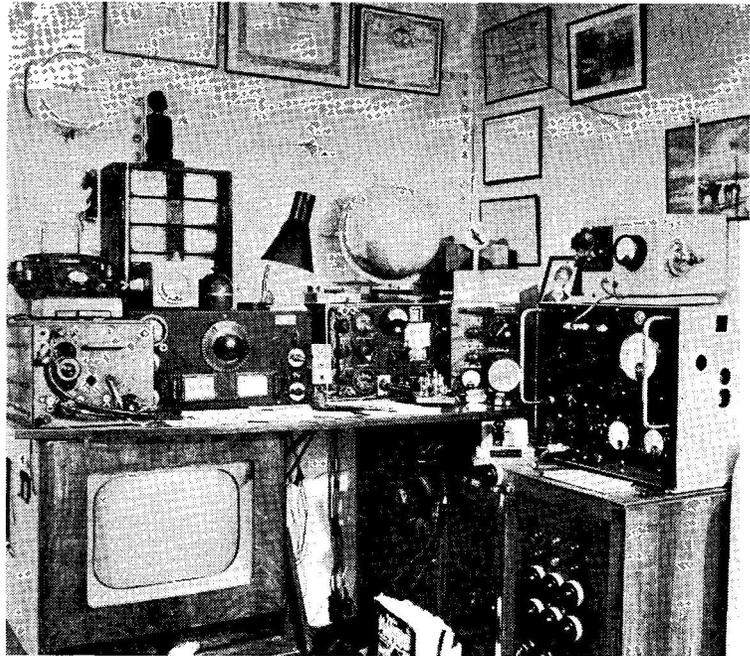
G5MY (Leicester) brings the band right back into the DX picture with his list of seventeen ZL QSO's, W1, 2, 3, 4 and 8, VE1, 2 and 3; raised and lost TI2; heard VP2, VP7, VE6 and KL7. He also confirms our suspicions that the chaps who really work the DX don't bother to report it—he mentions others who work the ZL's with apparently no trouble at all. Best from the other end have been ZL3FZ, 3JT, 4IE and 4NX; often, after a QSO, one of them will call CQ, without result. The moral? If you can't hear 'em you can't work 'em . . . and there are still some people who haven't learnt that one! G5MY uses an "old-fashioned" rig with a triode PA, lots of bias and plenty of drive, and a quarter-wave aerial.

#### Forty Metres

The 50-kc squeeze on this band is going to make an even greater hash of things, unless we go in for some logical band-planning. G3JLB, in the FOC "Circular Letter," suggests that phone operators should now leave the lowest 25-30 kc exclusive to CW, and adds that once you have eliminated the frequencies used by commercials and broadcasters you have very few kc's left for reliable communication. A rigid band-plan will be the only solution to the problem here. Some even suggest that phone will have to be prohibited!

Meanwhile, life goes on, somehow. G3HDQ reports working CM2QN (0430) and YV4CI (0610); G3JVU raised VE3EAM; G3JZK (Cambridge) worked KL7CXR/KP4, UM8KAB, UD6 and UA9.

G3LPS (Blackburn) is now active on Twenty, so his list for this band is not as long as usual—but he did raise W5JYS, W7ESK, CN2, ZC4, UP2 and 4X4. He has found W's audible as late as 1015, and VK 2 and 3 stations coming in at 0830. SM5BIC/MM was heard working a JA8, the latter not audible.



Arising from a comment in a recent issue of "Short Wave Magazine," G2VV (Sunbury-on-Thames, Middx.) assures us that his station can be entirely shut down from one switch. The various power supplies, each with its own indicator lamp, are individually controlled, but all primary feeds are taken through a single switch near floor-level, so arranged that it can be kicked off in an emergency.

G3LET (Westcliff) spent a lot of time on 40 metres, but thought conditions had dropped off since January and early February. On February 12 and 13, he says, the JA's were coming in from 1445 until 2100, all JA districts having been heard on the Saturday afternoon. The ZL's have fallen off in the mornings, but KH6DGL is on at 0400 and 1700, and a long-path contact might be possible. OR4TX is often a good signal at 2100, and YA1AO has been heard, working UA's.

Worked by G3LET—VK, JA2, 3, 4 and 8, ZL, YV (2300), CM2QN (0815), UAØ, MP4BCV (1900), VP4LQ (2145), ZD2IHP, OR4TX (2100), KS4AZ and AP4M (2300). Now last year's rock-crusher is back, completely wiping out the DX whenever it is on.

G3DNR (Broadstairs) worked UA9, UR2, LZ and EA . . . G2BLA collected UA9CM and UO5WN . . . G3ABG netted PY4AXN and UA9CM.

G2FQW (Worthing) works nothing but Forty phone, and has built up a score for the WPX

Marathon of 49 by this means. LX1WK was raised at 1245 GMT; PX1PA was heard at midnight; and 5A2TD came back to a call at 2135, but disappeared soon after. G2FQW sends an interesting chart of QSO's per hour, both U.K. stations and Europeans, covering the period from October to February, and the change-over from U.K. to Europe, around 1700 GMT, is most marked all the way through. A separate chart for February follows the previous four-month average very closely.

SWL P. Day says the band has been excellent from the listener's point of view, and on phone he has logged XE1LA (0700), VP2AR (0730), VP2DX (0830), YN4CB (0830), TI2CMF, 2RO and 2OE (0830-0850) and ZC4JB and 4FR calling Europe at 2145.

#### Twenty Metres

Short-skip, it seems, is always with us in some degree or other—usually too much of it. Fortunately, the DX is usually there as well, at most times of day or night; but the band is becoming

more and more a business for the late-night and early-morning boys. There is a definite change for the worse since last year at this time.

G8VG (Dartford) worked SVØWAC and EA6AR on phone; SVØWZ and ZD2GUP on CW.

### Short Wave Magazine

#### DX CERTIFICATES

The following have been issued since the publication of our last list, in the December 1959 issue:

#### FBA

No. 165	K2CJN (New York)
166	DL1WP (Aachen)
167	DL3ZA (Heilbronn)
168	DL9KP (Duisburg)
169	DL7EM (Berlin)
170	HA5BU (Budapest)
171	DJ2UU (Hanau)
172	W3DKT (Baltimore)
173	OZ6HS (Ingstrup)
174	F9YZ (Merignac)
175	DL3DD (M-Gladbach)

#### PRA

No. 4	W2GVZ (New Jersey)
5	OH2NB (Helsinki)
6	K6DDO (Hollywood)

#### WABC (Top Band only)

No. 198	G3KXT (Croydon)
199	G3LEV (London, S.W.16)
200	G2AFV (Barnsley)
201	G3NFV (Ashted)
202	G3ISG (Bristol — Phone No. 8)
203	G3LXT (Peel)
204	G2DSF (Leicester)
206	G16TK (Hollywood)
207	G3HRV (Walkden, M/cr)
208	G3MYT (Ashton-u-Lyne)

#### WBC (Overseas only)

No. 152	K2CJN (New York)
153	W9YNB (Racine, Wis.)
154	DL3SX (Munich)
155	VQ3CF (Mwanza)
156	ZB1CR (Malta)
157	ON4IZ (Drongen)
158	OZ6HS (Ingstrup)
159	W0IUB (Wichita, Kan.)
160	OZ7UW (Herlev)
161	DJ1TX (Urfeld/Bonn)
162	SM5BRS (Enkoping)
163	DL7CS (Berlin)
164	ON4MW (Ostend)
165	SM7BAU (Ystad)
166	MP4BBE (Bahrein)

#### WFE

No. 43	W9YNB (Racine, Wis.)
44	W2SAW (New York)

#### WNACA

No. 230	PY3ZI (Itauna)
231	PY4OD (Belo Horizonte)
232	DJ2XP (Wiesbaden)
233	G3HIV (Plymouth)
234	DL9KP (Duisburg)
235	G2DYV (Carlisle)
236	F85H (Paris)
237	G16TK (Hollywood)

Details of MAGAZINE DX AWARDS and CERTIFICATES and the claims required for them appeared in full on p. 26 of the March, 1960 issue.

Overseas claimants may send either (a) A check list, without cards, duly certified by the Hq. of their National Radio Society, or (b) An uncertified check list, from which any or all cards may be called in for scrutiny by us. U.K. claimants must send the relevant cards for each award.

All claimants must include sufficient return postage for the cards and Certificate—five IRC's in the case of overseas claims.

GI3NPP (Dungannon) sends a first report and lists CP3CN, XZ2TH, FG7XF, LA8FG/P, LA1NG/P, VS1 and 6, KR6GT, CR7IZ, all CW; also MP4DAA, VS9OC, FM7WN, VP2DX and ZP5CP on phone.

Another from Northern Ireland, GI3IVJ (Belfast), reports working CE2AT, DU7SV, EL4A, FB8CE and 8XX, FR7ZD, JA, KH6, KL7, KS4AZ, KV4, OA4FT, VR3Z, VKØKH, XE1AX, YN4AB, YV, ZD2 and 4S7EC—all CW. Phone brought him OK7HZ/YI, VP5AR, ZE5JU and ZS4DK.

G3JVU raised KS4AZ, LA9RG/P (Spitzbergen) and ZS7R—all CW . . . G3HDQ was pleased to get W7HDQ for his first Utah contact, and was also cheered up by a 5-8 phone report from VK2FU at 2000—the end of a contact that started on CW.

G2BLA raised KS4AZ for a new one; G3ABG mentions OR4TX; G2YS (Filey) put up a 14 mc dipole and knocked off YN4AB, VQ6GM, UM8KAB and KS4AZ, all new. Gotaways were FB8XX, LA1NG/P, LA3SG/P and KR6CG.

G5BZ (Croydon) offers a long list, from which we extract KS4AZ, YV5DO, KG6AIF, KH6's, FG7XF, VS9ARF, VQ6GM, LA5AD/P, JA1, 7 and 8. He comments on the "wonderful signal" from VQ6GM.

G3LNR (Nottingham) boosted his score with LU5BAL, UG6AE and VQ6AB on CW; VP2DX, ZB2A and 4X4AS on phone.

G4JA (Shrewsbury) worked KS4AZ, UG6, OX and the usuals; he heard FR7ZD, FQ8HO, DU7SV, KC4USV, FF7AG, VKØPM and many other good ones . . . G3GMK (Southampton) raised KH6BXU, VE8RX, LA3SG/P, ZB1NR, W's, VK and so on . . . G3LPS, now reporting for this band instead of Forty-only, lists VE8AY, KL7, ZK1AK, EL4A, UA1KAE, UAØEH, VS1FZ and quite a lot more; he's running 150 watts to a dipole about 25 feet high.

G2DC (Ringwood) thinks the short-skip menace is lessening, to be replaced by "a crowd of QSO-hungry EU stations that call one in answer to a CQ or even a call to a DX station." SVØWZ

(Crete) was the only new one; others were KH6ALU, ZD2IHP, UAØKAR and VR3Z.

G3BHW (Margate) fetched in FG7XF, LA1NG/P, KS4AZ, VP2AR, VQ6GM, VS9AHM/VQ6 and YN4AB, all CW. G3DO (Sutton Coldfield), running SSB only, worked VP2AB, TA3GI, OK7HZ/YI and 9N1CJ. G3IVL (London, W.5) raised FB8XX, FG7XF, KS4AZ, LA5AD/P, OQ5, OX, VP8BK, ZD2, YV and 5A2CV.

G3JZK says the band had its moments "when the EU's were out." during which he worked VE6AAE/SU, VU2XG, LA9TG/U, UA1KAE, UT5CA and UA1CW, whose call, he says, should have been "UA1CW," as there was no discernible carrier among the mess! Also reported is "a new psychological torture" on 14020, sending "f . . . f . . . f . . . f" *ad lib*. G3FXB (Southwick) raised VU2ANI and LA3SG/P.

#### Fifteen Metres

This still seems to be the best band of all, caught at the right time. But it is dull in the early mornings, and too full of W's during the afternoons. In the evenings, fortunately, anything can still happen.

GI3IVJ had quite a good time on phone, with AP2Y, CR7AD, FB8CP, FE8AR, FF7AB and 7AG, HK, JZØHA, KA, KL7, MP4BCZ and 4TAF, VK9AN, VS1KM, ZS3D and ZS8O. CW was less busy, with JA1ACB, UAØGF, VK7WA, VQ2MS and VQ6GM.

GI3NPP raised YA1BW and VK9VM on CW; phone fetched in FB8CD, JZØHA, CP5EL, FF7AB, FE8AR, DU6MJ, VP3MC and 3VM, SU1AB. G3JVU added OX3RH on CW. G8VG raised VS9AE on phone, OQ5EH and YA5BW on CW.

G3JZK worked FE8AR, VS5GS (1300), FB8GP (Comoro), MP4TAF, JA's, and YA1BW. JA1ACB hinted that Marcus Island would not be on until the winter. G2VV worked lots of JA's between 0930 and 1200. XZ2TH, KR6ZT, MP4TAF and a W7 in Utah.

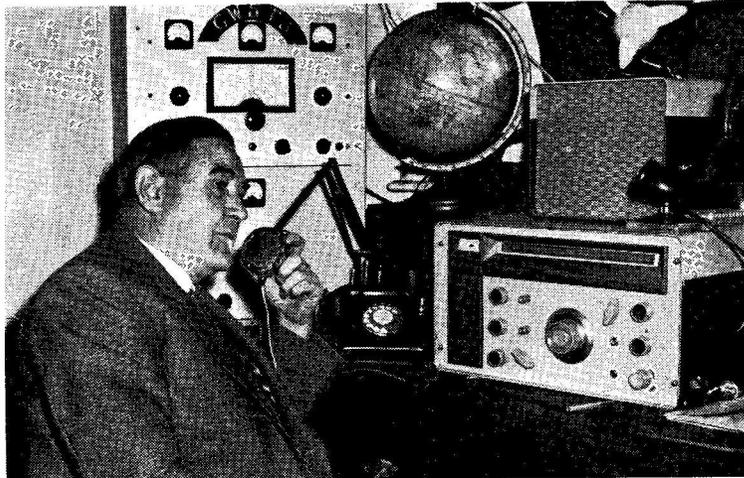
G3BHW pushed his phone through to FB8XX, FF4AB,

FF7AB, VK9AN, VP5EM and 9M2EZ. CW accounted for MP4TAF, VQ6GM, YA1BW, ZS3D and ZS7R. G3EHT (Wade-bridge) worked S9 phone both ways with VU2PK and 2RN. JA. ZD2, HK1CN, PZ1AA and 1AR. TG9TI, VP2DX, VP4LP, KZ5US, HP1AC and some "usuals."

G2DC found the Far East a bit scarce, but VK3's boomed through around mid-day. He worked five new ones — EA9AP, HH2CB, LS1PX, MP4TAF and TG9TI. Other nice contacts were LA2TD/P and 5AD/P, ST2AR, VQ6NG, VQ8AD, ZD1EO and ZS8O.

G3LZF reports "ragchew QSO's" with CX2BT and VQ3HG; G3DNR added VK9RO on phone. UL7FA on CW, and also worked KR6, VQ2 and 4. and ZS.

UP2AT was new for G2BLA, who also raised UI8AG; G3ABG stuck to CW and collected HH2CB, OD5CQ, UT5CA, ZS7R and 5A2CV; G6VC worked YA1BW and UP2AA; and G4JA raised XZ2TH, UI8AD, HC1LE and



GW5TJ, Merthyr Tydfil, South Wales, is a real old timer who has been licensed for many years — in fact, since 1913, when a start was made with spark! After the First War, he was on 440 metres, then the 200m. and 45m. bands, as amateurs began "to explore the short waves." GW5TJ has always kept up with the times, and is now regularly active on SSB. He has a Tiger TR300 transmitter, with an 813 Linear PA for Sideband; the receivers are National NC-300 and HRO-MX, together with a lot of modern ancillary equipment. Many East Coast W/Ve stations are regularly worked SSB on 3798 kc, and a recent contact on the 14 mc SSB band was with AP2CR, ex-GW3JET, and the only Sideband station in Pakistan. GW5TJ says that after 40 years of AM phone, he much prefers SSB!

4X4, with YA1BW and VK6SM as gotaways.

G3NOF (Yeovil) says the 15-metre band has been opening around 0800 and staying open until 0030 the following morning, with W's workable as late as midnight. Best for him were FB8BF and 8CF, FD8AMS, FF7AB and 7AG, FQ8AF, JZØHA, VK7NC and 7RL, VP9DL, VS9AE, VU2RN, 9M2DW and a bunch of Air Mobiles, two of them flying over Greenland. ZL's, ZS's and the like were also there in plenty.

GW3AHN (Cardiff) turns in the longest list of all, with phone to FD8AMS, FE8AR, FF4AB, FF7's, FQ8, KA, KG6, MP4BCC, OQ5, PZ1AR, TG9TI, VP2DX, 3MC, 4MM and 8DW, VS9AE, YA1BW, YV5ANQ, ZD2AMS and 9G1CT. In addition, he worked CW with FF8BF, KA, KR6, MP4TAF, OQ5, UAØ, UT5CA, VQ6GM and ZD2GUP.

G3NFV (Ashtead) exchanged phone with OX3KW, VP8DW, ZP5CF, VP3MC, PZ1AA, ZD1RO, MP4BCZ and ZL3UY, the latter at 2020 GMT.

A new one for G3FXB was VP2ML on phone; also worked, MP4TAF, UI8AG, VP2DX and VQ6AB.

**Ten Metres**

Strange things still happen to this band. We have found it, on several mornings, full of JA's and other Far Eastern stations, while on other adjacent mornings there was little but the Russian soda-water syphons. VQ4HT has been heard several times, putting in a fantastic signal from his rhombic (0900 or thereabouts). Some days the W's are there in force, West Coast and all; sometimes not a smell of one. In short, the old unreliable 28-mc behaviour when the band is beginning to become "not so good."

G8VG reports working VQ2WR and ZB1FA on CW; GI3NFF collected CR5SG, CT3AN, FY7YE, HR2MT, MP4QAO, HKØAI, VK9RO, VQ8AV and ZS7L—all on phone.

GI3IVJ's phone raised FB8CM, FQ8AT, JA, KR6, OA4ED, R18AVG, T15 FLL, VU2PS, XW8AC, ZD1AW and 1EO, ZS3X, ZS7L, ZS8O and 9G1CT; CW accounted for JA1, 2, 3, 4, 5 and 9, UAØAZ and ZD6RM.

G3IGW stuck to phone and hooked RH8's and RI8's; G3JZK worked phone with HI7CJY, ZS7L and RI8AAD, although he says the latter's signal hardly merits

**WPX MARATHON**

Starting January 1, 1960

CW Only		Phone Only	
G6VC	228	MP4BBW (SSB)	164
G8DI	185	G3DO (SSB)	155
G3LZF	146	G3GHE	114
VUZYG	144	UR2BU	80
G3JVL	114	GM3NQB	70
G3JVU	109	G3LHJ	59
VO2NA	90	G8VG	57
UR2BU	79	G3MCN	53
G4JA	74	GM2DBX	51
G8VG	74	G2FQW	49
G3DQO	68	G3DNR	32
G2BLA	65	G6VC	31
G3LHJ	63	G3JSN	28
G3WP	52	VO2NA	22
G3DNR	49	G4JA	22
G3GMK	40	G2FQR	8
G3MGL	36	G3MGL	4
GM3LYI	36		
G3NTU	32		
G3JFF	24		
G2BP	23		
G3BHJ	18		

(Stations not reporting for three months will be deleted.)

such a description! G2VV raised JA2RP, RA9CAI and RH8ABC, plus the usual W's.

G3NWT (Nottingham), a new reporter, swapped phone with VQ8AD, 9G1AB, FB8CG, VP2DX, OA's, ZD1AW and 2JKO, UL7FA, VU2RN, 9K2AP, TI2OE, CX4CS, ZD6DT and ZS3DP. He has also worked a few G's by back-scatter. G3NWT runs about 110 watts, with a Quad.

G3BHW connected with FD8AMS, FE8AR, PJ3AB, YN1LC, VP3MC and XE2WC, all on phone. G2DC was pleased to get FD8AMS for a new one, as well as ELIP and 4A, JA, VE7 and 8, ZD2JKO, VP3MC, and ZS7L. G3GHE, on phone, worked HK0AI, HP1HC, JA, KL7, OA1W, OQ5, VP3MC, VQ5GF, VS9AE, VU2EJ, 2PS and 2RN, XE1JP, ZD1AW and 2JKO, and 9K2AP.

G5BZ raised RH8ABC for a new one, and says he was a good op., too. New, too, for G3DNR, was RD6KAR; ZD2JKO was also worked—both phone. G3ABG was one of the relatively few on Ten CW, and he raised RA3, RA9, ZE8JJ and 9M2GT. G6VC worked RH8ABC and says "Some of these Russians must be keying electric fires!"

G4JA, on CW, lists ST2AR, SV0WQ, KR6MD, JA, UN1 and FG7XS. G3NOF, on phone, offers FE8AR, FQ8AT, HC1AM, HK3LX, MP4BCC, VP6LT and 9WB, VQ2, 3 and 4, YS1BW, YV3AS, ZD1AW and 2CKH, ZS3X and others.

GW3AHN ran phone only on this band, to the tune of CR7CH, FE8AR, HP1AC, PJ3AB, ZD2JKO and 9G1BA. G3NFV, also on phone, raised ZD2JKO, ZD6DT, HK1KU, ZS8I and CX5BR. G3WP (Chelmsford) heard KG6AGL/MM on CW but didn't work him; but he made CW contacts with several new ones to boost his WPX score.

#### News from Overseas

VO2NA (Goose Bay) writes to say that the annual GBARC QSO Party will take place between April 8 and April 18, 0700-0700 GMT. It is open to all, either Phone or CW, and WAG certificates will be sent to all stations

outside Canada and USA who work three members of the GBARC during that period. (QSL's must be received by the station worked before the certificate is awarded!) Claims to Ed. Harvey, VO2AB, Aeradio, Dept. of Transport, Goose Bay, Labrador.

VO2NA himself reports working VP2DX (Dominica) for a new one on both 14 and 21 mc; he also pushes up his WPX Marathon scores somewhat.

Further news from GW3ITD/MM, via GW5TJ (see p.31, March issue). He operates on 21 and 28 mc, mostly around 28350 kc between 1600 and 1800 GMT. After working from ZB2 and EL, he will by now have had a spell from FF8; next calls, ZD9, ZS1 and VQ8. Most of his QSO's will be from the dockside, and all will be QSL'd. GW5TJ reports very good signals from him.

MP4BBW (Awali) writes once more, still SSB and 14 mc only. Despite this one-band limitation, he has raised such nice ones as 9M2DB, ZK1BS, FS7RT, AP2CR, ZL5AF, HI8AN, EI, EA0AC, KW6CL, HS1B, ZS7 and ZS8. He found conditions a bit difficult

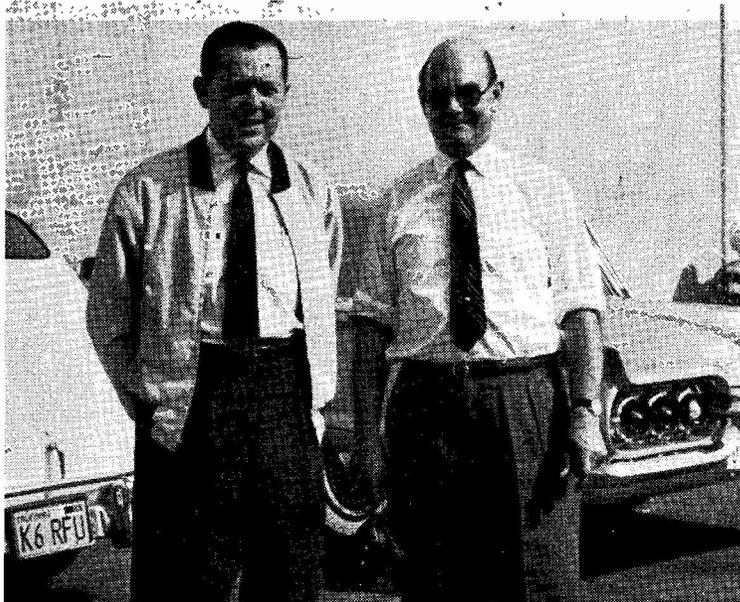
this month; next month he won't be active, but will be down in VQ4-land. MP4BBW, commenting on the extension of the US phone band to 14350 kc, says that the proposal now is that the DX SSB boys should gather as follows: 14100-14125; 21100-21150; and 28100-28150 kc.

VK5TA is ex-G3MMI and is now at Glenelg, South Australia, operating 14-21 mc CW; he says that he will always be looking for contacts with U.K. stations—and he would also like SWL reports (8 Farrell Street, Glenelg, is the QTH).

#### Miscellany

We were sorry to hear that G3HZL, once a regular correspondent, has been off the air since last August, having been in hospital since then. He hopes to be out fairly soon, and meanwhile his friends can drop a line to Don Walmsley in Ward A1, West Middlesex Hospital, Isleworth. We wish him good luck and a speedy recovery.

G3JZR (Portishead) has worked that Liberian tanker signing 5LWP/MM, but he was asked to



Two well-known personalities on the SSB bands: Right, G6LX, with Ted Henry, W6UOU, taken recently in Los Angeles when G6LX was over there on a visit. W6UOU is not only proprietor of Henry's Radio Stores, famous on the West Coast, but is also known world-wide for his outstanding SSB signal. He has provided a 40-watt Side-band transmitter, known as "The Argonaut," which has gone round the world to get remote stations interested in SSB operation.

QSL via G3ASG, not CX2BT. And he adds that a card forwarded to the SP Bureau for SP2CK/MM was returned to him.

Piracy again: G2FOF (Chingford) reports that he has not been active for six years, and it may be several more before he can get on the air again, but he is getting cards for 28 and 7 mc contacts. Please note and treat this call with suspicion!

G2CWL (Fareham) tells us that he has had 550 contacts with W3HQO since 1957, those in the last fifteen months all being SSB. He comments on the terrific SSB signal from TA3GI on 14 mc.

G4JA writes: "Have you noticed how a rare one at one end

of the band seems to attract the entire population, although numbers of them just CQ like blazes, leaving the other end empty? Then, ten minutes later, everyone seems to realise how nice and clear it is at the other end, and they're all back there!"

GM3NQB says that UR2BU told him that the Russian novices are not compelled to use NBFM, but do so in most cases because of its cheapness. (Whatever do they think that "N" stands for?)

### Contests Again

We are nearing the end of this little discussion, but it has certainly got well round the world, and comments have reached us, over the air, from most unlikely places. Those who bother to comment at all seem to fall just about equally into the category of lovers and loathers of contests; the indifferent ones keep quiet.

There's a slight breath of fresh air from W6AM (Long Beach), who writes: "When I go to an ARRL Convention I try to see and talk with most everyone there. It makes me feel good to see so many kindred souls in so short a time and at one place. The contests, in many respects, are similar . . . a meeting place where one can hear, work and exchange the equivalent of a Hello or How Are You?—meet old friends and make new ones, literally by the hundreds.

"I thought you'd like to hear from an old contest man who, in times past, often pleasantly met more G's in a single contest than would normally occur in a whole year. No doubt there are others that feel the same way." One record of W6AM's that still stands is that of making 1243 phone QSO's in one "SS" contest!

G3HDQ says he agrees with our remarks about contests being too long, but wonders how you could arrange a fair one for all parts of the world if short duration were part of the plan. He points out that if too many countries were all to arrange their own "world-wide" contests of short duration, even more week-ends would be cluttered up—so he's in favour of reducing the number of contests rather than the hours.

G3JZK ties the whole thing up with blood sports, and points out that, without the competitive element, DX-chasing would be meaningless. "Vive la chasse" and the devil take the hindmost! DX work and ragchewing are quite separate matters, and ragchewing with a rare DX station is gross selfishness—but many people are like that (witness the situation when there is a queue for a telephone booth!)

G3BHW doesn't enter contests, but likes the chance of snapping up new ones quickly . . . G3GMK likes them, but agrees that they are far too long. But he thinks we'll never stop them, and it's a case of live and let live . . . G5BZ says that since the bands are more overloaded when there is a contest than when there is not, surely this is a proof of their popularity? Or do people take part just for the sake of it and not because they like it?

G2DC suggests that the number who enter, with a view to sending their scores in, may be in the minority; but most of the people who are usually active will be found happily passing out points with the best of them. He suggests that those who don't like them should take the family out for a change!

In similar vein is G3IDG (London, S.W.12), who says: "If you don't like them, then close down—one doesn't always have to be on the air." He opines that some amateurs could do with a little fresh air at week-ends, judging by the number of pale-faced characters one sees at meetings and gatherings generally! Final fling—he asks "How many of these narrow-minded, every-minute - of - the - day - and - night amateurs even remember what football is? They might go and watch a match."

We're not applying any final closure to this subject, but it might be broadly hinted that we've all probably heard enough of it by now! If you have any frightfully important closing remarks, let's have them next month. Meanwhile, we've arrived at the fact that some like them, and some don't. (Comments from

### TOP BAND COUNTIES LADDER

(Starting Jan. 1, 1952)

Station	Confirmed	Worked
G2NJ	98	98
G3JEQ	97	97
G6VC	96	96
G3FNV	94	95
G3JHH	94	94
G3HDQ	89	90
G2CZU	81	83
G3APA	74	86
G6QN	73	80
G3LHJ	70	74
G2CZU (Phone)	67	68
G3FS (Phone)	64	70
G3NFB	61	67
G3MYI	60	82
G8VG	58	66
G3NBT (Phone)	55	57
G3MXJ	52	65
G3LNR	52	57
GW3NAM	44	53
G3NPB	44	51
G3NNE	39	46
G3JFF	36	45
G3LZF	28	42
G3NKH (Phone)	26	32
G3NNO	20	56
G3NTU	15	36
G3NJQ	16	30

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

G3FXB and GB2SM arrived too late for inclusion.)

### Mittel-EU Technik

G3JZK, having spent a lot of time in one of the middle-European countries, sheds some light on why so many EU's reply to all our CQ DX calls. He says: "To these chaps it's about as difficult to work a G as for us to work a VK, due to a lack of know-how and sundry misconceptions about operating."

Concerning the latter, he says the whole thing is governed by "one-upmanship." If you call CQ and someone replies, that's one up to you. The station who replies is at the disadvantage. Calling someone else who is calling DX is hot DX technique. Long calls are imperative—they create an air of importance about one's signal. High-speed Morse is admired, and it's a quibbling waste of time to bother about the quality of one's signal. A transmitter with a straight oscillator and a piece of wire may be keyed by the latest W6-type el-bug.

It is very "one-up" to run a rig like this, because one can boast of working the stuff without all the complex aids such as superhets, VR-150's, smoothing condensers and so on, as used by the weaker brethren. G3JZK says: "This attitude is standard among the lower echelons of amateur society in many countries . . . those who have a more enlightened attitude speak and read English or some other foreign language, take the *Magazine* and, under its chastening influence, rise rapidly to a higher status."

### RTTY Progress

From VE7KX and W6AEE we learn that during the recent RTTY Contest the W's worked the following DX stations: G3CQE, KL7's, TG9AD, UB5LH, XE1BI, XE1ZZ and ZL1WB. We also have a record of a five-way RTTY QSO between VE7KX, KL7MZ, W6CG, W8CAT and G3CQE.

From G3CQE himself, we hear that the RTTY Contest really crowded up 14340 kc for a week-end. He worked TG9AD, and forwards the QSO (the full thirteen inches of it!)

Other news: DL1GP is on 3.6 mc; G3BST is on 7010 kc. 5A2CV is another recruit to the gang, and PY2CK hopes to join in shortly. RTTY is coming right into the DX picture.

### Late Flashes

ZD2AMS, now back in Nigeria, says that when signing FD8AMS he made many CQ's for hours at a time, both phone and CW, without replies. He hopes to return, with a gas generator and a Cubical Quad.

Willis Island will, it is hoped, be on the air again from May onwards . . . VP8BK (South Georgia) promises full QSL'ing when he returns to Norway, later this year . . . Ex-ZL2AHA, who ran the recent Chatham Island affair as ZL3VH/3, promises operation from ZM7 later in the year, with more power than the 12 watts he had available this time.

W6YY (La Canada) has received QSL's from VK4IC (Willis Island, 1955) and VQ8BBB, giving him a new score of 286 confirmed on phone! For the moment, this puts him ahead of W6AM.

### Conclusion

Readers are asked to look carefully at the deadline clearly stated each month. It is seldom possible to make use of any letters received even *one day* after that

date—because it is a Friday, and this feature must be written over the week-end immediately following. This month, owing to various circumstances, quite a batch of letters was received after the deadline; most of these have been briefly noted, but only briefly. If, therefore, you wrote a letter full of news and find only the briefest mention of one single item—you will know the reason. Do, please, watch it in future, and remember that to arrive first post in London you will have to post by mid-day on the Thursday from many parts of the country. A letter posted on Friday is not seen till Monday, by which time "DX Commentary" is usually on the way to the printer.

Next month's deadline date is **first post on Thursday, April 14**, but it would be appreciated if everyone would make an effort to get in two to three days before that. April 15 is Good Friday, and the office will, of course, be closed during the long week-end. Since this issue is published on April 1, you still have plenty of time in hand.

Address everything to "DX Commentary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. And with that we sign off, with grateful acknowledgments to all correspondents, who include W1BB, W6YY, and *West Gulf DX Club*, with many other sources. Until next month, 73, Good Hunting, and—BCNU.



The new Telecomm 40-watt transistorised DC converter, specially developed for use with mobile/portable gear. It will provide a compact, silent and efficient source of DC power at 300v. 130 mA from a 12-volt car battery.

# Modulator Driver Unit

FOR HIGH-QUALITY  
"TAILORED SPEECH"  
OUTPUT

G. T. SASSOON (G3JZK)

*This will be found to be a very interesting and informative discussion on certain aspects of phone working that have not yet been given much attention in amateur circles. Our contributor argues that for good, readable-through-QRM communications quality speech, what in fact is necessary is a hi-fi type of amplifier to which the various corrections have been applied for limiting audio bandwidth; it is then capable of making the most of the useful speech-frequency range. He also shows that for effective modulation under such conditions, far more modulating power is required than is normally supposed.—Editor.*

FOR over a year, a modulator using Class-B KT88's has been in operation at G3JZK, with excellent results. However, the pre-amplifier in use with it lacked certain facilities, and the driver stage, a single-ended Class-A KT66, was working flat out to provide the necessary drive. The acquisition of a multi-match driver transformer provided an excellent excuse for building a separate unit to precede the KT88's. Furthermore, it was hoped to experiment with various super-modulation systems, requiring higher audio power than the existing unit could provide, so that it was desirable to build a new driver having sufficient output to drive bigger valves than the KT88. It is also good practice to keep as much of the equipment as possible remote from the operating position, so that the driver would be built on a separate chassis, and connected by cables to the main control unit and to the high-power modulator stage, with its associated power supply.

Perusal of valve data tables showed that 10 watts of audio is ample to drive any reasonable pair of zero-bias or AB2 triodes, and the (Thordarson) driver transformer was rated at 15w. It was therefore decided to use a pair of Class-AB1 6BW6's in the output stage which, with the 300v. HT line available for the low-power audio and RF stages of the transmitter, would provide 12 watts output.

Manufacturers invariably recommend the use of low- $\mu$  triodes for driving Class-AB2, or B, modulators, since their low internal resistance ( $r_a$ ) ensures good regulation of the drive voltage, against the highly non-linear impedance of the output stage grids. However, valves of this type are not readily available in this country, though triode-connected tetrodes would perform similarly. Use of the L63, or the veteran PX4, was considered, though the latter requires a 4v. filament supply. However, it was eventually decided that tetrodes with ample negative feedback would produce still better results, while offering the additional advantage of increased output. A "long-tailed pair" phase-splitter using a 12AX7 was designed, which would be driven with audio from the pre-amplifier, and with negative feedback from one of the output terminals.

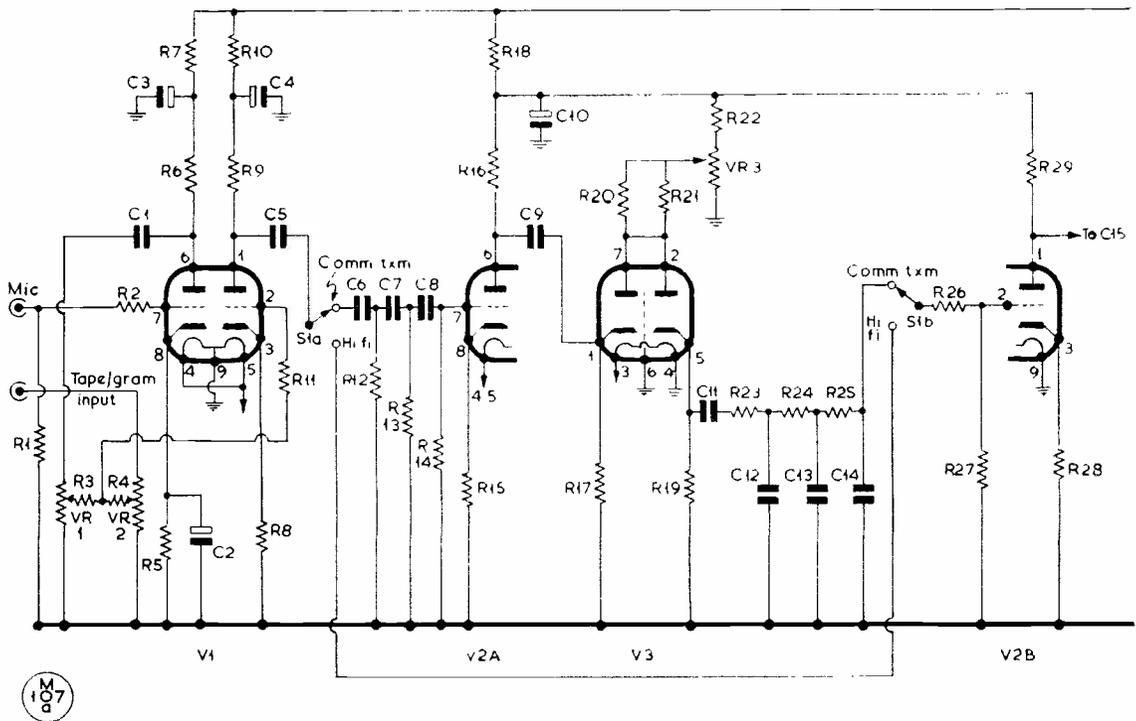
## Speech Tailoring

A 150-watt carrier can take only a certain amount of audio—therefore, it is desirable to ensure (a) That the carrier is modulated to the fullest extent practicable, and (b) That the audio with which it is modulated contains only those sounds which contribute to intelligibility. The normal voice contains a great deal of low-frequency component, in which most of the voice-power is concentrated. They carry very little information, however, as they occur only during vowels. Compare the following sentences:

- (1) oe o o oai u ioaio
- (2) Cnsnts cntrbte mstl t spch ntlglbly.

It is easy to see that the more intelligible of the two is that in which only the consonants have been shown. (In case you didn't get it, the first sentence reads: "Vowels do not contain much information"!). Therefore, it is a waste of time to transmit the low, vowel frequencies at the *expense* of the consonants, which are mainly high-frequency transients.

Accordingly, a three-stage high-pass filter C6-C8, R12-13 is incorporated in the pre-amplifier, with a turn-over frequency around 500 c/s. Also, another RC circuit is included to give a 6 dB/octave cut below 1000 c/s. To ensure maximum modulation of the 150-watt carrier, a clipper circuit is also included. This must be *preceded* by the high-pass filter—if the low frequencies are allowed to pass through the clipper, they will give rise to harmonics falling in the pass-band of the modulator; these harmonics, not present in the original speech waveform, contribute nothing to intelligibility, and use up precious reserves of available audio power.



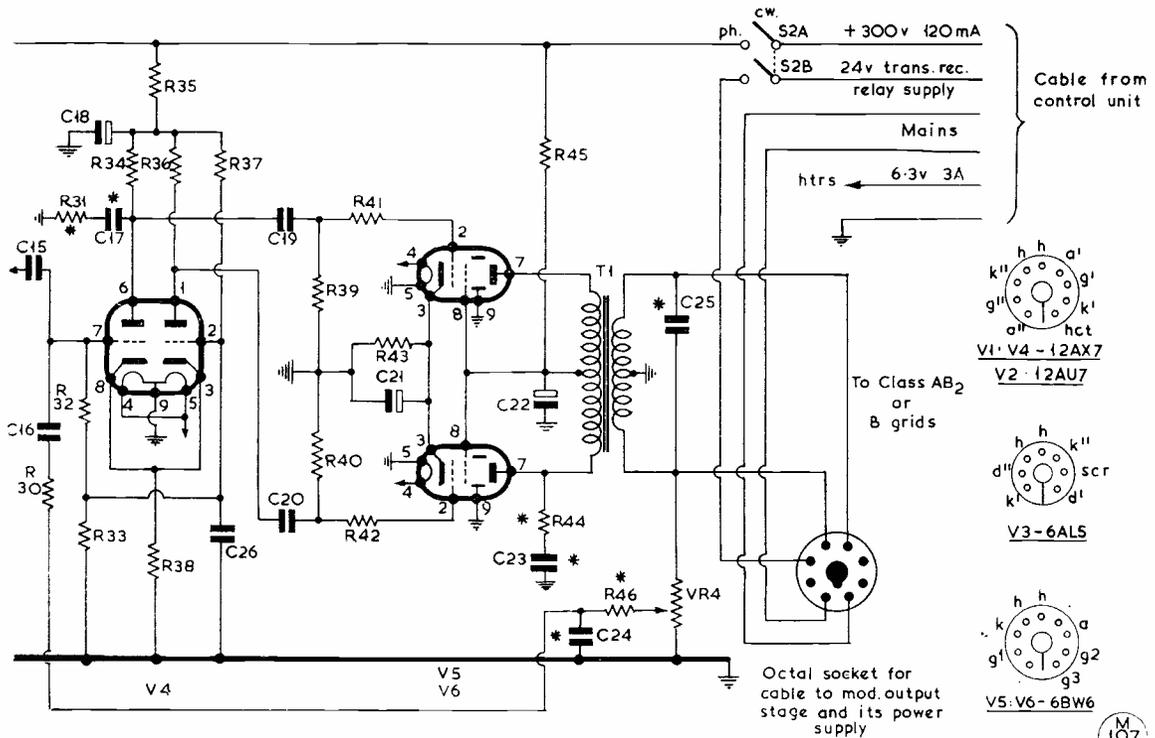
Early stages of the speech amplifier/driver unit described by G3JZK.

A choice of clipper circuits is available—these may be grouped into series-diode, shunt-diode, and limiting amplifiers. The latter were eliminated because their characteristics are not fully controllable, and they provide no direct variation of clipping level. There is not much to choose between the shunt and series-diode circuits, but the series type is simpler and is said to give sharper clipping. A “soft” clipping characteristic is often advocated because it generates less splatter—this is, however, of no advantage, since the clipper is followed by a splatter filter anyway. The clipper used is operated at high voltage and impedance levels, to minimise non-linear distortion, and takes a double-diode V3, with bias from a potentiometer, VR3. The HT supply to this divider should be “stiff”—the voltage at the tapper of VR3 determines the level to which the audio is clipped, so a sag in HT voltage on speech peaks could cause also a reduction of clipping level.

The low-pass filter R23-R25, C12-C14 following the clipper again uses RC elements, cutting 18 dB/octave above 2000 c/s. LC filters are widely used, but they are expensive, difficult to design, and not really necessary. A

sharp cut-off characteristic such as is found in LC filters causes phase-shifts which detract from the quality (such as it is) of the clipped signal, alters the peak amplitude, and again contributes nothing to intelligibility.

The circuit shown above provides perfectly adequate splatter suppression, and gives a rounder signal than that passed through an LC filter. The clipper and filter cause considerable attenuation of the audio signal, so a triode stage V2B is included in the speech tailoring circuit, to give extra boost when it is in use. The possibility of incorporating volume compression was considered—this involves passing the audio through a variable- $\mu$  pentode, the gain of which is controlled by a bias voltage derived from rectified audio taken off a later stage in the modulator. However, it is necessary to use a fast-attack slow-release characteristic, and the time-constants must be carefully chosen—even then, undesirable effects can occur, such as surges of background noise during pauses in speech, and complete blanking for several seconds following a door slamming. The clipper itself provides volume compression simply by limiting speech output, hence a compressor was considered an unnecessary complication. They are used to a certain extent in broadcast work (such as for symphonic music with a large



6BW6's are used at the output of the G3JZK speech driver, giving ample audio power for a high-level modulator. Some aspects of "speech tailoring" and the producing of a properly-modulated carrier for communications quality speech are discussed in the text.

volume range) but even then it is usually better to have an engineer with one hand on the gain control and a score in the other. As it stands, the speech tailoring circuit is extremely effective—it will transform the veriest 80-metre mumble into a crisp transmission, charged with vitality and forcefulness, which demands attention!

**The Hi-Fi Aspect**

Nevertheless, it is not always necessary to use the "speech tailor"—it is desirable for DX work, but when nattering to locals, or to stations giving 5-and-9 plus signals both ways, it is pleasant to back off the audio, cut the clipper, and correct the impression that one had just finished a six-month course of elocution lessons. Therefore, a switch S1A-B is provided whereby either Hi-Fi or Communications Quality is available. This is also extremely useful for testing and setting-up purposes, and enables the unit to be used as a hi-fi amplifier, connected to a suitable output transformer. Good fidelity is of extreme impor-

**Table of Values**

(Circuit of G3JZK Modulator Driver)

C1, C5, C9, C11, C15, C16, C19, C20, C26	R27, R32, R37, R39, R40
C2	R28 = 1 megohm
C2, C21	R29 = 1,000 ohms
C3, C4	R29 = 15,000 ohms
C6	R31 = 1,000 ohms*
C7, C8	R33 = 330,000 ohms
C10	R34, R36 = 220,000 ohms, 10%
C12, C13, C14	R35 = 27,000 ohms, 1/2w
C17	R43 = 260 ohms, 2w
C18	R44 = 2,200 ohms*
C22	R45 = 200 ohms, 1w
C23	R46 = 27,000 ohms*
C24	VR1, VR2
C25	VR1 = 1 megohm log. potentiometers, gain controls
R1	VR2 = 25,000 ohm linear w/w potentiometer, clipper control
R2, R11	VR3 = 50,000 ohm carbon track potentiometer, feedback control
R3, R4	VR4 = S1A-S1B DPDT toggle, output quality c/o
R5, R8	S2A-S2B Mod./CW c/o DPST
R6, R9	I1 = 15w, multi-match transformer, Woden UMI
R7, R10, R30, R38	V1, V4 = 12AX7/ECC83
R12, R13, R14, R17, R19, R20, R21, R23, R24, R25	V2 = 12AU7/ECC82
R15	V3 = 6AL5/EB91
R16	V5, V6 = 6BW6
R18	
R22	
R26, R41, R42	

NOTE: Items marked \* are for stabilising and are subject to variation—see text. All resistors rated 1/2w, 20% except where otherwise stated.

tance in all modulators—every modulator should be capable of BBC quality, in order to render fully effective the true benefits of speech tailoring. For example, it is common practice to use small coupling condensers in the modulator to cut the bass response. This is sound enough, provided that the stages so treated precede the clipper. The writer has observed, on his panadaptor, the modulation waveforms of stations which are cutting bass after the clipper—the effect is disastrous! The object of clipping is to transform speech into a square wave; if square waves are passed through a high-pass filter, it causes the flat tops of the waves to be tilted downwards. Thus the waveform is merely returned to a distorted version of the original, and the advantage of clipping has been lost. Therefore, the “tailored” waveform must first be generated, and the modulator thereafter must render as accurate a reproduction as possible of this. Any distortion will simply detract from intelligibility.

In the best sense, communications quality speech is actually *more* difficult to obtain than good hi-fi—but in many cases “communications quality speech” is made the excuse for sloppy and haphazard designs, which produce signals far more difficult to read than a good quality transmission, though it does occupy more bandwidth. It follows, then, that hi-fi techniques should be used throughout the modulator, even if the aim is only “communications quality.”

The pre-amplifier design uses a 12AX7, for V1, under maximum gain conditions, and calls for little comment. Inputs for crystal microphone, and for a tape recorder, gramophone, or other external input from 100 mV to 1 volt, are provided, with independent gain controls, VR1, VR2, and a simple resistive mixer. The gram. input is extremely useful for test purposes (when the transmitter should, of course, be operated into a dummy load) and for playing-back taped transmissions from other stations.

A further triode stage is employed before the phase-splitter. The gain provided may seem excessive, but this is not so; if at a conservative estimate, 20 dB of clipping is to be used, an extra 20 dB of gain must be derived from somewhere. Furthermore, the negative feedback across the phase-splitter and driver raise the output requirement from the pre-amplifier section by a further 20 or 30 dB. This means, in practice, at least two extra stages.

### The Output End

The output side of the driver is the most critical part of the design, and that which is

most frequently responsible for trouble. It is essential that a high-quality transformer be used, and desirable that the stage should be push-pull. A single ended stage is barely capable of adequate output to drive a Class-AB2 or Class-B stage, and is both critical in setting up and heavy on the HT supply. The 6BW6's are used under the recommended AB1 operating conditions of screen and anode voltages of 285, with 35 mA and 4 mA anode and screen current, respectively, per valve.

The transformer used is the most critical component—it is almost standard practice at the moment to use an SCR-522 modulation transformer back-to-front; admittedly, this gives a correct match for driving most low- $\mu$  triode-connected tetrodes, but it cannot be used with push-pull drivers, having no centre-tap on one winding. Further, it was not designed to carry standing DC in the windings, so that it is possible that the core may saturate on modulation peaks; it also has a sharp cut-off below 150 c/s. Hence, if the driver is being fed with lower frequencies than this, the transformer will not present the correct impedance, mismatch will result, and the higher frequencies within the transformer pass-band will become distorted, and intermodulate with the LF component. It is strongly recommended that a proper driver transformer be used, if it is available. Nothing suitable is to be had on the “surplus” market at the moment, but various standard commercial types can be obtained through the normal channels. However, if it is intended to use an SCR-522 transformer for any application whatever, a sharp cut-off below 150 c/s should be inserted early in the amplifier.

*(To be continued)*

---

### ROYAL NAVY AMATEUR RADIO SOCIETY

Further to the note on p.240 of the September, 1959 issue of SHORT WAVE MAGAZINE (“R.N. Activity List”), we are asked by G3JFF to announce that plans are now in hand for the formation of an R.N. Amateur Radio Society, on the lines of the R.A.F.A.R.S. Those working on the scheme are G3JFF, GW3ITD and G8IX, who already have over 200 names to start the society. However, it is felt that many more must be eligible, as all interested in Amateur Radio who belong, or have belonged, to the Royal Navy may become members. Personnel of the Commonwealth Navies are also invited to apply for membership. Those interested (who have not already done so in response to the previous announcement) are asked to write to: R/S M. J. Matthews, R.N., G3JFF, Petty Officers' Mess, H.M.S. *Ganges*, Shotley, Suffolk. Details required are: Name, callsign, home QTH, serving QTH (if any), rank or rate, and official number, with brief details of station equipment.

SO that we all know where we are, the tabular matter is given in full this month—and what a fine record of achievement it shows over the years. Coverage of the whole of the British Isles and most of Northern Europe, with nearly 100 G's listed as having worked eight or more different countries on two metres.

These results also suggest the scope and the opportunities open to the newcomers to VHF, many of whom have yet to experience even a good GD<sub>X</sub> opening, let alone the chance to work Continentals. All this will happen during the coming season, when we can be reasonably certain that those propagation conditions peculiar to VHF will develop to make GD<sub>X</sub> and ED<sub>X</sub> working possible once again.

**Catching the Openings**

Not that some useful openings are not occurring now, though the opportunities are more fleeting than when we get a wide area of settled weather, with the glass high and cool evenings following on warm days—then the VHF bands open wide and, depending upon

# VHF BANDS

A. J. DEVON

the coverage of the high-pressure system, contacts are possible over long distances with high signal levels both ways. Nowadays, there is a sufficient number of intelligent watchers of the VHF bands in all countries to ensure activity when the right DX conditions develop. Then the jungle-telegraph rings, the signal-fires make smoke, the buzz gets round, and suddenly the two-metre band is jam-packed with keen types after the DX. How the news is broadcast, nobody has ever been able to explain—suffice it to say that it is, and that is what happens! But the beginner on VHF will find that it is not so much "switching on and finding the band full of signals," as watching the weather and making his own deductions. During periods of warm weather, and given the *desiderata* already mentioned, look for those evenings when the cloud is high, thin and stratified; if the weather map tells you that a stable, high-pressure area has developed over the Channel area and Northern France, the ED<sub>X</sub> should be coming in from that general direction.

The other propagation modes to look out for are Aurora and Sporadic-E manifestations—both quite unpredictable, and happening, generally, in diametrically opposite directions. Much has been written about both these strange occurrences, capable of giving long-haul ED<sub>X</sub>—and curiously, the Aurora on CW only, but Spor-E on phone or CW. The

auroral reflecting curtain can appear at any time in the 24 hours, but sporadic-E can usually be expected for only an hour or two before or after high noon, during periods of intense sunspot activity. The existence of either of these disturbances (for that is what they are) can always be deduced from the behaviour of Band II BC signals (VHF/FM); but that does not necessarily mean that the effect is usable on our two-metre band. An auroral curtain or a sporadic-E cloud capable of reflecting 100 mc signals will not always, or even usually, be effective at 150 mc. It is simply that the two-metre band is worth trying when the FM Band II shows signs of erratic behaviour, such as when French or Italian broadcasters are found

**SEVENTY CENTIMETRES**

**ALL-TIME COUNTIES WORKED**

Starting Figure, 4

Worked	Station
32	G2XV
27	G3HBW, G3JWQ, G3KEQ, G5YV
26	G6NF, GW2ADZ
23	G3BKQ, G6NB
20	G3HAZ
19	G2CIW
18	G3IOO
17	G2CIW*
16	G2DDD, G3LHA, G3MED
15	G4RO
14	G2HDZ, G3FAN, G3KPT
13	G3MPS
12	G5BD
10	G2OI, G3AYC, G3IRW
9	G5DS
7	G2HDY, G3JHM, G3LTF
6	G3JMA, G3KHA, G3WW
5	G3FUL, G3IRA, G3IUD, G5ML
4	G3JGY

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

\* New QTH

**TWO METRES**

**COUNTIES WORKED SINCE SEPTEMBER 1, 1959**

Starting Figure, 14

From Home QTH Only

Worked	Station
43	G3HBW
42	G5MA
36	G2CIW, G3LTF, G6XA
34	G3JWQ, G3KPT, G3LAR
30	G3AYC, G3NBQ, G5ML
29	GW3ATM
27	G3G8O
24	G3HWR
19	GW3MFY
18	G3CO, G3ICO
14	G3DLU, G3IOF

This Annual Counties Worked Table opened on September 1st, 1959, and will run till August 31st, 1960. 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.

## TWO METRES

## ALL-TIME COUNTIES WORKED LIST

Starting Figure. 14

From Fixed QTH Only

Worked	Station
75	G5YV (787)
76	G3CCH
73	EJ2W
76	G6NB
70	G5MA, G6XM
68	G3BW, G3GHO
67	G3HBW
66	G3IUD (302), G3KEQ, G5BI
64	G3BLP
63	G2FJR (542)
62	G3FAN (760)
61	GM3EGW (232)
60	G2OI (402), G3DMU
59	G3EHY, G4SA
58	G3IOO, G8OU
57	G8SB, G3HAZ (535)
56	G3WW (770), G5DS (654)
55	G2HDZ (495), G2HIF, G5BM, GW5MQ
54	G8VZ
53	G2AJ (519), G3JWQ (461), G3LHA (387), G4CI
52	G2NH, G3FZL, G6RH, G6XX, GW2ADZ
51	G5ML
50	G3ABA, G3GSE (518)
48	G3FIH, G6TA (487)
47	G2CIW (282)*, G3DKF, G5WP
46	G4HT (476), G5BY, G6YI
45	G2AHP (647), G2DVD (362), G2XC, G3BJQ, G3GFD, G5JU
44	G3BK, G3DVK (282), G8DA
43	G2CIW (164), G2DDD, G2FCL (322), G3BA, G3COJ, G3DLU*, G3HWJ, G3KHA (262), G3KUH, G3WS, G4RO, G5DF, G6XA
42	G2HOP, G3BNC, G3DO, G3IER, G3KPT*, G6CI (220)
41	G2CZS (282), G2FQP
40	G3CGQ, G5MR (366), G8KI
39	G2IQ, G3GBO (434), G3LTF, G3VM, G8IL (325)
38	G3APY, G3CKQ, G3HTY, G3KQF, G8VN (190)
37	G3AYC, G3FNW, G2FZU (180), G3DLU, G3LAR (435), G3MAX, GC3EBK (260)

in between, under or even on top of the BBC stations, with poor quality transmissions.

When rough and dirty signals are heard on two metres, with phone very distorted, it is Aurora :

Worked	Station
36	G2DCI (155), G3CXD, G3DLU*, G3IIT, G6CB (312), G8DR (354), G8IP
35	G3FYY (235), G3GSO (266), G3HCU (224), G4LX
34	G3AEP, G8IC, GM3DIQ, GW3ATM
33	G3CO (303), G3FUR, G3HHY (125)
32	G3HIL, G8QY, G8VR, GC2FZC
31	G3HXO, G3KPT (180), G5RP
30	G2AHY, G3FRY, G3GOP (208), G3GVF (129), G3JAM (269), G3IRA, G3KEF (110), G3NBQ (115), G5NF, GW8UH
29	G3AGS, G3AKU, G3FIJ (194), G3IOF
28	G3ICO, G3ITF, G4JJ/A, G8DL, GM3BDA
27	G3CVO (231), G3DAH, G3ISA (160), G3LTF/A, G6GR, G13GQB, GW3GWA, GW3MEY
26	G2BRR, G3CFR (125), G3MED, G3SM (211), G3YH, G4MR (189)
25	G3JHM, G3JMA, G3JXN (220), G3MPS, G5SK, G6PJ
24	G3FD, G3FEX (226), G3FXG, G3FXR, G3HWR (213)
23	G3CWW (260), G3HSD, G5PY
22	G2DRA, G3AGR (135), G3ASG (150), G3BPM, G5AM, G8NM
21	G2AOL (110), G3BDQ, G3DVQ, G3IWJ, G6XY
20	G3EYV
19	G2HDR, G3GCX, G5LQ (176)
18	G3DBP, G3JGY, GC2CNC
17	G3EGG
16	G3FRE, G3MLS
15	G3IWA
14	G2DHV, G3CYY, G3MHD

Note: Figures in brackets after call are number of different stations worked on Two Metres. Starting figure for this classification, 100 stations worked. QSL cards are not required to verify for entry into this Table. On working 14C or more, a list showing stations and counties should be sent, and thereafter added to as more counties accrue.

\* New QTH

turn the beam northerly (exact heading depending upon where the most effective reflecting area happens to be) and call on CW, irrespective of the direction in which you want to work. If you are hearing clean phone from Continentals, very loud but with deep and sudden QSB, it is probably sporadic-E — so turn your beam south and look for Italians and North African stations.

## The Station Count

There have been some interesting comments on the points made last month about U.K. activity on VHF, the general opinion being that your A.J.D.'s estimate was too low. G3HBW says he thinks the figure would be nearer 700 (and he should know); G3LAR suggests that since he himself has worked 435 stations and heard more than 100 others in just over a year, the total could be 800 or more; and G2CIW thinks that what most of the VHF types do is to work on their gear when conditions seem flat. Others have written in similar vein, without actually hazarding any estimate.

Your A.J.D. accepts all this, and can only say that his figure was intended to estimate the number of U.K. operators who might be able to come on at some time during a sustained opening of, say, one week. Anyhow, whatever that figure might be, what we can all agree on is that VHF occupancy should be on the increase during the next year or three.

## VHFCC Elections

VHF Century Club Certificate No. 262 is gained by C. A. May, G3KMP, of Hastings, who started on two metres in June last year and worked 135 stations to get his 100 cards from five countries and 20 counties.

On the other hand, J. Withers, G6XA, of Leamington Spa,—who is awarded VHFCC Certificate No. 263—had to work 198 stations to obtain 100 QSL's. Though G6XA had his first two-metre contact in July 1953, it was not until last June (coinciding with the spell of fine conditions) that he became regularly active, and is now on both VHF bands. The gear for two metres consists of a QQVO6-

40 PA running 50w.. with a Cascode converter into an AR88, and a slot-fed 4/4 at 35 ft. For 70 cm he has a G3HAZ Tripler—see SHORT WAVE MAGAZINE, May 1954 —and a CC converter to the G3BKQ design, as published in our issue of July 1954; the 430 mc beam is a slot-fed 6/6.

**Reports and Results**

A new station for the rare and rather difficult county of Ross is GM3JFG (The Rectory, Saltburn Road, Invergordon), who has a crystal-mixer VFO driving a 3E29 PA to 90w. input, into a J-Beam at 35 ft. As he is just starting on Two, GM3JFG would be very glad to hear from any GM within reasonable distance; as he will need some help and encouragement, by way of QSO, we hope his plea will not go unheeded.

G3NBQ (Coventry) writes that he has been able to raise his score to 1155 in 30C; he has found activity quite good—the contest during March 5/6 helped in this—and mentions contacts with GW2HIY, several stations in the London area, and a particularly interesting QSO with G3ASC (Oswestry), who was only running

2½ watts. With G3OAF now on from Bridgnorth, Shrops., G3NBQ says he is beginning to feel more like an old timer!

As far as G3GSO (Derby) is concerned, the counties of Devon, Cornwall, Suffolk and Oxon. are “dead”—he has been trying for them for years, and though he worked 36S in 19C during the contest over March 5/6, nothing was heard from those wanted counties. Best signals noted recently have been G2DTO/P, G3GHI, G3HBW and G3LTF—and G3GSO wonders why G5MA has been so difficult to raise from the North Midlands; Bob is a hefty signal but doesn't come back, says G3GSO.

For G2CIW (Birmingham) the March contest brought 37 contacts, only *one* of which was on CW—so Jack quite believes what was said here last month about people “putting away their keys.” As it turned out, conditions for the contest were such that more and better QSO's would have been made on CW; but, as usual, most of the effort was on phone. (Your A.J.D. can confirm this; long calls on CW produce no response; a CQ on phone brings back lots of chums!). G2CIW reports an improvement in activity on Seventycems, with 11 stations worked in the month to March 12; one of them was G3MYD, of Birmingham. G3COJ says that there is little to report for G3AYC (the BBC Radio Club) except that they have put up an 8/8 for 70 cm, and have worked a couple more counties for the two-metre tables.

A new hand putting his claims in is G3MHD (Stanford-le-Hope, Essex), who actually started six months ago, but has since moved into a new QTH; this is giving encouraging results on the Rx side, for which he has a G6UH-type CC converter—see SHORT WAVE MAGAZINE, May 1955. The transmitter at G3MHD runs 8w. to an 8/8 at 35 ft.

An interesting letter from G3OBB/G3OBD, reporting jointly from the Bournemouth area: Their tickets arrived on March 2, and they are now hunting together on two metres! Diving nervously

**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)
- 17 G6NB (DL, EI, F, G, GC, GD, GI, GM, GW, HB, LA, LX, ON, OZ, PA, SM, SP)
- 17 G3HBW (DL, EI, F, G, GC, GD, GI, GM, GW, LA, LX, OE, OK, ON, OZ, PA, SM)
- 16 G3CCH, G3GHO, G5MA
- 15 G2XV, G3FZL, G4MW, G6XM
- 14 G2FJR, G2HDZ, G3AYC, G3FAN, G3HAZ, G3IOO, G3JWQ, G3KEQ, G3WS, G5BD, G6LI, G8OU
- 13 G3BLP, G3DMU, G3DVK, G3GPT, G3KPT, G5DS, G6XX, G3EGW, PA0FB
- 12 EI2W, F8MX, G2HIF, G3EHY, G3GFD, G3GHI, G3LTF, G3WW, G5CP, G5ML, G6RH, G8VZ
- 11 G2AJ, G2CIW, G2CZS, G3ABA, G3CO, G3JZN, G3KUH, G3LHA, G4RO, G4SA, G5UD, OK1VR
- 10 G2AHP, G2FQP, G2HOP, G3BDQ, G3BK, G3BNC, G3DLU, G3GSE, G3GSO, G3JAM, G3KQF, G3MED, G5MR, G8IC, GWSMQ
- 9 G2DVD, G2FCL, G3DKF, G3FIJ, G3FUR, G3IUD, G4LX, G8DR, G8GP, GC3EBK, GM3DIQ
- 8 G2DDD, G2XC, G3AEP, G3AGS, G3BOC, G3EKY, G3GBO, G3HCU, G3HWJ, G3KHA, G3MPS, G3VM, G5BM, G5BY, G8SB, GC2FZC, GW3ATM

**BRITISH ISLES**

**TWO-METRE ZONE PLAN**

Revision, March 1959.

- Zone A:** 144.0 to 144.1 mc. Cornwall, Devon, Somerset.
- Zone B:** 144.1 to 144.25 mc. Berks., Dorset, Hants., Wiltshire, Channel Islands.
- Zone C:** 144.25 to 144.5 mc. Brecknock, Cardigan, Carmarthen, Glam., Gloucester, Hereford, Monmouth, Pembroke, Radnor, Worcester.
- Zone D:** 144.5 to 144.7 mc. Kent, Surrey, Sussex.
- Zone E:** 144.7 to 145.1 mc. Bedford, Buckingham, Essex, Herts., London, Middlesex.
- Zone F:** 145.1 to 145.3 mc. Cambridge, Hunts., Leicester, Norfolk, Northampton, Oxford, Rutland, Suffolk, Warwick.
- Zone G:** 145.3 to 145.5 mc. Anglesey, Caernarvon, Cheshire, Denbigh, Flint, Merioneth, Montgomery, Shropshire, Stafford.
- Zone H:** 145.5 to 145.8 mc. Derby, Lancs., Lincoln, Nottingham, Yorkshire.
- Zone J:** 145.8 to 146.0 mc. All Scotland, Northern Ireland, Isle of Man, Cumberland, Durham, Northumberland, Westmorland.

into the contest activity over March 5/6, they started knocking the stuff off right away; the best QSO for G3OBB was G3AYC, and for G3OBD it was GW3DFF—nice going, G3OBB is on 144.25 mc, and G3OBD on 144.15 mc. They say they hope we “will not mind two humble beginners sending a report.” Good gracious us, speaking for himself, A.J.D. could not be more pleased, and that can be taken as going for all other followers of this piece, too. Good luck to G3OBB (Christchurch, Hants.) and G3OBD (Poole, Dorset)—they gave each other a county right away!

G6XA (Leamington Spa) found March 4, the evening before the contest, the best for the period—so did A.J.D.; the glass had risen sharply, and it was a fine, cold night after a spring-like day. During the contest week-end.

## TWO-METRE FIRSTS

G/DL	G3DIV/A-DL4XS/3KE	5/6/50
G/EI	G8SB-EI8G	23/4/51
G/F	G6DH-F8OL	10/11/48
G/GC	G8IL-GC2CNC	24/5/51
G/GD	G3GMX-GD3DA/P	29/7/51
G/GI	G3DA-GI2HML	29/6/49
G/GM	G3BW-GM3OL	13/2/49
G/GW	G5MQ-GW5UO	22/10/48
G/HB	G6OU-HB1IV	12/9/53
G/LA	G6NB-LA8RB	29/6/53
G/LX	G5MR-LX1AS	23/7/55
G/OE	G3HBW-OE1WJ	4/1/60
G/OK	G5YV-OK1VR/P	27/10/58
G/ON	G6DH-ON4FG	25/9/48
G/OZ	G3WW-OZ2FR	1/6/51
G/PA	G6DH-PA0PN	14/9/48
G/SM	G5YV-SM7BE	1/6/51
G/SP	G5YV-SP6CT/P	28/10/58
GC/DL	GC3EBK-DL3VJ/P	22/3/53
GC/EI	GC2CNC-EI2W	8/10/51
GC/F	GC2CNC-F9OK	17/11/53
GC/GI	GC3EBK-GI3GXP	14/9/56
GC/GW	GC2FZC-GW8SU	16/6/54
GC/ON	GC3EBK-ON4BZ	4/3/53
GC/OZ	GC3EBK-OZ2FR	2/3/53
GC/PA	GC3EBK-PA0HA	16/7/55
GD/EI	GD3DA/P-EI2W	30/7/51
GD/GM	GD3DA/P-GM3DA/P	29/7/51
GD/GW	GD3DA/P-GW5MQ	28/7/51
GI/DL	GI3GXP-DL1SE	5/1/56
GI/EI	GI3QGB-EI2W	13/6/51
GI/GD	GI2FHN-GD3DA/P	29/7/51
GI/GM	GI2FHN-GM3OL	1/7/49
GI/GW	GI2FHN-GW3ELM	8/7/49
GI/OK	GI3GXP-OK1VR/P	27/10/58
GI/ON	GI3GXP-ON4BZ	5/1/56
GM/DL	GM2FHH-DJ1XX	29/5/55
GM/EI	GM3BDA-EI2W	12/6/51
GM/HB	GM3HLH-HB1RG	4/8/57
GM/ON	GM3EGW-ON4BZ	21/11/53
GM/OZ	GM2FHH-OZ2IZ	18/6/57
GM/PA	GM3EGW-PE1PL	22/4/53
GM/SM	GM2FHH-SM6ANR	22/7/55
GW/DL	GW5MQ-DL4XS	22/9/51
GW/EI	GW2ADZ-EI8G	19/4/51
GW/F	GW2ADZ-F3LQ	14/5/50
GW/HB	GW2ADZ-HB1IV	14/9/53
GW/ON	GW2ADZ-ON4YV	13/5/50
GW/OZ	GW2HIY-OZ5AB	14/6/59
GW/PA	GW2ADZ-PA0HA	13/5/50
GW/SM	GW2ADZ-SM6QP	1/7/53
CN2/CN8	CN2AO-CN8MB	26/6/55
DL/OZ	DL6SW-OZ2FR	4/3/51

G6XA heard 25 counties and worked 21 of them. For G3HBW (Bushey Heath), best DX during the contest was GW2HIY in Holyhead, at 215 miles; he worked a total of 138 stations. Under the conditions, which were no more than fair, that was going some. G3JAM (Woodford Green) raised 28S in about five hours' operating over the same week-end, five of them being new, bringing him to 269S worked. Like A.J.D., G3JAM found the glass irregular during the period.

G3LAR is in Tooting, S.W.17. "in a very heavily populated part of London." His transmitter runs 15w. in a QQVO3-10 as PA, the receiver is an ECC88 Cascode with A.2521 g.g.t. pre-amp, and the beam is a pair of 5-ele Yagis spaced 3/4-wave, at 40 ft. G3LAR reports that he now has the frequencies of about 520 U.K. stations, to an accuracy of "probably  $\pm 5$  kc." The station record is 435S in 37C, with seven countries worked and 13 heard, including OE1WJ by meteor-scatter.

## The Zone Plan

This month's mail has included various comments to the effect that the two-metre band plan appears to be breaking down—and not all because West Country stations are moving into the London Zone. There is a general tendency to go LF, with the result that much unnecessary QRM is being caused.

Now, this is a very bad thing, and is against the interests of all users of the two-metre band. Over the years, the Zone Plan—first introduced by SHORT WAVE MAGA-

ZINE in 1949—has proved its worth abundantly, and there can be few who would deny this, or that the Plan is a good thing in principle. As it has also been justified by practical experience, it is to be hoped that all concerned will continue to observe the principle—and to *search the whole band*.

## The Annual Convention

This year's UHF/VHF Convention will be held on May 21 at the Kingsley Hotel, Bloomsbury. Applications for tickets should be made to: F. G. Lambeth, G2AIW, 21 Bridge Way, Whitton, Twickenham, Middlesex.

## Long-Distance Reflections

On February 27, the Americans tried a 100-ft. balloon—see p.544, February—at a height of 200 miles, and good results were obtained on VHF by reflection. This was by way of being a pilot test for putting one into orbit.

When the new long-distance space vehicle *Pioneer V* was fired on March 11 to orbit the sun, Jodrell Bank was in control, the frequency being 378 mc; the return signal is understood to be on 960.05 mc, and it is hoped to maintain communication up to about 50 million miles.

And touching again upon Fylingdales Radar, it would seem that—whatever its contribution to security—one result that can be anticipated is severe interference with radio and TV reception over a wide area in the neighbourhood of Whitby. Thousands of kilowatts of pulsy noise cannot easily be confined to one narrow frequency band. Every old bedstead and piece of loose guttering will be a rectifier, to radiate local noise!

## Conclusion

We look forward to many more reports and claims for the tables.

Deadline for May is **Wednesday, April 20**, with everything VHF addressed to your A.J.D. If you are out, go carefully over Easter—if you are in, keep a close watch on the VHF bands should the weather conditions be propitious. With you again on May 6, all being well. 73 de A.J.D.

DL/SM	DL2DV-SM7BE	10/3/51
EI/DL	EI2W-DL3VJ/P	29/8/52
EI/F	EI2W-F8MX	9/8/56
EI/ON	EI2W-ON4BZ	21/9/51
EI/OZ	EI2W-OZ5AB	14/6/59
EI/PA	EI2W-PA0FC	10/10/53
ON/LA	ON4BZ-LA1KB	4/7/53
ON/LX	ON4TR-LX1MS	? ?
ON/OZ	ON4BZ-OZ2FR	3/6/51
ON/SM	ON4BZ-SM7BE	2/3/53
ON/SP	ON4BZ-SP6CT/P	28/10/58
ON/9S4	ON4UD-9S4BS	19/8/56

## LECHER LINE DEVICE FOR TVI EXPLORATION

INGENIOUS METHOD FOR  
FREQUENCY LOCATION

R. L. Rooney (W2CQI)

**W**HILST Lecher wires are often used on the bench for determining the approximate frequency of VHF and UHF transmitters, the author has also found them quite useful in locating the source of TVI. Lecher wires provide a reasonably accurate means of determining the frequency of any signal interfering with television reception, and a test assembly can be built up easily and with a minimum of expense.

An experimental model may be constructed in one evening that is portable enough to be taken round to the area of television interference.

Two bare wires of 14 or 16g., or lengths of aerial wire, are mounted on a 3½ in. x 1 in. x 48 in. piece of wood. The wires are arranged parallel with approximately ½ in. spacing and are left open at both ends. (The author used the smallest size turnbuckles available at one end to keep the wires taut.) The open end of the line connects to the television receiver input terminals with two 6 in. leads. The line impedance of the set up is near-enough 350 ohms.

### Application

In use the Lecher wires are connected to the receiver input terminals and shorted by a moveable metal bar so as to form a half-wave shorted stub at the receiver input terminals. The influence of the high and low input circuit makes it possible to analyse even the very weak forms of television interference by watching the picture tube and listening to the audio. The Lecher wires will assist in determining whether the interfering signal is on the high or low side or directly on the picture frequency. Inter-channel interference can be analysed if it is due to cross-talk within the television receiver by shorting out the offending sound or video channel at the input terminals. In cases where an interfering beat signal is produced within the receiver by an outside signal in conjunction with the receiver oscillator, the situation can be analysed by exploring along the parallel lines and removing the offending signal. In a case where the need is for a permanent stub at the receiver, the Lecher wires can be used to determine the length of the stub to within close tolerances.

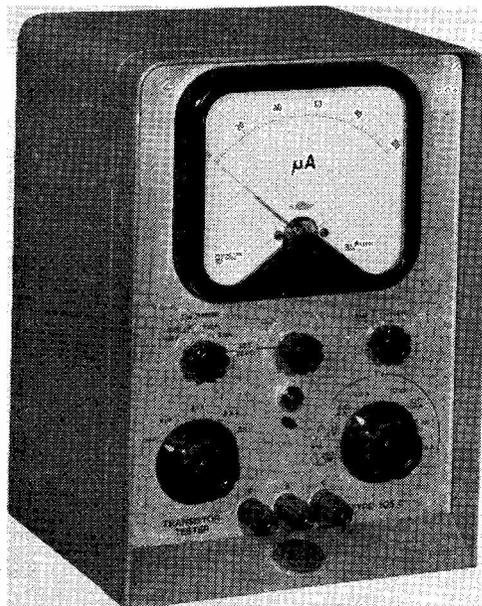
Continuous coverage with the Lecher wire device can be obtained down to the IF frequencies of the average television receiver and through the 28 mc band. This is done by using lengths of 300-ohm line cut in multiples of 4 feet and connected between the Lecher wires and the receiver input terminals. The instrument can be calibrated in inches along one side of the wire, and in megacycles along the other side, including the short connecting wires. The

calibration should include only the higher television frequencies within the range of the device when used without the additional lengths for continuous coverage.

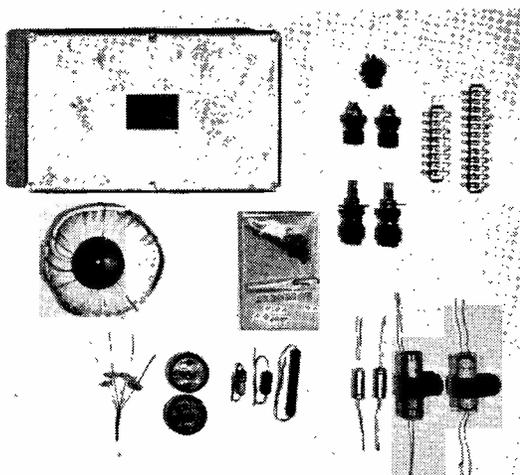
The author found one uncertainty in the use of this instrument. On the highest ranges, it is possible to reflect a low impedance at the receiver terminals, using a full wavelength on the Lecher wires rather than a half-wave. This could cause an error in determining the frequency of an interfering signal and is avoided by starting exploration of the wires at the highest frequency ranges of the instrument. It was found that the efficiencies of the wires at the half and at the one wavelength points are very nearly equal.

### LOOK THEM THROUGH

In our Readers' Small Advertisement columns this month some £1,500-worth of branded equipment is offered for sale at very reasonable prices. There are also several interesting "wants." Those wishing to use Reader space for the May issue of SHORT WAVE MAGAZINE should endeavour to get their advertisements in before Easter. The cost is 3d. a word, including abbreviations, with a minimum charge of 5s. Notices, with remittance, to: Advertisement Manager, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.



The new Labgear Transistor Tester, on which all essential transistor checks can be carried out, including the selection of matched pairs for push-pull operation.



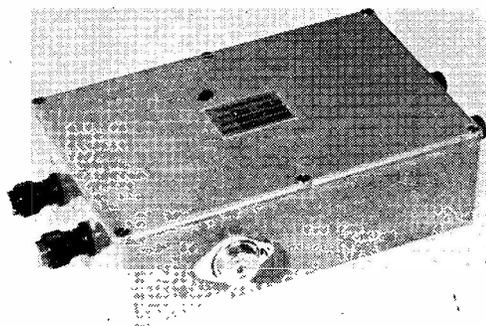
Items supplied for the construction of a typical Transpack DC/HT Converter unit, of which some details are given in the article below.

#### TRANSIPACK DC CONVERTER UNITS

A very interesting range of transistorised HT supply units is offered by the firm of Transpack, there being four types available in kit form, which considerably reduces their initial cost. These units are the Type 505 (rated at 100w. output), the 606 (60 watts), the 707 (30 watts) and the Type 808 (giving 180w. at 600 volts).

All units incorporate a toroidal-wound multi-tap transformer, from which outputs of 50-550v. can be obtained in 50v. steps. The secondary winding can also be split into independent sections, each with its own rectifier circuit, so that considerable flexibility is attainable as regards output, with full-load efficiency of the order of 95%.

"Transipacks" are constructed in heavy die-cast boxes, acting as heat-sinks for the transistors, which are of the 13 amp. type. While a positive-earth 12v. input is the standard, the units can be modified for



Finished appearance of the Transpack Type 505 DC conversion unit, rated at 100 watts output from a 12v. supply, and available in kit form.

primary DC supplies of 6, 24 or 28 volts, with the input floating if required.

For the kit assemblies, the general design is such that construction is easy and the wiring-out simple. A test on the Type 505 Unit, rated 100 watts at 500v., with an oscillator (or "switching") frequency of 1,000 c/s nominal, showed an efficiency of 90% down to 60 watts output, with a temperature rise on full load only a few degrees above ambient. The size of the Type 505 is 7½ ins. by 4¼ ins. by 2 ins. deep, and the total weight just under 4 lbs.

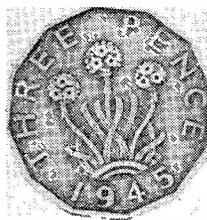
Apart from amateur-band mobile working, there is a wide range of practical applications for DC/HT converters of this type, including aircraft HT supply, commercial UHF/VHF mobile, industrial TV, and transportable electronic equipment of all types for which HT is required with only a low-voltage DC power source available.

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

We are always glad to have contributions for this feature, which has appeared regularly in SHORT WAVE MAGAZINE for many years. The main requirement is a clear, sharp print, which should be accompanied by full notes covering equipment used, on-the-air results, and details such as date of licensing, radio interests and activity and such other personal information as the contributor cares to give. All this can be in "own words," as we write the story from the material sent in. (But if you can make your contribution read like "The Other Man's Station" in any recent issue, so much the better.) All material used is paid for on publication—and we are just as interested in the new timers as in those who have been on the air for years, nor do we mind whether the station is large and elaborate, or small and simple.

#### TIGER RADIO—NEW DIRECTOR

We are asked to announce that Major P. Wolfendale, G2FQT, has taken over the appointment of managing director of Tiger Radio, Ltd., 136 River Way, Christchurch, Hants.



The Plessey Type L miniaturised potentiometer is of ½-in. diameter only and is the smallest of the spindle-operated type in production. It can be obtained in all usual values and the voltage limitation is 350v.

## LONGER LIFE FOR DRY BATTERIES

### PRACTICAL RE-CHARGING TECHNIQUE

J. B. Dance, M.Sc.

**D**URING the last war dry batteries, which are normally considered to be of the primary type, were difficult to obtain, and any way in which their life could be extended would have been most useful. Methods such as warming the used battery in an oven or boring a hole in it and filling the hole with an acid solution were found to give a temporary improvement in performance, but the results obtained were not good enough to make such methods worth while.

When the writer was a schoolboy he could not resist attempting to charge some small single dry cells from a charger intended for use with 2-volt accumulators. In view of the fact that he had been told by his physics master that dry cells cannot be charged, he was most surprised to find that the performance of the cells was very much improved by the charging!

A steady DC current passed through a dry cell in the reverse direction to which the cell normally delivers a current during discharge only makes a relatively small improvement in the performance of the cell. A charger which was not very effective contained a full-wave rectifier, and its output consisted of pulses of current as shown in Fig. 1(a). Another charger which was effective with dry batteries contained a half-wave rectifier and produced pulses of current through the rectifier, as shown in Fig. 1(b). Between each pulse the rectifier allows a small reverse current to pass through it and through the cell. This reverse current is believed to enable zinc to be deposited more evenly on the inside surface of the zinc case during charging, and also helps depolarisation. If the reverse resistance of the rectifier is very high, somewhat better results can be obtained by connecting a resistor across the half-wave rectifier, as shown in Fig. 2. This increases the amount of reverse current passing through the cell during the intervals between the charging current pulses. The output current of the circuit of Fig. 2 is shown in Fig. 1(c).

The chemical reactions taking place when a dry cell is discharged are not fully understood, and the charging process is probably even more complicated. When a discharging current is taken from a dry cell, the voltage between its terminals steadily falls, due to polarisation and increasing internal resistance. Much of the useful life of a dry cell is lost because the depolarising agent (manganese dioxide) is unable to prevent polarisation of the cell, and the voltage falls to a level at which the cell is useless. If a hole develops in the outer zinc case, the voltage of the cell usually falls quickly to zero.

But if a cell is *only slightly discharged and is re-*

*charged immediately*, it becomes virtually a new cell, and the *discharging and charging processes* may be *repeated almost indefinitely*. The total charge taken from a cell during repeated charging and discharging is often greater than could have been supplied by all of the original zinc in the case. Zinc must therefore have been deposited, during the charging process, on the inside of the zinc case. From this, it seems fair to say that the dry cell *can* be used as a true secondary cell, within certain limits.

### Charge Rates

The relatively few experiments carried out by the writer have indicated that the best results are obtained if the resistor in Fig. 2 is adjusted until the current passing through the cell in the intervals between the charging current pulses is about one-twentieth of the charging current. If a single cell of the "U2" size is being charged, a charging current of the order of 0.05 amp. (mean) is suitable. The charging rate may be less than this if desired, but if it is increased to several times this value, the cell will become too hot. The charging current may be increased in approximate proportion to the cell size. A convenient value of the resistor in the Fig. 2 circuit is about 400 ohms if a "U2" cell is being charged. If an HT battery is to be charged, the transformer secondary voltage and the resistor value should be much higher. The values need only be approximately correct, but the cells on charge should not be allowed to get more than slightly warm.

In order to obtain the maximum life from a dry cell, it is important that it should be charged as soon as possible after it has been used, even though its performance is still perfectly satisfactory. Although the writer has brought "dead" cells temporarily

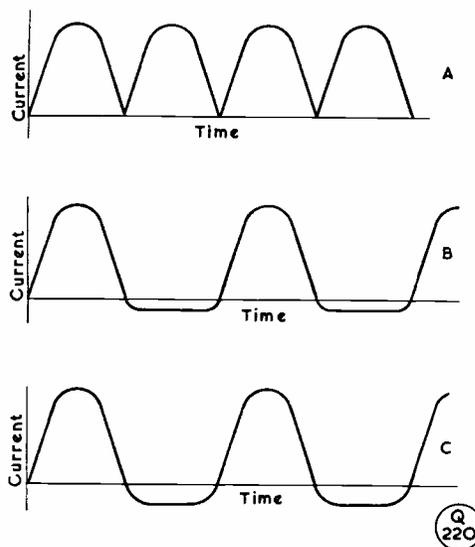


Fig. 1(A). The output from a full-wave rectifier type of battery charger. (B) Output of a half-wave rectifier with a small reverse current. (C) The current flowing through the cell using the circuit of Fig. 2.

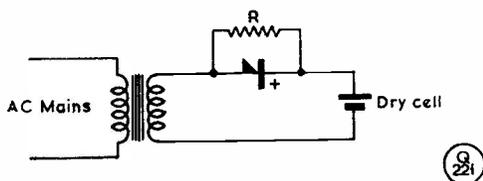


Fig. 2. Circuit for charging a dry cell, as used by the author and discussed in the text.

back to life, it is only worth while charging a cell if it is first done fairly early in its useful life. Cells should be recharged frequently. If a hole has formed in the zinc outer case of a cell, it is not worth while attempting to recharge that cell at all.

After a cell has been charged, its voltage may be well over 2 volts, but it falls to the normal 1.5 volts after a load has been applied for a quarter of an hour or so. Care should therefore be taken that the cell is not connected across any filaments which

it could burn out whilst its voltage is higher than normal immediately after it has been charged.

The length of the charge should be such that about 50% more ampere-hours are passed from the charger through the battery than has been taken from the battery during use. R. N. Eubank states that (*QST*, June 1944) the charging current taken by a dry cell decreases fairly rapidly after the start of charging and then remains steady for some time. After this it suddenly increases. Charging should be stopped when this sudden increase is observed, as further charging is detrimental.

If care is taken, the life of dry batteries can be increased many times by the recharging process. The internal resistance of a charged cell may be even lower than that of a new cell. The method outlined here, and based on actual tests, is practicable both for large companies regularly using many dry cells and also for the private user who simply wishes to make torch or HT batteries last longer. Apparatus for charging dry batteries has been made commercially and was very successful during the war.

### THE MOBILE RALLY PROGRAMME

There are several interesting events scheduled for the next few months, the venues being well spread over England in both space and time. When are we going to hear of a Mobile Rally organised in Scotland or Northern Ireland? Edinburgh would be a fine objective for mobileers from the South, and one in, say, Bangor, Co. Down, would have the added interest of the sea-crossing to Belfast, with the prospect of some /PM working from the rarer GI counties for anyone who could combine it with a holiday trip. The Isle of Man is another possibility for those who would like to sign GD/M—and, by the same token, GC/M, though as yet we have never heard of any mobile activity from the Channel Islands.

**April 10:** Amateur Radio Mobile Society Rally at Overstone House, near Northampton. off the A.43 Northampton-Kettering, commencing 12.00 noon. Lunch available by advance booking; entrance to grounds 6d. a head; good parking and catering. One of the earliest and most successful rallies was held here in April, 1956. Talk-in stations will be G3NMS on 160 metres, and G3HTC/P on two metres. Further details from: G. E. Storey, G3HTC, 10 Avon Road, Sunbury-on-Thames, Middlesex.

**April 24:** North Midlands Mobile Rally at Trentham Gardens, Stoke-on-Trent. General arrangements as last year; Trentham is two miles south of Stoke-on-Trent, on the A.34, which is the main Birmingham-Stafford-Stoke road.

**May 8:** Cheltenham Mobile Rally, Montpelier Gardens, Cheltenham (in the middle of the town). Talk-in stations will be G3GPW/A on 1920 kc and G3IER/A on 145.39 mc. A contest run through the Cotswolds is planned to test navigating ability and driving skill as well as the efficiency of the mobile gear. Full details from: J. H. Smith, G2DUG, 27 Scott House, Arle, Cheltenham. An equipment dis-

play is being arranged on site, and good local catering will be available, with ample parking space.

**May 8:** Thanet Radio Society Mobile Rally at Hugin Site (of local archaeological interest) on the A.256 between Sandwich and Margate.

**May 15:** A.E.R.E. Harwell Amateur Radio Club Mobile Rally at Harwell, on the A.34 Oxford-Abingdon-Newbury road. This rally is of particular interest because a limited number of those attending will be given a conducted tour of the Atomic Energy Research Establishment; advance booking for this part of the meeting is *essential*, and full name, address and occupation *must* be given when applying for inclusion in the tour, which will start at 3 p.m. There can be no variations or v.i.p. favour about this, as A.E.R.E. security regulations are involved. The meeting opens at 2.30 p.m., with G3NNF/A doing the talk-in on 1930 kc, and G3NNG on 144.10 mc; the ladies will be taken off on a coach trip round about Oxford, and there will be buffet tea at 5 p.m., winding up with a raffle. Ample parking space will be available, and the inclusive cost is only 4s. Intending visitors are asked to notify in advance, to facilitate the catering arrangements, while those wishing to tour the Establishment *must* apply before April 30. Tickets, with remittance 4s. and s.a.e., from D. T. Boffin, G3HS. A.E.R.E. Amateur Radio Society, 6 Highworth Road, Faringdon, Berks.

**May 22:** Northern Mobile Rally. Harewood House, between Leeds and Harrogate, on A.61. This event is being organised by the Spen Valley Amateur Radio Society, and the Rally secretary is J. Charlesworth, G3IJC, 23 Craven Lane, Gomersal, nr. Leeds, to whom application should be made for further information.

**June 26:** West of England Mobile Rally at Longleat House, near Warminster, Wilts.—details later.

**July 10:** South Shields and District Amateur Radio

Club Mobile Rally—details later.

**July 17:** Southern Counties Mobile Rally, Beaulieu Abbey, near Southampton, at the Vintage Car Museum established by Lord Montagu of Beaulieu. This event is being organised by several southern Clubs in co-operation, and detailed arrangements will be announced in due course.

Rally organisers are reminded that as soon as possible after the event they should let us have a

report, with an estimate of total attendance and a count of the number of vehicles actually fitted mobile; the proportion per band (which is a useful figure to establish) can usually be estimated from the logs of the talk-in stations—or from the visitors' book, if there is a column for /M bands operated.

We shall, of course, also be glad to see good photographs to illustrate the Rally story, and payment will be made for those used.

## NYASALAND DX-PEDITION

SOME EXPERIENCES  
SIGNING /ZD6

M. Geddes (ZE3JO/ZD6)

**H**AVING already operated as VQ1, VQ3 and VQ4JO, plus a short spell as ZE3JO/VQ2, the writer decided on another trip for last July, to Nyasaland. ZE3JJ and ZE8JJ were invited to make it a threesome, and thus arrangements were made to travel by car from Salisbury, the home QTH, to Zomba, Nyasaland, via Tete and over the Zambesi River, in Portuguese East Africa (CR7).

The following equipment was taken (which was enough, considering there were three operators in a fairly small car): A Panda Cub, which covers 160 to 10 metres, either phone or CW, with about 30/40 watts; the B2 transceiver (of VQ1JO memories); and an Eddystone 888 receiver belonging to ZE3JJ. ZE8JJ supplied the car, a French Renault "Dauphine."

We left Salisbury on July 25, intending to make Zomba, some 425 miles away, about lunch time the following day. We had not, however, considered the Customs and, upon arrival, close to the Rhodesian/Portuguese border, we found that they were closed until 6 a.m. the next morning, which necessitated some considerable delay with a night stop at Mtoko in Rhodesia. At dawn on the next day we left and, without any major complications, arrived at our destination at the Zomba Hotel, where accommodation had been reserved by ZD6NJ—who is, incidentally, the postmaster for that town, and who assisted us to the extent of even putting up an aerial, and later loaned a ground-plane.

About 11 p.m. that evening the first calls under the prefix of ZD6 were sent out, and several stations were contacted until the 14 mc band closed up. The next day the rigs were transferred to a garage at the back of the hotel—which caused some amazement to the local African population, who were not quite sure as to what was going on. Here we were able to operate two rigs at the same time on 14 mc. That evening one of the local ZD6's invited ZE8JJ to operate from his own station, situated well away from the Zomba plateau, and during the short visit he knocked off about 600 contacts. ZE3JJ and the writer continued at the hotel with the two low-power

rigs, and found that 20 metres was the best bet for working W's over the long path, well away from the mountain. It was here that a pile-up occurred, especially when the three stations using the calls ZE3JJ/ZD6, ZE8JJ/ZD6 and ZE3JO/ZD6 were on the same band at the same time! In fact, the similarity of calls was confusing at times when someone who had just worked ZE3JJ tuned across the band and heard either '8JJ or '3JO.

Operation continued for four days and five nights, with ZE8JJ/ZD6 making 600 contacts, and ZE3JJ/ZD6 and the writer another 300, mostly on CW but with the odd phone QSO with the locals and the ZE's on 40 metres. At the end of the week we were obliged to leave Zomba and return to Salisbury. It was then that we experienced the worst part of the whole trip; the roads seemed to have got more dusty and more corrugated; then we had a puncture near Tete in sub-tropical heat; the brakes failed except the hand brake; and finally the lights let us down. The last 150 miles of the trip made us realise that perhaps we were trying to do too much in too short a time—with bad roads, a small car, plus three heavy passengers.

Another trip is contemplated early in 1960, into either ZS7 or ZS8, and possibly a week on the return journey in ZS9. Whether or not SSB is used remains to be seen, but it is certain that a more substantial means of transport will be used. Regarding conditions during the ZD6 trip, they appeared to be similar to those in Rhodesia, and despite low power, it was still possible to have numerous contacts, with the added help, of course, of the /ZD6.

### OBTAINING DL2 LICENCES

Licensed U.K. operators in the Services—or those qualified to hold a G permit by virtue of having passed the R.A.E. and the Morse Test—can obtain a DL2 licence for amateur operation in Germany on application to: Joint Communications Electronics Board, British Forces Germany, c/o Hq. B.A.O.R., B.F.P.O. 40. Proof of qualification must accompany the application, together with the Unit C.O.'s permission in writing to establish an AT station, which will be subject to routine inspection by the German authorities.

### THE FSK CONVERTER—SUPPLY NOTE

We are informed by R. V. Wright, 4A Nepal Avenue, Atherton, Manchester, that he can supply polarised relays and centre-zero (45 mA) meters suitable for the FSK Converter described by G3BST.

# NEW QTH's

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

**G3GVL**, J. S. Orme, 13 Wirksworth Road, Duffield, Derby. (*Re-issue.*)

**G3LCH**, M. Pharaoh, 1 Madeira Road, Mitcham, Surrey.

**GW3NMQ**, P. J. Crosbie (G3NMQ), R. Signals, c/o 21 Med. Regt., R.A., Rhyl, Flintshire.

**G3NRQ**, C. D. Higgins, 45 Cromwell Road, Grimsby, Lincs.

**G3NTB**, D. N. Staines, 6 Hollywood Croft, Great Barr, Birmingham, 22A.

**GW3NTR**, C. Bowman, 9 Prince Street, Newport, Mon.

**G3NUE**, G. W. Tibbetts, 108 Old Hills, Callow End, Worcester.

**G3NVL**, R. F. Allen, 90 Church Lane, Acklam, Middlesbrough, Yorkshire.

**G3NWX**, D. Forster, 37 Belmont Gardens, West Hartlepool, Co. Durham.

**G3NXV**, R. H. Jennings, 12 Dark Lane, Hollywood, nr. Birmingham. (*Tel.: MAYpole 3040.*)

**G3NXV/A**, R. H. Jennings, Wood Rising, Ashurst Road, West Moors, Ferndown, Dorset. (*Tel.: Ferndown 2332.*)

**G3NYH**, S. R. Climas, 70 Aldershot Road, Fleet, Hants.

**G3NYZ**, A. F. Stafford, The Roundlets, Cockshutt Lane, Melbourne, Derbyshire.

**GM3NZI**, B. G. Taylor, St. Margarets, Irvine Crescent, Bathgate, West Lothian.

**G3NZK**, P. G. Robson, 2 Middle Road, Higher Denham, Uxbridge, Middlesex. (*Tel.: Denham 2810.*)

**G3NZO**, G. D. Kidder, 44 Ingestone Road, Woodford Green, Essex.

**G3NZS**, H. W. Parkes, 75 St. Stephens Road, Smethwick, 40, Staffs.

**G3NZT**, A. Hodgkinson, L.D.S., V.U.M., 794 Bury Road, Brightmet, Bolton, Lancs. (*Tel.: Bolton 8046.*)

**G3NZU**, B. Gilbert, 12 Rutland Close, Ashton - under - Lyne, Lancs.

**G3NZV**, A. J. C. Park, 118 Fabian Crescent, Shirley, Solihull, Warks. (*Tel.: SHI 2151.*)

**G3NZW**, S. I. W. James, 5 Abbey View, Marsh Lane, London, N.W.7.

**G3NZZ**, R. J. Copeland, Moor View, Harbour Road, Kilkeel, Co. Down.

**GM3OAE**, Amateur Radio Club, Third Submarine Squadron, Faslane, Helensburgh, Dumbar-tonshire.

**G3OAG**, S. J. Gilbert, 3 Charlbury Avenue, Prestwich, Manchester, Lancs.

**G3OAR**, G. Greenwood, 23 Gloucester Road, Lupset, Wakefield, Yorkshire.

**GM3OAV**, D. G. Varney, 17 Avenel Road, Knightswood, Glasgow, W.3.

**G3OAW**, R. G. Schilling, 112 Sydenham Park Road, Sydenham, London, S.E.26.

**G3OBB**, K. J. Rhodes, 54 Edward Road, Somerford, Christchurch, Hants.

**G3OBD**, P. V. Dutfield, 20 Stokes Avenue, Poole, Dorset.

**GW8NQ**, N. L. Stephens, Hollybank, Hereford Road, Monmouth.

## CHANGE OF ADDRESS

**EI3AF**, J. O'Connell, 27 Collins Park, Donnycarney, Dublin.

**G2BHZ**, E. F. Gadsden, c/o Heriot Lodge, 123 Belle Hill, Bexhill-on-Sea, Sussex.

**G3AAX**, T. R. G. Lampard, 26 Woodside Road, Weybourne, Farnham, Surrey.

**G3BXI**, J. C. Farlow, 49 Mount Pleasant Road, Chigwell, Essex.

**G3CEB**, P. M. Scaddan, 34 Princes Road, Holland-on-Sea, Essex.

**G3CPP**, J. Smith, 35 Pages Hill, London, N.10.

**G3ENB**, W. E. Gates, 71 Bradford Road, East Ardsley, Wakefield, Yorkshire.

**GM3FIU**, W. B. Gray (*ex-G3FIU*), 12 Ryefield Avenue, Drumpellier, Coatbridge, Lanarkshire.

**G3GEU**, E. H. Hildreth, 6 Claremont Drive, West Hartlepool, Co. Durham.

**GI3HNM**, C. E. Davies, 5 Easton Crescent, Belfast, 14. (*Tel.: Belfast 746717.*)

**GW3ILZ**, T. E. I. Bromham, 18 Warwick Road, Sketty, Swansea, Glam. (*Tel.: Swansea 24572.*)

**G3IVK**, D. P. T. Evans, 83 Rowallan Road, Sutton Coldfield, Warks.

**G3LAK**, H. Barron, 44 Tudor Way, Hillingdon, Uxbridge, Middlesex.

**GM3LVG**, W. S. Gray, 44 Heathryfold Circle, Aberdeen.

**G3MAW**, D. Noble, Heather Bank, Hillings Lane, Menston, Ilkley, Yorkshire.

**GM3MFE**, D. Aird, 16 North Castle Street, Alloa, Clackmannanshire.

**GW3MMU**, P. M. Fulton, 36 Sunnybank Road, Blackwood, Mon.

**G3NAC**, J. M. Hern, c/o Officers' Mess, R.A.F. Station, Little Rissington, Cheltenham, Glos.

**G3NAD**, N. Richardson, The Lodge, Conishead Priory, nr. Ulverston, Lancs.

**G3NEU**, T. L. Painter, 10 Poplar Avenue, Chasetown, Walsall, Staffs.

**G3NFE**, G. C. White, St. Mary's Cottage, 67 Handbridge, Chester, Cheshire. (*Tel.: Chester 21811.*)

**G3NOP**, D. J. Peacock, 12 Bradley Road, Huntercombe Place, Nuffield. Henley - on - Thames, Oxon.

## AMENDMENTS

**G3IOR**, P. J. A. Gowen, 71 Links Avenue, Upper Helleston, Norwich, Norfolk. **NOR.60.M.**

**G3NIB**, Amateur Radio Club, British Timken, Division of The Timken Roller Bearing Company, Duston, Northampton, Northants.

# THE MONTH WITH THE CLUBS

By "Club Secretary"

(Deadline for May issue : April 14)

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

IT has been said before, and there is no harm in repeating it, that the most important person in Amateur Radio is that new SWL who will probably, one day, become a fully-fledged amateur and will inherit the tradition that *you* and your associates are even now helping to build and extend.

For this reason the most important aspect of Club activities should be the R.A.E. coaching, the Morse classes and the general "helping hand" for the beginners, who are not by any means all youngsters.

Some Clubs are far too off-handed in this respect; others really organise things well. Those who wait for young members to turn up are on the first steps of the road to extinction. Those who make approaches to local schools, youth movements, Cadets, A.T.C. groups and so on are working in the right direction.

All those who were youngsters and beginners not so long ago will realise that they went through a difficult phase at first; but that as soon as they were accepted into a local Club as friends and equals, their difficulties were almost over.

We shall be glad to have comments from Clubs on this subject. Does *your* Club extend the full welcome to the novice and even the would-be novice? How many new call-signs have come on the bands as a result of *your* endeavours?

## More About Newsletters

Further to the comments in this space last month, and arising from some interesting correspondence on the subject, it seems that many of those charged with the duty of compiling the Club newsletter have great difficulty in getting material of a "newsy" character to put in it. People, they say, will not bother to write in about what they are doing. Of course they won't—they never do! The only way to get news is to chase for it. This means some sort of organisation.

In the case of a Club, the best thing is to appoint one or two committee members, or regular attenders at meetings, for the specific job of finding out from other members what they are doing, and providing the compiler of the newsletter with notes on which he can base his activity report. It should also be under-

stood, by Club members generally, that what they may be heard saying or doing over the air is liable to be used as news for the activity report.

While it would obviously be difficult in the case of large Clubs with regular meeting-attendances of 40 or more (which in any case do not have many of these problems) it is also a good thing to publish in the newsletter, by call-sign, all those who attend any meeting. This is one of the ways in which a small Club can be kept together.

## GENERAL NEWS

**Bradford**, covering as far ahead as June, mention a "Top Score" meeting with valuable prizes on May 10, and a visit to Holme Moss BBC station on June 14. Their meetings begin at 7.45 p.m. at Cambridge House, Little Horton Lane, Bradford 5.

**Crystal Palace** forward their Newsletter No. 49, from which we learn that they will be having a Technical Film Show on Saturday, April 9; at their recent AGM they elected G2FKZ chairman and G3FZL secretary. Club awards were made to G3BCM, G3NUE and Mr. Dave Pearce.

**Dorking** also had their AGM, at which they elected Mr. F. H. Hearnden chairman, G3AEZ secretary and G3JEQ treasurer; on March 22 they had a talk by G3LBA, followed by a Junk Sale. The Club also paid interesting visits recently to Broadcasting House and to the Cable and Wireless Terminal.

**Greenford** report membership increased to 25 and the arrival of a new call-sign—G3NXX; they meet on alternate Tuesdays, 8 p.m., in Room 1, Greenford



When the Southgate, Finchley & District group ran a stand at their Local Wood Green (London, N.22) show, they put on a working exhibit signing GB3SRA. Three transmitters were used to cover all bands 160-10 metres, with two HRO receivers. In the photograph, left to right, are: G3KDF, G3MXQ, G3MBL, SWL Hodson, G3MWF and G3MXX. All contacts made by GB3SRA have been duly QSL'd.

Community Centre, Oldfield Lane. On April 12 there is to be a talk on GPO Radio Systems; April 26, Break-In (G3JVL); and on May 28 G3IZW/A will be on the air from the Greenford Community Association's Open Afternoon.

**Halifax** report a record attendance of members and friends for their recent Film Show of amateur activities. The subject for April 12 is Fire Prevention; April 26 is an Informal Evening; and May 3 the AGM.

**Harrow** meets every Friday, 8 p.m., in the Science Lab. at Roxeth Manor Secondary School, Eastcote Lane; visitors cordially invited. On April 22 there is

a lecture on Meteor Scatter, by G3HBW, the expert on the subject, and on May 6 the Club Constructional Contest takes place. Alternate Fridays are practical or Ragchew evenings.

**North Kent** send in their Newsletter No. 32, recording that they recently had a "full house" for a demonstration of modern commercial Hi-Fi equipment by Messrs. Broadway Radio. On March 10 the technical experts tore apart the subject of Oscillators; on March 18 they celebrated their tenth anniversary with a luncheon; and on April 14 they are to have a talk (Messrs. Elliott Bros.) on Transistor and UHF Devices. Congregational Hall, Bexleyheath, at 8 p.m.

**Southgate, Finchley and District** (Newsletter for March 1960) recently welcomed a YL DX visitor--SM7BFO. Meetings have covered the subjects of Workshop Practice and Tools, and Aerials. On April 14 there will be a talk by KW Electronics on their own equipment, including the new SSB transmitter.

**Acton, Brentford and Chiswick** had a successful demonstration of Amateur TV by G3MEO/T at their February meeting; on April 19 G2CAJ will be demonstrating his Two-metre Gear. Meetings are on the third Tuesday at 66 High Road, Chiswick, W.4, when new members will always be welcome. **Cannock Chase** record a good attendance to hear about the manufacture and testing of Vitreous Enamel Resistors, followed by a demonstration of Labgear equipment by G8RY. Preparations are now going ahead for Field Day "on the biggest scale ever."

**Peterborough** enrolled seven new members in seven minutes at their recent meeting, at the home of G3KPO, formerly GC3KPO. Arrangements have been made to gather there on the first Friday of the month, 7.30 p.m., and anyone interested in Amateur Radio or short-wave listening is welcome.

**South Birmingham** report that their last Mobile Rally, at Lickey Beacon, was the most successful yet. There were seven mobiles and about 30 members taking part. Each mobile was given a code card and, at the start, a coded eight-figure grid reference. He had to find a telephone box and call control with this number transposed into code, when, if correct, he received the next one. Seven points were covered, and G3NXV was the winner, both of this and of the previous two rallies.

**Worcester** have re-formed, and at a recent open meeting at the YMCA some 38 interested people gathered together. All branches of Amateur Radio will be catered for, and regular meetings arranged as soon as possible; meanwhile the clubroom is open seven nights a week and is being furnished and decorated. A callsign is being applied for, and members can enjoy the full facilities of the YMCA, including the canteen. Future programme includes a Mobile Rally, an exhibition, Field Day and social events. All details from the hon. sec. (see panel).

**Blackburn** meet every Friday, 8 p.m., at The Corporation Hotel, Revidge Road. They recently held their Annual Dinner, and their new officers are G3NCZ, secretary; G3EKP, treasurer; Mr. J. Will, chairman. Their station G3NTJ is now active on Top Band. **Lothians** are organised up to June (see "Club Calendar" for next meetings). With a total membership of 38. they are averaging 24 per meeting.

NAMES AND ADDRESSES OF CLUB SECRETARIES REPORTING IN THIS ISSUE:

**ABERDEEN:** W. K. Heggie, GM3NHW, 80 Leslie Terrace, Aberdeen.  
**ACTON, BRENTFORD & CHISWICK:** W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, London, W.3.  
**ALDERSHOT:** A. M. Laidler, Pondsides, Sandy Lane, Churt, Nr. Farnham, Surrey.  
**BARNET:** D. K. Robinson, 3 Castle Road, London, N.12.  
**BLACKBURN:** K. Heap, G3NCZ, 138 New Bank Road, Blackburn.  
**BRADFORD:** D. M. Pratt, G3KEP, Glenluce, Lyndale Road, Eldwick, Bingley.  
**CANNOCK CHASE:** P. J. Davis, G3NTU, 45 Broad Street, Bridgtown, Cannock.  
**CHELTENHAM:** J. H. Moxey, G3MOE, 11 Westbury Road, Leckhampton, Cheltenham.  
**CLIFTON:** C. H. Bullivant, G3DIC, 25 St. Fillans Road, London, S.E.6.  
**CORNISH:** G. W. Hubber, 9 Cardrew Terrace, Redruth.  
**CRAWLEY:** R. G. B. Vaughan, G3FRV, 9 Hawkins Road, Tilgate, Crawley.  
**CROSBY:** K. R. Coates, G3IZT, 132 The Northern Road, Crosby, Liverpool 23.  
**CRYSTAL PALACE:** G. M. C. Stone, G3FZL, 10 Liphook Crescent, London, S.E.23.  
**DERBY:** F. C. Ward, G2CVV, 5 Uplands Avenue, Littleover, Derby.  
**DORKING:** J. Greenwell, G3AEZ, Wigmore Lodge, Beare Green, Dorking.  
**GREENFORD:** E. Gray, G3CPS, 111 Ravenor Park Road, Greenford.  
**HALIFAX:** A. Robinson, G3MDW, 7 Upper Brockholes, Ogden, Halifax.  
**HAM-HOP:** G. A. Partridge, G3CED, 17 Ethel Road, Broadstairs, Kent.  
**HARROW:** S. C. J. Phillips, 131 Belmont Road, Harrow Weald.  
**HASTINGS:** W. E. Thompson, G3MQT, 8 Coventry Road, St. Leonards-on-Sea.  
**I.R.T.S.:** T. O'Connor, EI9U, 280 Collins Avenue, Whitehall, Dublin.  
**LEEDS:** D. Dinsdale, 8 Quarry Mount Street, Leeds 6.  
**LOTHIANS:** L. Lumsden, 33 Hillview Drive, Edinburgh 12.  
**MIDLAND:** C. J. Haycock, G3JDJ, 360 Portland Road, Birmingham 17.  
**MITCHAM:** M. Pharaoh, G3LCH, 1 Madeira Road, Mitcham.  
**NEWARK:** J. R. Clayton, 160 Wolsey Road, Newark.  
**NORTH KENT:** D. W. Wooderson, G3HKX, 75 Mount Road, Bexleyheath.  
**NOTTINGHAM:** E. C. Weatherall, 16 Avebury Close, Clifton, Nottingham.  
**PETERBOROUGH:** D. Byrne, G3KPO, Jersey House, Eye.  
**PURLEY:** E. R. Honeywood, 105 Whytecliffe Road, Purley, Surrey.  
**SOUTH BIRMINGHAM:** G. E. Simonite, G3JAO, 19 Wistaria Close, Northfield, Birmingham 31.  
**SOUTHGATE, FINCHLEY & DISTRICT:** A. G. Edwards, G3MBL, 244 Ballards Lane, London, N.12.  
**SOUTH YORKSHIRE:** W. Farrar, G3ESP, 2a Highbury Avenue, Bessacarr, Doncaster.  
**SPEN VALLEY:** N. Pride, 100 Raikes Lane, Birstall, Leeds.  
**STOCKPORT:** G. R. Phillips, G3FYE, 7 Germans Buildings, Buxton Road, Stockport.  
**STOKE-ON-TRENT:** V. J. Reynolds, G3COY, 90 Prices Road, Hartshill, Stoke-on-Trent.  
**TORBAY:** G. Western, G3LFL, 118 Salisbury Avenue, Barton, Torquay.  
**WIRRAL:** A. Seed, G3FOO, 31 Withert Avenue, Bebington, Cheshire.  
**WORCESTER:** R. D. Pritchard, G3NXE, 42a Avon Road, Worcester.  
**WORTHING:** P. J. Robinson, G3KFH/T, 46 Hill View Road, Worthing.

Alternate Thursdays, 7.30 p.m., in the YMCA, South St. Andrew Street, Edinburgh 2.

**Mitcham** send their March Newsletter, with details of the A.G.M. and consequent re-shuffle of officers; G3LCH is now secretary, G3NGY chairman and G3NFA treasurer. Recent meetings included a "Do-it-Yourself" talk by G3NFA, a Ragchew and Field Day Discussion, and a Junk Sale. All meetings on Fridays, 8 p.m., at The Cannons, Madeira Road, Mitcham.

**Stoke-on-Trent** report that G3EHM's R.A.E. Lectures are well attended, and that G3COY intends to carry on where they leave off, after R.A.E. is over. They hope for a large crop of callsigns in the near future! The members are building equipment in readiness for the city's Jubilee Celebrations, when the city's own callsign, GB3SOT, will be on the air.

**Torbay** held their Annual Dinner, at which G5QA appealed to all members to do everything possible to encourage SWL's. G2GM, chairman, recorded a record attendance of 92, and congratulated Mrs. Western, G3NQD (and the wife of G3LFL) on holding the first "YL" call in the area. A greetings tape recording from G3BBF (now at 5A2CV) was played—this was recorded in a QSO between 5A2CV and G3LHJ. The dinner was followed by a social evening and the usual "draw," for which several fine prizes were donated.

**Worthing** will meet on April 11 (Adult Education Centre, Union Place) for a demonstration of Centimetre Equipment, by G3JHM. The next meeting will be on May 9, and the annual "Bucket and Spade Party" has now been fixed for July 10.

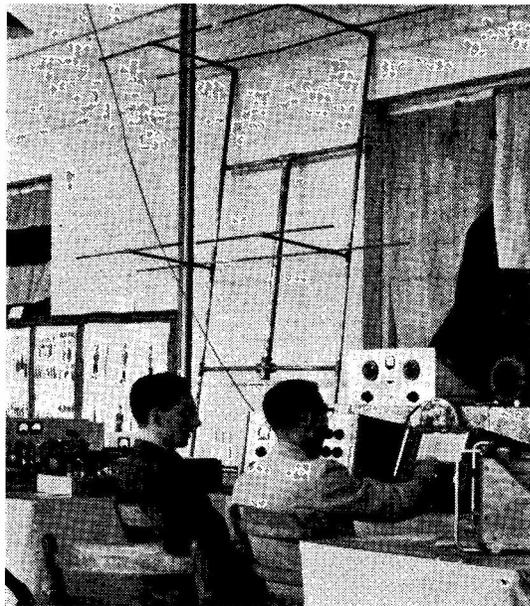
**Crawley** will meet on April 28 at The Brewery Shades, High Street, to hear G4ZU on Aerials for Restricted Spaces; visitors and prospective members will be most welcome. Slow Morse classes are being held, and arrangements are in hand for an exhibit in the Crawley Carnival, Whit Monday.

**Derby** report that their clubrooms have been decorated and refurbished. G3ERD is also being overhauled. Meanwhile they meet on April 6 for a talk by G5YY—Retrospect 1928-1960; on April 13 for a D-F Practice run; on the 20th for a talk on Practical Application of Transistors; and on the 27th for an Open Evening.

**Hastings** report membership now up to 35—a great improvement. On April 5 they are showing a Mullard film on Transistors for Receivers; April 19 is booked for Top-Band Topics—a general discussion. Both at 33 Cambridge Road, Hastings, 7.30 p.m.

**Newark** held their tenth AGM in March, with G3ELJ in the chair. Future meetings will be on the first Tuesday at Northgate House, Newark, and activities planned include Field Day discussions, Club D/F events, talks on Radio Control of Models, Communication Receivers, Aerials and Hi-Fi. Next year's chairman is G3JNL; Mr. J. R. Clayton continues as secretary.

**Stockport** recently held a dinner-dance, at which 70 members and guests danced to the music of G3GVH and his Band! G2ARX was presented with a wall clock in recognition of 40 years' service to the Club—a wonderful record indeed, on which we, too, congratulate him. Nine members will be taking the R.A.E. this year.



The Hastings group usually put G6HH/A on the air for their local Home and Hobbies Exhibition. This time, they had a Vanguard transmitter and an Eddystone 888A receiver, together with a display of members' equipment. When this photograph was taken, the operators were G3HRI (left) and G3MQT.

**Clifton** really go to town with films on April 8, when they show four Mullard films *plus* a Russian scientific film—with the co-operation of **Crystal Palace**. On April 29 they will have a demonstration of B.C.C. Products, by G8BU. Their Club station now covers the two-metre band. Meetings every Friday, 7.30 p.m., and Sundays from 11.30 a.m.

**Cornish** held their March meeting at Falmouth YMCA, with several talks and a discussion on Aerials. The first certificate for working 25 Cornish stations has been awarded to G3DTB (Ilminster) who achieved it in five months.

**Crosby** had their AGM in March, and elected

#### CLUB CALENDAR IN BRIEF

- Aberdeen:** April 1, Morse, by GM3ALZ and '3LER; April 8, "Huge Sale" of Radio Equipment (hundreds of items); April 15, GM3BSQ Activity Night.
- Barnet:** April 26, Lecture on Collins Radio Equipment.
- Bradford:** April 5, Field Day Arrangements; April 26, The Development of Television.
- Crystal Palace:** April 9, Technical Film Show; April 26, Morse class and Technical lectures.
- Leeds:** April 6, Radio Controlled Models; April 27, Visit to Roneo Ltd.
- Lothians:** April 7, Simple Receiving Equipment and Conversions of ex-W.D. Gear (GM3BQO); April 21, Amateur Radio Pre-War (GM6X1).
- Midland:** April 7, The New Trunk Dialling Scheme (Brig. F. Jones, C.B.E.); April 19, Radio Pictures of the Sky (K. Stevens).
- South Birmingham:** April 21, Two Metres, by G3BMN and G3TTH.
- Southgate:** April 14, KW Electronics Products.
- South Yorkshire:** April 12, General Discussion on Aerial Systems; April 28, How to Succeed in R.A.E. (G3ESP).
- Spen Valley:** April 13, Post Office Mechanisation; April 27, Open Meeting.
- Wirral:** April 8, Constructional Contest; April 22, Open Night.

G3JUA chairman, G3IZT secretary and G3JDT treasurer. On April 5 they have a talk on Wave Propagation; April 12 and 26, Open Nights, with operation of the Club station; and April 19, Transistors (G3JDT). The station layout is being re-organised and a BC-342 has been added. All meetings are at 8 p.m. at Colonsay, Crosby Road South, Liverpool.

**Cheltenham** meet on Wednesdays at 8 p.m., and are somewhat tied up at present with the coming Mobile Rally—see "Mobile Rally Programme," elsewhere in this issue. They are also organising some aerial tests in readiness for Field Day; these will take place at the usual site, on Sundays. **Nottingham** have an Open Night and Morse practice on April 5 and 19; Talk on Alignment of Superhets on April 12; Mobile Equipment (G3GXZ) on April 26; and R.A.E. Classes on the 7th, 14th, 21st and 28th.

The **Irish Radio Transmitters' Society** forward *The News* (Vol. 12, No. 1), six foolscap pages of news and gossip. They have now divided Eire into five regions, and it is proposed that their representa-

tives get together on a net frequency on one of the LF bands. The Society's president is EI6W, secretary EI9U, and treasurer EI9Y.

**Purley** have their next meeting on April 22, at the Railwaymen's Hall, Whytecliffe Road, when there will be an "Any Questions" session, with no holds barred. Good luck to the panel!

The **International Ham-Hop Club** is making excellent progress, with an ever-growing list of U.K. members, and many requests for visitors from overseas to call upon them; readers from abroad who are contemplating a trip to Britain or Eire this year should certainly write to the hon. secretary, I.H.H.C.

**Aldershot** would like to see a lot more of their licensed members return to the fold, especially as it is intended to get the Club station into operation. Lecture notes are being prepared and will be issued to all those taking the technical course for the R.A.E. Meetings are weekly on Wednesdays at Gibraltar Barracks, with one a month at the Cannon Hotel, Victoria Road, on the second Wednesday. All in the district interested in any way in Amateur Radio should contact the hon. secretary (see panel).

#### TELEVISION LICENCE INCREASE

According to the G.P.O., the 10-millionth domestic TV licence in the U.K. was issued some time during December last. The rate of growth is illustrated by the fact that in 1947 there were only 18,135 licensed TV receivers in Britain. The B.B.C. now gives 98% coverage of the U.K., and the I.T.A. 91%.

#### RUSSIAN RADIO ORGANISATION

It is reported that a new body, the USSR Radio Amateur Federation, has been set up and an inaugural meeting held in Moscow. It is to be hoped that one of the first actions of the U.R.A.F. will be to get those prog operators cleared out of the 10-metre band.



Interior of the new Daystrom factory near Gloucester. It was officially opened on December 7. Occupying about 10,000 sq. ft., some 22 kits of all types are now offered in the Heathkit range, using British components throughout. All kits are assembled and packed on the spot, and the aim is same-day despatch from stock. Sample kits are always tested against assembly instructions, and everything possible is done to ensure that kits can be built up with the certainty of satisfactory results.

## 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.

## SITUATIONS VACANT

**R**OYAL AIRCRAFT ESTABLISHMENT, BEDFORD, requires ELECTRONICS MECHANICS to serve as Research and Development Craftsmen (Special) for interesting work on airfield radio, radar installation and instrumentation equipment. Pay starts at 227/8 (including 38/- merit lead) for a 44-hour 5-day week, and is re-assessed within three months up to 259/8, according to ability. Revised pay will be retrospective to date of entry. Good prospects of houses within a reasonable time for applicants living outside the area.—Apply to Personnel Branch (SWM), Ministry of Aviation, Royal Aircraft Establishment, Bedford.

**A**IR MINISTRY have vacancies for civilian **RADIO TECHNICIANS** at Royal Air Force, Carlisle, and at other R.A.F. Stations throughout the United Kingdom, for the servicing, repair, modification and testing of air and ground radio and radar equipment. Commencing salary (national) (according to age) is £525-£670 p.a.; max. salary £795 p.a. These rates are subject to a small deduction at certain provincial stations and to a small increase in London. Annual leave, 3 weeks 3 days, increasing to 4 weeks 2 days after 10 years' service, 5 weeks after 20 years' service, and 6 weeks after 30 years' service.—Apply, giving details of quals. and exp., and mentioning this advertisement, direct to the Officer Commanding, No. 14 Maintenance Unit, Royal Air Force, Carlisle, or to Air Ministry, C.E.4b, London, W.C.1, for vacancies in other areas; or any Employment Exchange, quoting "Carlisle 701."

## TRADE

**CR-100 RECEIVERS**, overhauled, excellent condition, noise limiter, manual, £17 10s. 0d. T.1131 VHF-Tx's, £18. 1000v. at 500 mA power-packs, 100-watt modulator units, £4 each. Driver/PA units (Ex-T.1131), £3. RA1B Rx, with mains supply unit, £13. BC375E high-power Tx, with tuning units TU5B, TU6B, TU8B, and TU10B, modified for 20m., working condition, manual, £20 o.n.o.? (p. & p. on above, £1). 1100-0-1100v. Xformers at 500 mA, 25s. (p. & p. 5s.). Tested valves: 12AU7, 12AX7, 12AT7, 6L6, at 5s.; KT66, 6s. 6d.; 6J5, 1s. 6d.; FW4/500, 4s.; EF50, 7s. 6d. per doz. All valves post free.—B. R. Jessop, G3NOO, Hamble House, Hamble, Hants.

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

**WANTED FOR CASH:** Good clean communication receivers and SSB equipment. Please state price. — Short Wave (Hull) Radio, 30/32 Princes Ave., Hull. (Tel. 189553.)

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

## Make no mistake . . . Morse is still the most important factor for the Radio Operator

The great advantage of The Candler System of MORSE TRAINING is that all the apparatus you need is your Short Wave Receiver and a simple Morse Key and Buzzer or Oscillator. No expensive Records and Players or miles of tape and costly Recorders—just the simple gear you will always be using in your Station.

Most important of all, you listen and learn from "LIVE" traffic—The Real Thing. That is why CANDLER has been teaching Morse Operators successfully all over the world for nearly 50 years.

And don't forget, you do not require a partner, you practise at home when you like and how you like and if you wish you can pay as you learn.

Write now enclosing 5s. stamp for Candler "Book of Facts" and particulars of Courses and plans of payment—without any obligation.

### CANDLER SYSTEM CO.

(Dept. 55) 52b ABINGDON ROAD · LONDON · W.8

[Candler System Company, Denver, Colorado, U.S.A.]

## SURPLUS SALE

To clear warehouse we offer our remaining stocks of surplus gear at giveaway prices. All orders handled in strict rotation and all goods offered subject unsold.

**RF AMPLIFIERS TYPE AM33/ART.** 25-100 mc/s. with pr. 836 and pr. 4E27 or HK257B. The bargain of the year at only £4/17/6. NEW and BOXED. See "Short Wave Magazine," Oct./Dec. 1959.

**RESISTANCE UNIT 231** containing 12, 50 watt non-inductive 80 ohm resistors, 15/-.

**BC906D FREQUENCY METER.** NEW 32/6.

**OSCILLATOR 37.** 20-80 mc/s. 807 PA. 230v. A.C. Used, mostly complete. Working order not guaranteed, 35/-.

**COMMAND RX's.** Sold out.

**PART OF BC610 WHIP.** Four sections screw-in. 12ft. long, 10/- each, four for price of three.

**MIDGET VARIABLES.** 3 gang 55 55 35pfd., 3/- each or £3/10/- box of 50.

**B9A MOULDED VALVEHOLDERS** with screens 11/6 doz. Micalax ditto 13/6 doz. gross lots less 25%. 10 gross lots less 50%.

**AR88 chokes** (10H 100m/a) 3 for 18/6, special prices large quantities.

**UX 4-pin vibrators,** 3/- each, 22/6 doz.; £6/10/- per 100.

**XTALS.** Octal 4.6 mc/s. U.S.A. 2-pin 6159, 6181, 6203 kc/s. Random British 2-pin between 4 and 6.9 mc/s. all 6 for 7/6. 6AG5's 6 for 6/-.

**PARMEKO Trans.** 200-250v. input 750-630-0-630-750v. 96 m/a (OK for 140 m/a) 6.3v. 2A. 4v. CT 3A. NEW £1 each.

**TABLE TOPPERS,** 620-550-375-0-375-550-620v. (see previous advertisements) 42/6 each.

All above goods carriage paid UK mainland. We regret we cannot accept overseas orders. S.A.E. enquiries.

For valves, etc. see February's advertisement.

FOR CALLERS ONLY a wide variety of miscellaneous surplus at rock bottom prices.

## JOHN ANGLIN

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

**R.C.A. 5 element Yagi arrays** on 16in. mast support 420 Mc/s., 35/- (5/-). **P.O. RACKS**, de-luxe heavy pattern with channel sides drilled and tapped 36in. high, 50/- (10/-), 72in. high, 90/- (12/6). **Taylor 10B Test Sets** only 63/- (5/-). **Milliammeters** 2½in. 0/1 20/- (2/6); 0/30 or 0/100, 12/6 (2/6). **R.C.A. Modulation Driver Transformers** for ET. 4332, 15/- (3/6). **R.C.A. Filament** ditto 190/260v. to 10v. 3.25A CT twice, 15/- (3/6). **85 watt Woden Modulation**, 42/6 (5/-). **200 Watt Marconi** ditto 62/6 (7/6). **American Auto Circuit Breakers**, re-settable 10, 15, 25, 35 amps, all 5/- (1/6). **MOTOROLA POLICE CAR TRANSMITTERS** 30/40 Mc/s; F.M. 6v. input. 10 valves. 30 watts. £12/10/- (12/6). **BC-6591 TRANSMITTER RECEIVERS** 6, 12 or 24v. input, with separate Power Unit, £12/10/- (15/-). **PLESSEY 6 FT. TRANSMITTER CABINETS** open front for standard 19in. panels, full length rear door with latch, ventilated top and sides, £4/10/- (20/-). **R-201 BRIDGE UNITS** give D.C. output from Radio Receiver for teleprinters, undulators, etc. 230v. input, £12/10/- (15/-). **DA-30 OUTPUT VALVES**, 20/- (1/-). **40-IN. MOBILE WHIP AERIALS**, one-piece, with loading coil in base effectively increasing length to 12ft. American super finish, 35/- (5/-). **AMPLIFIERS AMERICAN**, 40/250 ohms input, 300 and 2000 ohms output with 2=12J5 and 2=12A6; 28v. input, with dynamotor, 9in. x 5in. x 5in., 20/- (5/-). **300 FT. BRAIDED COPPER WIRE AERIALS**, U.S.A., 4/6 (2/-). **COLLINS HIGH-VOLTAGE AERIAL KNIFE SWITCHES** on 4½in. stand-off insulators on 5in. x 2in. base. SPST, 7/6 (2/6). **BENDIX FILAMENT TRANSFORMERS**, 230v. to 6.3v. 3a. C.T. 3 times and 6.3v. 1.3a. once, capable large overload, 20/- (3/6). **CHOKES, RELAYS AND TRANSFORMERS**. Hundreds of different types in stock—send for lists. **TELEPRINTER EQUIPMENT, RECTIFIERS AND CONVERTERS** for operating from Receivers. Lists available. **NEW AMERICAN TRYLON LATTICE LADDER TOWERS**, 50ft. high, with everything ready to erect, £60 carriage paid, England and Wales.

Send for 40 page list of over 1,000 different items

Amounts in brackets are carriage England and Wales.  
We have large quantities of "bits and pieces," and can probably help your needs. Please enquire — everyone answered.

**P. HARRIS**  
**ORGANFORD                      DORSET**

**BARGAIN OFFERS**  
**IN VALVES**

OZ4 ... 5/-	6C5 ... 5/-	9D2 ... 3/-	EF36 ... 5/6
1R5 ... 7/-	6C6 ... 6/-	12A6 ... 6/-	EF39 ... 5/-
1S4 ... 7/-	6D6 ... 6/-	12A7T ... 7/6	EF50 ... 4/6
1S5 ... 7/-	6F6G ... 6/-	12AU7 ... 7/-	EF80 ... 7/6
1T4 ... 6/-	6G6G ... 6/6	12AX7 ... 7/6	EF91 ... 5/-
2X2 ... 4/-	6H6 ... 3/6	12J5GT ... 3/6	EL32 ... 5/-
3D6 ... 4/-	6J5GT ... 4/-	12SN7GT14 ... 4/-	FW4/500 ... 8/-
3R4GY ... 15/-	6J5 ... 5/6	12Y4 ... 4/-	H63 ... 10/-
5U4G ... 7/6	6J6 ... 5/-	28D7 ... 5/6	KT33C ... 9/-
5Y3GT ... 7/-	6J7G ... 5/6	42 ... 8/6	KTW61 ... 7/-
5Z3 ... 10/-	6K7G ... 3/6	77 ... 6/-	KTZ63 ... 7/-
5Z4G ... 8/6	6K8G ... 7/6	78 ... 6/-	ML4 ... 7/-
5Z4 ... 14/-	6L6G ... 9/-	80 ... 8/-	MU14 ... 8/-
6AC7 ... 6/-	6L6 ... 11/-	807 ... 5/-	P61 ... 3/-
6AG5 ... 6/-	6N7G ... 5/6	954 ... 4/-	Pen46 ... 5/6
6AK5 ... 7/-	6SA7 ... 7/6	955 ... 4/-	SP41 ... 3/-
6AL5 ... 5/-	6SG7 ... 8/6	5763 ... 11/6	SP61 ... 3/-
6AM6 ... 5/-	6SH7 ... 7/6	7193 ... 4/-	UBF80 ... 8/-
6B7 ... 10/-	6S17 ... 7/6	9003 ... 6/6	UCH81 ... 8/6
6B8G ... 4/-	6SK7 ... 7/6	AC6/Pen ... 6/6	UCL83 ... 10/-
6BA6 ... 7/-	6SN7GT ... 6/-	AC/P4 ... 7/-	UY85 ... 6/-
6BE6 ... 7/-	6V6G ... 6/6	EA50 ... 1/6	VR90 ... 8/-
6BW6 ... 8/6	6V6GT ... 7/6	EB34 ... 2/6	VR105 ... 8/-
6C4 ... 6/-	6X5GT ... 5/6	EB91 ... 5/-	VR150 ... 8/-
6C5G ... 5/-	7V7 ... 3/-	EBC33 ... 6/6	

Please add 6d. postage per valve. Orders over £2 10s., post free.  
Terms: Cash with order or C.O.D. (C.O.D. 2/- extra).

Our list of Communications Receivers in first class condition available upon request. S.A.E. please.

**R. T. & I. SERVICE**  
ASHVILLE OLD HALL, ASHVILLE ROAD, LONDON, E.11  
Telephone: LEYtonstone 4986.

**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.

**NUMBER of QST and Short Wave Magazine issues** between 1946-'58. 2s. a copy; stamp requirements.—Box No. 2242, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**EDDYSTONE 888A**. S-meter, speaker, recently checked at works, as new, £85 o.n.o.?—G3DO, Brook House, Ladywood Road, Sutton Coldfield.

**FOR SALE: HRO-Senior**, complete with G/C coils, 50 kc to 30 mc, B/S on 14, 21 and 28 mc, Type D power unit and LS. Will deliver 40 miles. £29.—Scott Campbell, 43 Hilton Road, Alloa, Clackmannanshire.

**FOR SALE: G.E.C. BRT-454 Transmitter**, 150 watts, CW/Phone. In two 4ft. 6in. cabinets; no interchassis cables, RF power supply dismantled, handbook; £20 or offer?—Pannett, Coombe Abbey, Coventry.

**WANTED: 500 mA 20 Henry Choke**; also Swinging Choke 500 mA 5-15 Henry.—Noakes, 4 Baronsfield Road, Coventry.

**TOWER STEEL LATTICE**, 45ft., dismantled; buyer collects; £20.—Wright, 35 Mount Pleasant, Hertford Heath, Herts.

**"VALVES FOR VHF": QQVO6-40**, brand-new and tested, £3 each.—Capstick, 4 Oakfield Avenue, Whickham, Newcastle-on-Tyne.

**12 SET**, £10; **SX24**, good condition, £25; Williamson Amp., £5. **WANTED: Johnson Valiant Valves**, 7094, 811A.—Leslie, G3EMW, 108 Breakspear Road, South Ickenham, Middlesex. (Ruislip 7810.)

**QVO4/7 and RK75 valves**, 8s. each, or 3 for £1. Money-back guarantee. — G. A. Jeapes, 165 Cambridge Road, Great Shelford, Cambridge.

**LG**, 300 with power supplies, modulator, Z-match and Monimatch, £75. Collins TCS15 mobile rig, Transreceiver, double gen. power supply and helical whips for 160, 80, and 40 metres, £20. 40ft. 2in. steel sectional mast with guys, £5. Receivers: Hallicrafters SX24, 14; DST-100, 50 kc to 30 mc, £12; R1392 for 2 metres, £3; R1132, £2; R109, £1; Cossor 3343 Wobbulator/Sig. Gen., £4; T.1191 Sig. Gen., £2. Volume compression unit with power pack, £3. Buyers collect.—G3KAS, 21 Lingwood Gardens, Osterley, Middx.

**UNPACKED**, brand-new, superb "Hitachi" medium and short wave transistor portable, with leather carrying case, telescopic aerial, tuned RF stage; performs like a communications receiver; cost 40 gns.; offers over £22. HRO laboratory modified with 6AK5 front end, xtal calibrator, noise-limiter, all band-spread coils, power unit/speaker, relay supply/monitor, in very good condition, £25.—G3FYS, Walcot, Pine Glen Avenue, Ferndown, Dorset.

**WANTED: PSU**, 240v., two separate double-smoothed outputs, 600v. 250 mA, 400v. 150 mA plus 6.3v. 3 amps.—Particulars, price: GW3LSB, Pant-Derw, Betws-y-Coed, Caerns.

## SMALL ADVERTISEMENTS, READERS—continued

**WANTED:** LG.300 or TR.200/300 Transmitter. —Box No. 2243, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**AR** 88D, £45; K.W. "Vanguard," £45; Sender Type 36, £15.—GW2DLK, Llangefni, Anglesey.

**FOR SALE:** 6 and 8 mc xtals, 7s. 6d. each; many others, 3s. each; valves from 3s. each; 522 Tx, 12s. 6d.; s.a.e. lists.—Box No. 2244, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**IMMACULATE** Minimitter Converter, offers? Reason, rebuild.—S.a.e. to: Box No. 2245, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**BRAND-NEW** Hallicrafter's R-44/ARR5 Receiver, three wavebands, 27 mc to 145 mc; AM or FM, S-meter, AVC, BFO, ANL, selectivity, sharp or broad, £25.—R. V. Wright, 4a Nepal Avenue, Atherton, Manchester.

**MARCONI** CR150 Receiver; frequency coverage 2-60 mc; with power supply unit, phones, speaker and manual; in brand-new condition; cost £65; accept £38.—Box No. 2246, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**VALVES FOR SALE,** new and boxed: 813, 35s. each; QQVO6-40, 45s. each.—Box No. 2247, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**KEEN** 15-year-old SWL requires CR-100 or Eddy-stone S.640 in good order, reasonable price.—Please write: Graham Gaunt, 71 Gypsy Lane, Marton, Middlesbrough, Yorks.

**MINIMITTER** MR-37 Receiver, perfect; Mosley Tri-Band aerial, £30 o.n.o.?—Baily, Gatehurst Cottage, Pett, Hastings.

**NATIONAL HRO SENIOR, NINE COILS, MAINS POWER PACK, EXCEPTIONAL BARGAIN. ACT QUICKLY!!** £10 PLUS CARRIAGE.—TRACEY, 55 MARSHALL STREET, WISHAW, LANARKSHIRE.

**FOR SALE:** CR-100 with manual, little used, £15.—Watson, 3 Bartlow Road, Castle Camps, Cambridgeshire.

**BUG KEYS,** new all-brass on ebonite and mahogany base; sturdy job that will last a lifetime; sent on seven days' appro.; £3.—W. B. Stirling, GM6RV, East Lodge, Kerelaw, Stevenston, Ayrshire.

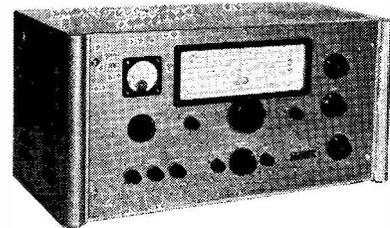
**HRO SENIOR** Mains Pack, loudspeaker, 0.5-7.0 mc and 1.7-4.0 mc (80 BS), coils, £15. Transformer 520-0-520v, 150 mA, 6.3v, 1.5A, 5v, 3A, £1 (carriage extra).—G3BNW, 13 Heywood Road, Alderley Edge, Cheshire.

**WANTED:** Cathode Ray Tube, long persistence, Type VCR.521.—Box No. 2236, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**NEW** LG300, 1250/350v. p/pack, filter and spare 813, FB, £80. Class-B mod., 75 watts, pair QVO6/20's with p/pack, £10. Panadaptor, 450-475 kc, manual, £25. HRO-MX, p/pack, 6BA6 RF section, 8 coils, bandspread 80-10, nice Rx, £20. 20ft. mast and motor, £5. Valves, etc.—Enquiries, please: D. Jackson, G3LVZ, 11 Back Lane, Sibley, Loughborough, Leics.

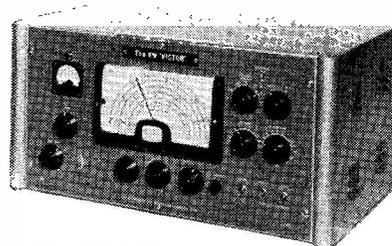
*... if you want a phone signal with "a punch" choose a K.W. transmitter you can't beat H.L.M.\**

K.W.'s "VICTOR" "VANGUARD" & "VALIANT" employ plate and screen high level modulation. Results prove that low efficiency systems of modulation cannot compare with H.L.M.



The KW "Viceroy"

- K.W. "VICTOR" complete 120 watt phone/c.w. transmitter
- K.W. "VANGUARD" complete 50 watt transmitter
- K.W. "VALIANT" complete transmitter with VFO—add your own power supplies, mobile or fixed
- K.W. "VALIANT" c.w. only transmitter
- K.W. "VALIANT" A.C. Power Supply
- K.W. "VICEROY" SSB transmitter



The KW "Victor"

**RECEIVERS**

GELOSO G209-R for CW-SSB-AM, HALLICRAFTERS SX100, SX101, SX110, etc. KW76 MOBILE (available again shortly).

**AERIALS and BEAMS**

MOSLEY Tribanders, GM3BQA Quad, 8KW Multiband Dipole with traps. NEW! The K.W. Junior Trap Dipole, 56ft. top, complete ready to erect with 75ft. low loss co-ax, £7.5.0, with 97ft. £7.15.0 K.W. Match. SWR Bridge, £6.15.0—Low and High Pass filters. Microphones, etc.

**\* High Level Modulation**

Send S.A.E. for details: Easy terms available on most of the above items.

**K. W. ELECTRONICS LTD**

Vanguard Works, 1 Heath Street, Dartford, Kent.

Tel.: Dartford 25574

## THE SPOT **G3EKX** THE SPOT

DERBY Tel. 41361

**ALLOY TUBING**,  $\frac{3}{8}$ " 8d.;  $\frac{1}{2}$ " 11d.;  $\frac{3}{4}$ " 1/1; 1", 1/6, per foot. Any length (up to 12 feet) sent anywhere in Br. Isles. 14' 2", O/D Strong Alloy Masts, 63/9 each, 7/6 carr., for one or two. Cast Couplers for joining two 14' masts, 8/9 each, 2/- P.P. Guy Support Clamps, 4/9 each. Pyrex Ribbed Insulators, 1/- 6d. P.P.

**2 METRE 5 ELE**, W. S. Yagi with bracket. Latest design sent in special box, 45/- each, 3/- carr. Get a "Birketts Better Beam," 12 $\frac{1}{2}$ " 3 section whips, 8/6 each, 2/- P.P. Rubber base, 5/-; solid base, 2/9, pair of 6L6, metal, 12/6, 1/6 P.P.

**2 Metre Signal Gen.**, 32/6, 7/6 carr. Eddystone P40 Rx. 55/-, 3/6 carr. Command Tx's, few, 45/- each, 3/6 P.P. 19 sets, 44/19/6, 15/- carr. 300 watt co-ax, 4 $\frac{1}{2}$ d. a yd. Extra low loss super co-ax, 1/6 a yd., 2/- P.P.

**FIL TRANS**, 6.3v. 1 $\frac{1}{2}$  amp., 200/240v. 1/p., 6/9 each, 1/- P.P. G209R and G212 Geloso Rx. and Tx., new £120 pair.

**MINIMITTER**, AM and FM, as new, 65s.

**COMMANDER**, Double super. All bands, 44s.

**EDDYSTONE 740**, all bands, 42s.

**EDDYSTONE 640**, all bands, 42s.

**HALLICRAFTER SX24**, all bands, 42s.

**HALLICRAFTER S27**, 27-144 Mc/s., 42s.

813 Valves, new, 50/- each, 2/6 P.P.

**SUPER SPECIAL** imported car aerial, 4 section, 72" long, 43. Chromium plated plus screened lead. Special 100" one available at 52/6 each. Smaller 4 section with lead, 30/- each. **SPEAKER** for mobile, 4 $\frac{1}{2}$ " round, Goodmans, 18/9 each, 1/6 P.P.

**GLOBE KING S.W. kit**, 3 coils, latest type, 10-100 metres. Very superior layout and design, 79/6 each, 2/- P.P.

**4 VALVE SUPERHET 90v.** H.T., 1 $\frac{1}{2}$  L.T., brand new in cabinet blue finish, 7" x 4" elliptical speaker, 15-130 metres, 2 ranges, powerful and selective, amazing bargain, 6 gns. each, few left.

### NORMAN BIRKETT LTD

THE SPOT, 26 OSMASTON ROAD, DERBY

## SAMSON'S SURPLUS STORES LTD

LONDON'S GREATEST DEALERS IN ELECTRONIC AND RADIO EQUIPMENT

**SPECIAL OFFER OF L.T. TRANSFORMERS, No. 1.** Gresham Oil Filled Potted Type. Pri. 230v. Sec. 50v. 2a., 6.3v. 5a., 6.3v. 1a., 6.3v. 0.6a., 5v. 6a., 5v. 3a., 42/6, carr. 4/-. **No. 2.** American Potted Type. Pri. 230v. Sec. 2 x 6.3v. C.T. 4a., 6.3v. 4a., 29/6, p/p 3/6. **No. 3.** Pri. 230v. Sec. 3 x 5v. C.T. 5a., 4v. 4a., 32/6, p/p 3/6. **No. 4.** Pri. 230v. Sec. 6.3v. 15a., 27/6, p/p 3/6. All transformers brand new and guaranteed. **H.T. TRANSFORMERS.** Tapped Pri. 110-230v. Sec. 450-0-450v. 106 ma., 6.3v. 2a., 6.3v. 1.5a., 5v. 3a. Potted type, brand new by Sperry, 35/-, carr. 5/-. Pri. 200-250v. Sec. 330-0-330v. 100 ma. 4v. 6a., 4v. 1.1a. Potted type by Woden, 22/6, p/p 3/6. **GRESHAM OIL-FILLED POTTED TYPE L.T. CHOKES,** 5H. 500 ma. Res. 30 ohms, 35/-, carr. 5/-. 5H. 250 ma. Res. 40 ohms, 19/6, p/p 3/6. **A.M. L.T. CHOKES.** Suitable for smoothing 12-24v. 5a. Res. 0.5 ohms, 15/-, p/p 3/6. **A.M. ACCUMULATORS.** 2v. 75 A.H. at 100-hr. rate, size 6 $\frac{1}{2}$  x 4 in., complete with carrying handle. New, 15/-, p/p 3/6. 4v. 18.5 A.H. at 12-hr. rate, size 7 x 4 $\frac{1}{2}$  x 3 $\frac{1}{2}$  in. New, 8/6, p/p 3/6. Miniature 2v. 3 A.H. size 4 x 1 $\frac{1}{2}$  x 1 $\frac{1}{2}$  in. Ideal for models, bell circuits, parking lights, etc. Supplied new with charging instructions, 2/6 each, p/p 1/6. Three for 6/-, p/p 2/-. Six for 10/6, p/p 3/-. Or twelve in strong wooden crate, connected to give 24v. 3 A.H. size 12 x 7 x 4 $\frac{1}{2}$  in. 19/6, carr. 5/-. **R.F. UNITS TYPE 25B.** Complete with valves, brand new, 12/6, p/p 3/6. **H.D. OHMITE RHEOSTATS.** 2 ohms. 7a., 15/-; 15 ohms. 2.24a., 12/6; 25 ohms. 0.75a., 5/6; 350 ohms. 25 watt, 3/6; 1.280 ohms. 0.14a., 6/6; 25 ohms. 2a., 15/-; 58 ohms. 0.6a., 8/6, p/p on all types 2/-. **BRITISH CAPACITORS.** T.C.C. Visconol 8 mfd. 600v. at 71°C. 7/6. T.C.C. 4 mfd. 250v. at 160°C. 3/6. T.C.C. 0.5 mfd. 2,000v. at 71°C. 3/6. Dubilier Nitrogol 8 mfd. 750v. wkg. at 71°C. 8/6. Dubilier 4 mfd. 800v. wkg., 4/6. Dubilier 2 mfd. 800v. wkg., 3/6. G.E.C. Pyranol 10 mfd. 300v. D.C. Tropical tubular, 3 $\frac{1}{2}$  x 2 in., 5/6. **AMERICAN CAPACITORS.** 10 mfd. 600v. wkg. tropical, 8/6. 8 mfd. 1,000v. wkg. tropical, 8/6. Sprague 2 mfd. 1,500v. wkg., 5/6. 15 mfd. 1,500v. wkg. tropical, 15/-, p/p on all types 2/-. All capacitors brand new & guaranteed. **BRAND NEW EQUIPMENT WIRE BY HENLEYS. P.V.C. COVERED.** 11,024 100-yd. reels, 6/-, p/p 1/6; 250-yd. reels, 13/6, p/p 2/-. 14,140 50-yd. reels, 5/-, p/p 1/-. **RUBBER COVERED BRAIDED WITH COTTON.** 40,0076 50-yd. reels, 6/-, p/p 1/6; 110,0076 50-yd. reels, 8/6, p/p 2/6. **HIGH GRADE P.V.C. SLEEWING.** 1.5 mm. 24-gross yd. reels, 7/6, p/p 2/-; 2.5 mm. 1 gross yd. reels, 5/-, p/p 1/6; 6 mm. 100 yd. reels, 10/-, p/p 2/6. **SPECIAL OFFER OF A.M. NEW AND BOXED VALVES.** RCA 1616, 3/6, p/p 1/-; six for 17/6, p/p 3/6; REL CV92, 8/6, p/p 1/6; VT90, 7/6, p/p 1/6; 1625, 5/-, p/p 1/6; 6K7, 3/-, six for 15/-, p/p 2/-; 6K8, 6/6; 6V6, 6/6; 6AR4, 4/6; 6AR12, three for 5/-, p/p 6d. **MICA, SILVER MICA AND TUBULAR CONDENSERS.** Good selection of values, 10/- for carton of 50, p/p 1/-. **CARBON RESISTORS.** 1/4 — 2 watt. carton of 100, good selection of values, 10/-, p/p 1/-.

169-171 EDGWARE RD., LONDON, W.2

PAD 7851

AMB 5125

### SMALL ADVERTISEMENTS, READERS—continued

**FOR SALE:** Vibra Pack, 12v.-250v., 100 mA, £1, plus carriage. K.W. "Vanguard" for sale, 10-160 metres, £40 plus carriage.—Livermore, 38 Alexandra Road, Cleethorpes, Lincs.

**COLLINS TCS (2)** covering: (a) 160, 80, 40; (b) 20, 15, 10 metres; each fitted 2-valve amplifier for xtal mike, 35-watt power pack, screened with leads, giving 500 volts PA, 250 volts VFO, 12-volt DC (relay), 6-3 heaters. Ample power Tx/Rx. £20 (o.n.o.). Prefer buyer collects.—Rogers, 17 Eccleshall Road, Stone, Staffs. (Tel.: Stone 5.)

**AR 88D** or E, wanted for private use by advertiser. Must be in mint condition; no second-quality accepted.—Details and price required to: Box No. 2237, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**813 PA**, £4. **AR77E**, £11. Taylor Multimeter Type 82, £3. Sig. Gen. Type 49, 'Scope Type 43, £5 each. Rx TBY VHF, £2. Valves: 6B4G (2), TZ40 (2), 7s. 6d. each; 813 (1), £1; 866a (2), 5s. 1500v. transformer, £1; 62A, 1355, 15s. each; UM3, £4. (Phone: WAX 5133.)

**OFFERS?:** BC-348R, unmodified, with two spare dynamotors. Two Rola speakers, 6in. and 8in. Two 27in. flares for public address, complete with units and spare diaphragm; 200/250v. input 350-0-350v. at 80 mA, 4v. at 4 amps., 4v. at 2-5 amps., new, in box. AVO Valve Tester with separate panel and adaptors. 65 valves, all new, in cartons, mostly obsolete types (e.g., AC/PEN, PEN 45DD, X76, etc.), 3s. each or 2s. each The Lot; s.a.e. for list.—Box No. 2238, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**EDDYSTONE 740** with matching speaker, S-meter and manual; overhauled by Webbs; £21. Seen evenings or week-ends.—Osborne, 8 Grange Road, Geddington, Kettering, Northants.

**NEW BOXED B7G** 2-metre crystals, 12050, 12083, 12133 kc, 10s. 6d, including post. Also 9500, 9700, 9750 kc. — D.M.P., Glenluce, Lyndale Road, Bingley, Yorks.

**DX 40-U TRANSMITTER**, mint condition, only a few hours' use, £25. R206 Receiver 0-55-30 mc, two RF, two IF, 3-position IF selectivity; same size as R107 but far superior; £15. Going UHF.—Acton, 55 Elizabeth Road, Sutton Coldfield, Warks.

**ADVANCE Constant Voltage Transformer**, i/p 190-260v. 50 c/s, o/p 230v. 150w. max, £5. Bradmatic semi-professional Tape Deck, amplifier, power unit, £70. Miles of Tape! Cadenza Ribbon Mike, £6. Etc.—Enquiries (s.a.e., please): P. W. Buck, 54 Ashford Road, Iford, Bournemouth. (Christchurch 2675.)

**FOR SALE:** Hallicrafters SX-24, "Skyrider Defiant," covering medium-wave to 40 mc, with amateur bands fully spread; RF stage, xtal filter, variable selectivity, noise-limiter, BFO, S-meter, RF and audio gains, tone control and send-receive switch. This receiver is in good mechanical and electrical condition, and has been adapted for touch tuning by a blind operator—see *Short Wave Magazine*, December 1950. Braille operating notes can be provided if required. Price £15 only. Inspection can be arranged.—Apply: W. Krohn, G6KJ, 20 Church Street, Buckingham. (Tel.: Buckingham 2349, any time.)

SMALL ADVERTISEMENTS, READERS—*continued*

**WANTED:** "Command" Transmitters and Receivers for 2-3 mc, preferably ARC5 T-18's and R-25's, or CCT-52232's and BC-454's, new and unmodified.—G3NES, Mellow End, Broad Oak, Canterbury.

**COLLINS 75A-1 Rx**, complete with matching speaker and manual, first-class condition, £135. Consider good Rx in part-exchange. Offers?—Poulter, 80 Endsor Street, Manchester, 16.

**WANTED: PRE-SELECTOR**, Radiocraft or similar, covering 14, 21, 28 mc; self-contained power supply; good appearance and working order essential.—Watts, 62 Belmore Road, Thorpe, Norwich.

**SALE:** 150w. CW, 100-watt Phone/Tx, Elizabethan type; modulator, p/packs, relays, control box. 160m. Tx, Phone/CW, power pack, relays, control box. No. 3 p/pack, 220v. 100 mA. All rack-mounted, £37 10s. 0d. Can deliver 100 miles approx. Reason for sale: Gone SSB.—G3JIE, 53 Salisbury Road, Norwich, Norfolk.

**WANTED: RF Unit**, modified for 14, 21, 28 mc, with power pack.—Please write: Hart. 117 Windermere Avenue, Ilkeston, Derbys.

**TRANSMITTER WANTED.**—Advertiser requires first-class 150-watt (CW only) amateur band Transmitter. Professionally-built miniature equipment preferred. Must incorporate up-to-date techniques and be built with components that have adequate reserve to ensure trouble-free operation over very long periods. Perfection is sought and payment will be accordingly.—Offers, please, to: Box No. 2239, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**TELEPRINTER TYPE 7B** required by amateur in South of England. May be interested in other types.—Particulars and price to: Box No. 2240, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**CRYSTAL CALIBRATOR**, spare valves, £2. Freq. Meter W.1191, £3 10s. 0d. Rx CR-100 with ATU and low-pass filter, £15. Elizabethan Tx, needs overhaul, offers? Buyer collects.—G3DGV, 58 Wyngate Drive, Leicester.

**FOR SALE:** B2 with three coils (80, 40, 20) and key, £10, o.n.o.?—Box No. 2241, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**SELL Panda Cub**, £30; Minimitter Converter, £12; Grundig TK20 Tape Recorder, £35.—G3NJM, 1 Bishopton Park, Ripon, Yorks.

**WANTED:** Minimitter Mobile Transmitter, control box. MC8 all-band converter, Jason FM tuner.—Platt, Underhill, Glenlyon Drive, Keighley, Yorks.

**PANDA CUB** for sale, FB condition, infrequently used, possible delivery £37 (or offer?)—G3MHV, 20 Upper Marsh Road, Warminster, Wilts. (Warminster 3227.)

**FOR SALE:** BC-453 (complete valves, connecting cables, tuning mechanism) and S.T.C. rotary converter, 12v. DC input; has been used as a car radio; £3 o.n.o.? **WANTED:** Manual and circuit of Hallicrafters SX24 "Skyrider Defiant."—Peter Ashley, 119 Sundale Avenue, Selsdon, South Croydon, Surrey.



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.

Suitable for use with AvoMeter, Multiminor and Avo Electronic Test Meter Leads. post free 15/- per pair

**AVO LTD** AVOCET HOUSE,  
92-96 VAUXHALL BRIDGE ROAD, LONDON S.W.1.  
VICtoria 3404 (12 lines).

A MEMBER OF THE METAL INDUSTRIES GROUP OF COMPANIES  
PC2

## G. W. M. RADIO

### MOBILE EQUIPMENT

Ex-Police Car Radio-Telephone.!

**RECEIVERS.** Valves: 5 EF91, 3 EF92, 2 EB91, 1 EL91 or equivalent. Crystal controlled (xtal not supplied). Internal 12 volt rotary 250 volts 60 ma. Covers single frequency in range 80-100 mc/s. approx. Ideal for fixed or mobile use on 4 metres or convert for other bands. In good used condition with valves, 30/-, carriage 7/6.

**SPEAKERS, WHARFEDALE.** 5in. in circular black crackle case. Standard 3 ohm. Ideal for any receiver, 15/-, postage 3/6

**FIST MIKES,** carbon with coiled stretch cable "Press to Talk" switch and Tx Rx control box, 15/-, postage 3/6.

**HANDSETS,** carbon microphone low impedance earpiece "press to talk" switch, with control box as above, 25/-, postage, 4/-.

Please note Transmitters cannot be sold by order of Ministry Watch next month's advert. for very useful parts, including modulation tranny, valves, etc.

**CHARGING METERS.** Moving coil 0-10 amps, tested and in good condition, 6/6, postage 1/3.

**CAPACITORS** pre-set 7 x 7 pf. 1/6 each, box of three 3/6, postage 6d. either.

**MARCONI CR100** Communications receivers, tested, £17/10/-, carriage £1.

Terms: Cash with order. Early closing Wednesday.

40-42 PORTLAND ROAD  
WORTHING - SUSSEX  
HUNDREDS OF BARGAINS FOR CALLERS

SMALL ADVERTISEMENTS, READERS—*continued*

**C**OSSOR Double-beam oscilloscope, Model 339A. £15.—G3JOL, Silver Plough, Pitton, Nr. Salisbury. (Phone: Farley 266.)

**S**ALE: Minimitter Amateur Band Converter, 1.5 mc. £10 o.n.o.?—Tupholme, 21b Brondesbury Villas, Kilburn, London, N.W.6.

**W**ANTED: *Radio and Amateur Radio Handbooks*, particularly 1945-55. Will pay cash. Also transmitters.—Reddings, Longdon Heath, Upton-on-Severn, Worcester.

**W**ANTED: G4ZU 3-band beam, rotation gear and telescopic mast; also Z-Match coupler and Miniscope.—G3MIX, 50 St. Mark's Crescent, Maidenhead, Berks.

**E**DDYSTONE 888, complete with S-meter and matching speaker, £75.—G3JYO, 27 Arundel Crescent, Solihull, Warwickshire. (ACO 1253 after 5 p.m.).

**N**EW VALVES, tested: 5B/254M (min. 807), 20s.; 1 5763, 10s.; N78, VR150/30, VR105/30, 7s.; 6AC7, 6AK5, 6AK6, 6X4, 6X5, 6SN7, 6V6, 5Z4, 9D6, 12AU7, 12AX7, 5s.; 6AM6, 4s., 6 for £1; many others; s.a.e. enquiries, please.—Taylor, 27 Glenluce Road, Blackheath, London, S.E.3.

**S**ALE: Miniciter, Mini-PA, Modulator, Power Packs and Ant. Coupler, complete, working order. First £30 secures. Reason: Purchased Tiger TR200/HF.—Box No. 2249, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**Q**QVO6-40A, QQVO3-20A, 4X150A, 829; sell to best offers within 7 days. WANTED: 6146's and good Acos microphone.—Box No. 2250, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**M**ETERS, 2in. square, 50 mA, 150 mA, 10/6; 60w. Mobile Transmitter; Phone, complete; £20. Genemotors, 400/700v. 200 mA, 90s. Add carriage.—G3ATL, Hugglescote, Leicester.

**W**ANTED: Set of Morse Code teaching records; good condition.—R. Adams, 71 New Road, Shoreham-by-Sea, Sussex.

**E**LECTRONIC Keyer, own power supply with vibroplex key; silent in operation; valve-controlled; £10 (buyer can call and test). Panda L.P. filter, £2; 2E39, £1 10s.; 100 *Bulletins* from 1951, £3; 80 *Short Wave Magazine*, £2 10s.; or £15 lot.—H. J. Lawn, 20 Croft Road, Godalming, Surrey.

**N**ATIONAL NC109 Receiver, as new, mint, £132; 3 months old, still under makers' guarantee; sacrifice, £85. First come, first served.—B. Lear, 1 Walters Terrace, Morrision, Swansea, Glam.

**G2ACC offers you —**

**Transmitting Valves** —G.E.C. TT21, 33/9; Mullard QV06-20 (6146) 40/-; QV04-7, 25/-; RGI-240A, 39/6; Brimar 5763, 20/-; 5R4GY 17/6.

**So-Rad Pi-net P.A. Choke** —150 watt r.f. input. Suitable for TT21, 813 or pair of 807's, QV06-20's, 6146's, etc. Single  $\frac{3}{8}$ " dia. hole mounting with ceramic feed-through for h.t. lead below chassis, 10/-.

**Disc Ceramic Capacitors**: 350v. wkg. —.01  $\mu$ F, 1/-; 500v. wkg. —.01  $\mu$ F, .001  $\mu$ F, .002  $\mu$ F, .003  $\mu$ F, .005  $\mu$ F, 7½d. each; 1400v. wkg. —.01  $\mu$ F, 2/-; 4000v. wkg. —.00047  $\mu$ F, 2/-; .001  $\mu$ F, 2/-.

**Eddystone Components** — Full range in stock.

Postage extra on orders under £3.

**CATALOGUE No. 11** — 56 pages, 108 illustrations on art paper. Over 2,000 new guaranteed items by best makers. 9d. post free.

**Southern Radio & Electrical Supplies**

SO-RAD WORKS . REDLYNCH . SALISBURY . WILTS

Telephone: Downton 207

**Special Offer****GM3BQA DUAL QUAD**

for 10 and 15 metres with single 75 ohm feed.  
Only £12/10/- carriage extra.

**TRIPLE QUAD**, 10-15-20 metres.  
£17 carriage extra.

SAE for details—

**FORTH MOTOR CO.** Dept. "M"  
Edinburgh Road, Cockenzie, East Lothian, Scotland

**SPECIAL AMATEUR LICENCE MORSE COURSE**

**COMPLETELY NEW METHOD** takes all the drudgery out of learning Morse. Passes secured in all cases, even after previous failures.

By using specially prepared recordings (3 speed L.P. player required) students learn automatically and without effort, perfect Morse in half the time required by any other method. S.A.E. full details Advanced courses also available

**G3HSC, 45 GREEN LANE, PURLEY, SURREY**

**BRASS, COPPER, BRONZE,  
ALUMINIUM, LIGHT ALLOYS**  
IN ROD, BAR, SHEET, TUBE, STRIP, WIRE

**3000 STANDARD STOCK SIZES**

**H. ROLLET & Co. Ltd.**

6, CHESHAM PLACE, LONDON, S.W.1.

SLOane 3463

Works: 36 ROSEBERY AVENUE, LONDON, E.C.1.

Branches at LIVERPOOL, MANCHESTER, BIRMINGHAM, LEEDS

"No Quantity too Small"

*Short Wave Magazine Advertising gives World-Wide Coverage  
in the Amateur Radio Field*

**NOW IS THE TIME  
TO THINK ABOUT  
AERIALS**

**GELOSO VFO UNITS.** 4/102 with New Dial and Escutcheon, Output on 80-10 metres for 2-807 or 6146's. Only £8.5.0. 3 valves to suit, 24/-. Post free.

**MULTI-WAY CABLE** 3/4" 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.

**NATIONAL HRO.** Crystal Filter Units 455 Kc with crystal set and phasing controls. new, boxed, Only 19/6. P. & P. 1/6.

**GOING MOBILE?**

Then you cannot afford to miss this.

**ROTARY CONVERTERS**  
6v. input, 250v. 125 mA output.  
ONLY 17/6 P. & P. 3/-

**12v. D.C. MINIATURE ROTARY CONVERTERS**

Size only 4 1/2" x 2 1/2" overall. Output 360v. 30 mA cont. rating, or 310v. 70 mA intermittent. ONLY 12/6 each or 22/- for 2, P. & P. 2/-.

Post and packing 2/-.  
Special quotations for quantities.

**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. P. & P. 1/6.

**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 AERAXIAL,** 70/80 ohm coax, 300 watt, very low loss, 1/8 per yd. P. & P. 1/6.

**FOR THE DX ENTHUSIAST  
MOSLEY TRAP BEAMS**

Vertical 3 Band V3 ... .. £7.10s.  
3 Band 3EL Beam TA 33 dr ... .. £24.15s.  
Also the **NEW Single Band Power Beams.** Send for details.

50 ohm, 300w. 1/2" coax Low loss. Ideal for Mosley and other beams, 1/6 per yd. P. & P. 1/6

**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 19/6 EACH. post free.

**HEADPHONES, H.R. type, 4000 ohms,** very sensitive. Only 12/6 pair. P. & P. 1/6. C.I.R.(low res.) 8/6 P. & P. 1/6.

**CONDENSERS.** 8 mfd., 750 V, 5/6 each, post 1/6.

**TRANSMITTER/RECEIVER AN/PPN-2.** FREQ. 214/234 Mc/s. Complete in carry pack with 9 valves (5-3A5, 3-155, 1-1R5). WITH DUAL VIBRATOR PACKS (2v). HS 30 PHONES and ANTENNA. full instructions Book, £3/19/6, carriage 7/6.

**VARIABLE CONDENSERS.** All brass with ceramic end plates and ball race bearings. 50pf. 5/9, 100-6/6, 160, 7/6, 240, 8/6 and 300pf. 9/6. Extension for ganging, P. & P. 1/-.

**RACK MOUNTING PANELS:** 19" x 5 1/2", 7", 8 1/2", or 10 1/2", black crackle finish, 5/9, 6/6, 7/6, 9/- respectively. P. & P. 2/-.

**RELAYS** (sealed) 12 volt 1 1/2" x 1" x 2". D.P.S.T. contacts, beautiful job, only 5/- each. P. & P. 9d.

**AMERICAN 813 VALVES.** New and boxed. ... .. £3.10s. each.

**AR88 POWER TRANSFORMERS** Genuine RCA, few only, £2 each. Carr. paid.

**ACOS 39/1 STICK MIKE** List Price £3 3s. our price 39/6.

Full Range of  
**DENCO, REPANCO AND  
EDDYSTONE**  
coils and components available

**CHAS. H. YOUNG LTD.**

Dept. 'S', 110 Dale End, Birmingham.

CENTRAL 1635

No C.O.D. on  
Orders under £1.

Please print  
your name  
and address.

Where the  
**Tiger TR60B Table-topper**  
scores over all other Table Top Rigs

1. Completely Separate RF and Mod decks for easy Servicing.
2. THREE HT power supplies, giving almost COLD operation at Max Input.
3. Voltage-regulated VFO supply for T9 note on CW on all bands.
4. Ten Inches of VFO band-spread on ALL bands, including 10M.
5. Three Positions of Power switching. 10W, 30W and 60W, as required.
6. SEPARATE P.A. Coils on DX Bands, ensuring Max Efficiency on 20/15/10.
7. Six Bands, bandswitched throughout Pi output to aerials.
8. Low-priced Valves used throughout.
9. Series-tuned Filter (TVI) in RF deck.
10. Special Filter against BCI in Mod deck.

The above unique features, plus superb Twin-deck Tiger Table-top Cabinet in Hammer finish enamel and **THREE METERS** Complete for only £85.

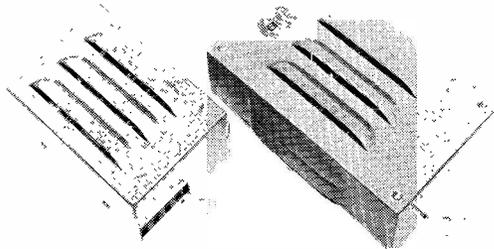
Compare these features with those of any other make of Rig before buying. Stamp for leaflet to:

**TIGER RADIO LTD**

136, River Way, Christchurch, Hants.  
Tel. Bournemouth 48792

**WE MAKE THESE FOR THE AMATEUR**

With the same care and "know-how" as those we make for Aircraft and other technical uses.



CA7 (Mark 1)

CA8 (Mark 2)

**TRANSISTORISED POWER UNITS**

for mobile marine or similar use where only low voltage D.C. is available and minimum current drain is essential.

**CA7 (MARK 1)** 50 watt, 12v. D.C. input 300v. D.C. 165 mA output in grey crackle case 5" x 3 1/2" x 2 1/4" Transistors completely protected ... .. £12

**CA8 (MARK 2)** 100 watt, 12v. D.C. input 300 310v. 320 mA and —120v. 10 mA (Bias) in similar case to Mark 1 but 6 1/2" x 4" x 2 1/4" ... .. £17

THE ABOVE ARE TWO OF OUR STANDARD UNITS. BUT LET US KNOW YOUR PARTICULAR REQUIREMENTS, AND WE WILL WILLINGLY QUOTE FOR PROMPT DELIVERY.

Most mobile power problems can be solved by the use of our units... efficiently and economically.

**COMMUNICATIONS (Air) LTD**

HALF MOON STREET, BAGSHOT, SURREY  
Bagshot 3089

SUPPLIERS TO THE AIRCRAFT INDUSTRY

# INTRODUCING TO YOU THE WORLD-FAMOUS

Easy-to-build kit-sets of highest quality at lower cost



**HI-FI F.M. TUNER.** Tuning range 88-108 Mc/s. For your convenience this is available in two units sold separately as follows : Tuner Unit (FMT-4U) with 10.7 Mc/s I.F. output (£32/- inc. P.T.). I.F. Amplifier (FMA-4U) complete with cabinet and valves (£10/10/6). Total  
**£13 12 6**

**HI-FI 16W STEREO AMPLIFIER.** Model S-88, 10 mV. basic sensitivity (2 mV. available, 30/- extra). Ganged controls. Stereo/Monaural gram., radio and tape recorder inputs. Push-button selection. Two-tone grey metal cabinet  
**£25 5 6**

**6-TRANSISTOR PORTABLE.** Model UXR-1. Pre-aligned I.F. transformers, printed circuit, 7 x 4 in. high-flux speaker. Real hide case  
**£15 18 6**

**DUAL-WAVE TRANSISTOR RADIO UJR-1.** This sensitive headphone set is a fine introduction to electronics for any youngster  
**£2 16 6**

**RES.-CAP. BRIDGE.** Model C-3U. Measures capacity 10 pF to 1,000  $\mu$ F., resistance 100 $\Omega$  to 5 M $\Omega$  and power factor. 5-450 v. test voltages. With safety switch  
**£7 19 6**

**AUDIO SIGNAL GENERATOR.** Model AG-9U. 10 c/s. to 100 kc/s, switch selected. Distortion less than 0.1%. 10 v. sine wave output metered in volts and dB's  
**£19 3 0**

**VALVE VOLTMETER.** Model V-7A. Measures volts to 1,500 (D.C. and RMS) and 4,000 pk. to pk. Res. 0.1 $\Omega$  to 1,000 M $\Omega$ . D.C. input imped. 11 M $\Omega$ . Complete with test prods, leads and standardising battery  
**£13 0 0**

**R.F. PROBE.** Model 309-CU. Extends the frequency range of our V-7A to 100 Mc/s and enables useful voltage indication to be obtained up to 300 Mc/s  
**£1 5 6**

**5 in. OSCILLOSCOPE.** Model O-12U. Has wide-band amplifiers, essential for TV servicing, F.M. alignment, etc. Vertical freq. response 3 c/s to over 5 Mc/s without extra switching. T/B covers 10 c/s to 500 kc/s in 5 ranges  
**£34 15 0**

**ELECTRONIC SWITCH S-3U** (Oscilloscope Trace Doubler). Enables a single beam oscilloscope to give simultaneous traces of two separate and independent signals. Switching rates approx. 150, 500, 1,500, 5,000 and 15,000 c/s.  
**£9 18 6**

**CAPACITANCE METER CM-IU.** Direct-reading 4½ in. scale. Full-scale ranges, 0-100 $\mu$ F, 0-1,000 $\mu$ F, 0-0.01 $\mu$ F and 0-0.1 $\mu$ F  
**£14 10 0**

**AUDIO WATTMETER.** Model AW-IU. Up to 25 w. continuous, 50 w. intermittent  
**£13 18 6**



CM-IU



S-33



USP-1



S-88



FM TUNER



S-3U



DX-100U



THE "GLOUCESTER" EQUIPMENT CABINET

**6-W STEREO AMPLIFIER.** Model S-33. 3 watts per channel, 0.3% distortion at 2.5 w/chnl., 20 dB N.F.D. Inputs for Radio (or Tape) and Gram., Stereo or Monaural, ganged controls. Sensitivity 100 mV.  
**£11 8 0**

**TRANSCRIPTION RECORD PLAYER RP-IU.** 4-speed A.C. motor. Ronette Stereo/Mono pick-up. Complete with plinth.  
**£12 10 0**

**HI-FI SPEAKER SYSTEM.** Model SSU-1. Ducted-port bass reflex cabinet "in the white." Twin speakers. With legs (£11/12/6)  
**£10 5 6**

**"HAM" TRANSMITTER.** Model DX-40U. Compact and self-contained. From 80-10 m. Power input 75 w. C.W., 60 w. peak, C.C. phone. Output 40 w. to aerial. Provision for V.F.O.  
**£29 10 0**

**AMATEUR TRANSMITTER.** Model DX-100U. Covers all amateur bands from 160-10 metres. Self-contained including power supply, modulator and V.F.O.  
**£78 10 0**

**"GLOUCESTER" EQUIPMENT CABINET.** 4½ x 30 x 21 in. deep. Mk. I houses : Record Player, Stereo Amplifier, F.M. Tuner, records, etc. Mk. II will house a Tape Deck in addition. Left in the white for finish to personal taste.  
Mk. I ... **£15 18 6** Mk. II ... **£17 8 6**

**"COTSWOLD" HI-FI SPEAKER SYSTEM KIT.** Acoustically designed enclosure "in the white" 26 in. x 23 in. x 15½ in., housing a 12 in. bass speaker with 2 in. speech coil, elliptical middle speaker and pressure unit to cover the full frequency range of 30-20,000 c/s. Complete with speakers, cross-over unit, level control, etc.  
**£19 8 6**

**COMPLETE MATCHED STEREO OUTFIT.** Includes RP-IU record player, S33 amplifier and twin SSU-1 speaker systems. (Pedestal speaker legs optional £2/14/- extra)  
**£42 10 0**

**STEREO-HEAD BOOSTER USP-1.** Input 2 mV to 20 mV. Output adjustable from 20 mV to 2 v. 40-20,000 c/s. Also suitable as high-gain monaural amplifier.  
**£5 19 6**

**VAR. FREQ. OSCILLATOR VF-IU.** From 160-10 m. Ideal for our DX-40U and similar transmitters. Price less valves £8/19/6.  
**£10 12 0**

**AUDIO VALVE MILLIVOLT-METER AV-3U.** 1 mV to 300 v. A.C. 10 c/s. to 400 kc/s  
**£13 18 6**

Prices include free delivery U.K.

Deferred terms available on orders over £10.

Please send me FREE CATALOGUE (Yes/No) Full details of model(s).....

NAME.....  
(BLOCK CAPITALS)  
ADDRESS.....

SW4

## DAYSTROM LIMITED

DEPT. SW4, GLOUCESTER, ENGLAND

A member of the Daystrom Group, manufacturers of the

WORLD'S LARGEST-SELLING ELECTRONIC KITS