

The SHORT WAVE Magazine

VOL XXI

NOVEMBER, 1963

NUMBER 9

Be sure to visit us at the International Radio Communications Exhibition, Seymour Hall, London W.1. Oct. 30—Nov. 2, 1963
STANDS 21, 31 and 34

K.W. ELECTRONICS for all your Amateur Radio Requirements

KW again lead the way at the
RADIO COMMUNICATIONS EXHIBITION IN LONDON

Write for details of the new equipment :—

KW2000 TRANSCEIVER

KW707 RECEIVER

KW "VESPA" SSB TRANSMITTER

KW "VANGUARD" 2 metre TRANSMITTER

All additional to the wide range of KW equipment

Why not consult us at KW.

WE ALSO STOCK :

KW "Vanguard" Transmitters.

KW 160 Top Band Transmitters.

ROTATORS—CDR AR22 and "HAM-M"

BEAMS—Mosley, Hy-Gain, IHHC 2 metre curtain.

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

VFO's—Geloso, Shure, Acos.

FILTERS SSB—McCoy Crystal and Kokusai Mechanical.

FILTERS—High Pass and Low Pass.

RELAYS—Dow Key Co-axial type.

SIG. GENERATOR—Nornbrex Transistorized.

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

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

SWR INDICATOR—KW Match 75 or 52 ohm.

CONVERTER—Front-end KW, Geloso.

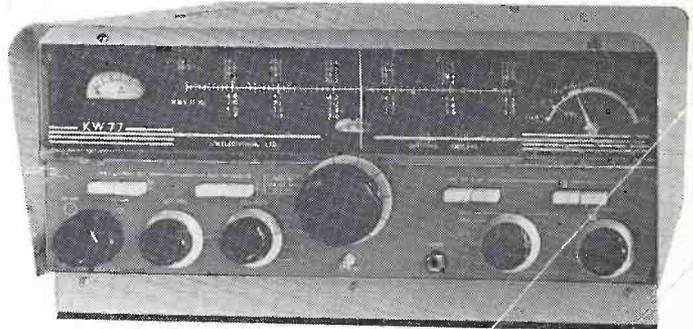
PLUGS, SOCKETS, PI COILS, R.F. CHOKES, etc.

TOKAI "Walkie-Talkie" all Transistorized Transceiver. TX and RX crystal controlled on 28.5 mc/s.

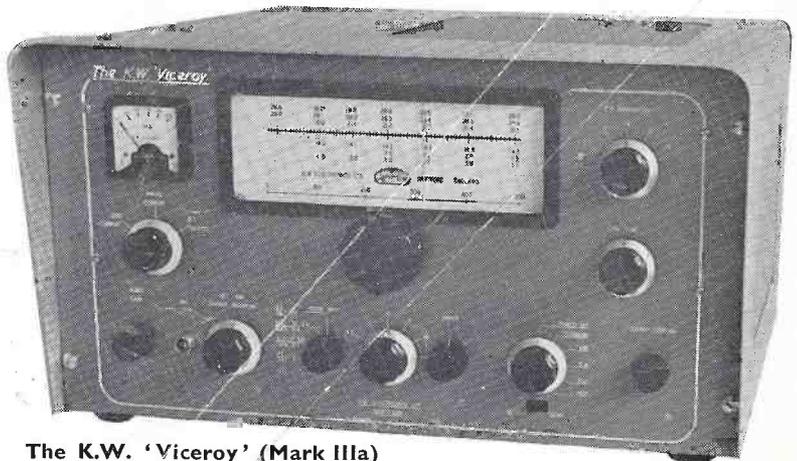
Range 3—4 miles across town. Ideal for Emergency Services, Mobile operation, Rallies, Beam adjustment, etc. Size $6\frac{3}{4}'' \times 2\frac{5}{8}'' \times 1\frac{1}{2}''$. Weight $1\frac{1}{2}$ lb. Complete with telescopic aerial, in leather case, with batteries £19-10-0 each (plus 5/- carriage and insurance).

EASY TERMS AVAILABLE

Importers of U.S.A. Equipment



The KW77 Receiver



The K.W. 'Viceroy' (Mark IIIa)

KW TRANSMITTERS

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

KW500 Linear Amp. 500 watts p.e.p., £87 10s.

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

Send for details.

Carriage extra

KW

ELECTRONICS LTD Vanguard Works

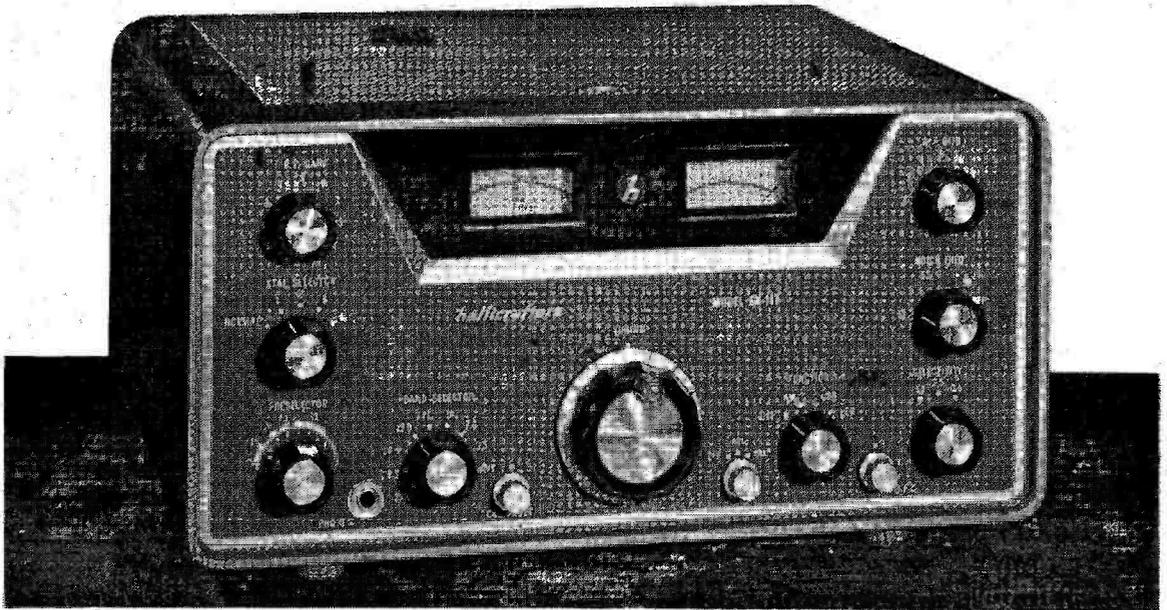
1 HEATH STREET, DARTFORD, KENT

Cables: KAYDUBLEW, Dartford

Phone: DARTFORD 25574

Fantastic!

the NEW  *hallicrafters*
SX 117



The most versatile Receiver
in production ... it has everything
Phone, write or call TODAY
for comprehensive folder
£163 cash, or low H.P. repayments

DALE ELECTRONICS

109 JERMYN STREET
LONDON · SW1
WHITEHALL 4856

TECHNICAL PUBLICATIONS - Available from stock

Latest Issues

RADIO HANDBOOK (16th Edition)

Published by *Editors & Engineers*, W6-U.S.A. 800 pages.
Durable binding. A magnificent book in every way.

Price 86s. post free

RADIO AMATEUR CALL BOOK

The CALL BOOK is published in two parts: *American* Section only, at 45s. post free; *Foreign* (non-American) Section at 27s. post free. Both Editions appear quarterly and include latest call sign/address listings for all countries, with much DX data. The only complete directory to the radio amateur stations of the world.

American Section, Fall Edition 45s. *Foreign* (non-American) Section, Fall Edition 27s.

The two together at 65s. post free

RADIO AMATEUR'S HANDBOOK

1963 EDITION — 740 pages fully indexed
All Amateur Radio

Published by the American Radio Relay League

Price: Standard Binding 37s. 6d., post free

Bound in Buckram, de luxe, 47s. 6d., post free

A few copies of the 1962 edition available at 30s.

DX ZONE MAP (Revised October 1962)

(Great Circle, centred U.K., size 25ins. by 35ins. A "must" for every DX operator and SWL)

Linen Backed (de luxe) 11s. 0d. post free

AMATEUR RADIO MAP OF WORLD

Much DX Information — In Colour, 8s. 6d. post free —
Second Edition

WORLD SHORT WAVE RADIO MAP

(General SWL and BC coverage, with handbook)

8s. 6d. post free

RADIO AMATEUR'S WORLD ATLAS

A new publication, for desk use. Gives Zones and Prefixes

8s. 3d. post free

MAGAZINES BY SUBSCRIPTION

	One Year
73 MAGAZINE	30s. 0d.
CQ, RADIO AMATEUR'S JOURNAL.....	44s. 0d.
QST, ARRL	48s. 0d.

Post free, ordinary mail only

EASIBINDERS for Short Wave Magazines, holds 12 issues
(One Volume) 13s.

LOG BOOKS spiral bound, by ARRL, 7s. 6d.

LOG BOOKS, by Webbs Radio, 6s. post free

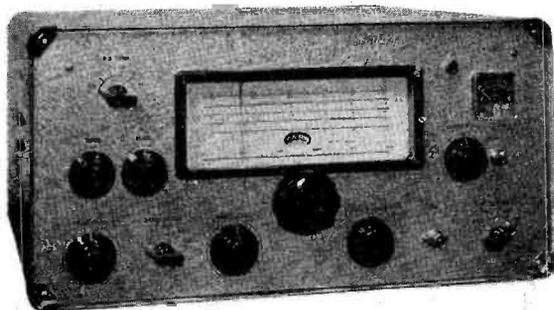
Post Free

AMATEUR RADIO HANDBOOK (new Publication by R.S.G.B.), 550 pp.....	36s. 6d.
AMATEUR SINGLE SIDEBAND (Collins)	30s. 0d.
ANTENNA ROUND UP (by CQ).....	25s. 0d.
ANTENNA HANDBOOK (A.R.R.L. 9th Edn.)...	19s. 0d.
A COURSE IN RADIO FUNDAMENTALS	10s. 6d.
AUTOMOBILE ELECTRICAL EQUIPMENT	57s. 0d.
BASIC MATHEMATICS FOR RADIO AND ELECTRONICS	18s. 3d.
BEAM ANTENNA HANDBOOK	24s. 6d.
BETTER SHORT WAVE RECEPTION	24s. 0d.
CALL BOOK (U.K. only), 1963 Edition.....	5s. 0d.
CHART OF INTERNATIONAL FREQUENCY ALLOCATIONS - GENEVA, 1960 (Official), 10 Kc. to 40 Gc. 51" x 34", wall mounting.....	8s. 3d.
COMMAND SETS (Published by CQ)	12s. 6d.
COMMUNICATION RECEIVERS.....	3s. 0d.
CQ ANTHOLOGY (the Best of CQ 1945-1952)	16s. 9d.
CQ ANTHOLOGY (1952-59)	25s. 0d.
DXERAMA (3rd Edition).....	16s. 0d.
DX GUIDE	16s. 9d.
ELECTRONIC CIRCUITS HANDBOOK.....	24s. 0d.
FOUNDATIONS OF WIRELESS	17s. 3d.
GUIDE TO AMATEUR RADIO	4s. 0d.
HAMS INTERPRETER (4th Edition)	8s. 6d.
HINTS AND KINKS, Vol. 6	11s. 0d.
HOW TO BECOME A RADIO AMATEUR★	5s. 0d.
HOW TO IMPROVE YOUR SHORT WAVE RECEPTION.....	14s. 9d.
HOW TO LISTEN TO THE WORLD, 1963/4.....	15s. 0d.
HOW TO GET THE BEST OUT OF YOUR TAPE RECORDER.....	9s. 1d.
LEARNING MORSE.....	1s. 9d.
LEARNING THE RADIO TELEGRAPH CODE	4s. 6d.
MOBILE HANDBOOK (Published by CQ)	24s. 0d.
MOBILE MANUAL (Published by A.R.R.L.)	24s. 6d.
NEW RTTY HANDBOOK.....	32s. 0d.
NEW SIDEBAND HANDBOOK (Published by CQ, latest issue).....	25s. 6d.
NOVICE HANDBOOK, Tx and Rx, 150 pages ...	23s. 6d.
OPERATING AN AMATEUR RADIO STATION (Published by A.R.R.L.)★	2s. 8d.
PORTABLE TRANSISTOR RECEIVER	3s. 0d.
QUAD ANTENNAS	23s. 0d.
RADIO AMATEURS' EXAMINATION MANUAL (2nd Edition)	5s. 6d.
RADIO CONTROL MANUAL	25s. 0d.
RADIO CONTROL FOR MODELS (F. C. Judd)	16s. 0d.
RADIO DATA CHARTS	11s. 3d.
RADIO DATA REFERENCE BOOK	14s. 0d.
RADIO DESIGNERS HANDBOOK, 1,498 pp.	57s. 6d.
RADIO AND ELECTRONIC LABORATORY HANDBOOK (7th Edition, by Wireless World)	57s. 3d.
RADIO INTERFERENCE SUPPRESSION	11s. 3d.
RADIO VALVE DATA 4,800 types listed.....	7s. 0d.
S-9 SIGNALS.....	8s. 6d.
SERVICING TRANSISTOR RADIOS.....	43s. 6d.
SCATTER PROPAGATION THEORY AND PRACTICE (H. W. Sams)	25s. 0d.
SHORT WAVE RECEIVERS For the Beginner	6s. 6d.
SHORT WAVE AND THE IONOSPHERE.....	11s. 9d.
SINGLE SIDEBAND FOR THE RADIO AMATEUR (A.R.R.L.) (3rd Edition).....	18s. 6d.
STEREO HANDBOOK	11s. 4d.
SURPLUS SCHEMATICS (Published by CQ)	21s. 0d.
SURPLUS HANDBOOK (See p.420, Oct. '61) ...	24s. 0d.
SURPLUS CONVERSION MANUAL	
Vols. I, II and III, each.....	24s. 0d.
TELEVISION EXPLAINED	13s. 6d.
THE RADIO AMATEUR OPERATOR'S HANDBOOK (Data Publications).....	5s. 0d.
TRANSISTORS: THEORY AND PRACTICE (Published by Gernsback)	23s. 0d.
TRANSISTOR THEORY AND PRACTICE (Published by World Radio Handbook).....	9s. 6d.
TRANSISTOR TECHNIQUES (Gernsback)	12s. 6d.
UNDERSTANDING AMATEUR RADIO	19s. 6d.
VHF HANDBOOK (Orr W6SAI).....	24s. 0d.
VHF FOR THE RADIO AMATEUR (CQ).....	28s. 0d.
WORLD RADIO HANDBOOK, 1963 Edition	22s. 6d.

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

Mosley Commando II

◦ AM, SSB, CW TRANSMITTER ◦



with
"DXability"

- 180 WATTS P.E.P.
- AM - SSB - CW MODES.
- LATTICE FILTER EXCITER.
- PI TANK OUTPUT CIRCUIT.
- VOX AND MANUAL OPERATION.
- 10 - 80 METRE BANDSWITCHING.
- FULL VISION EDDYSTONE DIAL.
- IDEAL FOR RTTY BY TONE INJECTION.
- THREE CHANGE - OVER CONTACTS FOR EXTERNAL SWITCHING FUNCTIONS.
- ADAQUATE OUTPUT TO DRIVE THE BEEFIEST QRO LINEAR.

The features incorporated in the Mosley Commando II makes it The Outstanding Transmitter Buy Today! Only reliable "air-tested" circuitry is used. Power Supply is the latest cool-running Silicon Rectifier, fuse protected and conservatively rated. Power Amplifier employs two 6146 Tetrodes operating at 750 Volts Class AB₁ Linear Amplifier Service to give maximum I.C.A.S. rating at 180 watts P.E.P. The Pi Tank circuit bandswitching 10 thru 80 metres gives efficient loading into low impedance coaxial lines. Sideband generation at 435 kcs. with half-lattice crystal filter for 45 db. sideband/carrier rejection. Sideband switch in "normal" position is correct for band in use, but, an "inversion" switch gives choice of alternative sideband.

Hams, throughout the world, know that a real commanding signal depends on a unity match of the Transmitter and Aerial. Mosley Aerials are designed to meet the highest standards of the most discriminating hams. When completing your dream station . . . Insist on the best . . . Rely On Mosley.



Electronics Ltd.

Representative in U.K., O. S. CHILVERS, G3JOC

40 Valley Road, New Costessey, NORWICH, Norfolk. NOR.26.K

Tel: Norwich 22147

A Subsidiary of MOSLEY ELECTRONICS, INC., Bridgeton, Missouri, U.S.A.

FREE
inside every copy of
**PRACTICAL
WIRELESS**

Big DOUBLE-SIDED

Value 5!-

BLUEPRINT

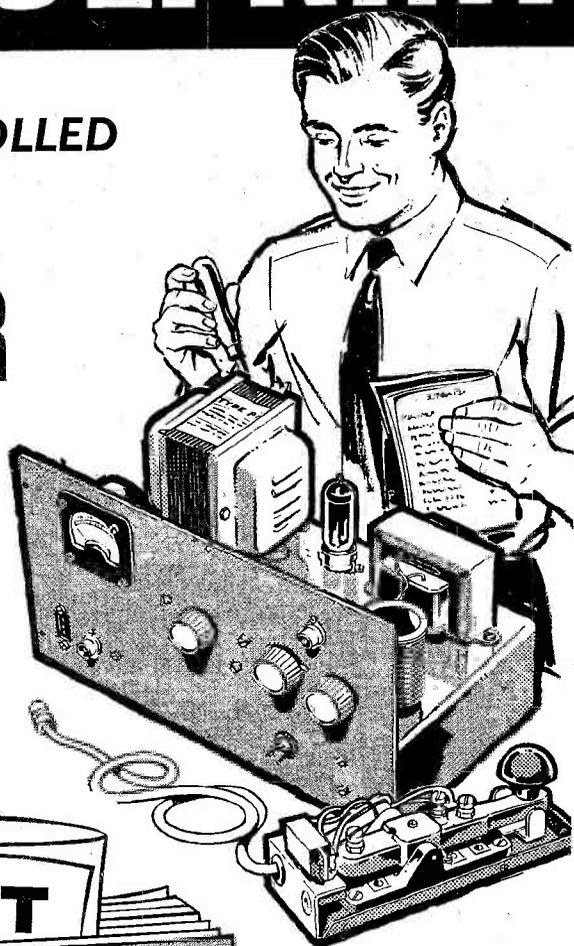
to build **CRYSTAL-CONTROLLED**

SHORT WAVE TRANSMITTER

- 3-Valve Transmitter (Crystal Oscillator—Power Amplifier—Rectifier).
- Covers all Amateur Bands from Top Band to Twenty.
- Built-in A.C. Power Supply.
- Crystal Controlled, but provision for feeding in V.F.O.
- Simple to set up and use. 2-Knob Control.

PLUS INVALUABLE

**GUIDE TO SHORT WAVE
TRANSMITTING**



BLUEPRINT

**PRACTICAL
WIRELESS**

DECEMBER

2!

**On Sale NOV. 7th
BIG DEMAND!
ORDER FROM YOUR
NEWSAGENT
NOW!**

Why not make good use of your spare time

AND JOIN THE

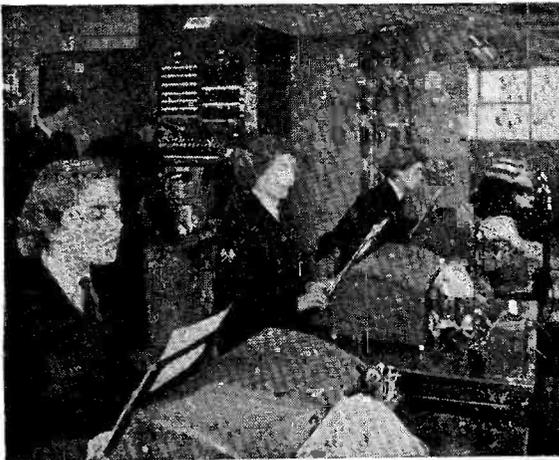
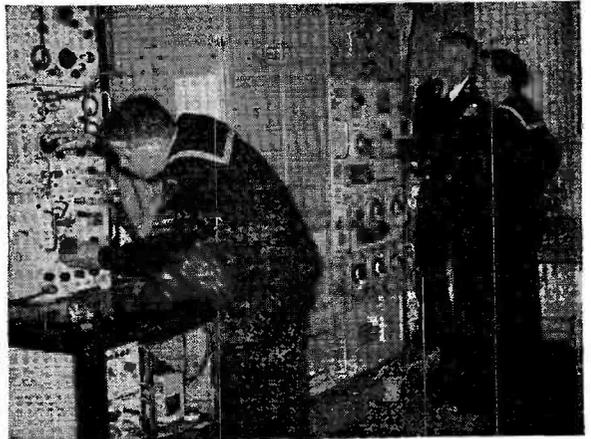
ROYAL NAVAL RESERVE COMMUNICATION BRANCH



Men and women between 16 and 26 may join but men with previous experience of this branch of the Royal Navy may be accepted up to the age of 45. Training takes place 2 or 3 evenings a week with opportunities for training at sea which might well entail visits to foreign ports.

You will not be out of pocket as Pay, allowances, bounty and uniform are provided.

Although we take our work seriously there is a social side giving you the chance to meet people with the same interests in a friendly atmosphere. There are Communication Centres and Units in many towns throughout the country.



Write for full details of this interesting service to:-

**ADMIRAL COMMANDING RESERVES,
EMPRESS STATE BUILDING, LONDON, S.W.6.**

or ask at your nearest Royal Naval Careers Office.

TOP QUALITY—LOW COST **CRC** AMATEUR RADIO EQUIPMENT

CR 66 COMMUNICATIONS RECEIVER KIT

SPECIFICATION

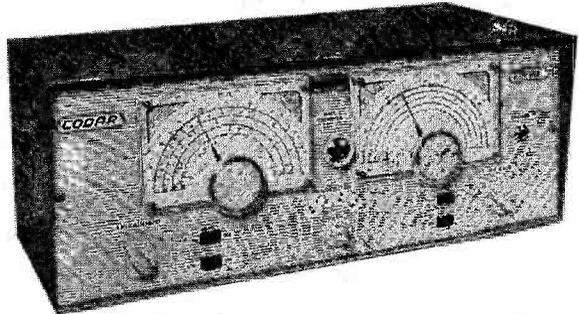
Frequency range 540 Kc to 30 Mc in 4 ranges.

Band 1 30 Mc-11.5 Mc.

Band 2 11.5 Mc-4.2 Mc.

Band 3 4.3 Mc-1.5 Mc.

Band 4 1.5 Mc-540 Kc.



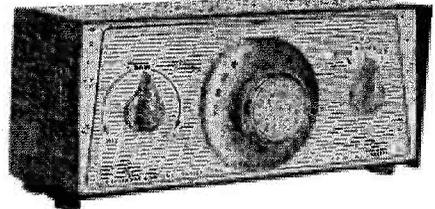
- Separate electrical bandspread
- Coil Unit wired ready and I.F. Trans. factory aligned
- Oscillator Coils fitted temperature compensated trimmers
- Regenerative I.F. Stage for maximum gain and B.F.O.
- Panel Aerial Trimmer
- Cathode Follower for Tape Recorder, etc.
- Panel Phone Jack, separate Speaker Switch
- 3 Watts Output for external 2-3 Ohm Speaker

Valve line-up:—ECH81 Frequency changer, EBF89 I.F. amp./Det./AVC/BFO, ECC81 A.F. amp./Cathode follower, EL84 output, EZ80 full wave rectifier, EM84 tuning indicator (Optional extra). Modern styling in silver grey cabinet, 16" x 6½" x 8¾". Complete kit with 17 page instruction manual, £18 5s., carriage 6/-. Tuning indicator parts with EM84, 17/6. H.P. Terms available on request.

★ P.R. 30. R.F. PRESELECTOR ★

Frequency range 1.5-30 Mc/s.

Substantially improves the performance of any superhet receiver



G2LU writes . . .

You are to be congratulated on turning out a very fine piece of equipment. Several of the Coventry "gang" have heard the P.R.30 in use and all have expressed their amazement at the gain obtained and the absence of background noise . . . You may use any remarks I have made in this letter as I am so delighted with the Unit.

G3RIA writes . . .

The results in conjunction with my Eddystone 888 are amazing. Signals are twice as strong with much higher signal/noise ratio. A first class product well worth the money.

G3ADZ writes . . .

I feel I must congratulate you upon your P.R.30 Preselector. It is more than refreshing to find:— Equipment well up to stated specification and performance . . . very well made and finished . . . at a fair price for Amateur . . . and care in packing.

G4HZ writes . . .

I am delighted with it, it improves my Eddystone 640 in all respects. The difference with the Preselector is fantastic, a weak signal on 15 metres about S2 changed to S8. On the L.F. Bands, unwanted noise and mush is cut out.

The P.R.30 Preselector uses EF 183 Frame Grid R.F. Amplifier and provides up to 20 dB gain. Outstanding features include vernier tuning, gain control, selector switch for either dipole or end fed antenna. Smart styling in grey and black, 8½" x 4" x 5". External power supplies (obtainable from Rx). Complete, ready for use, with all plugs, cables, £4/17/6. Carr. 3/-.

In answer to many requests, a self powered version is now available, Cat. No. P.R.30X. This is identical in size and suitable for 200-250 volts A.C. An accessory socket is fitted to provide up to 25 M/a at 200 volts H.T. and 6.3 volts at 1 amp. for other accessories. Price complete, £7/2/0. Carr. 3/-.

Coming shortly: Completely NEW "Q" Multiplier Cat. No. RQ 10, watch for details.

CODAR RADIO COMPANY

BANK HOUSE, SOUTHWICK SQUARE, SOUTHWICK, SUSSEX

Canadian Distributors: JAYCO ELECTRONICS, TWEED, ONTARIO

INDEX TO
ADVERTISERS

	PAGE
Anglin	519
Bartronic, Ltd.	<i>cover ii</i>
Bernard Downes	517
British National Radio School	513
Busfield's Astro-Marine ...	514
Cathodeon Crystals	518
Charles H. Young	<i>cover iii</i>
Codar Radio Co.	462
Dale Electronics	457
Daystrom	<i>cover iv</i>
Electroniques, Ltd.	464
G3HSC (Morse Records)	519
Green & Davis	513
G.W.M. Radio	515
Henry's Radio	517
H. L. Smith & Co.	514
Home Radio	519
Jack Tweedy	520
K.W. Electronics <i>front cover & cover iii</i>	
Minimitter	515
Multicore	518
Mosley Electronics	459
Partridge Electronics, Ltd. 512, 519 & 520	
Peter Seymour	511
"Practical Wireless"	460
Quartz Crystals	<i>cover ii</i>
Royal Naval Reserve	461
R.S.C. (Derby) Ltd.	514
Service Trading Co.	513
Short Wave (Hull)	512
Small Advertisements ...	511-518
Smith & Co., Ltd.	516
Southern Radio & Elec. ...	520
S.W.M. Publications	458
Watts Radio, Ltd.	514
Webb's Radio	464
Withers	516

SHORT WAVE MAGAZINE

Vol. XXI

NOVEMBER, 1963

No. 241

CONTENTS

	Page
Editorial	465
Modern SSB Transmitter for Three Bands, Part II, <i>by J. D. Heys (G3BDQ)</i>	466
Receiving Modulation Meter	472
Portable on Top Band in the Highlands, <i>by W. R. Steverson (G3JEQ)</i> ...	473
For The Beginner — <i>Discussing Amplifiers</i>	474
This Decibel Business, <i>by J. B. Tuke (GM3BST)</i>	478
Wide-Range Modulated Oscillator	482
DX Commentary, <i>by L. H. Thomas, M.B.E. (G6QB)</i>	484
"SWL" — <i>Listener Feature</i>	490
Highlights of The Show — <i>Advance Report</i>	494
Two-Metre Mobile Installation, G3MCG/M	497
VHF Bands, <i>by A. J. Devon</i>	498
Notes on the Book List	502
New QTH'S	505
The Month with The Clubs — <i>From Reports</i>	506
MCC Entries — <i>Supplementary List</i>	509
Mobile in Belgium <i>by Sylvia Margolis (xyl/G3NMR)</i>	510

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

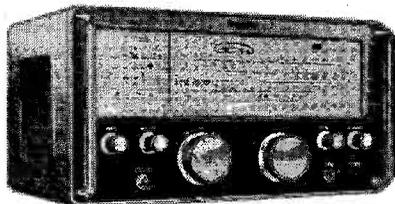
Annual Subscription : Home and Overseas 36s. (\$5.25 U.S.) *post paid*

© 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.

FOR PROFESSIONAL PERFORMANCE . . .



INFORMATIVE BROCHURE POST FREE ON REQUEST BUT FOR FULL APPRECIATION OF '840C' THE RECEIVER SHOULD BE HANDLED

★ The new Eddystone "EAI2" receiver for Amateur Bands only is in the offing. It is well worth the waiting. The "EAI2" WILL CONSTITUTE A LAND-MARK in the history of Amateur Radio—watch for important announcements very shortly.

at amateur cost!

THE

EDDYSTONE

'840C'

COMMUNICATIONS RECEIVER

FIVE BANDS COVER 480 Kc/s TO 30 Mc/s WITH ACCURATE LOGGING AND RE-SETTING BY PRECISION TYPE 130-1 RATIO DRIVE. AC OR DC 110 AND 220/240V.

PRICE £58

WRITE FOR DETAILS OR CALL AND HANDLE THIS IMPRESSIVE RECEIVER AT

WEBB'S RADIO

14, SOHO STREET, LONDON, W.1.
Tel.: GERrard 2089 & 7308 - Cables: CRISWEBCO LONDON

'HIQIF'
'QOILMAX'
'STABQOIL'

ELECTRONIQUES

(FELIXSTOWE) LTD

'QOILPAX'
'QOILHEART'
'PATHFINDER'

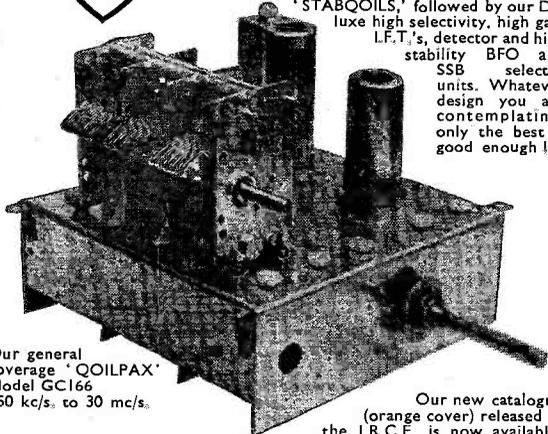
AIR-WOUND "CODAR-QOILS"



As manufacturers of the finest and most comprehensive range of components ever offered to the constructor, we take exceptional pleasure in announcing our exclusive appointment as distributors of the brilliant range of "CODAR-QOILS." Beautifully engineered, they are available in a wide range of sizes and inductance of high Q and low losses. Ideal for P.A. tank circuits, PI networks, aerial tuning units, etc. Easy to cut or tap.



The **HEART** of many good communications receivers today is based upon our renowned 'QOILPAX' and 'STABQOILS,' followed by our Deluxe high selectivity, high gain I.F.T.'s, detector and high stability BFO and SSB selector units. Whatever design you are contemplating, only the best is good enough!



Our general coverage 'QOILPAX' Model GC166 550 kc/s. to 30 mc/s.

Our new catalogue (orange cover) released at the I.R.C.E. is now available.

price 2s. inc. post. Contents include comprehensive technical and general data on all the latest items, including a superb 1.6 mc/s. bandpass Xtal filter, the "CODAR-QOILS," a most attractive 2-speed slow motion dial ideal for converter, VFO or Rx, our famous 'QOILPAX,' over 300 types of coils, I.F.T.'s, 'Q' multipliers, high stability VFO's and BFO's, SSB selector units, R.F. chokes, low-loss switches, tuning condensers, etc. plus detailed data on the new G3BDQ Tx, G2DAF SSB Tx, prize-winning G3RKK Rx design, also the G3BDQ, G3KWG and famous G2DAF Rx designs.

RADIO WORKS, BRIDGE ROAD, FELIXSTOWE, SUFFOLK. Phone: 4500

The SHORT-WAVE Magazine

EDITORIAL

Remedy *In this space in the last three issues — under the headings of “Political,” “Consequences,” “Foreseen” — future possibilities with regard to our band allocations have been discussed, and certain conclusions reached.*

These were, briefly, that while our bands are not likely to be seriously curtailed, we must face the possibility of more sharing — which means, in effect, competing with commercial stations in what were hitherto exclusive amateur bands. It has been shown that while this problem already exists to some considerable extent, it can only be met in the future by much improved gear and operating techniques, and taking full advantage of the space-time-location factor.

But there is another very effective remedy, open to amateurs the world over, which could anyway discourage further commercial infiltration. This was touched upon in the last paragraphs of the October comment. Our numbers, which are ever increasing, are now such that commercial occupancy of our bands could be made almost untenable — or, at the very least, extremely uncomfortable. For instance, when Radio Saudi-Banana on 7015 kc is propagating its gospel to some particular part of the world, the probability is that (because local field strength would be relatively low) amateur stations in that area could work through and over the transmission to such effect as to make the programme worthless. Similarly with commercial teleprinter transmissions; these cannot always be strong enough at the receiving end to overcome all local interference, so that CW operation on the channel — or even RTTY if the amateur signals were at a sufficient level — would be extremely discouraging. The point is that if “sharing” means sharing, then the interference problem can be made to work both ways.

There should be no hesitation whatever about working over, through or alongside any unauthorised commercial station at present occupying one of our channels. The more this can be done now, the less the likelihood of further encroachment, and those authorities who may think of advocating the taking-over of the amateur bands will be brought to realise that this would only create more problems than it would solve.

In this whole rather confused situation, which may come to a head in about two years or so, three things are certain. One is that Amateur Radio has gone too far and has developed into too strong a force simply to be abolished by decree. Another is that the more of us there are, active on all bands, the stronger our position becomes and thus the more positive our right to adequate space in the ether. And thirdly, we must be prepared to help ourselves.

*Austin Fobyl
G6FO.*

MODERN SSB TRANSMITTER FOR THREE BANDS

THE FREQUENCY CONVERTER,
DRIVER STAGE AND LINEAR
AMPLIFIER — CONSTRUCTIONAL
DETAILS — AND SETTING UP

PART II

J. D. HEYS (G3BDQ)

In this second part of his article, besides covering the construction and alignment of the Frequency Converter section of the transmitter, G3BDQ describes an ingenious and original circuit device for VFO calibration; this enables the transmitting frequency always to be accurately located on the main tuning dial. The PA section, incorporating a 4X150A with blown-air cooling, is also discussed in detail. All necessary information is given for construction and setting-up procedures as far as the RF amplifier stage, capable of 300 watts peak-envelope-power on Sideband and an easy 150 watts on CW. To follow the design and constructional treatment right through, it is essential to read with this article the Part I discussion, which appeared in the October issue.

—Editor.

THE third transmitter module comprising V6, V7, V8 and V9 (p.469) converts the 9 mc SSB or CW output from the Basic SSB Generator (see Part I) to 80m., 20m. or 15m. and provides enough RF voltage output on these bands to drive the 4X150A Linear Amplifier. V6 is a 7360 beam deflection valve operating as a balanced mixer which ensures that very little unwanted RF at 9 mc or 5 mc appears in its output circuit. There is therefore no problem of spurious frequencies being passed on to later stages. The VFO output voltage is too low to allow efficient mixing so one triode section of an ECC85 (V7A) is used as a grounded-grid amplifier at the VFO frequency. This type of amplifier has moderate gain and a broad-band pass characteristic and the pre-set tuned circuit made up by L1 and C2 may be set to mid-frequency in the VFO range. The ECC85 valve has been specially chosen because it has an effective internal screen (pin 9) between its two triode sections. This prevents any spurious frequency generation which might arise from coupling between V7A and V7B, the latter operating as a crystal oscillator when 15m. output is required. The output from V7A is applied via C4 (Fig. 3) to the control grid of the mixer valve, D2 being necessary to maintain mixer linearity. C4 also connects to a crystal X1 which has

a series resonant frequency in the VFO range (5.0-5.5 mc). X1 together with D1 and associated components operates as the VFO calibrator. When the VFO is tuned to the series resonant frequency of the crystal, D1 passes a DC current which operates M1. This simple circuit is an effective means of checking the VFO calibration once the series resonant point has been put on the main tuning scale, and the rest of the scale has been marked in 100 kc and 50 kc steps. Tuning to the calibration mark on the scale should produce a sharp peak on M1, and any frequency shift can be corrected by adjustment of the VFO trimmer on the front panel, so making the Tx frequency reading instantly accurate. The writer used a surplus type FT-243 crystal marked "5325 kc" for X1 and the calibration point is approximately mid-way along the tuning scale. Any crystal frequency within the VFO tuning range would be just as effective. To the writer's knowledge this useful and cheap method of frequency calibration has not been incorporated in any previously published amateur transmitter designs.

The 9 mc input from the Basic SSB Generator goes to one of the 7360 deflection plates, the other plate being at earth potential to RF but having an adjustable HT voltage. Balance is achieved when R13 is set to give equal HT on each of the plates; this is approximately 25 volts.

The anodes of V6 are balanced with respect to earth and coupled via SW1a and SW1b to the primary coils of the 80m. and 20m. wide-band couplers. For 80m. or 20m. operation the secondary windings of the wide-band couplers are switched by SW1c and SW1b to the control grid of V9, the driver stage.

Drive on 15 metres

In order to obtain 15m. output an additional mixer is needed. V8 is used as a simple cathode-coupled dual triode mixer with a 15m. WBC in the anode circuit. 15m. output is derived by mixing 80m. output from V6 with the 17.5 mc from V7B, which is a Pierce oscillator. 17.5 mc fundamental frequency crystals are not available on the surplus market but a suitable unit for X2 may be obtained from Cathodeon. This crystal is mounted in the type 2M or HC-6/U holder, as the FT-243 holders are now obsolescent and cannot be supplied. V7A and V8 are switched out by SW1c when 80m. and 20m. outputs are required. C19 prevents de-tuning of the 80m. WBC when its output goes to V8, for the input capacitance of the driver valve (V9) is considerably greater than that of V8. Grid-block keying of the mixer (V6) ensures excellent chirp-free CW operation, with a clean, sharp signal; the blocking bias is, of course, removed for SSB operation when the key plug is withdrawn.

V9 is a 6CL6 valve operating as a conventional Class-A amplifier. SW1g selects the necessary output coils and C27 is used as the driver tuning adjustment. This control is the only one needed ahead of the Linear Amplifier by reason of the use of wide-band couplers. No neutralising is needed in the V9 circuit; the grid stopper R28 and the damping resistor R34, together with adequate shielding between the input

and output circuitry, is enough to give stability. In addition, R34 also provides constant output loading of the driver and improves its linearity. A sample of the RF output from V9 is obtained from the voltage divider network comprising C30, R32 and R33 and this is rectified by D3 to give a negative ALC voltage. D3 must be of the high back-resistance type, an OA81 being suitable in this application. A back biasing voltage derived from the HT line is applied to D3 and the potentiometer R25 functions as an ALC pre-set control available on the front panel of the transmitter.

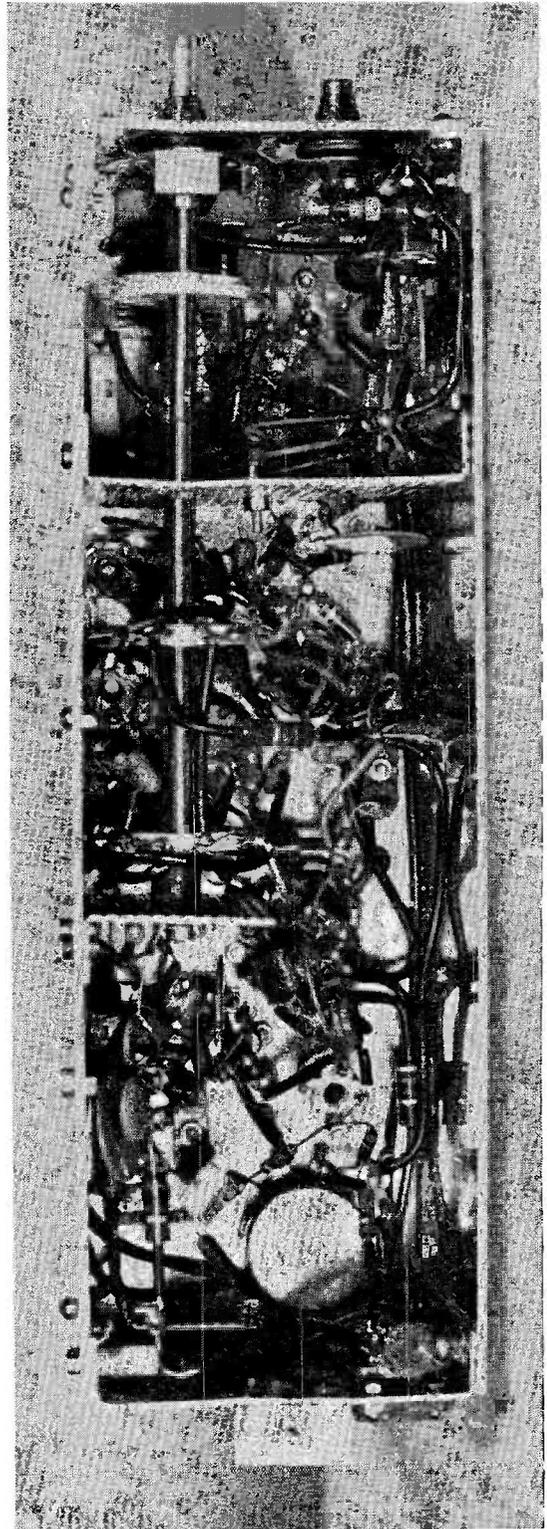
Frequency Converter Construction

This unit has the same chassis area as the 9 mc Basic SSB Generator but it is in the form of a long narrow rectangle. The chassis measurements are 10in. x 3in. x 3in. deep. This shape is dictated by space considerations and the spindle length of SW1. An aluminium screen runs across the chassis and provides a compartment for the components on the output side of V9. This screen is taken over the valveholder for V9, separating its input and output circuits. A miniature multi-pin socket for power connections is mounted on the rear wall of the chassis and the three coax leads are taken to Belling-Lee connectors on the top plate. The wide-band coupler coils and the V9 anode inductances are housed above the switch assembly and all the coil cores are adjustable from the top of the unit. The positioning of the coils allows for very short RF leads to the switch tags. The balance potentiometer R13 is a pre-set component mounted under the chassis to the rear.

The photograph here of the underside of this unit reveals that most of the wiring is made in the point-to-point style and the actual disposition of the minor components is not critical. The only difficulty encountered by the writer was in the assembly of the switch, which must be carefully mounted to avoid "binding" due to distortion of the spindle. Fixing the coils into place is also a task requiring a little patience and dexterity owing to their location between the switch shaft and the chassis. This factor emphasises the advantages to be derived from using ready made *Electroniques* coils in this unit, for the layout is not conducive to "cut and try" methods.

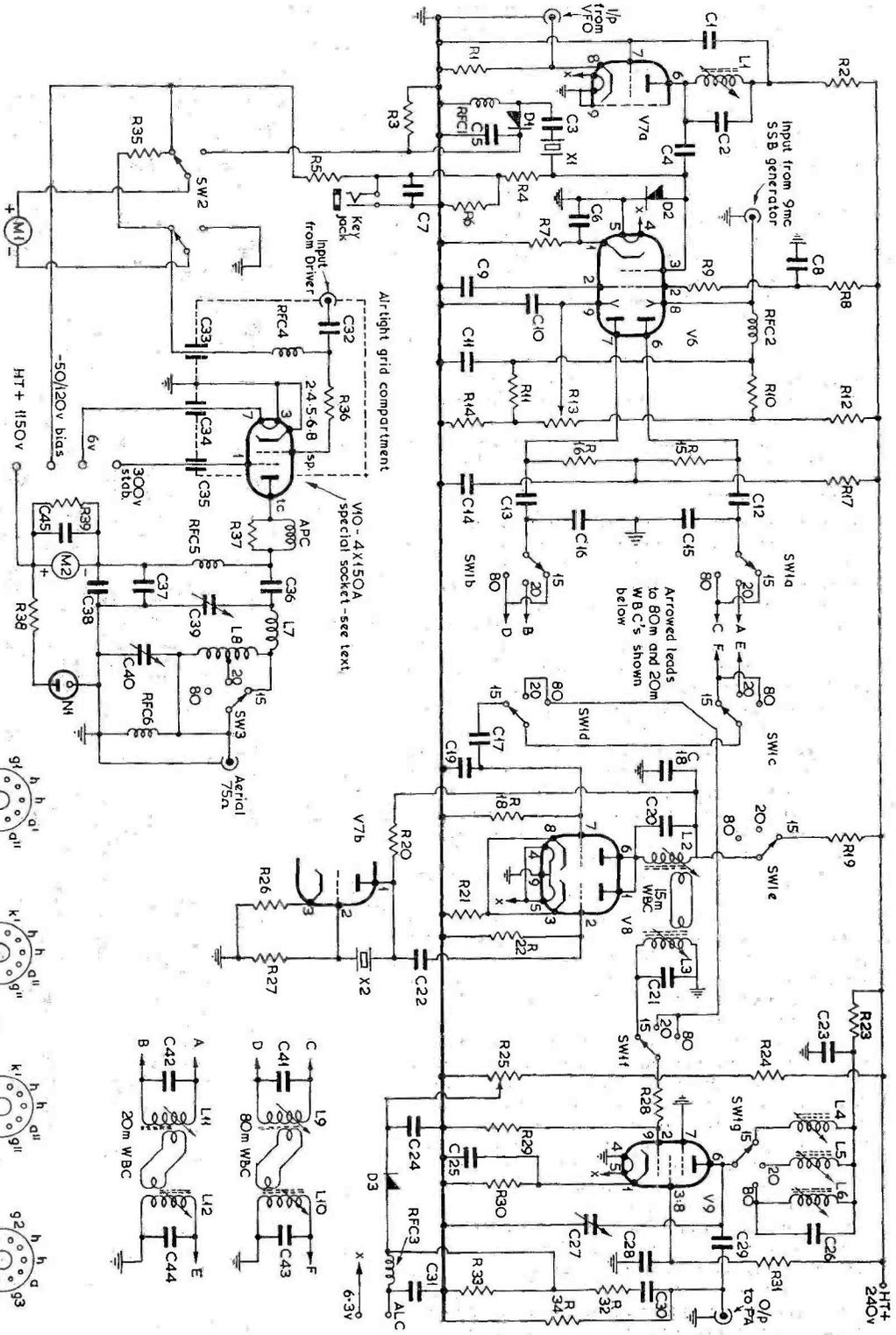
Setting Up

Before any voltages are applied to the Frequency Converter all the tuned circuits are best checked with a GDO. The valves must all be in place when this is done, for their inter-electrode capacities have a considerable effect upon the coils. (Before checking the WBC coils the bandswitch SW1 must of course be turned to the correct settings.) The difficulty of getting the GDO pick-up near to the coils under test can be overcome by making up a link coupler using flexible insulated wire, which can be fidgeted under the switch shaft. An exact frequency setting for the WBC coils is not needed at this stage; the cores

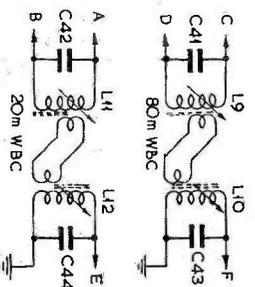


Inside the Frequency Converter and Driver unit for the three-band SSB transmitter described by G3BDQ. The positioning of the band-selector switch and some general constructional points are discussed in the text.

356



CIRCUIT OF THE FREQUENCY CONVERTER, DRIVER AND RF POWER AMPLIFIER SECTIONS OF THE THREE-BAND SSB TRANSMITTER



x 6-3V

the 80m. and 20m. sections. Whilst this setting-up procedure is being carried out, the lead from R4 which goes to the key jack must be earthed to ensure a return for the control grid of V6. Setting up is now complete and a final touching up of the cores of L4, L5 and L6 is best done when the unit is connected to the Linear Amplifier.

Other Bands

The three bands chosen in the design of this transmitter are perhaps the most useful for overall communication and DX working, bearing in mind the fickleness of 10m. and the many QRM problems attending the 40m. band. However, some may regard 40m. as their favourite band and it would not be difficult to modify the Frequency Converter to include it. The substitution of an 11 mc crystal for X2 and a 40m. WBC in the anode circuit of V8 would work out satisfactorily. To tune the first 500 kc of the 10m. band, X2 should oscillate on 24.5 mc. Fundamental crystals cannot be obtained higher than 20 mc so an overtone or frequency-doubling circuit would be required in place of the Pierce oscillator (V7B).

The Linear Amplifier

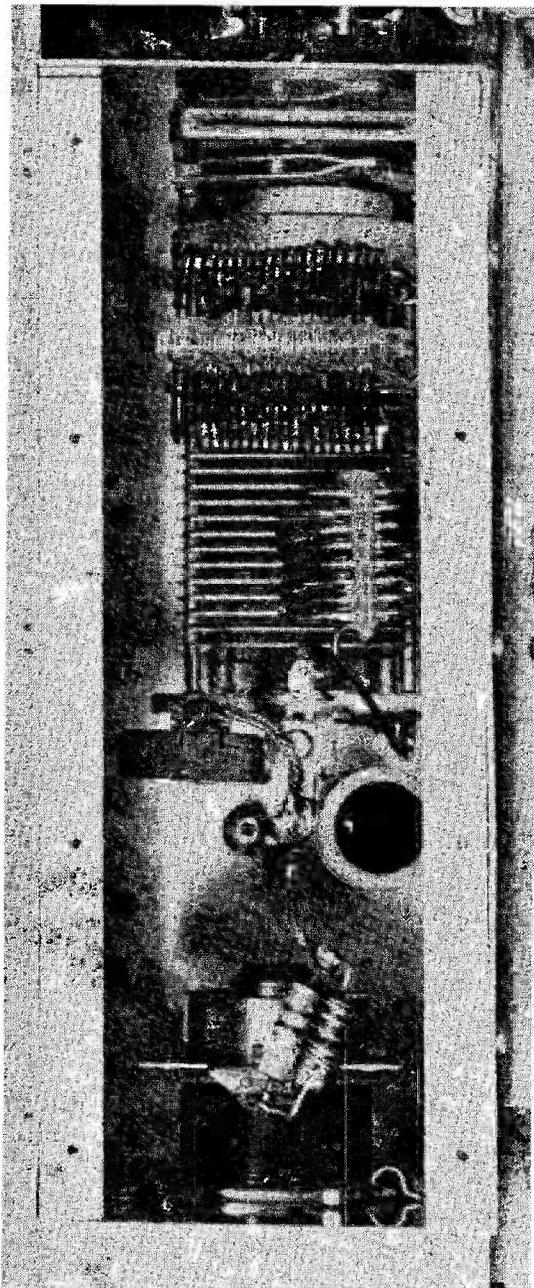
A 4X150A tetrode (V10) is used in active grid Class-AB1, its tuned grid circuit being the output section of the 6CL6 driver valve. A 300-volt stabilised screen supply is provided and there is an operating grid bias of 50 volts. Standard *pi*-tank output circuitry is employed with an output impedance of 75 ohms. On the surplus market 4X150A valves are easily obtainable (and often cost less than a new 6146 !). Also available are 4X150D valves which have a different heater voltage—26.5 volts as against the 6 volts (*not* 6.3 volts) of the 4X150A.

It is also sometimes possible to locate "ruggedised" 4X150A's which have stainless steel anode metalwork and cooling fins, instead of the more usual silver-plated brass. These special valves have a dissipation rating of 250 watts which is 100 watts greater than that of the standard valve.

Whichever type is used, however, forced air cooling is necessary, *even when just the heater is switched on*, or else the glass to metal seals may fracture. Air is blown through the base of a special valve socket, along a short chimney and through the anode fin assembly. This special valve socket is very difficult to obtain new in this country at a reasonable price. British-made ones cost more than £6! However, by scouting around patiently, second-hand Eimac sockets with built-in screen by-pass capacitors are sometimes available for under £2. (The writer has no spares so *please* don't write asking for more information on this matter!) The chimney may be of almost any material which is a good insulant and can stand a fair amount of heat without distortion or cracking. It was found that a bakelite 5 amp. wall-socket available from a well-known chain store could be dismantled and by sawing off its front face a chimney of the correct length and diameter became available. This can be seen in the photograph of the Linear Amplifier, together with the large finger stock anode connector. Should the latter item be unobtainable, a flexible brass strip $\frac{1}{2}$ in. wide can be clamped

around the valve anode structure.

In order to obtain the greatest benefit from the blower the 4X150A is mounted horizontally at one



View into the PA compartment, showing the tank circuit construction and the mounting of the 4X150A PA valve; this is run with forced-air cooling and the stage will give up to 300 watts p.e.p. on all three bands; the fan has to be running even when the 4X150A is on heater only. An expanded-aluminium grille encloses the PA section — see photograph on p.409 of the October issue.

end of the PA compartment and the open end of its socket at the rear is enclosed, together with all the grid components, in an air tight box of aluminium. Some careful metal cutting, bending and fitting is needed to make this box, and the inside corner cracks have been sealed with *Isopon* paste (as used for fibreglass work). The blower outlet, fitted with a rubber gasket, is bolted over a rectangular cut-out at the back of this box so that there is an uninterrupted flow of air through the valve socket. Underneath, ceramic feed-through capacitors carry bias, heater supply and screen supply into the box, and a Belling coax socket for the RF input is mounted to one side. The 4X150A socket has five cathode pin connections and each of these must be earthed with short stout leads.

The PA anode compartment measures 9½ in. x 3½ in. x 7½ in. deep and is covered with a piece of expanded aluminium for ventilation and screening. The air-tight grid compartment is 2 in. deep, which allows a space behind for the blower, an Airflow Developments type 26BT; this has a shaded-pole motor and operates silently; it does not need any electrical noise suppression.

RFC5 is a home made item, it being difficult to obtain a suitably rated choke without amateur band resonances. A 1 in. diameter Tufnol tube is close-wound with 28g. enam. silk covered Eureka wire for five inches and mounted on top of C37; the latter bolts down to the chassis and provides effective RF by-passing. The 80-ohm DC resistance of the Eureka winding effectively suppresses unwanted choke resonances. (The writer recently had the opportunity to peep inside a Collins Linear Amplifier and discovered its anode choke to be 10-watt wire wound resistor.)

L7 and L8 are home wound air-dielectric coils

(see Coil Table) and are self-supporting, being soldered to SW3 and C39. Suitably dismembered flexible plastic hair rollers (chain store) make good separators between adjacent turns of L8.

The anode current meter M2 has an 0-1 mA movement and must be carefully shunted to give a full-scale reading of 400 mA. The value of R39 will depend upon the internal resistance of the actual meter used, and it can be made up from paralleled lengths of the Eureka wire left over from the RF choke construction. The small neon indicator NI is a useful warning light which does not extinguish until the power supply capacitors have discharged after switching off. M1 is another 0-1 mA movement, for checking the 4X150A grid current in addition to being used in the VFO calibration circuit. R35 does not function as a normal meter shunt, it having very little effect upon the full-scale reading of the meter—but it ensures PA bias voltage when M1 is switched out of the grid circuit. Theoretically, an AB1 amplifier should not pass any grid current when operated in a linear condition, but in practice kicks of up to 1 mA are normal and M1 is useful for seeing that this is not exceeded by overdriving.

With 1,150 volts HT applied, the 4X150A standing anode current for proper AB1 operation is 50 mA. On speech peaks this rises to between 200 and 250 mA and represents an indicated DC input power of about 250 watts. The *peak* input power is of course considerably greater than this. For CW working the carrier insertion control is adjusted so that the DC input to the Linear Amplifier is 150 watts.

A description of the complete transmitter tuning-up procedure will be included in the next part of this article.

(To be continued)

SINGLE-COPY ORDERS

Those readers in remote places who have difficulty in getting *SHORT WAVE MAGAZINE* are reminded that we can accept single-copy orders from individuals for delivery through the mail. Publication day is always the first Friday of the month. So, a postal order for 3s. 5d. sent off the Tuesday before, with name and address and asking for a copy of the required issue, will reach us in time for it to be posted back by publication day.

NEVER TOO OLD . . .

When his callsign/address for the "New QTH" page came in from GM3SLW, Halkirk, Caithness, we were very interested to hear that he had passed his exams, and obtained his licence—at the age 62! Though keen about radio construction and listening since the early days, it was not until he got towards retirement that Alexander Auld found the time to work for a callsign. Having built himself the G3BDQ receiver from the June-July '62 issues of *SHORT WAVE MAGAZINE*; a Heathkit DX-100U with SB-10U Sideband adaptor; and a Z-match with reflectometer and dummy load (as in the article in the January, 1962 issue of the *Magazine*) he was all ready to go

on the air when the ticket arrived on September 27. By lunch-time that day GM3SLW had made his first QSO, with GM3PIP, getting a very encouraging report on the quality and strength of his "5 & 9" Sideband phone.

NEW MULLARD FILM

The latest addition to the well-known series of Mullard films of technical and educational interest is called *Girdle Round the Earth* and is in effect a history of telecommunication. Going back to Oersted's discovery of the electro-magnet in 1820, it picks out the landmarks and reconstructs the development right down to the present day, covering such important steps forward as the Cook and Wheatstone telegraph of 1837; the evolution of the Morse Code; the laying of the first trans-Atlantic cable in 1858; Kelvin's mirror galvanometer; Marconi's early work; and Fleming's valve invention. Many authorities have contributed to the production of *Girdle Round the Earth*, which is an authentic historical record of great interest. The running time is 20 mins. and the gauge is 16mm., black and white. This new addition to the Mullard Film Library is distributed by the Educational Foundation for Visual Aids, 33 Queen Anne Street, London, W.1.

RECEIVING MODULATION METER

REFERENCE CIRCUIT FOR DIRECT READING OF MODULATION DEPTH

THE device discussed in this article, although it does not approach the oscilloscope method of checking modulation depth, does give a much more useful indication than "depending on one's ear." The method used to evaluate the modulation depth on any phone signal is to set the RF gain of the receiver to give a predetermined voltage to the demodulator, as judged by the S-meter against a reference signal. The modulation meter is then switched to the "on" position, when the swing of the needle will indicate the peak modulation by noting the highest point which it reaches.

The disadvantage of such a system is that the calibration only holds for a given receiver, which must be very carefully tuned to the signal. It is advisable to connect the meter as early in the receiver audio system as possible, as any tone control—or other limiting device as is often introduced in receivers primarily designed for communications use—will give a false reading on signals where the modulation power is concentrated in the lower audio frequencies. But providing care is taken in setting the meter up and it is re-calibrated when any major adjustment is made to the receiver which would alter its gain, then the meter should work well and enable accurate reports of modulation depth to be given.

The circuit is shown in the diagram and, as can be seen, consists of a linear audio amplifier feeding into an output stage which, in the absence of signal, is cut off. Any audio power delivered from the demodulator to the amplifier grid is therefore used to drive the output valve into anode current, so giving a measure of the level of audio power present on a carrier for a predetermined S-meter reading. The theorists will be quick to point out the system's many drawbacks but the fact is that in practice it does work! The meter was checked against an oscilloscope and it was found, on some 40 signals within the amateur bands, that the meter reading was within

10% of (and on most signals very much nearer) to the 'scope' indication.

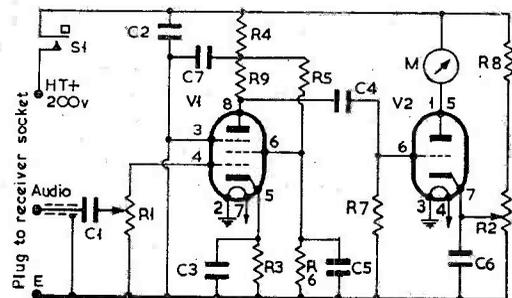
Construction

The unit can be constructed on a small chassis with the leads brought out to a four-pin plug to match a socket in the receiver. The two controls can be of the pre-set type and mounted on the front panel as the bias setting may need occasional adjustment in areas where the mains voltage fluctuates. All grid leads should be well screened and the smoothing efficient, as any hum introduced will lead to errors in calibration. No special precautions in lay-out are called for, although good quality components should be used as a non-linear response would give variations in the output depending upon the audio system at the transmitter end.

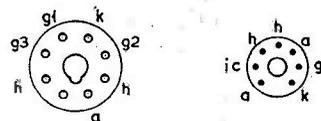
Setting Up and Calibration

To set the meter up plug in to the receiver socket and find a station of known modulation depth—if no oscilloscope check is possible, use a B.B.C. speech transmission and take it as 60% modulated. Tune very carefully to the centre of the carrier and increase the RF gain until the S-meter indicates, say, S8. *All subsequent readings must be referred to this setting on the S-meter.* Next, adjust R2 until the modulation meter itself reads 0.1 mA and set the zero-balance on the instrument to zero. Then adjust the audio gain control R1 of the unit until the meter just kicks up to a full-scale reading on audio peaks with a 100% modulated signal.

The meter is now set ready for use and unless it is recalibrated the controls must not be reset. Assuming the 0.1 mA meter is scaled in tenths, 0.6 mA would represent 60% modulation, 0.25 mA 25%, and so on; this can be checked by reference to a BBC



6.3v htr



VI-6AC7

V2-6C4

Table of Values

Circuit of the Receiver Modulation Meter

C1, C2,	R3 = 3,300 ohms
C4, C5 = 0.1 μ F	R4 = 33,000 ohms
C3 = .005 μ F	R5 = 100,000 ohms
C6 = .01 μ F	R6 = 150,000 ohms
C7 = 8 μ F, 350v. elect.	R7, R9 = 68,000 ohms
R1 = 1 megohm pot'	R8 = 15,000 ohms, 2-w.
meter	M = 0-1 mA m/c meter
R2 = 5,000-ohm pot'	V1 = 6AC7
meter	V2 = 6C4

(All resistors 1-watt except as stated)

This modulation metering device could be used as an auxiliary unit with almost any type of communications receiver. Its working and setting-up are explained in the text. It is primarily a reference system but it can be quite accurately calibrated. Its power can come from the Rx with which it is to be used.

signal, on which average speech modulation is 60%. And even if the figures are not accurate, they will always be *comparative*. Remember, the meter only gives an accurate result when the incoming signal produces an S8 reading on the S-meter, so it is important that the RF gain control be set to give this value on each signal to be measured. The press-to-read switch S1 can be mounted either on the unit or, as is usually more convenient, on the receiver front panel; it is required to make the meter in-operative when a signal of over S9 is tuned in, otherwise the needle would swing across the scale on modulation peaks and could be damaged. It should be mentioned that the meter for its operation requires very little audio to drive it and should cause no

noticeable change in the receiver audio output.

The audio input for the meter can be taken from the diode demodulator circuit at the point of audio feed to the voltage amplifier or, if no tone control is provided in this circuit, it may be taken from the grid pin of the first audio valve. In some circuits it may be a good thing to connect a 100,000 ohm resistor in series with the meter feed and, as care must be taken not to introduce hum at this point, the lead should be well screened. Should it be found that the linear amplifier of the unit will not give sufficient output to drive the control valve, the audio may be taken from the anode of the receiver triode amplifier; the grid connection is to be preferred, however, for the required linear characteristic.

PORTABLE ON TOP BAND IN THE HIGHLANDS

GM3JEQ/P, AUGUST 10-24, 1963

W. R. STEVERSON (G3JEQ)

AFTER 440 miles of hard driving, East Lothian was reached on August 10, and the telescopic mast was raised on the Lammermuir Hills—a ritual which was to be repeated for the next 14 nights. A short call on 1825 kc was immediately greeted with a pile-up of a considerable number of callers (no doubt due to the small item in *SHORT WAVE MAGAZINE* for August, p.308) and a welcome indication that we were in business. In all 45 stations were worked that evening, an average which was subsequently to be maintained during the whole trip.

With a wet start on the following morning, evening operations were continued as scheduled from Loch Lomond (Dunbarton), Bute, Loch Ness (Inverness) and Gairloch (Ross).

Anyone who has operated portable from Scotland in August will well know the agony of being eaten alive by the swarms of midges that descend at dusk, defying all known evil smelling preparations. This trip was no exception, and each QSO was therefore punctuated by a heavy swatting session! Another hazard was sheep, constantly trying to scratch their backs on the mast and guys, though luckily they never succeeded in getting it down.

Of course the rain in Scotland has to be seen to be believed, and in Ross we had our share. A lot of will-power is required to erect an aerial in torrential rain, but having done it, it's nice to sit back and enjoy sorting out the ensuing pile-up.

The trip continued northwards into Sutherland, with operation from Scourie and Tongue on the north coast, and a stop was made at Thurso in Caithness for a pleasant personal QSO with GM3COV. At Geoff's recommendation, operation that night was from Dunnet Head (Caithness), the most northerly

part of the mainland a few miles west of John-o'-Groats. With the mast on the summit of the Head and with a wonderful view of the Orkneys, the usual quota of QSO's resulted.

Homeward Run

After bidding GM3COV farewell, tracks were retraced, with stops at Durness (N.W. Sutherland), Scourie, Ardgay (Ross) to Nairn, where aside from the grouse-shooting fraternity and the vigilant local "Z-cars" who suspected our motives, the only mishap of the tour occurred. The aerial c/o relay commenced to give trouble. Considering the extremely rough tracks we had travelled, it says something for the home-built rig to have stood the battering so well.

Repairs to the relay took an hour, in the semi-darkness of the vehicle, and on return to the band at 0030 BST, stations were still there calling; they were rewarded for their patience with a QSO from Nairn, and all who were heard calling were worked, till well into the early hours.

In Kincardine, the mast was again set up at Cairn O'Mounth at 1,448ft., where last year difficulty was experienced in getting out. However, after the first few QSO's it was obvious that last year we had only succeeded in pushing the RF into a sheep barrier, with very little radiated. This year PA, OK and a considerable number of other DX stations were successfully raised.

Perth and Roxburgh were the last two counties to be put on the air and final total figures of 2,500 miles travelled with over 620 contacts in the log indicates pretty clearly that once again we had a very successful, if strenuous, trip through some of the finest scenery in the country.

A regular sked with a local Surrey station had been maintained daily, without difficulty, and on the whole the standard of operating on 160 metres was found to be pretty good.

The writer's thanks to all the stations who were on the frequency, for their forbearance. It is hoped they did not have to wait too long for the ensuing QSO, and that they and SWL's have gone many steps up the County Ladder.

For The Beginner

DISCUSSING AMPLIFIERS

Whether one is thinking of a receiver or a transmitter, it is certain that more than half of the valves it uses are functioning as amplifiers of some sort. The many different modes of operation must be clearly understood, so that the correct choice for any stage can be made.

EARLIER articles in this series have dealt with Crystal Oscillators (April 1963); VFO's (May and June 1963); and Mixers (August 1963). It is now necessary to cover the subject of straightforward amplifiers and their operation in amateur-band transmitters. This is a very wide subject, as there are so many types to think about, and also so many different requirements.

It will be assumed that the "required reading" from the earlier chapters of one of the various Handbooks has already been carried out, and that the beginner who has read all this knows something of valve characteristics and the fundamentals of RF amplification. What really has to be made clear is that each type has advantages and disadvantages when considered for any particular purpose. It is impossible to say that one type of amplifier is "better" than another . . . this is only the case when one considers exactly what the purpose of the stage will be.

Class A, B and C

First, a very brief re-cap of what you should already know about the classes of amplification, if you have done your homework in the matter of Fundamental Principles. What follows is highly condensed and simplified, but should help to sort out your ideas methodically.

Consider the characteristic curve of an imaginary valve (Fig. 1). This shows the variation of anode current with grid voltage; and once a fixed grid voltage (bias) has been applied, the curve will show what happens to the anode current when a varying grid voltage (sine-wave) is applied, in the form of an incoming signal from a previous stage.

In this simple case, we will consider what happens with the same valve under three different conditions, calling them Class A, B and C. The Class-A point is highest up the curve, allowing a considerable swing on either side within the straight portion of the curve; the Class-B point is near the bottom of the curve, which means that the positive-going half-cycle of grid voltage will swing on the straight part of the curve, but the negative-going half will be on the lower bend; and the Class-C point, actually right off the curve as shown, will ensure that the negative-going half-cycle will have no effect whatever (since the valve is already biased well beyond the cut-off point) but that the positive-going half will cause a corres-

ponding half-cycle of anode current to flow.

Fig. 2 shows, in idealised form, the anode-current wave-forms resulting from an applied grid voltage in the form of a sine-wave. In Class-A, if the input sine-wave is kept down in amplitude so that the operation is confined to the straight part of the characteristic, a similar sine-wave appears at the anode. In Class-B the input may be increased in amplitude to give a wave-form that is sinusoidal in one direction but distorted in the other; and in Class-C a much larger input swing is used to give a somewhat distorted anode wave-form (the "kink" at the top is caused by running into saturation where the characteristic curve flattens at the top), with no negative half-cycle at all.

Note that in Class-A condition there is a high "standing current" in the anode circuit (22.5 mA); in Class-B it is much lower (6 mA in the case shown, but it might be zero); and in Class-C it is most definitely zero, the valve being biased to perhaps as much as twice the cut-off point.

Now, it should be obvious at once from these curves that only Class-A could be used for distortionless amplification—and that would be true. But if the Class-B situation is amended by using two valves in push-pull (and remember that the top of the output curve is on the straight part of the characteristic and therefore virtually a sine-wave), then the missing half-cycle from each valve is supplied by the other one, working 180° out of phase with it, and the overall output curve should resemble the Class-A specimen.

Class-C, of course, can be used for nothing but RF amplification of a pure sine-wave input. Even then it is only possible because the high-Q tank circuit of the amplifier valve has a "fly-wheel" effect which supplies the completely-missing half-cycles. It is a very efficient generator of harmonics; in fact, frequency-doublers are nothing but Class-C amplifier stages with their tank circuits tuned to twice the frequency. One can even go further and pick out four or six times the frequency, with reduced efficiency. And one can go on up to the TV frequencies and find extremely solid harmonics, due to Class-C amplification!

It is doubtful whether there is now any justification for the use of Class-C in amateur transmitters, but that is another story. Certainly the old chain of frequency-doublers, which every transmitter used to include, is right "out." In these days of TVI, we

arrive at the wanted frequency by *mixing*, not by mass-production of harmonics.

Attributes of Each Type

A quick summary, then. *Class-A*: Low distortion, high standing anode current, which restricts the level at which a given stage may be run (or, in other words, necessitates a bigger valve). Ideal for voltage amplification. No power drain on previous stage. Hence, ideal for isolating stages or buffers. Also ideal for linear amplifiers, but usually impracticable because of high standing current and therefore high anode dissipation, and low efficiency.

Class-B: Higher efficiency, since the anode current remains low when the input signal is small; therefore smaller valves can be used for a given input, compared with *Class-A*. Can be made almost distortionless when two valves are used in the push-pull mode. But if the input is high enough to drive the grids positive during part of the cycle, power will be taken from the preceding stage, and the good "isolation" characteristics of *Class-A* are lost.

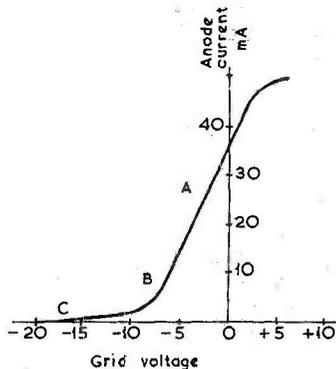
Class-C: Highest efficiency, but requires considerable driving power and is a fine generator of harmonics unless precautionary measures are taken to suppress them. Most unwise to use a *Class-C* final amplifier immediately after a CO or VFO without a buffer or isolating stage in between. (See also Table I, p.476, for advantages and disadvantages of all types.)

At this stage someone is sure to be asking "What about *Class-AB*, *AB1* and *AB2*?" So we must confess to having simplified things somewhat. Strictly speaking, in *Class-B* the valve must be biased to cut-off, and the negative half-cycle is therefore completely suppressed. The term "*Class-AB*" is reserved for a condition that lies between this and that of *Class-A*. "*AB1*" implies the use of slightly higher bias than for true *Class-A* work, allowing the signal almost as far up the curve as the point where grid-current starts (*i.e.* where the grid is actually driven positive by the signal working against the bias). "*AB2*" takes matters a little further and actually allows the grid voltage to swing positive, so that grid current *does* flow. In both cases, push-pull operation of two valves cancels out most of the distortion of the wave-form. The point "B" in Fig. 1 approximates to "*AB2*" operation.

Amplifiers at Work

A typical small transmitter (say a 10-watt effort for Top Band) will usually be found to consist of three stages—a VFO, a buffer amplifier (BA) and a power amplifier (PA). To keep a VFO stable it is essential to isolate it from the fluctuating loads placed upon it by a following stage which is either keyed or modulated, so a *Class-A* buffer stage is ideal for the purpose, since it never runs into grid current and therefore does not draw power from the VFO.

When it comes to the matter of modulation, though, we have a choice. The PA can be run in *Class-C*, with high-level modulation applied to it (only a relative term, when dealing with a 10-watter!); or the BA may be modulated, at a much lower level



(B 71)

Fig. 1

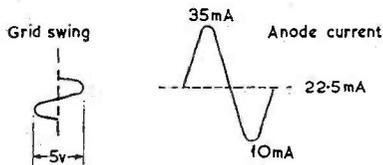


Fig. 2 (a) CLASS 'A'

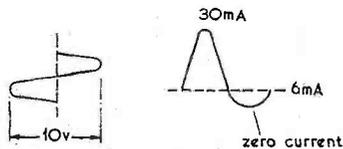


Fig. 2 (b) CLASS 'B'



Fig. 2 (c) CLASS 'C'

of audio, and followed by a PA which is *linear*. (A *Class-C* PA, of course, is anything *but* linear and cannot be used to amplify a modulated signal ... so *Class AB1* or *AB2* is generally used.)

The *pros* and *cons* come out like this: In scheme 1 (Fig. 3a) you will need at least 5 watts of audio power for the modulator, but your *Class-C* PA will work at high efficiency and give you nearly 7 watts output for 10 watts input. In scheme 2 (Fig. 3b) you can achieve full modulation with only a watt or so of audio power, but your *Class-AB* PA will not do much better than 5 watts output for 10 watts input.

With a ten-watt Top-Bander, the usual answer is

Table I

CATEGORY	ADVANTAGES	DISADVANTAGES
Class A	Low distortion—linear operation possible as modulated driver. Low drive requirements—no power taken from previous stage. Simple bias supply needed. No harmonic generation.	Low efficiency (25-30 per cent). Therefore, high anode dissipation and larger valve needed.
Class AB1	Linear operation possible, as low-level modulated driver. Low drive requirements. Low harmonic generation. Simple unregulated bias supply.	Medium efficiency (50-60 per cent). Regulated screen supply necessary.
Class AB2 and B	Linear operation with 55-65 per cent efficiency.	"Stiff" (regulated) bias and screen supplies necessary. Greater drive needed, as power is drawn from preceding stage, which must be suitably damped to avoid "pulling." Increased harmonic generation.
Class C	Highest efficiency (70 to 80 per cent).	Large harmonic output. High level modulation needed, and thus double ratings on RF components, as compared with CW condition.

to use scheme 1. It is not difficult to raise 5 watts of audio, and the Class-C condition of the PA at such a low frequency will not generate a crop of harmonics sufficiently prolific to cause TVI. But with a 150-watt transmitter on the HF bands the reasoning changes somewhat. There, you are faced with the difference between 75 watts of audio (to modulate a Class-C PA) or a reasonable amount, such as 2 or 3 watts, to modulate a buffer which is followed by a linear PA. Furthermore, there is everything in favour of using a Class-AB PA on, say 14 mc—simply to avoid the harmonic generation of a typical Class-C stage, which is a prime cause of TVI. So, when planning a transmitter, first think hard about the question of low-level or high-level modulation.

A typical SSB transmitter will, of course, include many amplifier stages of various types. There will certainly be one or more audio amplifiers; probably an amplifier at the carrier frequency (435 kc or whatever it may be); a VFO amplifier; a Class-A stage ("driver amplifier") and the final PA, running in AB1. And there may well be a further high-powered linear stage following the erstwhile "final."

In addition there may be cathode-follower stages (which we will be dealing with on another occasion, together with grounded-grid amplifiers, cascodes and other types not yet mentioned).

Types of Valve—Correct Choice

With the truly amazing variety of valves at present on the market, the correct choice of type becomes a puzzling business for the novice. Not only is he con-

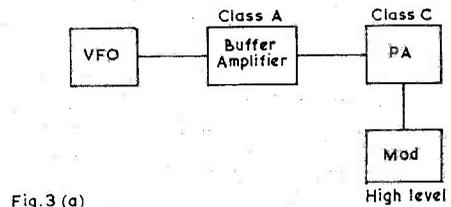


Fig. 3 (a)

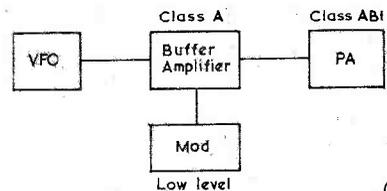


Fig. 3 (b)

B
72

fronted with triodes, tetrodes and pentodes, but these categories are sub-divided into variable- μ types, high- μ , medium- μ , sharp cut-off, remote cut-off, beam-power tetrodes, power-amplifier pentodes . . . there seems no end to the variations.

Fortunately the average transmitter does not employ valves doing as many different jobs as the modern receiver; and certain well-known and trusted types appear over and over again. Among the transmitting tetrodes we repeatedly find the 5763, 2E26 and 6146 as general-purpose types in ascending order of magnitude (their output ratings are respectively 12, 27 and 70 watts).

In the early stages of transmitters, ordinary receiving-type valves are extensively used. The popular 12AU7 and 12AX7 double triodes will often appear as audio amplifiers; the ubiquitous 6V6 and 6L6 could hardly be avoided among the older designs (either as buffers, frequency-doublers or PA's); and the more recent 6CL6 has now come into prominence as an excellent Class-A driver for a linear (Class-AB1) PA, possibly using 6146's.

Essentials

Transmitters of ten years ago, with the inevitable Class-C PA, were not particularly stringent in their requirements in the way of power and bias supplies. This is *not* the case with linear amplifiers, which must have extremely well-regulated bias, screen and anode supplies. The very mode of operation of a Class-B stage—mean anode current varying with the input signal, and grids driven positive (therefore grid-current flowing) over half of each cycle, means that well-regulated power supplies are essential.

This is one of the reasons why other types of amplifier such as the grounded-grid stage, have become popular. This is another part of the story, and will be dealt with in a further article in this series.



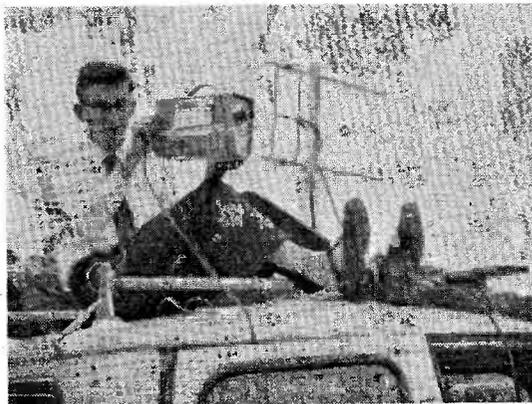
G3IAC (Ely, Cambs.), on left, was with G3AKU (Nottingham) at the Lincoln Rally on September 15.

A G5CP print



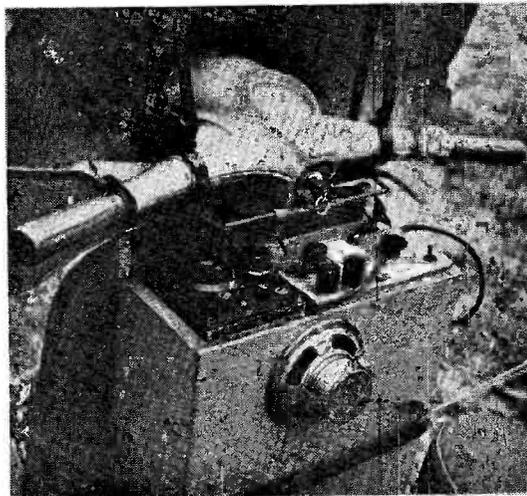
General view, at about the middle of the afternoon, at the Woburn Rally organised by the RSGB, on September 22. The attendance was estimated at around 700 people, and the talk-in stations were kept busy on both bands — the 2m. mobiles were noticeable more numerous than usual. The mobile committee worked hard to make this Rally the success it undoubtedly was. An outstanding attraction was a display of radio-controlled model aviation, of a quality and on a scale not often seen. One of the models crashed badly due to thoughtless QRM on the control frequency near the 28 mc band.

A G3GMN print



G3NDT/T and G3OUO/T, who run a roving ATV camera, were at one of the Reading Amateur Radio Club's mobile picnics during the summer. The slot-fed aerial is for 70 cm. TV transmission to a local receiver on which the roving-eye pictures are displayed.

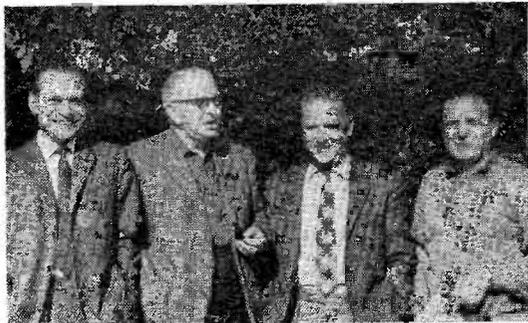
A G30MU print



One way of going mobile is as by G3RGD/M, who has 160m. gear mounted on a Lambretta scooter; it is built on to the front apron of the machine. The Tx runs 10w., using transistors in the exciter and modulator stages, and the Rx is a "Command" type.

A G5CP print

**Last of the Season's
Rally photographs**



If ever you have heard or worked G3PZC, G8DN, G3ESR or G3GEW here they are lined up, from left to right, at the recent Lincoln Rally.

A G5CP print

THIS DECIBEL BUSINESS

WHAT IT IS AND HOW TO USE IT

J. B. TUKE (GM3BST)

To some, this article may look too mathematical, but in fact it is a painless discussion on one of the most frequently used but least understood terms in the radio amateur vocabulary. Our contributor shows by example how the decibel can be regarded as an easy way of expressing quantities and solving certain of the problems commonly met with, both on the air and off it.—Editor.

WHILE listening idly on the bands the other evening an interesting conversation between two amateur phone stations was overheard. Tests were being carried out, and presumably they were not all that far apart as they did not seem to be troubled by QRM, and station "A" was telling station "B" that his signals were "S9 on the meter." "A" then made some alteration to his transmitter (something to do with the PA stage) and announced that this improvement had increased the aerial current from 0.6 to 0.8 amps, whereupon "B" replied "That is certainly a big improvement and you are now 20 dB over nine." "A" accepted this quite happily and they subsequently went on to talk about other matters. It was plain from the tone of their discussion that they were experienced amateurs, and undoubtedly well "clued up" when it came to radio theory—but it was also painfully obvious that neither had the slightest idea what was meant by an increase from S9 to 20 dB over S9, having regard to the increase of aerial current at the transmitting end. It is felt that there is some general misunderstanding in the use of the decibel in this and other contexts and it is hoped that this article will make things a little clearer and show that, properly used, the decibel is a very useful tool.

What is the fundamental meaning of the word "decibel"? It is the tenth part of a Bel, and it is basically a power ratio. The formula in the text book says that if we have two powers, P1 and P2 and we wish to express the ratio of P2 to P1 in decibels we find it as follows:

$$\text{dB} = 10 \text{ Log} \frac{P2}{P1}$$

This formula means that P2 is divided by P1 to bring them to a ratio, and the answer to this little sum is then expressed as a logarithm, and then multiplied by ten. The small "10" after the word log means that logs, "to the base ten" are used, but there is no need to worry about that as although there are other bases, the base ten is the normal one such as we once used in school and is found in any maths. text book in the form of tables. Let us now work

out a very simple example to see what it all means in practice.

Examples

Let us start with a power of one watt, and call that P1, and then amplify it to two watts and call that P2. We can now substitute the figures in the formula

$$\begin{aligned} \text{dB} &= 10 \text{ Log} \frac{P2}{P1} \\ &= 10 \text{ Log} \frac{2}{1} \\ &= 10 \text{ Log } 2 \\ &= 10 \times 0.3010 \\ &= 3 \text{ (ignoring decimal places)} \end{aligned}$$

So, a change of 3 dB (approx.) represents doubling the power. Suppose we now compare four watts and one watt. Substituting in the formula we get:

$$\begin{aligned} \text{dB} &= 10 \text{ Log} \frac{P2}{P1} \\ &= 10 \text{ Log } 4 \\ &= 10 \times 0.6021 \\ &= 6. \end{aligned}$$

So a change of 6 dB means multiplying the power by four. Similarly it can be calculated that multiplying the power by 8 gives a 9 dB increase, multiplying power by 16 gives 12 dB and so on. In other words, every time the power is doubled, it is increased by 3 dB.

Now suppose these individual 3 dB increases are represented as single stages in an amplifier as shown in Fig 1. One rather long way to describe the performance of this amplifier would be to say that it consists of four stages, each of which doubles the power applied to it. In order to work out the overall gain (power) we would have to multiply the individual power gains together, and while this is easy enough with the simple example shown, it could conceivably be rather involved in a real and complex amplifier. The alternative and altogether better method would be to say that it consists of four stages, each of 3 dB gain, making a total of 12 dB (3+3+3+3). What could be simpler? So the decibel is, to begin with, a very simple method of describing the performance of an amplifier. Using Fig. 1 as an example, we can check our figures by saying the overall power increase is 16 times, so, once more substituting in the formula:

$$\begin{aligned} \text{dB} &= 10 \text{ Log} \frac{16}{1} \\ &= 10 \text{ Log } 16 \\ &= 10 \times 1.2 \\ &= 12. \end{aligned}$$

In the same way a loss of power can be expressed in decibels. Strictly speaking the original formula still applies, and suppose this time we have an attenuator

which reduces four watts to one watt. This time P2 is one watt, and P1 is four watts. Substituting:

$$\begin{aligned} \text{dB} &= 10 \text{ Log } \frac{1}{4} \\ &= 10 \text{ Log } 0.25 \end{aligned}$$

and this immediately takes us into logs with negative characteristics. Since this is intended to be a practical article and not a maths. lesson, we will now say that if:

$$\begin{aligned} \text{(+)} \text{ dB} &= 10 \text{ Log } \frac{\text{P2}}{\text{P1}} \\ \text{then:} \\ \text{(-)} \text{ dB} &= -10 \text{ Log } \frac{\text{P1}}{\text{P2}} \end{aligned}$$

Using this new formula to solve the original attenuator problem we get:

$$\begin{aligned} - \text{dB} &= -10 \text{ Log } \frac{4}{1} \\ &= -10 \times 0.6021 \\ &= -6. \end{aligned}$$

This method is rather easier than finding the log of 0.25, and from then on dealing with the characteristic and mantissa as separate items. Sufficient to say that in further examples considered in this article, the larger power will always be the upper figure and the smaller one the lower, with the negative sign indicating a power loss. The absence of any sign in front of "dB" implies that it is positive and expressing a gain. The above examples have now shown one of the common uses of the decibel—the expression of power gains and losses. As we shall see, these may well be used together, providing the signs are remembered.

Voltage and Current Ratios

Can we use the decibel similarly to express current and voltage ratios? The answer is both "yes" and "no." It is "yes" providing input and output impedances are always the same, but "no" if they are different. Also the formula requires a little modification, as we shall now see.

Let it be assumed at the moment that when considering two voltages, the impedances are the same. Again taking a power of one watt, let it be supposed that this one watt was produced by 10 volts being applied to 100 ohms. Since we have stated that impedance is unchanged, if we now increase the power to two watts, this must also be produced across 100 ohms. The formula relating power, voltage and impedance is:

$$\begin{aligned} E^2 &= W R \dots \text{so,} \\ E^2 &= 2 \times 100 \dots \text{and} \\ E &= 14 \text{ (approx.).} \end{aligned}$$

We already know that three dB gain means that power has been increased by two, but we find that the voltage has only been increased by the square root of two, i.e. 1.4. This is quite correct when one considers that in order to double the power with impedance unchanged, both voltage and current must

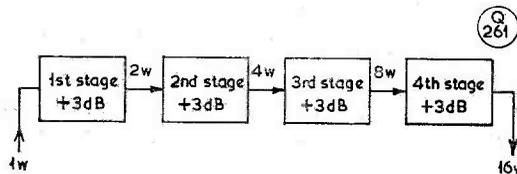


Fig. 1. Showing how amplifier performance can be expressed in dB — see text for explanation and discussion.

increase by the root of two, since $W = E \times I$, and if E and I are both increased by 1.4, W is increased by 1.4², which is 2. Going on a step further and using a times-four increase of power as an example, the voltage across the 100 ohms resistor is:

$$\begin{aligned} E^2 &= W R \\ &= 4 \times 100 \dots \text{so} \\ E &= \sqrt{400} \\ &= 20. \end{aligned}$$

and this is twice the voltage we started with. So 6 dB means twice the voltage (and four times power increase). So now it will be seen that if we are going to use voltages or currents to find decibels, the formula must be altered slightly as the answer will always otherwise come out at half the correct one. This is done by changing the multiplier from 10 to 20, so that the formula now becomes:

$$\text{dB} = 20 \text{ Log } \frac{E2}{E1} \left(\text{or } \frac{I2}{I1} \right)$$

Checking the example above using the new formula we get:

$$\begin{aligned} \text{dB} &= 20 \text{ Log } \frac{20}{10} \\ &= 20 \text{ Log } 2 \\ &= 20 \times 0.3010 \\ &= 6. \end{aligned}$$

Having sorted that lot out, let us now enquire why it is so important that the input and output impedances remain the same. Suppose we use the figures above but apply them to an amplifier to explain. We have an amplifier which requires a drive of one watt, and this is in the form of 10 volts across 100 ohms. The output of this amplifier is four watts—this being produced by a valve the correct anode load of which is 2500 ohms. This load is provided by a 100 ohms resistor via a 5:1 transformer which produces a reflected impedance of 2500 ohms at the valve anode. Assuming no losses anywhere we can say straight away that if there is one watt input and four watts output, the gain is 6 dB. Considering the voltage produced by the output valve itself across the primary of the transformer:

$$\begin{aligned} E^2 &= W R \\ &= 4 \times 2500 \dots \text{so,} \\ E &= \sqrt{10,000} \\ &= 100. \end{aligned}$$

If we were to use this figure as "E2" in the decibel formula the result would be all wrong. However if we use the voltage across the 100 ohms resistor, which is 20 volts, the answer comes out correctly to 6 dB. Clearly, impedances are important when dealing with voltages or currents.

Reference Level

It is not often one hears decibels being mentioned over the air unless in connection with S-meter readings or aerials, and both of these will be dealt with later, but a further appreciation of the term is obtained by considering its use in line engineering. If one could eavesdrop on engineers testing lines, you might well hear one say "I'll give you zero dB at 1 kc." To which the other might reply "Not bad, getting neg one this end." This sounds about as odd as the amateur conversation at the beginning of this article, but it is in fact sound engineering practice. But how does one send a zero level down a line, and end with something less than zero the other end? Of course the vital piece of information is missing, and that is the *reference level*. If power of a standard level is fed into a line, and that power arrives at the distant end completely unchanged, then the level at each end is zero dB, and the line has neither gain nor loss *en route*. If only half the power arrived at the distant end, the level at that end would be -3 dB with reference to the sending end (commonly called "neg three"). In the above example then, there was a loss of 1 dB on the line. At the moment though, it is not known whether one watt, one milliwatt or one megawatt was sent down the line in the first instance. Why then was the reference level not stated? Because in this particular case it is known to both parties already. Most line engineering uses as a reference level the figure of 1 milliwatt, and strictly speaking the symbol "dBm" should be used instead of "dB" when this standard is inferred. We can now appreciate that a level of 1 milliwatt was being sent down the line at a frequency of 1 kc, but that the level at the receiving end was 1 dB below this value. Of course it is unlikely that the line would have the same characteristic for other frequencies, so that perhaps at three kc the loss might be 3 dB, and so on.

In a similar manner, in the amateur world we see reference to the performance of amplifiers, reproducers, etc. A certain amplifier may be "flat" from say, 50 c/s to 12 kc—this means no change of output with reference to a certain figure (often that obtained at 1 kc) between these limits. It may further be said to have a loss of 3 dB/octave between 50 and 12.5 c/s—which means that at 25 c/s the power is half what it was at 50 c/s, and at 12.5 c/s it is half that again. (So at 12.5 c/s it is 6 dB down on 50 c/s.) Finally, it may be stated that the output at 20 kc is 40 dB down, which will mean that only 1/10,000th part of the power will be available at this frequency. All this has been described without giving a reference level, and is all right up to this point. But if it were required to say just how many *watts* the amplifier would deliver, then the reference level must be quoted. If the above figures were given in

"dBm" we would know immediately that the reference level was one milliwatt, but without a reference we can only give comparative frequency/power figures, instead of real watts, volts or amps.

The standard of 1 milliwatt is not the only one—a well known multimeter with a decibel scale uses another quite usual standard of 50 milliwatts. It doesn't matter what standard you use, as long as one is used and everybody knows what it is!

The S-Meter Problem

Having learnt a bit about the decibel, let us now return to the opening paragraph of this article and see why it is so much in error. "A" said that he had increased the current in his transmitting aerial from 0.6 to 0.8 amps. Using the current formula we can calculate the dB gains as:

$$\begin{aligned} \text{dB} &= 20 \text{ Log } \frac{I_2}{I_1} \\ &= 20 \text{ Log } \frac{.8}{.6} \\ &= 20 \text{ Log } 1.33 \\ &= 20 \times 0.12 \\ &= 2.4 \text{ dB.} \end{aligned}$$

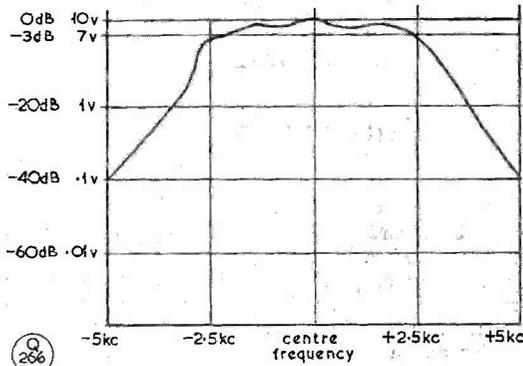
This, we may note, is no mean increase as 3 dB would have been twice power, so the improvement that "A" made was certainly worthwhile. But at the receiving end the signal which was S9 to start with went up to 20 dB over S9, and 20 dB represents one hundred times increase in power! However, it is not suggested that either "A" or "B" were misreading meters. What is suggested is that the calibration of the S-meter was rather far off the mark. If either of the participants in the test had known about the decibel they would quickly have realised that an increase of 2.4 dB at the transmitting end could not possibly produce an increase of 20 dB at the receiving end.

Probably readers who have S-meters on their receivers which are calibrated in S-points together with two additional marks of "+20 dB" and "+40 dB" (and on some very hopeful receivers "+60 dB") may well wonder at this stage whether they can ever obtain a reading of 20 or more dB's over S9 which represents a real value (apart from connecting the Tx output directly to the aerial terminals of the receiver!). Well, of course, it all depends on what you mean by S9, or some other S-point. It seems generally accepted that one S-point represents 6 dB (though another standard of 4 dB/S-point is also used), so each S-point doubles the voltage at the aerial terminals of the receiver. It has been suggested that S1 = one microvolt. If this is the case, S2 = 2 μ V, S3 = 4 μ V and so on up to S9 = 256 μ V. Rounding that off to 250 μ V or $\frac{1}{4}$ millivolt, then 20 dB over S9 is 2.5 mV, 40 over 9 is 25 mV and 60 over 9 is $\frac{1}{4}$ volt. Another suggested standard is S9 = 1 millivolt. In this case 20 dB over S9 is 10 mV and so on. If you use 4 dB/S-point, other answers can be obtained. A world-wide standard somewhere would be most useful!

Evaluating Selectivity

One frequently hears decibels spoken of with reference to selectivity curves. In this case, since valves in a receiver are voltage rather than power operated, we are mostly interested in the voltage applied to a valve amplifier at different parts of the bandpass curve of, say, an IF transformer. If we know with reference to the centre frequency that the curve does not fall below -3 dB over a width of 2.5 kc, we know that the voltage applied to the valve will always be at least 0.7 of the maximum within those limits. For further information about the curve we may be told that 5 kc off resonance the response is 40 dB down, so we know that only 1/100th of the maximum voltage will be delivered at this point on the curve. Fig. 2 makes these examples clear, where it is assumed that the maximum response delivers 10 volts, and the decibel equivalent is shown alongside.

Another popular use of decibels is concerned with the performance of directional aerials. The ratio quoted here can be one of several. One in common use is the power radiated in the desired direction compared with that of an imaginary "all-round" radiator—a vertical dipole for example. Another ratio is that in the desired direction compared to that 180 degrees away—this is the "back-to-front ratio." Sometimes a comparison is made between the desired direction and that 90 degrees from it—this is of course the front/side ratio. Beam "widths" are often quoted as so many degrees for 6 dB down. If a beam was said to be 20 degrees wide at the 6 dB points, it would mean that either side of the centre-line at an angle of 10 degrees, the power had fallen off to a quarter of the value of that radiated along



Q 266

Fig. 2. The use of dB values in expressing selectivity, which GM3BST explains in his article.

the centre line. This would also mean that voltage and current fields had fallen by half. And so on.

It is hoped by now that the decibel is a little clearer, and will become a handy weapon for those who were a little bit confused to start with. How about an example to see if it is all understood?

The VFO at GM3BST delivers 1 watt of RF, and this is fed via a piece of coax cable which has a loss of 3 dB to an exciter giving 20 watts output. This exciter feeds a grounded grid PA which takes 20 watts of drive to give 120 watts output. This is fed into an ATU which has a loss of 1 dB, and the output of this goes via a buried feeder, having a loss of 2 dB to the aerial. If the aerial has an impedance of 60 ohms (and is perfectly matched) what is the voltage and current at the aerial feed point? (See p.493 for the answer!—Editor.)

MORSE COURSE SUCCESS

Though G3HSC says it is not at all unusual for him to work a new operator who reports that he learnt the Code and passed his test by using the G3HSC Course on record, he did have one surprise the other day: He was informed by a certain Cheltenham station that five others in that neighbourhood had also passed the Morse Test, the one set of Course records having been used in turn by them all! As G3HSC says, it may not be very good for business, but it is at least a tribute to his method for learning Morse.

REQUEST FOR HELP

We are asked by G3RWF to say that he would be very grateful for any help from U.K. readers in the formation and support of a radio club he is starting at his school—particularly required are radio periodicals (any kind or date) and small parcels of unwanted parts or components. Anything of this sort would be most gratefully received. We publish this request only because P. N. Henwood, G3RWF, writes from The Technical Institute, Congo Cross, Freetown, Sierra Leone.



WIDE-RANGE MODULATED OSCILLATOR

FOR GENERAL BENCH WORK

THE circuit arrangement shown in the diagram can be regarded as a simplified signal generator, with tone modulation, for general test purposes over a wide frequency range — indeed, the cathode-coupled oscillator V1 will go off on frequencies from VLF to VHF; it is just a matter of the correct L, C ratios and a suitable constructional format to get to upper limits around 250 mc.

Of course, in covering such a wide frequency range and using a large variable capacity for C5, on HF and into the VHF area the tuning will become so sharp that only an approximate frequency setting will be possible. However, the point is that output can be obtained at some frequency in Bands II and III, and on two metres, for reference purposes.

Since the V1 circuit configuration is that of a two-terminal oscillator, construction is simplified and standard commercial coils—from the Denco, Electroniques or Osrom ranges—can be used for the inductance banks (refer the Home Radio or Southern Radio catalogues).

If much HF/VHF work is to be done, it would be advisable to reduce C5 to, say, 50 μF , and connect a second variable capacity, of 500 μF , across S3; this would only come into circuit when S2 is at its position 6.

Resistor R1 functions purely as an output control (amplitude) but will also be found to affect the waveform if the instrument is used in conjunction with a 'scope. The switch S1 defers to the fact that over the lower frequency range, more coupling capacity is required.

If the unit is to be used mainly for HF/VHF work, a well smoothed and stabilised HT supply of 150-200v. should be provided. This is not so important on the VLF ranges down to 100 kc.

Tone Modulation

The triode V2 is connected as an audio oscillator, using a 5:1 intervalve transformer (such as the *Radiospares* "Standard" type). The switching, S4A-S4B, is arranged to give either straight RF or modulated RF output, as required. The pitch of the audio tone can be varied by putting capacities of different values, from .005 to .05 μF , in the Ct position. To get this audio oscillator to go off, it may be necessary to reverse the connections on one side of the transformer. The tone modulation will not be more than about 40% of carrier amplitude, but this is ample for all practical purposes.

Notes on Construction

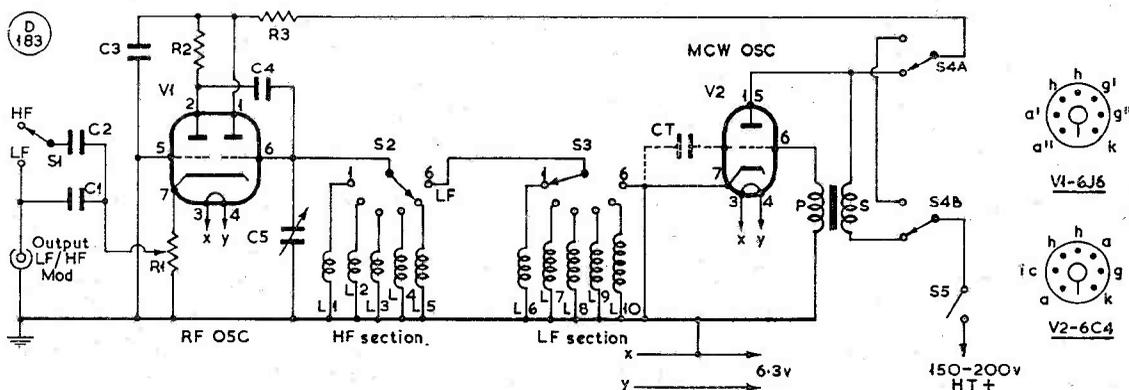
Whatever constructional form is adopted will probably depend on the uses to which the instrument will be put and what is available in the way of chassis and boxes.

Obviously, the HF coil assembly L1-L5 and C5 should be mounted as close as possible to the valve (V1), with L1 as the highest frequency to be tuned and therefore taking the shortest connecting leads. L10 can be the coil for the lowest frequency to be covered, which could be in the region of 100 kc or

Table of Values

The Wide-Range Modulated Oscillator

C1 = 47 μF	R3 = 15,000 ohms
C2 = .01 μF	Coils = see text
C3 = 100 μF	S1, S5 = SPST
C4 = 50 μF	S2, S3 = see text
C5 = see text	S4A, S4B = DPDT
R1 = 2,000-ohm pot'	V1 = 6J6
meter	V2 = 6C4
R2 = 20,000 ohms	



Circuit of the modulated oscillator discussed in the text. It can be regarded as a simplified form of signal generator, suitable for first-instance test work on the bench. By using commercial coils for the L1-L5 and L6-L10 inductance banks, a very wide frequency range can be covered, from VLF to VHF. Depending on the uses to which the instrument might be put, separate tuning condensers could be provided for the two banks, as the value given for C5 would be found excessive for HF-VHF work. V2 is an audio oscillator for tone modulating the RF side, and the switching S4A-S4B isolates the MCW oscillator when not required. The pitch of the audio tone will depend upon the transformer characteristics, and can be adjusted to suit by trying condensers of different values in the Ct position.

even lower.

While S3 can be any ordinary sort of switch giving the required six notches, S2 ought to be a good low-loss ceramic type and, if the mechanical configuration demands it, be mounted on an extension rod to keep the HF/VHF leads short.

The oscillator circuit, while not giving much RF output, is inherently stable. But it will show a certain amount of switch-on drift, definitely noticeable on frequencies above 100 mc. The LF stability is, however, excellent, and should not be more than a few cycles at 100 kc. There will be a bit of frequency pulling when the tone modulator is switched in, because of the abrupt change in HT voltage on the oscillator. This could be compensated for in a more refined version of the instrument by using separate HT feeds.

Though any similar valve types can be substituted for V1, V2 (and for purely LF work miniatures would not be necessary), note that V1 should be a twin-triode of the common-cathode variety.

Finally, to avoid any confusion of thought, it must be emphasised that the circuit given and the suggestions made here are for an essentially simplified type of wide-range signal generator, intended for first-instance bench and test work. The design is not offered as a laboratory-type instrument—but if carefully built, adjusted and calibrated, and run off a well smoothed and stabilised HT supply, it will give a very good account of itself and be found extremely useful for practical amateur work.

CRICKET TEAM AT K.W. ELECTRONICS

As no less than eleven members of the K.W. Electronics staff now hold call signs and are active on the air in one way or another, there is some suggestion that they ought to get together next season as a Wanderers' Side! (Though what they may think of this when they see it in print, we wouldn't know!) Anyway, congratulations to a firm making such progress in the field of Amateur Radio. It would not have become possible unless K.W. Electronics Ltd. (under Rowley Shears, G8KW) were doing a first-class job as regards the gear they purvey and the service they give.

THE AUTUMN "CALL BOOK"

The latest edition of the *Radio Amateur Call Book*, in two parts (U.S. only, and the rest of the world) is now available. The American section costs 45s., and the Foreign (non-American) part is 27s. The latter includes the U.K. section, and takes in all call sign-addresses as published in our "New QTH" page up to and including the July 1963 issue of *SHORT WAVE MAGAZINE*. The Foreign edition gives amateur QTH's from AC3 to 9X5, and runs to 228 large pages, three columns to a page; this represents about 113,000 amateur call sign/addresses in countries of the world outside the United States! Both *Call Book* parts (U.S. 45s. and Foreign 27s.) can be obtained, from stock, through our Publications Dept. at 55 Victoria Street, London, S.W.1., the prices

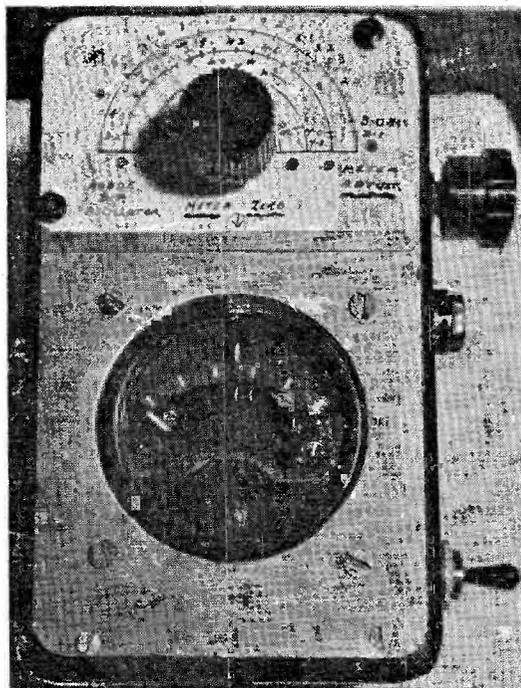
being post free. For those who order both sections of the Autumn ("Fall") Edition of the *Radio Amateur Call Book* together, we knock the price for the two down to 65s. This gives you the QTH's of about 330,000 amateur stations, throughout the world.

LEARNING TO COPY MORSE

If you tune around 3550 kc on the first Tuesday each month at 2000 GMT you may be able to sort out G3BZU, of the Royal Naval Amateur Radio Society, sending Morse practice runs of 20 to 35 w.p.m. If you can write this down, send what you get to: R.N.A.R.S., G3BZU, H.M.S. *Mercury*, Leydene, Petersfield, Hants. Should you be able to copy 35's correctly, you will get a special bit of paper which, so far, has only been awarded to nine listeners to these Morse Code proficiency tests. We would like to print the names/callsigns of those who do qualify—so please let us know.

ANOTHER "AVO" RESPONSIBILITY

The firm of Waveforms, Ltd., manufacturers of *Graph* oscilloscopes, will henceforth be under the direct control of Avo, Ltd.—themselves a constituent company of the large Metal Industries Group of some 20 concerns active in the fields of radio, electronics and electrical manufacturing.



GM3LRZ (Kelso) built himself the Anode-Dip Oscillator, described in our October '62 issue, in the form shown here. The box is 6 x 3½ x 2ins., with an aluminium panel, the coils being wound on Eddystone miniature formers, and covering 10-160m. The meter is an ex-Air Ministry item scaled "Rad. Temp." which proved to have a sensitive microammeter movement (see p.493, November '62). GM3LRZ says that he has found this ADO a most useful piece of gear.

DX COMMENTARY

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

ONE often hears it said that "conditions are unpredictable," and this appears to be more and more true in the literal sense of the word. One of the best-known sources of propagation predictions is the American CRPL (Central Radio Propagation Laboratory), whose forecasts are summarised for the amateur bands by W3ASK in *CQ* each month, and for quite long periods these tend to be pretty reliable. However, September 22 was forecast as an "above normal" day and the 23rd "normal" . . . then along came an unusually large sunspot, observed in Southern England on the 20th and 21st, and off went the conditions right away! The week-end of September 21-22 must have been one of the worst experienced during the current cycle.

The bands went really flat, and the HF bands stayed that way for several days. Some of the newcomers on the air must have had their first experience of how bad things *can* become during a sunspot minimum, and we heard one or two comments to the effect that DX was impossible, and even working Europeans was pretty tough.

It was a full fortnight before the bands fully recovered, despite predictions of further "above normal" days for October 3 and 8, and things were again seriously disturbed around October 11 and 12.

Despite all this, the fact remains that conditions, *on the whole*, continue to be much better than in 1952-53, around the time of the last sunspot minimum. Admittedly we have progressed a long

way in these last eleven years; far more people realise the importance of a really good aerial, and SSB has practically supplanted AM as the mode for DX phone. Furthermore, full advantage has been taken (to put it mildly) of the interpretation of power input and output when SSB is used.

But, against this, we have a large CW population still using the HF bands, and still using the same power (or even the same gear) that they were doing eleven years ago. The efficiency of CW has not changed, and in many cases the leading DX'ers on this mode were already using very potent beams a full cycle back. And what do we find in the world of CW DX? Well, broadly this—that if an efficient station with a good operator sets up in almost any part of the world, he can be worked on almost any day on a variety of bands.

True, Gus Browning of DX-pedition fame is an exceptional case; he has good gear, he can pick his sites and he is a wonderful operator. And he has good publicity support all round. But the fact remains that he can set up shop in places like FR7, VQ9, AC3, 9N1 and so on, and is workable by a good 150-watt station *almost any day he is on* (with the exception of really poor ones such as September 21). This being so, it seems that we have little to fear from a sunspot minimum. But what about those other bands?

Loss of Frequencies

Here is the rub—that for some years the 28 mc and 21 mc bands are completely dropped by the keen DX operators. And what does this mean in terms of QRM on the lower bands? Facts and figures give a surprising answer. Our six bands (1.8 mc to 28 mc) allow us a total width of 3100 kc (in the U.K. that is—the U.S.A. has roughly 400 kc more). And, of that 3100 kc, the 28 mc and 21 mc

bands account for 2150 kc, or roughly 70 per cent. Does that make you think? Furthermore, of the 950 kc left, 600 kc are *shared*, and the remaining 350 kc (the 14 mc band) are extensively intruded upon, although theoretically exclusive.

Thus the enormous benefit that will accrue, as the sunspot cycle climbs to its maximum, is that we shall find ourselves with three times as much useful band-space as we have at present. Along with this, of course, the LF bands become less and less suitable for DX, but at present it could be said that all the LF-band DX is being worked within a total space of not more than 60 kc at the most . . . and probably far less than that. So put a bright face on things, when we get another of those flat week-ends . . . there's a good time coming.

Brief Guide to the Bands

From the genuine DX point of view, *Ten* is the only band really out of use at the moment. *Fifteen* is pretty shaky, and can become quite useless when one of those spells of really bad conditions comes along, but the fact remains that a considerable amount of AM phone DX is being worked. (Why is this, by the way? It seems to be a convention that has grown up. You can cover the CW part of the band and find nothing doing; the SSB end may yield a few American /MM's; and yet in the AM (middle) section you are likely to find a selection of quite exotic prefixes. If more SSB users would get cracking here, things might be quite good.)

Twenty suffers from too much short skip; and, in the U.K., from too many active stations within that short-skip area! Furthermore it seems that most of them never sleep. But anyone with a reasonable receiver can penetrate this layer and find genuine DX around at almost any hour between 0700

and 2300—though the latter end will be shortening rapidly and the band may well close before 2100 by the time you read this.

Forty, for the persistent types, yields DX at any time between 1600 and 0800 . . . and also for periods during the afternoon, if you know how to dig. JA's, KR6's and even VK's have been heard and worked at most unlikely times (1430 to 1600, for instance).

Eighty, at the time of writing, is most noticeable for the ZL activity in the mornings. Two or three ZL's on SSB have been working G's with almost land-line reliability between 0600 and 0730. Gus Browning has been worked on CW at the LF end from AC3, AC4 and 9N1, and various good pieces of DX are there for the night-owls.

Finally, *One-Sixty* has really shown signs of waking up, not only for Canada and the U.S.A., but even for the first G/VK, the odd G/ZL contact, and for such stations as 5N2JKO and VP8GQ. In short, all bands Go!

Ten Metres

Not dead, just dormant—but how dormant can you get? We recall a charming little song from a musical show in the twenties called (believe it or not) "Nobody's Using It Now!" With the exception, it seems, of G3NOF, who worked ZE8JZ, ZS6AAJ, 5A2TD and 9G1DM, and heard CX, PY, LU and VP6NW, the latter the only station in the Northern Hemisphere that you could call DX.

However, we have been delighted to note that so many groups of stations are now using the band on Sunday mornings. Down on the South Coast, quite a number of the London nets are audible and very R5, with more distant stuff also coming in. It seems a shame for the 200 kc of Top Band to be so cluttered in the dense areas when there's 1700 kc going begging.

The more the merrier on *Ten*—or do we want to risk losing the



F2QX operating as PX1QX, Andorra, during the early part of September. The location was at 8,000 ft. a.s.l., the other operator was F2MO, and they worked SSB/AM/CW with an all-band vertical aerial. In spite of bad weather, they enjoyed themselves and will be going again next year.

band through sheer lack of activity? Help to keep it warm until 1965? . . . '66? . . . '67?

Fifteen Metres

This one's not dead, by any means, but it takes patience to find out just what it's doing. On days when there's only one DX station audible, that one may still be of interest . . . 9N1MM or AC3PT, to name two recent examples.

G3LPS mentions just two CW contacts—YS9AJR and CR6FW . . . G3NWT says that a ZS was busily calling ZD3A on AM, but the latter was not heard.

G3FYR especially wanted to work a ZE (he has a brother out there), and after months of trying on a 132-ft. wire which merely brought him S9 from YO, UA, YU and the like, he strung out a 21 mc half-wave (22 ft.) from the shack window and started getting nearer to the goal with an S9 from 5A5TE. (But the strange thing was that it also raised a W6 on Twenty, even when other Europeans were not making it!)

G3PEK worked Gus, at 9N1MM, at 1100 GMT; otherwise nothing but W4 and some new Europeans. G3NOF reports several openings to East Coast W's, at various times between 1500 and 2100. ZD7BW was heard on SSB (1600), and at the same time some South Americans and ZS's. 9Q5, ZE, ZS and 9G1 have all been there, 0900-1700. Unfortunately G3NOF has a TVI problem on this band, and so he only worked ZS, 5B4 and 5N2.

G8VG, on CW, raised 5A3CJ and CR7IZ; many others just mention single QSO's made during the month, but nothing notable in the way of DX.

Twenty Metres

This is where all the activity is, and at practically all times of day and on all modes. No wonder the band is always overcrowded! Still, there it is—it's the best band we've got, and sometimes it seems to be the only one.

DX-wise, you wouldn't think we were at the bottom of the valley at present, and if the prevailing opinion (that things won't get noticeably worse) is correct, we have little to grumble about.

G8NY, on SSB with a Hy-Gain TH3 beam, raised VK4JQ (Willis),

REPORTING ACTIVITIES ON SIX BANDS

VR2BC, HI8XAG, ZP5OG, PJ2AA, VS1's, YA1AN, KA5MC, many VK's and ZL's, all districts W (to select some from a long list) and says "SSB has taken a bit of the kick out of working DX—it's too easy!" Most of the foregoing was after 2330, or Saturday and Sunday mornings.

G3NOF found the band open almost round the clock, and worked SSB with AC7A, EP's, HL9KH, KV4CF, MP4's, PJ2AA and 5MF, VP2VS, VK, YN1LH, ZS7R, 5N2HJA and 9M2GA. VP2VS, by the way, was VE8RG from Tortola, and he may well have been on from Anguilla by now.

G3BDQ mostly exploited CW, which raised 5S8AA, BV3NO, 6W8AC, ZD6LA, EP2AS, 9N1MM, KG6AAY, AP2AR and

VU2ND. SSB netted AC3PT, 9N1DD and 4S7IW—all on the Tx being described in the current issues.

G8VG shows about the same proportion, with KP4AZ, VK3DQ, VU2GWD, VU2ND, VS9ASP, VS9HAA/VS9O, ZL's and 9N1MM on CW; KP4BBW and AC7A on SSB.

GW3AHN contributes the longest list of the month, SSB accounting for AC3PT, AC7A, HS1P and 1X, KC6BO, KM6BI and 6CX, K7NNE / KG6, MP4TAX, TC3ZA, PJ2AA and 5MF; VK4JQ (Willis), VK9DR (Christmas), VP2VS, 3RS, 6KL, XW8AL, YA1AN and 1BW, ZD7BW, 9M2DQ and 9N1MM. Apart from this, he adds AC3PT, KC6BO, UM8AP and 8KAB, VS1LV and 9N1MM on CW.

G3PEK, on CW, lists 6O1ND, PY's, KP4, VP2VS, KG6OAJ, 6W8AC, 9N1MM, KA2YA, JA5AJQ, HL9KH, VU2AJ, BV1USC, PJ2ME, VK and ZL... G3LPS, also on CW, raised VS9OS, AC3PT, 9Q5AB, VS9MB, ET3USA, 9N1MM, ZD8HB, VQ8AI, ZP5OG, CR9AH, ZS8B, KC6BO, 9M2UF, VU2LN and many more.

Forty Metres

Some of the lists for 7 mc this month caused your conductor to do a double-take and make sure they weren't referring to Twenty. But they weren't—it's all open and above-board; and many 'chasers remark that it's easier on Forty than Twenty, because their dipoles or ground-planes are competitive with the other stations on the band, whereas on Twenty they have the big-beam boys to contend with.

GW3AX worked SSB on 7070 kc, and raised 4X4AS, 4IX and 4DK; VK2AVA and 2NN; VS9MB, VS1LP, VQ2WR, 5A1TW and 3CJ, ZS's, ET3MEN, KR6FIA and some Europeans. All, by the way, between 1800 and 2135 GMT.

G3LPS, on CW, got in YV5BTK, CE1AK and 1AD, HC1DC, VQ4IV, VS1LP, AC5A /AC4, UA9 and Ø, UL7's, VP8GQ, 5A3CJ, VQ2WR, 5N2JKO, VK's, ZL1ASZ, JA6HW, FP8AS, all PY except 9, VE, W and 5B4's. He sometimes gets the impression that

he is the only G calling through a welter of Europeans, and wonders where all the others have got to.

Well, G3PEK is not absent, judging by his list of CW contacts, which includes VP8GQ, KV4CI, VQ4IV, YV5AXA, KP4BEA, VS1LU (1700), VS9HAA/VS9O, EP2BQ, ZL1HY (0630), HP1IE (0640), and numerous VK's worked between 1615 and 2100 and also at 0655. (VK2EO was raised at 0654, 1658 and 2034.) An interesting gotaway was W6GRX at 1515—so the long-path boys have started coming in already... that doesn't usually happen until December. Really nice ones that escaped were 9N1MM, ZD3A, ZD7BW, FG7XJ, FY7YK, PJ2ME... never mind, there's always next month!

A strange feature of the band is that the proverbial European clutter (or should we invent the word clutter?) now seems very little worse than it is on Twenty. This is not to say that Forty has improved; sadly, it is rather that Twenty has deteriorated.

Eighty Metres

The season of SSB DX seems to have descended upon Eighty once more, with the ZL's reaching fantastic strengths in the mornings. G3BDQ, on SSB, raised 5A3CJ and ZL4OD; G8NY, same mode, worked VK2AVA (1945), EA9AX and CT3AV; G6QB, likewise, ZL4OD and 4LM (0630). Some of the SSB regulars have been having conversations of almost landline reliability with the ZL's every morning.

G3PEK worked 5A2CJ (2210) and VP8GQ (2140) on CW; DX heard included PY1BIX, UL7, UH8, UI8 and numerous ZL's (0600-0630). Many others have been heard working good DX (by our various private ears) but don't like to confess to it... others might find out the time and frequency and spoil the whole business. Sensible chaps—or are they?

Top Band Achievements

And so to One-Sixty, which is becoming the daddy of them all, as far as really thrilling DX-plots are concerned. First, it now seems that the DL1FF/VK5KO contact of which we were notified last

TOP BAND COUNTIES LADDER

Station	Confirmed	Worked
<i>CW and Phone</i>		
G2NJ	98	98
G3GGS	97	98
G6VC	97	98
G3NPB	94	98
GM3KLA	93	95
G3LWQ	93	95
G3REA	91	92
G3OLN	86	92
G3RFE	85	90
G3NFV	85	87
G3PLQ	84	93
G3PDM	74	82
GM3IKD	65	75
G3RHM	59	65
GM3PPJ	52	69
G2BP	52	59
G3IDG	50	53
G3HZL	25	52
<i>Phone only</i>		
G3FS	86	86
G3NPB	85	86
G3RHM	55	60
G2NJ	50	51
G3OLN	36	49
G3LHI	27	31

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

month was not a real two-way QSO—although they *did* make one on October 5 and again the following day. But the honour of the first-ever, on this band, between VK and Europe falls to G3PU and VK5KO, who, after two weeks of careful sked-keeping, made it on September 30, 2010-2030 GMT. Terrific, this, and hearty congratulations to both. G3PU used his veteran 8-watter, a half-wave 70 feet high and tuned “end-on,” and a KW-77. The contact was confirmed immediately afterwards on 7 mc, and we have seen VK5KO's QSL for the occasion.

After that news, almost anything comes as an anti-climax. However, we have been notified of the following, though not always by the stations concerned:—G3ERN also made it with VK5KO . . . G3GRL has worked VQ4IV . . . PAØPN got the first PA/W QSO on October 4 . . . and G3OQT/5N2JKO made the first contact between G and 5N2. (GI6TK, as reported last month, snapped up the first between 5N2 and the U.K.)

Other news of the super-DX on this band:—VP8GQ, on 1801 kc, continues to look for G's (1800-1830 kc) . . . VQ4's operate as follows—VQ4AQ (1855), VQ4HE (1802), VQ4IN (1827 and VFO), VQ4IQ (VFO) . . . ZB2A will be on the band soon . . . JA's expect to have Top Band early in the New Year.

Apparently VK5KO has now moved to 3505 kc, but will be back in the spring. VP8GQ will be leaving the South Orkneys by then—and what a gap he will leave in the 160m. DX! He worked many W's in mid-September, peaking 589 at W1BB.

G3RBP's list of recent DX worked runs like this—FP8AS, VP8GQ, 5A3CJ, ZB1BY, WITX, 2IU, 2EQS, 3GQF and VE1ZZ. Heard, but not worked (as yet)—5N2JKO. G3RBP has now got his aerial 60 feet up at the centre.

Top Band—Normal Working

G3PLQ sent his receiving logs for two short /MM trips, on which he heard loads of G's as usual (we haven't the space to print them, but no doubt he has notified the

real DX loggings direct). But we will quote: “Why don't people *listen*, or get a decent receiver? ‘CQ DX’ is a sheer waste of time, especially if you are on the frequency of a DX station trying to make himself heard . . . If you can't hear the DX station, then for crying out loud don't bother calling him—you are only messing it up for someone else.”

G2CZM operated portable from Rutland on September 15, but at 1555 his balloon broke adrift . . . G3PWY mentions G3OBY/P, also in Rutland (and possibly the first SSB from that county) . . . G3PPE found other expeditions in the forms of G3KBC/P and G5PP/M, both in Cumberland, and GW3FSP/P in Carmarthen. He also had a letter from ZB1BY stating that “ZB1WC” was a pirate—the calls issued only go as far as ZB1CE.

The “new boys' ladder” continues to show many alterations, but G3REA still sits on the top rung. This will end on December 31, but the normal Counties Ladder will of course be continued.

General Chat

Last month's note on commercial intruders in our “exclusive” bands has brought forth many

comments, most of them rather despondent (What can *we* do, with 150 watts?) However, it seems that some of the W/K stations who can boast at least 10 kW (ERP!) are doing their stuff, but not always on the stations that bother *us*.

On this subject, your conductor recently enjoyed a visit from Gene, W6EBG, who showed scores of colour slides of the top DX stations in the U.S.A. The lasting impressions, after recovering from the initial impact, are these—(1) A Collins 75-A4 (or perhaps two) in every shack; (2) an aerial system which would make the normal 3-el. beam, fifty feet up, look insignificant; (3) the ability to come on at any specified time, put out a signal that grinds all QRM into the dust, and (4) a DXCC score of 320 or over!

These are the amateurs who could beat the professionals and drive them back to their own parts of the spectrum. And perhaps G3OLN has got something when he asks “How about an Intruder-Jamming Club, members of which would pledge themselves to jamming the commercials in the exclusive amateur bands? In fact I am willing to organise such a service, if you can provide me with the calls of interested parties . . .



5H3HG, D. J. Lloyd, P.O. Box 3163, Arusha, Tanganyika, is active mainly on 14 mc CW — till he gets his Sideband rig going. U.K. stations are heard most evenings during 1700-2100 GMT, and contacts are always welcome. In this photograph are the QSL cards of stations worked on 10 metres when that band was last open for regular DX from Tanganyika.

I am going to raise my power to 120 watts in the near future!"

G3RUS comments on G2DC's recent admission that he "did sit up" one night." He writes "I thought everybody knew that Jack had not been to bed (at night) in the last ten years . . ."

G3FKM asks us to mention the fact that VK4JQ's gear was a personal gift from Gene (W6HYG). It is a single-band transceiver with three extra transmitting frequencies (14149, 140 and 130). But he can only receive above 14180 kc, so calls on the lower crystal frequencies are a waste of time. Two dipoles (for Europe and U.S.A.) and battery operation only. Logs are forwarded over the air to W6HYG, and also sent Air Mail from VK3AWX.

ZB1BY has returned permanently to the U.K. and is signing G3RUH. He enjoyed his Top Band operation from Malta, and says there is now no one active or equipped for the band. He made 247 contacts in eleven countries, the U.K. heading the list with 72 stations worked. *Quote*: "The discipline of the G's during the week-end pile-ups was of the highest order and made for rapid QSO's even under very noisy conditions." Finally, he tells us that there is a Malta net on 21150 kc, Sundays at 0900 GMT.

From East Africa

VQ4IQ reports that the Radio Society of East Africa is running a stand at the first Kenya Electronics Exhibition, to be held in Nairobi between December 9 and 14 as part of the Independence celebrations. The special call allotted for use up to 2100 GMT on December 11 is VQ4I. At that moment they will change to the new prefix and become either 5Y4I or 5Z4I—no one seems to know, yet, which it will be. SSB, CW and AM, with an HT-37 and Linear, SX-117 and the best aerial they can devise. Special QSL's and 100 per cent acknowledgement.

5H3HG writes about "a blossoming little group in Arusha, affiliated to the Radio Society of East Africa, and busy promoting the R.A.E. course to our younger members." Apparently they have some very keen SWL's

out there, and hope to get them on the air pretty soon.

The Ex-G Radio Club

G4MJ forwards the Club's Bulletin and informs us that the Club net now returns to its normal weekly schedule—1900 GMT on 14345 kc, every Sunday. The club continues to flourish, with new members from all over the world. They are anxious to attract more SWL's to apply for the club's SWL Certificate—and to do this the first and most obvious thing is to listen to the net and report the stations heard. SWL readers, please note.

DX News from Readers

From GW3AHN: VK4JQ listens on his own frequency when he is transmitting above 14250, or between 14250 and 14260 kc when transmitting lower down . . . VP2VS (Torotola) became PJ5MF (Sint Maarten) and was expected in Anguilla, October 14 . . . CEØZI (Juan Fernandez) expected on for about 10 days from October 21; CW and SSB all bands; QSL to W4QVJ . . . VE3BSB will be active from Togoland, 14 mc SSB, from November 1 until January; QSL to VE3AXC . . . W5LAK expects to be on from Lord Howe Is., starting mid-November; CW and SSB with S-line equipment.

From G3NOF: Alex and Eva, the well-known pair of operators who used to activate CN8MM, are now PY2PA and PY2PE, 14 mc SSB . . . VS9PHH (Perim Is.) counts for DXCC as—Aden!

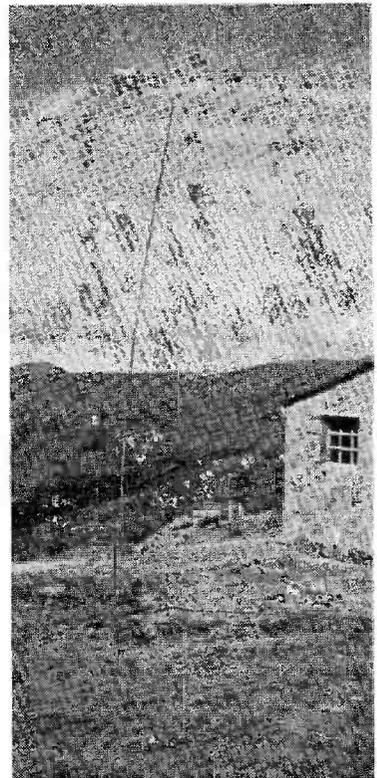
One of the proposed Anguilla trips (that by K4UTE, VP7LG and PJ3AO) did not come off . . . FM7WQ was unlucky enough to lose his aerial and have his rig flooded in Hurricane Edith . . . VK4JQ (Willis Is.) has been much more active; generally, whatever frequency he transmits on, he is listening over 14260-280 kc.

VK9DR (Christmas Island) will continue using the Hammarlund rig during November and possibly December . . . ZD9BA (14020 CW) appears to be genuine but is not in the *Call Book* . . . 3A2AF (W6SAI) was due to be on for a few days, late October . . . VS4RS and 4IH (now Malaysia) have been active on 14 mc CW (mostly 1200-1400).

Gus, somewhere in his travels, threatens to operate from a place called Gwadar . . . and it will be worth watching! Meanwhile he has had very successful stints from AC3PT and 9N1MM, and was due in YA-land as this was being written.

TC3ZA, spasmodically active, is Rundy, W3ZA, and is genuine. Other TA's, pretty uncertain . . . VP2VS (British Virgin Is.) was activated by VE8RG . . . CEØAD, Easter Island, said to be workable on 7020 kc, midnight onwards . . . Masirah Island was recently put on the air by VS9AAA, signing VS9AAA/V59O . . . Socotra Island will be kept active for about 10 months by VS9PHH.

Angus (HZ1AMS, ex-5N2AMS) has plans to put the Neutral Zone (9K3) on the map. It may pay to ensure working him at every stop,



This rather dreary prospect is actually of more than usual interest—the locale for the PX1MO/PX1QX expedition to Andorra, mounted by F2MO/F2QX early in September. A constant high wind put the bend into the all-band vertical aerial they were using.

since the present MP4 country-plan is based on out-dated frontiers and could all be changed (thus writes SWL Dave Gray, Easington). Also that 5N2JKO has worked 117 countries on SSB since he started on that mode last July; that HS1X is *not* off the ARRL/FCC banned list . . . and that the new VQ4 prefix is to be 5Z4 (but see previous note on this subject).

W6AM says "I almost have a new rhombic up, aimed right at Sikkim—140 ft. high, 950 ft. long. I used to have two rhombics in phase on AC3, when I had 120 acres, so this is quite a come-down." (Doubtless Don has now worked AC3 on phone!)

PJ5MF on Sint Maarten was worked on 3795 kc by GI3CDF and GI6TK; also on 7 mc CW by G3HDA . . . TL8SW is a new one to show up (21 and 14 mc CW) . . . VS9HAA/VS9O was on Masirah Island, and hopes of "country status" existed for awhile—but as far as is known, it will count as Muscat and Oman.

YA1EW, due to appear soon (probably CW only) is DJ3EW . . . ZS6BBB and 6YQ have permits for ZS8 and ZS9 operation, probably about January 3 for five days . . . HI8's may become scarce again, the political situation being what it is, but HI8CLU and 8MMN are still active.

Coming Shortly

You will hardly have forgotten the CW section of the *CQ* World-

wide DX Contest, starting midnight GMT on Saturday, November 23 and continuing for 48 hectic hours. The rules have already been published, but must be familiar to all by now (this is one of the really big events that doesn't ever seem to change them). Pray for good conditions that week-end. The Phone half (October 26-27) was still in the future as this was written.

November 5 or 6 is quoted as the starting date for the Kuria Muria Is. venture by the R.A.F. types at Aden. Highly probable that it will become a new DXCC country . . . also that Gus will be there to join in the fun.

The ARRL Sweepstakes Contest (of no interest to us in the U.K. except being a pretty good menace on the bands!) will run from 2300 GMT, November 9 to 0800 GMT, November 11 . . . and again a week later. Don't expect to work many W's during those hours, or, if the North Atlantic path is good, many of those elusive weak ones from elsewhere. (Good week-ends for sticking to the LF bands, renovating the beam, finishing that pre-amp or . . . knitting.)

Sundry Shorts

W7MH worked W7QLC (200 miles) and WA8EDK (2,500 miles) almost simultaneously on 28 mc—indicating that skip is not always what we think it is . . . W9WNV/HL9KH, especially famous for his operating of KG61D and CR9AH, closes down his South

Korea station on December 2, prior to returning to the U.S.A. But he has 30 days' leave and might even dream up something on his way home, so it is said.

VP8HF/MM should be heard on the air again very shortly, and VP8HJ has an SSB rig on its way to him . . . Presumably when Kenya turns into another of these valve-type prefixes (5Z4 or is it 5Y4 after all), Zanzibar will also do so. Their independence is scheduled for the same date.

Likewise we await the second prefix for Malaysia; it seems that Singapore and Malaya will unite under the old 9M2 banner, but another (9M1 ?) is needed for the former VS4 and ZC5.

Sign-Off

So, inevitably, to the end of yet another one. For some of the meat therein, thanks and acknowledgements to the *WGDXC Bulletins*, to W4KVX's *DX Magazine* and to WIBB for his Top Band bulletins. Also to our regular readers, some of whom have been especially useful and informative this month.

Next month's deadline will be **first post on Monday, November 18**, but, as ever, not a minute later. We work to a very tight schedule, these days, and readers have the benefit of it up to the last minute. Address everything, as usual, to "DX Commentary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. Good Hunting; may all the rare ones come back to you; 73 and—BCNU.

INTERESTING APPOINTMENT FOR G3DCT

It is reported that P. H. Green, G3DCT, has been appointed U.K. sales engineer for the important American firm of Motorola Semiconductor Products, a subsidiary of Motorola, Inc. of Phoenix, Ariz., one of the world's largest manufacturers of electronic and telecommunications equipment. The U.K. office address is: 1-5 New Bond Street, London, W.1. We wish G3DCT, who has been licensed since 1946, success and good fortune in his new job.

INFORMATION ON R.A.E.

Those contemplating the Radio Amateurs' Examination (the next available sitting for which will be in May 1964) are reminded that they can obtain the exam. syllabus (price 1s.) and sets of question papers for the last three years (2s. per set per year) on application to the Sales Section, City & Guilds of London Institute, 76 Portland Place, London, W.1. Send a postal order, and be sure to quote "Subject No. 55, Radio Amateurs' Exam."

SWL • • • • •

CONDITIONS ON THE DX BANDS—REPORTS ON DX/TV—READERS' NEWS AND VIEWS —THE LENGTHENING HPX LADDER

THIS month's volume of mail has broken all records. With so many letters, so many subjects covered, and so little space in which to do justice to everything, it is unfortunate, but inevitable that some have had to be passed over, and others cut down to the bare bones. Obviously there is no room in this feature for lengthy descriptions of the month's listening, or of all the transmissions heard on the various bands—unless they really are of *outstanding* interest.

This matter of reporting individual items of DX, in any case, has become rather pointless. If you heard XX2B coming in at S9 on Twenty, the chances are that many others also heard him; and right now there are two possibilities—that he is still coming in and being heard, or that he has gone off the air or faded out. So a single event such as this, while it may put *your* score of countries heard up by one, is not of world-shattering importance!

And the *complete* novices, who have just started up with their first receiver and send in a long list of Calls Heard, consisting mostly of local Europeans like DL's, I's, SM's and so on . . . well, they are so new to the game that, quite naturally, they think they have really achieved something important and worth reporting. But really they are just following in the steps of countless SWL's—so will, we hope, not be too disappointed at finding that they are not reported in print. And so, as quickly as possible, on to the month's news.

Conditions

R. M. Bloomfield (*Crowthorne*) found the bands very variable. His favourite (Twenty) seemed absolutely dead one night, yet a little tuning around produced two VP9's, a VP6 and VP8GQ with one of the strongest signals he had ever heard. Incidentally M. D. Ottley (also of *Crowthorne*), who was R. M. Bloomfield's "tutor" in SWL, has now become G3JL.

D. S. Smith (*Stanmore*) is one of many who mention "Gus," that fabulous globe-trotter who has put so many new countries on the air; he was surprised to hear him from AC3PT and from AC7A around 1400 on Twenty. Henceforth, "Academic QRM" will restrict SWL Smith's activities to week-ends.

J. R. Daws (*Leeds*) thought that Twenty SSB was "very exciting" in the evenings, but now that early-closing hours are beginning to operate on the band he will be turning his attention elsewhere. Already he has been amazed to learn of the SSB DX being worked on Forty. He uses a "Joystick" mounted horizontally indoors and about 35 feet up—domestic

QRM precludes big outside wires!

M. A. French (*Highbridge*) found Fifteen quite lively some nights, especially for Africa . . . Roger Western (*Torquay*) is now in for some G.C.E. QRM, but has found things good. He wonders why some of the potential R.A.E.-chasers leave it to the last minute to start learning CW, when they could be DX'ing in a big way. He enquires about 9X5MW: 9X is now being used by Burundi, the Rwanda stations retaining 9U.

Incidentally at least half-a-dozen readers have asked about the status of UT5 stations. They are the same as the UB5's (Ukraine); other Russian prefixes to have appeared during the last twelve months or so are UW3, UW9, UWØ and, more recently, UV3. It is the number, not the letters, that tells you where they are.

R. Hunter (*Kenton*) found Fifteen open around 2000-2100 on some nights, with the southern U.S.A., Central and South America simply pouring in. Twenty he thought disappointing, but Forty yielded VK's at 2200 and South Africa at 0100.

Dave Gray (*Easington*) heard most of the "super-DX" that was going, and says that some of it was logged under "pipe-line" conditions, free of all QRM, with only two or three signals on the entire band. And he adds that he often takes time off from DX to listen to the many /MM stations on Twenty SSB, some of which turn out to be in quite exotic parts of the world (Baffin Island, Korean Coast, Hawaii, New Siberian Islands and Guinea, to quote just a few).

Roger Evans (*Swansea*) was one of the few who were lucky enough to hear "Gus" under the call AC5A/AC4—when he was actually in Tibet. His signals then were not as strong as those from AC5A, AC7A and AC3PT.

Malcolm Healey (*Horsham*), combing his old log books for overlooked prefixes, came across the activity on Ten during 1958-61 and says "it would be nice to hear all this, romping in at S9 on an odd scrap of wire, like it used to." Certainly would—but you'll have to wait until 1968 or thereabouts. He has also been on VHF—see separate paragraph.

D. A. Pickup (*Preston*) thinks conditions have improved over the last few months, but is disappointed with Ten, which has gone off again.

Ted Hill (*Plymouth*) has discovered the thrills of Top Band DX, and in early August, hoisting himself out of bed at 0330, he logged W's, a PY and a 5A3 on CW. He wants a certificate for "Heard All Zones," as he is rapidly approaching that happy state.

DX TV Reception

Charles Rafarel (*Poole*) reports again, and comments on the properties of those X-shaped TV aerials. It is worth noting, he says, that as the elements are at 45° to both the horizontal and vertical, they pick up either type of transmission with equal efficiency (or inefficiency). Some of the TV DX'ers who find horizontally-polarised transmissions from abroad blotted out by the vertical ones from the BBC are probably using X aerials, and the trouble would cease if they would use elements in the correct plane.

Another snag is that the BBC's 3.5 mc separation of sound and vision does not hold good for foreign stations, so that it will not always be possible to get DX sound and vision at the same tuner setting.

He has been over to Belgium to visit Jacques Herreman, who has now logged over 170 TV stations (his own score is 90). And, finally, he will be delighted to hear from any of the other DX/TV chasers, and to lend a hand where he can.

D. Boniface (Ripon) logged several unidentified test cards, but finds conditions failing now as the Sporadic-E season dies out (although September 21 was very good). He proposes to build a new converter with frame-grid valves, and would like any help or advice that's going.

G. A. Raby (Penwortham) gets a good picture from Eire on Channel 7, Band III, but has found DX/TV much harder to receive than in the spring, and has seen little DX on Band I.

VHF News

SWL's on VHF are still few and far between. However, *S. Foote (Reading)* reports a windfall in the shape of a G6JP-type converter; with a dipole in the roof space he has logged ten counties on Two. *Martyn Vincent (Cheltenham)* found Two Metres good, and hopes soon to have an 8-element beam up at 30 feet (five of the elements are at present on the ground). He has heard 15 counties on the band, and now wants to build a portable VHF receiver—preferably using his converter with 6.5 mc IF.

Malcolm Healey (Horsham) is building a receiver for 70 cm., as well as modifying a TV set for DX chasing, but most of his listening time has been spent on Two Metres, where he has heard 38 counties and 9 countries (including ON, F, PA, EI, OZ and HB). He has a 5-over-5 beam in the loft, rotated by a gramophone motor. With his converter he uses a much-modified HRO (nuvistor front-end and all); he found that a specially-wound coil covering 22-24 mc with the local oscillator on the LF side cured the previous trouble of spurious responses.

Shorts

Quotes from letters which cover many different subjects now follow:—"I am afraid that much too much grumbling goes on in our hobby, and it ought to be remembered that it is a hobby" (*Martyn Vincent, Cheltenham*)... "I have heard several amateurs really get stuck in to some of these 'klots and lids'—the 80-metre bands seems to have a pretty high percentage of these fire-spouters!" (*Charles Duncan, Dunfermline*)... "Are prefixes heard at a friend's station accepted as long as the member of the HPX Ladder is operating the receiver?" (*R. P.*

Smith, Manchester). Sorry, No!

"I would like to thank you for the introduction to the Reading Amateur Radio Club, of which I am now a member" (*Brian Jemmett, Reading*)... "I notice from my log that K6CQV/KS6 has been heard at least once a week since the beginning of April, on 14263 kc SSB; often no other Pacific signals audible at all, but he has been S8" (*R. R. Loe, Colchester*)

"May I add my congrats to those SWL's who are now G3---? The best of luck to them, but personally I am more than content to listen. The bands are already infested with myriads of crawlies and all that sort of rubbish, so why should I make it worse than it already is?" (*Ken Duggan, York*)... "Favourite listening conditions here are with a crowded 20-metre band late in the evening; best DX, ZD7BW, KM6BI and KM6CX, on SSB of course. The only worthwhile listening these days is on SSB, and quite a rat-race it is, too" (*Gil Bunting, Birmingham*).

"The highlight of my month was hearing FP8AS on Top Band CW, using a 15-metre indoor dipole for the aerial; I have now heard 14 countries on 160m. CW" (*David Beaumont, Wythenshawe*)... "Roger Western's challenge to have a go at him on the CW section of the Ladder has been duly noted but will not be taken up—after all, his CW score of over 500 (a fine one on which I congratulate him) would take some catching from scratch." (*H. G. Shaw, Heswall*).

"I possess a Service certificate obtained in 1916 for Morse at 12 w.p.m., so CW listening is now my pigeon. But theory finished for me in the days of the Fullerphone D3's and Power Buzzers. I listen on an HRO-MX with a whip aerial and at 65 I have no ambition to obtain a licence to transmit." (*G. A. Guile, Brighton*).

[over



SWL Peter Baxter is 19, and runs a Mosley CM-1 receiver with a Q-Multiplier and an FB5 multi-band dipole. His QTH is Sunnyside, Morn Hill, Winchester, Hants., and his scores stand at 203 countries heard with 74 confirmed, in 28 Zones. He hopes shortly to add a Top Band converter to the Rx.

Newcomers

A large number of new names appear in the HPX Ladder for the first time this month; not all of them wrote letters, but here are extracts from a few who did: "I am fifteen, started with a crystal set, then a three-transistor radio covering Top Band, and now run CR-45 (Codar) and a Globe King 144 mc receiver with a ground plane 25ft. high. I have visited six 'shacks' now, and on my CR-45 have heard all continents." (*Phil Houlston, Solihull*) . . .

Peter Ball (Co. Donegal) started with the family BC set, then graduated to a transistor portable, on which, with a 100ft. indoor aerial, he has mustered up 180 prefixes and joins our ladder. Now for Morse! *John Bell (Leicester)* is another newcomer, with a 52 Set, listening to phone (mostly on Twenty) and learning Morse from records.

Peter Robinson (Ruddington) would like to know the calls used by the Kon-Tiki and Everest (1953) expeditions, if anyone can supply them; he also asks whether there is once again an amateur station on Tristan da Cunha—and we know that the answer to that one is "no."

There can't be many SWL's using rotary beams, but *K. C. Staddon (Stroud)* has acquired a TA-33 Jr.

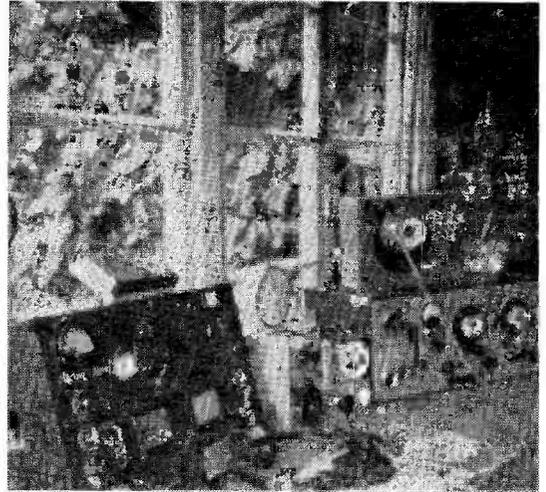
HPX LADDER

(Starting January 1, 1960)

Qualifying Score—150

SWL	PREFIXES	SWL	PREFIXES
<i>PHONE ONLY</i>		<i>PHONE ONLY</i>	
H. G. Shaw (Heswall)	672	A. F. Roberts	
A. W. Nielson (Glasgow)	607	(Kidderminster)	217
R. J. C. Coats (Cowie)	605	C. G. Duncan (Dunfermline)	214
R. Hunter (Kenton)	548	D. Welby (Eastleigh)	213
D. Douglas (Dundee)	542	S. Foote (Reading)	207
D. S. Smith (Stannore)	494	M. A. French (Highbridge)	207
R. R. Loc (Colchester)	476	D. H. Doff (Wallington)	203
B. Curnow (Plymouth)	452	G. S. Bunting (Birmingham)	202
C. N. Rafarel (Poole)	448	M. Maxfield (Solihull)	201
R. K. Western (Torquay)	444	P. R. Doughty	
D. Gray (Easington)	432	(Loughborough)	201
S. Foster (Lincoln)	425	P. Etheridge (Hull)	200
F. Bourne (Plymouth)	421	P. H. Moncaster (Goole)	190
D. A. Whittaker		P. R. Ball (Co. Donegal)	180
(Waddington)	412	D. C. Parker (Redditch)	179
D. A. Pickup (Preston)	403	M. J. Gilding (Kenton)	177
J. E. Pither (London, W.5)	390	J. Bell (Leicester)	174
K. C. Staddon (Stroud)	388	J. Card (Edinburgh)	172
P. J. Lennard (Wartling)	382	H. Wolton-Carr (Cambridge)	170
A. L. Davidge		P. Robinson (Ruddington)	166
(London, E.12)	372	B. J. Turner (Westcliff)	163
M. Healey (Horsham)	371	C. G. Iverme (Reading)	160
M. Warrington (Burnley)	371	P. Houlston (Solihull)	156
M. Vincent (Cheltenham)	369	A. E. Beales (Clacton on Sea)	154
P. Baxter (Winchester)	362		
M. D. Stapleton			
(London, W.13)	359		
A. F. Huggett (Lamberhurst)	350	R. K. Western (Torquay)	518
C. M. Palmer (Birmingham)	347	R. Hunter (Kenton)	463
R. G. Evans (Swansea)	334	P. J. Lennard (Wartling)	434
P. A. Whitchurch (Bristol)	326	B. Curnow (Plymouth)	385
R. M. Bloomfield		G. Thomas (Salford)	358
(Crowthorne)	316	P. L. Stevens (Donnington)	333
N. J. Summers		K. M. Duggan (York)	311
(Market Harborough)	307	J. D. Williams (Manchester)	310
M. English (Yeovil)	293	M. Vincent (Cheltenham)	265
D. Barker (Browhills)	283	D. Beaumont (Manchester)	265
J. T. Eden (Solihull)	267	J. F. Hudson (Birmingham)	216
B. Cree (Newark)	244	D. W. Rowan (Farnborough)	202
S. E. F. Howell (Hove)	243	E. F. Taylor (Birmingham)	189
A. J. Birch (Lichfield)	240	M. Healey (Horsham)	164
A. Stone (Kidderminster)	237	R. P. Smith (Manchester)	163
J. R. Daws (Leeds)	236	V. Lindgren (Hull)	152

(NOTE: Listings include only recent claims. Failure to report for two consecutive issues of "SWL" entails removal from the Table. Next list, January 1964 issue—deadline November 29.)



SWL Brian Newman, Betsoms, Westerham, Kent, operates the station with his brother, and they have an HRO-MX, with a 19 Set receiver as well. Some very good DX QSL's are held, not visible in this photograph. They hope to be on the air after the December R.A.E., and to that end constructional work is in hand.

and is building a mast for it . . . *E. F. Taylor (Birmingham)* passed both R.A.E. and Morse Test, but is not "going G3---" just yet, as he has now started work at Cardiff University.

David Hayes (London, N.3) has returned from his summer break and is back at his 80-metre stints. He has QSL's for that band from HK, TI, FY7, VP2, PX and other good ones, but none from VK or ZL as yet.

P. J. Lennard (Wartling) says he realises that most foreign amateurs speak and read English, but he thinks it would be very nice if more English amateurs (and SWL's as well) would equip themselves with a smattering of French, Italian, German, Spanish, Russian and so on—at any rate enough to give a report and say "Good-Day."

Too Many /MM's?

D. H. Doff (Wallington) thinks it is far too easy to log the numerous American /MM stations in the Mediterranean, and that they should not all count for HPX (anyone with an O-V-O can easily find a dozen of them). Also, he would like to see all the U.S. third-party traffic cleared out of the amateur bands (but—by whom?).

V. Lindgren (Hull) listens mostly to CW (he has just joined the ladder with 152)—but has no BFO in action! This must be a record of some sort . . . *P. Moncaster (Goole)* visited the Lincoln Mobile Rally and was most favourably impressed by the rigs and the whips, as well as delighted to speak to a few amateurs he had previously heard.

Printing Morse

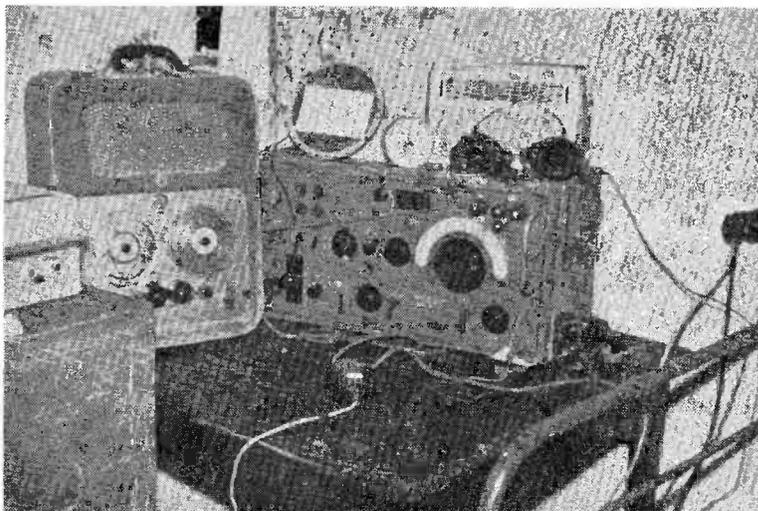
Dave Rowan (Farnborough) has just finished building a Morse printer, which works at speeds up

to 30 w.p.m. With an elderly S.680 he has "copied" such DX as CX, FC, KG4, M1, PX, PY, PZ, VK9, VU, W7, YN, YV5 and 3A2. After listening to phone nets all day in his work (Signal Squadron, Parachute Brigade) he says it makes a nice change to listen to CW, and while he is too busy to copy it himself, the printer "chatters merrily away on the frequency."

Phil Hitchchurch (Bristol) spent his holiday in Austria, as planned, and has many pleasant things to say about the hospitality shown towards an SWL. It is not illegal for non-licence-holders to talk over the air in that country, so he had the thrill of operating OE1NY, and saw some other OE stations as well as meeting many amateurs at the club station OE1XA.

Finally, a note to SWL's from G31DG, who spent a long time as an SWL himself. Quote: "Despite the impression, prevalent to-day, that a QSL is an SWL's right (especially if he supplies an s.a.e. or IRC), the only type of report which warrants a reply is the truly informative one." He goes on to say that reports on drift, chirp, clicks, modulation and so on will be appreciated, as will details of replies to CQ's not heard by the CQ'er. Also, he says, the SWL would do well to follow whole QSO's, rather than flit from station to station collecting call-signs.

On the subject of CW, he remarks "Anyone, provided he knows where to look on the dial, can hunt phone stations, but only the select few can savour the pleasures of CW . . . Any SWL worth his salt can pass the R.A.E. and Morse test, and feel pleased with himself in so doing. To make things easier would encourage mediocrity, whereas what we



SWL Bryan Ulyate of Arusha, Tanganyika, has an R.107 as his main receiver, with a tape-recorder on stand-by to catch the interesting ones. Most of his listening is done on 20 metres, for Sideband phones, and much EDX has been heard and confirmed — remembering that G's, DL's and HB's are DX from Tanganyika. The next step is a 5H3 licence, to be obtained by way of the R.A.E., which can be taken locally.

want is more and more effort to bring the U.K. to a peak of good signal quality and operating ability." (With which remarks we most heartily agree, and hope that they will not be lost on our readers.)

Our next deadline (for the January 1964 issue) will be Friday, November 29. Note, please, that first post on that day is the deadline; if you look at your calendar you will see that it is a Friday, as always for this feature. Because the work for "SWL" is done over the ensuing week-end, it follows that reports received during the week after are too late—and we have been having too many of them in recent months! Please try to keep letters short and concise, though *not* at the expense of any news of interest. As always, *no* lists of Calls Heard, please, except in cases of very unusual DX (such as VK's on Top Band!)

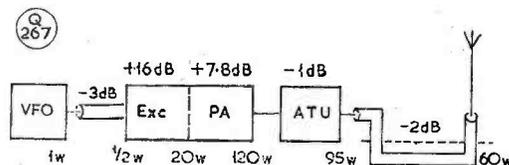
ANSWER TO THE PROBLEM

Referring to the exercise set by GM3BST on p.481, a block diagram of his transmitter layout, with the power and reference levels, is shown opposite. The calculations give the answers as 60 volts and one amp.

Total of + dB = 23.8 (approx.)
 „ „ - dB = -6
 Overall gain 17.8 dB approx.

Power ratio = Antilog $\frac{\text{dB}}{10}$
 = Antilog 1.78
 = 60 approx.

. With one watt input, output is sixty watts as shown.



Illustrating the problem

If impedance is 60 ohms (assume perfect match), then

$$E^2 = W R \quad \text{Also} \quad I^2 = \frac{W}{R}$$

$$= 60 \times 60 \quad = \frac{60}{60}$$

$$E = 60 \text{ volts.} \quad I = \sqrt{1}$$

$$I = 1 \text{ amp.}$$

HIGHLIGHTS OF THE SHOW

Some Exhibits Reviewed from the 1963 I.R.C.E.

A SURVEY of the 1963 Amateur Radio exhibition proves the strength and value of the market for commercial amateur-band equipment, and the versatility and resource of British manufacturers and suppliers in catering for it. Each year, the range of apparatus is extended, the quality is improved, and the product shows a higher standard of radio engineering technique.

The present review aims to pick out only some of the new and more interesting items, under the general headings of Receivers, Transmitters, and Ancillary Apparatus. Those who visited this year's exhibition at the Seymour Hall cannot fail to have been impressed by much of what they saw—and there was a good deal more to see and to discuss than we mention here. And practically everything on all the stands was new to somebody, because each year so many newcomers make the rounds of the Hall.

RECEIVERS

For those interested in mobile operation—and their numbers increase every month—the new **Minimitter TR7**, a very neat transistor job for 1.8-2.0 mc, with Q-multiplier built in, is an attractive proposition. The same firm also offer the MC-64, a re-designed converter for all six amateur bands, with a wide slide-rule scale; MC-64 supersedes the earlier **Minimitter** converters, which have done very well for many years.

Of particular interest is another new **Minimitter** product—an amateur-band tuning heart complete, to form the basis of a highly efficient receiver for the home constructor; the idea is to enable a good Rx to be built at a reasonable cost, with this tuner unit as the core of the design. For those who want a built-up and tested receiver for operation on all amateur bands, there is the MR-44/11 in its 1963 styling.

Naturally, **K.W. Electronics** are out with a fine lot of new gear. This includes the KW-707, a receiver specially for SSB, with a mechanical filter giving 2.1 kc at 6 dB, and a 200-cycle half-lattice filter for CW reception; this Rx is similar in general appearance, styling and coverage to the KW-77, itself a most successful design and still finding a ready demand. The KW-707 is offered

for the connoisseur-market and costs £145.

As is well known, K.W. Electronics are agents for the American **Hammarlund** range of amateur-band apparatus, which includes a number of receivers in the HQ-series. Of the half-dozen or so models available, we pick out the HQ-170A, the latest triple-conversion model for SSB/CW/AM on the amateur bands only; and the more modestly-priced HQ-110, which is a dual-conversion job, likewise for the amateur bands. K.W. Electronics also handle the very successful Drake-2B receiver, and the **Collins** line in specialised amateur equipment; an outstanding example of modern receiver design is the new Collins 75S-3, for SSB/CW/RTTY on the 10-80m. bands.

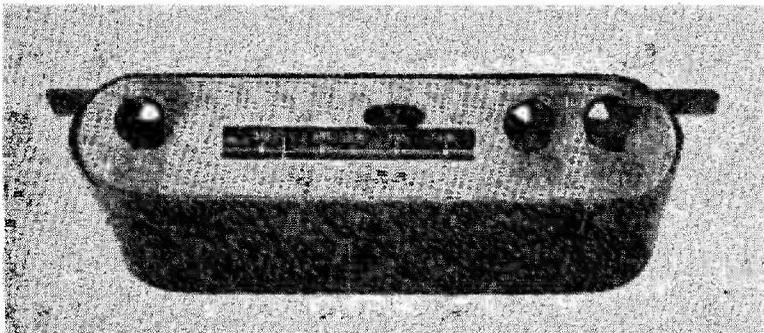
Turning now to VHF, in which **Withers (Electronics)** are specialists, we note their new 70-cm converter using an A.2521 in a trough-line circuit, with a 6DS4 nuvistor mixer, complete with a cascode wide-band IF amplifier giving output tuning over 14-16 mc. This is a very nicely made unit, matching the **Withers** range of two-metre converters.

NEW TRANSMITTERS

From **Minimitter** comes a new 20-watt mobile transmitter with transistorised power supply, to go with the TR7/M receiver already mentioned. Available separately is a 20w. modulator suitable for either mobile or fixed station use. The three-band transmitter known as the Top 2-7 is still a popular model in the **Minimitter** list.

An interesting new VHF transmitter is offered by **Withers (Electronics)**—a full-power two-metre job with a QQV06-40A in the PA, running 150w. CW or 120w. AM phone, modulated by a pair of KT77's. Called the TW2-120, it is self-contained in the contemporary style of cabinet with a large hinged lid.

In quite a different category is the KW-2000, an SSB transceiver by **K.W. Electronics**, giving 90w. p.e.p., and arranged for either an AC power supply (for fixed-station use), or for a 12v. DC input, with a transistor pack, for mobile operation. It covers all bands 10-160m., has a VFO coverage of 200 kc per band and, though a transceiver, can also be operated with independent receiver and transmitter tuning for off-frequency working; a 2.1 kc mechanical filter is



The TR-7 transistor mobile receiver for Top Band, by Minimitter. A very neat design, it incorporates a Q-multiplier.

used for both Rx and Tx function, VOX is provided for, and the general construction is notably light-weight, for easy transfer from bench to mobile installation. In /M service, plenty of Tx output power is available without the car battery being too heavily loaded. The price of the KW-2000 is £160 for the complete transceiver, the power supply units, to choice, being extra.

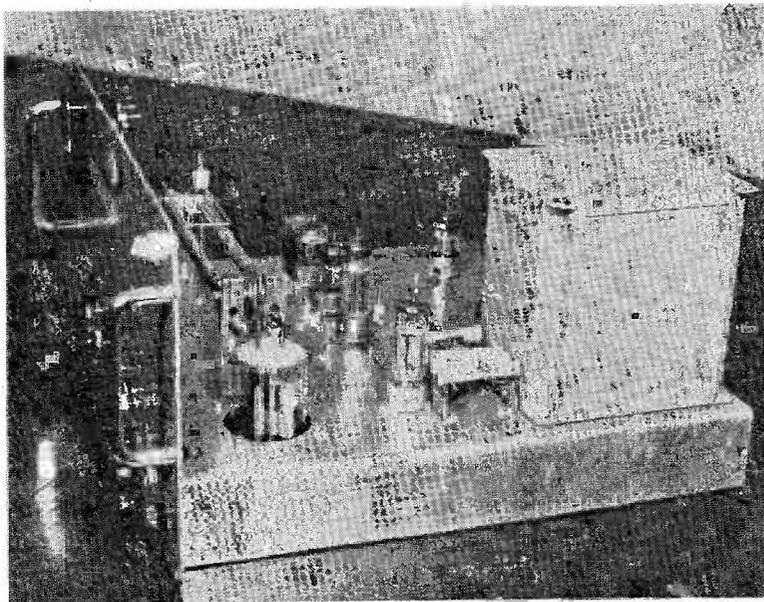
A much cheaper Sideband transmitter is the K.W. Vespa, giving 90w. p.e.p. on three bands, and 75w. CW. It has a crystal filter and built-in power supply, and costs £85. Another new K.W. Electronics offering is the Vanguard Two-Metre Transmitter, running 50w. input, with a modulator and speech amplifier similar to the Vanguard all-band AM phone Tx, still very popular as one of the original K.W. Electronics kit jobs. The Mk II version of the KW-160 Top Band transmitter comes with a new VFO circuit having improved calibration.

In the **Hammarlund** range, handled by K.W. Electronics, is the HX-50 Sideband transmitter, rated at 150w. p.e.p.; having a 3 mc crystal filter, it is designed for 10-80m. with a Top Band modification possible for those who wish it. This is a well-tryed American design, of which many have already been sold in this country.

COMPONENTS AND ACCESSORIES

Apart from the Transmitters and Receivers already mentioned, this year's Exhibition will be remembered for the wide variety of new parts and components shown by several manufacturers.

In addition to their standard range of coils, condensers, coil packs and units, constructors' items and kits for recent constructional designs in the radio press, **Electroniques** have introduced, in conjunction with Codar, something quite new—the air-spaced inductors known as "Codar-Coils," in various sizes, and intended for transmitting applications. Having very low-loss and high-Q characteristics, they are light in weight and generously rated for power. The idea is that you buy them in lengths (to the diameter and spacing required) and simply cut off the coil you want for your VFO tuned circuit or PA stage. Another new **Electroniques** product is a 1.6 mc full lattice band-pass crystal filter, with a bandwidth of 3 kc and a shape factor of better than 1.5:1. This will ensure high selectivity without it being necessary to use low-IF at the second conversion. The **Electroniques** slow-motion condenser drive and dial, first shown last year, has been considerably improved; it is now two-speed, giving ratios of 6:1 and 36:1. Other additions to this interesting and most useful range of parts are some new RF chokes, primarily



The new Withers (Electronics) TW2-120 is a two-metre transmitter running 150w. input on CW and 120w. of AM phone. It is a very well engineered job and is self-contained.

for transmitting applications.

As usual, **Philpotts Metalworks** keep up with the times and, apart from their standard chassis and cabinet assemblies, offer a one-off service for the constructor who wants an individual design. For those who build portable or mobile equipment, **Philpotts** have the appropriate hardware in the smaller sizes, and it all comes in a varied choice of colours. The firm has been in this specialised business of metal work for the radio industry for many years now, and G4BI and his staff are well acquainted with amateur problems—and amateur foibles!

A new departure for them is **Minimitter's** entry into the hardware field—they offer a selection of metal equipment cases, complete with chassis, in six sizes and styles. In the **Minimitter** components list are a half-lattice crystal filter at 465 kc, coil sets for all HF amateur bands, Q-multiplier inductances, and RF chokes and transformers.

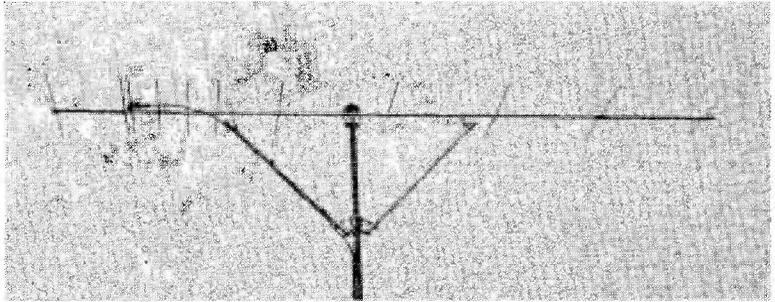
As well as their own manufacture in the components field, **K.W. Electronics** can supply many imported items, from Italy, America and Japan. These include mechanical filters, keys and microphones, coils and PA assemblies, coax switches, phase-shift networks, VFO units, test gear and meters, transistorised items of various kinds including signal generators, and mobile aerial assemblies. They also stock a full range of replacement valves and components for the equipment they handle.

In addition to their operations in the field of commercial aerial engineering, **J-Beams, Ltd.** offer very well designed and constructed VHF beam systems for the various amateur bands from 70 mc upwards. The Turnstile array was reviewed in the October issue of **SHORT WAVE MAGAZINE**. They can also do a two-metre 10-element Yagi giving a genuine

13 dB gain, and suitable for feeding at either 75 ohms unbalanced or 300 ohms balanced. With some of the VHF gear for transmission and reception here reviewed, this aerial system would be a pretty potent addition to complete a highly efficient two-metre station. **J-Beams** also offer a much-improved $\frac{1}{4}$ th wave mobile whip for two metres, which is not only better gain-wise than the usual $\frac{1}{4}$ -wave /M aerial, but has an adjustable mounting insulator so that the array can be fixed to any vehicle.

Recently, the firm of **Green & Davis** have been coming to the fore as suppliers of parts and equipment for the amateur market—including such items as meters, both test and panel, and transmitter monitoring devices. A nice instrument in the latter category is their RF-40 F/S Meter, having a range of 1-250 mc in five switched bands, with a 200 μ A movement. They are also doing DC/DC converters, rated 45w. and 60w., for mobile use. Quite new is their "Cambion" range of coil formers and trimmers, and they also offer a variety of microphones in the crystal and dynamic types.

Just as this issue closed for press, information was obtained covering the **Green & Davis** 2-metre Nuvisor Converter, Mk. III, claimed to have a noise-factor better than 3.5 dB, and a Mk. IV version with three 6CW4's in RF (cascode) and mixer stages; this costs 14 guineas. Their "Falcon" range of two-metre transmitters has been extended to the 2M90 100w. CW Tx, with a companion modulator unit, the LM100, as a separate item; the two together come out at £68. For the American "Sonar" 4-band SSB transceiver, **Green & Davis** have their own 500w. Linear PA, in a matching case. They can also offer



The 10-element long-Yagi, by J-Beams, has been specially developed in that the spacings give a genuine 13 dB of gain in the two-metre band, with sharp directivity. The bracing on the boom prevents sag.

adaptor units for SSB on two metres and Top Band.

Since soldering, and all that goes with it, is an essential factor in radio construction, we are glad to be able to mention the new miniature soldering iron, the Miniscope, now available from **Enthoven Solders, Ltd.** Eight inches long and weighing less than two ounces, it is a quick-heating low-voltage tool with a spring switch on its pen-holder grip. As the heat-up time is only about 5 seconds, the iron can be "dapped on" the work quickly and easily as required. It takes 20 amps. at 4 volts, DC or AC, and a suitable transformer is an optional extra. It can be described as very hot, very safe and very fast—and a very nice tool for anyone doing a lot of radio constructional work.

Finally, we should perhaps explain that this review does not purport to be a "stand-by-stand tour of the 1963 Amateur Radio Exhibition." Rather, it is intended to inform those many of our readers who could not get to the Show about what is new and most interesting in the market-place of Amateur Radio—and even some of those who were at the Seymour Hall this year may not have got round to seeing much of what has been discussed in this piece!

ANOTHER OLD-TIMER GOES ON

The death is reported, suddenly on September 30, his 60th birthday, of Patrick O'Brien, VS6AE, Hong Kong. First licensed in 1925 as AC1PA (under the old prefix system, to denote Asia-China), he also operated as XU1B for a short time during 1934. But it was as VS6AE that he was best known, not only in the Far East but throughout the world. A founder-member of the Hong Kong Amateur Radio Transmitting Society, he was always a very keen worker in its interests. He was much respected in Hong Kong, and his loss will be deeply felt.

PAINTON/MOSSMAN MARKETING AGREEMENT

We are informed that Painton & Co., Ltd., the well-known Northampton manufacturers of high quality radio and electronic components, have concluded a marketing agreement with the American firm of Donald Mossman, Inc., New York, who make a

variety of switches for the industry. The agreement covers manufacturing as well as selling rights in the U.K., Europe and Australasia.

GET IN TOUCH LOCALLY

We are often asked by letter questions that could easily be answered if the enquirer belonged to a local Club group—such as: "What do I need to know to get an amateur licence?" or "What sort of receiver should I buy?" or "Could you tell me what the amateur abbreviations mean?" Each month in *SHORT WAVE MAGAZINE* we publish the addresses of a long list of active Amateur Radio clubs and societies, all glad to welcome new members and to help beginners. This list does not necessarily cover every Club, because they do not all report every month, but any four issues of the *Magazine* will include all those who can be helpful. If there is no organised amateur group in your neighbourhood, it is often possible to get one started by putting a preliminary notice in the local paper.

TWO-METRE MOBILE INSTALLATION

From Notes by G3MCG

The interesting and very well engineered /M rig illustrated here has been seen at several Rallies this season, and was a winning entry at the Woburn Rally on September 22. G3MCG describes his outfit as follows:

On the Rx side, the two-metre receiver consists of a crystal-controlled converter with a modified "Command" ARC-5 tuning 3.0-6.0 mc. The Rx section incorporates a twin noise-squelcher with full-wave limiting, AVC and an extra output stage for comfortable speaker reception. The transmitter is on lines similar to the well-known Withers TW-2, but is constructed to fit in a single housing which takes the converter, main Rx, Tx and the relays. The size overall of this part of the equipment is 12 ins. wide by 13 ins. deep and 5 ins. high.

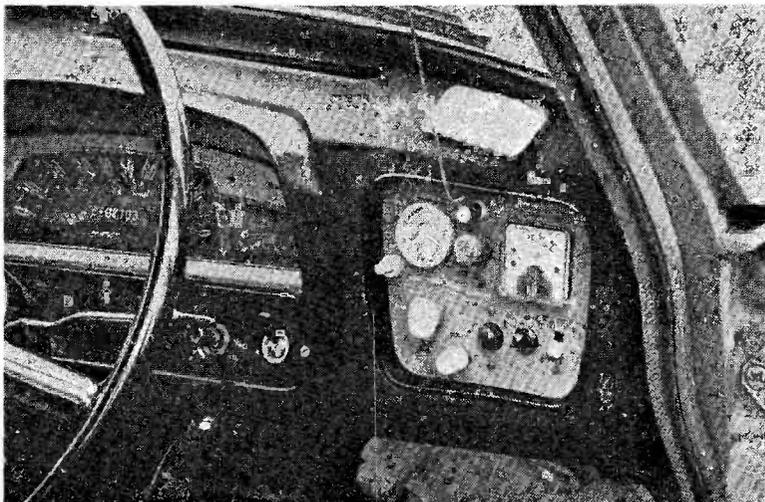
With this assembly, a drive unit houses a motor to tune the receiver; this is a worm-and-helical gear removed from an RF Unit No. 1 (or RF Unit 24, Band I, with suitable gears), and also includes a Desynn drive potentiometer and S-meter circuit, less the actual meter itself (which is up front). The power supply is a conventional type of transistorised pack with toroid coil and silicon-diode full-wave rectification.

All this equipment is housed in the boot of the car, which is

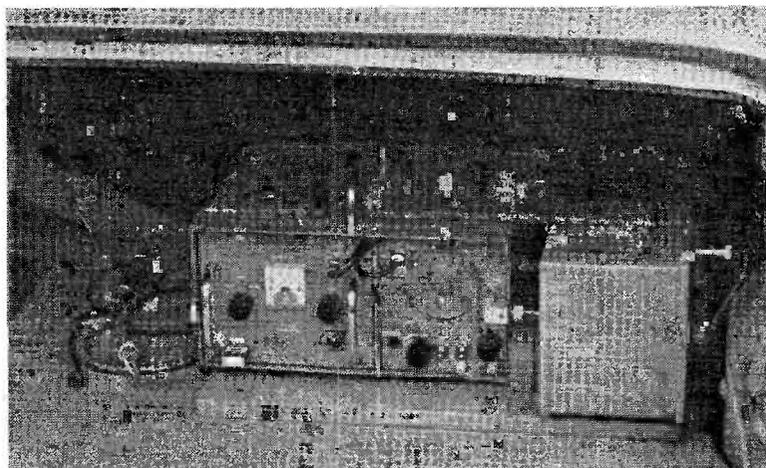
a Morris 1100 (see photographs).

Driving Position

Up in front, the control panel (see below) is situated in a convenient position relative to the fascia board. It embodies the following controls: Rotary switch (multi-point Yaxley type) resistor loaded, to control the direction and speed of the Rx tuning motor rotation; Desynn indicator (miniature 1¼-in. diameter type) calibrated to Rx tuning; BFO on-off switch; RF gain control; combined S-meter and RF indicator; audio monitor jack; and on-off switch. The latter brings in a 12-volt battery, via a relay in the drive unit in the boot.



The control panel for the G3MCG/M two-metre mobile rig. The left-hand dial is a repeater for the tuning of the remote Rx in the boot, the motor control being for both speed and direction. The meter (right) functions as an S-meter and an RF output indicator. The panel is about 4½ ins. square and quite shallow. A 12-core cable connects it to the Tx/Rx and PSU at the rear. *A G3GMN print*



The G3MCG/M two-metre installation, in the boot of his Morris 1100. The transmitter and receiver are in the left-hand housing (Tx on left) and the receiver is motor-tuned by remote control. The drive unit, power supplies and control relays are in the box on the right. The whole assembly is on shock-absorbing mounts. *A G3GMN print*

This control panel measures only 4½ ins. square and takes up very little space in depth. A 12-core GPO-type cable connects to the equipment at rear; this need be no more than light-duty rating, as the currents involved are only about 150 mA.

A two-core screened cable connects the microphone and a pressel-switch in the body of the mike actuates a main relay in the power pack; this changes HT over for the transmitter, and the Tx current is fed through a second (coaxial) relay for aerial change-over; the aerial itself is a halo.

Refinements such as panel lights and tell-tales are not strictly necessary, but are easily fitted within the core-capacity of the cable.

VHF BANDS

A. J. DEVON

LAST time out, the peroration drew attention to an SP contest to take place during October 13-14. As it happened, the two-metre band opened for SP on the 11th, just about a day too soon. And if you didn't know this, you may also not have heard that there were two LX stations and quite a lot of DJ/DL EDX available at the same time. In fact, we had a very nice opening for Friday, October 11—though it did not take in all the northern part of the country, conditions did extend towards the west, to the great content of a number of chaps who have not always had their share of what has recently been going for the south-east and the Midlands.

This improvement in conditions started to develop on Wednesday 9th, with all the usual signs—and we hope that by now most followers of this piece can interpret the signs—building up well during Thursday and to a peak for the evening of Friday 11th, extending right across the southern half of the U.K. and covering Northern Europe well to the south and east. Hence the appearance of SP3GZ, LX1SI, OK1KMV, DL7FV (West Berlin), DM2AIO (East Berlin) and HB9RG (Zurich)—to mention only a few of the good ones.

The two-metre band was a babel of voices and a roar of QRM from end to end, with heavy cross-modulation effects from some quarters, and a general struggle to get EDX contacts. In fact, for your A.J.D. it seemed a good deal

worse than 80m. on a Sunday morning! Never mind—it's better to have plenty of EDX activity and everyone working hard for QSO's, than scratching about on a dead band with nothing much doing.

Conditions held good into the Saturday morning and evening, but by Sunday 13th, had tailed off considerably, and most stations still on were discussing their experiences during the Friday opening. Taking it by and large, we have not done too badly for VHF/DX so far this season, and the general trends can be clearly seen on the barograph trace, which reached a peak of 30-8ins. around midnight on Thursday 10th.

Seventycem Results

The outstanding QSO on 430 mc, if not of the whole opening, was probably G3LTF/LX1SI, for the G/LX "First" on the 70-cm. band. Peter also worked DL3SPA, near the OK border, and DL9AR—these were all on October 11.

For G3LHA (Coventry), though he did not raise any EU's, this also was the big night for GDX on Seventycems; he worked about a dozen new stations at considerable distances, from G2OI in Lancs. to G5QA for Devon. GW3ATM and GW3MDY were heard, but did not respond.

Very successful on 430 mc from the Midlands was G2CIW (Birmingham)—Jack worked DL1PS, ON4VN and PA0LWJ on 70-cm. phone, heard several other EU's, and had many G contacts, at what he calls "fantastic strengths." At G2CIW, both bands were wide open by about 7.0 p.m. on the 11th, with very strong signals coming in from all southerly directions.

And on 23 Centimetres

Another extremely interesting result was the reception by G2CIW of 23-cm. signals from G3FP (Thornton Heath, Sy.)—as the former is not yet ready to transmit on 1296 mc, they had a cross-band 23/70 cm. QSO, G3FP's phone being S6 in Birmingham; the distance is around the 100-mile mark and they were, of course, working QTH-to-QTH—which is what makes it so very remarkable for the 23-cm. band. It happened at 0845 clock on Saturday 12th.

Going back a bit under this heading, G3LTF reports a first QSO on 23 cm. with F8MX/A on September 14—and tests showed that F8MX/A was audible at G3LTF *each night* during September 13-30! Surely another most remarkable result, and probably due to scatter-propagation effects. G3LTF also heard PA0COB (154 miles) at S6 on September 15, and PA0VLP was S2 at 190 miles—no actual contacts resulted. The Tx for 1296 mc at G3LTF is a 2C39A tripler giving 3w. RF output, into a 4ft. dish at 20ft.; Rx is a xtal mixer trough-line arrangement with low-noise IF amplifiers at 14 mc.

Two-Metre DX—October

Another "first" fell to G3LTF on this band—on October 11 he worked HB9RG on two-way Side-band, this being the first such contact G/HB, and the QSO was held without difficulty for some little time. Next morning, 12th, G3LTF found Dresden's TV (the EDX marker signal on 145.265 mc) spreading over the *whole* of the two-metre band, with the carrier at S9-plus! Though the band was obviously wide open to the east and south-east, repeated calls on CW failed to produce a QSO—it was about the breakfast-hour, so those who were not still in bed after an exhausting night on the air were probably busy with the rolls-and-coffee. But as Dresden had only been at a maximum of S8 the night before, when everyone was on, it is clear that opportunities were being missed on the Saturday morning.

To get the EDX on October 11, G3BA had to go LF to avoid the Dresden TV spread in the Midlands zone! Tom worked LX1SI and SP3GZ, giving him two new countries, as well as several stations in East Germany. He comments on the strength of the signal from LX1SI, who stayed in for hours on end and was in great demand in the Midlands (and everywhere else!).

G3CO (Dartford) was able to work further into France than ever before, getting stations south of Paris and to the south-west across to F8ME in St. Brieuc—actually,

F's as far south as the area of Vichy were available during Saturday 12th. (As it happens, on the Saturday, A.J.D. followed G3CO talking very nice French at F3XY!) G3CO reports himself as "very satisfied" by contacts with DL3SP/A, near Nuremburg, LX1SI and GC's in Jersey and Guernsey. He found the DJ/DL's very strong during the Saturday evening. Altogether, by these operations G3CO bettered himself in the tables to a considerable extent.

G3CKQ (Leicester) raised F2KD, F8MW and GC2FZC for two new countries, and mentions an interesting QSO with G2DCG (Margate) who, at about 125 miles, was a solid S9 running only 2 watts input.

October 11-12 was a field day for G3SAR (Sevenoaks), with many stations worked at over the 300-mile mark—including F8LF right down near the HB border, several in the Champagne country, and LX1SI. G3SAR also reports hearing LX1AL and, in the other direction, GM2UU. In all, he accounted for 20 F's and DL3NI over the two days, with much other EDX heard. G3DKF (Coventry) got in with LX1SI and, having improved things with an 8/8 J-Beam at 40 ft. and an increase of power to 50w., says he is ready to compete for the DX.

G3HRH (Welwyn) worked a great many French stations, and in the two days October 11-12, covered no less than sixteen of the Departments of France, the furthest south being Allier and Vendee.

As everyone who was on for the opening will know, GC2FZC (Guernsey) was in the thick of it—he worked altogether 50 different stations in six countries, including many G's from up North. His QSO with LX1SI was the GC/LX "First." Also from Guernsey, GC3OBM reports a number of new contacts, bringing him up to 23C.

G3LRP (Wakefield, Yorks.) did not do too well with the EU's because of screening in the required direction, but he did have a CW contact with an ON4. The difficulty is to be remedied by

getting the 6/6 up higher. However, he is at 9C in Countries and has worked 52 counties for the Annual, so is not doing badly!

G3GWL (Bletchley) was digging out the EU's without much difficulty, from GC and F round to DJ/DL, and mentions hearing G4LU working LX1SI—a very nice contact for them both. Reports from further north show that the Europeans were not getting through to GDX—G3JYP (Westmorland) says that none were heard up there. On the other hand, the northerners could work down to GC quite comfortably, and G3EKP (Lancs.) did get a good QSO with F2NX.

Other Two-Metre News

It is interesting to see that GW3PWH, comparatively new on the band and as far west as Swansea, has already got 26C for the Annual. G2BJY (Walsall) sends in a new list covering 31C, and G3PSL (Loughborough) is at 28C, with 9C for the Countries table.

G3EKP (Belthorn, Lancs.) runs 12w. with an indoor 5-ele Yagi, on which he has worked 17 counties. G2CDX (Cambridge) claims for the Tables, having 32C for the Annual, and G3PKT (Rainham, Kent) goes up to 24C in that table. The latter remarks that he feels he is often confused on the two-metre air with G3KPT—and he also points out that Rainham, Kent, is a different place from Rainham, Essex! All very confusing, but in spite of that G3PKT (and we said PKT) has now worked a total of 301 different stations on two metres.

G3DVQ (Purley) and G3OJY (Penzance) both move in the various tables, G3OJY remarking that he hasn't as much time for it these days, though he was there for October 11 and had some nice QSO's.

G3EHY (Banwell) reports an interesting, and very useful, encounter with EI4R/P, operating from the west coast of Eire and giving the very rare county of Clare, at something around 300 miles and over a particularly difficult path.

G3LAS (Berkhamssted) now has 80w. with an 8/8 at 40 ft., on a

site 475 ft. a.s.l.—he says it's opened his eyes to the possibilities for DX working under mediocre conditions. He is also much impressed by the penetrating power of the two-metre SSB stations, with G3ILD, G6CW and G8SB (all DX to him) always readable even when the band is poor; he mentions DJ5IA as another very good Sideband station. G3LAS himself is building for transverter SSB operation on two metres, and hopes that more G's will learn to use their BFO's, even if they cannot abandon AM for SSB.

More About MS

It will be remembered that recently in this space meteor-scatter has been discussed, and some very interesting MS results noted. G3LTF, one of the leading exponents of this particular art, with 7 countries worked on MS, has now heard from LZ1DW in

TWO METRES

COUNTIES WORKED SINCE
SEPTEMBER 1, 1963

Starting Figure, 14
From Home QTH only

Worked	Station
57	G3BA
52	G3LRP
47	G3GWL
40	G3HRH
36	G3CO
32	G2CDX
31	G2BJY, G3SAR
30	G3CKQ
28	G3PSL
26	GW3PWH
24	G3PKT
20	G5JU
19	G2BDX, G3KPT
17	G3DVQ, G3EKP
16	G3HWR, G3LAS, G3OJY
14	G3CCA, G3OZF, G5ZT

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

FOUR METRES

ALL-TIME COUNTIES WORKED LIST

Starting Figure, 8
From Home QTH Only

Worked	Station
40	G3EHY
34	EI2W
33	G3PJK
31	G3OHH, G5JU
30	G3JHM/A
28	G2OI
26	G5FK
23	G3NUE
21	G3PMJ
20	G3LZN
19	G3BNL
18	G3AYT
16	G3BJR, G3FDW, G3IUD, G3OWA
14	G3OKJ, G13HXV
12	G3LQR, G5DS
11	G3HWR
8	G3PRQ

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

Sofia reporting reception of G3LTF's signals during the Perseids (Aug. 10-13), with pings up to S9. Another reception report has come from UP2NMO in Lithuania, who heard G3LTF during his Perseids sked with UP2ABA.

Though G3LTF did hear LZ1DW (as previously reported) no actual QSO resulted. It seems that LZ1DW, who has worked SP5SM by MS, runs 80w. of RF into a 10-ele Yagi; this may not be quite enough, even if the beam is giving its fully realisable gain.

On this same theme, G3LAS mentions that in the course of a 20m. QSO with UQ2FX, it transpired that there is quite a lot of two-metre activity in Latvia. UQ2KAA has a kilowatt on 144.025 mc, into a good beam, and others mentioned are UQ2AO, 144.065 mc, and UQ2KAX. They are all keen to try DX propagation tests with U.K. stations.

Four-Metre Notes

G13HXV (Belfast) is getting on well on the 70 mc band, having recently worked GM2UU (Wigtownshire) and GM3FMO (Ayrshire) for two new 4-metre counties. What he, and many others, would like to find is more CW on the band—there are plenty of unresolvable carriers to be heard, which would yield R5 signals if only they were keyed.

From Washington, Sussex, G3JHM/A has been putting a good deal of time in on four metres, his total of stations worked on that band now being 125. The GDX includes G3ENY for Shrops., G3IUD Ches., G3JZN and G3PLX for Lancs., and G3RND in Yorks. The heard-list mentions EI2W, G3FDW/P in Cumberland, and GW3MDY for Flints. With an improved 70 mc converter, G3JHM/A finds that he can hear 4-metre stations in Yorks. and Lancs. any time they are on.

The local (Sussex) net on 70.26 mc goes from strength to strength, with about 18 stations, fixed and mobile, numbered in it, and vertical polarisation used for mobile operation. With a vertical dipole at 90 ft., G3JHM/A has been working /M's at up to 50 miles. Stations in Sussex and neighbouring counties have adopted 70.26 mc as a common calling and working frequency, and newcomers to this group include G3CNO (Portsmouth), G3MRQ (Lancing) and G3JLO (Chichester).

They are not idle up in the North, either. New stations on are G3JZN, G3KMS, G3KRX, G3OSI and G3SAY, while G3SNA made his initial on-the-air appearance with 4-metre CW! G3OHH has now worked 90 different stations on the band and is at 31C in the 4m. All-Time. G3PMJ (Manchester), one of the keenest of the group, is on regularly—he was disappointed to miss G3JHM/A during the October festivities.

G3PJK (Manchester) can claim 33C for the 4m. table, and has worked 81 stations on the band; this figure includes G3SNA, whose Tx he lined up for the latter's first QSO.

The going on four metres is evidently good, in all parts, and it

is to be hoped that many more stations will come on. There is not much to it so far as the gear goes, and it is now probably true to say that from any part of the U.K. contacts on 70 mc can be obtained on a Sunday morning.

Notes and News

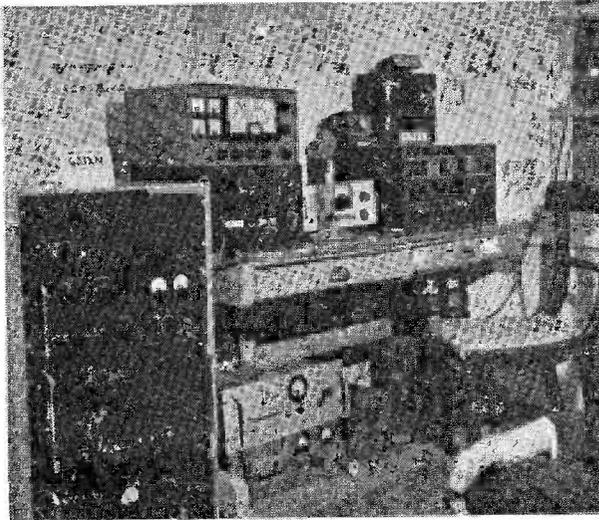
A new station on 70 centimetres is G3RAX/T (Wimbledon, London). Being at Sheffield Univ. he can only run the rig during vacations; his Tx consists of an 8 mc xtal tripled in an EF91 to 24 mc, tripled again to 72 mc in an EL91, with a 5763 doubling to 144 mc and a QQV02-6 tripling to 432 mc; the Rx is a G2DD converter (as in *SHORT WAVE MAGAZINE*, March 1953) but preceded by a transistor RF stage giving about 10 dB gain, the converter feeding into an AR88 tuning from 24 mc. The aerial is a slot-fed 4/4 J-Beam turned by a CDR rotator. With this lot, G3RAX/T has worked 17 stations in five countries, to make a start on the 70 cm. ladder. Future development envisages an increase of power with a QQV03-20A as a straight PA, and ATV transmission using a transistorised Vidicon camera.

From GW4CG we hear that it is proposed to form a South Wales VHF group—those interested are invited to get in touch with him at 20 Austin Avenue, Porthcawl.

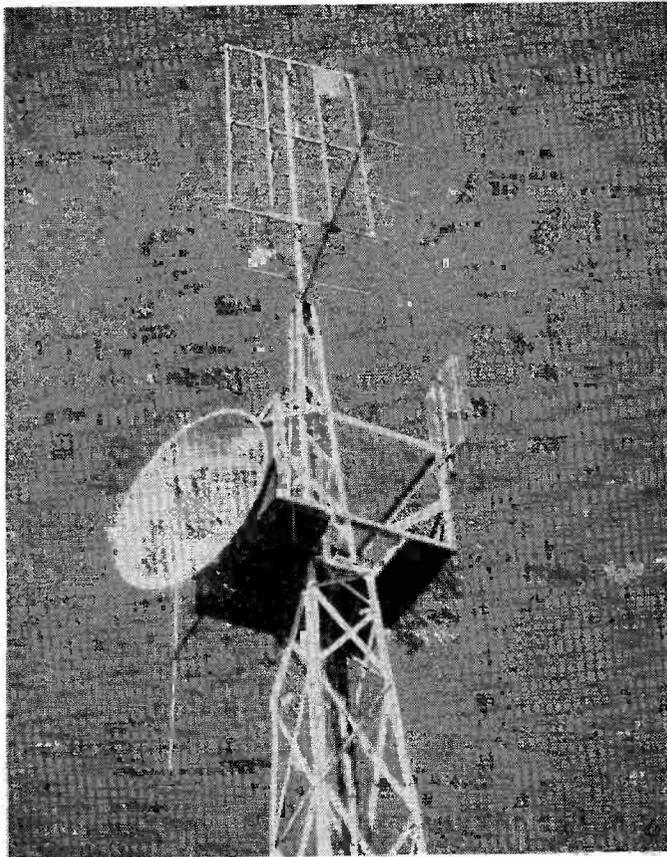
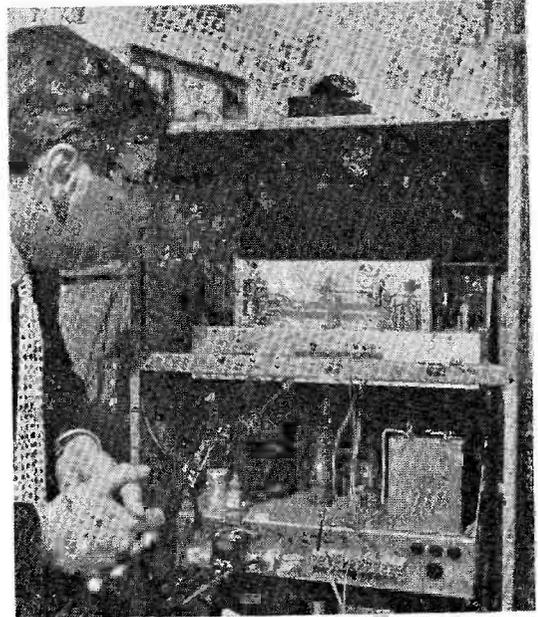
The North-West VHF Dinner and Convention on October 5 was again a great success, with 120 at the meeting and a total of 116 sitting down to dinner. The visits arranged included Jodrell Bank and Manchester Airport; the talks were by G2HCG and G2HCJ on E-M-E working; and after the dinner there was a general discussion on two-metre zoning. Excellent arrangements were made by a strong committee, the members of which are to be congratulated on their effort and the support they attracted.

Deadline—

For next month is **November 22**—which gives your A.J.D. a little time to catch his breath. Send it all to: A. J. Devon, "V.H.F. Bands," *Short Wave Magazine*, 55 Victoria Street, London S.W.1. C.U. on Dec. 6.—73 de A.J.D.



The two-metre station of G3JXN, operated by Dr. John Tindle at 149 Hamilton Terrace, St. John's Wood, London, N.W.8. The QTH is actually a block of flats, and G3JXN has his slot-fed 6/6 on the roof. Right is the two-metre PA, a QQV06-40A running 100w. and modulated by a pair TT21's. G3JXN was one of those who knocked off HBIADT during the late-July opening, and he is now at 12C in Countries Worked. *Prints by G3AWS*



Shown alongside is the 4 ft. paraboloid for 23 cm. in use at G3NOX/T (near Saffron Walden, Essex). It is fed by 35 ft. of special low-loss coax from a 3CX100A5 stage run as a tripler from 70 cm. and taking 25w. input. To facilitate tuning up, a probe in the dish feeds some rectified RF back to a microammeter in the shack.

On the Rx side, G3NOX/T has an A.2521 RF stage into a xtal mixer, with injection at 1274 mc from another A.2521 tripling a frequency in the 420 mc band; a fundamental crystal frequency around 7 mc is multiplied up into the 70 cm. band. The IF of 22-30 mc for the 1296 mc signal frequency is tuned on an AR88.

It was on this rig that G3NOX/T made his record 23 cm. contact with F8MX/A, on September 15, as reported on p.431 of the October issue of *SHORT WAVE MAGAZINE*.

Since it is a bit of a problem to rotate the dish—it is a heavy ex-Army radar aerial—G3NOX/T now has a Quad Helix under construction, as described in a recent issue of *QST*.

Apart from the 23-centimetre gear, the station is fully equipped for amateur TV transmission and reception on the 70-cm. band and, as is well known, G3NOX/T has been very successful in this field, too. He started with ATV by assisting his father, G2WJ, with what was probably the first amateur television station in the U.K. capable of giving results.

NOTES ON THE BOOK LIST

Some Selected Titles Reviewed and Discussed

AT this season of the year, we gently draw attention to the fact that the Book List published on p.458 of this issue contains a most comprehensive selection of titles, ranging over the whole field of Amateur Radio. It is hardly for us to attempt to make suggestions and it would be invidious to draw comparisons—but the notes following may help those interested to make up their minds about selecting what they want. Even the reviews here cannot cover all the titles we hold—such is the scope and variety of Amateur Radio today.

The prices quoted are post free, from stock, and it is the aim of our Publications Department to give same-day handling of all orders.

HANDBOOKS

Radio Handbook, 16th Edn.: For anyone with a serious long-term interest in radio theory, design, construction and the art and practice of Amateur Radio, this book is an obvious thought—and not because it is the most expensive in the List! Of particular value to the “professional amateur,” this edition of the *Radio Handbook* is a mighty tome of 800 pages, well bound and printed, copiously illustrated, and it just about covers everything in Amateur Radio. At 86s., it should do!

Radio Amateur's Handbook, 40th Edn.: The *ARRL Handbook*, as it is usually called, has for 40 years been the recognised practical guide to the subject. It is an annual compilation and tens of thousands of copies are sold throughout the world every year. Always up-to-date, it is, in the first place, practical; secondly, it is comprehensive; thirdly, it is accurate and reliable; fourthly, it is easy reading for radio amateurs; and fifthly, it is unusually well illustrated, with a good many more diagrams and photographs than its 700-plus pages. The index runs to 14 pages, and there is a large catalogue section of more than 100 pages (interesting reading for its own sake). In the 600 or so text pages, the coverage is general, through the whole field of Amateur Radio practice—from aerials to power supplies, and HF to UHF, including receivers, transmitters, modulators, test and measuring equipment, and operating practice. The price of the *ARRL Radio Amateur's Handbook* is 37s. 6d. (or 47s. 6d. in a special library binding). It is not the sort of book you need every year, but you should have the latest edition about every third year or so to keep up-to-date.

Amateur Radio Handbook: This is the RSGB publication slanted for the U.K. amateur. It is in 20 chapters, each of practical interest to the British AT station operator, and is complementary to similar American amateur manuals. First published early in

1962, it is full of constructional designs and ideas, covering all amateur bands HF/VHF/UHF, and provides basic data and circuitry for U.K. amateur station equipment of every kind. Of 550 pages, in stiff covers, it is well illustrated in line and half-tone, and costs 36s. 6d.

AERIALS AND ANTENNA SYSTEMS

S-9 Signals: Essentially a manual on simple and practical aerial systems, suitable for transmitter or receiver, written and compiled for those who want the facts without the theory and have not the money to spend on elaborate arrays. *S-9 Signals* runs to 48 pages in 12 chapters, and its price is 8s. 6d.

Quad Antennas: You would hardly think it possible that a whole book could be devoted to this one subject—but *Quad Antennas* is a 96-page manual covering the theory, design, construction and operation of cubical quad beam arrays. In this book the practical man will find his problems about Quads answered in a practical way, while the theoretically-inclined will also find the treatment interesting and instructive. *Quad Antennas* is very well illustrated, and costs 23s.

Beam Antenna Handbook: This has been described as “a mine of information on beams of all types.” As well as dealing with propagation theory, such problems as the angle of radiation, array gain figures, SWR measurements, operating band-widths and matching systems are covered, and dimension charts, with detailed constructional data and photographs, are given for all amateur bands. The treatment includes the theory of transmission lines, and their construction and use in practice; devices for matching aerial and feeder; and sections on testing and evaluating antenna systems. With more than 100 charts, diagrams and photographs, the *Beam Antenna Handbook* runs to 128 pages, and costs 24s. 6d.

Antenna Round-Up: A brand-new offering by the publishers of *CQ*, this amounts to an anthology of the better aerial articles from that magazine, gathered over recent years. The purpose of *Antenna Round-Up* is to dispel some of the mystery surrounding aerials and aerial systems in the mind of the average amateur. The treatment is therefore straightforward, and is divided into five main chapter headings: Theory, VHF, Beams and Quads, Vertical and Mobile, and Aerial Accessories, this last covering about 15 different ideas and designs in the way of aerial testing, installation and measurement. Of 160 pages, in stiff covers, well printed and fully illustrated, the price is 25s.

Antenna Handbook: This is the well-known *ARRL* publication on the subject of Aerials and

Aerial Systems, which is now in its 9th edition. Including not only the basic treatment, it gives a great deal of practical data on radiating systems of all types, and is in effect an expansion of the chapters on Aerials in the *ARRL Handbook*. The general style and format are as *QST*, from which some of the material is taken. This is a thoroughly dependable guide to the subject of Aerials, and costs 19s.

SIDEBAND, MOBILE AND RTTY

New Sideband Handbook: Another in the *CQ* series of radio amateur books and manuals, this one gives a very good explanation of Sideband theory and shows how to apply it in practice. Indeed, the approach is essentially how-to-build-it and get-it-going. A wide range of receiving adaptors, transmitter exciters, amplifiers and the gadgetry associated with getting an SSB transmitter going properly, and keeping it on the air, is described. This book costs 25s. 6d.

Amateur Single Sideband: In the August issue, p.315, we carried a full review of this one, by G3BDQ. Though it is not for the beginner who simply wants circuits to copy, he will eventually need what the experienced Sideband man would regard as an important source of information for the design of SSB equipment. Produced by the Collins Radio Co., it can be regarded as authoritative and right up-to-date, and it covers the whole subject of Sideband transmission and reception very thoroughly. The price is 30s.

Single Sideband for the Radio Amateur: The well-known *ARRL* compilation on the subject, discussing theory, practice, design and construction, with plenty of illustration and numerous graphs and tables. The entire area of amateur Sideband is covered, both transmission and reception. Now in its third edition, price 18s. 6d.

Mobile Handbook: The latest edition of another manual in the *CQ* practical series, it gives just about all the design and constructional information the keen /M operator requires—transmitters, receiving arrangements, power supplies, monitoring gadgetry, and of course aerial systems in considerable detail. It is a well illustrated book of 240 pages, and costs 24s.

Mobile Manual: The *ARRL* also publish a comprehensive handbook on Mobile, consisting largely of a bringing-together of the better articles on the subject that have appeared in *QST* during the last few years. This is a book for the practical man who wants circuits and constructional ideas rather than theory. Its price is 24s. 6d.

New RTTY Handbook: At present the only comprehensive guide to the subject, covering basic principles, receiving and transmitting teleprinter installations, terminal units, and various accessories for amateur T/P working, mainly to improve selectivity and discrimination. Being an American publication, it does not discuss the Creed machines generally available in the U.K., but apart from that is the sort

of book every RTTY operator needs to have by him. It runs to 190 pages, and the price is 32s.

MAPS AND CHARTS

Every amateur operator, SWL or transmitting, who is at all interested in DX working requires a map or chart which pictures the face of the world as seen from the Amateur Radio point of view. We now have a very good selection of these, suitable for wall adornment or desk use.

DX Zone Map: This is the latest issue of our own wall map, which gives a great deal of essential DX information—bearing and distance of all parts of the world relative to the U.K.; the areas of the 40 Zones into which the world is divided for Amateur Radio purposes, with the major prefixes for each listed separately; a time scale in GMT; a latitude/longitude marking close enough for any position to be reasonably accurately plotted; something like 1,000 place names, mainly the unusual ones, and including nearly all those rare islands; and an amendment sheet (free with each Map) to cover the most recent prefix changes. The size is 35 ins. wide by 25 ins. deep, in colour, and linen-backed for wall mounting. The price is only 11s., in a postal tube for safe delivery through the mail.

Amateur Radio Map of the World: On the standard Mercator's projection and thus it does not give beam headings by direct plotting. It provides the following at-a-glance information: Zone areas (1-40); Prefix areas, with each country-prefix marked in; List of prefixes, alphabetically by countries; List of countries alphabetically, with prefixes; Time scale in GMT; and Distance scale, referred to latitude. Well printed in bold colours on good paper, it is 29 ins. deep by 42 ins. wide, and costs 8s. 6d.

Radio Amateur's World Atlas: This is the desk-use version of the *Amateur Radio Map of the World* (which is intended for wall display). It gives exactly the same information as already described for the latter Map, and is 8s. 3d.

World Short Wave Radio Map: A very useful general coverage map, on a Mercator projection, which is of particular interest to the SWL and BC listener, as a large number of the world's S/W broadcast stations are shown in their geographical positions. It does not give any special Amateur Radio information. The price is 8s. 6d., and that includes a handbook which is a listener's guide.

Chart of International Frequency Allocations: An official I.T.U., Geneva, publication it is designed and laid out to show the allotment of frequencies as between all services over the whole range 10 kc to 40,000 mc. A system of colour-coding is used and once this is grasped, there is no difficulty in sorting out say, the marine services from the amateur bands, or the aeronautical allocations from the fixed-station services. This chart requires a wall-space of 51 ins. wide by 34 ins. deep. It is based on the current I.T.U. enactments, and is priced at 8s. 3d.

BOOKS ON SURPLUS

The publications on Surplus Equipment in our List are steady sellers, though they cover only apparatus of American origin. It has never been possible to produce, to sell at a reasonable cover price, a manual on U.K. surplus, even if the essential information about it could be obtained from official sources.

Surplus Conversion Manuals, Vols. I, II and III: These give, between them, conversion and circuit data on a wide variety of U.S. surplus items—such as the BC-221, the SCR-522, most of the BC series of equipments, and some in the ARC range. The most recent of the *Surplus Conversion Manuals*, Vol. III, covers more than 40 pieces of gear from the APN-1 to the SCR-274N. The price of each volume is 24s.

The Surplus Handbook: The latest Editors & Engineers publication, it deals with nearly 50 different items in the category of "Receivers and Transceivers," only, the treatment being the circuit and an illustration of each; *i.e.* no actual modification or conversion details are given. Many of the circuit plans are so large that they are made to fold out, and the book is in an 11-in. by 8½-in. format, so that most of the photo-reproductions are big enough for the name-plates to be read; this is in order to assist in correct identification. The price is 24s.

Surplus Schematics Handbook: Rather more comprehensive than the *Surplus Handbook*, this is a publication by *CQ*, giving the basic information on more than 100 items of American surplus; it may be described as the essential guide where only a circuit is required. Of some 112 pages, it costs 21s. and is very good value.

MISCELLANEOUS TITLES of INTEREST

Electronic Circuits Handbook: An absolutely new one from the *CQ* library, it gives a number of leads and constructional ideas covering a wide range of electronics equipment—indeed, about 150 of them, in the way of accessory items for amateur-band apparatus and the experimenter's work-bench. Many of the suggestions are new, and all are interesting—whether it is a transistorised pre-amplifier using a small speaker as a microphone, or neon tube modulation for the GDO. Well illustrated with circuitry, the book is of 126 pages and the price is 24s.

Understanding Amateur Radio: Another new one, from the ARRL, which can be described as a very useful handbook for the beginner. It covers principles, construction and operation, with clear explanations and the minimum of elaboration. Included is complete how-to-build-it information on receivers, transmitters and aerial systems. Very well illustrated, it goes to more than 300 pages, with an index and, as an American publication of such wide scope, is a very economical buy at 19s. 6d.

Hints and Kinks: As the title implies, the contents of this ARRL manual consist of an enormous number of short-cut ideas and constructional pointers

for the radio amateur's station and work-bench. Mainly brief items, such as circuit tricks, quick modifications or constructional notes, they are sorted under twelve appropriate chapter headings, with anything from four to 14 pages for each. This is Vol. 6 of a book which has been appearing at intervals over the years, is of 125 pages with an index, and is well worth 11s.

The Ham's Interpreter: Essentially a phrase-book for conducting a QSO with a foreign amateur, it tells you how to say things like "*very nice to meet you for the first time*" or "*my rig here is as follows*"—in any one of eight different languages, including Russian and Yugoslav! Correct pronunciation is shown for the alphabet and various phrases in all languages, and it is true to say that by careful study of the *Ham's Interpreter* any British amateur should be able to acquit himself on the air with credit—at least, he will show he is trying to make himself understood in the other man's language. This is a very carefully thought-out book, by fluent linguists who are themselves amateurs, and we have no hesitation in recommending it. The price is only 8s. 6d.

Radio Amateur Operator's Handbook: For quick reference at the operating position for amateurs and SWL's who want a check on such points as call areas or zone boundaries; the time anywhere in the world in relation to GMT; and also information such as prefix allocations, the codes used in Amateur Radio operating, and the times and frequencies of standard calibration transmissions. Now in its 8th edition, it costs but 5s. for its 56 pages.

World Radio & Television Handbook: This has become the standard reference on all to do with broadcasting and television on the long, medium and short waves. It does not touch Amateur Radio at all, but is quite indispensable if the interest is in S/W BC station reception. *World Radio Handbook* gives the fullest possible details about the world's broadcast and TV stations and systems, with comprehensive data such as transmitting schedules (by time and frequency), station addresses, wavelength-frequency allocations from LF to VHF, and such specialised information as the solar activity during the previous year, the number of radio/TV receivers estimated to be in use in each country, and a list of programmes in Esperanto—to mention only a few of the headings. It is used by broadcasting authorities throughout the world, which is a guarantee of its scope and authenticity. The current edition is 22s. 6d.

SCHOOL AT-STATION REGISTER

With the object of catching the interest of his local education committee, G3NPB is anxious to compile a register of all schools and educational institutions at which an amateur station is established under the supervision of a member of staff. He asks for brief details of the gear, the call sign, and activity periods; replies should be addressed to: D. W. Blackford, G3NPB, Corbridge County Secondary School, Corbridge, Northumberland.

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.

G3RVE, L. W. Hibbert (*ex-EL2P/EL1P*), 15 Timberlane, Purbrook, Hants.
G3SDW, K. J. Underwood, 122 Carylon Road, Hayes, Middlesex.
G3SES, P. L. Stevens, 23 Hawthorn Road, Donnington, Wellington, Shropshire.
G3SFK, P. L. Kerry, 44 Valence Wood Road, Dagenham, Essex.
G3SFT, E. J. Bailey, 324 Quinton Road West, Quinton, Birmingham, 32.
G3SFZ, J. Carter, 224 Cavendish Avenue, Ealing, London, W.13.
G3SGB, E. Paddock, High Street, Brant Broughton, Lincs.
G3SGC, G. W. Morris, 66 Barnhill Road, Hayes, Middlesex.
G3SGS, J. H. Clements, 4 Gordon Road, Richmond, Surrey. (*Tel.: Richmond 4193*).
G3SGT, A. P. Teale, 16 Whitestile Road, Brentford, Middlesex.
G3SGU, J. Gordon, 37 Colvin Road, East Ham, London, E.6.
G3SHY, R. Cottrell, 18 Maple Grove, Newark, Notts.
G3SIH, R. F. C. Bennett, Broomhill, Clutton, Bristol, Somerset.
G3SIP, R. A. Merriman, 73 Burnside Grove, Tollerton, Notts.
G3SIU, P. Hearson, 70 Malvern Drive, Seven Kings, Ilford, Essex.
G3SIY, G. R. Steele, 30 Saughall Hey, Great Saughall, Chester.
G3SID, G. Drake, 19 Osborne Street, Moldgreen, Huddersfield, Yorkshire.
G3SJE, J. W. Bluff, 52 Winchester Road, Kenton, Harrow, Middlesex.
G3SJG, C. V. F. Reeve, 10 Rock Place, Bonegate, Brighouse, Yorkshire.
G3SJJ, J. C. Burbanks, 28 Leacroft Road, Bobbers Mill, Nottingham.
G3SJK, S. M. Cherry, 8 Attlee Road, Hayes, Middlesex.

GM3SJU, H. Galt, 39 Fettercairn Avenue, Glasgow, W.5.
G3SJX, P. J. Hart, 42 Gravel Hill, Addington, Croydon, Surrey.
G3SJJ, M. Lawrenson, 50 The Ridgeway, Cleadon Park, South Shields, Co. Durham. (*Tel.: South Shields 3522*).
G3SKE, W. J. Pope, 23 Herbert Road, Rainham, Gillingham, Kent.
GI3SKH, C. C. Black, 1 Ormiston Park, Belfast, 4.
G3SKI, R. A. Bravery (*ex-DL2FH*), 7 Cope Hill, Withdean, Brighton, 5, Sussex. (*Tel.: Brighton 506418*).
G3SKU, D. W. Lakin, 89 Sandford Road, Moseley, Birmingham, 13.
G3SKW, D. J. Morgan, 1 Croft View, Crawcrook, Ryton, Co. Durham.
G3SLF, R. C. D. Cummings, 14 Burgh Street, Angel, London, N.1.
G3SLK, R. Pickering, 69 School Hill, Chapel End, Nuneaton, Warks.
G3SLP, L. Peace, 6 Briar Close, South Green, Billericay, Essex.
GM3SLW, A. Auld, Hillview, Bridge Street, Halkirk, Caithness.
G3SMA, D. B. Strong, 4 Grange Road, Cuddington, Northwich, Cheshire.
G3SMB, W. Reilly, 242 Skipton Road, Keighley, Yorkshire. (*Tel.: Keighley 5480*).
G3SMC, Mrs. Marguerite A. Cox, 44 Bowerdean Street, London, S.W.6.
G3SMD, R. L. Turner, 15 Dagger Lane, West Bromwich, Staffs.
G3SMD/A, R. L. Turner, c/o Students' Union, University of Keele, Keele, Staffs.
G3SMF, I. B. Hamill, 167 Sandringham Road, Barking, Essex.
G3SMN, R. Forster, 28 Springbridge Road, Manchester, 16. (*Tel.: MOS 3278*).

G3SMV, J. E. Smith, 18 Hounslow Road, Mackworth, Derby.
G3SNB, K. Bower, 81 Wilthorpe Road, Barnsley, Yorkshire. (*Tel.: Barnsley 5372*).

CHANGE OF ADDRESS

G2BTY, L. J. T. Lewis, West Winds, Arbor Lane, Winnersh, Berks.
G2BWN, J. F. H. Weller, 2 Birch Green, Freshfield, Formby, Lincs. (*Tel.: Formby 4925*).
G2CKU, J. W. Cookson, 103 Acre Lane, Bromborough, Wirral, Cheshire. (*Tel.: Bromborough 2206*).
GM3FAO, A. F. Davidson, Monymusk, Doonholm Road, Alloway, Ayr.
G3GWI, N. Spivey, 40 Barnsley Road, Ackworth, Pontefract, Yorkshire.
G3HYR, B. V. Lockey, 67 Boulton Lane, Alvaston, Derby.
G3JUT, T. Jones, 28 Miltons Way, Wootton Bassett, Wilts.
G3KAW, J. W. Maddison, Y.M.C.A., 2 Leyburne Road, Dover, Kent. (*Tel.: Dover 138*).
G3LNM, R. Scrivens, Maygreg, Nordland Road, Canvey Island, Essex.
GM3NUU, J. S. Reid, 8 Westerton Road, Cults, Aberdeen. (*Tel.: Aberdeen 47208*).
G3OSJ, L. H. Parsons, 93 Roman Way, Glastonbury, Somerset.
G3OWA, P. J. Wooden, 117 Tollers Lane, Old Coulsdon, Surrey.
GM3POK, E. J. Kelly, 41 Tylers Acre Gardens, Edinburgh, 12.
G3PYY, S. A. Denner, 68 Hawton Road, Newark, Notts. (*Tel.: Newark 3757*).
G3RNM, F. W. Pallant, Wheatleys, Martins End Lane, Great Missenden, Bucks. (*Tel.: Great Missenden 2642*).

THE MONTH WITH THE CLUBS

By "Club Secretary"

(Deadline for December Issue: November 15)

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

EVERY month a considerable number of Club publications pass through your Club Secretary's hands; in fact, much of the news for this feature is extracted from them, and in some cases "extracted" (almost in the dental sense) is the right word.

They come in all shapes and sizes, and no two are similar in layout. Some, very wisely, display the forthcoming programme of events prominently on an early page (although, too often, the list stops short at a date falling before our publication day). Others contain numerous paragraphs of general interest which we are pleased to write into these notes in condensed form—but no clue whatever as to future meetings.

Some are duplicated professionally and fitted into printed covers; and some are a couple of foolscap sheets, neatly typed and duplicated, containing all the important information and bearing all the signs of trouble taken in presentation. But there are always quite a few to which the only adjective we can apply is "scruffy." Sloppy typing added to rough duplicating, with a tremendous number of literal mistakes, bad spelling, corrections that are hard to decipher, and so on. It occurs to us forcibly that they must have a poor effect on club members.

A well-produced News Sheet or other type of local publication *must* be a morale-builder within the club; some of the "scruffies" to which we refer must surely be quite the reverse.

Scribes, please note! Even if you are hard pressed for time; even if you do the thing voluntarily and have to give up other activities in order to do so—please do remember that two pages, well turned out, are so much better than six or eight pages of messy stuff which everyone finds difficult to read.

If the producers of some of the bad ones could only see some of the good ones, they would surely try to improve! And a final note: It isn't necessarily the biggest clubs that produce the best publications . . . quite the reverse, in some cases.

ACTIVITY REPORTS

Spenn Valley (who publish a printed syllabus covering their meetings right up to the AGM next June) frequently go off the beaten track for their lectures and visits. On November 14 they are due at the electronically controlled Marshalling Yard of British Railways at York; on the 28th G2HHV will be talking on Office Electronics. The Hq. is at Heckmondwike Grammar School and the fortnightly

meetings are at 7.15 p.m.

Halifax will meet at the Beehive and Crosskeys Inn on November 12, and the evening will open informally at 7 p.m., with R.A.E. tuition and "problem corner" at 7.30, and a talk by G3NIZ on QSL'ing at 8 p.m. **Hastings** hold their AGM on November 5, 7.30 p.m., at 33 Cambridge Road. **Torbay**, at their November meeting (but no date given) will hear G3NBR on Loudspeakers—Then and Now.

Melton Mowbray will be visiting the shack of their secretary, G3FDF, on November 21; on December 19 there will be a talk on Transducer Control by Transistors, by G4MK.

Clifton will be visiting **Crystal Palace** on November 16 for a demonstration of Hi-Fi equipment. This joint meeting has now become an annual event. On the 22nd, G3OGE will be conducting a Quiz, and the Annual Constructional Contest will take place on December 13.

Enfield (*Lea Valley Reflector*, September) recently heard a lecture on The History of Cathode Ray Tubes, by Mr. Eastwood of Thorn AEI. **Cheltenham** held their AGM in September, electing G3HCV chairman and G3MOE secretary; they also have a "station officer," G3LDA, who looks after G5BK, the club outfit; a contest organiser, G3CGD; a junior section organiser, J. Whitehouse (aged 14); and an Activities Committee.

Mansfield operated a station on Top Band and Eighty, with the call GB3MRS, from the local Hobbies Exhibition at the beginning of October; over 100 contacts were made, despite electrical interference from neighbouring exhibits. **Stourbridge** recently heard G2JZ describe and demonstrate his Drake 2B receiver. The attraction on November 5 will be a Brains Trust—7.45 p.m. at headquarters.

Lincoln report that their Mobile Rally was a great success and blessed by wonderful weather. The

THE EIGHTEENTH "MCC"

Takes place November 16/17. Rules in full, with map and Club identification letters, pp.442-443 October. Supplementary Club list p.509 this issue. A large entry is assured and it will be essential to get logs in on or before Friday, 29 November. Late entries cannot be evaluated—post by Wednesday 27th at latest.

increased popularity of two metres for mobile work was noted; G3JEQ won the prize for the best mobile installation; highly commended were G5CP, G3DSA and G3HLG.

Derby are holding a Surplus Sale on November 6; and on the 13th they have a Social Evening and Supper; the 20th is an Open Evening and Juniors' Night; and on the 27th A. Hitchcock will demonstrate "Finishing Touches to Amateur Equipment."

Coventry (CQ CARS) ask us to note that future meetings will be held at Westfield House, Radford Road, Coventry. On December 2 they will hold an exhibition of members' home-built gear, and award the CARS Construction Trophy. **Cray Valley (Newsletter, October)** recently held a well-attended lecture on VHF Techniques, by G3FZL; they also visited the Orpington telephone exchange.

Dorking participated in the Model Railways and Engineering Exhibition at Dorking Halls in October. They had a 36-foot display, with G3CZU "batting nobly against the QRM." Informal meetings, at the Wheatsheaf, Dorking, are booked for November 12 and December 10, and on November 26 there will be a Film Show (and Ladies' Night) at the Star and Garter.

Barnet held their AGM and elected G3GMY chairman/secretary, G3SHS treasurer and G3MWG publicity member. Full details of the club's lecture programme for the next 12 months may be obtained from the secretary. Their sixth Christmas Party will be held on December 7 (7.30-11.30 p.m.) at Oakmere House, High Street, Potters Bar.

Wolverhampton, whose October Newsletter displays their full programme up to the end of November, meet for a demonstration of the Drake 2B, by G2JZ, on November 4; on the 18th there will be a talk and demonstration by G3NOW; and Slow Morse practice, at the Hq., is laid on for November 11 and 25.

Burslem meet at the Town Hall on the third Wednesday of each month, 7.30 p.m. Some interesting lectures and film shows have been arranged, and prospective members are asked to contact the secretary.

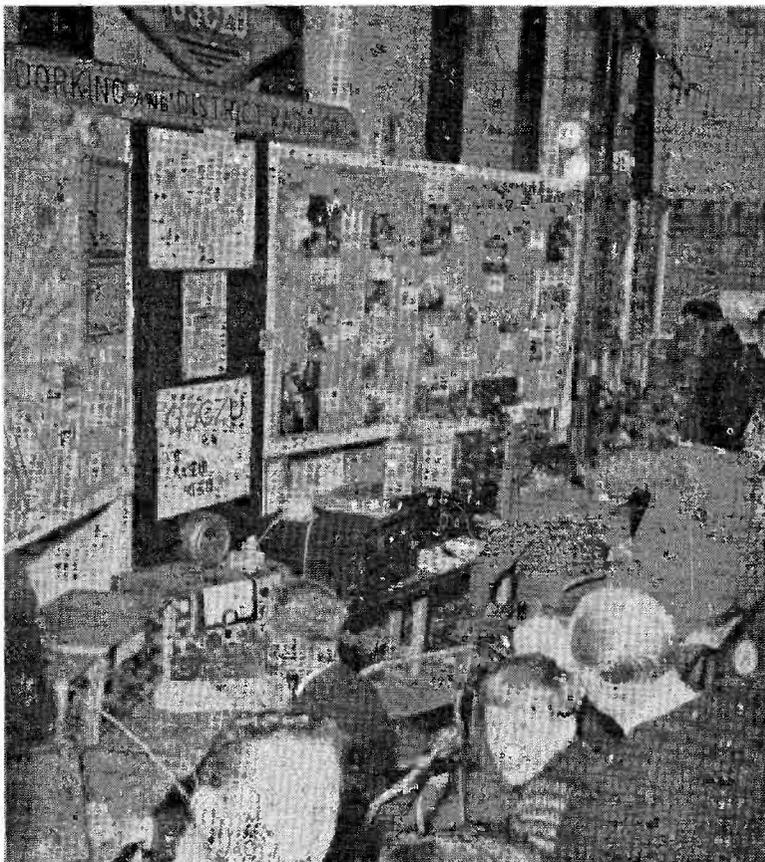
Lothians (Lothians Radio Amateur, September) recently heard a talk by GM3SBC on Transistors in Receivers and Transmitters. Attendances are improving, especially among the under-20's, thanks to the formation of Radio Clubs in three of

Edinburgh's biggest schools. On November 14 GM3PQU will talk about "Monkey Glands for the HRO"; the 28th will be a Visitors' Night.

Isle of Wight report a successful field day at East Cowes on September 29, and announce the dates of their next meetings as November 8 and 22—both at 7.30 p.m. in Unity Hall, Wootton, near Ryde.

Acton, Brentford and Chiswick will hold another Mixed Film Show at their meeting on November 12 at the AEU Club, 66 High Road, Chiswick, at 7.30 p.m. **Peterborough** ran an exhibition station in the Town Hall during the last week of September, and then opened their winter session on October 4 with a talk by G3BK on the KW-77 receiver. Next meeting is the AGM on November 1, and there will be a lecture on TV1 on December 6.

Cornish recently heard the first of a series of talks on SSB, by G3OCB, and other lectures are scheduled for their forthcoming meetings—on the first Thursday each month at the S.W.E.B. Recreation Hall, Pool, Camborne, 7.30 p.m. [over



The very fine stand put on by the Dorking & District Radio Society, G3CZU, for a local exhibition early in October. Running a K.W. "Viceroy" on 20m. Sideband and G3HZJ/A on Top Band, many contacts were made in about 20 countries, and there was enormous public interest in the display, with crowds three and four deep round the stand. The Society's static exhibit included some interesting vintage apparatus and a variety of home-built amateur equipment.

A.E.R.E. (Harwell) meet at 7.30 p.m. on the third Tuesday of the month, in the Social Club at A.E.R.E. They have very strong VHF interests, as mentioned in "VHF Bands." Prospective members are most welcome, and need not be connected in any way with A.E.R.E.

Reigate (Feedback, September) have put back their November meeting until the 23rd, to avoid clashing with MCC. Miss Nell Corry, G2YL, will be giving an illustrated travel talk on her recent African tour. Members of local clubs are invited—The Tower, High Street, Redhill, 7.30 p.m.

Northern Heights seem to be on the upgrade, with larger attendances and many new licences among the membership. On November 6 there will be a talk by a member of the Halifax Fire Brigade, and on the 20th a lecture at the Yorks. Electricity Board showrooms. December 4 is booked for G3IBN on Antenna Problems and December 11 for the Annual Dinner.

Grafton, at their AGM, heard of another very successful year. Their former secretary, G2CJN (who has served Grafton so well for many years), now becomes chairman—see panel for new secretary's address. On November 15 G2FUX will be giving his "Visit to America" talk, and the 29th will be the "SWL Corner" meeting. Their Christmas Party

is booked for December 7 at the Bedford Corner Hotel, London, W.C.1—tickets at 12s. 6d. (or 22s. 6d. double) obtainable from the secretary.

The **East Worcestershire** Group is now well established, and meetings are held on the second Thursday of the month at the Old People's Centre, Redditch. There has been a change of secretary—see panel.

Thames Valley, who meet on the first Wednesday at the Carnarvon Castle Hotel, Hampton Court, have a Constructional Contest on November 6, a lecture on Nuclear Power on December 4, and their 30th Annual Dinner (same QTH) on November 9. A "very special programme" has been arranged for the latter.

North Kent (Newsletter No. 72) report some interesting meetings, an exhibition, a wedding, a theatre outing and, most regrettably, a Silent Key (G3RPF). November 14 is booked for a Quiz, but nothing definite has been arranged for the 28th. Congregational Church Hall, Clock Tower, Bexleyheath, 8 p.m.

Blackpool and Fylde meet on November 4 for Part II of G8GG's talk and demonstration of his receiver; the 11th is an Open Night and the 18th a Tape Lecture with slides. On November 25 G6DN will discuss his transistorised converter for mobile

Names and Addresses of Club Secretaries reporting in this issue :

ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, W.3.
 A.E.R.E. (HARWELL): C. Sharpe, G2HIF, Building 347 B, AERE, Harwell, Didcot, Berks.
 BARNET: F. Green, G3GMY, 48 Borough Way, Potters Bar.
 BELFAST (City of): D. J. Kyle, 33 Hillside Crescent, Belfast, 9.
 BLACKPOOL & FYLDE: J. Boulter, G3OCK, 175 West Drive, Cleveleys, Blackpool.
 BRISTOL: E. J. Davis, 72 North View, Westbury Park, Bristol 6.
 BURSLEM: W. Luscott, 36 Rothsay Avenue, Sneyd Green, Hanley, Stoke-on-Trent.
 CHELTENHAM: J. H. Moxey, G3MOE, 11 Westbury Road, Leckhampton, Cheltenham.
 CIVIL SERVICE: G. Lloyd-Dalton, 2 Honister Heights, Purley, Surrey.
 CLIFTON: J. Rose, G3OGE, 63 Broomfield Road, Beckenham, Kent.
 CORNISH: W. J. Gilbert, 7 Poltair Road, Penryn.
 COVENTRY: A. J. Wilkes, G3PQQ, 141 Overslade Crescent, Coventry.
 CRAWLEY: R. G. B. Vaughan, G3FRV, 9 Hawkins Road, Tilgate, Crawley.
 CRAY VALLEY: S. W. Coursey, G3JJC, 49 Dulverton Road, London, S.E.9.
 DERBY: F. C. Ward, G2CVV, 5 Uplands Avenue, Littleover, Derby.
 DORKING: J. Greenwell, G3AEZ, Eastfield, Henfold Hill, Beate Green, Dorking.
 EAST KENT: D. Williams, G3MDO, Seletar, New House Lane, Canterbury.
 EAST WORCESTERSHIRE: M. J. Nicholas, 12 Crabtree Close, Lodge Park Estate, Redditch.
 EDGWARE: D. L. Lisney, G3MNO, 17 Pickett Croft, Stanmore, Middx.
 ENFIELD: R. Langston, 54 Poynter Road, Bush Hill Park, Enfield.
 GRAFTON: A. E. Bristolow, 37 Tyndale Mansions, Upper Street, London, N.1.
 HALIFAX: J. Ingham, G3RMO, Lambert House, Greetland, Halifax.
 HASTINGS: W. E. Thompson, G3MQT, 8 Coventry Road, St. Leonards-on-Sea.
 I.H.H.C.: J. Coote, 56 Dinsdale Avenue, Kings Estate, Wallsend, Northumberland.
 ISLE OF WIGHT: Capt. E. C. Dolling, Sweet Briars, New Road, Wootton, I.O.W.
 LINCOLN: Mrs. F. E. Woolley, G3LWY, 10 Sturton Road, Saxilby, Lincoln.

LOTHIANS: L. R. Richardson, GM3AKM, 64 Easter Drylaw Place, Edinburgh 4.
 MANSFIELD: F. N. F. Bewley, G8HX, 116 Westfield Lane, Mansfield.
 MEDWAY: P. J. Pickering, G3ORP, 101 Chatham Road, Maidstone.
 MELTON MOWBRAY: D. W. Lilley, G3DFD, 23 Melton Road, Asfordby Hill, Melton Mowbray.
 M.R.C.C.: J. Lockyer, G3OVA, 23 Beechwood Road, Birmingham 14.
 MITCHAM: A. Thurley, 50 Bruce Road, Mitcham.
 NORTHERN HEIGHTS: A. Robinson, G3MDW, Candy Cabin, Ogden, Halifax.
 NORTH KENT: B. J. Reynolds, G3ONR, 49 Station Road, Crayford.
 PETERBOROUGH: D. Byrne, G3KPO, Jersey House, Eye, Peterborough.
 RAF A.R.S.: RAF Locking, Weston-super-Mare, Somerset.
 R.A.I.B.C.: Mrs. F. E. Woolley, G3LWT, 10 Sturton Road, Saxilby, Lincoln.
 REIGATE: F. D. Thom, G3NKT, 12 Willow Road, Redhill.
 SALOP: K. Jones, G3RRN, Greystones, Shrewsbury Road, Church Stretton.
 SCOTLAND: A. Barnes, GM3LTB, 7 South Park Terrace, Glasgow.
 SOUTH HANTS: P. A. L. Shoosmith, G3MDH, 7 Fairfield Close, Hythe, Southampton.
 SOUTH MANCHESTER: M. Barnsley, G3HZM, 11 Cemetery Road, Denton, Manchester.
 SPEN VALLEY: L. A. Metcalfe, la Moorlands Road, Birkenshaw.
 STOURBRIDGE: R. A. G. Macintosh, 50 Field Lane, Oldswinford, Stourbridge.
 SURREY: S. A. Morley, G3FWR, 22 Old Farleigh Road, Selsdon, South Croydon.
 THAMES VALLEY: K. A. H. Rogers, G3AIU, 21 Links Road, Epsom.
 TORBAY: Mrs. G. Western, G3NQD, 118 Salisbury Avenue, Barton, Torquay.
 W.A.M.R.A.C.: Rev. A. Shepherd, G3NGF, 121 Main Street, Asfordby, Melton Mowbray.
 WESSEX: G. J. Fowle, 138 Surrey Road, Branksome, Poole.
 WIRRAL: A. Seed, G3FOO, 31 Withert Avenue, Bebington, Wirral.
 WOLVERHAMPTON: J. Rickwood, 738 Stafford Road, Fordhouses, Wolverhampton.
 WORCESTER: T. W. Byrne, Y.M.C.A., Henwick Road, Worcester.

operation.

Edgware will be hearing G2BVN's talk on SSB on November 11; on the 25th they hold their Home Constructors' Contest and a Radio Photograph Competition—John Keble Hall, Church Close, Deans Lane, Edgware.

Wessex will visit Bournemouth Police Headquarters and Radio Cars (Madeira Road) at 7 p.m. on November 14; on the 25th there is a get-together and a Morse class at the president's home (47 New Road, Northbourne).

Medway are now installed at the Brasenose Club, Nelson Road, Gillingham, where they are able to erect outdoor aerials, and hope shortly to get G2FJA on the air with a K.W. Vanguard and an HRO. They have a Junk Sale on November 4 (plus CW proficiency tests conducted by G3ORH) and a tape lecture on the 18th.

Civil Service, who meet at 6 p.m. in the Science Museum (starting with tea) have a lecture by G3AAE on Short Wave Listening on November 4. On the 18th there is an informal meeting, with W1HDQ's recorded lecture on VHF Propagation.

The **Salop Amateur Radio Society** held their inaugural meeting and will now gather on the second Thursday at the Tennis Club, Harlescott Crescent, Shrewsbury (with informal meetings a fortnight later). October 10 was the occasion of a general get-together, and the next formal meeting will be on November 14 with a "Bring-and-Buy Sale." A club station will, it is hoped, be on the air before long.

Mitcham, whose continued existence is in some doubt, send a brief report. We hope their future has been satisfactorily settled by the time this note is published.

Radio Club of Scotland ('GM' Magazine, September) do not mention any future meetings, but we gather that the Glasgow Branch get together every Friday evening at Partick Burgh Hall. The Glasgow Top Band net operates on Sundays, 10.30 a.m. on 1850 kc, and a Four-metre Net is now laid on, also on Sundays—time given as 11.30 BST.

Wirral (Newsletter, Vol. 16, No. 8) held their AGM on October 2 and a normal meeting on the 16th. November 9 is the date of the Annual Dinner. Ordinary meetings are on November 6 (SSB, by G8BM) and on the 20th (Electronics in Industry, by G3FOO).

Surrey (SRCC Monthly News, October) are booked for a talk on Colour TV (GEC Research Centre) on November 12. For the December meeting they are trying out the idea of a series of ten-minute talks on "Hints and Kinks," and on December 14 the Annual Dinner will be held at the Selsdon Park Hotel. Attendances are improving, and the Junk Sales are found to be especially popular.

East Kent meet every Tuesday, 7.30 p.m., at the Canterbury Technical College. On November 12, G3KFW will describe an Aerial Mast, and on the 26th there will be an invitation lecture.

Crawley are running Slow Morse classes, arranged to dovetail with the R.A.E. course organised by

"MCC"—ADDITIONAL CLUB IDENTIFICATION LETTER-GROUPS

Identification letter-groups for more than 100 Clubs were given on p. 443 of the October issue. The following additional groups have since been issued:

Buchan	BC	Reading	RD
City of Belfast	CB	Rhondda Valley	RH
Chorley and Leyland	CY	Royal Naval R.S.	RN
Cotswold R.C.C.	CW	R.A.F. Sealand	RZ
Keele Univ.	UK	Sole Bay, Suffolk	SK
Leeswood, Mold	LY	Stroud	SG
Lymington	LM	Vickers, Hurn	VS
Newcastle University	NU	Wimbledon	WS
Midland A.R.S.	MS	Worcester	WT
Reigate "A"	RA	42nd Sig. Regt.,	
Reigate "B"	RB	Liverpool	LP
Reigate "C"	RC		

Note: From the October list, Durham University DU and Reigate RG should be *deleted*. Reigate are entering three separate stations, as above. Though further identification groups will be issued as requests may be received, they cannot now be published.

G3PHG. Other members are concerned with building the station to be used from the Exhibition. Next regular meeting is on November 27, when G3IIR will give a lecture/demonstration on RTTY.

South Manchester (Friday nights, 8 p.m. in the Rackhouse Community Association, Daine Avenue, Northenden) will have a talk on Lasers on November 8; the 15th is the day of their Hot-Pot Supper at The Swan with Two Necks, Withy Grove; and the 29th is another meeting at which the subject is Basic Valve Circuits, with tape and slides. Alternate Friday evenings are devoted to operating G3FVA and building a Heathkit Oscilloscope.

South Hants (QUA, October) describe recent activities rather than future meetings. However, we gather that the Wessex Group as well as the Southampton Area Group are very active.

Midland Radio Contest Club ran an exhibition station at the Barbecue and Fête organised by the Birmingham Association of Youth Clubs. They went to the trouble of sending up a balloon aerial for possible Top Band DX, but it was "shot down by a party of teenage louts equipped with air rifles." They held their AGM in October and re-elected the principal officers. Next meeting is on November 4, at which preparations will be made for the Firework Display they are organising for the following day (at Windmill House, 6.30 p.m.).

Worcester, who have just started producing a Newsletter, send the October issue, from which we gather that the AGM is on November 9 (8 p.m.). About ten members are attending the R.A.E. class, under G3NUE, on Tuesdays at 7.30 p.m.

City of Belfast recently held their AGM, elected new officers (*see* panel for secretary) and are in full swing again. They have the unrestricted use of two rooms for six nights a week, free of rent, lighting and heating charges . . . now they are all out to make it an efficient and enthusiastic club which will take advantage of this amenity. They publish a

bi-monthly Newsletter called *G16YM*—and promise they *will* be in MCC this year.

THE NON-MEETING CLUBS

The **RAIBC**, whose monthly publication, "*Radial*," is one of the very best of its type, continues its excellent work of keeping members in touch with each other's fortunes by means of snippets of personal news. *SWL*'s naturally figure prominently in its ranks, but there are many sightless or disabled amateurs to whom the club means a lot.

RAFARS publishes a regular Newsletter which gives details of Postings In and Out, New Members, Changes of Address and so on. We also learn from

No. 10 that Station *CO*'s can now authorise amateur installations, formerly subject to Air Ministry authority.

WAMRAC has a worldwide membership and uses a monthly Circular Letter to keep them in touch with each other. In the UK they run a net (3600 kc or thereabouts, Tuesdays at 1800, Saturdays at 0800 and Sundays at 1300). They are holding a get-together at the Exhibition—Saturday, November 2, 2.15-3.15 p.m. in the meeting room.

IHC now claims members in 54 countries, and their quarterly Newsletter (October issue) includes an article on touring in Uruguay, by *CX3BH*, also suggestions to intending visitors to Germany.

MOBILE IN BELGIUM

BRUSSELS RED CROSS

CENTENARY RALLY—

22 SEPTEMBER 1963

SYLVIA MARGOLIS (xyl/G3NMR)

THE very close link that exists between the Red Cross and Amateur Radio in Belgium was vividly demonstrated at the ambitious Mobile Rally which took place on Sunday, September 22, in Brussels, to celebrate the Centenary of the founding of the Red Cross Movement in 1863.

In Belgium the Red Cross run the ambulance services and work continuously and realistically with amateurs. Mobile amateur radio units are posted at accident black-spots and work back to Red Cross Hq. for help when there is an incident. That Red Cross takes Amateur Radio seriously is proved by the palatial Club Station, *ON4UB*, of U.B.A., the Belgian Amateur Radio organization, which is actually situated in the heart of the elegant Red Cross Headquarters in Brussels.

This U.B.A. is a most dynamic and far-seeing body. Although it has less than a thousand members, it liaises, with most gratifying results, with the Belgian Post Office authorities. One result is that the Belgians were the first to introduce temporary mobile licences for visiting foreign amateurs, as a trial for the Verviers Rally last April. This scheme has since been put on a long-term basis and foreign amateurs in Belgium can now obtain on *ON* licence at any time, with only a fortnight's notice required.

Serious Competition !

The Red Cross Centenary Rally was opened by the Director-General of Belgian Red Cross. Final instructions were given over the PA by *ON4VY*, Rene Vanmuysen, President of U.B.A., and they were off! The Rally was on lines utterly different from British events. Here was no picnic meeting at a

beauty spot, with wives and families and dogs and mothers-in-law and a host of elaborate non-radio entertainments. A European mobile rally is just that—*mobile*. A most strenuous and carefully (maybe cunningly) devised series of tests was evolved for the 39 participants, Belgian, Dutch, French, German and British. Everything was timed with military precision and hours of exacting planning and paperwork must have preceded the actual day.

The contestants faced the ordeal with a determined, single-minded, no-holds-barred, out-to-win ferocity, so very different from the casual holiday atmosphere which prevails at British events. It is therefore with a certain ruefulness that we have to report that the two British entries, *G3BID* and *G3NMR*, with *G3KVF*, came *bottom* of the scoring, although they were only there for the fun—or so they say!

Entries could be made on 2 metres or 80 metres. No Sideband was permissible, which was probably because *SSB* operation has only recently been regularised in Belgium, although a vast amount of interest is now being shown in the technique. It is only recently, too, that mobile operation has been generally permitted in Belgium—and there is no Top Band.

The Rally involved a 75 kilometre drive, with instructions to make mobile *QSO*'s at specific times and to carry out slightly screwball directions, like climbing the 226 steps to the top of the Waterloo Battle Memorial, reading invisible ink commands and collecting as many beer-mats as possible! Four hours were allowed, but only two participants were disqualified for not reporting at the final checkpoint on time.

Party Finale

About 150 people gathered in the evening at Red Cross Hq. for a Reception. The first prize, a fine vase in Daum glass, presented by H.R.H. Prince Albert, President of Belgian Red Cross, was won by a Belgian amateur; second prize went to *DL1KN*; this was a noteworthy achievement on his part, considering that foreigners and strangers to Brussels had to work under an inevitable handicap. Then an excellent supper was served, all provided by Belgian Red Cross. Altogether, a most enjoyable event.

PETER SEYMOUR

COMMUNICATION EQUIPMENT SPECIALISTS

	£	s.	d.
EDDYSTONE S640. 1.8-30 Mc/s. with "S" meter and speaker ... (P/P £1)	25	0	0
EDDYSTONE 960. All transistor "S" meter, xtal filter, etc., as new ...	95	0	0
EDDYSTONE 358X with all coils, 40 Kc.-30 Mc/s., less power unit ... (P/P £1)	12	10	0
HALLICRAFTERS S120. 540 Kc.-30 Mc/s. (P/P 10/-)	12	10	0
NATIONAL H.R.O. less coils and power unit, model 5T	13	10	0
NATIONAL H.R.O. less coils and power unit, model MX	12	10	0
NATIONAL H.R.O. 60T with 4 coils ...	100	0	0
BC1033 BEACON RECEIVERS with three valves and sensitive relay ... (P/P 2/6)	10		
COMMAND RECEIVERS. 6-9.1 Mc/s. As new ...	3	0	0
COMMAND RECEIVERS. BC453 "Q" fiver ...	5	0	0
R107. 1.2-18.5 Mc/s. built-in speaker and power unit for 240 AC ...	12	10	0
MARCONI CR300. 15 Kc.-25 Mc/s., less power unit ...	15	0	0
MARCONI CR100. 60 Kc.-30 Mc/s. 200-240 AC input (P/P £1)	13	10	0
EDDYSTONE 770/R. 150-500 Mc/s. AM/FM ...	175	0	0
R.C.A. AR88F. 540 Kc.-32 Mc/s. As "D" but with IF gain ... (P/P £1)	45	0	0

	£	s.	d.
American HEATHKIT SENECA VHF TX VFO/XTAL. 150w. on six (would move to 70 megs.) and 100w. on two. AM/CW. with auto transformer ...	85	0	0
JOHNSON VIKING VALIANT TX. 160-10 Mtrs. 275w. CW - 200w. AM, PA switchable to linear operation ...	110	0	0
COLLINS R278B/GR. 220-400 Mc/s. 1799 channels synthesized xtal control, 100 Kc. spacing, 110-240 AC input, auto tuning, etc. ... P.O.A.			
COLLINS 51J-3. 30, 1 Mc. bands .5-30.5 Mc/s. Tunable IF. Dial accuracy better than 200 Cps. on all bands ...	235	0	0
EDDYSTONE 840A. 480 Kc.-30 Mc/s. Silver hammer finish. Built-in speaker. 110-240 AC/DC. As brand new ...	35	0	0
MARCONI NOISE GENERATOR. 240 AC input ...	7	10	0
AMERICAN 6146. New boxed ... (P/P 1/6)	1	10	0
GET 114 TRANSISTORS NEW, 3/6; OC71, new, 3/6 Ring Modulator diodes matched packs of 4, ... pack	5		
COMPUTER PANELS. New, with 8 OC76 transistors, diodes, capacitors, etc. ...	1	0	0
AVOTFM SIGNAL GENERATOR. 450 Kc.-220 Mc/s. AM/FM. As new ...	40	0	0
PANDA "CUB" 1.8-30 Mc/s. amateur bands, 10-25w. A3 10-45w. A1 ...	35	0	0
BEAM INDICATOR SELSYNS ... (P/P 2/6) pair	15	0	

IF YOU HAVE ANY MODERN UNMODIFIED EQUIPMENT TO SELL WRITE IN FOR QUOTATION. ALL TYPES URGENTLY REQUIRED

HIRE PURCHASE TERMS AVAILABLE ON EQUIPMENT OVER £35.

WORLD WIDE EXPORTERS

410 BEVERLEY ROAD - HULL - YORKSHIRE

Tel.: HULL 41938 (41166 after 7 p.m.)

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

CRAFTSMAN REQUIRED for installation and maintenance work on the Board's communication system. Experience of VHF and UHF transmitters and receivers essential. Knowledge of telephone systems an advantage. Present rate of pay 5s. 11½d. per hour plus 4s. 6d. per week productivity bonus. N.J.I.C. conditions including 42-hour 5-day week. Holiday and Sick Pay Schemes. Optional Superannuation Scheme.—Apply, by letter, within 10 days, to Mr. W. Winwood, Area Manager, Midlands Electricity Board, Spring Gardens, Ditherington, Shrewsbury.

SALES PROMOTION ENGINEER with initiative and technical background. First-rate man required.—Write in complete confidence, giving personal details, experience, present salary, etc., to: The Managing Director, K.W. Electronics Ltd., Vanguard Works, Dartford, Kent.

TRADE

BRAND NEW Hallicrafters equipment for sale: SX-101, £140. SX-101A, £140. HT-37, £140. SX-111, £100. SX-100, £110.—Burns, Mews Lane, Kirkcudbright.

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

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

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

WEBB'S LOG BOOK for recording signals heard and worked; 112 pages 9¼ in. x 8 in. approved format, semi-stiff covers. Excellent value; 6s. 0d. post free, or callers, 5s. 4d.—Webb's Radio, 14 Soho Street, London, W.1.

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

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

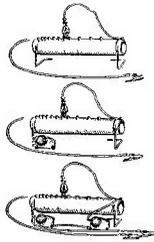
FOR SALE: SSB Enthusiasts. What an opportunity! Limited quantity of variable vacuum capacitors at knock-down price. Maximum peak volts 10 kV, R.M.S. current 42 amp. Capacitance range 30-200 µF. £10 each. Cash with order.—Pye Process Heating, 28 James Street, Cambridge.

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

Goy Match

COMPACT HIGH EFFICIENCY TUNERS
— FOR ALL RX'S AND TX'S!

A range of special units will "match anything to anything!" Peak up your R.F. performance to many 'S' points



*Type 1. General purpose tuner for receiving and transmitting
+ 1/6 P/P. **10/-**

*Type 2. Medium wave tuner for receiving, also peaks up over H.F. range. + 2/- P/P. **45/-**

Type 3. H.F. band tuner for receiving — a MUST for the serious short wave operator, covers 1.4 to 30 mc/s. + 1/6 P/P. **39/6**

*Type 4. As type 1 but with built-in series var. capacitor, for receiving. + 1/6 P/P. **15/-**

Type 5. As type 1 but with built-in series var. capacitor for transmitting. + 2/- P/P. **20/-**

*These Units are illustrated

Only the **PRICE**
is low!

**SEND FOR
FULL DETAILS**

Use the RF40 Field Indicator/phone monitor, 69/6, post free.

**PARTRIDGE
ELECTRONICS
LTD.**

**7, Sowell Street,
Broadstairs, Kent
Thanet G2535**

SMALL ADVERTISEMENTS, TRADE—continued

BC-312 Receivers, good condition, unmodified.—Gilfillan, 98 Dominion Road, Worthing. (Tel.: 8719.)

EQUIPMENT constructed, modified, serviced. SWL Service. Enquiries welcomed, s.a.e. to—G2VV, 53 Thames Street, Sunbury-on-Thames, Middlesex.

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

CR-100, perfect working order, £12.—M. E. Packer, 63 Sycamore Road, Northway, Ashchurch, Tewkesbury, Glos.

HEATHKIT OIZU 5 in. oscilloscope, brand new and unused since manufacture, not now required, absolutely mint condition, fine specification, handbook; list price unbuild £38 10s.; sell for £28; save over £10!—Box No. 2891, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: R.1155B, excellent condition, 6V6 output stage, S-meter, 160m. coverage, £10.—R. Perrin, 30 Franchise Street, Kidderminster, Worcs.

A R88, 540 kc to 32 mc, for sale, £32 o.n.o.? Come and see it working; prefer buyer in London area.—Jenkins, Bakers Mead, Ware, Herts. (Tel: Ware 2520.)

CR-100/8, in good condition, in exchange for 5-unit teleprinter (page type), must print well, and be complete.—Wm. Middlemos, 68 Albert Avenue, Glasgow, S.1.

FOR SALE: RTTY Converter ZA-39384, with matching power unit ZA-39385; both units in mint condition, £40 o.n.o.?—Box No. 2892, Short Wave Magazine Ltd., 55 Victoria Street, London, S.W.1.

A R88D Receiver, absolutely beautiful condx and appearance, ex-Tatsfield; S-meter, handbook, improved SSB carrier injection, and "breathed on" generally; tools, speaker, phones; far above average, price £40.—Box No. 2893, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

METERS 2½ in. round 0-1 mA, 7s. 6d.; 2 in. round 0-1A RF, 5s.; 2 in. round 0-350 mA, 5s. Speaker 8 in. round, 12s. Fil. xformer 0-250v., 6-3v. 1-5A, 7s. 6d. R.S.C. power pack 230/250v. in, 250v. DC 6-3v. AC out, size 7 in. x 6 in., £1 10s. all inc. p/p.—30 Johnson Road, Barrow, Bury St. Edmunds, Suffolk.

EDDYSTONE 358X Receiver for sale, amateur-band coils, power pack, spares, £8 plus carriage, delivered 30 miles.—G3MKU, 22 Fairway, Keyworth, Notts.

EDDYSTONE 640, S-meter, spare valves, manual, £25. Heathkit Balun, £2 10s. Codar Preselector, brand new, £4. Carriage extra.—J. H. Jones, 3 Bryn Clyd, Leeswood, Mold, Flint.

WANTED: Self-powered S-meter, first-class condition.—Farr, 83 Preston Road, Wembley. (ARN 6322.)

EDDYSTONE 870A, drive damaged, £11. Eddy-stone speaker, 43s. (usually 63s.). New CR-100 manual, 30s.—Box No. 2890, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SHORT WAVE (HULL)

G5GX

Second-hand Receivers

	£	s.	d.
EDDYSTONE 740. 550 kcs. to 30 mcs.	25	0	0
EDDYSTONE 840A. 550 kcs. to 30 mcs.	35	0	0
EDDYSTONE 840C. 550 kcs. to 30 mcs.	45	0	0
EDDYSTONE 670. Marine cabin receiver	22	0	0
HALLICRAFTERS SX140. Amateur bands	30	0	0
GELOSO 209R. Amateur bands	40	0	0
HALLICRAFTERS S120. 550 kcs. to 30 mcs.	24	0	0

New Receivers

HALLICRAFTERS SX111	120	0	0
HALLICRAFTERS SX140. Kit	32	10	0
EDDYSTONE 960. Transistor	135	0	0
EDDYSTONE 940	125	0	0
EDDYSTONE 840C	58	0	0
EDDYSTONE 870A	30	17	6
MOSLEY CMI	86	0	0

Radio Control Gear by Grundig, R.C.S., MacGregor, Metz, R.E.P. and all associated models and equipment

Carriage extra on all the above

24a NEWLAND AVENUE, HULL

Telephone: 408953

SMALL ADVERTISEMENTS, READERS—continued

DX-100U, mint condx and sparkling appearance. Professionally built and augmented for SSB operation; latest Heathkit 160m. modification and other top flight features, including time sequence keying, Collins type slow-motion VFO vernier, and many other official improvements make this a very superior version of a fine self-contained transmitter. Price £59 10s.—Box No. 2889, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

CR-100/7, good condition, noise limiter, speaker, 60 kc-30 mc, £15. Complete Amateur Radio Course, £3.—Wilson, 128 Canterbury Walk, Cheltenham, Glos.

WANTED: ATM terminal unit (RTTY) AP66862 with relay, your price paid within reason.—Dickenson, 46 Lichfield Drive, Warden Hill, Cheltenham.

FOR SALE: TF-144G Signal Generator, 85 kc to 25 mc (no dummy aerial) with instructions, £25; buyer collects. Taylor 45A Valve Tester, with adaptors and valve book; buyer collects, £5. **WANTED**: R.M.E. 152A VHF Converter, complete and working; Mullard high-speed valve cards; AVO-8 Meter.—1 King Street, Withernsea, Yorkshire.

£100 CASH for best amateur-band receiver to Hayden, 62B Thorpe Road, Norwich.

FOR SALE: Hallicrafters S.108, excellent condition, £35.—G3NPQ, 51 Seaton Road, Hayes, Middlesex. (Phone 4104.)

WANTED: HT-11, BC-669/699 or any Marine type Transmitter/Receiver. Also xtals (kc) 2009, 2016, 2527, 2534, and others 2 to 3 mc. Sell TCS-12, B29, etc. Rx's; 100 xtals, etc. List offers.—Box No. 2894, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

L.G.50 Tx just overhauled by Labgear, realigned and new 6146, £30. Prefer buyer collects.—30 Johnson Road, Barrow, Bury St. Edmunds, Suffolk.

WANTED: CR-100 manual for impecunious SWL; also suitable ATU for same, offers?—Jones, 53 Ipsden Buildings, Windmill Walk, London, S.E.1.

A.R88LF Rx for sale, excellent condition, £29. Also Geloso VFO/PA table top transmitter, 75w. phone, fully metered, etc., £25.—G3SEL, 84 Conway Road, Biddulph, Stoke-on-Trent.

WANTED: Manual or circuit details for following surplus equipment: Receiver AP-B40, Transmitter-Receiver CR-143044, TBY8, £ s. d. or gear in exchange.—G2FCV, 49 School Road, Orford, Warrington.

MINIMITTER MR44, recently overhauled by makers, excellent condition, £35 o.n.o.?—Josephy, 8 Weetwood Park Drive, Leeds 16, Yorks.

K.W. VANGUARD, 160 to 10 metres, £35. Eddystone S.750 Rx, S-meter, speaker, complete factory overhaul, as new, £50. Class-D Wavemeter, £3 10s. £85 or near offer for lot.—G3OHN, 72 Rosemary Crescent, Woodsetton, Dudley.

FOR SALE: Drake 2B Rx (as new), £95 o.n.o.? B2 Spy Tx/Rx, PSU, and coils, £8 10s. S.38 Rx, £8 o.n.o.? Minimitter PA 2/807, £5. VFO 1-18 mc, £3 10s. **WANT**: BC-342 Rx in good condition.—Please write 71 Deakin Road, Erdington, Birmingham, 24.

GREEN and DAVIS

1964 Range of Equipment for the Radio Amateur

SONAR 4 BAND S.S.B. TRANSCEIVER. Tx input 200 watts. PEP. Rx sensitivity. $.2 \mu V$. for 10 dB s/n. PRICE **£200**

GREEN and DAVIS P.S.U. to match Sonar **£20**

HIGH POWER GREEN and DAVIS S.S.B. LINEAR AMPLIFIER (R.C.A.7094) **£87.10.0**

2 METRE NUVISTOR CONVERTER, Mk. III **£8.19.6**

2 METRE NUVISTOR PREAMPLIFIER, 2m. and 4m. **£5**

2 METRE NUVISTOR CONVERTER, Mk. IV. 3 Nuvistors, 6060. Miniature Xtal. Cambion trimmers. Complete with P.S.U. **£14.14.0**

TX EXCITER for 144 or 420 mc/s. 10 watts input ... **£10**

FALCON 2M15/20. AC and DC. PSUs. 2 metres. 15-20 watts input. Mobile or Fixed **42 gns.**

2M90. 90 watt. CW. Tx for 2 metres. inc. P.S.U. **38 gns.**

LM100 COMPANION MODULATOR to 2M90 **26 gns.**

2M 1000. Complete 2 metre, 100 watt Tx. AM/CW. 'Sonar' design cabinet. Complete in all respects ... **£68**

A complete range of transistorised equipment for V.H.F. and U.H.F. will be announced in the near future.

All the above equipment and other may be seen at the New

GREEN and DAVIS AMATEUR RADIO CENTRE

104 HORNSEY ROAD, LONDON, N.7

(1 min. from Holloway Road Tube station)

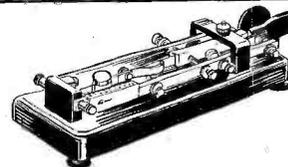
(Telephone NORth 6871)

RADIO AMATEURS LICENCE

We supply a special course of home study prepared specifically for the Radio Amateurs sound and TV Licence as issued by the G.P.O. It covers every aspect of the syllabus—starting right from the beginning—so that no previous knowledge is necessary. The fullest details of the licence requirements, itself are included and the method of sitting the examination and applying for the licence is fully described. At the end of the Course, a complete series of specimen exam. questions with fully worked model solutions are provided—giving invaluable revision before students take the exam. We also provide full training for the Morse Code—including morse key, transistor audio oscillator and 12 in. L.P. practice record. This latter equipment is available separately from the Course if required. Our record of successes by our students for the Exam. is unsurpassed by any other institute. Established 23 years. COURSES ALSO AVAILABLE for all subjects in Radio, TV and Electronics and for the City & Guilds Technicians Certificates, etc. Write NOW for full details without any obligation, to—

Dept. 20, **BRITISH NATIONAL RADIO SCHOOL,**
RADIO HOUSE, READING, BERKS.

at
last!

**SEMI-AUTOMATIC "BUG"**

Super Speed Morse Key. Seven adjustments for speed and comfort. Precision-tooled, anti-rust nickel-plated brass and stainless steel operating parts. Speed adjustable 10 w.p.m. to as high as desired. $\frac{1}{2}$ " silver contacts. Weight scale for reproducible speed settings. A real bargain for radio amateurs and professional CW operators! $6.7/8 \times 3 \times 2\frac{1}{2}$ exclusive of knobs and feet. Weight, 2½ lbs. Imported. Price: £4. 12. 6 post paid. All Mail orders, also callers,

at **SERVICE TRADING CO.**
47, HIGH STREET, KINGSTON-ON-THAMES, SURREY
Personal callers only at: KIN 9450

9, Little Newport Street, London, W.C.2

BUSFIELD'S ASTRO-MARINE

- Eddystone 358 X with power unit and 5 coils (P/P 10/-) **£9**
1155 A. Rx, power unit, output stage and speaker. (P/P 10/-) **£9**
 Heathkit "Mohican" with manual, good (P/P 7/6) **£30**
 Ex. W.D. Medium Wave Rx, unused (P/P 7/6) **£3/10/-**
 M.C. Phones with carbon Mic. Ex. Govt. S. (P/P 1/6) **7/6**
 D.L.R. No. 5. Phone with Throat Mic., new (P/P 1/6) **15/-**
 Shorrocks "Mariner III" NEW with direction finding equipment, 11 transistors, .17-27 mc/s. (P/P 10/-) **£55/13/6**
 Eagle Rx 60, NEW, .55-30 mc/s. (P/P 7/6) **£34**
 Sailor 16 T, NEW Marine Rx, 9 transistor, .16-3.9 mc/s. (P/P 10/-) **£53/15/-**

WANTED — GOOD RECEIVERS and S.X.28 MANUAL

45/47 EASTBOROUGH, SCARBOROUGH, YORKS.

LATEST TEST METERS

	Cash Price	Deposit	Hire Purchase Mthly/Pmts.
AVO Model 8 Mark II ...	£24. 0. 0	£4. 16. 0	12 of £1. 15. 2
AVO Model 7 Mark II ...	£21. 0. 0	£4. 4. 0	12 of £1. 10. 10
AVO Multimeter Mark 4 ...	£9. 10. 0	£1. 18. 0	12 of 14. 4
T.M.K. TP10 ...	£3. 19. 6	£1. 3. 6	3 of £1. 2. 0
T.M.K. TP55 ...	£5. 19. 6	£1. 15. 6	3 of £1. 11. 4
T.M.K. Model 500 ...	£8. 19. 6	£1. 15. 6	12 of 13. 8
TAYLOR MODEL 127A ...	£10. 10. 0	£2. 2. 0	12 of 15. 8
CABY A10 ... (Post 1/9)	£4. 17. 6	£1. 7. 6	3 of £1. 6. 8
CABY B-20 ... (Post 1/3)	£4. 10. 0	£2. 0. 0	3 of £3. 13. 4
CABY M-1 ...	£2. 14. 0		

Full details of any of the above supplied free on request. The AVO models 7 and 8 are both latest models from current production — not to be confused with Government Surplus.

Illustrated Lists

Illustrated lists are available on LOUSPEAKERS, TAPE DECKS, TEST GEAR, GRAMOPHONE EQUIPMENT, AMPLIFIERS. Any will be sent free upon request.

WATTS RADIO (MAIL ORDER) LTD.
 54 CHURCH ST., WEYBRIDGE, SURREY. (Tel. Weybridge 47556)
 Please note: Post orders only.

THE SPOT R.S.C. DERBY 41361

2 METRE. 5 element W.S. Yagi and super mast bracket, 39/6; 8 element, 59/-; add on 3 element to make 5 into 8, 19/6. All plus 4/- each carr.
 S.S.B. components, 1k. and 2k. Carbon lin controls, 1" O/D long shaft, Not ex-Govt., 5/- each. 8d. P. and P. 1" SF6, ferrite rings, 3/9 each, 6d. P. and P.
 MATCHED pair OA79 diodes, 6/-, 6d. P. and P.
 NEW BOXED ROTARY CONVERTERS, 11.5 to 13.5v. 1/2 P D.C. Giving 250-300v. 125 mA D.C. O/P, 15/- each, 4/6 P. and P.
 VIBRATOR UNITS, 6v. 1/2 P. 250v. 80 mA O/P, 15/6 each, 4/6 P. and P. 12v. 1/2 P D.C. with spare vib., etc. 300v. 100 mA O/P, 19/6 each, 7/6 carriage.
 EDDYSTONE RX's, 940, £125; 840C, £58; 870A, etc., etc.
 RECONDITIONED RX's. Eddystone 750. Double Super, gen. coverage, £50. Hallicrafters SX28, £35. R208, £9. R107, £12. 870A, £24. Many others.

Send SAE with enquiries. Aerial equipment list available

R.S.C. (DERBY) LTD

EX NORMAN BIRKETT LTD
 THE SPOT, 26 OSMASTON ROAD, DERBY

BLANK CHASSIS

Precision made in our own works from commercial quality half-hard Aluminium. Two, three or four sided SAME DAY SERVICE of over 20 different forms made up to YOUR SIZE

Order EXACT size you require to nearest 1/16" (maximum length 35", depth 4")
 Specials dealt with promptly. SEND FOR ILLUSTRATED LEAFLETS or order straight away, working out total area of material required and referring to table below, which is for four-sided chassis in 18 s.w.g. (for 16 s.w.g. add 1/6th)

48 sq. in. 4/-	176 sq. in. 8/-	304 sq. in. 12/-
80 sq. in. 5/-	208 sq. in. 9/-	336 sq. in. 13/-
112 sq. in. 6/-	240 sq. in. 10/-	368 sq. in. 14/-
144 sq. in. 7/-	272 sq. in. 11/-	and pro rata
P. & P. 2/6	P. & P. 2/9	P. & P. 3/-

FLANGES (1/4" or 1/2" or 3/4") 6d. per bend.
 STRENGTHENED CORNERS 1/- each corner.

PANELS. The same material can be supplied for panels, screens, etc., at 4/6 sq. ft. (16 s.w.g. 5/3) plus postage and packing

H. L. SMITH & CO. LTD.

287-289 EDGWARE ROAD, LONDON, W.2. PAD 5891/7595

SMALL ADVERTISEMENTS, READERS—continued

FIRST £6 SECURES PSU: 1000v. 300mA on 19 in. chassis; constant voltage and 5 other mains transformers; 2/813's, and 813 transformer; 2/807's, 2/KT66's, 2/5U4G's, 5 meters (one microammeter); Labgear DS2-28 10-metre coil and one speaker; buyer collects. Further details—Butland (*Finchley 7262.*) Also will exchange latest Bush record player (fitted stereo) for good small recorder in same price range (£30). BC-221 with PSU, £12.

WHY NOT MAKE IT a personal QSO? By offering hospitality to visiting Radio Amateurs, or better, you may visit them. This can be arranged by joining the International Ham-Hop Club. Membership is open to all Radio Amateurs and SWL's. Subscriptions 10s. per year, including free *Newsletter*.—Contact G.B. Division Hon. Sec., G3HZP, H. James, 7A South Avenue, Egham, Surrey, or Deputy Gen. Sec., J. Coote, 56 Dinsdale Avenue, Kings Estate, Walsand, Northumberland.

JOHNSON "INVADER" latest SSB Transmitter, mint, selectable sidebands, 10-80 metres, full 200 watts p.e.p., nearest £150; terms considered.—G2CDN, 13 Wood Lane, Isleworth, Middlesex.

OLD SHIPMATES and friends. G8IX arrives Euston on 0740 from Stoke 2/11/63 to splice the mainbrace. Take it out lads.—G. H. Tagg, 11 Bottestow Street, Henley, Stoke-on-Trent.

MOVING QTH. MUST SELL: 3-6 mc Command receiver, 45s.; B2 receiver, 40s.; home-built 160m. mobile receiver, 40s.; two new Eddystone square-type slow motion dials, 15s. each; 5B254M, 7s. 6d. All o.n.o.? Plus many other items.—Send for list G3OJV, Waters, 6 Walden Way, Hornchurch, Essex.

SALE: CR-100, 6SG7 RF's, box spares with valves, S manual; good condition, £14, buyer collects.—Bundey, 87 Park Lane, Hayes, Middlesex.

COSSOR 343 Oscillator, 70s. Six Newnes *Radio & Television Servicing*, including 1955/1956 models, 30s.—Stapleton, 5 Villiers Close, Plymstock, Devon.

URGENTLY WANTED: CR100/B28, will arrange delivery. Regret planning permission from XYL to spend £12 only.—Underdown, 20 Highfields Close, Farnborough, Hants.

SALE: R.107, perfect, OK for SSB, £12 10s. Class-D Wavemeters, new condition, complete in transit case, spares, headphones and instructions, £5. Universal AVO Minor, new, leads, leather case, £5 5s. Fluximeter No. 1 in wooden case, slightly damaged, £2 10s. Testmeter 0-5/0-100 volts DC in carrying case, £1. Boxes of spare valves for 19, 22, R.107 Sets, £1 each. Testmeter 3-0-3 volts in leather case, 15s. 12 volt Vibrators, 2s. 6d. each. Two Mobile Transceivers Type 9AB, 12 volts, write for details, £10 each. 10-watt Amplifier, AC mains, less speaker, £4. Eddystone Modulation Meter, £3. All carriage paid.—GM3BQA, 19 Edinburgh Road, Cockenzie, East Lothian, Scotland. (Phone: Port Seton 331.)

PCR3 Rx, MW and 2-3-22 mc, fitted int. p/pack and BFO, ext. speaker, £10, inc. p/p.—K. Livermore, 30 Johnson Road, Barrow, Bury St. Edmunds, Suffolk.

WANTED: TA33 or TA33 Jr., must be in good condition.—Particulars to Box No. 2897, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SMALL ADVERTISEMENTS, READERS—continued

R. 206 RECEIVER, 500 kc-30 mc, £10. BC-312 Receiver, £8 10s.—Melhuish, 31 Shepherds Bush Green, W.12. (Calls any morning.)

WALKIE-TALKIE, Marconi Type H19, suitable four-metre band, present crystals Tx 85-875 mc, Rx 72-375 mc, complete with accessories and hand-book. Offers to—Hanley, Westmead, Bridport, Dorset.

G.E.C. BRT-400K, as brand new, c/w 500 kc crystal calibrator, FSK, etc., and manual, 150 kc-30 mc, £85 cash, no offers.—(Phone: LAR 1544 (London) after 5 p.m.)

STUDENT GROUP seek Command/TCS, Rx/Tx or BC-348, BC-342, BC-312, LG.50, Panda Cub, W.H.Y.? AR88LF manual and xtal, *Short Wave Magazines, Bulletins*, Surplus Radio manuals.—Box No. 2895, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

A1 Rx FOR SALE: Hammarlund HQ-160 double conversion gen.-coverage, bandsread, with notch filter, Q-mult, 100 kc xtal, SSB function, manual and speaker, new two years ago. The Rx comes with a BC-1038A Panadaptor. The lot, £125.—Phone TUD 0446 evenings.

A R88D, new, £45. Vanguard transmitter type, £25. Cossor 1035 Oscilloscope, £30.—(Tel: Dorking 73598.)

R. 107, almost new, £12. Carriage outside London.—G3SJM, 1 Emperor's Gate, S.W.7. (FRO 1393.)

FOR SALE: CR-100, working but needs attention; buyer arranges collection; offers to—Moyes, 40 Johnstone Drive, Rutherglen, Glasgow.

GELOSO 4/102, valves, dial, £4 (p/p 2s. 6d.). Three small speakers, 2s. 6d. each. HR Phones, 5s. Box of 5 relays, 5s. Box of 100 condensers, 5s. Valves: RS237 (German 150w. triode, with base), 10s.; 5763, 7s. 6d.; E88CC, PX25, P27/500, 5s.; PL81, PL82, PL83, ECL80, ECL81, ECL82, PCC84, PCF80, 1773, 1973, 8A8, 6AL5, 6C6, 6AG7, 6F6M, KT61, 42, UL41, N142, 2s. each; 954, 6K25, EF80(12), 1s. All postage extra.—Smith, 12 Atkinson Terrace, Benwell, Newcastle-on-Tyne, 4.

MR44/11 model with new front end and disc tuning drive, nearest £50. HRO Senior and power pack; coils 10, 20, 80m. bandsread, £22. BC-453 with 6v. valves, v/control, etc., £5.—Box No. 2896, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: AR88D, new valves, tuning gear, manual, £35. CR100/8, new condition, modified cabinet and tuning gear for less height, S-meter, £28. BC-221 modified cabinet, separate power pack, calibration book, £18.—H. Johnson, 48 Sudbury Heights Avenue, Greenford, Middx. (WEM 9013 after 6.30 p.m.)

MINIMITTER amateur band converter, 80-10m., output 1.55 mc, mint, £7 10s. QOV06-40A plus base, 30s. 813 plus base, 25s. 4/125A, £2. Geloso pi-tank 80-10 metres, with 150 µF Tx condenser, 15s. Philco 2N1742, £1.—Harrison, 28 Carmalt Gardens, Putney, London, S.W.15.

WANTED: Receiver R.107 or equivalent, in good condition. Would also consider amateur-band converter for same.—Details to Cox, 9 Byrneside, Hildenborough, Kent. (Hildenborough 2553.)

MOHICAN, £27 10s. or swop for monitor 'scope HO10E.—Terry Edwards, 65 Connaught Street, London, W.2. (Phone AMB 8846, PAD 9728.)

G. W. M. RADIO LTD.

MOBILE RECEIVERS FOR 4 METRES

Receivers Ex-Police Car, Superhet. Crystal (not supplied) controlled in range 70 to 90 mc/s. approx. Valves 5 EF91, 3 EF92, 3 EB91, EL91 or equivalent. Internal 12 volt rotary giving 250 volts 60 m/a. Size 8" x 7" x 14", weight 16 lbs. Supplied in good clean condition with valves, 40/-, post 7/6. Matching 3 ohm speaker in crackle case, 7/6, post 2/6.

TRANSMITTER PARTS

Exciter chassis — 2 EF91, EL91, many useful parts, 6/-, P.A. chassis — TT12, 10 watt modulation transformer, aerial relay, two jack sockets, 12/6. Modulator chassis — 2 6V6, transformer for carbon mike, 4/-, Rotary transformer — 12 volts to 300 at 216 ma. with 3 relays, 7/6. Control box — 3 toggle switches and carbon fist mike with "Push to talk" button, 10/-, Post 2/6 per order.

METERS. 2½" round 0-200 microamps, 15/-, 2" square, centre zero, 100-0-100 ma., 7/6, 3" square 0-250 ma., 15/-, All new and boxed, Post 1/6 each.

RELAYS. 1,000 ohm high speed single pole change over, suitable for keying relays, 7/6, Post 1/-.

AERIALS. 7 strand hard drawn copper wire on reel, 85ft., 8/6, 100ft., 10/-, Post 2/-.

TRANSMITTER POWER PACKS. 230v. A.C. input with outputs of approximately 325 volts D.C. at 200 ma., and 6.3v. A.C., two smoothing chokes, paper capacitors, on chassis 13" x 8". Complete with two U52 (5U4) rectifiers. Used, good condition, 25/-, carriage paid.

RECEIVERS RI132. Tunable 100 to 120 mc/s, good clean condition, £4/10/-, carriage 12/6.

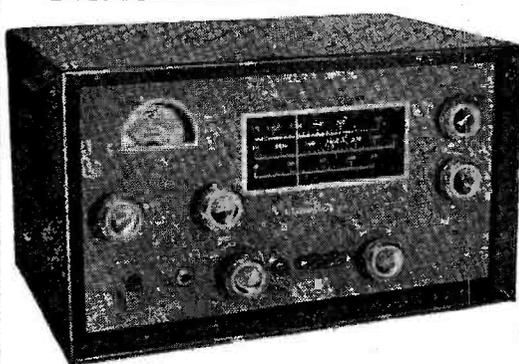
RECEIVERS. Canadian Marconi 52, 1.75 to 16 mc/s, tested and clean, £5/10/-, Carriage £1. Reprinted handbook with all information and circuit, 5/-, Post paid.

RECEIVERS. Marconi CR100. Very clean, good working order, £18/10/-, Carriage £1.

All equipment offered is complete but not tested unless otherwise stated. Carriage charges are for Mainland only. Terms: Cash with order. Early closing Wednesday.

40-42 PORTLAND RD., WORTHING, SUSSEX

MINIMITTER



The latest 1964 models of the following Minimitter equipments are now in production:—

MR44/11 Communications Receiver ...	£65. 0. 0
MC64 6 band Converter ...	£19. 0. 0
"Top 2.7" 24 watt, 3 band Transmitter ...	£30. 0. 0
Mobile Transmitter, 20 watt ...	£17. 15. 0
TR7. All transistor Mobile Receiver ...	£11. 0. 0
"FB5" All band Aerial (High Power) ...	£5. 2. 6
Minimitter "Multi-Q" Unit 465 kc/s. ...	£5. 10. 0

H.P. Terms available

For full details of any of the Minimitter range please send S.A.E. to:

THE MINIMITTER Co. Ltd. 37 DOLLIS HILL AVENUE, LONDON, N.W.2. Tel: MAIda Vale 5588

R.C.A. AR.88D. RECEIVERS

New release. Offered in excellent used condition, fully tested and guaranteed. Frequency coverage on 6 bands, 550 kc/s. to 32 mc/s. Operation 110/230 volt A.C., £45 each, carriage £2.

NATIONAL H.R.O. RECEIVERS

Senior model. Supplied with full set of 9 coils covering 50 kc/s. to 30 mc/s. Available as follows—

- Table model, as new condition, £25
- Rack model, as new condition, £22/10/-
- Table model, good used condition, £19/19/-
- Rack model, good used condition, £18/18/-

Carriage 20/- extra

Power packs to operate any of above from 110-230 volts A.C. (also sold separately), 59/6 extra, carriage 5/-.

MARCONI CR100/8 RECEIVERS

Available brand new in original transit cases, complete with manual. Frequency coverage 60 kc/s. to 30 mc/s. on 6 bands. Operation 200-250 volt A.C. £35 each, carriage £2. CR100 receivers also available in good used condition, £21, carriage £2.

HALLICRAFTERS S-36 V.H.F. RECEIVERS

F.M./A.M. 27 to 143 mc/s. Operation 110 volt A.C. (transformer supplied for 230 volt operation). Available brand new in original transit cases with manual. £40 each, carriage £2.

P.C.R.1 COMMUNICATION RECEIVERS

Frequency coverage on 3 bands, 2,000-800 metres, 550-190 metres, 6 to 22 mc/s. Output for phones or speaker. Supplied in "as new" condition, fully tested, £5/19/6, carriage 10/6. The receiver can be supplied with an internal power supply to operate direct from 200-250 volt A.C. at 39/6 extra or alternatively plug in external power supplies are 35/- extra.

UNIVERSAL A.VOMETERS

Guaranteed perfect condition with leads and batteries.

MODEL "D" 34 ranges, £8/19/6 each.

MODEL "7" 50 ranges, £11 each.

Registered post 5/- extra.

AVO WIDE RANGE SIGNAL GENERATORS

Frequency coverage 50 kc/s. to 80 mc/s. in six turret operated ranges. For use on standard A.C. mains. Packed in original transit cases with accessories. Supplied in "as new" condition, fully checked before despatch, £15 each, carriage 10/-.

LAFAYETTE BRAND RECORDING TAPES

Brand new guaranteed first grade American tapes: 5"-600', 8/6; 5"-900', 10/-; 5"-1,200', 15/-; 7"-1,200', 12/6; 7"-1,800', 15/-; 7"-2,400', 25/-; Postage 2/-. Over £3 free.

WANTED FOR CASH. ALL GOOD CLASS COMMUNICATION RECEIVERS AND TEST EQUIPMENT

Hours of business: 3 Lisle Street, 9 a.m.-6 p.m. (Half day Saturday),
34 Lisle Street, 9 a.m.-6 p.m. (Half day Thursday).

G. W. SMITH & CO. (RADIO) LTD.
3 and 34 LISLE STREET, LONDON, W.C.2. Tel. GERrard 8204/9155

SMALL ADVERTISEMENTS, READERS—continued

888A, £65; matching S-meter, £3; matching £60. Japanese signal generator 250 kc to 300 mc, 230v. AC input, £4. R.1132A modified 105-132 mc plus power pack and output stage with speaker, £5. APS13 Tx/Rx, £1. BC-625 Tx, 7s. 6d. *Short Wave Magazine*, Volumes 9, 10, 11, 12, 13, 14, 15, 16, 1951/1959, £1 per Volume plus 1s. post, or eight volumes for £6 post 5s. RSGB *Bulletins*, Volumes 36, 37, 38, 1960/1963, 15s. per volume plus 1s. post. WANTED: Drake 2B receiver; small lightweight SSB transmitter or transceiver; Joystick Antenna; for use in Dx Location.—G3HPW QTHR. (Phone West Drayton 4192 evenings.)

SALE: Minimitter Mercury "200" Tx, excellent condition, 240w. CW and 150w. phone, 80m.-10m., £70 o.n.o.?—Box No. 2904, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Geloso G222 Tx, unmodified. Cash waiting. Similar Tx considered.—Box No. 2905, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: HRO less coils, £9; Crystal Calibrator No. 10, £2 15s.; AR88 loudspeaker, £2 7s.; RF-26B 50-65 mc, brand new and boxed, £2; Command receiver triple rack, £2 10s.; output transformer, 10s.; 12v. Dynamotor, 27s. 6d.; wooden case for BC-221, £4; blank calibration book, 15s.; S27 output transformer, 30s.; AR77 bandspread condenser, 17s. 6d.; S-meters for SX.28A, £4; HRO, £2 10s.; AR77, £2 10s. BC-611 Handie-Talkie chassis, less valves, £1. Spares for HRO and AR88D/LF, send s.a.e. for lists. Manuals for AR88D, HRO, CR-91A, 25s. each; CR-88, 35s.—A. J. Reynolds, 139 Waller Road, New Cross, London, S.E.14. (Tel. New Cross 1443 after 7.30 p.m.)

HRO-MX, 9 coils, three bands, matching HPSU/speaker, spare valves, instructions, immaculate, £22 10s. Tx/Rx Z.C.1, 160/80m., £5. Marconi LCR impedance bridge Type 1, £20. 813, 15s. 3BPI, 10s. WANTED: Geloso or Minimitter all-band converter.—G3LEB, Farnborough. (Kent 51132.)

MCMICHAEL (501A.C.) FB 7-valve Superhet Rx, 13.5-2000 metres, £10 o.n.o.? Mod. xformers, Woden UM2, £2; Parmeko (new), 12-350 watt secondaries, 30s. Large Mains xformer, 1200v., 15s. 1/2-h.p. E/S DC/AC Motor and flexible drive, 20s. 50 assorted valves (many new), 50s. 50 each—*Short Wave Magazine*, *Practical Wireless*, RSGB *Bulletins*. Offers, plus carriage, to—Box No. 2906, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: Top Band Tx, £5. Tx cabinet with 1 kV PSU, £5. Buyer collects.—G3KAB, 28 The Vale, Southgate, London, N.14. (PAL 7906.)

R.C.A. AR77 receiver, six bands, 540 kc to 30 mc, in good condition, with manual, £15.—J. Sharratt, 12 Clocks Close, Edlesborough, Dunstable, Beds. (Tel. Eaton Bray 297.)

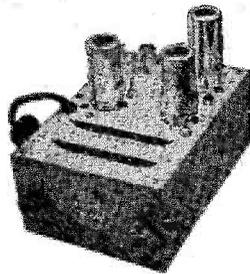
YOUNG recently licensed Amateur seeks accommodation in Sevenoaks district, Kent. Due to change of employment in near future. Please write to—G3SIB, 36 Wright Street, Hull, Yorkshire.

SALE: Labgear LG.50, excellent condition, prefer buyer collects. Offers?—G8IB, 95 Upper Road, Kennington, Oxford.

WANTED: Minimitter converter. Full details and price to—Box No. 2900, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

TW MEANS V.H.F.

FINEST QUALITY — UNEQUALLED PERFORMANCE



TW NUVISTOR (6DS4) CONVERTER

- Excellent noise factor
- 30 dB gain
- 70 dB I.F. rejection
- Wide Range of I.F.'s
- The TW Nuvistor Converter requires no Rx modification

£15

11 gns. Less power supply.

ALSO AVAILABLE:—

TW 2 I0w. TX. Complete with Modulator	... 23 gns.
TW Nuvistor Preamp. Built-in P.S.U.	... 6 gns.
TW Mains Power Supply/Control Unit	... £15
TW Mobile Power Supply/Control Unit	... £15
TW 2m. or 70cm. Driver Unit	... 10 gns.
TW Halo Aerial. Neat and easily mounted	... £2. 17. 6
TW 10 watt Modulator (P.P. EL84)	... 8 gns.
TW ALL TRANSISTOR MOBILE RECEIVERS—	
Topmobile and 80m. Models	... 19 gns.
Twomobile with built-in Converter	... £28. 0. 0

T. WITHERS (Electronics)
15b GILBERT STREET, ENFIELD, MIDD.X.
G3HGE Tel. Waltham Cross 26638 G3HGE

SMALL ADVERTISEMENTS, READERS—continued

PANDA PR-120V for sale, £45. Also heavy duty radar rotating gear, ideal for a beam; for full details s.a.c.—Silver Plough, Pitton, Nr. Salisbury. (Tel. Farley 266.)

TOP BAND "Command" Rx, brand new and unmodified, £8 10s. 829B, new and boxed, 27s. 6d.; both plus postage. **WANTED:** Admiralty B.46 Rx, preferably in new and original condition; also technical manual for this Rx; offers please to—Box No. 2898, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

CLEARING SHACK: 160m. SSB Tx/PSU, similar "Natterbox," £10. AVO battery signal generator, 95 kc to 80 mc, £9. Prefer buyers' collect these. Xtals Ch.44 45(2), 321(4), 322/3/4, 338, 343(4), 344(2), 345(4), 346(2), 2s. 6d. Paper condensers, new, 8 μ F 800v. 100°C., 8s. Meters: 500 mA, £1; 50 and 40 mA, 30s. Transistors: OC25, 23, 28, GET572, all £1. Mains timing switch 110v. 20A, £2. Pair Eddystone feet, 10s. All postage extra.—Box No. 2899, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

TOWER WANTED, crank-up or plain, around 40 ft., also Panda automatch unit.—Phone (Fordingbridge 2316) Augood, Wychwood, Harbridge, Ringwood, Hampshire.

EXCHANGE or sell GeloSO VFO 4/104, c/w valves and escutcheon, QY3-125(2); 5B/254M(2); all used but OK. **WANTED:** BC-453, oscilloscope. W.H.Y. mobile or SSB?—G3KIG, 1 New Church Lane, Ulverston, Lancashire.

COMPLETE AMATEUR STATION FOR SALE: AR77 Rx and pre-selector, £22. Tx's: Elizabethan, £20; Top Band and Modulator, £10; T.1154 and power pack, £7 10s. R/C Bridge, £5. Woden Transformers DT1, UM3, new, £7 10s. Various components, valves, transformers, meters.—Newman, 112 Norbiton Avenue, Kingston-upon-Thames, Surrey. (KIN 9865 after 8 p.m.)

MINIMITTER MR 44/2 RECEIVER FOR SALE, good condition, working as new. Price £40, carriage paid.—Flt. Lt. G. C. Moore (G3MCCY), R.A.F. Stradishall, Newmarket, Suffolk.

WANTED: 80 mc walkie-talkies for Mountain Rescue Team. Must be GPO approved types.—G3NQX, W. H. Brown, 1 Gib Lane, Hoghton, Nr. Preston, Lancs.

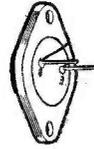
K.W. "VANGUARD" 160/10 metre Tx, factory assembled, little used, £39 or exchange for first-class AR88D. Write—Pat Spashett, G3RK, Bungay, Suffolk, or phone (Bungay 88.)

A88LF with manual, number of spares including A power transformer, £30. BC-453, £3 10s. Woden UM3, £2. Two manuals for BC-221, 10s. each. RF-26 Converter, 28, 21 and 14 mc, by G3FXB, £2. Transformer 230v./1600v. 500 mA, £2. Thermador modulation transformer, CS-2160, £1. TA-12E Transmitter, £2.—G5MD, Lower Westfields, Bromyard, Herefordshire.

WANTED: Vibroplex Bug Key, or similar, in FB condx. Details, price, etc., please.—Box No. 2901, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

HEATHKIT DX-40U Tx and VFO, together with manual, £22 10s.—Spencer, Paladyn, Lyons Hall Road, Braintree, Essex. (Tel. 2051.)

SALE: 68P (covers Top Band) and 18 Set, spare valves in case, key and mike, H/B, £6 lot, will not split.—Bundey, 87 Park Lane, Hayes, Middx.



**TRANSISTORS
CRYSTALS
VALVES
EQUIPMENT AND
COMPONENTS**



CRYSTALS

Over 600 types stocked.
100 kc/s., 15/-, AR88,
455 kc/s., 12/6. HRO
456 kc/s., 15/-, HC6U
miniatures, 18 mc/s. to
46.5 mc/s. 3rd overtone, 7/6.

TRANSISTORS

Over 200 semi-conductor devices of all types stocked.

VALVES

Over 800 types. Commercial and special purpose.

CATALOGUE

LATEST 68 PAGE FULLY ILLUSTRATED AND DETAILED. 2/- POST FREE

SIGNAL GENERATOR

Portable all transistor. 8 bands. 149 kc/s. to 350 mc/s. RF, AF mod. Complete, leads, etc.
12 months guarantee.
£7.18.6 P.P.2/-
Leaflet on request.

FROM STOCK

We can supply components used on circuits published in this and other magazines. Let us quote.

FIELD STRENGTH METER

Pocket sized. 5 bands, 1 mc/s. to 200 mc/s. Fitted 200 μ A meter. Calibrated dial, telescopic aerial. RF indication and phone monitoring. Magnet base.
69/6. Post Free.

MULTIMETERS

20 k/v., 5 gns. 30 k/v. £7.
50 k/v., £10. 2 k/v. 75/-.

● LEAFLETS ON REQUEST ●

HENRY'S RADIO Ltd 303 EDGWARE ROAD LONDON, W.2
COMPONENT SPECIALISTS PADDINGTON 1008/9

**BERNARDS
RADIO**

RECEIVERS

Hallicrafters SX110. 530 kc/s.—30 mc/s. "S" meter. Band-spread ... £60 0 0
Eddystone 840C. New. Unmarked ... £45 0 0
Minimitter MC8 Converter ... £12 0 0

TRANSMITTERS

Tiger 300. 150 watt. 80-10 ... £80 0 0
GeloSO TR212. 60 watt. 80-10 ... £45 0 0
Labgear Topband ... £20 0 0

Valves 1A7, 1H5, 1C5, 5Y3, 6AL5, 6A4, 6AT6, 6AU6, 6AQ5, 6BA6, 6BE6, 6B8G, 6F1, 6F15, 6J6, 6J7, 6K7, 6L6, 6L7, 6SA7, 6SH7, 6SK7, 6SQ7, 6S7N, 6U5, 6X4, 6X5, 7B7, 10C1, 12A6, 12A8, 12AT7, 12J5, 12S7, 12K8, 12SQ7, 12SK7, 12SA7, 35L6, CBL1, EA50, EBC33, EB41, ECC35, ECC40, EF40, EF42, EF50, EL42, EL3(N), EM1, EM4, EM34, EK32, EL37. 5/- each. Any 5 valves for £1.

COMPONENTS

All components listed in last month's issue available. Your enquiries invited for new receivers, transmitters, aerial equipment, etc.

HIRE PURCHASE ON ALL EQUIPMENT OVER £10
Payments over 12, 18, 24, 30 or 36 months.

620 HOLDERNESS ROAD, HULL
Telephone 71949

ERSIN Multicore SOLDER

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

THE HANDY DISPENSER



Easy to find in the tool box—simple to use. Virtually a third hand for tricky soldering jobs. 15 feet 5-core 18 s.w.g. ERSIN MULTICORE SAVBIT alloy in a continuous coil used direct from free-standing dispenser.
2/6 each

SAVBIT ALLOY

saves wear on
soldering iron bits

SAVBIT SIZE 1 CARTON

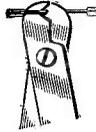
Contains approximately 45 feet of 18 s.w.g. SAVBIT. It is also supplied in 14 s.w.g. and 16 s.w.g. Obtainable from radio and electrical stores.

5/- each



BIB WIRE STRIPPER AND CUTTER

Strips insulation without nicking wire, cuts wire cleanly, adjustable to most thicknesses. Splits extruded plastic twin flex.
3/6 each



MULTICORE SOLDERS LTD.

MULTICORE WORKS · HEMEL HEMPSTEAD · HERTS. (BOXMOOR 3636)

CHMS 24

QUARTZ CRYSTAL UNITS

Hermetically sealed, Gold or Silver Electroded Crystals, post free at the following prices: each

Fundamental 3 Mc/s. to 15 Mc/s. at **£1 5s. 0d.**

Fundamental 15 Mc/s. to 20 Mc/s. at **£1 10s. 0d.**

Overtone 20 Mc/s. to 30 Mc/s. at **£1 10s. 0d.**

State holder type preferred — HC-6/U or FT243

PROFESSIONALLY MADE FOR THE AMATEUR

Send cash with order stating exact frequency and you will receive an Oscillator Circuit Diagram with your crystal.

Booklet "Guide to Specification and Use of Quartz Oscillator Crystals" 5/-.

CATHODEON CRYSTALS LTD. Linton, Cambridge

SMALL ADVERTISEMENTS, READERS—continued

FOR SALE: AR88D with S-meter, good condition, £35 o.n.o.? Also many English and American magazines.—Young, 1 Rugby Avenue, Neath, Glamorgan.

FOR SALE: TCS-12 Rx unmodified, extremely good mechanical and electrical condition, plus mains p/pack, £9 10s. Carriage extra.—Brain, G3RRE, Stallington, Green Lane, Radnage, High Wycombe, Bucks.

COLLINS TCS-12 Transmitter and Receiver, speaker control unit, mic., 12-volt generator, all connecting leads—a complete station, £30. Marconi TGY2 Transmitter with CR-300 receiver, all mains power supplies, £35. TBY8 Tx/Rx, 28 to 80 mc, complete, £7 10s. BC-221T with stabilised power supplies and chart, £13 10s. Pye Wave Meter Type 73, with crystal calibration, mains power supplies and 400-cycle variable output, 100 kc to 25 mc, with charts, £5 10s. Test Set Type 219, 500 to 5K, 1K to 10K, £5 10s. Cambridge Decade Resistance Box, £4 10s. Sullivan simple capacity bridge, £2 15s. Add carriage; see October advert. p.454, some items still available.—Lucas, Durbeyfield, West Bay, Bridport, Dorset.

CR-100 for sale, £10, with manual and speaker, good working order.—G3JZW, Gadsden, 17 Drovers Way, Dunstable; Beds.

TRANSMITTER, 100 watts, AM, CW, 160-10 metres, commercial make, unused, (list price £80), £50. CR-150 Receiver, 2-60 mc, £30. Carriage extra.—Box No. 2902, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

4-METRE Transmitter and Receiver, Pye PTC-114 Radio-Telephone, with PSU (12v.) 15 watts output, £4. Few only, buyers collect.—Write in first instance, s.a.e. please, G3PV, Berkhamsted 622 evenings (QTHR.)

NATIONAL HRO Receiver Senior, as-new condition, 8 coils, BS on all five amateur bands, £18 18s.—L. Hull, 35 Oakmere Lane, Potters Bar, Middx.

GELOSO Signal shifter 4/102 and valves, new, £5.—L. Hull, 35 Oakmere Lane, Potters Bar, Middx.

GELOSO pi-tank coil unit for one 807, 12s.—L. Hull, 35 Oakmere Lane, Potters Bar, Middx.

SALE: Vibroplex Bug Key, brand new, cost £9 9s., sell £7 7s.—Box No. 2903, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

AMATEUR-BUILT 150w. Tx, 20, 15, 10 metres, 813 PA, 807's plate and screen mod. Also NBFM VFO, built-in stab. HT. PSU 1500v., 400v., 750v., £12 10s. o.n.o.?—L. Hull, 35 Oakmere Lane, Potters Bar, Middx.

SOUND CR-100 Receiver, £18.—S. P. Coates, 4 Point Road, Avening, Stroud, Glos.

FOR SALE: CR-100, new in original packing-case with manual, £25 o.n.o.?—Phone evenings after 9 p.m. (Bywood 2654.)

WANTED: Grid dip meter, **FOR SALE:** Class D Wavemeter (AC Mains), £4.—Jones, 24 Forest Avenue, Foresthall, Newcastle-upon-Tyne.

FOR SALE: Multiband Antenna traps, 80m thro 10m, high efficiency, superbly finished, only 45s. Silicon Diodes 500 mA 1000 PIV, 9s. each. OC. 44, 45, 81, 81D, 3s. 6d. OC 170, 4s. OC. 171, 4s. 6d. Plus p.p.—Walkley, 70 Arnold Road, Binstead, I.o.W.

V I C T O R Y

YOU CAN BE ON THE AIR BY DECEMBER

By using the RHYTHM METHOD of Morse tuition a student, starting from scratch, has passed his Morse Test in just 13 DAYS by faithfully following the instructions given in this fantastic course. You could pass the test NEXT MONTH. Why not send now?

For explanatory booklet please send 6d. in stamps to:—
G3HSC, 45 GREEN LANE, PURLEY, SURREY
 TAPE TO DISC TRANSCRIPTION SERVICE ALSO AVAILABLE

V I A G 3 H S C

G4GZ's BARGAINS

VALVES : EA50, EF50, 1/6 each, 9/- doz. 6H6M, 6AC7M, 6K7G, 12SJ7M, 12SC7M, 2X2, 6BB6, EF80(S), 6C4, EL32, 6AL5, 6AM6, EF91, 6J6, 2/- each, 18/- doz. 12A6, ARP12, AR8, TT11, VP23, Z77, 2/6 each, 24/- doz. 6SN7GT, 1626, DC70, DF73, DL70, 3/- each, 30/- doz. 6AK5, 6I7G, 6J5M, 12K7G, 12Q7G, 12AT6, 35Z4G, 3Q4, 959, 4/6 each, 48/- doz. 6SL7GT, 6SJ7M, 6X4, 6F6M, 80, 12C8M, 12AU6, 12AU7, 12AT7, 6BH6, 42, 6AU6, PCF82, PCC85, PY83, VR150/30, 2A3, 5/- each, 54/- doz. 12SQ7, 446A, EC80, 836, PL32, EZ80, EZ81, EZ40, 6BJ6, UY41, EB80; EAF42, 6/- each, 66/- doz. 6L7M, 50L6GT, EM80, EABC80, VLS631, 7/- each, 78/- doz. ECC85, ECC84, 3A5, 6K8M, 6L6M, 8/- each, 90/- doz. 7B7, 7C5, 757, 5R4GY, UCH81, 9/- each, 102/- doz. 5763, ECH42, 9/6 each, 108/- doz. 805, 25/-, 4E27, 40/-, P/P 6d. per valve, 2/6 doz. lots if under £5. See previous advertisements for other goods.

EDDYSTONE RECEIVERS, FERROGRAPH TAPE RECORDERS — LEAK — QUAD — GOODMANS — WHARFEDALE, Etc. HI-FI EQUIPMENT.

JOHN ANGLIN

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

HOME RADIO OF MITCHAM

No Short Wave enthusiast can afford to be without the new

HOME RADIO CATALOGUE

200 pages, 5000 items, 800 illustrations

Complete the coupon below and send it with P.O. for 3/6 to

HOME RADIO LTD

187 LONDON ROAD, MITCHAM, SURREY

PLEASE WRITE IN BLOCK CAPITALS

Write CATALOGUE on top left of envelope

NAME

ADDRESS

SWM

THE UNIQUE



Joystick

VARIABLE FREQUENCY ANTENNA

The DX aerial for any QTH!

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

ONLY
£3 10 0
 COMPLETE

A life time of experience and aerial "know-how" has gone into the development of this revolutionary principle of a Variable Frequency Antenna on which World Patents are now pending. Possessing the unique property of an even performance over all frequencies between 1.5 : 30 mcs. the Joystick's special matching facilities and associated A.T.U. ensures efficiency on any frequency. Peak performance for transmission and maximum voltage for reception—the Joystick is a major break-through for ardent SWLs and all licensed stations. Over 700 stations all over the world are already equipped with the Joystick—testimonials have poured in—

GW3MWZ/P — DXpedition Wales, 52 Top Band contacts with "Joystick" inc. OK2KGV and PAOPN. G2FRY — worked VE8RN on indoor "Joystick" when outdoor multi-dipole failed. G4HZ — Indoor "Joystick" with 40 ft. feeder better than 120 ft. long wire, plus big reduction in noise level.

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

SIZE 7'6"
 VERTICAL
 2.3 METRES

ORDER YOUR JOYSTICK NOW

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

PARTRIDGE ELECTRONICS LTD., 7, Sowell Street, Broadstairs, Kent

Please supply "JOYSTICK" (tick appropriate box)

- Standard make, £3 10s.
- De luxe make (all copper RF elements) £4 10s.
- "JOYMATCH" A.T.U. 10s. (+ 1s. P/P unless ordered with Joystick)

Enclosed is cheque/M.O./P.O. value £.....
 Please send brochures and testimonials

NAME.....(Call sign)

ADDRESS.....

Town..... County..... 51

GET ABOVE THE QRN
WITH THE *NEW*

JoyMast

ONLY
£9.19.0
COMPLETE

WITH SPECIAL JOYSTICK
V.F.A. & ALL ACCESSORIES

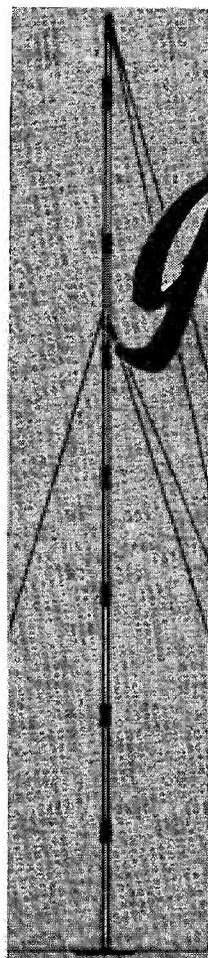
31' 6" above ground, the popular "Joystick" variable frequency antenna is "in the clear." On receive, crisp incoming signals stand out above domestic QRN. On transmit, a punchy signal is radiated through a 360° pattern—free from absorption by housewiring and gutters.

The "Joymast" has no traps or moving elements and employs a unique principle of matching which allows an even response from 1.5–30 mcs. Easy for one man to erect, lightweight construction, polythene guy ropes, simple, single wire feeder.

Full money-back **GUARANTEE** if you are not completely satisfied.

Want to know more?

O.K.—use the coupon to ask for a brochure.



ORDER YOUR JOYMAST NOW

PARTRIDGE ELECTRONICS LTD.

7, Sowell Street, Broadstairs, Kent

- Please supply one "Joymast" at £9.19.0
- Please supplyfeet of feeder at 1s. per 10 feet
- Please send me a fully detailed brochure (Tick box applicable)



NAME..... Call sign.....

ADDRESS.....

Town.....County.....

52

JACK TWEEDY G3ZY

SPEEDY AND RELIABLE SERVICE
Eddystone Receivers and Accessories Stocked

New Receivers: KW77, MK4, £120; TR10, 9R59, 59 gns.; Eddystone 870A, £30.17.6; Hammarlund HQ 170A, £140.

Transmitters, etc.: Hammarlund HX50, £175; KW Viceroy with extra ½ lattice filter, £165; MOSLEY VERTICAL AERIALS, TYPE V46, £14 each; Geloze VFO units. Codar preselectors, etc. EAGLE RF INDICATORS, TYPE RF40, £3.9.6 each.

Used equipment in good condition: MR38 Receiver, £30; BC348Q, £14; R209 (6V, 1 to 20 mc/s.) with spare brand new front end, £10; U.S.N. 4 metre Transmitter and Receiver R.C.A., Type TB58. New and unused, less valves, £12; Valves available. 19 sets, 46 sets, R109s, Valves, transistors, components. Please S.A.E. for list.

H.P. terms available. Generous trade-in allowance on your used equipment.

(Please state age, condition and approximate price required)

21 Birkin Lane, Grassmoor, Chesterfield

Tel.: Holmewood 506

AUTUMN BARGAINS

G2ACC offers 50% to 75% price reductions on brand new standard catalogue items (no ex-Govt. equipment) from his illustrated catalogue, No. 12. All bargains for a limited period and absolutely unrepeatable. Apply for details stating if you already have a copy of this catalogue.

Southern Radio & Electrical Supplies

SO-RAD WORKS . REDLYNCH . SALISBURY . WILTS

Telephone : Downton 207.

Short Wave Magazine

Advertising

gives

World-Wide Coverage

in the

Amateur Radio Field

For Space Rates apply:

ADVERTISEMENT MANAGER,

SHORT WAVE MAGAZINE, LTD.,

55 Victoria Street, London, S.W.1.

(Tel.: Abbey 5341)

EVERYTHING FOR THE ENTHUSIAST

AERIAL EQUIPMENT

TWIN FEEDER. 300 ohm twin ribbon feeder similar K25 6d. per yard. K35B Telecon (round) 1/6 per yard. 75 ohm twin feeder 6d. per yard. Post on above feeders and cable, 1/6 any length.

COPPER WIRE, 14G, H/D, 140 ft., 17/-; 70 ft., 8/6, post and packing 2/6. Other lengths pro rata.

RIBBED GLASS 3" AERIAL INSULATORS. 1/9 each, P. & P. 1/6 up to 12.

SHELL INSULATORS 2" 9d. each. P. & P. 2/- up to 12.

FEEDER SPREADERS. 6" Ceramic type F.S., 10d. each. Postage 1/6 up to 12.

CERAMIC CENTRE PIECE for dipoles, Type AT, 1/6 each. P. & P. 1/-.

2 METRE BEAM, 5 element W.S. Yagi. Complete in box with 1" to 2 1/2" masthead bracket. Price 49/- P. & P. 3/6.

SUPER AERIAL, 70/80 ohm coax, 300 watt very low loss, 1/8 per yard. P. & P. 2/-.

FOR THE DX ENTHUSIAST

MOSLEY TRAP BEAMS
Vertical 3 Band V3 ... £7 10s.
3 Band 3EL Beam TA 33dr. £24 15s.
Also the NEW Single Band Power Beams. Send for details.
50 ohm, 300w. 1/4" coax Low loss. Ideal for Mosley and other beams, 1/9 per yd. P. & P. 2/-.

BARGAIN TRANSFORMER OFFER. Made by Parmeko, half shrouded with screened primary, 200-240v. tapped, 200-0-200v., 40 mA., 6.3v. 3 Amp. Only 12/6, P. & P. 2/6. These are not Ex W.D.

FOSTER DYNAMIC MICROPHONES. Type DFI, H1Z, 50k. with stand and halter. Superb quality 52/6 P. & P. 2/-.

METERS. 3 1/2" Round 2 1/2" Scale, 2 Types 0-10 mA. and 0-100 mA. 15/- each, P. & P. 1/6, 0-2.5 Amp. Thermo 2 1/2" 7/6 each, P. & P. 1/6.

TRANSMITTING VARIABLES. Type TS 80S 80pf, Split Stator 80pf. per section .070 spacing, 22/6 each, P. & P. 2/6.

NEUTRALISING CONDS. Type N.C. 15, 15pf. max. .090 spacing, 4/6 each, P. & P. 1/6.

MIC 40 XTAL HAND MIKES. New Boxed, 19/6, P. & P. 1/6.

B.I. 8 MFD. 1200v. D.C. Wkg. Capacitors, 12/6 each. Post paid.

SCREENED MICROPHONE CABLE. 1st grade, 9d. yard. Plus postage.

10 CORE (5 PAIRS) SCREENED CABLE. 1/8 yard. All plus 2/6 P. & P.

COMPLETE SETS OF VALVES. For AR88 (14), £3 10s. Post free.

FERRITE BEADS for the S Band Aerial, 50 for 15/- or 100 for 30/- post paid.

150 OHM VERY LOW LOSS BEADED COAX. 20 yard lengths, only 10/- each. Post free.

TOUGH POLYTHENE LINE. Type ML1 (100 lbs.) 2d. per yard or 12/6 for 100 yards. Type ML2 (220 lbs.) 4d. per yard, or 25/- per 100 yards, post free.

ABSORPTION WAVEMETERS. 3.00 to 35.00 Mc/s. in 3 Switched Bands. 3.5, 7, 14, 21 and 28 Mc/s. Ham Bands marked on scale. Complete with indicator bulb. A MUST for any Ham Shack. ONLY 22/6 EACH. Post free.

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/-.

EDDYSTONE TRANSMITTING VARIABLES. Type 611, 25 x 25 pF. .08" Gap, 612, 50 x 50 pF and 725, 100 pF. Diff. All 10/- each. Post free.

GELOSO VFO UNITS. 4/102 with new dial and escutcheon. Outputs on 80, 40, 20, 15 and 10. For 2-807 or 6146 Tubes. Only £8 13 6. 3 valves to suit, 24/- ALL POST FREE.

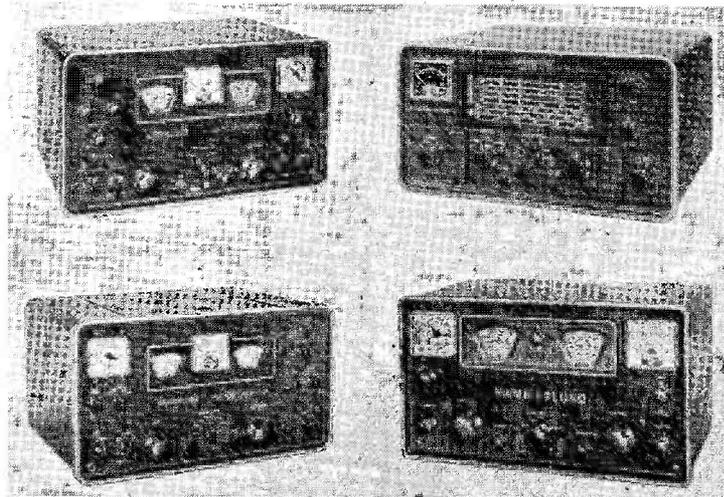
SHADED POLE MOTORS, 230 v. or 110 v. operation, ideal for fans, blowers or models. Single Unit 12/6 plus 2/- P. & P. or Pair £1 plus 2/6 P. & P.

AMATEUR RADIO
CHAS. H. YOUNG LTD.

170-172 CORPORATION ST.
BIRMINGHAM 4
Telephone No.: CEN 1635

Part of the range of HAMMARLUND (established 1910)

equipment specially designed for the discriminating Radio Amateur



All are available from the sole U.K. Distributors.

Top left:

HQ145X. Double conversion super. General coverage and Bandspread, 11 tubes, £110.

Top right:

HX50. SSB Transmitter. 130 watts p.e.p., crystal filter, self-contained power supply, £175.

Bottom left:

HQ170A. Triple-conversion super. Amateur bands only. 17 tubes, £140.

Bottom right:

HQ100A. General coverage and Bandspread. "Q" Multiplier. 10 tubes, £80 (clocks extra).

Other models include the HQ180A, HQ180AX, HQ110 and SP600 receivers, the HK1B keyer unit, etc.

Easy terms available.

K. W. ELECTRONICS LTD.

Vanguard Works, 1 Heath Street, Dartford, Kent

Telephone: Dartford 25574

A Selection from

Heathkit
PASSION

World Famous Kit-Sets

Radio - Amateur Gear - Test Instruments - Educational - Hi-Fi Equipment

A wide range of over 50 different British models to choose from. Send for FREE Catalogue

All models are available either in kit form or assembled (kit prices are given here— assembled prices on request)



SB-10U



DX-40U



RA-1



DX-100U



OS-1

AMATEUR TRANSMITTER. Model DX-40U. Compact and self-contained. From 80-10 m. Power input 75 W. CW., 60 W. peak, C.C. phone. Output 40 W. to aerial. Provision for V.F.O. £33 19 0

SINGLE SIDEBAND ADAPTOR. Model SB-10U. May be used with most A.M. transmitters. Less than 3 W. R.F. input power required for 10 W. output. Operation on 80, 30, 20, 15 and 10 m. bands on U.S.B., L.B.S. or D.S.B. £39 5 0

THE "MOHICAN" GENERAL COVERAGE RECEIVER. Model GC-1U. In the forefront of design with 4 piezo-electric transistors, 10 transistors, variable tuned B.F.O. and Zener diode stabiliser. An excellent fully transistorised receiver for both Amateurs and Short-wave listeners. See specification Sheet. £39 17 6
Suitable Battery Eliminator. Model UBE-1. £2 17 6

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

OPTIONAL EXTRAS. Crystal Calibrator CL-1 £4 12 0. Matching Loudspeaker Cabinet SG-4 £1 9 6. Loudspeaker £1 4 5-incl. P.T.

AMATEUR TRANSMITTER. Model DX-100U. Covers all amateur bands from 160-10 metres, 150 watts D.C. Input. Self-contained incl. power supply, modulator and V.F.O. £74 19 0

2½in. PORTABLE SERVICE 'SCOPE OS-1. A compact, portable oscilloscope ideal for servicing and general laboratory work. Overall size 5" x 8" x 14½" long, weight 10½ lb. £19 19 0



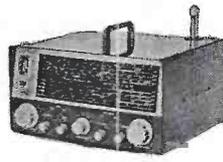
O-12U



V-7A



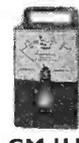
GD-1U



GC-1U



QPM-1



CM-1U



VF-1U

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

GRID DIP METER. Model GD-1U. Continuous coverage 1.8 to 250 Mc/s. Self-contained. 5 plug-in coils supplied £10 19 6.

R.F. SIGNAL GENERATOR. Model RF-1U. Provides extended frequency coverage in 6 bands from 100 Kc/s. to 100 Mc/s. and up to 200 Mc/s. on calibrated harmonics. Up to 100 mv output on all bands. £12 15 6

RES. CAP. BRIDGE. Model C-3U. Measures capacity 10 pF to 1,000 µF., resistance 100 Ω to 5 M Ω and power factor. 5-450 V. test voltages. With safety switch. £9 5 0

VALVE VOLTMETER. Model V-7A. 7 D.C., A.C., r.m.s. and pk. to pk. Voltage ranges 0-1.5 to 1,500 v. £13 18 6

5in. OSCILLOSCOPE. Model O-12U. Has wide-band amplifiers, essential for TV servicing, F.M. alignment, etc. Vertical freq. response 3 c/s. to cover 5 Mc/s. without extra switching. T/B covers 10 c/s to 500 Kc/s. in 5 ranges. £35 10 0

"OXFORD" TRANSISTOR PORTABLE. Model UXR-2. A luxury two waveband receiver, ideal for use in the home or out of doors. £14 18 0

SHORT WAVE TRANSISTOR PORTABLE. Model RSW-1. Four bands (2 short, Trawler and Medium). £19 17 6

SEE US AT STAND 6
RSGB INTERNATIONAL RADIO
COMMUNICATIONS EXHIBITION
Seymour Hall London Oct 30-Nov 2

£12 15 0

£13 18 6

£9 5 0

£35 10 0

£14 18 0

£19 17 6

THE "GLOUCESTER" EQUIPMENT CABINET

All prices include free delivery U.K.
Deferred terms on orders above £10

6-W STEREO AMPLIFIER. Model S-33. 0.3% distortion at 2.5 W/chnl. Inputs for Radio (or Tape) and Gram., Stereo or Monaural. £13 7 6

De-luxe version. Model S.33H. £15 17 6

VAR. FREQ. OSCILLATOR VF-1U. Calibrated 160-10m. Fund. outputs on 160 and 40 m. Ideal for our DX-40U and similar transmitters. £11 17 6

Q MULTIPLIER KIT. Model QPM-1. May be used with receivers having 450-470 kc/s. I.F. provides either additional selectivity or signal rejection. Self powered. £7 12 6
Model QPM-16 for 1.6 Mc/s. I.F. £7 12 6

HI-FI FM TUNER. 89-108 Mc/s. Tuning unit (£2 15 0 incl. P.T.) with 10.7 Mc/s. I.F. output and I.F. amplifier (£12 6 0) complete with cabinet and valves; self powered. Total £15 1 0

HI-FI AM/FM TUNER. FM: 89-108 Mc/s.; **AM:** 16-50, 200-550, 900-2000 m. Tuning heart (£4 13 6, incl. P.T.) and I.F. amplifier (£20 13) complete with cabinet and valves; self powered. Total £25 6 6

HI-FI SPEAKER SYSTEM. Model SSU-1. Ducted-port bass reflex cabinet "in the white." Two speakers. (With legs £11 12 0) £10 17 6

TAPE RECORDING/PLAYBACK AMPLIFIER. Thermometer type recording indicators, press-button speed compensation and input selection. Printed Circuit Board. Mono Model TA-1M £19 2 6
Stereo Model TA-1S. £24 10 0

HI-FI EQUIPMENT CABINETS. Range now available to suit all needs. From £6 19 6 to £29 8 0

CAPACITANCE METER. CM-1U. Direct-reading 4½in. scale. Full-scale ranges, 0-100 µµF, 0-1,000 µµF, 0-0.01 µF and 0-0.1 µF. £15 15 0

DUAL-WAVE TRANSISTOR PORTABLE. Model UXR-1. Medium and long wavebands. Real hide case. £12 11 0

Please send me **FREE CATALOGUE** (Yes/No)
Full details of model(s).....

NAME.....
(BLOCK CAPITALS)
ADDRESS.....
SW11

DAYSTROM LTD

DEPT. SW11, GLOUCESTER, ENGLAND

A member of the Daystrom Group
manufacturers of the

WORLD'S LARGEST SELLING ELECTRONIC KITS

Printed by The Courier Printing Co. Ltd., Tunbridge Wells for the Proprietors and Publishers, The Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1. The Short Wave Magazine is obtainable abroad through the following: Continental Publishers & Distributors, Ltd., William Dawson & Son, Ltd.; AUSTRALIA AND NEW ZEALAND—Gordon & Gotch, Ltd.; AMERICA—International News Company, 131 Varick Street, NEW YORK. Registered for transmission to Canada by Magazine Post. October 1963.