

The SHORT WAVE Magazine

VOL. XV

APRIL, 1957

NUMBER 2



communication

world wide

FOR THE RADIO AMATEUR AND AMATEUR RADIO

H. WHITAKER G3SJ

Court Road, Newton Ferrers, SOUTH DEVON
(A.R.B. APPROVED)

Telephone 320
Newton Ferrers

Precision crystals of all types in a wide variety of bases covering the complete range 50 kc/s to 18 mc/s in fundamental frequencies. All are made to extremely fine tolerances and frequency adjustment can be given up to .005%. Plated electrodes of gold, silver, or aluminium with wired in spot welded contacts are available. Quotations can be given for any type of cut, or mode of oscillation, including a complete range for filters with zero temperature co-efficient over a sensibly wide temperature range.

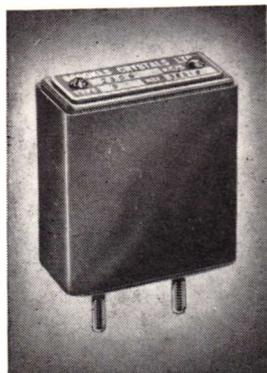
Special Offer :

400 crystals in the range 7100 to 7150 kc/s inclusive. Brand new and unused post-war production. Specification: BT cuts, zero temperature co-efficient, gold plated electrodes, wired into FT 241 type holders with standard $\frac{1}{2}$ " pin spacing. Accurately calibrated. Better than average activity, EPR is better than 14 K. Ohms at 30 pf. input capacity. Price 18/- each, post free. All fully guaranteed and unrepeatable at today's prices. The offer applies only to the range mentioned above, all frequencies between 7100 and 7150 kc/s available.

VHF ENTHUSIASTS

No more change of doublers ! A complete new range of crystals for DIRECT output up to 74 mc/s when using only a simple RF pentode oscillator such as Z77, EF80, etc. full details of this range on request.

BROOKES Crystals



mean
DEPENDABLE
frequency
control

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

- Black bakelite case.
- $1\frac{1}{2}$ " high x $1\frac{1}{8}$ " wide x $\frac{3}{8}$ " thick.
- Two $\frac{1}{8}$ " dia. pins spaced $\frac{3}{8}$ " centres.

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



Brookes Crystals Ltd

Suppliers to Ministry of Supply, Home Office, BBC, etc.
181/183 TRAFALGAR RD., LONDON, S.E.10.
Tel. GREenwich 1828. Grams: Xtals Green, London

The 'Minimitter' Amateur Band Converter

Designed by the makers of the famous MINIMITTER transmitting equipment, to convert any receiver into a highly efficient communication instrument.



- Covers 5 Amateur Bands 3.5 to 30 Mc/s.
- Full Band-spread coverage of each band.
- I.F. Output 1.5 or 6.0 Mc/s. to order.
- Feed into your Car Radio or I.F. Amplifier for superb Mobile Operation.
- Size: 8" x 7" x 6 $\frac{1}{2}$ "
- Silver-Grey Hammer Finish.
- Convert your Broadcast or surplus receiver into a Communications Instrument, or vastly improve the performance of your present Communications Receiver.
- Complete with internal A.C. Mains Power Supply, which can be switched out for Battery-Mobile Operation.
PRICE £17 CARR. PAID
H.P. Terms now available.

For full Details send S.A.E. to:—

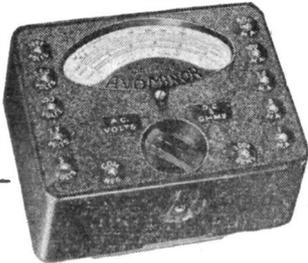
THE MINIMITTER COMPANY

37 Dollis Hill Avenue, London, N.W.2. Tel. GLA. 9436

'AVO' Precision ELECTRICAL TESTING INSTRUMENTS

A dependably accurate instrument for testing and fault location is indispensable to the amateur who builds or services his own set. Stocks are now available of these two famous "Avo" Instruments. If you have any difficulty in obtaining one locally, please send us the name and address of your nearest Radio Dealer.

THE UNIVERSAL AVOMINOR



D.C. VOLTAGE	A.C. VOLTAGE
0-75 millivolts	0-5 volts
0-5 volts	0-25 "
0-25 "	0-100 "
0-100 "	0-250 "
0-250 "	0-500 "
0-500 "	
D.C. CURRENT	RESISTANCE
0-20,000 ohms	0-2.5 milliamps
0-100,000 "	0-5 "
0-500,000 "	0-25 "
0-2 megohms	0-100 "
0-5 "	0-250 "
0-10 "	0-500 "

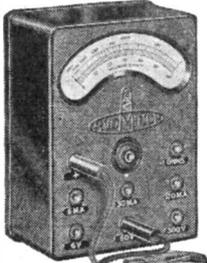
A small but highly accurate instrument for measuring A.C. and D.C. voltage, D.C. current, and also resistance. It provides 22 ranges of readings on a 3-inch scale, the required range being selected by plugging the leads supplied into appropriately marked sockets. An accurate moving-coil movement is employed, and the total resistance of the meter is 200,000 ohms.

The instrument is self-contained for resistance measurements up to 20,000 ohms and, by using an external source of voltage, the resistance ranges can be extended up to 10 megohms. The ohms compensator for incorrect voltage works on all ranges. The instrument is suitable for use as an output meter when the A.C. voltage ranges are being used.

Size : 4½ ins. x 3½ ins. x 1½ ins.
 Nett weight : 18 ozs.
 Price : £12 : 0 : 0

Complete with leads, interchangeable prods and crocodile clips, and instruction book.

THE D.C. AVOMINOR



CURRENT
0- 3 milliamps.
0- 6 "
0- 30 "
0-120 "
VOLTAGE
0- 6 volts.
0- 12 "
0- 60 "
0-120 "
0-300 "
0-600 "
RESISTANCE
0- 10,000 ohms
0- 60,000 "
0-600,000 "
0-3 megohms

A conveniently compact 2½-inch moving coil precision meter for making D.C. measurements of milliamps, volts and ohms. The total resistance of the meter is 100,000 ohms, and full scale deflection of 300 v. or 600 v. is obtained for a current consumption of 3mA. or 6mA. respectively

Size : 4½ ins. x 3½ ins. x 1½ ins.
 Nett weight : 12 ozs.
 Complete as above.
 Price : £5 : 5 : 0

● Complete descriptive Booklet available on application to the Sole Proprietors and Manufacturers :

The **AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT CO. LTD.**



Immediate Delivery from Stock

THE RADIO AMATEUR'S HANDBOOK

(Published by A.R.R.L.) 1957 Edition. Price 34s. Post Free.

RADIO AMATEUR CALL BOOK

Winter Edition. Abridged Edition excludes only American amateur stations. Otherwise complete with latest call sign-address listings for all countries, and including much DX data. In its 34th year of publication. Abridged Edition, Price 17s. 9d. Post Free. Complete Edition, Price 37s. 6d. Post Free. Winter Edition out of print, SPRING available April/May.

THE RADIO HANDBOOK 14th Edition

American, Published by "Editors and Engineers," 768 pages, 60s. Post Free.

	Post Free		Post Free
ANTENNA HANDBOOK (Published by A.R.R.L. (7th Edition)	19s. 0d.	NOVICE HANDBOOK (Available Mar.-Apr.)	23s. 6d.
AUSTRALIAN RADIO AMATEUR CALL BOOK (Contains up-to-date list of all VK's)	2s. 6d.	OPERATING AN AMATEUR RADIO STATION (Published by ARRL).....	2s. 8d.
A COURSE IN RADIO FUNDAMENTALS (New Edition)	10s. 6d.	PRACTICAL DISC RECORDING	6s. 6d.
BASIC AUDIO COURSE.....	22s. 6d.	RADIO AND TV HINTS.....	8s. 6d.
BASIC RADIO COURSE.....	19s. 0d.	SERVICING RECORD CHANGERS	24s. 0d.
BEAM ANTENNA HANDBOOK.....	22s. 0d.	SINGLE SIDEBAND FOR THE RADIO AMATEUR.....	14s. 6d.
HAMS INTERPRETER Published by OH2SQ	7s. 0d.	SINGLE SIDEBAND TECHNIQUES.....	14s. 6d.
HIGH FIDELITY by G. A. BRIGGS (Published by Wharfedale Wireless).....	12s. 6d.	SURPLUS CONVERSION MANUAL Vol. 1	21s. 0d.
HIGH-FIDELITY TECHNIQUES.....	8s. 6d.	Vol. 2	21s. 0d.
HINTS AND KINKS, Vol. 5.....	11s. 0d.	SWEEP MARKER GENERATORS FOR TELEVISION RADIO.....	20s. 6d.
HOW TO BECOME A RADIO AMATEUR	5s. 0d.	THE OSCILLOSCOPE.....	18s. 6d.
HOW TO LISTEN TO THE WORLD (Latest Edition). For the SWL.	7s. 6d.	TRANSISTORS —	
LEARNING THE RADIO TELEGRAPH CODE	4s. 6d.	THEORY AND PRACTICE (Gernsback)	16s. 6d.
MAINTAINING HI-FI EQUIPMENT.....	24s. 0d.	TRANSISTOR TECHNIQUES (Gernsback)	12s. 6d.
MOBILE HANDBOOK (Published by CQ)...	17s. 6d.	UHF ANTENNAS, CONVERTERS AND TUNERS.....	12s. 0d.
MOBILE MANUAL (Published by ARRL) (Second Edition)	22s. 0d.	VHF HANDBOOK	24s. 0d.
MODEL CONTROL BY RADIO.....	8s. 6d.	WORLD RADIO TELEVISION VALVE HANDBOOK	14s. 9d.
		WORLD RADIO HANDBOOK. 1957 Edition	13s. 0d.

	One Year		One Year	
MAGAZINES BY SUBSCRIPTION	AUDIO.....	40s. 0d.	RADIO AND TELEVISION NEWS.....	36s. 0d.
	CQ, RADIO AMATEUR'S JOURNAL..	44s. 0d.	RADIO ELECTRONICS	33s. 0d.
	ELECTRONICS (Trade only).....	160s. 0d.	SERVICE.....	24s. 0d.
	POPULAR MECHANICS	32s. 0d.	TELEVISION	48s. 0d.
	POPULAR SCIENCE.....	45s. 0d.	TELEVISION ENGINEERING.....	32s. 0d.
	QST, ARRL.....	36s. 0d.	Subscription Service for all American Radio and Technical Periodicals.	

SHORT WAVE MAGAZINE

(PUBLICATIONS DEPARTMENT)

55 VICTORIA STREET · LONDON · S.W.1 · ABBEY 5341

There is always a fine selection of equipment at The Walk-around Shop

LABORATORY RESISTANCE BRIDGE

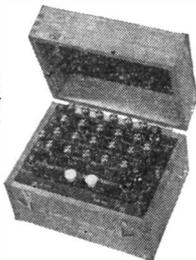
A Standard Resistance Box containing 22 hand-wound non-inductive resistance coils of manganin (co-efficient of expansion .000006) which provides a 1 to 11,110 ohm standard at 60°F in 1 ohm steps for meter calibration, etc. The coils are connected to heavy machined brass blocks in which shorting plugs are arranged to form the two ratio arms and variable arm of a Wheatstone bridge.

The ratio arms of x 1/100, x 1/10, x 1, x 10 and x 100 enable the variable arm to measure by direct comparison unknown resistances between .01 and 1,111,000 ohms.

Heavy brass binding posts, an infinity plug, battery and galvo keys, and ratio arms isolating link incorporated. New in teak box with operating instructions and explanatory circuits.

Size 5½" x 6" x 8": £2.10.0, plus 5/- p.p.

Size 10" x 6½" x 6½": £3.10.0, plus 8/6 p.p. (Larger unit is of superior finish with ebonite insulated shorting plugs.)



EDDYSTONE 358

COMMUNICATIONS RECEIVERS (B34)

Range 40 kc/s to 31 Mc/s covered with 10 plug-in coils: only 4 coils available covering 1250-2100 kc/s, 2100-4500 kc/s, 4500-9000 kc/s, 9000-22000 kc/s. Selectivity: 2 kc/s at 2.5 db down; 5 kc/s at 35 db down; 150 c/s at 4 db down. Supply required: 6V 1.4A; 175/200V 65mA. CIRCUIT: variable mu pentode H.F. Amplifier, Triode-Hexode frequency changer, two I.F. Amplifiers (450 kc/s), A.V.C./Detector/A.F. Amplifier, output stage, B.F.O. Valve che k Meter. £7 without power supply. Plus £1 packing and carriage.

COWL GILL MOTOR

THE PERFECT BEAM ROTATOR. This motor was designed to run on 24 volts d.c. but will successfully operate on 6 to 24 volts d.c./a.c. if the magnetic clutch is removed (not needed for use in conjunction with Beam rotating, as reduction gears are sufficient to stop wind movement).

There is a limit switch incorporated which allows rotation of 2½ turns in either direction (Co-axial cable can be used instead of slip rings on mast). Speed can be varied by voltage input. Easily waterproofed for exterior use. Size 12" long, x 4" dia. ½" splined drive. Price 25/- each, plus 3/- p.p.

HEATER TRANSFORMERS

6.3 volt, 1½ amp.; brand new, 6/6, plus 1/- p.p.

SMALL MAINS TRANSFORMERS

Input 230V 50 cycles, output 250 V 40 mA, 6.3V 1.5A. Size 3.9" x 2.4" x 2". Ideal for TV converters. Price 12/6 each, plus 1/- p.p.

CHARGER TRANSFORMERS

For 6 or 12 volt; 230 volt 50 cycles input, 9 and 17 volt 3 amp. output. Price 15/6 each, plus 1/- p.p.

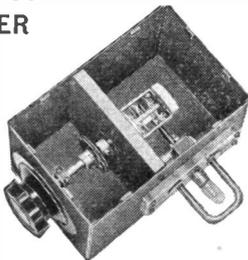
ABSORPTION WAVEMETER

Easily converted to 2 metres or 70 cm. In Copper-Plated metal case 3½" x 4½" x 5½" with dial calibrated 0-100 and 80v. Neon tube. Coverage approx. 190-210 Mc/s. New. 6/6 each, post paid.

RELAYS

Sensitive Single Pole change-over 2,000 ohm Coil. 10 volt D.C. Mounted on insulated base 2½" x 2½" x 1". American manufacture. New and Boxed. Price 12/6 p.p.

4 Pole change-over. Miniature Relay 200 coil. 24.27 volts D.C. Size: 1½" x 1½" x 1½". American manufacture. Price 7/6 p.p.



E.M.I. TEST EQUIPMENT FOR AMATEURS

SPOT FREQUENCY MARKER. Type AD/U405. Operating on a frequency of 1 Mc/s and generating harmonics at 1 Mc/s intervals up into the V.H.F. range.

V.H.F. GRID DIP OSCILLATOR. Type AD/U406. Frequency may be varied over the range 65-150 Mc/s and accuracy is within ± 2% at all frequencies within this range. Consumption 0.3 Amp. at 6.3V and 3mA at 150-250V. A stabilised power supply is not essential.

ABSORPTION WAVEMETER Type AD/U408. This consists of a variable tuned circuit, across which is connected a germanium crystal in series with a 500 microammeter. Frequency range is continuous from 1.6-30 Mc/s. Accuracy is within ± 2%.

V.H.F. ABSORPTION WAVEMETER AND FIELD STRENGTH METER. Type AD/U409. Of similar design to the Absorption Wavemeter, but for operation in the frequency range 65-150 Mc/s, accuracy being within ± 2% over the specified range. The external coupling element consists of a single turn loop connected to the instrument by 2 feet of co-axial cable. A terminal is provided for the connection of a short rod aerial, to enable comparative field strength checks to be made, and, using such an aerial, the instrument can also be used as a carrier shift indicator, as a check on over-modulation of transmitters. The case, finished in pale green, with rubber feet, measures 8½" x 4½" x 2½".

GENERAL PURPOSE POWER SUPPLY UNIT. Type AD/U410. L.T. supply being isolated from earth. A separate H.T. "On/Off" switch is provided. Input: 200-250 volts, 50 Cycles A.C. only. Output: 6.3 Volts at 2 amps. approx. and 250 Volts at 60mA (unstabilised). Dimensions: 8½" x 4½" x 5½".

All Above Units New and Boxed

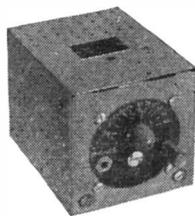
AD/U 405-406-408-409 £3 . 10 . 0 each
AD/U 410 Power Unit £4 . 0 . 0 each

Postage*and Packing 3/-

BEACON RECEIVER BC1206A

Covering 200-400 kc/s. Valve line up: 6K7 RF; 6SA7 frequency changer; 6SK7 I.F. amplifier; 6SQ7 det; 28D7 O/P.

This was designed to run on 24/28V d.c. HT/LT. Excellent basis for car radio; size 6" x 5" x 4". Good working order. £3.5.0 each, plus 5/- carriage.



COMMUNICATION RECEIVER CG.46116

(General Electric U.S.A.) Highly sensitive receiver 1500 to 9000 kc/s (200-232) metres continuous coverage with overlaps in 4 channels. 3 I.F. stages, 3 R.F. stages and I.F. break-through trap. B.F.O. and O/P. Valve line up: 5 12SK7s, 12K8, 12SR7, 12A6. Neon static in antenna circuit. Fully valued £8.10.0, plus 10/- pack. and carriage.

BENDIX TRANSMITTERS TYPE TAI2B

Master oscillator type transmitter. Four-channel 40W., operation, provide telephone, CW or MCW in frequency ranges of 300-600 kc/s, 3-4.8 Mc/s, 4-6.4 Mc/s, 4.37-7 Mc/s. Each of the 4 channels has its own oscillator and uses a 12SK7. The IPA stage consists of an 807 while the PA is two 807s in parallel. Size 10½" x 6½" x 15½". Price £3.15.0, plus 10/- carriage.

USA ALTITUDE SWITCHES

Totally enclosed incremental network of 14 x 2.5K ohms 10% 1 watt resistors on two bank 11 way Yaxley type switch unit. Insulated mounting flange and handsome glass covered dial with large central switch knob covering 11 positions in steps of 25 "feet." Rear socket, 4 connections to network and earthing point for screening. 3" dia. x 5" long. Brand New, Boxed. 4/- post free.

RADIO ALTIMETER

5 mA panel mounting meter, 3" dia., 8" circular scale. Large magnet. Scale easily removable leaving finished faceplate for re-calibration. Basis for sensitive portable multimeter. Brand New, Boxed. 7/6 post free.

Note: Carriage prices quoted apply only to England and Wales.

PROOPS

BROS. LTD.,
DEPT. 'S' · 52 TOTTENHAM COURT ROAD · LONDON, W.1.

Shop hours 9 a.m. to 6 p.m.—Thurs.: 9 a.m. to 1 p.m.

Head Office: Telephone : LANgham 0141

Mail order enquiries: Telephone: EUSton 8812

OPEN ALL DAY SATURDAY.

Junction Transistors

by



GET 3 · GET 4 · GET 5 · GET 6

The accumulated improvements resulting from a year's run on pilot plant production of the EW53, EW58 and EW59 have been incorporated in the factory products being issued under reference GET 3, GET 4, GET 5 and GET 6.

GET 3 · GET 4

These are general purpose transistors for 6 and 12V operation. They are capable of a good HF performance and can be used in amplifiers at 315 and 465 kc/s

GET 3—22/-; GET 4—27/-

GET 5

Two watts of audio are available from a pair under class B push-pull conditions. This performance is obtainable combined with the high frequency performance typical of a small transistor.

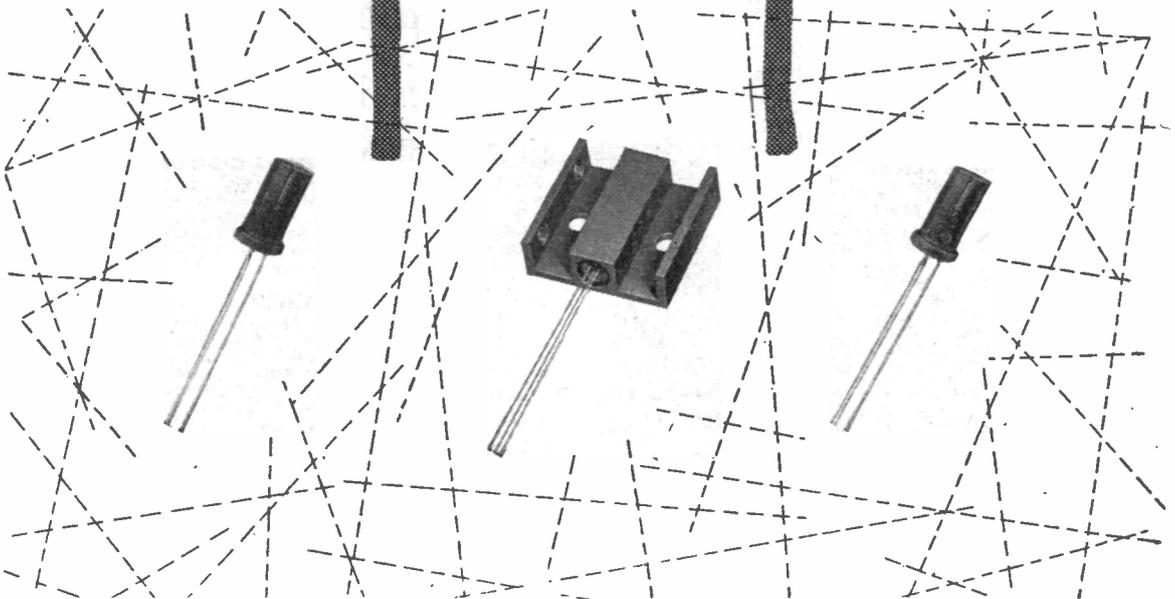
GET 5—£2.13.0

GET 6

This transistor features an extremely low noise level which has hitherto been unobtainable with transistors.

Noise factor	6db
f=1 kc/s	R _s =500Ω
V _c =2V	I _e =0.5mA

GET 6—£1.17.6



Full particulars of these devices can be obtained from G.E.C. Valve and Electronics Dept.

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

INDEX TO
ADVERTISERS

	PAGE
Altham Radio	112
Anglin	112
Automatic Coil	57
Brookes Crystals, Ltd.	<i>cover ii</i>
Brown, S. G.	<i>cover iii</i>
Candler System	109
Electronic Precision Equip.	111
E.M.I. Institutes	111
G.E.C.	60
Harris, P.	110
Henley's	108
Henry's	<i>cover iv</i>
Home Radio	<i>cover iii</i>
Minimitter	<i>cover ii</i>
Mullard	62
Panda	107
Popular Mechanics	112
Proops	59
Radiocentre	106
Rollet, H.	112
Small Advertisements	108-112
Southern Radio	109
S.W.M. Publications Dept.	58
Universal Electronics	107
Whitaker	<i>cover ii</i>
Young	<i>cover iii</i>

SHORT WAVE MAGAZINE

VOL. XV

APRIL 1957

No. 164

CONTENTS

	Page
Editorial	63
A Practical Oscilloscope Design , by <i>W. E. Thompson</i>	64
Modulation with Economy , by <i>C. J. Morris, D.F.M. (G3ABG)</i>	68
Relay Control for Small Transmitters , by <i>W. R. Ohlsen (G3FVH)</i>	70
Changing Crystal Frequency , by <i>R. H. Wright (G3IBX)</i>	71
Eddystone "888" — Test Report	72
An Introduction to Amateur Radio, Part II	77
DX Commentary , by <i>L. H. Thomas, M.B.E. (G6QB)</i>	80
SSB Topics , by <i>R. L. Glaisher (G6LX)</i>	87
Aerial Filter for Two Metres , by <i>W. F. Neal (G3FUL)</i>	92
VHF Bands , by <i>A. J. Devon</i>	93
High Performance Converter for the 23-Centimetre Band, Part II , by <i>A. L. Mynett, B.Sc. (G3HBW)</i>	97
The R.R.A.E.	101
New QTH's	103
The Month with the Clubs — From Reports	104

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

Advertisement Manager : P. H. FALKNER

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

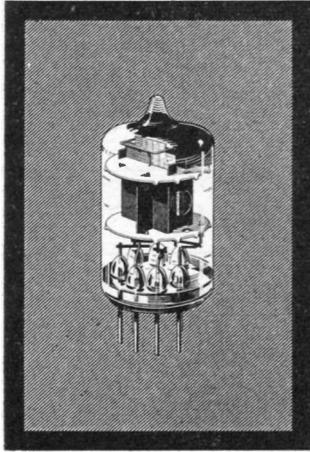
Annual Subscription : Home and Overseas 30s. post paid.

Copyright Reserved throughout the World.

AUTHORS' MSS

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

A superior dual control pentode



Services type number
CV2522

Heater

Vh	6.3	V
Ih	175	mA

Capacitances

	With shield	Without shield	
cg1-a	< 0.02	< 0.025	pF
cg3-a	0.7	0.7	pF
cg1-h+k+g2 +g3+a+s	4.0	3.9	pF
cg3-h+k+g1 +g2+a+s	3.4	3.3	pF
ca-h+k+g1 +g2+g3+s	3.0	2.2	pF
cg1-g3	< 0.15	< 0.15	pF

Characteristics

Va	120	120	V
Vg3	-3.0	0	V
Vg2	120	120	V
Vg1	-2.0	-2.0	V
Ia	3.6	5.2	mA
Ig2	4.8	3.5	mA
gm (g1-a)	1.85	3.2	mA/V
gm (g3-a)	810	470	μ A/V
ra	-	110	k Ω
Vg1 (Ia = 10 μ A)	-	7.5	V
Vg3 (Ia = 10 μ A)	-10	-	V

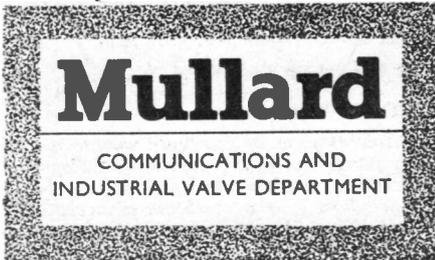
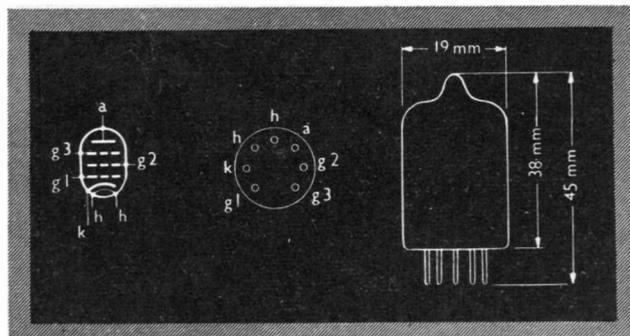
Limiting Values

Va max.	180	V
pa max.	1.7	W
Vg2 max.	140	V
pg2 max.	750	mW
Vg3 max.	27	V
Vh-k max.	90	V

The 6AS6 is a dual control pentode intended for switching or gating applications or for use as a frequency changer.

It is a short suppressor base version of the 6AK5 and is particularly suited for equipment for the American market. Widely used in America and elsewhere, it is manufactured and marketed by Mullard under the American type number 6AS6.

This pentode is designed for operation from 120 volt supplies and is, therefore, convenient for use in conjunction with the 6AK5.



MULLARD LIMITED • MULLARD HOUSE • TORRINGTON PLACE • LONDON • WC1

The SHORT WAVE Magazine

EDITORIAL

Noises

Radio reception at any frequency from MF to VHF, almost anywhere in this country, is subject to noise interference of all kinds, at varying levels and degrees of intensity. Some of this noise is caused by natural phenomena over which man can have no control—but a lot of it is directly due to apparatus, machinery and power distribution systems that are inherently noisy and uncontrolled in the purely electrical sense. To this great barrage are shortly to be added two tremendous new weapons, which will almost certainly have a paralysing effect on all radio equipment operated within their range. These sources are the British Railways main line electrification scheme, and the Super-Grid. What nobody can say now is exactly what their interference areas are likely to be.

The former development we have referred to already (p. 107, April 1956 SHORT WAVE MAGAZINE). Briefly, the plan is that British Railways' electrification shall be at 25,000 volts AC collected. As the highest voltage at present in use, by rail conduction, in this country is 660v. DC (which itself creates very considerable local interference) it is a fair assumption that the new system will produce a high level of noise over a wide area—not only by reason of the voltage involved, but because the feeder line will be equivalent to a long, well insulated aerial of constantly varying inductance.

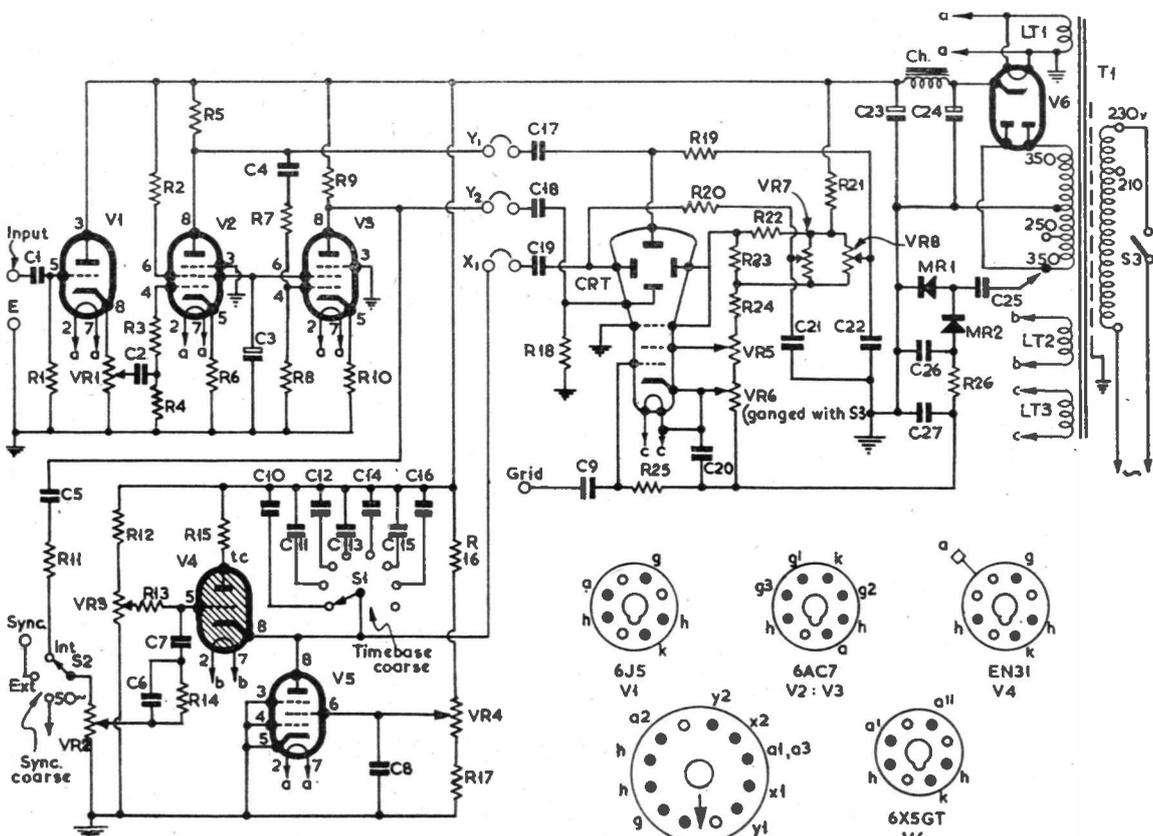
As regards the Super-Grid, now under construction, this envisages a high-pylon power distribution network operating at 275,000 volts, more than twice the EHT grid transmitting voltage in service at the present time.

The effect of noise radiated by EHT lines on radio frequencies is well known already. For the Super-Grid, the highest voltage yet used is to be doubled. In our climate, one can imagine what the state of the insulators will be for most of the time, and how frequently corona effects will develop under particular atmospheric conditions. Yet at all such times the primary requirement will be met—the system will operate quite satisfactorily as a means of transmitting power.

However, it is pertinent to ask whether any practical or theoretical investigations have been carried out to arrive at some conclusion as to the area of radio interference likely to be created by the British Railways network on 25,000 volts AC, and by the Super-Grid energised at 275 kV.

If no such information is available, and nothing is being done to minimise radio interference, then it would seem that both the Central Electricity Authority and British Railways—while they have produced schemes which are entirely sound in the strictly engineering sense—are about to add enormously to the general radio noise level over wide areas of the country. Moreover, this is being done without the slightest regard either for the convenience of the public or for the efficiency of many of the very important radio communication centres, operated by the Services and various organs of Government, which will certainly be brought within range of these new noise sources.

Austin Fobell
G6FO.



VR1: Y Amp. VR5: Focus.
 VR2: Sync. fine. VR6: Brilliance.
 VR3: X Amp. VR7: X Shift.
 VR4: Timebase fine. VR8: Y Shift.

Circuit of the Oscilloscope complete, all values being given in the table. The design incorporates such refinements as are necessary for practical work on the bench, and the circuit can be put together from readily available parts. Note that the base connections for the 6SK7, V5, are the same as for the 6AC7, used at V2 and V3. At position 8 of the time-base switch S1, stray capacity is relied upon for this highest-frequency range.

Table of Values

Circuit of the Oscilloscope.

C1, C5, C20 = 0.1 μ F 350v., paper	C15 = 0.001 μ F 350v., paper	R7 = 560,000 ohms, $\frac{1}{2}$ -w.	VR7, VR8 = 2 megohms, carbon
C2, C8, C10, C17, C18, C19 = 0.5 μ F, 350v. paper	C16 = 300 μ F 350v., mica	R8, R25 = 47,000 ohms, $\frac{1}{2}$ -w.	S1 = 1p-3w. (part of 4p-3w.) switch
C3 = 8 μ F 450v., electrolytic	C23, C24 = 16 + 16 μ F 450v., electrolytic	R11, R14, R21, R22 = 1 megohm, $\frac{1}{2}$ -w.	S2 = 1p-8w. (part of 1p-12w.) switch
C4 = 0.2 μ F 350v., paper	C25 = 0.1 μ F 600v., paper	R12, R16 = 47,000 ohms, 1-w.	S3 = On/off ganged with VR6
C6 = 500 μ F 350v., mica	C26 = 0.25 μ F 1kv., paper	R13 = 10,000 ohms, $\frac{1}{2}$ -w.	MR1, MR2 = SenTerCel K3/15, Brimar
C7 = 0.05 μ F 350v., paper	C27 = 0.1 μ F 1kv., paper	R15 = 500 ohms, 2-w. w/w.	V1 = 6J5
C9, C13, C21, C22 = 0.01 μ F 350v., paper	R1 = 3.9 megohms, $\frac{1}{2}$ -w.	R18, R19, R20 = 2 megohms, $\frac{1}{2}$ -w.	V2, V3 = 6AC7
C11 = 0.15 μ F 350v., paper	R2, R17 = 4,700 ohms, $\frac{1}{2}$ -w.	R26 = 100,000 ohms, 1-w.	V4 = EN31, Mullard
C12 = 0.04 μ F 350v., paper	R3 = 1,000 ohms, $\frac{1}{2}$ -w.	VR1 = 10,000 ohms, 1-in. w/w.	V5 = 6SK7
C14 = 0.003 μ F 350v., paper	R4, R23, R24 = 470,000 ohms, $\frac{1}{2}$ -w.	VR2, VR3, VR4 = 50,000 ohms, lin. w/w.	V6 = 6X5GT
	R5, R9 = 6,800 ohms, 1-w.	VR5 = 1 megohm, carbon	CRT = VCR.139A
	R6, R10 = 220 ohms, $\frac{1}{2}$ -w.	VR6 = 100,000 ohms, carbon, with on/off sw.	Ch. = 15H 60 mA choke
			T1 = Mains transformer, see text

D
76

phase to produce symmetrical deflection. The only change here is the use of a 6J5 in place of the 6C5, since several of the former, but none of the latter, were to hand. Such small differences in characteristics that published data for the two types reveal are of no consequence in the cathode-follower application. The simple arrangement for synchronizing the trace has been retained, though provision has been made in the instrument design to incorporate a 6AC7 as an auto-sync. stage at a later date.

In the Haas and Hallows circuit the tube network forms part of the circuit arrangement for a DG72 cathode ray tube. Having a VCR139A and several circuits appertaining thereto on hand, it was finally decided to replace this with the arrangement given by E. N. Bradley in *The Oscilloscope Book* (published by Norman Price, Ltd.). This circuit also has provision for variable beam-blanking on the return X-trace, and it is hoped that this can be adapted later for use with the thyratron time-base circuit.

In place of the now obsolete J50 metal recti-

fiers specified by Bradley for the EHT voltage-doubler, SenTerCel K3/15 selenium elements were chosen, and circuit values adjusted accordingly. The rectified HT from the 6X5 has been stepped up to about 350v.; otherwise the features of Bradley's circuit have been retained.

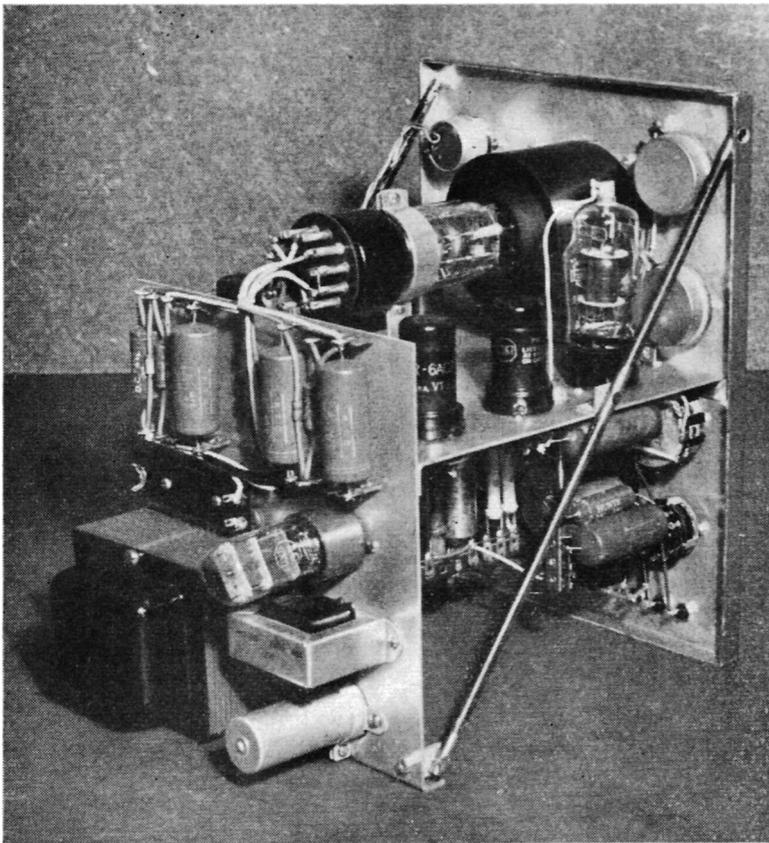
Mains Transformer

A suitable design for a transformer to provide all required voltages was produced using a 1 $\frac{3}{8}$ -in. stack of 1 $\frac{1}{4}$ -in. waste-free type laminations, taken from old transformers on hand. A bobbin was fabricated from sheet paxolin and the windings put on with a simple winder fitted with a modified cyclometer as a turn-counter. A tapping at 250v. in one half of the 350v. HT secondary was brought out so that some means would be available of setting the EHT voltage correctly. Finer adjustment, if required, can be obtained by altering the value of the 100,000-ohm smoothing resistor, R26. Winding details of this transformer are given in the Appendix. A commercially-made component of about the same

ratings can, of course, be used instead.

Layout and Construction

Among the various bits and pieces stowed away because "they might be useful sometime" was a louvred metal case from an ex-Government unit acquired long ago. With its frontal opening of 11 $\frac{1}{2}$ -in. high by 8 $\frac{1}{2}$ -in. wide, and depth of 12-in., it seemed just the thing to use. Thus were dictated essential measurements of front panel and depth of chassis measurements. The location of the panel controls was set out on paper, the position of each being related as nearly as possible to the wiring layout which would ensue, having regard to a functional and symmetrical placement of parts on panel and chassis. Thus, the X- and Y-shifts, brilliance (incorporating mains on-off switch) and focus controls are grouped around the CRT on the upper part of the panel. Below the tube are the remaining controls, and along the bottom



Half-rear view of the Oscilloscope, showing construction round the tube, a VCR139A. The general arrangement is discussed in the text.

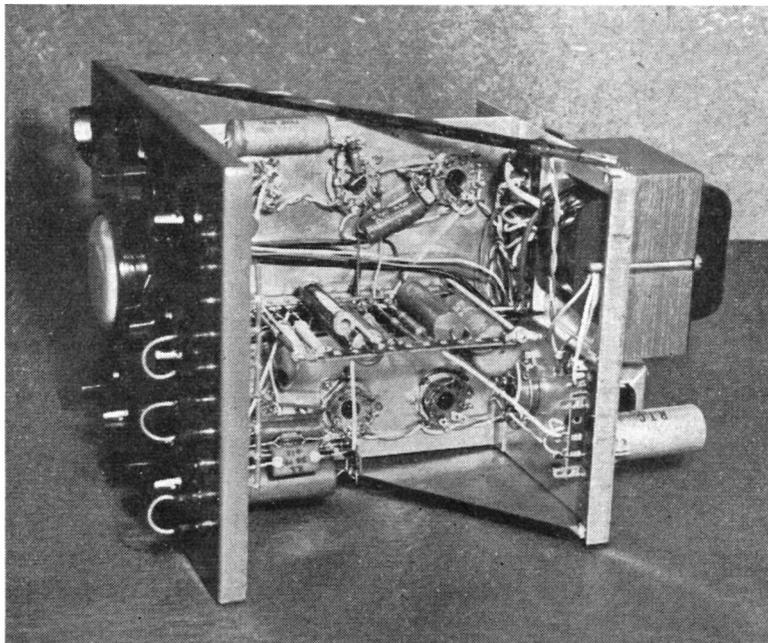
are ten Clix wander-plug sockets to serve as access connections for the instrument. Bulgin K370 knobs and K371 plain bevelled escutcheons produce a very pleasing "instrument" appearance, while the tube surround is the bakelite case from one of those cross-over meters which are available on the surplus market. If need be, this mount could be reversed to form a hood for the tube-face. Whichever form of mounting is adopted, the tube-face fits nicely into the aperture after removal of the glass from the meter case.

All round the front panel is a $\frac{1}{2}$ -in. lip to make it rigid. The simple chassis deck and the rear upright chassis, like the front panel, are made from 16 SWG sheet aluminium, very few bends being required. Two $\frac{1}{2}$ -in. diam. rods form triangular bracing to strengthen the assembly.

The front panel is finished with "Belco" Winchester Blue brushing cellulose. Legends and figures for the controls are Panel-Sign transfers. The only screw-heads visible on the front panel are those used to secure the tube surround. Two countersunk screws which fix the chassis to the panel are concealed by the outermost escutcheons immediately below the tube mount.

Valves for the time-base and Y-amplifier are mounted on the chassis deck. Viewed from the front panel, the time-base valves are on the left of the tube, the EN31 being nearest the front panel. The 6AC7 for future use as auto-sync. is at the rear. On the right of the tube are the 6J5 cathode-follower nearest the panel, with the two 6AC7 Y-amplifiers behind. A simple support made from 16 SWG aluminium forms a clamp which fits snugly round the tube neck to locate it at the correct height above the chassis. Under the chassis, and along its centre, is a group board on which are mounted resistors and condensers. Other components of this sort are wired directly to valveholders and panel-controls where possible.

The rear panel carries the 6X5 rectifier and the other HT and the EHT components. At the top of this panel, each side of the tube



The construction underside of the Oscilloscope. The transformer is a home-made item, for which the necessary details are given in the text. It can, of course, be substituted by any commercial product providing the required outputs.

socket, are two small group boards carrying the resistors and condensers associated with the tube circuits. The mains transformer and the smoothing choke are mounted well away from the tube to avoid magnetic deflection of the electron-beam. [over

Appendix

TRANSFORMER WINDINGS

Primary:	0-210-230v. 50 c.p.s. 605 + 58 turns 28 SWG enam. Layers interleaved with 3-mil paper.
Screen:	1 turn insulated foil.
HT sec. :	350-0-350v. 60 mA, with tapping at 250v. in one half. 1080 + 770 + 310 turns 38 SWG enam. Layers interleaved with 1-mil paper.
LT sec. 1:	6.3v. 2.5a. 20 turns 18 SWG enam. in one layer.
LT sec. 2:	6.3v. 1.3a. 20 turns 22 SWG enam.—part layer.
LT sec. 3:	4v. 1a. 13 turns 22 SWG enam.—part layer.

The last two windings are on the same layer, placed at each end of the layer.

Interleaving paper, and material for the screen, obtained from discarded paper condensers.

All windings separated from each other by three turns of 5-mil Empire cloth. Two turns of same material over the whole winding as a finish.

Quantities of wire : 5-oz. 28 SWG enam.
3-oz. 38 SWG enam.
2-oz. 18 SWG enam.
1-oz. 22 SWG enam.

Calculated efficiency at full load is 86.5 per cent.

Liberal use has been made of tag strips, either as such or in pairs to make group boards. Some detailed consideration of component layout in relation to the schematic circuit enabled the writer to design particular forms of tag strips which locate components just where they are needed in relation to wiring and other parts. Such items are easily fabricated from Radiospares 28-tag strips, the tags being re-arranged as required and the strips cut to the desired lengths.

Conclusion

As with any apparatus design which reveals evidence of some thought in its production, this instrument is the result of a fair amount of preliminary planning. This entailed the "placing" and "wiring" on paper of components and parts before a single hole was made in the metalwork. The design thus evolved and

pictured here is thought to be reasonably presentable, as well as being open enough in construction to allow easy access to all components for maintenance purposes—a requirement all too frequently overlooked in the build-it-as-you-go technique. Incidentally, it did succeed in winning for the author that pewter tankard referred to earlier!

Acknowledgments

To the authors of publications mentioned in this article whose circuits have been used or adapted; to colleague F. Blakemore for cutting into a full size sheet of 16 SWG aluminium for the metal-work, and bending it much neater than the writer could have done; to J. L. Warne for taking the photographs illustrating this article. And, finally, to the XYL for allowing the dining room to be commandeered so that the thing could be built in comfort.

Modulation with Economy

MODERN CATHODE-CONTROL UNIT

C. J. MORRIS, D.F.M. (G3ABG)

Modulation on the cathode of a PA stage is no new idea, though the older circuits involved some sort of transformer or matching network to achieve full control, and hence power in the modulator section itself. In the circuit discussed here, the ubiquitous 6Y6—well known for its capacity to take punishment in the clamp-tube application—is used as the cathode series element, modulation of the PA then being obtained by grid control of the 6Y6. The HT

THIS circuit is a modified version of a unit which has been published, and achieved great popularity, in the U.S.A. It is excellent for mobile operation where economy of power supplies is essential, and for the amateur who operates mainly on CW, but likes the occasional phone contact. The simplicity of the circuit should appeal to the newly-licensed amateur, who may not wish to embark on relatively expensive high-level modulator and power pack.

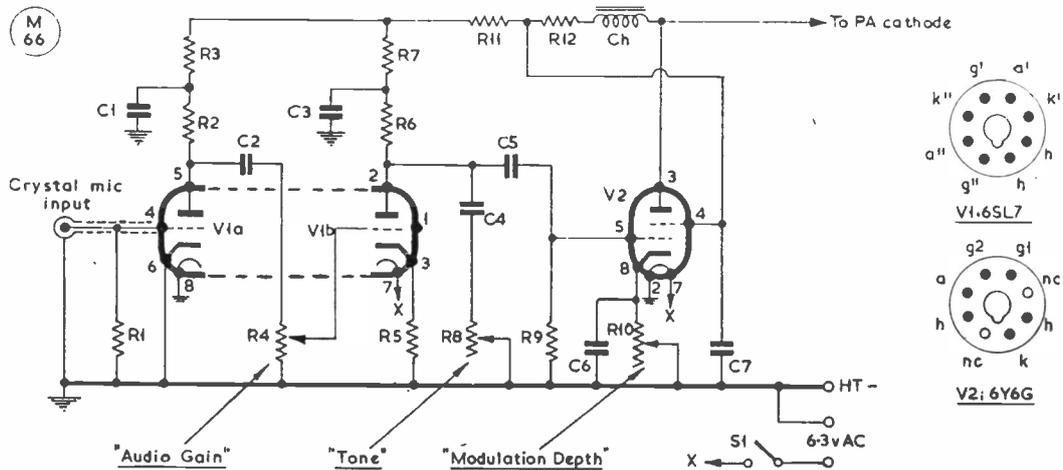
The main feature of the circuit is that no HT power supply is required; the only transformer necessary is a small heater transformer capable of providing 6.3 volts at 2 amps. When

for the audio section is taken from the PA cathode itself—thus, this modulator requires no separate HT supply, and so can be constructed as a unit to plug into the cathode side of any RF power amplifier. It should be noted that, as in all such systems, it is only possible to get deep modulation by reducing the carrier level to about 60% of that obtainable under full CW conditions. However, this is no great disadvantage at stations where telephony operation is not of prime importance, or when a simple modulator system is required only for the convenience of working the locals.—Editor.

the modulator is inserted in series with the cathode of the transmitter PA valve by means of a jack plug and socket, HT is obtained automatically, the 6Y6G valve acting as a variable cathode resistor, varying in accordance with the audio voltage applied to its grid from the 6SL7 speech amplifier.

Few components are required and the average amateur will have most of these in his stock pile. The modulator at G3ABG was constructed in an empty RF-25 unit case. No details of the construction have been given, as any small chassis will be suitable, and no special precautions need be taken in the layout, other than ensuring that the microphone side is well screened to avoid hum and RF feedback troubles. The grid resistor, R1, can be mounted directly in the microphone housing. Ch. can be any audio choke which will pass 20 mA or so.

Using a cheap crystal insert of the "surplus"



Circuit of the cathode modulator unit, in which the control valve V2 (6Y6 or KT66) is the series element in the PA cathode, modulation being effected by audio control of V2 grid, in the usual way. The circuit is so arranged that HT for the audio side is obtained from the PA cathode line, there being a voltage drop across V2. The twin-triode circuit V1a, V1b will give enough gain for a crystal microphone, and the whole unit can be built as a self-contained piece of apparatus, to plug into the cathode of any PA—see text for discussion.

Table of Values

Circuit of the Cathode Modulator Unit

C1, C3,	R6, R9 = 100,000 ohms, ½-w.
C7 = 8 µF, 450v. elect.	R8 = 25,000 ohms, var.
C2 = .005 µF, 350v. w.	R10 = 500 ohms, w/wound,
C4, C5 = .01 µF, 500v. w.	var.
C6 = 50 µF, 50v. w. elect.	R12 = 2,000 ohms, 2-w.
R1 = 3 megohms, ½-w.	S1 = Single-pole toggle
R2 = 220,000 ohms, ½-w.	Ch. = Audio choke, 20 mA
R3, R7,	V1a,
R11 = 22,000 ohms, ½-w.	V1b = 6SL7, 12AX7, or
R4 = 500,000 ohms, var.	ECC83
R5 = 2,200 ohms, ½-w.	V2 = 6Y6, or KT66

type, excellent quality reports are obtained. The twin-triode 6SL7 valve gives no distortion of waveform, and degenerative feedback is obtained across R5, which is not bypassed.

The writer has tried most forms of "efficiency" modulation and has found that the settings of aerial coupling and PA grid drive are inclined to be critical. But with this system there are no tedious adjustments. Once set for any given RF power input to the transmitter, the modulator unit should require no further attention.

Getting It Going

Setting-up procedure takes only a few seconds and should be carried out as follows:

- (1) Apply heater voltages to both the transmitter and the modulator.
- (2) Tune the transmitter PA in the normal manner for maximum input, then switch off the PA HT.
- (3) Insert the modulator jack plug, wired one side cathode and the other to the base line,

switch on PA HT and adjust the "modulation depth" control R10 on the modulator unit until the PA anode current meter shows about 60% of the previous reading.

(4) Advance the modulator "audio gain" control R4 until a neon bulb coupled to the aerial circuit shows a perceptible increase on modulation peaks, or there is a 25% increase in the reading in an RF ammeter in the aerial.

Valves to Use

Tests have shown that a 12AX7 or an ECC83 twin-triode valve functions well as V1; no suitable substitute was to hand for the 6Y6G, though a KT66 should work. A 6L6 valve was tried, but control was found to be somewhat erratic. Using a 6Y6G the maximum PA anode current before the modulator is connected is 200 mA, so the system is very suitable for the popular parallel or push-pull 807 combination.

The writer has used this system for several months to modulate an 813 PA on 80, 15 and 10 metres. Results have been outstanding, reports from DX stations comparing very favourably with the reports obtained with a Class-B 807 anode-and-screen modulator. Using simple doublet aerials, S9 reports have been received from W6, ZS and VK, and many DX stations have commented upon the high intelligibility of the signal. Some seven out of every ten stations raised on 80-metre phone when using this system have requested details of the circuit.

The unit has also been tested on the Top

Band transmitter and local amateurs have come back with such comments as "best quality ever heard from your station."

During CW operation, with the audio gain control turned to minimum, adjustment of the modulation depth control provides a convenient means of varying the transmitter power input to any desired figure up to the maximum.

Relay Control for Small Transmitters

USING PA SCREEN CURRENT

W. R. OHLSEN (G3FVH)

WITH the advent of portable and mobile working on a much larger scale than hitherto, it is not unusual to find the same transmitter being used in the fixed and portable modes of operation. In either application, it is very desirable to have some form of rapid change-over, and relay control is usually necessary to switch the aerial, VFO, PA, modulator and, sometimes, the common HT supply.

For convenience, it is usual to operate the relays from the LT line when working as a portable or mobile station, and the system adopted will generally be a low-resistance relay with the necessary contacts operated from a "push-to-talk" switch. This system is simple, takes up little space, and will be quite satisfactory so long as the relay supply is DC. If, however, the same transmitter is in use at the home station with an AC supply for the heaters, satisfactory operation is not possible unless the relay system is specially designed.

The merit of the system described here will enable operation from either mains or batteries without modification, and with standard type relays.

Relay Circuit

The arrangement is as shown in the diagram, the general points being as follows: The relay coil is a high-resistance type connected in series with the PA screen, and should be chosen so that satisfactory operation is assured (having regard to the number of contacts) on about 8-10 mA. A standard PO relay of 1000 to 1500 ohms is satisfactory; the value of the normal screen resistance is reduced by that of the coil.

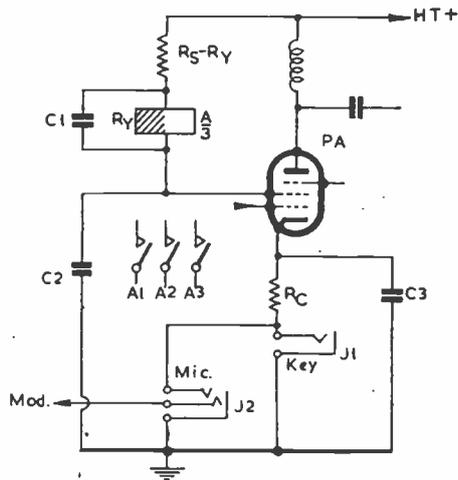
In conclusion, the writer would like to thank the many amateurs who have co-operated to test the effectiveness of the circuit by means of comparative reports, oscilloscope checks and tape recordings, as well as those who have suggested that this circuit be published in order that British amateurs can enjoy the many advantages of the system.

The push-to-talk switch is wired in the PA cathode in parallel with the key jack. When it is pushed, the screen of the PA takes current which actuates the relay, and the necessary switching functions are performed.

It will be seen that this system will work equally well irrespective of the source of supply, so that the difficulty of fixed operation with mobile equipment is overcome.

The large condenser, C1, connected across the relay performs two functions; first, it bypasses the audio frequency component when anode-and-screen modulation is employed; secondly, it puts a delay on the release of the relay when CW is used.

On CW, the initial "make" of the key will change over as for phone operation, and will hold in this condition until the condenser discharges through the relay coil to the value at which it releases.



Q
143

The circuit discussed in the article by G3FVH. The values of C2, C3 and Rc are as normally used, the screen resistor would have to be reduced by the resistance of the relay (Rs-Ry) and C1 is explained in the text. J1, J2 could be combined as one, the action of the device being that when the cathode circuit is closed, the valve draws screen current, thus actuating the relay, used for the control and change-over circuits. The valve operating conditions must, of course, be such that cathode current is not completely cut off when it is undriven—there must be some standing current to work the relay.

By suitable choice of value for C1 the relay can be made to "hang" over the spaces between keyed words, and a very useful form of modified "break-in" is obtained. The value will depend to a large extent on the relay and its adjustment, as well as the operator's normal keying characteristic, but something like 25-50 μ F is satisfactory; as the voltage-drop across the coil is small a low-voltage type can be used.

The system as described has been used in

a small mobile/portable/fixed transmitter for a period of a year or so, and has proved very reliable in operation both on phone and CW, with a PA which takes a small standing cathode current when undriven.

In the author's transmitter, where space was at a premium, the two jacks, J1, J2, were replaced by the single three-contact jack; then, by suitable plug wiring, the same jack is used for microphone, key, and tuning milliammeter.

CHANGING CRYSTAL FREQUENCY

SIMPLE GRINDING TECHNIQUE

R. H. Wright (G3IBX)

AS there are a quantity of quartz crystals (outside the amateur bands) available at the present time suitable for regrinding, a few words on the subject for the benefit of the relative newcomers to Amateur Radio might be timely.

As things are these days, there is a marked tendency to control transmitter frequency by means of a variable frequency oscillator (VFO). While such a method has many advantages in the hands of an experienced operator, for the beginner the well-trodden "CO-PA" path is usually to be preferred—at least until some experience in amateur work has been gained—since transmission frequency is always in the band and RST reports almost invariably T9 or T9x.

To change the frequency of a quartz crystal—and, incidentally, the frequency can only be *increased* by this method—the first necessity is a sheet of good plate glass about a foot or so square. Very fine grade carborundum paste can be used as the abrasive, but for the beginner a slower but surer alternative is one of the standard household scouring powders such as "Vim."

To Grind the Crystal

Scatter a quantity of the powder on to the centre of the glass and add a little water to make a stiff paste, place the crystal in the centre of the mess and rub in a figure-8 pattern, applying medium pressure to the back of the crystal with the first two fingers of one hand. This motion assists in keeping the crystal flat. If the crystal is hard to move across the glass add a few spots of water to the paste. As the paste becomes smooth more powder and water may be added, a little of each at a time. In general, about ten minutes of this rubbing will increase the frequency of a 5 mc crystal by about 300 kc, but *frequent checks of the frequency should be made*, particularly in the later stages as the crystal approaches the desired frequency. It is not possible to be specific about grinding time against frequency—this technique is very much a matter of "cut-and-try." It is advisable

always to grind the same face of the crystal.

Before replacing the crystal in the holder for a frequency check, it should be thoroughly scrubbed in warm water using an old soft toothbrush and then carefully dried; remember that these crystals are easily cracked and should, therefore, be handled with great care. Another method of cleaning is to dip the crystal in a bath (egg-cup) of "Thawpit," the well-known household cleaner, which is carbon tetrachloride.

Should the crystal fail to oscillate after a spell of grinding, provided it has not been fractured in any way the most probable reason will be dirt or moisture on the crystal itself or on the electrodes, so be sure that these are clean and dry. If the activity of the crystal is still down, it can often be restored by bevelling all eight edges, but this will also increase the frequency of oscillation.

To test the crystal easily and quickly, make up a Pierce oscillator—see any handbook for the circuit—which is untuned and will go off at any frequency from one megacycle upwards. Alternatively, the tuned CO which is to work with the crystal can, of course, be used. The station communications receiver will tell you where you are with the frequency.

One final word of warning: Before using the crystal in a transmitter, have it checked for frequency to ensure that your transmission is within the band. It is almost certain that at least one member of your local club will have a 100 kc crystal standard or a good wavemeter and so will be able to check your frequency to within a few kilocycles.

GETTING IT REGULARLY

Like almost all other periodicals, SHORT WAVE MAGAZINE can be obtained through any bookstall or newsagent—whether in the heart of a great city, or in a village post office where they sell sweets with the daily newspapers. This does not necessarily mean that the *Magazine* will be stacked on the counter to catch the eye of casual customers. Rather is it to say that your local newsagent, whoever he is or wherever he may be, can always obtain SHORT WAVE MAGAZINE, in any reasonable quantity, from one to one hundred copies, either through his usual wholesaler or by order direct to us. It will help him as much as it helps us if you place an order for your copy.

Eddystone "888"

AMATEUR BAND COMMUNICATIONS RECEIVER

TEST REPORT

As we know, many readers have been waiting for a comment on the new Eddystone 888, the first British receiver designed and built exclusively for amateur band reception.

It is not intended here to repeat the performance data and the technical specification, given in detail in the makers' descriptive literature, but rather to discuss the "888" strictly from the point of view of its operation, handling and behaviour on the amateur bands, under practical on-the-air conditions—that is to say, the results the receiver is capable of giving in the hands of the discriminating user.

The first point to make is that the price has been built into the "888." Nowadays, it is not possible to produce a really good article cheaply. In the case of the "888," its list price merely reflects the high cost of developing the design and, hence, the quality of the finished job, considered as piece of mechanical and electrical engineering produced for a specific purpose.

Band Spread and Calibration

All six amateur bands, Top to Ten, are well spread over a wide, fully calibrated scale; this is scanned by a free-running cursor moved smoothly by a flywheel mechanism. One can either spin rapidly across a band or, with equal ease, tune closely on to a signal with absolute certainty.

The degree of band-spread provided and the accuracy with which tuning can be done are features of particular importance on our bands as they are today. In the "888," tuning on 10 metres is as smooth and easy as on 160 metres—and on all bands one can read off the frequency to well within the limits practicable, or necessary, in normal amateur working. To be able to get within, say, 5 kc on 10 metres would be near enough for most people—but, in fact, you can do much better than that (to within 2 kc on 28 mc) while on 160 metres a frequency can be set up to within a fraction of a kilocycle. On the bands between, the scale and calibration accuracy varies between these limits, as one works either up or down in frequency.

This is only possible because calibration accuracy is maintained by a built-in crystal calibrator, giving 100 kc points throughout the whole tuning range, combined with an oscillator fine-setting adjustment as a front-panel control. The crystal calibrator is itself push-button controlled from the front panel; when the button is pressed, the receiver is muted, and, with the main dial set to the band-edge (or any 100 kc scale point) the oscillator control is adjusted to zero-beat with the crystal calibrator.

For accurate working, the oscillator has thus to be re-set with each change of band—a matter of a few seconds only.

Noise Limiting and Selectivity Controls

In the "888," noise can be limited, or controlled, in three ways: By use of the noise limiter itself, by increasing selectivity, and, in CW reception, by use of the AF filter at the audio end of the receiver.

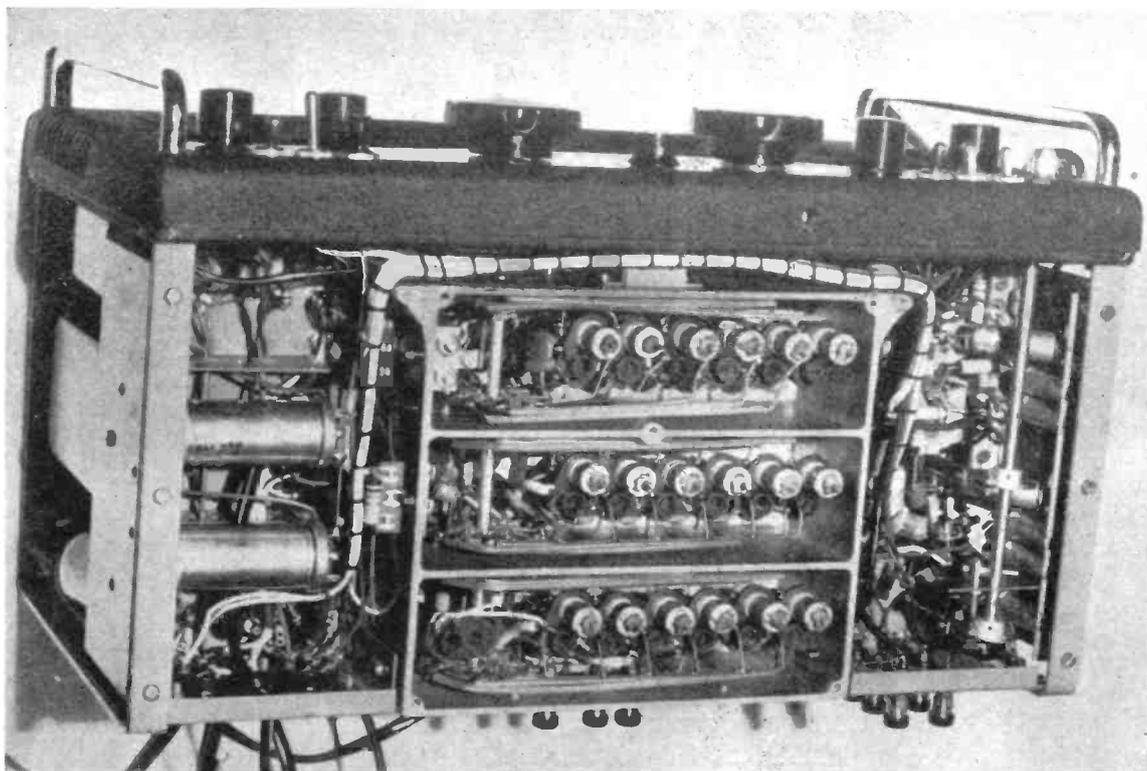
The noise limiter will cut staccato peaks to a low level, and is particularly effective on Loran, on stray noise such as occurs when the receiver gains are well up, and on sideband splashing or key clicks from a nearby transmitter.

In previous Eddystone designs, a system of constantly variable selectivity has been used, and this is incorporated in the "888." It permits a variation of selectivity over a wide range on the IF side; under the normal conditions of amateur-band reception it is a most essential operating control. As the IF response is sharpened, so selectivity is increased and noise-level is reduced, enabling more gain to be used. The inherent selectivity is in any event high, because the receiver is a double-superhet with 85 kc as the second IF channel.

The Audio Filter

For the CW operator, this will be found to be a most fascinating refinement. The filter comes in, by switching, before the final output stage, and can be made to "ring" at 1,000 cycles on an incoming CW signal; the effect is to pick out and build up the wanted signal to a much higher level than is possible without the filter. It is brought into operation first by tuning the wanted signal in the ordinary way, then switching in the filter, and finally ringing the signal by adjustment of the BFO. When the 1000-cycle beat is obtained, the gains can be turned up and the signal will stand out clear of noise and interference. Hence, it can be described as an additional selectivity control.

An interesting feature of the AF filter is the



Underside view of the Eddystone "888," showing general construction. The central complex is the heart of the receiver—the RF, mixer and oscillator tuning assembly, fully screened in an aluminium casting. The lower compartment is the RF section, followed by the mixer, with the oscillator section nearest panel. The band-change switch mechanism is the control on the left; it gives smooth but positive action. The rod on the extreme right is the variable selectivity control, engaging the cores of T2, T3 (see circuit diagram). Construction throughout is meticulous, with good accessibility for maintenance and servicing.

way it can be used to check the stability of the signal on tune—the filter is so sharp that the slightest drift or irregularity is shown up. It will be found that in listening to a DX signal or, even more particularly, when working one, very few will stay within the narrow pass-band of the filter. Yet, even on 10 metres, there are stations so stable on frequency that they will come back and ring the filter every time. This is a test of the stability both of the distant station and the receiver itself.

Sensitivity and Gain

The overall sensitivity of the "888" is such that full gain — RF and IF — can seldom be used. Nevertheless, at normal loud-signal settings, the receiver is extraordinarily quiet—so much so that in tuning between phone stations on, say, 10 metres, it sounds almost dead, until one hits a signal.

During tests, the performance of the "888" was tried in comparison with some seven other receivers of different types and makes. Taking

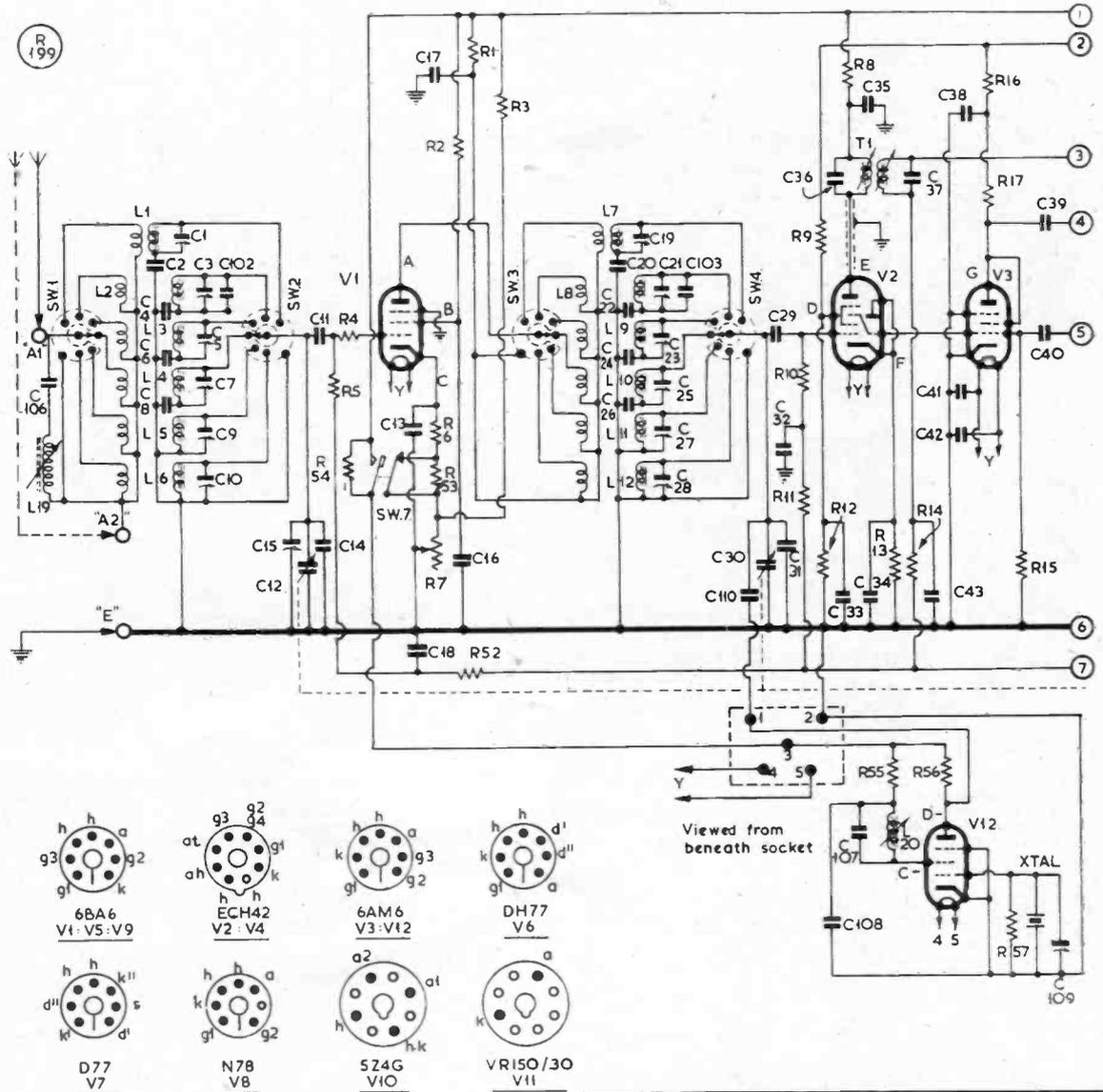
10 metres as the test band, the "888" produced louder, steadier signals, much easier to find and tune, than any of the other receivers.

The time constant for the delayed AGC has been set at a good average value, and telephony signals are held steady over a wide range of input variation.

It can be said, therefore, that in terms of gain, sensitivity and AGC action the "888" gives an outstanding performance. At all times, one feels that there is plenty in hand, and that there is no need to squeeze the receiver to get the utmost in sensitivity. One obvious reason for this is that the design takes full advantage of the fact that with only the six amateur bands to cover, the circuits can be peaked to give optimum results over what are relatively narrow frequency ranges.

SSB Reception

In taking an SSB signal, it will be found that entirely satisfactory results will be obtained by using the BFO, with the RF gain right up,



and controlling the level on the IF gain, with whatever AF setting is required to give a tolerable audio output. This is the usual method of tuning an SSB signal on a receiver not specially adapted for sideband reception.

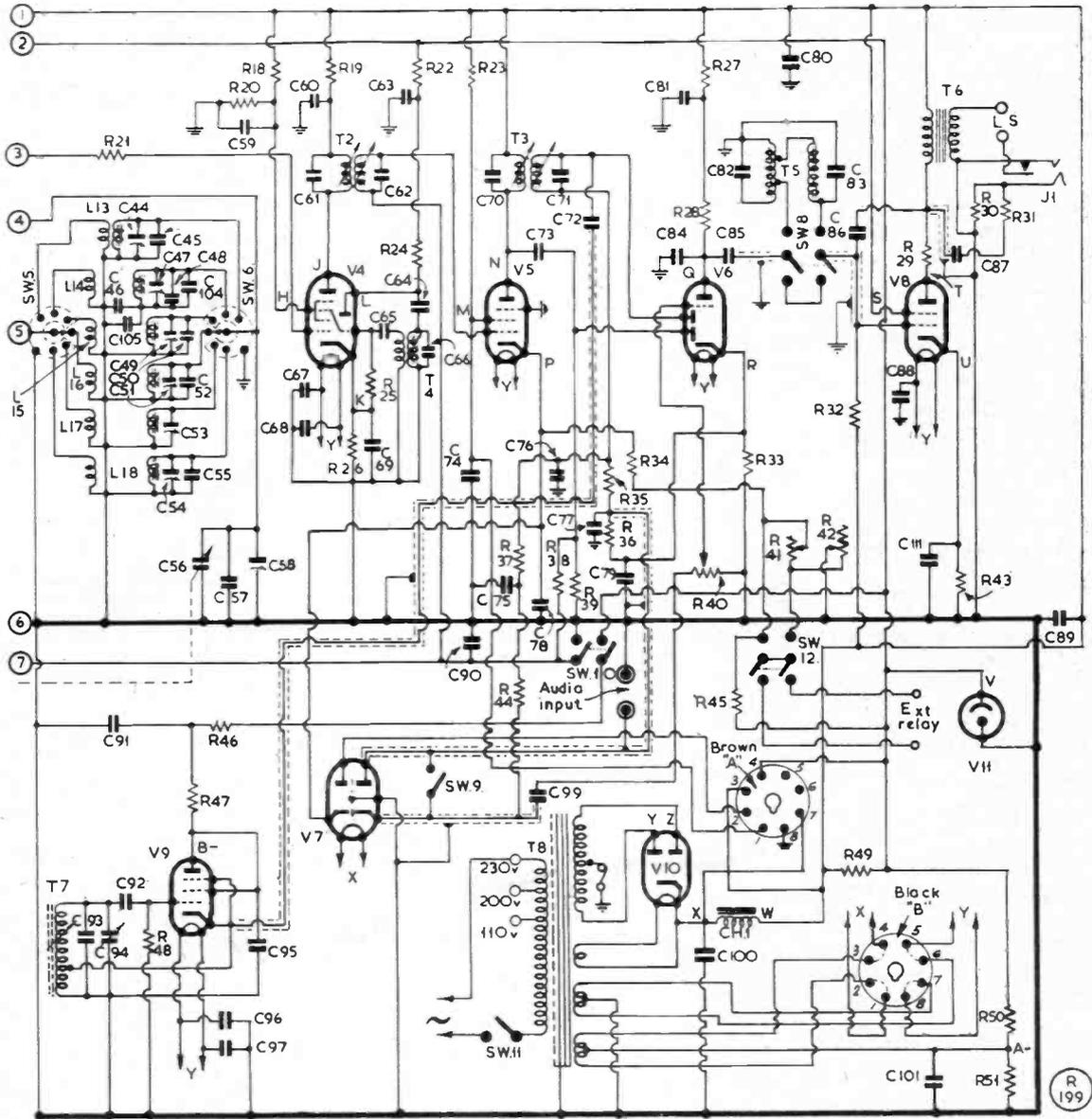
Additional Features

So much for the general behaviour and performance of the "888," and its handling.

A useful additional feature is an (internal) aerial input trimmer, C15 in the circuit diagram, adjusted by a knob accessible by lifting the cabinet lid: this is a band-to-band

EDDYSTONE "888" SWITCHING
(See Circuit Diagram)

- Sw.1-Sw.6 — Band change switch assembly
- Sw.7 — Calibration push-button, bringing in Crystal Calibrator
- Sw.8 — Audio Filter in-out
- Sw.9 — Noise Limiter on-off
- Sw.10 — BFO on-off (BFO on, AGC off)
- Sw.11 — Mains on-off
- Sw.12 — Send-Receive, and muting



Circuit complete of the new Eddystone "888," shown in two parts facing for the convenience of this presentation, the numbered junctions being, of course, continuous in the actual wiring. The general front-end arrangement is RF-mixer-oscillator (V1, V2, V3) with the first frequency change, to 1620 kc, in V2, and the second, 1620 to 85 kc, in V4. The IF stage is V5, the variable selectivity control being applied to T2, T3. The audio side is taken care of by V6, V8; the circuitry round T5, controlled by the switch Sw. 8, is the 1000-cycle audio filter for peaking up sharply on CW reception. V7 is the noise-limiter diode, controlled by Sw.9, and V9 the BFO, brought in by Sw.10, which also earths down the AGC line. V12 is the crystal calibrator unit, separately controlled by push-button switch Sw.7, which mutes the front end (for calibration) by bringing in R53. The main send-receive switch is Sw.12, connected to actuate a relay in the "send" position, if required. The two AF stages V6, V8 can be used separately (for a microphone or other form of audio input), the audio gain control R40 remaining operative under all conditions.

adjustment, not at all critical unless using end-on aerials of "awkward" length for the frequency.

The other refinement of particular interest is that the receiver gives full monitoring. The

send-receive switch, while muting on "send," permits enough pick-up for the transmitter to be heard, without any paralysing front-end blocking effect. The pick-up sensitivity is adjustable, within certain limits, by a contro

Table of Values

The Eddystone "888" Communications Receiver (See pp. 74-75)

C1 = 2.5-33 μ F air trimmer	C44 = 2.5-33 μ F air trimmer	C87 = .01 μ F moulded mica	R19 = 1,000 ohms
C2 = 80 μ F silvered mica	C45 = 30 μ F tub. ceramic	C88 = .25 μ F tub. paper	R20 = 27,000 ohms 1 watt
C3 = 2.5-33 μ F air trimmer	C46 = 120 μ F silvered mica	C89 = 50 μ F tub. electrolytic	R21 = 12 ohms
C4 = 35 μ F silvered mica	C47 = 2.5-33 μ F air trimmer	C90 = 0.1 μ F tub. paper	R22 = 1,000 ohms
C5 = 2.5-33 μ F air trimmer	C48 = 30 μ F tub. ceramic	C91 = .01 μ F tub. paper	R23 = 33,000 ohms 1 watt
C6 = 20 μ F silvered mica	C49 = 2.5-33 μ F air trimmer	C92 = 100 μ F silvered mica	R24 = 10,000 ohms
C7 = 2.5-33 μ F air trimmer	C50 = 400 μ F silvered mica	C93 = 400 μ F silvered mica	R25 = 47,000 ohms
C8 = 40 μ F silvered mica	C51 = 2.5-33 μ F air trimmer	C94 = B.F.O. pitch	R26 = 220 ohms
C9 = 2.5-33 μ F air trimmer	C52 = 200 μ F silvered mica	C95 = .01 μ F tub. paper	R27 = 27,000 ohms
C10 = 2.5-33 μ F air trimmer	C53 = 2.5-33 μ F air trimmer	C96 = .01 μ F tub. paper	R28 = 0.27 megohm
C11 = 100 μ F silvered mica	C54 = 2.5-33 μ F air trimmer	C97 = .01 μ F tub. paper	R29 = 47 ohms
C12 = 8-34 μ F RF section three gang	C55 = 50 μ F silvered mica	C99 = .01 μ F moulded mica	R30 = 1,000 ohms
C13 = .01 μ F tub. paper	C56 = 8-34 μ F Osc. section three gang	C100 = 50 μ F tub. electrolytic	R31 = 33,000 ohms
C14 = 20 μ F silvered mica	C57 = 40 μ F tub. ceramic	C101 = 30 μ F 15V. tub. electrolytic	R32 = 0.47 megohm
C15 = aerial trimmer	C58 = 2.5-4 μ F air trimmer	C102 = 20 μ F silvered mica	R33 = 3,300 ohms
C16 = 0.1 μ F tub. paper	C59 = 0.1 μ F tub. paper	C103 = 40 μ F silvered mica	R34 = 68 ohms
C17 = 0.1 μ F tub. paper	C60 = .01 μ F tub. paper	C104 = 80 μ F silvered mica	R35 = 0.1 megohm
C18 = .01 μ F tub. paper	C61 = 800 μ F silvered mica	C105 = 35 μ F tub. ceramic	R36 = 0.1 megohm
C19 = 2.5-33 μ F air trimmer	C62 = 800 μ F silvered mica	C106 = 200 μ F silvered mica	R37 = 1.0 megohm
C20 = 80 μ F silvered mica	C63 = 0.1 μ F tub. paper	C107 = 20 μ F silvered mica	R38 = 0.47 megohm
C21 = 2.5-33 μ F air trimmer	C64 = 100 μ F silvered mica	C108 = .01 μ F tub. paper	R39 = 0.47 megohm
C22 = 35 μ F silvered mica	C65 = 100 μ F silvered mica	C109 = 3-23 μ F air trimmer	R40 = 0.5 megohm potentiometer
C23 = 2.5-33 μ F air trimmer	C66 = 200 μ F silvered mica	C110 = 1 μ F silvered mica	R41 = 50,000 ohms potentiometer
C24 = 20 μ F silvered mica	C67 = .01 μ F tub. paper	C111 = 30 μ F tub. elect. 15V.	R42 = 10,000 ohms potentiometer
C25 = 2.5-33 μ F air trimmer	C68 = .01 μ F tub. paper	R1 = 1,000 ohms	R43 = 150 ohms
C26 = 40 μ F silvered mica	C69 = .01 μ F tub. paper	R2 = 33,000 ohms 1 watt	R44 = 2.0 megohm
C27 = 2.5-33 μ F air trimmer	C70 = 800 μ F silvered mica	R3 = 68,000 ohms	R45 = 68,000 ohms
C28 = 2.5-33 μ F air trimmer	C71 = 800 μ F silvered mica	R4 = 12 ohms	R46 = 1,000 ohms
C29 = 100 μ F silvered mica	C72 = 40 μ F silvered mica	R5 = 0.47 megohm	R47 = 47,000 ohms
C30 = 8-34 μ F mixer section three gang	C73 = 20 μ F silvered mica	R6 = 68 ohms	R48 = 47,000 ohms
C31 = 20 μ F silvered mica	C74 = 0.1 μ F tub. paper	R7 = 10,000 ohms potentiometer	R49 = 2,700 ohms wire wound
C32 = .01 μ F tub. paper	C75 = 0.1 μ F tub. paper	R8 = 1,000 ohms	R50 = 0.1 megohm
C33 = 0.1 μ F tub. paper	C76 = 100 μ F silvered mica	R9 = 10,000 ohms	R51 = 6,800 ohms
C34 = 0.1 μ F tub. paper	C77 = 100 μ F silvered mica	R10 = 0.47 megohm	R52 = 0.47 megohm
C35 = .01 μ F tub. paper	C78 = 0.1 μ F tub. paper	R11 = 0.47 megohm	R53 = .1 megohm
C36 = 200 μ F silvered mica	C79 = 30 μ F 15V. tub. electrolytic	R12 = 15,000 ohms 1 watt	R54 = 3 megohm
C37 = 200 μ F silvered mica	C80 = .01 μ F moulded mica	R13 = 330 ohms	R55 = 22,000 ohms
C38 = 0.1 μ F tub. paper	C81 = 4 μ F tub. electrolytic	R14 = 0.47 megohm	R56 = 2.7 megohm
C39 = 200 μ F tub. ceramic	C82 = .007 μ F silvered mica	R15 = 22,000 ohms	R57 = 1 megohm
C40 = 50 μ F tub. ceramic	C83 = .007 μ F silvered mica	R16 = 1,000 ohms	
C41 = 500 μ F tub. paper	C84 = 500 μ F moulded mica	R17 = 10,000 ohms	
C42 = 500 μ F tub. paper	C85 = .01 μ F moulded mica	R18 = 27,000 ohms 1 watt	
C43 = .01 μ F tub. paper	C86 = 6 μ F silvered mica		

inside the cabinet; in practice, once set it need hardly be touched.

Rear-drop connections (aerial, speaker, audio input) are made to spring-loaded terminals, which is very convenient, and there are sockets for plugging in the standard S-meter—which for years has been a feature of Eddystone receivers—and auxiliary power supplies.

Some General Points

Before putting the power lead into a socket, it is advisable to study carefully the very complete notes on installation and operation provided with the receiver. These are most comprehensive and give a good deal of practical information on the handling of the set. The servicing sheet gives the circuit with all values and test voltages, together with full instructions for RF and IF alignment, should this be necessary at any time.

To get the best out of the "888," it has got to be learnt in the sense that practice is required in the manipulation of the controls. It is a receiver any keen amateur-band operator would be proud to own. Its figures and performance compare favourably with any modern

American type in the same price range, and are better than most. The layout, construction and general finish are excellent and—as with all Eddystone products—the receiver is up to the best British standards in design and workmanship.

The "888" has been discussed here in some detail because it is a noteworthy product, besides which its circuitry and construction will be of interest to all those readers who wish to be *au fait* with the trends in modern amateur-band receiver design.

Eddystone Receiver Type 888. Twelve-valve double superheterodyne, 1620-85 kc, miniature valve types in ten positions, tuning six amateur bands 1.8 to 30 mc only. Output 2½ watts audio into 3-ohm speaker, or HR headset. Incorporating independent RF, IF and AF gain controls, monitoring, crystal calibration, BFO, audio filter, noise limiting, constantly variable selectivity, AGC, send-receive muting switch. Mains input 110, 200-240 volts AC, power consumption 80 watts, weight 44 lbs., dimensions overall 17 ins. wide, 10 ins. deep, 9 ins. high. U.K. list price £110. Manufacturers: Stratton & Co., Ltd., Eddystone Works, Alvechurch Rd., West Heath, Birmingham 31.

AN INTRODUCTION TO AMATEUR RADIO

STRICTLY FOR THE BEGINNER

PART II

The first part of this article appeared in our March issue, and covered the call-sign system, use and behaviour of the different amateur frequency bands, and the Amateur Radio set-up in general. Here we discuss the Q-Code, the QSL system and what might be described as the competitive or sporting side of amateur activity.—Editor.

The "Q" Code was devised for general communication purposes and contains a whole series of abbreviations applicable to commercial radio. Amateurs have, however, adopted it for themselves (somewhat modified), and you are almost certain to hear them using the abbreviations shown in the table of Q Code Signals.

There are many more official "Q" signals, but the examples given are those mostly used (and "intelligently misused") by amateurs. On CW they also use several other recognised abbreviations, most of which are obvious, such as "Ur" for "Your"; "Cuagn" for "See you again"; "Tks" for "Thanks"—and so on. Strictly speaking, the "Q" signals should apply only to CW working, but they are very frequently and rather unnecessarily used on telephony as well.

The DX Angle

It has already been made clear that the different bands give quite different results, since the distances they cover vary considerably. This also gives rise to the fact that they are put to very different uses and, one might almost say, are used by different types of people—that is to say, amateurs with different interests in Amateur Radio.

The letters "DX" originally stood for "distance," in the sense of "My DX from you is 3000 miles"; but nowadays they mean something much more mystical and hard to define. The art of working DX is the art of contacting more stations, and particularly more "rare" ones, than the man next-door. DX work is long-distance work, but, to illustrate our point, one solitary station in the Solomon Islands is better "DX" than twenty stations in New Zealand, although the actual distance is not so great.

These solitary stations are much sought-after just because they are so elusive and difficult to work. It is almost as though the amateur, having broken down the barriers of sheer distance, had to set himself another and more difficult goal, by setting out to fill up all the gaps in his coverage. It is quite natural that any amateur, keen on long-distance working, should want to see how many areas of the globe his signals really do cover: and the amateur population of the world is so widespread that a grand opportunity presents itself. Some of the world's leading operators have worked nearly 250 different

countries out of a possible total of roughly 270—the present highest score is, in fact, 271!

The difficult problem of "When is a country not a country?" has to be solved every now and then by consultation between the national Amateur Radio societies and the writers of the various DX columns throughout the world, but there are now only a very few doubtful cases.

Thus the incessant quest for DX means that an amateur station in Saudi Arabia is quite a nice "catch" but by no means a rarity; when, however, the same station moves itself across the border into the territory of Yemen (recognised as a separate country and with a prefix of its own) he becomes a fabulous collectors' piece and everyone in the world is on his tail at once!

This gives a hint of the implications of the term "DX"—and, as you might imagine, some sort of proof of contact is essential.

The QSL System

Many years back a British operator, G2UV, startled the stations he worked by following up his chats over the air with a post-card, bearing details of his station and also the signal "QSL" (meaning "Please acknowledge"): This certainly started something; brighter and better cards were produced, usually with the call-sign in brilliant colours and large letters, and someone had the brainwave of papering the walls of the station with these trophies.

It became the fashion and is now an essential part of Amateur Radio; no good DX contact is complete until the other fellow's "QSL card" has been received. QSL's are regarded as the final proof of a contact and a deterrent to optimistic spirits given to drawing the long bow.

As the number of amateur stations increased, it became expensive to QSL every contact by direct post, and so the system of "QSL Bureaux" grew

Q CODE ABBREVIATIONS AND MEANINGS

QRG:	Frequency (in kc)
QRI:	Tone
QRJ:	Signals are weak
QRK:	Signals received (strength)
QRL:	I am busy
QRM:	Interference
QRN:	Static
QRO:	High power
QRP:	Low power
QRQ:	Send faster
QRS:	Send slower
QRT:	Stop transmitting
QRU:	I have nothing for you
QRV:	I am ready
QRX:	Stand by (listen)
QRZ:	You are being called by
QSA:	Readability
QSB:	Fading
QSC:	Faded out
QSL:	Acknowledgment (see text)
QSO:	Contact
QSP:	Pass message
QSV:	Send series of V's
QSY:	Change frequency

up. In each country of any importance there is now a Bureau (and in many cases more than one) which takes care of all the outgoing cards, sorts them and despatches them to the various addresses; and, conversely, receives the incoming cards from the other Bureaux throughout the world, sorts them and sends them to their destinations in the home country. Users of the Bureau merely keep it supplied with a few self-addressed, stamped envelopes, and as soon as some cards accumulate for each owner of envelopes, they are put into one and duly despatched.

This cuts QSL costs down to a minimum, as the international traffic in these cards now takes place largely by means of fat parcels instead of individual cards.

All kinds of designs have been developed since the early days, in which the convention was to have a rather full description of the station, with spaces, of course, for the signal report, and a huge overprint of the call-sign. These gave way to more individualistic and more artistic designs, and some of the cards from remote parts are now very interesting souvenirs. Many people even regard them as too good to impale on the wall with drawing-pins, and they either file them in a cabinet or keep them in an album.

Certificates and Awards

Once it was realised that a QSL card could be regarded as a satisfactory proof of contact, it was obvious that the demand for various trophies and certificates should arise. One of the earliest, for instance, was a "Worked All Continents" certificate, issued by the ARRL—the American Amateur Radio organisation—and universally known as a WAC. This was no mean feat back in 1925 and thereabouts, when contacts between Europe and Australasia had only just been made for the first time, and the original WAC-holders had something they could really be proud of—but they could not claim this award, or any other, without the production of the QSL cards to prove they had made the contacts. And so it has been ever since, with the list of available awards growing and growing until, nowadays, the hard worker should be able to paper, not only his radio room but the entire house, with certificates of this and that!

After the WAC came the WBE (Worked British Empire). Then, for really top-notch operators in pre-war days, came the DXCC (DX Century Club), to become a member of which meant working 100 different countries. This was very difficult in the 1930's, but nowadays many members of the DXCC have over 200 to their credit.

The WAZ (Worked All Zones) was based on a division of the world into 40 different zones—as shown on our *DX Zone Map*—some of which present a really difficult problem. Particularly tough is Zone 23, which includes only Tibet and the remoter parts of China and Mongolia! For some years the only station in this huge zone was AC4YN in Lhasa, Tibet, who became quite fabulous and was undoubtedly "the rarest DX in the world." He is still on the air, but signs G5YN nowadays.

DISCUSSED IN THIS ARTICLE

Amateur and Professional
Call-Signs and Prefixes
The Amateur Bands
How the Bands are Used
Seasonal Changes
The Amateur Set-Up
Typical Contacts
Operating Procedure
The Q Code
The DX Interest
The QSL System
Certificates and Awards
The Listener Interest
Contests and Competitions
Results to be Expected
Listening and Concentration
Telephony or Telegraphy?
Modern Procedure
Nets and Parties

Do YOU Know All The Answers?

From these beginnings, it now seems that almost every national society has originated its own particular awards. So we have a WAVE for Canada, a WASM for Sweden, a DUF for France and the French Colonies, a WAB for Brazil, and so on almost *ad infinitum*.

SHORT WAVE MAGAZINE has originated six Certificates for DX workers; as these were discussed in our February issue, there is no need to explain them here.

So QSL cards in bundles of various sizes continue to circulate briskly round the world in order that keen DX men can collect more and more trophies as some sort of return for their concentration and burning of midnight oil.

For the Listener

Keen short-wave listeners, while not trafficking in QSL cards to the extent of the transmitters, do, of course, send out postal reports to rare stations that they hear, in the hope of receiving a QSL in return. Discriminating reporters do well in this respect, by writing only to stations that do not appear to be receiving many replies to their calls; by confining themselves to the wave-bands on which DX reception is less easy; and by keeping a watch on one particular station and sending a useful "period report" covering, perhaps, many days or even weeks.

QSL cards are not invariably forthcoming in return for listeners' reports. A station with an outstanding signal, especially if he be rare DX from the Cook Islands or Tristan da Cunha, will have no difficulty in *working* scores of amateurs whenever he comes on the air. All these transmitters will naturally

want a QSL from him; and if he is deluged with dozens of listeners' reports as well (which will tell him very little that is news to him) he may well give up the whole business as too expensive or too time-wasting.

But the fact remains that *some* short-wave listeners, who are intelligent in their choice of stations to report on, and who often succeed in winking out some very weak signals that are not being replied to, do acquire extremely good collections of cards for their trouble. By specialising, for instance, in DX on 40 or 80 metres, it is possible to hear stations to whom it really *is* news that their signals are getting as far as this . . . they are duly grateful, and oblige with a QSL.

Among the leading short-wave listeners in this country you will find "scores" of over 100 countries heard on 80 metres; nearly 200 on 40 metres; well over 200 on 20 metres; and perhaps 150 or so on 10 metres. The over-all score of countries heard may be over 240.

But not all listeners are as keen as this on DX work, and some, with little or no knowledge of the Morse code, confine their energies to phone transmissions, their scores therefore being considerably lower.

Much amusement can also be derived from listening merely to the local and semi-local stations; in fact, it is probable that the vast majority of short-wave listeners are by no means keen on DX for the sake of DX. On the 160-metre band there is a very friendly collection of British stations working phone as well as CW. Many of *them* are glad

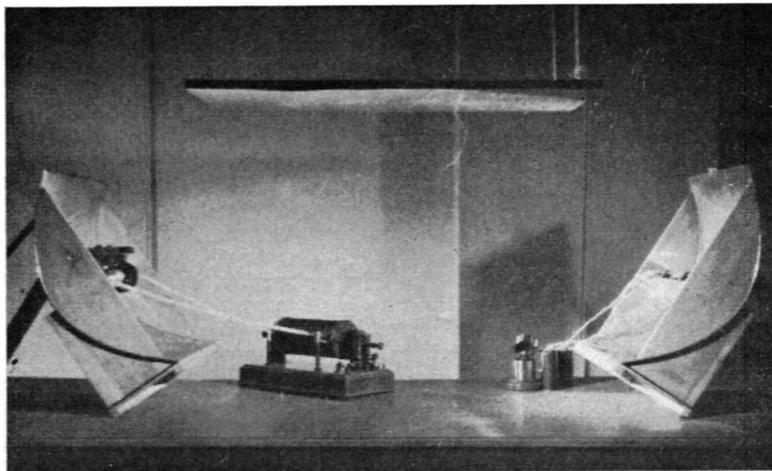
of listeners' reports on quality of transmission; and even if you are an SWL and never bother to send out postal reports, you soon feel that you are part of the scheme of things. You find that certain transmitters become quite old friends, and when the supreme moment comes for you to take out your own licence, you know the ropes. And you find that you can join in the fraternity of transmitters without making yourself look foolish, because the "procedure" and the jargon are so well known to you by then.

Almost every new transmitting operator on the air has "served an apprenticeship" of at least some time as a short-wave listener; and there is no training to compare with it. It is rather like learning road sense by riding a bicycle before aspiring to the ownership of a small car.

Many ex-Service receivers are now available which, with slight modifications, put up really excellent performances on the amateur bands. They are, in fact, often used by the transmitters, not all of whom can aspire to receivers specially built for amateur-band reception. Home-built receivers are even more fascinating and give as much scope for skill and knowledge as home-built transmitters—probably even more so.

The complete newcomer will find that we are now almost at the peak of an eleven-year cycle of sun-spots and that conditions this year are extremely good for DX. Throughout this summer real DX should be quite easy! Next winter, too, will be an outstanding season for DX.

(To be continued)



This is the centenary year of the birth (February 28, 1857) of Heinrich Hertz who, as Professor of Physics at Karlsruhe University, constructed the first apparatus proving the existence of electro-magnetic waves. Hertz's work was based upon the theories advanced originally by the great Scots physicist Clerk Maxwell, who published his treatise in 1873, when he was Professor of Experimental Physics at Cambridge University. Though between them Clerk Maxwell and Heinrich Hertz laid the foundations of radio communication as we know it today, neither took their original ideas any further. It was left to Branly, Lodge and Marconi to develop the experimental side leading to the practical application. The apparatus pictured here is a reconstruction of the equipment used by Hertz, who was able to prove not only the existence of radio waves, but that they behave in a manner akin to light waves. The photograph is a still from the Mullard instructional film "Mirror in the Sky," noticed on p. 34 of the March issue.

DX COMMENTARY

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

FOR more than ten years this Commentary has been kept to a standardised layout whereby the DX on the various bands has been presented under distinct headings. This month, for the first time, a break is being made with tradition by dealing with all the major DX work under one heading.

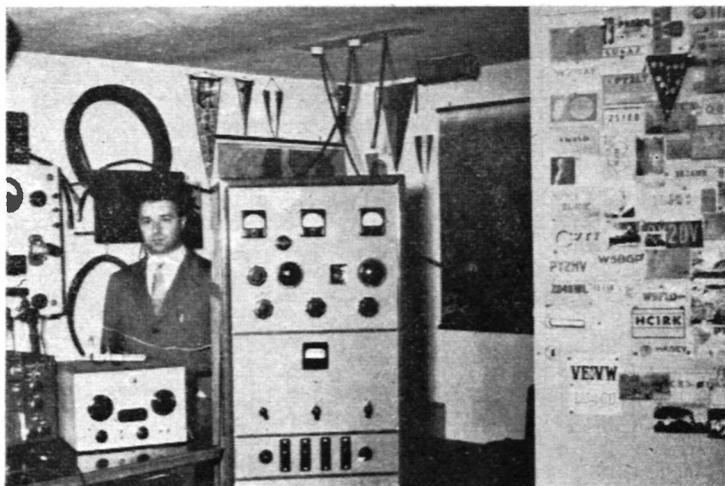
The segregation into bands had several disadvantages. Many readers (in fact the great majority) cover at least three different bands in their letters, which means that three different extracts have had to be made. This has tended to eliminate general comments which, while applying to no particular band, would probably have been of interest in the story as a whole.

The only readers to benefit from the separation of the DX into headings of Ten, Fifteen and Twenty were those who specialised in one band or another, and their numbers, which have always been very small, are becoming even smaller.

One hopes that with the new layout it will be possible to maintain more of a personal touch with regular correspondents and also to give opinions on the respective merits and demerits of the DX bands which would otherwise be lost after dissecting letters.

We shall, of course, keep Top Band matters entirely separate from the others; likewise, the valuable collection of "DX Gossip" items, derived from foreign publications and letters from overseas readers, will remain.

Thus the only real change, which is not necessarily permanent, will be the grouping together of DX in the "Ten-Fifteen-Twenty" category, with, we hope, certain advantages in its presentation.



IIBAO

CALLS HEARD, WORKED and QSL'd

The DX Bands

Conditions have remained at a pretty high level all through the month, apart from a few patches of Aurora. One never knows what the latter will do, as it seems to have all effects from improving conditions in certain directions to producing a complete blackout. At all events it makes life interesting, because when you hear those fluttery signals at unusual times you can be pretty sure that the following few days will show freak conditions of one kind or another.

The pattern of the three main DX bands remains unchanged. *Twenty* is still the place for most of the rare ones, especially on CW, but short-skip throughout the hours of daylight has been a real pest. *Fifteen* is besieged by all kinds of bubble-and-squeak, but produces DX signals of fantastic strength when it is good. There are not many rarities, but several new countries to be winkled out, particularly on phone. *Ten* is the band for good solid ragchews with fine signal strength and little QRM, but the DX-chasers who no longer find pleasure in talking to W's are

apt to become a little bored with it. At most times of the day the W's account for quite 90 per cent. of the CW population, but it is always worth watching during the mornings, before they arrive. Phone can be expected to produce almost anything, with the enormous benefit that the W's are segregated in their own phone band, vast though it is.

The Five-Band Table shows the relative importance of the bands for sheer Country-Collecting: eight stations have worked more than 200 countries on *Twenty*, but no-one is yet even approaching that figure for *Ten* or *Fifteen*. DL7AA's phenomenal 166 on *Forty* indicates that something might happen on that band before anyone reaches his mark on the HF bands!

All-Rounders

G3GGS (Preston) was one of the select few who used to report on all six bands (and have his letter carved into six separate bits!). This month he confines himself to the three DX bands, although he says he has used all six again. *Ten* did not produce anything new.

but many W's were worked. Fifteen gave him two all-time new ones—HH2DX and VP2VG. The latter is in the British Virgin Islands, and KV4AA says he is accepted as a new one by CQ, but not yet by ARRL. Others worked by G3GGS were K6ABM/KG6 and a KP4. On Twenty he found two more new ones in VP2LU and VP8BK. ET2US might make up for the MI3 card that he never received, and UJ8AF was welcome. Gotaways, an exciting list, included FB8BR and 8CC, VP8BS, LU5ZC, VKØZM, VS9AG and others.

G3BHW (Margate) found ZS3DX for a new one on Ten; Fifteen was rather better and gave him VK9AT (New Guinea), HC1FS, VP9DA, KR6's, KA, JZØPC and OH2AA/Ø—all on phone, with 3W8AA, HC1LE and a JA on CW. On Twenty CW he accounted for VKØAS, FL8AB, VP9DD and ZS3Q.

G5BZ (Croydon) has been using the paint-brush more often than the key or mike, but he collected a VP4 on Ten phone, as well as all W/VE on CW; Fifteen gave him KR6, ZD2, OHØ, CT3, HH2DX, FF8, UJ8, JA and VP2VG. Twenty yielded VK's, VP9AG, XE1RM, VP9, ET, OQ, YV and the usuals. He forwards a very interesting letter from W6VX, who is on a world cruise—details appear in "DX Gossip."

G3BDQ (Hastings) raised ZE3 and YO on Ten phone, and some W6's and ZL's on Fifteen, but his main enthusiasm is for Twenty. On that band his CW brought him PZ1AP, VP8BK, KR6AE, VR2DA (1910), UA1KAE, ZD9AE, VKØAS, FB8BX (Noss Bé Island), YV, KH6, CE, VS1, KG1, UAØ and loads of the more usual DX. KW6CE and an FO8 were got-aways, and G3BDQ tells us that ZD9AE, who runs 100 watts to a rhombic, is now one of two left on the Island, two of the original four having been taken away sick.

G2BLA (Morden) is another who works six bands, but reports "nil" for Ten this month. Fifteen brought him UC2CB and a PY, and Twenty two UA9's and a ZS (all-time new ones for him).

G3FXB (Southwick) worked more on Ten than most, his list including CR6, CX, FS7RT, HC, HK, JIP, HZ, KA, KG6, KR6,

MP4K, FB8BP, JZØPC, VQ5, ZD1, ZD6, ZP and an LU mobile with 15 watts to a whip (all on phone). CW raised UD6 and 3W8AA. On Twenty G3FXB collected OH2AA/Ø, both CW and phone.

G3DNR (Broadstairs) was mainly on Fifteen, where new ones were ZD4, EA, YU, UQ, Trieste, and KR6RB and OH2AA/Ø for all-time additions. The only new one on Ten was ZB1, and G3DNR didn't think much of that band during the period.

G2YS (Filey) raised the first XE of his life when he got XE1PJ on Fifteen; just before that he worked UA9DP. Both in a chance ten minutes' session at lunch-time.

G3JJZ (Locking) had twelve days of leave at the end of February, and pushed his input up to 120 watts. Although reports were not much better than he used to get with 30 watts, he did raise ZL4GA, KA3BE and VS1HC on Twenty one morning; his trouble seems to be not *hearing* the DX (apart from bags of W's) in spite of trying various aerials. So G3JJZ is now thinking in terms of a 35-ft. tower and a couple of HF-band beams.

GW3DNF found it a rather poor month for his .12 watts, but although one week went by without any DX at all, he also collected his two best new ones in VP8AX

(Twenty) and LU2ZS (Fifteen). On Forty he raised SM8YF, an /MM between CT1 and CT2.

G6VC (Northfleet) is playing with a "ZL Special," not yet finished. Apart from working OH2AA/Ø on Fifteen, his activities have been mostly on Ten phone, where he added IT, HA, ZB2, 4X and ZS to his bag. He laments that the "rare" Russians never come back to him—he would like UD6, UF6, UH8, UI8 and such, but they just don't play.

G3JKF' (London, W.5) had a good time on Twenty CW with UL7GN, UAØKKB, FF8, VS9AG, ZS9P, 3W8AA, I5RAM, ET2US, UI8AG, FM7WR, FG7XC, 4X5RE, VQ6LQ, FY7YF and KH6AYG. Ten phone brought him HP3DA, and three ZD6's. A solitary QSO on Forty was YK1AZ (2330).

G3HQX (Mitcham) manages to work ZL both at 0830 and 2100, and new ones on Twenty have been CE, UP, UQ and YV (0830). Plenty raised on Ten, but the only new ones were CN8, HZ, PY and ZB1. G3HQX also made, together with G8UG, the last QSO with VP6AM before he pulled down the aerial and left for England.

DX Gossip

Here we pause a moment for a cup of tea and a cosy chat about DX in general, after which we will



"... And now, in my crystal I see a VFO ..."

return to the individual clients! ST2NG is now operating as VS9AG (many people have discovered this) and ST2DB has left for ZD4, so the ST2 territory is now somewhat barren.

G3FXB says SVØWD should be in operation from Crete for about three months . . . ZAIKUN (phone, 14135) is said to be genuine—Box 55, Tirana, Albania . . . HS1MQ and HS1A are both active on phone.

Last month G5BZ warned us to look for VQ9 activity on a certain date—too early for last month's Commentary to have been any use, so we didn't mention it. Now the story is out. W6VX, on a round-the-world cruise on the *Caronia*, has a portable rig with him. He had arranged to sign VQ9VX from the Seychelles, and so he did; unfortunately the time available was much shorter than he had hoped. Total log of stations worked under this rare call was VQ4AQ, VQ4ERR and VQ5EK. ZS6BJ was heard, but no Europeans. Conditions were so bad on Fifteen that even OLU was

inaudible! Meanwhile, look out for intriguing calls with "VX" in them, as Dave is scouting for exotic locations in the region of Bali and other places East.

Labrador stations became VO2's from April 1. VO6N will be signing VO2NA. Newfoundlanders will be VO1's . . . CR4AS is on Fifteen phone, very active . . . ZL5AA, one of the IGY stations, is on Twenty phone and CW. 0900-1200 GMT . . . FB8CC, much in evidence on Twenty, is old FB8XX . . . VKØAB is in Antarctica, and there is no activity at present from Heard Island.

GW3CMK (Barry) is now off the air and *en route* for Jamaica. He hopes to be on with a VP5 call as soon as possible, and will be looking for G contacts all the time . . . Conversely, ZB2Q has now packed up and is in Aylesbury awaiting his G call. He was brought home during the WAE Contest and is still awaiting his log and QSL cards, so please be patient. Meanwhile, he says his good friend ZB2W is now on the air.

Top Band Topics

These years of sunspot maxima are definitely no good to the Top Band DX'ers, and all credit to them for achieving as much as they have done this season. There are no further reports of Transatlantic work, although there is plenty of activity still on the other side. No DX was heard in the States on February 17 or 24, and on March 3 there seems to have been nothing doing over here.

G2HNO (Bournemouth) writes to say that he will be operating from *Alderney* as GC2HNO between April 16 and May 1, so gather round, County-chasers, and keep him busy. His location will not be ideal nor his aerial very good, but he hopes for a little fun and promises to send us a *post-mortem* report if all goes well.

G2HDR (Bristol) has been busy building an HF-band rig. He reports that activity has fallen off more than ever, and supposes this is because of DX band conditions, which he now proposes to take advantage of himself. GD3UB was worked for a new one.

GM3COV (Caithness) is now up to 49/62 and hopes soon to claim his second WABC (first made from Cumberland as G3COV). He confirms that conditions have not been good, although he did work G3JEL (London) on phone at RS56 both ways. Other QSO's were with G6NA, using 0.1 watt, and with G3CSZ/TTX. GM3COV's disadvantage is that he can't work his own county or the two adjoining ones—Sutherland and Orkney. He might visit the latter in the summer.

G3LNR (Nottingham) collected five new counties and also worked HB9IN. Called in vain were DL2's, GD3UB and sundry OK's, GM's and GW's. DX heard was W1MOS at 0110 on February 22, and K2KWP at 0515 on March 11—the latter being the only signal on the band and quite deaf to G3LNR's replies.

SWL Iball (Workshop) confirms that there has been very little doing in the DX line, but he was pleased to get a card back from ZBIHKO, thanking him for the first G/SWL report received for Top Band work. ZBIHKO expects to be more active on the band next season.

FIVE BAND DX TABLE
(POST-WAR)

Station	Points	Countries					Station	Points	Countries						
		3.5 mc	7 mc	14 mc	21 mc	28 mc			3.5 mc	7 mc	14 mc	21 mc	28 mc		
DL7AA	808	109	166	224	165	144	236	G3INR	310	45	57	119	58	31	130
W8K1A	704	68	148	265	113	110	265	G3IGW	245	42	61	75	50	17	104
G5BZ	687	64	118	239	155	111	245	GM3EFS	243	26	46	98	42	29	113
G3FXB	667	71	126	201	159	110	222	G3JWZ	243	48	60	65	38	32	95
G3FPQ	587	62	83	184	156	102	203	G3GZJ	240	18	43	72	67	40	107
G3DO	570	24	46	218	132	150	238	G3JLB	240	40	41	62	52	45	101
W1VG	536	25	115	190	114	92	199	G3IUW	222	31	38	67	59	27	103
K2BZT	511	66	71	203	104	67	208	ZBIHKO	212	18	32	74	57	31	90
W6AM	502	30	58	271	86	57	271	G3JZK	172	15	34	38	63	22	90
G2YS	445	65	84	145	97	54	163	G3DNR	153	10	21	69	25	28	82
GM2DBX (Phone)	411	34	31	158	97	91	172	G3HQX	147	9	36	43	36	23	68
G3WL	404	38	73	136	84	73	161	DL2ZS	131	2	31	82	15	1	92
G3ABG	399	45	83	158	67	46	167	G2BLA	126	16	35	38	35	2	60
W6AM (Phone)	339	13	32	234	39	21	234	GW3DNF	116	19	28	47	20	2	51
JA1CR	334	15	49	170	67	33	173	G8TJ	109	12	30	39	19	9	50
G2HPF	333	33	54	151	56	39	161	G3KKM	80	16	29	24	10	1	41
G3BHW	328	15	32	134	81	66	161	G3IDG	74	11	14	12	12	25	38
G6VC	313	30	43	134	62	44	140	G3JSN	74	16	17	22	12	7	32
GM3EDU	310	44	60	115	51	40	137	G3HEV	70	10	21	17	20	2	44

G3JSN (Harrow) raised DL2ZO and GD3UB; now he would like HB and EI to bring his figure up to the round ten countries, but he has not heard either of them for some time.

G3JHH (Hounslow) has not added to his score (which is 88/88) and is hoping for some new activity at Easter—obviously a ready-made customer for GC2HNO!

G2BLA (Morden) worked OK1AEH, 1KKR, 2KBE and DL2ZO, and also heard a ZB1 being called by W1BB at 0345 on March 3, but only RST-239.

Late Flash: One piece of DX is reported by GW3HFG, who worked W1MOF at 0058 GMT on February 19. He also received reports from SM, OE and HB. GW3HFG, whose QTH is Pembroke Dock, has been trying to give Pembs. contacts to as many as possible since last April, with a break of three months. Now he tells us that he will probably appear from VS1 during this summer . . . not on One-Sixty.

DL2ZO and 2ZK visited Luxembourg on February 20, as planned, having been given permission to operate therefrom on One-Sixty. On arrival they found that the matter had been "re-considered" and they were given permission instead for all bands Eighty to Ten! Since the only gear they had with them was for Top Band, this wasn't much help. However, they plan a return trip in June to cover the other bands.

DL2ZO, from his new QTH south of Frankfurt, has worked SP6KBE, who came back to a CQ; also G3KOX/TTX at 504 miles—good going! Later he worked G3CSZ/TTX at 550 miles—better still, and believed to break the existing TTX record. DL2ZO is now licensed as DL4FH, and is QRT on 160 metres until next season, but active on all other bands.

Historic Event

The change-over from Gold Coast to Ghana, at midnight on March 5/6, was celebrated in a big way. ZD4BQ (Tarkwa) tells us that G5BJ of Birmingham was the last station in the world to work the Gold Coast and the first



G13JEX, Sydenham, Belfast, is a keen DX man, with CW as the main interest. He is the holder of several operating certificates, including our WNACA, and led the GI section in the 1955 ARRL DX Contest. G13JEX was licensed in 1953, uses all bands Top to Ten, and has worked 85 countries. The transmitter runs a pair of 897's in the PA, the receiver is a CR-100, and the aerials include a GP for 14 mc, vertical folded dipoles for 21 and 28 mc, and a 264-ft. end-fed wire. G13JEX is a disabled ex-Serviceman with rather an interesting job—he installs the radio equipment in Britannia air liners.

in the world to work Ghana, on CW, as the ZD4BQ/G5BJ contact ran from 2359 on March 5 until 0013 on March 6.

At the same time ZD4BF and G2HQ were in contact on SSB phone, so G2HQ can apparently claim the "first and last" distinction for phone.

ZD4BR had a G station on 21 mc phone at 0001 on March 6, but no further details are known. ZD4BQ worked W9VIN on CW at 0021, giving him the first W contact with Ghana.

ZD4BQ writes: "To give you some idea of the tremendous QRM, it took me from 0012 to 0021 GMT, eight minutes, to identify a complete call-sign from the States. I tuned from 10 kc below to 10 kc above my frequency and it was jammed solid with W's calling me." All the more credit to G5BJ for beating them to it!

Specialists

Under this heading we group a few reports from stations who have stuck to one, or at the most two, bands during the month.

A new cubical-quad beam encouraged G3ABG (Cannock) to celebrate on *Ten* phone, where a week's operation pulled in such

DX as K5HNY/KG6, VO, VE8, KP4, ZC4, ZS, LU, PY, CT2, 5A, HZ, OD5, VP6, CN8, FA, CX, ZB1, VQ2, ZD4 and CO.

G3WL (Plymouth) reports for *Fifteen* only, where his new countries were AP2RH, VP8CC (Deception Is.), HH2DX, PJ2ME, KL7CAW, VS6DN and HC1LE. G2YU (Cannock) also reports on *Fifteen* phone only, having worked VP8CH (2000) and VR2BZ (0800).

G3HCU (Chiddingfold) has always been a man for the two HF bands. His activity has been less, and will become even lesser, as he is involved in a change of QTH. (The new one will be 500 ft. a.s.l. and "in the clear.") New ones for him on *Ten* phone were ZP5CZ, HH2PR (both all-time new, ones), CX8AN, OA4BP, 5A5TE, FA8EV, ZD1DR, FB8BP, VQ5GC and HZ1SA. He is now worked 49 countries on *Ten* this year, with an all-time total of 110. On *Fifteen* he raised VP2KD, HB1QN/P, F8DJ, OD5BN, CR4AD, EA6AR and CE2GG, giving 55 countries this year and 150 all-time. In addition to these new ones his log shows lots of DX such as VE7, VK, ZL and the like.

New ones for G3DO (Sutton Coldfield) on *Fifteen* were CR4AP,

VP2AD, YA1AM and VP8CH. Ten only yielded CT2AH and OX3LD.

Forty

G3BST (Bletchley) uses a modified TA-12 with 130 watts on *Forty* CW, and says: "I can't think what all the fuss is about on the higher frequencies, as there's bags of DX on dear old *Forty*"—such as PY's, ZB1, FA8, VK2QL (long path), VE, CN8, UH8BA, LX1SN, 5A2CR, YI2RM, plenty of East Coast W's, and K5AJG. The latter was the only signal one morning at 0500, apart from the Russian jamming, described by G3BST as RST-590!

TOP BAND COUNTIES LADDER

(Starting Jan. 1, 1952)

Station	Confirmed	Worked
G2NJ	97	97
G5JM	97	97
GM3EFS	96	96
G3JEQ	95	95
G6VC	94	94
G3HEK	92	94
G3GGS	91	92
G3JHH	88	88
G2AYG	88	88
G3FNV	87	90
G1JEX	84	85
G3BRL	84	84
G3KEP	83	83
G3AKX	80	82
G3ABG	79	81
G3DO	75	75
G3KOG	73	78
G2CZU	69	69
G3HGY	68	68
GM3KLA	66	68
G2HDR	62	65
G3KYU	52	55
GM3COV	49	62
G2HPF	48	65
GW3HFG	46	63
G3HKF	40	59
G3HXT	36	42
G3JSN	35	48
G3JZP	35	43
GM2BUD	12	25
ZB1HKO	10	14

G3JZK, at a new QTH in Cambridge, flung out his faithful "damp string" and got cracking on *Forty* CW. He raised 4X4IB, KT1EXO and YI2RM, and says: "This is certainly a weird and wonderful band. At 0100 one night I heard a Russian-speaking BC station being chased furiously up and down by two jammers and a carrier. Even more could be seen on the panadaptor. Maybe one day we will find out what it's all about." He adds—*Stop Press*: worked 4S7GE at 1700. But we're not clear whether this was on *Forty* or not.

G3JSN remarks on how good *Forty* was during the ARRL Phone Contest, especially the first weekend, when W's were still S9 as late as 1000 GMT, but not working Europeans. He adds: "It makes me think what a wonderful band it must have been before the war, and before the 41-metre broadcast racket started." It was, indeed.

SWL Bennett (Bristol) wonders why all the BC stations have to operate where they are, when there are so many clear spaces between 7.3 and 7.5 mc. He finds that the only useful bits of the amateur band are 7270-7290, and 7140-7170 kc (speaking in terms of phone), all the rest being taken up by jammers and BC stations. On March 9 he logged hordes of W's on phone, between 0040 and 0140 GMT, many at 30 dB over S9. SVØWT was also heard.

News from SWL's

Continuing with Roger Bennett's most interesting letter, he also mentions many W's on the 75-metre band, late on February 23, some at S9 plus. Aurora conditions must have been taking effect, judging by the flutter that he describes. Then on March 9 he logged a whole page of DX on *Ten*, moved up to Eighty and heard someone lamenting that *Ten* was dead!

SWL Day (Sheffield) heard W9QHR saying that a VQ2 and ZE2JE had, between them, worked about a dozen W's on 50 mc. Other tit-bits he forwards are that HS1MQ is on 21200 kc around 1400 GMT; ZD8SC on Fifteen phone around 1830; VS1's and 2's coming in at good strength again, same band; also KR6RB and 6JT,

and KG6AGD.

Best heard on *Twenty* phone were CR5SP (1700), SU1AS (1800), FQ8HG (1900), VP5KJ (2200). On *Twenty* CW he found UN1AB, FG7XE and tells us that VQ9VX was on for three hours on February 26—but doesn't say whether he actually heard him.

At this point we should like to explain that while SWL reports like those above are welcomed for these columns, we cannot publish the many others we receive, consisting simply of lists of calls heard, and generally run-of-the-mill stuff at that. But we do welcome any interesting DX snippets picked up by SWL's in the course of listening to QSO's, and we should like to see more of them for credit in this space.

Operating Notes

Last month's paragraph on "Prolongations" brought forth some amusing replies. G3JHH says that the prolongation of what should have been "R" has often enabled him to sort out a station to whom he gave a good report, but who was swamped in his second over... G3JJZ says that the RST code has been modified on the Continent of Europe, and that RST 599 now means "*R FB dr om but pse dr om agn ur name es QTH es ur fb rig—here local much QRM—vy pse dr om ur QSL—nw QRU vy 73*" etc. The above, he says, is the actual text of many QSO's preceded by a 599 report.

Last month's query about VEØ stations, in reply to which we said that they might be /MM's, is also answered by quite a few who state that this is the case. VEØND operates from the *Bonaventure* (G3JJZ worked him in Belfast) and he will be in London shortly.

G3GGS confirms that the average time of a QSO is getting less, and he often finds stations already well into another contact when one thought they were "taking a final." He actually had an "encounter" with VP2VG consisting of an exchange of call-signs, without even an RST! When is a QSO a QSO?

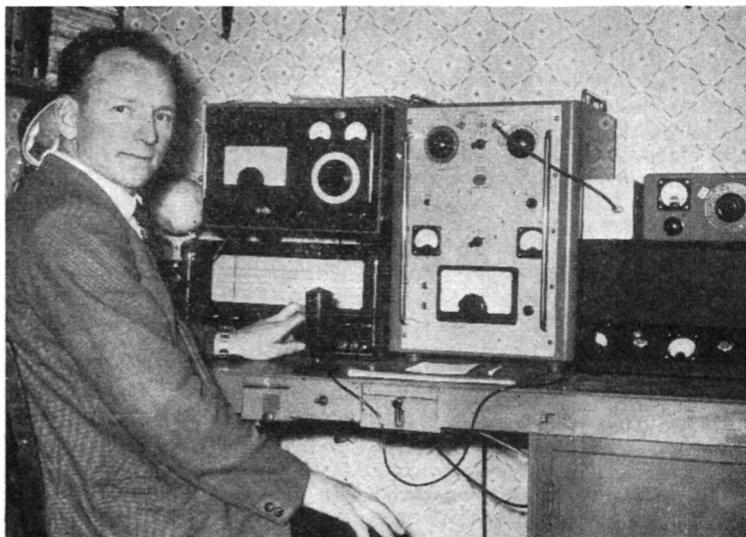
G3GGS also suggests that ET2PA's "CQ LA," mentioned last month, might have meant "Louisiana," not "Norway." (To

which we might add "Or Los Angeles?")

News from Overseas

ZBIHKO (Balzan) has been keeping thrice-weekly skeds with WIBB on Top Band, but has not been heard over there yet. He says if there are any G stations who want a ZBI on One-Sixty, he will be pleased to make skeds. The best time, even for G's, seems to be about 0530, the static level being so bad in the evenings. ZBIAJX is leaving for the U.K., but there are some new calls and at least one old one is being renewed. ZB1BF is spending a lot of time on Forty and Eighty and giving many stations a "new one" on those bands.

K2BZT (Summit, N.J.) worked



Station of G3KMD, Grays, Essex, who runs an LG.300 transmitter and an Eddystone S.750 receiver. Above the receiver is a complete CW/Phone 10-watt Top Band transmitter. To the right of the LG.300 is its modulator unit, above which is a low-pass filter and a GDO. All power supplies are in steel cupboards, which support the bench. On 15 metres G3KMD has a "ZL Special," a long-wire being used on the other bands.

W A Z MARATHON, 1957

All Bands

Station	Zones	Countries
G5BZ	36	114
G3FXB	35	78
G3HCU	34	88
G3BHW	34	87
G3BDQ	34	87
G3HLY	33	92
G2HPF	32	65
G3GGS	29	75
G3DO	29	61
G2DC	29	60
G6PJ	29	55
GM3EOJ	28	78
G3JKF	28	55
G3FKM	27	52
GM3BCL	22	37
G3HQX	20	46
G3GZJ	20	41
G3JWZ	19	48
G3DNR	19	41
GM3EFS	19	33
ZB1BF	18	39
G5FA	17	45
G8TF	16	40
G2BLA	16	32
G3INR	10	10
GM2DBX	6	27
G3KMA	5	16

ZC4IP on Eighty—his fifth band. The same QSO gave K2BZT his WAC on five bands. But main activity has been on Ten, with a new 3-element beam which "sways precariously above the Twenty-metre beam." In the recent ARRL Contest (first half) he worked FK8AL on Ten and Twenty, CR9AH on Twenty, ZP9AY on Ten (all CW). Best on Twenty phone were FP8AP and FS7RT. K2BZT's fellow club-member, K2GMO, has given up chasing rare ones and is now enthusing over SSB and Two Metres. He claims to be getting out well—says you *couldn't* have as much TVI as he does and not be getting out!

VS4GT (Miri, Sarawak) will be there for at least two years and is very active on Twenty phone. VS4BO is on most week-ends on Fifteen.

W4OMW (Covington, Ky) wrote (unfortunately too late to catch the last issue) to say that he, with W4KVX and W8EZF, were going to operate from Cayman Is. during the second half of the ARRL Contest. They hoped to be on for a while after the Contest so as to work as many foreign stations as possible. But, by the time you read this they will have returned

to the States.

DL7AA (Berlin) worked 3W8AA on Eighty and Ten; Fifteen gave him OH2AA/Ø, UF6FB and KX6ZB for new ones; and Twenty added OH2AA/Ø.

DX Miscellany

HS1A runs 100 watts and a beam, and is on 14190 kc phone daily from 1400 to 1600... There will soon be three new VQ6 amateurs, VQ6AB, 6AC and 6AD... It is whispered that W6MHB (remember TI9MHB?) will possibly be operating from ZD8-land some time in the near future.

There has apparently been no allocation of VK8 calls for the Northern Territory of Australia. VKØ's at present in action include VKØAA and ØCJ (both Macquarie); on the Antarctic mainland are said to be VKØAB, ØAC, ØAS, ØDC, ØDJ, ØJP, ØPK, ØPR and ØZM—not all active, by any means, but there!

FB8YY is expected to show up from Adelie Land; FB8XX is unlikely to operate from Kerguelen this year... The elusive VP2VG (Buck Island, British Virgin Is.) is operated by KP4DE and KV4BB, liable to turn up in other spots around the B.W.I. . . . PJ2ME

(Sint Maarten) has been showing up all over the place, including Eighty CW.

It is said that future HB stations on from Liechtenstein will be using the suffix /FL, not /HE.

ZC6UNJ/ZC6UN is active on Ten phone with a PA operator—QSL to UN HQ, Government House (Communications Section), Jerusalem. (Thanks to SWL V. Kelly for this last-minute item.)

Contests and Awards

The Helvetia 22 Contest, briefly noted last month, will be held from 1500 GMT on May 18 to 1700 GMT on May 19. The object is for stations outside Switzerland to work as many HB stations in each of the 22 Swiss Cantons as possible. All bands, contacts CW-CW or phone-phone. Usual six-letter or five-letter exchanges, comprising RST (or RS) plus three-figure progressive number for the contact. Three points per contact, and points on all bands multiplied by number of Cantons worked on all

bands. Maximum multiplier possible is 44—22 on phone and 22 on CW. Entries and usual declaration to HB9QO not later than June 6.

The second week-end of the WAE Contest (CW section) runs from 1200 on April 6 until midnight on April 7. Note that all stations worked during the first week-end may be worked again.

The well-known Frankford Radio Club of Philadelphia is celebrating its 25th anniversary, and to mark the occasion has issued a new sheepskin, known as the FRC Award. A certificate is given for proof of contact with 15 members of the Club, with stickers for higher numbers. Nearly all members are W3's, but the full list is too long to publish here. (Thanks to G2YS for translating and forwarding the above, from *Radio Rivista*.)

Acknowledgments and thanks to the NCDXC, WGDXC, "Ether Waves" (Ohio Valley), the JDXRC Bulletin, The Malayan Radio

Amateur and others to whom we are always indebted for interesting news items.

And may we add one of our infrequent words of thanks to all our regular correspondents, whose DX exploits and gossip help so much to make up this feature. Without them it would not exist—your Commentator is only the secretary-bird who pieces things together. Let us hear from even more readers in the future.

Next month's dead-line is an early one, **first post on Friday, April 12**, so please get down to it right away and write that letter. Overseas readers please note that the following deadline is *May 17*. Address everything to "DX Commentary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1, and please see that we get it on time. One day late is *too late*. We work to a very tight schedule, and it is seldom possible to write in late items. Until next month, Good Hunting, 73 and BCNU.



Station of GW3DNF, Chirk, Denbighs., who at one time was G3DNF in London. Though the gear looks elaborate and high-powered, in fact no more than a maximum of 12 watts is put in on all bands. The aerial at present in use, at a very good location, is a 200-ft. wire, end fed.

SSB Topics

TECHNICALIA, ACTIVITY & OPERATING RESULTS

Conducted by R. L. GLAISHER, G6LX

JUDGING by recent correspondence to "SSB Topics," many prospective Single-sideband operators have been deterred from trying the system because they consider their technical knowledge is too limited. Other correspondents have complained that it is not possible to purchase (in the U.K.) commercially constructed audio phase-shift networks and band-pass filters. Several readers have asked where they could buy complete SSB transmitters, excitors or receiving adaptors.

The writer will be the first to agree that to use some commercial sub-assembly would be an excellent time saver, but one cannot so readily accept the view that commercially made equipment and piece-parts are necessary to produce a good SSB signal, nor support the contention that one has to be a highly qualified electronics engineer to understand the workings of SSB equipment.

There are now well over 4,500 SSB amateur stations and this number increases daily, despite the fact that for many of these new operators it is their first attempt at something outside the scope of the normal AM and CW amateur techniques. SSB circuitry is not difficult to understand and the construction of suitable equipment is no more difficult than building the modern complex multi-stage band-switched transmitter or communications receiver.

SHORT WAVE MAGAZINE will continue to publish constructional and technical articles covering SSB equipment. One of the purposes of this column is to help potential sideband operators to get a better understanding of all aspects of SSB operation. The "Query Department" is available for readers' questions and in this connection, the writer would like to thank the members of the Sideband fraternity who assist by providing so much of the information and circuits requested by correspondents.

The G3BFP SSB Exciter

Readers may be interested in some further notes on this design, as published in the March issue of SHORT WAVE MAGAZINE. They arise as the result of immediate correspondence and queries over the air.

An SCR-522 driver transformer can be used in place of the component specified at T7, p.11.

If a fundamental frequency of 85 kc and a second

IF of 455 kc are used, crystals X2 and X3 will be 370 kc and 540 kc respectively. Both these frequencies are readily obtainable on the surplus market.

There appears to be a temporary shortage of 85 kc crystals, although these do appear from time to time as "surplus." G3JXA has made an exciter using the 85 kc BFO unit as the fundamental oscillator and reports excellent results. G3IRP is also using the same system, which eliminates the awkward 85 kc crystal.

Choice of valves is very flexible and a 6SN7, 12AU7 or 12AT7 should be quite satisfactory in the balanced modulator position, V2. A 6J5 will, of course, serve in lieu of the 6C4 oscillator, V1.

G3BFP says that he cannot over-emphasise the need for the 85 kc oscillator to be well screened, so that it feeds into the balanced modulator and nowhere else. He warns that the constructor will be plagued with a carrier that just will not balance out unless the screening is first-class. The sideband energy must get to V4 via the filter and not by any other random route.

And in the circuit on p.15 (March) note that C4 should be 500 μF , and not as given. It must be an HV test item, too.

Unusual Linear Amplifier Circuits

Information has been received from DL4WM about his experiments with cathode-follower linear amplifiers. He claims that he has obtained good results with the circuit shown in Fig. 1. The valve used in the tests was an Eimac 4-400 tetrode, but he says other pentodes and tetrodes work equally as well.

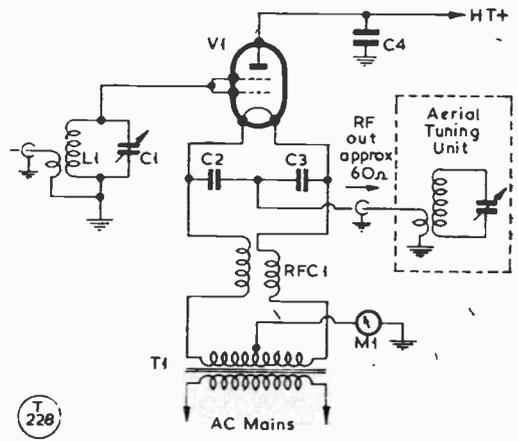


Table of Values

Fig. 1. Cathode follower Linear RF stage

L1, C1 = Normal grid tank	12 SWG 1-in. dia. by 2-ins. long (for 20 metres)
C2, C3 = .002 μF	
C4 = 500 μF , rated for anode voltage	
M1 = Cathode meter rated for total current	T1 = Filament xformer of suitable rating
RFC = Double-wound bifilar choke, 22 turns	V1 = Any suitable tetrode or pentode

Fig. 1. The cathode follower Linear RF Amplifier used by DL4WM, and discussed in the text. It will work with any tetrode or pentode.

Obviously, the cathode RF choke, must be a good one—data given are for 20 metres.

Theoretical consideration of the circuit shows that the overall efficiency will not be high because of the inherent overload characteristics of the arrangement. Separate tests made by ZB1CZ and the writer indicate that under strictly linear conditions the efficiency was about 30% only.

GW2DUR has sent in details of his new 813 screen-controlled linear. The circuit is shown in Fig. 2, and the method of operation is as follows:

With no grid-drive the 5763 control valve V1 will not conduct and little or no screen voltage is applied to the 813. When drive is applied the U78 rectifier V2 produces a DC voltage across the common load-resistance R1 which allows the 5763 to pass current and apply voltage to the PA screen-grid. The final amplifier screen current is determined by the amount of grid-drive and the standing PA anode current runs at approximately 10 mA. The main advantages of the circuit are that the need for stabilised bias and screen supplies are eliminated, a most important factor. GW2DUR has found that in his particular layout neutralisation was not needed for stable operation. He adds that the drive requirements are very small and that two watts peak will be sufficient for maximum power input.

Query Department

First, several questions on current SSB practice from G3FPQ (Oxford). He wishes to know the average sideband suppression that can be expected from phasing and filter exciters; the amount of carrier attenuation necessary for good sideband operation; and if sideband switching is an essential feature to incorporate in new equipment.

The theoretical maximum attenuation of the unwanted sideband is about 40 dB in the types of 90° audio phase-shift networks used in amateur equipment. In practice, between 30 and 35 dB is more usual and this attenuation is not difficult to attain over the speech frequency range of 300-3000 c/s. The simpler type of crystal-filters operating in the 400-500 kc region have attenuation figures between 30 and 40 dB when correctly aligned, while the more complex types provide upwards of 60 dB. To quote practical examples, the G2NH filter exciter using a simple band-pass filter with two crystals has about 33 dB sideband attenuation. (It should be mentioned that this exciter uses a third crystal in the filter as a "brute force" carrier suppressor.) The Collins KWS-1, which has a 250 kc mechanical filter in the sideband generator, has at least 60 dB attenuation of the unwanted sideband, while the G3CWC and the "Multiphase" series of phasing exciters using the so-called passive type of phase-shift networks achieve attenuation figures of better than 30 dB.

Although the filter method is inherently capable of higher attenuation, in practice the difference is often masked by non-linearity and spurious products generated in the frequency conversion and amplifier chains following the sideband generator. The A.R.R.L. consider that 30 dB average suppression of unwanted emission of all types, including the undesired sideband

and carrier, represents good amateur performance at the present time.

For single-band operation, sideband switching, although not essential, is certainly desirable. The same sideband (upper or lower, depending on the frequency band in use) is used by all stations in a net. At times two or more stations wishing to leave a net temporarily will do so by switching to the sideband not being used by the other members of the net. Most multi-band transmitters use mixer arrangements for converting the sideband-generator frequency to the required amateur band. As lower-sideband is used on the 1.8, 3.5 and 7 mc bands and upper-sideband for the higher frequencies, it is obvious that the ability to be able to switch sidebands allows much greater flexibility in the choice of mixer injection frequencies for multi-band operation.

G3GHB (Birmingham) asks for further information on the transformers specified in the recent *QST* article "Cheap and Easy Sideband" by W2EWL. The answer to this query appeared in "SSB Topics" for August, 1956, but in case this issue of *SHORT WAVE MAGAZINE* has been mislaid, here again is the information: W2EWL has found that the ratios are not at all critical, and satisfactory results can be obtained by using normal anode to voice-coil transformers of the type used in small BC sets. All three transformers can be of the same type and should have as high a primary impedance as possible. Shunt feed, as suggested in the original article, is recommended. W2EWL is at the moment working on the design of a new exciter using the Crosby transformerless balanced-modulator.

A reader who is interested in the G3GEN Exciter (*SHORT WAVE MAGAZINE*, October, 1955) wonders if it can be used as a basis for a multi-band transmitter; he also asks if the performance of this exciter is good enough for operation on the DX bands. Answers are that it is possible to use this exciter for multi-band operation by generating the RF at some neutral frequency and then mixing the output by means of a separate outboard heterodyne unit into the required amateur band. If 9 mc is used for the generator frequency, a VFO operating in the region of 5 mc will give output in the 14 and 3.8 mc bands. The VFO frequency can be multiplied by a separate stage and will permit operation on the other bands. By doubling, 1.8 and 21 mc can be covered, by tripling, 7 mc is obtainable, and by quadrupling, output is available on 10 metres.

The modifications necessary for 9 mc operation are to change the values of R17 to 100 ohms and C14 to 210 $\mu\mu\text{F}$. The 9 mc crystal oscillator output should be coupled into the exciter by means of a low-impedance link matched as nearly as possible to 75 ohms.

Another alternative method of band-changing would be to use the external mixer unit to convert the 3.8 mc signal to the required output frequency. This method, although more convenient, does have the disadvantage that the unwanted sideband attenuation will suffer if the 3.8 mc frequency is moved by more than a few kc, and this of course limits the operating frequency range on the other bands.

G3GEN did not quote a performance specification

Table of Values

Fig. 2. Grid controlled Linear RF stage

C1, C3, C4 = .005 μ F. 1,000v. wkng.	C8, L2 = Normal tank circuit
C2, L1 = Normal grid circuit	R1 = 100,000 ohms; 1-w.
C5, C6 = .002 μ F, filament by-pass	R2 = 15,000 ohms, 2-w.
C7 = .005 μ F, 2,500v. wkng.	T1 = Heater xformer, 10v. centre-tapped
	V1 = 5763, Brimar
	V2 = U78, G.E.C.
	V3 = 813, Brimar

for the exciter in his original article in the October, 1955, issue, but checks made with several stations using his circuit on 3.8 mc indicate that unwanted sideband attenuation runs between 20 and 30 dB. VQ4EU is using the circuit on 14 mc and reports that he can obtain near 30 dB suppression when the exciter is on or near the RF phase-shift design centre frequency. The performance does, however, become degraded if a large frequency shift is made. For this reason, sideband generation at a fixed frequency, with subsequent frequency conversion to the required amateur band, is the procedure to be recommended.

Single Sideband Contest

Late news from *CQ Magazine* is that over 2,000 SSB stations were active during the contest. Log checking is well under way, but this is a mammoth task—400 entries have been received! The contest certainly achieved the object of the organisers in getting SSB stations on the air and many old timers were back after spells of inactivity. During the peak DX periods the QRM on the high end of 10, 15 and 20 metres had to be heard to be believed; what it would have been like if this had been an AM contest we shudder to think!

It is too early to spotlight the cup winner, but the following high scores may give a pointer:—

CN8MM	489 contacts	1458 points
CN8JD	475 "	1416 "
SVØWA	437 "	1247 "
HR2WC	535 "	1118 "

Other top liners include CN8GD, KA2YA, BV1US, DL4CX, TG9AD and VQ4EO. The highest G score claimed to date is G3A00, with GW2DUR a close second. A full report of the contest is promised by *CQ* in time for publication in the next "SSB Topics."

News and Views

The posting has come through for DL2TH and he is now G3HSR at RAF Locking. In just over a year of SSB operation from Hanover he clocked-up 958 contacts in 55 countries. His XYL was also active on sideband as DL2YL and she will now appear as G3HSQ. Perhaps with his influence the R.A.F.A.R.S. Hq. station G8FC will appear on SSB.

G3GKF (Purley) has run into TVI difficulties on 21 mc and with the increased TV hours, finds that his operating time is very limited. He has a new final amplifier under construction, which he hopes will cure the trouble. He has incorporated the NC-300 6BE6 product detector circuit in his Eddystone S.640 receiver, with good results.

G5YH (London W.4) has recently taken an interest

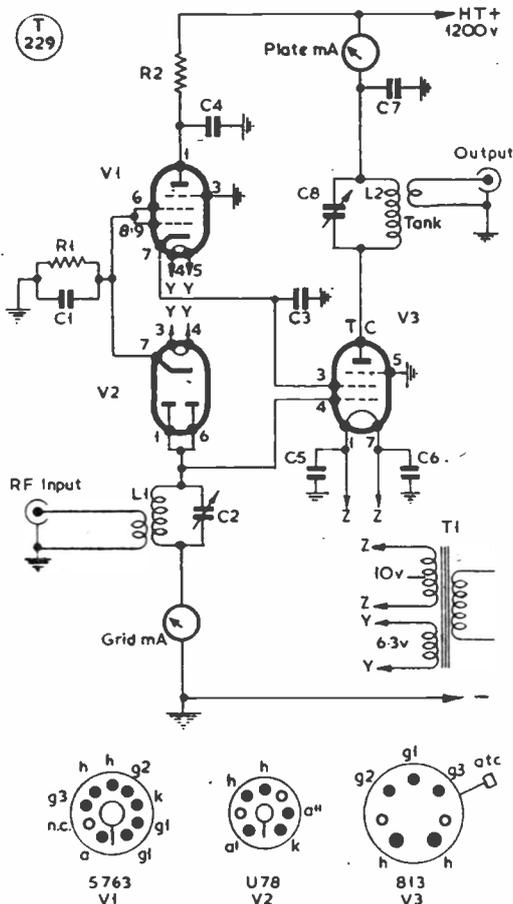


Fig. 2. Grid controlled Linear RF Amplifier in operation at GW2DUR, the action of which is explained in the text. In this case, the PA stage runs an 813. Values are given in the table.

in SSB and will shortly appear on the DX bands with a filter-type transmitter. During his first three weeks of operation, GW3LLU (Llanely) worked 28 countries on 14 mc sideband; he adds that it was SSB that finally persuaded him to take the Morse test. (Work that one out!—*Editor*.)

DL4SV (Munich) will return to the States later this month for a spell of home leave. He does not expect to return to Germany, as a re-assignment is due; SVØ appears to be the next port of call. Also scheduled for return to the States are DL4KS and DL4WM. New SSB calls from Germany are DL4AV, DL4GLM and DL4HAB.

K2GMO sends the word that he will be passing through London early next month. During the three-day stop-over he hopes to meet some of his SSB friends in the Greater London area.

G5BJ (Birmingham) reports that his new filter exciter is progressing well. After a spell of inactivity due to over-work he is back on 3.8 mc.

GW2DUR (Llanely) enjoyed the contest although his operating time was limited to the two Saturdays.

G3COJ (Maidenhead) who has been off for some time, fired up the SSB transmitter for the *fracas*. LA6J rebuilt his station for the test and gave many of the newcomers a new country; he asks his old 80-metre friends to look for him on 14 mc.

Old timers on Sideband will remember DL4AP who was so active in the early days. Writing from Colorado, he is now WØTTL. G3JPE reports that he has been testing a 3-wire quarter-wave vertical on 3.8 mc with excellent DX sideband results.

Welcome back to G2AJS (Caterham), who returned to Eighty SSB recently after 12 months' absence. Newcomers on 3.8 mc SSB include G3BWH, G3KEU and GM8CH.

DX Notes

During this period, conditions have been generally patchy on all the DX bands.

A further visit by W6ITH to St. Martin, over most of February, gave many sidebanders a chance to collect two new countries. Having experienced difficulties in moving his station from Dutch St. Martin to the French side during his previous visits, he played safe this time by taking *two* complete KWS-1 transmitters and 75A-4 receivers on the trip! The first was set up at FS7RT and the second at PJ2MC and both stations were located within 12 miles of each other, but on opposite sides of the international boundary. W3DZZ type multi-band trap aerials were used at both locations and operation was on 10, 15 and 20 metres.

BV1US in Formosa has been very active and has been using a new crystal frequency of 14305 kc for SSB operation. The U.S.A.F. club station HZ1AB in Saudi Arabia has recently changed over to SSB, with a Collins KWS-1 providing the talk-power. Another convert is OD5BZ who is on the high end of 20 metres with a very potent signal. 5A5TH is also a newcomer to sideband. KT1DD reports that the KT1 series of calls have been cancelled and all stations in Tangier

now use the CN2 prefix.

Although at least two stations in Monaco (3A2AH and AM) are equipped for SSB operation, the lack of activity has been responsible for the sponsoring of a Sideband-only expedition, which is due to take place within a few weeks under the guidance of a group of PAØ sidebanders.

An interesting new station now on SSB is LU7AS, who is active on all bands; his first U.K. contact was with G3GKG. And yet another interesting one: If you hear VP2VG, it will be the callsign of an expedition to Buck Is., off Tortola, in the British Virgin Isles, operators being KP4DE and KV4BB; they will be on 20 metres.

ZD4BF is back in Ghana after his spell of leave in the Channel Isles. Much to his surprise the transmitter still worked—at least, it did for a few days, then the exciter blew up with a loud bang and a cloud of blue smoke. Having no local junk-shop he had to wait for replacement components from England before resuming operations early in March. ZD4CF is ready to go with a 20A exciter and 811 linear. ZD4BQ, who was featured in the "Other Man's Station" in the last issue, is taking an interest in sideband and may be on soon.

DX Round Table

Following the successful 14 mc WAC round-tables held earlier this year, many of the regular 21 mc operators have been trying to arrange a similar get-together. Five-Continent hook-ups have been a regular occurrence on both bands, but on 15 metres Asia has been the stumbling block. The arrival of HZ1AB in February proved to be the key and under the net-control of F7AF a series of schedules were arranged for the period February 25-March 1 for 1800 GMT.

Propagation conditions were excellent throughout the week, but for the first two days South America was the missing link. On Wednesday, February 27,



When W6ITH signs FS7RT and PJ2MC on his visits to the Island of Saint Marten (French and Dutch) he has a KWS-1 transmitter, SC-101 station control unit and 75A-4 receiver, all of Collins manufacture. The SC-101, centred in this photograph, contains speaker, aerial matching and switching controls, beam direction indicator — and a clock. Murals by the XYL.

SSB COUNTRIES-WORKED LADDER

(Starting Date January 1st, 1954 — Two-Way
SSB Only)

STATION	3.5	7	14	21	28	Total
W2KR	0	0	75	0	0	75
K2DW	0	0	73	0	0	73
DL4SV	18	0	66	6	0	72
G6LX	16	3	66	45	9	70
ZL3PJ	0	0	66	0	0	66
ZL3JA	0	0	66	12	6	66
VK3AEE	0	0	66	0	0	66
W3ZP	0	0	65	0	0	65
G3MY	16	0	58	8	0	63
VE4NI	0	0	61	0	0	61
ZS6KD	0	0	61	0	0	61
OH2OJ	0	0	60	0	0	60
K2GMO	0	0	57	0	0	57
F7AF	0	0	54	23	7	56
DL2TH	10	0	52	19	2	55
GM3CIX	0	1	53	12	0	53
G3BX1	0	0	46	43	2	50
G3GKF	0	0	1	48	1	48
G3A00	0	0	48	0	0	48
OZ3EA	0	0	48	0	0	48
G5BJ	0	0	47	0	0	47
GW3EHN	5	0	45	2	2	45
GW2DUR	4	0	45	0	0	45
AP2BP	0	0	44	3	0	44
VQ4EO	0	0	41	20	5	41
G3AUB	13	2	36	0	0	39
G3GKG	9	0	29	0	2	34
GW3LLU	0	0	28	0	0	28

Table corrected to March 4, 1957

CE2HV and KC4USA joined the group and the Six-Continent round-table was achieved. Further schedules were arranged for the following two days and a similar WAC contact took place on March 1. The stations participating in these interesting tests included: F7AF, F7BN, F7EM, DL4RY, CE2HV, YV5FL, KC4USA, 5A2TP, 5A5TH, CN8MM, HZ1AB, KH6AQ, KH6AR, W8TII/KG1, W8DPF/4, W6ZNT/5, W6QJV, W8QIN, W7KVU and W9RUK. with the K4LIB expedition on safari in FQ8. At first

A new country appeared on SSB in late February, with the K4LIB expedition on safari in FQ8. At first on 21 mc, he was heard testing on 14 mc on March 3; he will be active from several African countries until the middle of the month, including OQ5.

Information for this column has been provided by K2DW (CQ Magazine SSB section), DL4SV, W6ITH, G3MY, G3GKF, CN8MM, F7AF, ZD4BF and SWL Amie.

Next appearance will be in June, for which reports to "SSB Topics" will be wanted by April 30. Till then, GL and 73 de G6LX.

CORRECTIONS AND AMENDMENTS
—MARCH ISSUE

Some slight, but nevertheless much regretted, errors crept into our last issue. In G3BFP's article on his *Inexpensive Single-Sideband Exciter*, the value for C4 in Fig. 6 on p.15 should be 500 $\mu\mu\text{F}$. In the *Simple Grid Dip Oscillator*, G3JZ points out that in the circuit on p.18, R4 should have been given as 100,000 ohms and R5 as 500 ohms. In the amateur band table on p.41, the 40-metre, band ought, of course, to have been shown as 7000-7150 kc, and hence the phone area as 7050-7150 kc.

EDDYSTONE APPROVED COMPONENTS

All tuning condensers of Eddystone manufacture have now been quality approved for inclusion in equipment produced to meet Service standards. This means that they are equally suitable for incorporation in commercial transmitters, receivers, test gear and measuring instruments. The appropriate Radio Components Standardisation Committee references are No. 1022/1 and No. 1038/2, the categories in both instances being Humidity Class H1 and Temperature 40/100.

TELEVISION SOCIETY EXHIBITION

This year's Television Society Exhibition was of particular interest because continuous demonstrations of colour television, to the N.T.S.C. standard now under test by the BBC, were being given. The subjects were stills, transmitted over a closed circuit, and the results can only be described as quite startlingly good. Colour shading, tone and definition were excellent, and it was quite evident that the main technical problems in the transmission and reception of colour TV have been largely overcome. One other interesting demonstration was the effect of ghosting and multi-path interference on a colour picture, showing that here there remains a problem to be solved. Among the firms represented at this important private exhibition were Cossor Instruments with their Valve Voltmeter and Oscilloscope constructional kits—the latter we hope to discuss in detail in an early issue of SHORT WAVE MAGAZINE—and Hallam, Sleigh and Cheston showing their cabinet parts and designs for the individual ("one off") constructor. The Television Society, and its secretary, Mr. Geoffrey Parr, of Chapman & Hall, are to be congratulated on organising such an interesting, useful and effective Exhibition.

SMALL ADVERTISEMENTS

The quantity (and quality) of our Small Advertisement columns proves the value of SHORT WAVE MAGAZINE in disposing of unwanted equipment, or in obtaining items in the "wanted" category. Readers who are thinking of using Small Advertisements are asked to set out their notices clearly, with full punctuation and using the accepted abbreviations. The cost of a Reader's Small Advertisement is but 3d. a word, minimum charge of 5s., with an additional 1s. 6d. for a Box No., if required. Readers who would like to know can take it that there is an immediate response for really attractive items for sale or wanted.

Aerial Filter for Two Metres

HOME-CONSTRUCTED
HIGH-Q CAVITY

W. F. NEAL (G3FUL)

This simple device and the way in which it can be made will be of considerable interest to VHF operators. The design is based upon the formula for the length of the central tube in a re-entrant cavity.—Editor.

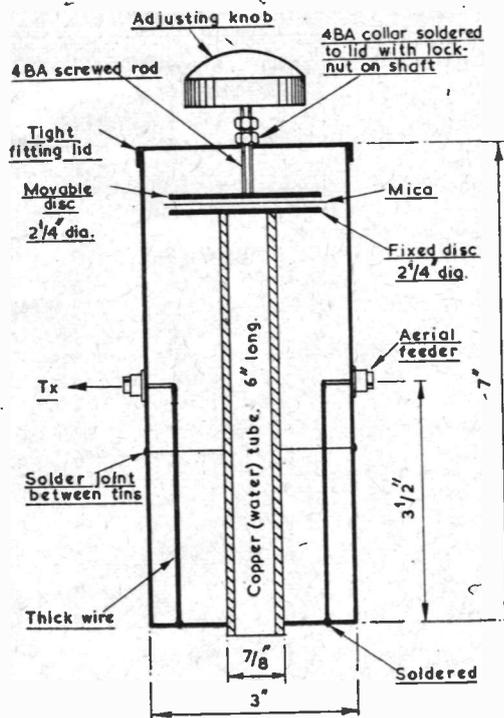
WITH a two-metre TVI problem in hand, some cogitation led to the conclusion that a cavity-type high-Q filter fitted between transmitter and aerial ought to be possible, convenient to construct, and effective in suppressing TVI.

The required dimensions (for two metres) and method of construction are shown in the sketch. The whole thing is simplicity itself. The outer container was formed by taking two clean empty tins (which had contained well-known brands of food), one 4½-in. high and 3-in. in diameter, having a tightly fitting lid, and another 2½-in. high and 3-in. in diameter. The bottom was cut out of the taller can and both were soldered together.

A piece of copper water tube 7/8-in. outside diameter and 6-in. long was soldered centrally to the bottom of the shorter container. Two coax. sockets were fixed through the sides 3½-in. from the top, and stout copper wires taken from the inside pins through two holes in the bottom of the smaller container, and soldered there. The two containers were then solder-jointed and a disc of sheet copper 2½-in. in diameter was fixed to the top of the copper tube.

A 4 BA terminal was soldered to the centre of the lid over a hole and a 3-in. length of 4 BA studding threaded through. Another similar disc of copper was fixed to one end, the rod threaded through, a lock nut put on, then a knob. This is the tuning, and to prevent shorting a sheet of mica is put between the discs. When assembled and working the lid is soldered on.

The tuning is very sharp and can be adjusted by watching the anode meter. It is connected to the transmitter with a half-wave length of coax. There is very little loss of output when using this high-Q filter and an SCR-522 trans-



CROSS SECTION THROUGH ϕ OF ASSEMBLY.

J
13

The filter unit contrived by G3FUL; it is designed for a two-metre transmitter with coax feed (70-75 ohm) between transmitter and aerial. Essentially, the device consists of no more than two suitably-sized tin cans soldered together, with a piece of copper tube of the right size up the middle, tuning being carried out as indicated in the sketch. The dimensions are fairly critical and should be followed. As explained in the article, tuning is sharp and, effectively, only the transmitting frequency can be passed. It is therefore an anti-TVI device, with a low insertion loss by virtue of its high-Q characteristic.

mitter which has a 48 mc stage causes only a trace of interference when the two-metre beam fires straight at the BBC TV aerial a few feet away. With 18 watts input to the final, a 15-watt lamp can be well lit at resonance.

The apparatus is not elegant, but it is simple, costs very little—and it works.

ENSURING CONTINUITY

The best way of making sure of your copy of *Short Wave Magazine* reaching you on the due date each month is to become a direct subscriber. By payment direct to us of 30s. for a year of twelve issues (15s. for six months) you receive the *Magazine* by post on the day of publication, if you are in the U.K. The overseas subscription rate is also 30s. post free, actual date of delivery depending on surface mails.

DURING the period covered by this report—the month to March 25—things have been altogether much brighter and more cheerful on VHF. We have had runs of good conditions, one or two nice GDX openings, and in general a very encouraging level of activity.

Significant date areas were: March 1-4, 11-12, 14-16 and March 24, with the evening of the 11th probably one of the best sessions yet experienced during early spring. These conditions, as usual, tie up quite closely with the state of the weather over the U.K. For instance, March 11 was a fine, warm day, with a rising glass (though it did not go very high), and by the evening very good GDX conditions had developed over north-south paths. Some Continentals were heard and worked from the south-eastern part of the country, but very few penetrated as far as the Midlands, and then only on the peak of QSB, which was rather bad on the longer GDX paths. Conditions were at their best between about 8.0 and 10.0 p.m., with the northern signals noticeably weaker towards the late evening.

On the occasion of March 11, activity was high, and there were far more stations on than could possibly be worked during the time they were coming through. Heterodyne QRM was quite bad round 145 mc, and even up towards 145.5 mc there were several operators who found themselves sharing the frequency with stations not often heard.

An important and interesting *negative* result was that noted on February 23 and March 10. On both these days, Aurora manifestations were in evidence, and all other bands were affected in one way or another. But on two metres—except perhaps for a very slight flutter on distant signals on March 10—the Aurora produced no effect on either occasion. This is in line with previous experience, and it can be taken that it is the exception rather than the rule for Aurora Bor. to produce the VHF conditions we got back on January 21.

Going on with the survey of the immediate past: March 12 was

VHF BANDS

A. J. DEVON

GDX Openings Again—

IGY Arrangements—

Technical Notes and News—

Station Activity Reports—

another fine day; though the glass was lowish, conditions were just as favourable as on the previous evening, and again tailed off towards 11.0 p.m. From what your A.J.D. heard, it appeared that some operators were under the impression that conditions generally were *not* so good as on the 11th, because they could hear far fewer stations. But this was not so; during the mid-evening period on the 12th, conditions were nearly, if not quite, as favourable for north-south GDX as they had been the night before—the trouble was that there were not enough stations on. A good many people had apparently shot their bolt on the 11th, which was the London area's Activity Monday. As mentioned in this space in February, one reason why, some years ago, we dropped the idea of regular activity periods was because of this possibility of losing opportunities during a run of good propagation conditions, when activity is wanted.

We cannot all be on every evening, to call CQ and waste precious time listening round on a dead band. But it is not difficult to decide for oneself when con-

ditions ought to be right: A fine, warm day, with a rising glass, getting cool towards the evening, little or no wind, a fairly clear sky with marked stratification of the cloud layers that are visible—and you can take it that the two-metre band (and 70 centimetres) should be pretty well open. One cannot expect this situation to develop regularly on a Monday evening!

By March 13, conditions were dead flat again, but improved on the 14th and remained quite good, for GDX, until the 16th. Yet the activity level had fallen very low, and the opportunities were largely being wasted—except by Bob, G5MA, who worked or heard G3BW and GD3UB every evening March 14-16, proving the point!

The next activity night, Monday, 18th, found conditions poor, and during that week there was not much doing. But by Sunday, 24th, conditions and activity had improved again, particularly east-west. For instance, GW8UH (Cardiff) was getting into the Midlands, G3KHA (Bristol) worked G2CIW (Cambridge), and G5YV was workable from the South Midlands.

Some of the Gleanings

On Monday, 11th, G3GHO (Roade) logged a total of 75 different stations . . . At 2130 on March 12, G5YV heard and called G5MR (Hythe, Kent) . . . Also on the 12th, G5MA (Gt. Bookham, Sy.) worked G3BW (Whitehaven, Cumb.), GD3UB and GI3GXP, as nice a bag of GDX as anyone could possibly wish for . . . The outstanding signal now being radiated by G8VZ (Princes Risborough) comes off a new stack, fed by 300-ohm *open* wire line, his PA input still being 12 watts only . . . G6JK (High Wycombe) is doing very well with NBFM; not only has it cleared his TVI, but his neighbours on the band no longer suffer from the proximity effects always produced by a near-by station . . . We could think of at least one other Bucks. two-metre man who could usefully adopt the same technique! . . . G3JWQ/G8VZ have had about 170 contacts on a regular schedule extending over 18

months; their path distance is 97 miles . . . G6NB has now worked some 60 different stations on 70 centimetres, including four Continentals—nice going. . . G2AUD (Nr. Bletchley) is ex-VS1FP . . . G2HCG/G3FAN maintain their schedule, now conducted cross-band Four/Two either way round, with both sides audible on the talk-back from either end . . . We hope Tony has got that barometer correctly adjusted for his height a.s.l. He has worked some 25 stations on four metres—more good work, from his Ryde, I.o.W. location . . . G5WW (High Wycombe), who only quite recently became regularly active on Two, has now worked his 100 different stations . . . The lack of 4-metre activity from the north-western area of England, due to the Jodrell Bank prohibition, is becoming increasingly felt . . . The general impression about Four seems to be that results are not as good as one can expect on two metres . . . G3LOK is a very new two-metre station in the Isle of Wight, and is doing well.

IGY Arrangements

The co-operation of U.K. VHF stations is requested in the collection of data for the study of (a) The relationship between the weather and UHF/VHF propagation, (b) Aurora effects on VHF, and (c) The incidence of solar noise on UHF/VHF.

As regards the first two, most of the answers could be provided by a careful digest of "VHF Bands" (and "VHF weather Report"), during the last ten years! If there is one thing that U.K. VHF amateurs do know about, it is the effect of weather on 144 and 430 mc propagation, and of the Aurora on five and two metres. Item (c) is not so clear, though we already have the extremely interesting report turned in by G3CGQ (Luton) and discussed in this space in January last, p.598.

Because of the varying noise level at most locations caused by agencies other than the sun, it is not very easy, as a practical exercise, to sort out the noise that does come from the sun, which can at times reach high intensity. For those interested in this inves-

TWO-METRE ACTIVITY REPORT

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

SWL Stokes, Ruislip, Middx.
HEARD: G2AHL/M, 2AHP, 2AIH, 2AJS, 2ANT, 2BDP, 2BRH, 2DVD, 2FM, 2FMJ, 2HDJ, 2HDZ, 2JF, 2JR, 2MV, 2RD, 2TP, 2UJ, 2WS, 3BII, 3BFF/A, 3CGQ, 3CNF, 3CO, 3DF, 3DOR, 3EIV, 3EYV, 3FAN, 3FCQ, 3FD, 3FNL, 3FQS, 3FUH, 3GDR, 3GHO, 3IAM, 3IUL, 3JON, 3JR, 3KEQ, 3KLI, 3KQC, 4DC, 4KD, 5DS, 5LH, 5LK/A, 5MA, 5UM, 5YH, 6JP, 6NB, 6YP, 8HY, 8YK, 8KW/M, 8RW. (February 16 to March 16).

G3EBK, Guernsey, C.I.
WORKED: G2DDD, 2JF, 3FMO, 3GAV, 3GHO, 3GZO, 4DC, 6JK.
HEARD: G2HCG, 3AUS, 3IRA, 3LHA, 6NB. (During period).

G6FO, Maids Moreton, Buckingham.

HEARD: G2ANT, 2AUD, 2BVW, 2CIW, 2FJR, 2FMJ, 2FNW, 2HCG, 2HOP, 2JF, 2MV, 2WJ, 2YB, 3BAC, 3CGQ, 3CNF, 3DKF, 3DOR, 3EJO, 3EMU, 3FCQ, 3FFV, 3FQS, 3GHO, 3HBW, 3HIQ, 3HXS, 3IIT, 3IRA, 3IRS, 3JFR, 3JRW, 3JZG, 3KEF, 3KEQ, 3KHA, 3LHA, 3PV, 4DC, 4PS, 5BD, 5DS, 5KG, 5KW, 5LK, 5MA, 5MR, 5WW, 5YV, 6AG, 6JK, 6NB, 6RH, 6XM, 6XX, 8VZ, GD3UB, G13GXP, ON4HN, PA0FB. (March 11-13).

G5MA, Great Bookham, Surrey.
WORKED: G2ANT, 2FNW,

2GG, 2OI, 3AGS, 3BA, 3BU, 3BW, 3GAV, 3GFD, 3HA, 3HHY, 3IOO, 3IRA, 3IRS, 3IWI, 3JWQ, 3JZG, 3LOA, 5NF, 5TP, 5YV, 6XM, 6XX, 8PX, 8VZ, GD3UB, G13GXP. (February 16 to March 18).

G3KHA, Knowle, Bristol.

WORKED: G2AHP, 2ANT, 2AUD, 2CIW, 2FJR, 2FQP, 2HOP, 2JF, 3CGQ, 3CNF, 3FEX, 3HBW, 3HHY, 3HXS, 3IRS, 3KEQ, 3KPT, 3YZ/P, 4DC, 4PS, 5DW, 5KG, 6AG, GW8UH.

HEARD: G2AIH, 2DDD, 2DVD, 2FNW, 2HCG, 2YB, 3ABA, 3BA, 3BW, 3CO, 3FAN, 3FQS, 3GHO, 3GHI, 3HIQ, 3HRH, 3IER, 3IIT, 3JZN, 5BD, 5BM, 5KW, 5UM, 6RH, 6XM, 8KW, 8VZ, PEIPL. (February 18 to March 17).

G3KUH, Rotherham, Yorks.

WORKED: G2BM, 2BVW, 2FJR, 3BU, 3DVK, 3EHK, 3ELG, 3GFD, 3HA, 3JDK, 3JWQ, 3KEQ, 3KFD, 5BD, 5KG, 5MA, 5YV.

HEARD: 2FNW, 2MV, 2OI, 2WJ, 3ALC, 3AZU, 3BA, 3DLU, 3FQS, 3IWI, 3JZN, 3KQV, 4DC, 6JK, 6NB, 6XM, 6XX, 8VZ, G13GXP. (To March 18).

G3LHA, Coventry, Warks.

WORKED: G2ACV, 2ANS, 2ATK, 2AUD, 2CIW, 2CVD, 2DCI, 2DDD, 2FJR, 2FMO, 2FNW, 2HCG, 2JF, 2NV, 2YB, 3ABA, 3AZW, 3BA, 3BW, 3CGQ, 3CKQ, 3CO,

3DKF, 3DKF/A, 3EJO, 3EMG, 3JENY, 3JENY/M, 3JENY/P, 3FD, 3FMO, 3FTN, 3FUW, 3FW, 3GFW, 3GGR, 3GHI, 3GHO, 3GSO, 3HAN, 3HAZ, 3HBW, 3HIQ, 3HTY, 3HXS, 3IER, 3IRA, 3IRS, 3JGY, 3JGY/M (Herefordshire), 3JQN, 3JWQ, 3JZG, 3JZN, 3JZW, 3KEF, 3KEQ, 3KEQ/P, 3KFD, 3KFX, 3KHA, 3KKV, 3KPT, 3LAY, 3LDW, 3LJG, 3LQK, 3YZ/P, 4MK, 4PS, 5DS, 5JO, 5KG, 5KW, 5MA, 5ML, 5YV, 6AG, 6NB, 6PO, 6XA, 6XM, 6YP, 6YU, 8KW, 8VZ.

HEARD: G2AHY, 2AJS, 2BVW, 2HDJ, 2HOP, 2MV, 2RD, 2TP, 2WJ, 3ATC, 3BJF, 3DOR, 3FAN, 3FCQ, 3FFV, 3FGT, 3FP, 3GDR, 3GWB, 3HA, 3IIT, 3IJB, 3IOO, 3IWI, 3JR, 3KCB, 3KUH, 3XC, 3YZ/M, 4DC, 5BD, 5DW, 5NF, 5WW, 6JK, 6XX, G3EBK, GW8UH, PEIPL. (January 18 to March 18).

FOUR METRES

G3EHY, Banwell, Som.

WORKED: G2ABD, 2DD, 3CLW, 3FAN, 5DS, 6NB, GW2ACW, 4CG, 8SU.
HEARD: G3HHY. (Month to March 18).

G5MA, Great Bookham, Surrey.

WORKED: G2ABD, 2DD, 3CLW, 3EOH, 3EYV, 3HRH, 3IUL, 5DS, 5KW.
HEARD: G3FAN. (January 29 to February 3).

tigation—which can be carried out using only a receiver and a rotatable beam with a reasonable back-front ratio—it would seem that the first thing to do is to make a "local noise survey" so as to arrive at some sort of datum from which noise that might be due to the sun can be estimated. This calls for a receiver with an S-meter—for those who have no S-meter, see the article on pp.39-40 of the March issue—the procedure being to get a zero with gains full up but no aerial on the converter, and then to see how much noise shows on the S-meter with the aerial on, taking observations at different times as often as possible so as to establish the datum. Unfortunately, solar noise sounds very like leaky EHT lines and corona effect, which is where the difficulty of separating the two sorts of noise comes in. Obviously, the noise investigation can really

only be carried out effectively from locations not normally subject to a high local electrical noise level, or where the noises that do come on can be tied down to some human agency, such as "next-door's vacuum," and thus are not part of the usual background.

The method of following the sun and recording observations was very well explained by G3CGQ, as reported in January "VHF Bands."

As to the collection and correlation of reports, this is being dealt with as a separate exercise, to which we shall refer again later.

Cross-Band 70/72 Mc

We are glad to give prominence to a request from F3XY for G schedules on four metres—which, due to the slight frequency separation between the French and U.K.

allocations, would be cross-band 70/72 mc.

F3XY, located at St. Remy de la Vanne, 50 miles east of Paris, is on 72.3 at 2000 GMT daily, and has a good converter on which he can tune our 70 mc band. So far, F3XY has worked (on 72.3 mc) distances up to 150 miles. It is to be hoped that this notice will produce some F/G contacts, and for those who would like to write F3XY, he is QTHR in any recent *Call Book*.

Some Technical Items

G3JGY (Malvern) uses 12-in. lines in his 3E29 (829) PA tank, which is tuned half-wave for 144 mc, and three-half-wave for 430 mc, the PA then being operated as a "power tripler"; the tuning capacity is 10 μ F at the plate end of the line assembly, 144 mc coming off half-way along, and 430 mc at the end of the line. As G3JGY says, this is the easy way of getting output on 70 cm without having to build a separate tripler; he can change from two metres to 70 centimetres in 30 seconds, using the same transmitter. One disadvantage is, of course, that the 430 mc RF output is pretty low, not more than a watt or so—but with a high-gain stack for that band, it is enough for putting out quite a respectable 70 cm signal.

G3DLU (Sheffield) reports that his tests with the YU1AD converter—using the noise-generator described in our issue for September 1954—show it to have an NF of 4.5 dB, with a final sensitivity factor represented by 10 mW AF out for 0.2 μ A RF input; from a no-signal noise level of 1 milliwatt. The converter is so sensitive that it picks up ignition noise with only the signal-generator as "aerial"! Referring to the circuit diagram on p.546 of the December 1956 SHORT WAVE MAGAZINE, G3DLU advises that the position of L1 does not matter so long as it is wound over L2; that the C1, L1 circuit will always tune separately and give the correct match into the feeder line; that the C2, L2 side must be made as high-Q as possible, using the specified value for C2, not a variable trimmer; and that the mixer HT voltage wants to be 65v. for the best

performance. All useful, practical information on a converter design which is distinctly out of the ordinary.

Which brings us to ON4BZ, with yet another converter. Guy has given us the details, for shaping into an article, on a new experimental design of his involving the Philips E88CC twin-triode, with which he is getting impressive results. He suggests that those who can should forthwith acquire one or several "valvos type E88CC." We will disseminate further details as soon as we can get round to it.

The Station News

G2AHY (Crowthorne, Berks.) puts in claims and is regularly active. And for those who have murmured about GC, Bernard of GC3EBK (Guernsey) writes this time to bring himself up-to-date in the Tables, remarking that he is "looking forward to some hectic DX spells."

G3LHA of Coventry (whom we shall always remember as SWL Bastin and whose hand-writing has been so familiar for so many years) continues to sort them out on two metres, but finds four metres a dead loss owing to TVI—running just the one watt on 70 mc, he can block TV sets at 300 yards; in the Midlands, they are too near Ch.4, apparently. On two metres, G3LHA has heard, and called repeatedly without success, both G1GXP and GW8UH; on the other hand, he can hear neither G3BW nor GD3UB when stations much further south are working them. A noteworthy QSO for G3LHA was G3JGY/M, for Herefordshire.

A note from G3YH (Bristol), an old timer on VHF who has kept in touch since the early days, brings us up-to-date with his scores; he remarks that he can receive on four metres, with a Tx under construction, and that on two metres he has been "trying a few CQ's lately between 0700 and 0730 GMT"; he would like to start a schedule at about this sort of time, for the spring and summer. G2BRR (Wootton Bassett) found himself tangled up in telephone wires when his 6-over-6 Slot-fed

TWO METRES

COUNTIES WORKED SINCE

SEPTEMBER 1, 1956

Starting Figure, 14

From Home QTH only

Worked	Station
47	G3GPT
43	G5MA
41	G3KEQ
36	G3LHA
35	G3GHO, G5ML
33	G2CIW, G3DKF, G3IOO, G3JWQ
32	G2DVD
30	GC3EBK
26	G3KHA, G3WW
25	G3CKQ, G3KUH
23	G3KEF, G3KPT
19	G3FIH
18	G5MR
15	G2AHY, G3IER

This Annual Counties Worked Table opened on September 1st, 1956, and will run till August 31st, 1957. All operators who work 14 or more Counties on Two Metres in the year are eligible for entry in the Table. The first claim should show a list of counties with stations, which can be added to thereafter as more counties are worked.

job came down in the wind, so for the time being is QRT on VHF till another mast can be erected.

As G3KHA (Bristol) so rightly says, "This period has not been without its moments, but you had to stick to the band otherwise you missed them." How true! See comment earlier about looking out for conditions every evening, not just on Mondays! G3KHA remarks that his most consistent signal from the London direction is now G4DC (Upminster), readable on phone any time. (He is also a very nice signal from where your A.J.D. sits, though it is not as far as G3KHA.)

On the two-metre /M front, G3JGY has worked G2ATK, G3CVK, G3EJO, G3HAZ, G3IER, G3LHA, G3NL, G5BM, G5ML and G6NB while running his PA consisting of a pair of 6C4's taking 15w. input—as ingenious an approach to the RF end as any of which we have yet heard. G3JGY describes his /M

receiver simply as "a double super," so we can tell you no more than that.

From up in Rotherham, G3KUH is GD_X for a great many people; he writes to say that in his part of Yorkshire activity "is not great, but steady"—which is exactly what we thought! The regulars are G3DLU, G3DVK and G3KUH himself, a lot of others coming on "now and then, mostly then," as G3KUH puts it. Not having written in for some time, he takes the opportunity of reporting that on January 21 he heard G3KHA, for the first and only occasion, with an RST-592 signal on a beam heading of 340°, or N20°W. Coming down to the recent past, G3KUH says that signals on or near 144.75 mc cannot easily be copied up Yorkshire way because of "the harmonic belting in from the Holme Moss TV sound transmitter." Lastly, G3KUH echoes the plea and the hope so long expressed in these columns—Look not for local phones, but the weak CW signal; put not your trust in R3, S4 carriers, for they are unresolvable; waste not your time on phones in QSB, for always they will sign in the trough of the fade. In other words, *use the key, not the other thing!*

Your A.D.J. mops his brow. For more than 20 years—(all right, all right, we know; get on with it.—Ed.).

Round-Up on Four

For an enthusiast for the 70 mc band, you need look no further than Banwell, Som., where Louis of G3EHY is on almost every evening (now using 70.32 mc) and finds there is enough to keep him busy—at any rate, during the period to March 18 he had no less than 80 contacts, at least 60 of them at distances greater than 100 miles. Regular working has been achieved with G3CLW (Bromley, Kent) at 130 miles, who can be raised any night and with whom 30 of the total of contacts mentioned have been made; as G3CLW only runs 10w., it shows what can be done. Apart from several other stations worked in the London area, Louis has also succeeded with G3FAN and G6NB. G3EHY asks for schedules

around 11.0 p.m. It would be interesting if he and EI2W could re-establish, on this band, their old marathon of several years back.

In his report, G3EHY compares results and conditions on four metres with those that used to obtain on five metres many years ago, asking why nothing can be heard from Liverpool or Manchester. The answer is simple—Jodrell Bank and the IGY. A very large area of the north-west is completely cut off so far as 70 mc is concerned, and there is nothing whatever to be done about it. With the 50-mile line from Jodrell Bank cutting the northern outskirts of Birmingham, then up through Mansfield and Bradford right round to Blackpool (and Midlands stations generally being deterred by TVI due to frequency proximity of Ch.4) what it comes to is that 4-metre signals can be expected only in the area from the South Midlands to the South Coast, with EI2W as about the one active operator in the north-westerly direction.

Of G5MA we have already spoken, and here it is to mention that now he also is on four metres, with about 10 stations worked to date on QRP. From Beaminster in Dorset, G3HKV reports that he is on 70.3 mc, fixed and mobile, using "R.E.E. Communicator" equipment, and would like to make contacts.

SWL Clip

A small one this time. SWL Smith (Diss) has closed down temporarily for overhaul and modification—he may be wishing he had waited a little longer, to catch the recent openings!—and SWL Stokes (Ruislip) sends a useful calls heard list, showing nearly 60S logged in the period.

Scatter Tests

An interesting item in the current issue of *Radar* reports on the Marconi tropospheric scatter tests now being conducted over a 200-mile link between Great Bromley, Essex, and Sutton Bank, Yorks. A 30-ft. reflector is energised by a movable horn directed at it, to steer the beam. The transmitter output is given as 500w. and the

working frequency 858 mc. The system is to be extended from London to Newcastle, using a 10 kW transmitter, and will be capable of handling either multi-channel telephony or a TV transmission.

Contest Note

We have been asked whether we intend to organise any VHF contests this year—the answer is No. For one thing, there are more than enough of them scheduled as it is, and for another, it is pretty evident that VHF contest working, as such, has lost much of its popularity—that is to say, while contests do encourage activity, what people come on for is the activity and only a small proportion actually go through the whole process of keeping a contest log and making an entry. Unless most operators can be persuaded to enter and to take the thing seriously, the published result is unrepresentative—how often during a contest have you not heard, in tones of carefully cultivated boredom, that "I am only on to give a few points and have no intention of putting in an entry"? So helpful, or is it!

What we feel, therefore, is that it is better to have the activity when conditions serve, rather than an artificial contest producing an unrealistic result.

VHFCC Elections

We are very glad to be able to notify three new ones this time: VHF Century Club Certificate No. 208 goes to R. Furrer, HB9LE (Winterthur); No. 209 to E. Kerr, G3HTY (Far Forest, Worcs.); and No. 210 to R. Stringer, G3DKF (Coventry). All three put in very interesting collections of cards.

Dead-Line —

This must be Wednesday, April 17, for the May issue—and not a day later; Easter falls right in our production period this time, which means the schedule will be tighter even than usual. Send it all to A. J. Devon, "VHF Bands," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. Go carefully over Easter, and look out for an EDX break if you are at home.

High Performance Converter for the 23-Centimetre Band

FURTHER CONSTRUCTIONAL AND MECHANICAL DETAILS

PART II

A. L. MYNETT, B.Sc. (G3HBW)

The first part of this article appeared in our issue for February last, which should be read with the information given here, since there are necessarily a number of important cross-references.—Editor.

THE 446A valves V4, V5 in Fig. 4 on p.662 of the February issue are mounted as shown in the drawing at Fig. 5 herewith. The grid disc is supported in a brass ring A with spring fingers to hold the valve in place. This ring is bolted to another, B, of larger outside diameter with a sheet of mica in between, using 8 BA brass screws in insulating bushes (Fig. 6), so that the two rings form a condenser, with the mica as the insulant. The ring B is the foundation on to which the rest of the circuit is built, brass tubes C and D being soft-soldered to each side of it, enclosing the cathode-shell and the anode, respectively.

Inside the cathode-tube C is fitted a polystyrene ring E (see Fig. 6), into which the cathode shell fits. Three phosphor-bronze clips, F, are screwed to one face of ring E, which is then mounted in the tube C in such a position that one of the clips F can be soldered to the centre connector of a Belling-Lee chassis-mounting coaxial socket G which is screwed to the tube C, thus forming the input drive connection.

The inner conductor of the anode circuit consists of two brass tubes, H and J, one, H, inside the shorter one, J, with a strip of .006-in. polythene sheet (or something similar) rolled up between them, forming the anode condenser. The outer, J, is a force fit in a turned brass end-plate, K, which is held tightly in tube D, allowing H to protrude from the end of the circuit, as the supply connection to the anode. The anode-circuit tuning discs are made up as shown and mounted in threaded holes in D. Tube L, the anode connector, is soldered on to tube H and then about six longitudinal cuts

are made, with a fine saw, in the end of L to make it more pliable, so as to avoid damage to the valve when it is inserted.

The supply grid connection is an 8 BA brass screw, with soldering tag, which is screwed into a tapped hole in the edge of ring A, and passes through a hole in tube C, being insulated from it by a small bush (see Fig. 5).

It should be noted that brass screws can be used, if desired, to hold the various tubes and rings in position, so long as the dimensions are followed. No instructions for doing this are given as the writer prefers to turn the components accurately, to make them a tight push-fit in each other, and so avoid drilling and tapping holes.

Output is taken from each line via small rotatable loops (see Fig. 7). These are made by cutting back the PVC outer cover for a short distance from one end of a length of ¼-in.

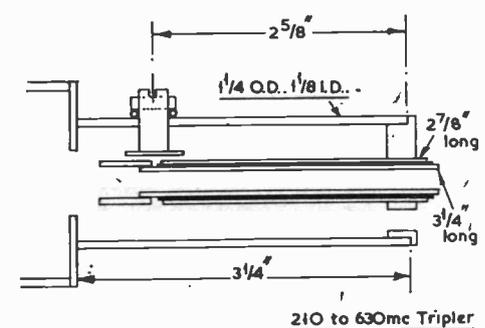
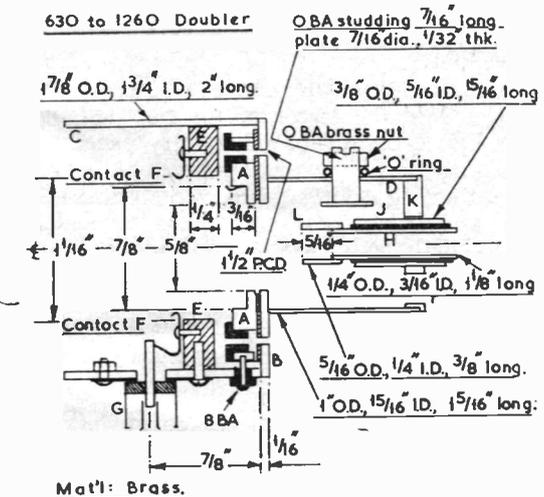


FIGURE 5

210 to 630mc Tripler



Fig. 5. Mounting (sectional view) for the 446A doubler and tripler valves. The circuitry was given at Fig. 4 on p. 662 of the February issue.

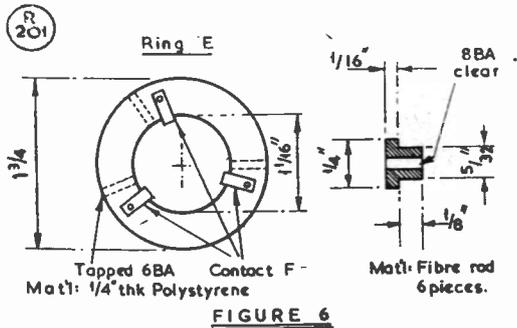


FIGURE 6

Fig. 6. Cathode contact ring and insulating bushes for the 446A—and see text.

coax. After removing some polythene as well, to reveal a very short length of the inner conductor, the rest of the polythene is pushed through the brass tube shown in the diagram, allowing the braid to slide over the outside, where it may be bound with fine wire or lacing twine. The loop is then soldered on as indicated.

The local-oscillator as a whole is accommodated in the larger of the two sub-chassis (see Fig. 2, pp. 658-659, February issue), which has a dividing screen along its length, near one side, forming a long, narrow compartment. All HT and heater leads are taken through this screen with feed-through condensers (C22, C23, C25) and thence through two additional feed-through capacities (C24, C26) inside the narrow compartment, fitted in the end wall of the sub-chassis. A brass cover fits tightly over the

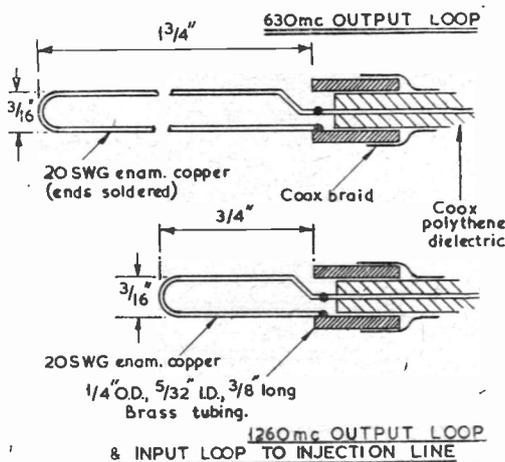


FIGURE 7

Fig. 7. The oscillator coupling loops, showing all constructional details.

chassis and is bolted to the sides and also to a piece of brass angle screwed to the top of the dividing screen. The cover for the local oscillator sub-chassis is 12-in. long by 4 1/2-in. wide, with a 1/2-in. lip all round.

The two coaxial stages are both mounted inside the sub-chassis by means of 6 BA brass screws, two holes being drilled and tapped 6 BA in the cathode tube, C, of each coaxial circuit.

Separate earth return points are used for each of the earlier stages, each earth connection for a particular stage being taken to a soldering tag on one of the valve-holder fixing screws. To ensure the reliability of these earth connections, the sub-chassis should be made of copper or brass; aluminium is definitely *not* suitable.

The pi-coupler between the second and third stages permits the earthing leads for these

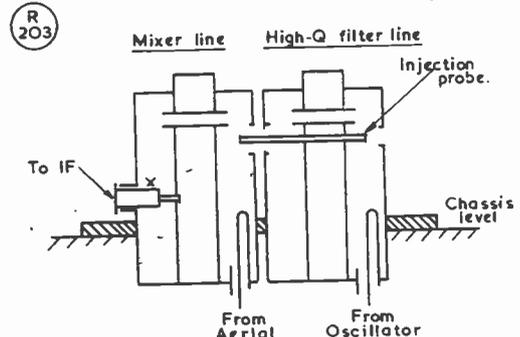


FIGURE 8

Fig. 8. The shunt-injection mixer arrangement, with the crystal tapped in about half-way down the signal frequency line—see Fig. 9 for further details.

stages to be split, the earth wire on the anode tuning condenser of V2 (C8) going to stage 2 earthing point, whilst that on the V3 grid tuning condenser (C9) goes to stage 3 earthing point.

The earth return for the series-tuning condenser of the link between stages 3 and 4 is the only exception, being taken to an earthed tag on a tagstrip. The next tag on the strip is used to anchor the inner of the feeding coax. and one side of the link. The tag next again has soldered to it the other side of the link and the "hot" terminal of the tuning condenser (Philips trimmer C15).

Many of these points can be checked by reference to the photograph on p.661 of the February issue.

It is most important that the layout and

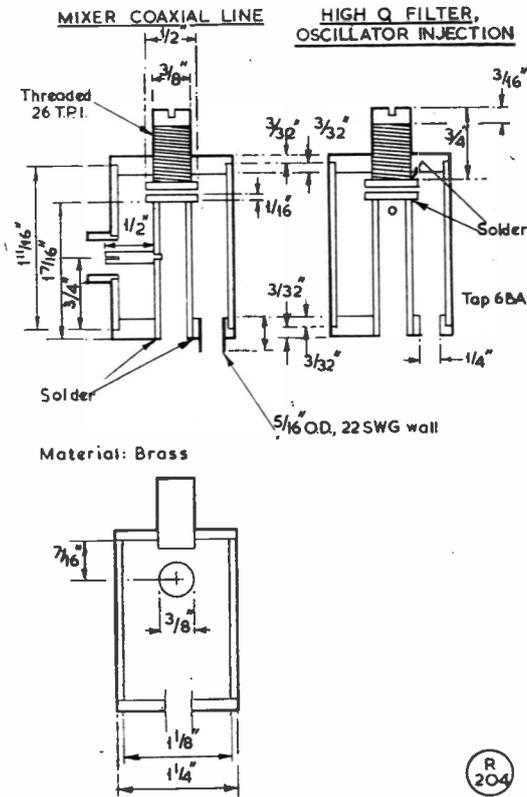


FIGURE 9

Fig. 9. Detail of the circuit arrangement shown in Fig. 8.

wiring should be followed exactly, particularly in the 200 mc stage, otherwise it may be found impossible to obtain sufficient drive for V4.

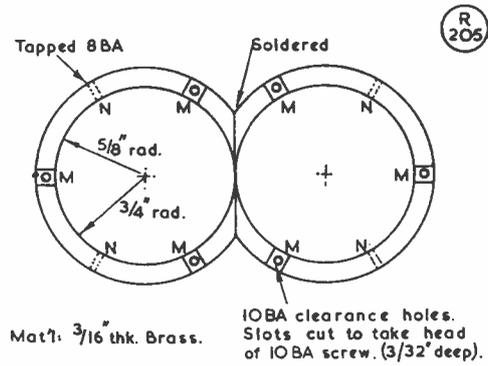
The heater and cathode chokes of the 446A's are each soldered at one end to a brass clip, which will fit tightly on the pins of the octal base, no actual valve-holder being used. The other end of each choke goes to a tag on a tagstrip. Ceramic wiring pillars are used as HT anchoring points. Provision is made for metering the grid currents of all stages through feed-through capacities (C2, C6, C12, C18, C21), small resistors being connected to ground from these points to complete the DC path in the absence of the meter.

Mixer and Aerial Coupling Circuits

The mixer uses a silicon-tungsten crystal in a shunt-injection circuit arrangement, with a high-Q filter. The design shown is intended for the shielded-type of crystal-diode, e.g., the CV-2154 or CV-2155, but can easily be adapted to suit more normal, unshielded types, such

as the CV-102, CV-103, 1N21, CV-364, and similar.

The signal - frequency and oscillator-frequency circuits are both end-capacity tuned quarter-wave coaxial lines, mounted side-by-side (see Figs. 8 and 9). The crystal is tapped about halfway down the signal-frequency line, the inner terminal making contact with a small brass collet, screwed into the inner conductor of the line, as in Fig. 10. The outer case of the crystal (which is its other terminal) is held in a brass collar which is pushed into the outer



SUPPORTING CLAMPS FOR MIXER & OSC. LINES

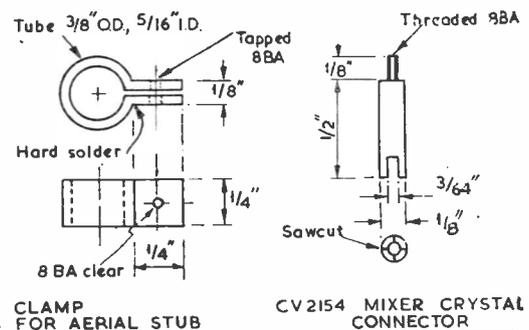
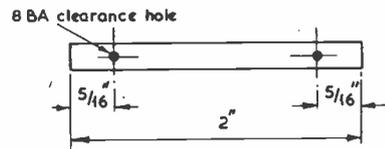


FIGURE 10

Fig. 10. Connectors and clamp for the mixer and oscillator lines, and the CV-2154 crystal mounting.

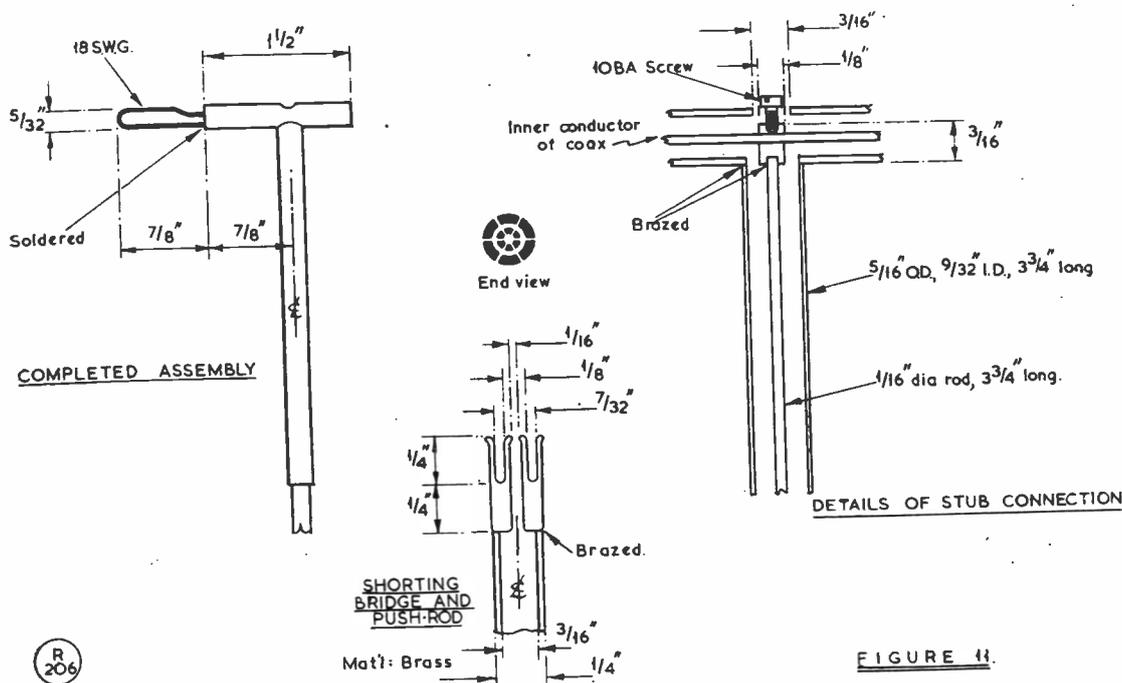


Fig. 11. Detail of the aerial matching stub and variable coupling loop.

conductor of the line. The crystal is insulated from the collar by wrapping a strip of .006-in. polythene tape round the case. This acts as the oscillator and signal-frequency by-pass capacity—and, as will be seen when the IF amplifier is described, it serves yet another purpose!

The IF output connection is made to a phosphor-bronze (or beryllium-copper) clip, details of which are given in Fig. 10.

The signal is coupled into the line by means of a stub-tuned loop, which can be pushed into the line or withdrawn from it, to tighten or loosen the coupling as required (see Fig. 11).

No trouble should be experienced in making the tuned loop. The loop tube and stub outer conductor are brazed together, as shown in Fig. 11; likewise for the stub shorting bridge and push-rod. After turning it, the bridge is slotted as shown, to make a springy contact. The stub inner and its connector are straight-forward, though care should be taken when tapping the hole for the clamping screw. The loop itself is formed from the inner wire of the feeding coaxial cable, which is a short length of Aerialite "Super-Aeraxial," a 5/16-in. diameter semi-air spaced 72-ohm cable, with an 18 SWG solid copper inner.

Remove the PVC outer cover from about four inches of this cable and also most of the braid, leaving only about half-an-inch. Then treat the polythene likewise, leaving about half-an-inch of this as well. The inner rod of the stub is put in position and the bared coax. pushed into the end of the loop-tube, allowing the braid to slide over it, the inner conductor of the cable being threaded through the hole in the stub connector. Next, a piece of the polythene dielectric, half-an-inch long, is cut from that which was originally removed from the cable and threaded back on to the coax. inner. to support it inside the tube. Finally, the copper inner is bent round into the required shape, cut to size and its end soldered into the loop tube, the clamping screw on the connector being tightened up on the wire.

The completed loop and stub assembly is a sliding fit in a brass tube soldered into the bottom plate of the mixer line. Longitudinal slots, eight in number, are cut in the protruding end of this brass tube.

The split clamp shown in Fig. 10 is made by brazing a piece of brass strip, $\frac{1}{8}$ -in. thick, to a short length of brass tubing, $\frac{3}{8}$ -in. o/d, 5/16-in. i/d, and then slitting both tube and strip with a small hacksaw; then drill a No. 51 hole

right through the two halves of the strip and tap 8 BA. Finally, carefully drill out the hole in one half of the strip to No. 40 for 8 BA clearance. This clamp can then be pushed on to the end of the tube in the bottom plate of the mixer cavity and used to hold the loop in position.

The oscillator injection line, or high-Q filter, is very similar to the mixer line itself, a loop similar to those used for coupling out of the coaxial multiplier circuits being employed for feeding the local-oscillator power in (see Fig. 7).

Actual oscillator injection is via a probe, made from a 1¼-in. length of 6 BA brass studding, with a screwdriver slot at one end, which is run into a tapped hole in the oscillator line inner and protrudes through aligned ⅜-in. dia. holes in the outer conductors of both oscillator and mixer lines, and into the mixer line itself (Fig. 8). A 3/16-in. hole in the opposite side of the oscillator line allows screwdriver adjustment of the probe position to obtain best injection.

The mixer and oscillator lines are both mounted at one end of the mixer-IF sub-chassis. They are held vertically in clamps,

with one end of each (that at which the tuning capacities are mounted) above the chassis and the other end below it, two circular holes being cut in the chassis to receive the lines. The mixer crystal is underneath the chassis, but the injection probe is above it.

The clamps (Fig. 10) are best made by turning from 1½-in o/d, 1¼-in. i/d brass tube, but could be cut from ½-in. material, if preferred. A flat is filed on each clamp and the holes drilled and tapped, as shown in the diagram. The clamps are then soft-soldered together and bolted to the sub-chassis by 10 BA brass screws and nuts in the holes "M." The lines are held in place by tightening four 8 BA brass screws in the tapped holes "N."

The local-oscillator power is brought in on ¼-in., 72-ohm coax., via a double-female Belling-Lee chassis mounting connector on one end of the chassis. A slot is cut in the end of the chassis, to take a grommet, through which the aerial matching stub passes (as with the main chassis) allowing it to slide up and down—see Fig. 3, p.660, February issue, and photograph on p.661.

(To be concluded)

THE R.R.A.E.

A LITTLE TWERPINGTON CONTRIBUTION

THE DX Committee of the Little Twerpington Radio Club is a more influential body than you might suppose. As an agency for the moulding of public opinion its potency is negligible, but it has often happened that what Little Twerpington thought yesterday, the rest of the world thought ten years ago—and if anything is wrong with that, we ought to overlook it.

Committee meetings are milestones in the history of the Club. Held in "Jack's Snacks" (Cocoa our Speciality) every month, they have their own peculiar atmosphere, partly due to the mid-day boiled cabbage and partly due to the fact that three of the members can only think while smoking shag. On account of the presence of many lorry drivers passing through, discussion tends to drift to m.p.g., m.p.h. and average speeds from point to point until the chairman calls the committee to order.

At the last meeting the chairman himself was off the beam, and was holding forth at some length on the Institute of Advanced Motorists, having just failed to pass the Advanced Driving Test himself. Showing every sign of sympathy, Fred suggested that an Institute of Retarded Motorists wouldn't be a bad thing, and then nearly everybody could join.

"Come to that," observed Joe, who had just failed

in his Morse test, "an Institute of Retarded Amateurs wouldn't be no bad thing, neither." Out of such chance remarks are born the inspirations that shape the course of this world. The chairman was looking at the ceiling, with the fire of the prophet (we are not sure which one) in his eyes, and he began to mutter . . .

"The R.R.A.E.—a special examination for retarded amateurs; special questions on every aspect of retarded technique; a Morse test for the genuine Lid; a QLF Award. I see it all—and why not Little Twerpington as the centre of it all? Why, those of us who are already licensed would feel like members of the FOC. Al ops Club and Tops combined."

And so the Idea was born which brought new hope to Retarded Amateurs the world over. No longer would the fluffy operator, the T5 note, the hopeful calling of someone who wasn't there, the chirp and the creep be regarded as the hallmarks of the ineffectual. On the contrary, by them shall the world recognise the holder of the R.R.A.E. sheepskin. (This, by the way, is a handsome certificate displaying the badge of the Club—a self-excited oscillator circuit with raw AC power supply, keyed by a left foot, with carbon microphone recumbent, and the inscription *Ritardando ma non troppo.*)

Hasty work was necessary, and the committee lost no time in circularising the members of Little Twerpington and neighbouring clubs with full details, enclosing a specimen set of R.R.A.E. Questions. We append these herewith, as a model paper of its kind.

A typical break with tradition was made, it being understood that these would actually be the questions set at the next examination, so that no one need fail.

Question 1: Draw the circuit diagram of an oscillator circuit suitable for the production of a distinctive note on the HF bands. It must not resemble the notes normally heard thereon in any respect. (10 marks).

Question 2: Suggest two alternative methods of keying a normally stable transmitter in order to produce an unstable or distinctive note, e.g. chirpy T6. (5 marks).

Question 3: Describe a method of modulation combining the advantages and disadvantages of AM, FM, NBFM and SSB. Note that the method of coupling a carbon microphone directly into the aerial coil or final tank circuit has been superseded in many Continental countries, where similar results may now be produced by more complex systems. (10 marks).

Question 4: Give details of the correct procedure for a CQ call which will arrest attention of all listeners near the frequency (say within 50 kc up or down). No time limit is imposed, but the station call-sign must not be sent more than twice. (5 marks).

Question 5: Produce evidence of having called stations in at least 100 countries without having made a QSO. Describe the techniques briefly, e.g., calling-while-sending, calling-on-wrong-band, calling-throughout-ten-minute-QSO-with-rare-DX, or calling-after-CL. (10 marks).

Question 6: A station in your own country has just called "CQ DX." In reply to your first call he called "CQ DX DX," underlining the second "DX." How do you set about working him? (5 marks).

Question 7: A DX station has replied to you with an incorrect version of your call-sign, and the only words he sent were "QSD terrible" before signing off. Should you send a QSL; was this a QSO; and what did he mean? (5 marks).

Question 8: An inductance of 10 microhenrys, a resistance of 72 ohms,

a condenser of .005 microfarads (U/S) and a pair of high-resistance headphones are connected in series. In parallel with this system is connected (a) the mains; (b) the output of your power-pack. Do you wish to go on? (10 marks).

Question 9: Describe a simple aerial system which will enable you to call "CQ DX" on any band, using A1 or A3, without more than the slightest risk of a reply. How many such calls should be necessary before the owner of the nearest TV set appears at your door? (10 marks).

Question 10: Quote a simple system of phonetics which will disclose your call-sign to fellow-members of your Club while remaining unintelligible to all other listeners. Also give brief details of a signing-off procedure occupying not less than five minutes. (10 marks).

Examiner's Note: One hundred marks or more constitute a record achievement. Ten to eighty marks constitute a "Pass." Less than 10 marks confers the privilege of applying for the Driving Test.

L.H.T.

NEW QTH's

Appearance in our "New QTH" feature guarantees publication of the call-sign/address in the *Radio Amateur Call Book*, which has a world-wide circulation and is the only directory to the licensed amateur stations of the whole world. If you are in the *Call Book* you can use the signal "QTHR"—or "QTH OK in latest CB," for those who are not quite clear as to the former meaning—with complete confidence. We accept new call-sign/addresses and changes of address for the *Call Book*, which is published from Chicago, from all U.K. amateurs, irrespective of whether they are subscribers to or even readers of SHORT WAVE MAGAZINE.

CARDS IN THE BOX

The operators shown here are asked to let us have a large, stamped addressed envelope, with name and call-sign, for cards held for them at our QSL Bureau, the full and only address of which is: BCM/QSL, London, W.C.1. If appearance in "New QTH's" and the *Radio Amateur Call Book* is also required, that should be mentioned when sending envelopes to BCM/QSL, London, W.C.1.

G2LN, 3BFB, 3DGW, 3FUD, 3JTH, 3KOB
3KPI, 3KQB, 3KUW, 3KXO, 3LFS, 3LFX,
3LHB, 3LHD, 3LLF, 4NP, 5FO, 5PN,
G13JUR, GM3JLX, 3JVH, 3KKD, GW3JQ
3LHK.

NEW QTH'S

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

- GM3BXW**, C. M. Mendelsohn, 26 St. Clair Avenue, Giffnock, Renfrewshire.
- G3DAG**, A. M. Alcock, Hillrise Cottage, Austen Way, Gerrards Cross, Bucks.
- G3HPC**, W. A. Stonehouse, Albert Cottage, Station Road, Plympton, nr. Plymouth, Devon.
- G3JSY/A**, Sgt. Nicholson, C. E., c/o Sgts' Mess, R.A.F. Station, St. Mawgan, nr. Newquay, Cornwall.
- G3KEK**, G. G. Carr, 63 Wagon Lane, Sheldon, Birmingham, 26.
- G3LCO**, D. J. Blocksage, 553 Queens Drive, Stoneycroft, Liverpool, 13.
- G3LDA**, A. B. Fletcher, 2 Fairview Cottages, East End, London Road, Charlton Kings, Cheltenham, Glos.
- G3LDE**, H. Swindley, 1 Iddenshall Cottages, Clotton, Tarporley, Cheshire.
- G3LGK**, B. M. Sandall, 21 Dale View, Ilkeston, Derbyshire.
- G3LGN**, M. A. Niman, 9 Montgomery Drive, Unsworth, Bury, Lancs.
- G3LHH**, V. T. Walkley, 43 Gaston Bridge Road, Shepperton, Middlesex.
- GM3LHV**, J. Ellerby, 38 Well Court, The Dean, Edinburgh, 4.
- G3LJV**, W. G. Dolby, 69 James Street, West End, Stoke-on-Trent, Staffs.
- G3LKA**, C. D. Mewis, Mikado Stores, Beech Lane, Stretton, Burton-on-Trent, Staffs.
- GM3LKG**, A. Gemmell (*ex-ZB2T*), 10 Windhill Place, Mansewood, Glasgow, S.3.
- G3LKJ**, B. E. Symons, 23 Westhill Avenue, Plainmoor, Torquay, Devon.
- G3LMG**, J. Spray, 49 Southwater Road, St. Leonards-on-Sea, Sussex. (*Tel.: Hastings 7732*).
- G3LMO**, N. G. Cooper, Concord Cottage, Porth, Newquay, Cornwall.
- G3LMP**, B. Page, 7 Queen's Gardens, Eaton Socon, Hunts.
- G3LMT**, A. D. Tregale, 41 Normandy Road, Heavitree, Exeter, Devon.
- G3LND**, G. R. Hamilton-Walker, The Timbers, Camden Park, Chislehurst, Kent. (*Tel.: Chislehurst 4877*).
- G3LNR**, A. E. Gwynne, 31 Caroline Street, Nottingham, Notts.
- G3LNS**, G. Beasley, 219 Moseley Road, Highgate, Birmingham, 12.
- G3LNU**, R. D. Gibson, 24 Middlewich Road, Holmes Chapel, Cheshire.
- G3LNW**, J. McGuire, 16 Cliff Road, Newquay, Cornwall.
- G3LNX**, G. C. Fletcher, 16 Hope Park, Bromley, Kent.
- G3LOA**, G. R. H. Hartstone, 428 Whitehorse Road, Thornton Heath, Surrey.
- G3LOD**, D. M. Rowse, Meadows Fair, Hamm Court, Weybridge, Surrey.
- G3LOJ**, A. A. Blythe, 27 Tedder Road, Acomb, York, Yorkshire.
- G3LOW**, J. Barrett, Porch House, Farnham Lane, Haslemere, Surrey. (*Tel.: Haslemere 872*).
- G3LPF**, C. H. Emeny, 7 Parkside Gardens, East Barnet, Herts.
- G3LPH**, K. F. Moss, 42 Acresfield Road, Timperley, Altrincham, Cheshire. (*Tel.: Sale 6894*).
- G3LPI**, H. W. Hooper, 3 Normanston Street, Forest Hill, London, S.E.23.
- G8JK**, R. Chadbone, Gainsboro, Trees Road, Hughenden Valley, Bucks.

CHANGE OF ADDRESS

- G2AWQ**, S. Anthony, 53 Stafford Road, Ruislip, Middlesex.
- G2FIX**, A. C. A. Newman, 74 Victoria Road, Wilton, nr. Salisbury, Wilts.
- G3AEF**, D. J. Sole, 22 Halsall Lane, Formby, nr. Liverpool, Lancs.
- G3COL**, J. Worthington, 65 Hurst Street, Birmingham, 5.

GM3DIQ, W. C. Bradford, 6 Langside Park, Kilbarchan, Renfrewshire.

G3DXA, C. J. Godden, 26 Westways, Edenbridge, Kent.

G3FEX, B. C. Oddy, Three Corners, Merryfield Way, Storrington, Sussex.

G3GED, B. Bracewell, 108 St. Martin's Road, Blackpool S.S., Lancs.

G3GIL, P. Forrest, 341 Catcote Road, Owton Manor, West Hartlepool, Co. Durham.

G3GOT, B. W. LeGrys, 46 Shaftesbury Road, Romford, Essex.

G3GUV, T. J. Griffin, 22 Albert Terrace, Middlesbrough, Yorkshire.

GM3HSF, W. H. Hier, 122 East Clyde Street, Helenburgh, Dumbartonshire.

G3IHI/A, D. W. Auton, 318 Great West Road, Hounslow, Middlesex.

G3IYX, G. J. Leask, Ward "B," Stoke Mandeville Hospital, Aylesbury, Bucks. (*Temporary*).

GM3JDR, D. Robertson, Seacraig, Main Street, Golspie, Sutherland.

G3JEM, J. Wallace, 154 The Ridgeway, North Harrow, Middlesex.

G3KCI, A. H. Webb, c/o Pendower Caravan Site, Bassingbourn Hall, Stansted Airport, Essex.

G3KFS, D. V. Preston, 20 Fishers Drive, Dickens Heath, Shirley, Solihull, Warks. (*Tel.: Wythall 3214*).

G3KLL, B. Mercer, 9 Epping Street, Hulme, Manchester, 15.

CORRECTION

G2BUJ, P. H. Greenwood, 32 Pound Lane, Pinehurst, Swindon, Wilts. (*Delete G3BUJ, March list*).

G3JJZ, D. J. Newton, 106 Allersford Road, Catford, London, S.E.6.

GM6TF, W. Davidson, 21 Gordon Drive, Alloa, Clackmannanshire.

THE MONTH WITH THE CLUBS

By "Club Secretary"

(Deadline for May Issue : APRIL 12)

JUDGING by the steady increase in the number of monthly activity reports, the Club movement is in a pretty healthy state. There has not been much of a response, as yet, to our query about how Clubs vary the monotony of normal routine, and we are beginning to think that the right answer is the obvious one—they don't!

Routine seems to be the adhesive material that holds most Clubs together, and if it has been proved to be the *right* routine, what is wrong with that?

All the same, we are always receptive to Bright Ideas, which we shall be pleased to pass on for the benefit of Clubs other than those which thought them out.

Why Club Notes?

From our side, it will not surprise many readers to know that we are often asked why we devote regular space to Club matters which (it is said) "can only be of interest to those concerned." In fact, the significance of this feature goes a good deal deeper than that, and it is far more important than might be supposed. For one thing, the local Club movement plays a large part in the development of Amateur Radio interest and activity; hence, Clubs must have regular publicity support so that their existence can be made known. Secondly, the activities of other Clubs are of mutual interest among the general body of Club members—now numbering, probably, not less than 3,000 amateurs and SWL's. Thirdly, it is a good thing that those who may have a jaundiced outlook on the existence of amateurs and Amateur Radio should see that there is a strong and healthy local Club movement. Fourthly, if all this is true (which undoubtedly it is) then obviously Clubs must have some forum, somewhere, in which they can come together. Fifthly, it is through publicity in this space that many Clubs not only acquire new members, but also find themselves taking an active interest in matters that might otherwise pass them by.

Hence, seeing things from the inside, we have no intention whatever of curtailing the space normally devoted to "The Month with The Clubs," an established feature of SHORT WAVE MAGAZINE since pre-war days.

And so to this month's Activity Reports :

Clifton met recently to hear a talk on Tape Recording by Mr. A. B. Still (Grundig). On April 5 G3HZI, holder of the D-F Shield, will be talking on D-F Equipment and giving details of the forthcoming contests. On April 12 and 26 there will be the usual Constructional Evenings, all at 225 New Cross Road, London, S.E.14.

Grafton spent an interesting evening when the

S.T.C. representative gave a lecture, with slides, on Design and Manufacture of Modern Valves. On April 5 G3IIR will be talking on "Titivating the Rig," and April 12 is a Practical Evening. After Easter the Club re-opens on April 29 and holds its Field Day on June 15-16. And see announcement regarding the forthcoming Grafton Top Band Contest.

Bradford meet on April 9 to hear G3IBN's talk on D-F Equipment, and on the 30th they pay a visit to Yeadon Airport, meeting at Broadway, 7 p.m. Normal meetings, fortnightly, continue at 66 Little Horton Lane.

The *British Amateur Television Club* (Chelmsford Group) meet on April 11, 7.30 p.m. at 10 Baddow Place Avenue, Great Baddow, when the subject will be Transistor Pulse Circuits, and the lecturer Mr. J. Howe.

Bury will be meeting at the George Hotel, Kay Gardens, to hear a talk (subject unannounced) on April 9 at 8 p.m. The following meeting will be on May 14, when G3HZM will talk on Direction Finding.

The programme for **Derby** consists of a General Discussion on four Subjects of Topical Interest (April 10), a Visit (details to be announced) on April 17, a talk on Radar Equipment, by G3EKX (April 24), and a Junk Sale on May 1. All meetings at the Club Room in the sub-basement, Derby College of Art, Green Lane.

Edinburgh will hold their A.G.M. on April 10, at Unity House, Hillside Crescent, and a large attendance is expected. They hope to do some portable operation on 1.8 and 3.5 mc during the week-end of June 1/2—call-sign not yet decided. Prospective members, and also visitors from other parts of the U.K., are always welcome at meetings.

Harrow have an informal talk by G2TA on April 5, a practical night on April 12, a Group Discussion on TVI on April 26, and another practical night on May 3.

Lancaster have met recently for tape lectures, film strips and a visit from the GPO Interference Engineer, who answered questions on TVI and BCI. A Junk Sale has also been held, and a visit was paid to Squires Gate Airport, Blackpool, on March 17. Meetings are at the George Hotel, Torrisholme, at 7.30 p.m.

GRAFTON TOP BAND CONTEST

Grafton Radio Society are once again running their private contest for the G2AAN Cup. The dates are April 6, 2230 GMT to April 7, 0100 GMT and similar times on April 13 and 14. Competing members will call "CQ GRS" and score five points for QSO's with other competing members, or one point for contacts with other stations. All fully paid-up members of Grafton are eligible, but naturally they will welcome co-operation from all users of the 160-metre band.

on the first Wednesday of the month.

Newbury meet on May 3 to hear Mr. H. D. Harwood, B.Sc., of the BBC Engineering Division, on Microphones for Broadcasting. It is assumed that members have overcome the petrol difficulty, mentioned last month (p.49).

Plymouth are now twelve months old, and will be holding a Social on April 10, and their AGM on May 14. A monthly news letter, "QUA," is issued free to attending members; non-attendants pay postage. Normal meetings every Tuesday at the Virginia House Settlement, St. Andrews Cross.

Purley will be holding a Junk Sale at their April meeting, and the A.G.M. in May. They also propose to visit the Uplands Telephone Exchange in the near future, on a Sunday.

Rhondda Radio Society has just been formed, with GW2FOF as chairman, GW3DRK secretary and GW3ITQ treasurer. Club activities will cover all aspects of radio, and they promise to report each month.

Romford held their AGM recently and elected G2BVN chairman, G2FWJ secretary and G3EBF treasurer. A programme of lectures and visits has been arranged, and the Club station has been re-equipped for all-band operation. Meetings are held every Tuesday, 8.15 p.m., at RAFA House, Carlton Road, Romford.

The **Science Museum** Radio Society will be meeting in the Lecture Theatre on April 11 at 6 p.m.,



Winner for this year of Derby & District Amateur Radio Society's "G5YY Trophy" was SWL Brian Monk (right) seen here in his station being presented with the cup by Derby's chairman, G3IUK. The contest was for SWL logs, and was held on February 24 last. Derby is one of the oldest Amateur Radio societies in the country, with a recorded history going back to 1911. The present fully paid-up membership totals over 100, meeting attendances varying from 35 to 55 members. The president's trophy for the current year was awarded to G3IBL.

NAMES AND ADDRESSES OF CLUB SECRETARIES REPORTING IN THIS ISSUE:

BRADFORD: F. J. Davies, 39 Pullan Avenue, Bradford 2.
BRITISH AMATEUR TELEVISION CLUB: D. W. E. Wheeler, G3AKJ, 56 Burlington Gardens, Chadwell Heath, Romford, Essex.
BURY: L. Robinson, 56 Avondale Avenue, Bury.
CLIFTON: C. H. Bullivant, G3DIC, 25 St. Fillans Road, London, S.E.6.
DERBY: F. C. Ward, G2CVV, 5 Uplands Avenue, Littleover, Derby.
EDINBURGH: M. Darke, GM3KKG, 44 Howe Street, Edinburgh 3.
GRAFTON: A. W. H. Wennell, G2CJN, 145 Uxendon Hill, Wembley Park, Middx.
HARROW: S. C. J. Phillips, 131 Belmont Road, Harrow Weald.
LANCASTER: B. Parker, G3KOQ, 125 Regent Road, Morecambe.
NEWBURY: NADARS, 83 Newtown Road, Newbury.
PLYMOUTH: C. Teale, G3JYB, 3 Berrow Park Road, Peverell, Plymouth.
PURLEY: E. R. Honeywood, G3GKF, 105 Whytecliffe Road, Purley.
RAF ST. MAWGAN: R. W. Nolan, G3KWK, Sgts. Mess, RAF St. Mawgan, Newquay.
RHONDDA: W. J. Smale, GW3DRK, 23 John Street, Porth, Rhondda.
ROMFORD: F. Simmons, G2FWJ, 15 Globe Road, Romford.
SCIENCE MUSEUM: G. C. Voller, G3JUL, Science Museum, London, S.W.7.
SCUNTHORPE: J. Stace, G3CCH, 38 Skippingdale Road, Scunthorpe.
SHEFFIELD: G. F. Lyon, G3GJF, 125 Rokeby Road, Sheffield 5
SOUTH MANCHESTER: M. Barnsley, G3HZM, 11 Cemetery Road, Denton, Lancs.
STOKE ON TRENT: A. Rowley, G3JWZ, 37 Leveson Road, Hanford, Stoke-on-Trent.
STOURBRIDGE: A. K. Davies, 48 Church Avenue, Amblecote, near Stourbridge.
SWINDON: F. G. Whatley, 6 Crombey Street, Swindon.
WANSTEAD & WOODFORD: C. Stevenson, 25 Boundary Road, Barking.
WEST LANCS: K. Wright, G3KVE, 24 Stuart Road, Liverpool 20.
WORTHING: J. R. Tootill, 113 Kings Road, Lancing.

when Mr. Christian, of the GPO, will lecture and demonstrate The Practical Approach to Transistors. Non-members wishing to attend are asked to communicate with the Hon. Sec., Mr. G. C. Voller, at KEN 6371, Ex. 237.

Scunthorpe will be meeting on April 11 and 23, 7.30 p.m., at the Talbot Hotel, Earl Street, Scunthorpe—no details given.

South Manchester will be together on May 3 to hear some Notes on the Design of a Band-Switched Transmitter, from G3DQU. In June they will be holding their Annual D-F Contest, and would appreciate entries, either from non-members or from other Clubs in the North-West.

Stoke-on-Trent continues to meet every Thursday, with a steady attendance. A new transmitter is being built by the Monday evening Constructional Class, supervised by G3UD. On March 7 G3EHM gave a comprehensive lecture on Transistors, and on March 28 the AGM was held. A full programme is planned, and new members will be welcome.

Stourbridge report a good attendance at recent meetings, which have included a very successful Junk Sale and some films on Electronics. Every Tuesday evening the members run a Net on the Top Band.

Swindon will meet on April 12 at 7.30 for an Open Meeting. On May 10 Mr. R. Hipperson, of the Plessey Co., will talk on Electrolytics. All meetings are held at the Drove Road School on the second Friday.

Wanstead and Woodford have found the demand for lectures and demonstrations so great that they

have acquired extra accommodation at their headquarters (Wanstead House, The Green, E.11) for the purpose. A complete overhaul of all the gear in their shack is also taking place. Meetings are held every Tuesday at 8 p.m.

Worthing members gather on the second Monday of each month at the Adult Education Centre, 8 p.m. On April 8 there will be a Brains Trust, to which visitors will be welcomed. Future events include Picnic Field Days and, on July 14, the Annual Bucket-and-Spade Party.

RAF St. Mawgan have re-formed their Club and are now back on the air, operating G3KHM. There are seven members with their own calls, as well as several aspirants. Meetings are held every Wednesday at 2 p.m. and visitors are very welcome if they are willing to help with hauling up aerial masts and the like.

Sheffield meet on April 10, 8 p.m., at Albreda Works, Lydgate Lane, for a talk on Audio Amplifiers; also on April 24 at the Dog and Partridge, Trippet Lane, when a "Swindle" will be held. Attendances have been improving, and the recent lecture on Radio Astronomy broke the Club record.

West Lanes held their AGM in March and elected new officials. Morse classes continue under G3KKU every Tuesday at 7.30 p.m., and new members will be welcomed any Tuesday in the Clubroom over Gordon's Sweetshop, 157 St. John's Road, Waterloo.

All Clubs and local groups are invited to use this space for publicity and the reporting of their activities. Reports should be addressed to: "Club Secretary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1, and posted to arrive on or before the date given every month at the head of the article. Reports received late cannot usually be taken into this feature.

GLASGOW SCOUTS—GM3ATB/A

During the Scout Show at the Kelvin Hall, Glasgow, during April 18-27, GM3ATB/A will be operated on 20-metre phone. Calls are specially requested from any station, at whatever distance, hearing their CQ. The QSL address is: J. Davidson, GM3ATB, Acton, Highburgh Drive, Burnside, Rutherglen, Glasgow.

ECHO FROM THE PAST

Writing in the other day, a well-known Old Timer who started up in November 1927—on the old 45-metre band—mentions CW contacts with, among others, GC6NX. The prefix GC was not, as you might think, for the Channel Isles, but for Scotland. In those days, the prefix structure was "unofficial" and rather different from what we know now.

SCOOP

radiocentre does it again

WE HAVE AGAIN PURCHASED THE GEAR YOU REQUIRE AT
PRICES YOU LIKE TO PAY

DST100	£13 10 0
HRO, 4 coils	£13 10 0
CR100	£13 10 0
Cossor Double Beam Scopes	£13 10 0
PI04 Receivers	£3 10 0
Power Packs for same	£3 0 0
BSR Audio Oscillator, Type L050A	£10 0 0
SCR522 TX RX, with valves	£6 0 0
Loud-hailers, 12 Volt operation, 6L6 in output. Ideal for mobile modulators	£4 0 0
Vitavox Microphones, moving coil	£3 0 0
Genuine R.C.A. AR88 Cabinets	£1 15 0
CR100 Cabinets	£1 5 0
Panels for same	15 0

Plenty of CR100 Spares. Please list your requirements.	
General Radio UHF Signal Generator, Type 804A. 9.22-330 Mc/s. Internal modulation	£40 0 0
Marconi UHF Wave Meter. 20-300 M/sc.	£5 0 0
GELOSO Receiver G206. Under maker's guarantee	£50 0 0
EDDYSTONE 680X. Under maker's guarantee; little used	£80 0 0
R.C.A. Receiver. AM/FM. Latest type	£40 0 0
A.C. Mains Power Pack SCR522	£7 10 0
2-Volt Accumulators, Varley Type VPT/9/17. New and guaranteed each	7 6

Valves: 807, 6SJ7, EL84, EF80, 6F13, 1625, 8025, all at 7/6 each.

WANTED. All kinds of Test Equipment Communication Receivers.
Hallicrafter Transmitters. Valves. BC221 Frequency Meters.

BEST PRICES GIVEN FOR CLEAN EQUIPMENT

RADIOCENTRE

12 SHIRLEY ROAD

D. L. and H. DAVIES.

SOUTHAMPTON

TELEPHONE 20951

'a wonderful little transmitter'

... I congratulate you on a wonderful little transmitter. Since I put it on the air I have had over 500 QSOs on phone. I have worked 32 States and in nearly all I have had reports of 5 and 9 or better. The best report I have got is 5 and 9 plus 30db from VE7ALR. The antenna in use is a simple dipole.

F. McClymont*



The Panda CUB gives you ALL you want

Top Band to TEN... PHONE or CW with the latest standard Panda V.F.O. and incorporating all the best T.V.I. proofing technique... just needs a mike or key to go straight on the air.

Delivery is now from stock. Terms are still available from only £13 deposit. Write today for full details.

The full range of PANDA EQUIPMENT can now be seen and demonstrated in our New London Showrooms in Redcliffe Gardens, Kensington, S.W.10 (opposite St. Stephen's Hospital). Delivery ex stock. Tel. FLAaxman 0906 (10 lines).

*Extract from a letter from GM3KJB, Bellevue Crescent, Ayr — an unsolicited testimonial.

Panda Radio Co. Ltd.

16-18 HEYWOOD ROAD, CASTLETON, NR. ROCHDALE
Tel.: Castleton 57396. Grams & Cables: Panda Rochdale.

Quality Electronic Equipment All Guaranteed in Perfect Condition

RECEIVERS

- EDDYSTONE**
- 640, 1.2-30 Mc/s. As new £25
 - 740, 550 Kc/s-32 Mc/s £30
 - 750, 500 Kc/s-32 Mc/s £58
 - 680 £65
 - 680x £85
- RCA AR77E, 500 Kc/s-32 Mc/s £35**
AR88D and type L.F. from £55
- HAMMARLUND HQ129X £85**
Super Pro complete with power supply £38
- HALLICRAFTERS**
- S38 a.c./d.c., 500 Kc/s-32 Mc/s £20
 - SC24, 500 Kc/s-32 Mc/s £35
 - S20R £28
 - SX28, 550 Kc/s-42 Mc/s £45
 - SX71, 500 Kc/s-32 Mc/s £85
- RADIOVISION**
- Commander Double Superhet £40
- ZENITH Transoceanic 1957 Model £60**
- RME 69, 550 Kc/s-32 Mc/s. As new £30**
- NATIONAL NC 173, 550 Kc/s-30 Mc/s.**
NEW, with matching speaker £100
- HAMMARLUND HQ 129, as NEW £75**
- MANUALS** for the following receivers :
AR88LD-D, AR77E, R107, Hallicrafters, SX24, SX28, S20R, S20, B2 Transmitter-Receiver, HQ120, HRO, Junior and Senior, £1.7.6 each.
Set of main dial, bandspread and name plate for AR88D. £1.10.0 set of three.

TEST EQUIPMENT

- AVO VALVE TESTERS**
- Roller Panel Type
£6.0.0 each
- AVO RESISTANCE CAPACITY Bridges** £7.10.0 each
- Taylor Model 82A. AC/DC Test meter** Ranges : 0-500V ; 0-10A AC/DC ; 0-1 Meg. resistance, £8.15.0

U.S.A. Brand NEW HICKOK

Valve Voltmeters, unused. Ranges : 2.5-250 a.c.V. ; 1,000 d.c.V. 2.5-1,000 mA d.c. Resistance 0-1,000 meg. Frequency up to 100 Mc/s. Voltage 110V. a.c. Price, £30 each.

AVO Model 7 reconditioned
As NEW each £14 0 0

AVO Model 40 each £12 0 0

U.S.A. Brand New Valve Testers. 210-230V. Radio City Products each £10 0 0
Plus 2/6 carriage

WANTED URGENTLY !!!
Exceptional Prices Paid for
BC221
FREQUENCY METERS
or CASES
Also : TS175, TS174, and all U.S.A. Microwave Test Equipment.
Receivers by
R.C.A., Hallicrafters, etc.

GELOSO EQUIPMENT IN STOCK

G.210/TR TRANSMITTER. Completely enclosed with power supply unit 35W input. 80, 40, 20, 15, and 10m. Pi output circuit. 65 gns., complete with valves.

G.207/DR RECEIVER. Double conversion super-het. Band spreads 80, 40, 20, 15, 10 metres A.M. and c.w. Complete with valves, £83.

SIGNAL SHIFTER. Output 80, 40, 20, 15 and 10 metres. Calibrated dial 8 1/2" x 5". Uses valves 6J6GT, 6AU6, 6V6G (6L6G). Price, less valves, £7.17.6

UNIVERSAL ELECTRONICS

22/27 LISLE STREET · LEICESTER SQUARE · LONDON · W.C.2

Call write or phone : GERrard 8410

**All
the
experts
use—**



- ★ Reliable
- ★ Speedy
- ★ Long-lasting

A model for every purpose

65 watt round pencil bit

Leaflets on request from:

W. T. HENLEY'S TELEGRAPH
WORKS CO. LTD.

51-53 Hatton Garden, London, E.C.1
Tel: CHAncery 6822

FOR 25 YEARS THE BEST.



SMALL ADVERTISEMENTS

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

TRADE

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

IF YOU ARE THINKING of buying a Grundig Tape Recorder, we will give generous part-exchange allowance on your old radio, TV receiver, or what-you-have. HP arranged.—Write, giving details of model, required and part-exchange offered, to: Wilson Brothers, 67 Pembroke Road, Ruislip, Middlesex.

HF BAND CONVERTERS from £2 12s. 6d.; s.a.e. details. High-pass filters, over 40 dB attenuation below 35 mc, 19/6. Stranded 72-ohm coax, 7½d. yard, post extra.—G3FXB, 86 Cross Road, Southwick, Sussex.

STOLEN FROM OLYMPIA: Portable Feldstar-kezeiger-type Huz. BN15012 (serial number 604/15). £15 reward for information leading to recovery.—Box No. 1849, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

MULLARD High-speed Valve Tester, basic test card pack, test card container and dust cover, as new, £80; BC-342H, unmodified, original packing case, with auto-transformer, £30; Wavemeter, Type 1310, as new, with charts, 150-250 mc approximately; offers? Large selection of new and used television valves; s.a.e. for list.—Box No. 1850, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

AERIAL EQUIPMENT: 7-ply copper wire, 22 SWG, 2d. foot; 7-ply galvanized soft iron wire for lashing and stays, 2d. per yard; Sisal rope, ¾-inch circ., 2d. yard; 1-inch, 3d. per yard; 1½-inch, 4d. per yard. Any length supplied, post free.—Box No. 1852, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

4-SPEED Automatic "Golden Box" Record Player in handsome carrying case; plays through your radio; £9 19s. 9d., carriage and packing 4/6 extra.—Box (A), Leeds Laboratories, 69 Allerton Grange Way, Leeds, 17.

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

A CRYSTAL MICROPHONE INSERT (Cosmocard Mic. 6/4), guaranteed newly made and boxed; costs only 15/6, post free, from Radio-Aids Ltd., 29 Market Street, Watford, Herts.

HALLICRAFTERS VHF AM/FM Receiver, Type HS-36, 28 to 143 mc, 100/250v. AC; brand-new in maker's packing, with spare valves; £55.—Harris, 93 Wardour Street, London, W.1.

SCOTLAND'S QSL PRINTER for a good job at a reasonable price. — Enquiries to McTaggart (Printer), 40 Vale View Terrace, Dumbarton.

SMALL ADVERTISEMENTS, TRADE—continued

G3CGD QSL's.—Fixed and mobile samples on request. Printing enquiries welcome.—30 St. Luke's Road, Cheltenham.

TELEVISION INTERFERENCE.—Receiver Filters: High-pass E.5037, 30/-; Low-pass E.5031, 30/-; Composite Band I/III, 49/6. Transmitter Filter E.5034, 80 dB. 1 kW, £6.—Labgear (Cambridge) Ltd., Willow Place, Cambridge.

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

SITUATIONS VACANT

LABGEAR (CAMBRIDGE) LTD., Willow Place, Cambridge, urgently require Junior Engineers for their Communications Laboratory for work on a wide variety of interesting projects. Qualifications required are a basic knowledge of radio and/or test gear, sound common sense and the ability to think clearly.—Apply personally or in writing to Personnel Department.

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.

WANTED URGENTLY: One or two pairs of 836's.—G3IUW. (Hayes 2305).

SHORT WAVE MAGAZINE: Volumes 10, 11, 12, 13 and 14, £4. New 1154 Tx, unmodified, with handbook, £1.—Stebbing's, 146 Stockport Road, Altrincham, Cheshire.

BARGAIN: EDDYSTONE 840 RECEIVER; INSTRUCTIONS, CIRCUITS; FIRST £27 10s.—BOX No. 1845, SHORT WAVE MAGAZINE, LTD., 55 VICTORIA STREET, LONDON, S.W.1.

CONVERTED R1155, with built-in mains power supply, output stage, speaker, £14 (including carriage).—Savage, 11 Chantry Avenue, Kempston, Bedford.

WANTED: Minimitter; must be in first-class condition and of recent manufacture; fullest details, stating date of purchase, condition, price.—Box No. 1846, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

ARMY SENDER 12 SET for sale; perfect working order; bargain, £14.—GM3BXW, 26 St. Clare Avenue, Giffnock.

FOR QUICK SALE: One G.E.C. Miniscope, as new, with manual and carrying case. Type Cay-47155, 47154A tuning units, with plug-in 807-6L6 chassis and clamp modulator (covers Top Band, 80, 40 and 20 metres), complete with valves. Power pack, 250v., 50 c/s in; 600-750v. 100 mA plus 12v. AC out. First offers of £15.—Offers to Box-No. 1847. Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

Morse Code operating . . .

The essential qualification of a Radio Officer at sea, in the air or ashore is **EXPERT MORSE OPERATING.** The Candler method of teaching Code either from "scratch" or to get over that 20 w.p.m. "hump" to the classic 30 or more w.p.m. is known the world over. Thousands of Radio Officers owe their present high position of responsibility to their diligent study of the Walter H. Candler System of Morse Training.

45 years of teaching Morse Code is proof of the efficiency of this system.

. . . as a PROFESSION

Careful thought is given by our Instructional Staff to individual problems, and provided you study diligently and follow our advice, success in reaching the qualification you desire is assured—we guarantee this or refund your fees.

Morse Key and Buzzer Sets of good quality on polished wood base, 15/- to Candler students only.

The Press carries an ever increasing number of advertisements of positions vacant at good salaries for competent Operators.

Send 2½d. stamp for Payment Plans and Full Details of all Courses.

CANDLER SYSTEM CO.

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

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

Southern Radio's Wireless Bargains

TRANSCEIVERS. Type "38" (Walkie-Talkie) complete in case with Five Valves (Four A.R.P.12. One A.T.P.4). These are untested by us but are serviceable. But not guaranteed each £1 2s. 6d.

ATTACHMENTS for use with Type "38" Transceiver. ALL BRAND NEW: HEADPHONES with Plug and Lead, 15/6 THROAT MICROPHONE with Plug and Lead, 4/6; JUNCTION BOX, 2/6; AERIAL No. 1, 4ft., 2/6; AERIAL No. 2, 4ft., 5/- WEBBING for "38" 4/-; HAVERSACKS, 5/-; SPARE VALVES A.R.P.12, 4/6; A.T.P.4 3/6

TRANSCEIVERS. Type "18" Mark II. TWO UNITS (Receivers and Sender) complete in Metal Case. Six Valves; Microammeter, etc., etc. Less External Attachments £4 10s.

ATTACHMENTS FOR USE WITH "18" Transceiver. HEADPHONES with Plug and Lead, 15/6; HAND MICROPHONE (4a) with Lead and Plug, 12/6; AERIALS 5/-

RECEIVERS R.109 8-valve S.W. Receiver with Vibrator Pack 6-volts; Built-in SPEAKER. Metal Case £5

RESISTANCES. 100 ASSORTED USEFUL VALUES. New Wire-ended per 100 12/6

CONDENSERS. 100 ASSORTED: Mica; Tubular; etc. New per 100 15/-

BOMBSIGHT COMPUTERS. Ex-R.A.F. NEW. Ideal for Experimenters. A wealth of Components; MOTORS; GEARS; etc., etc. £3

LUFBRA HOLE CUTTERS. Adjustable $\frac{1}{8}$ " to $\frac{3}{4}$ " for Metal, Plastic, etc. 7/-

MORSE TAPPERS. Extra heavy, on base, 5/6; Standard. 3/6, Midget 2/9

MORSE PRACTICE SETS. With Tapper and Buzzer on base, 6/9; with Battery 9/9

DINGHY AERIALS. Ex-U.S.A. Reflector Type. Brand new. 4/6

PLASTIC TRANSPARENT CASES. 14" x 10½". Ideal for Maps, Display, etc. 5/6

CRYSTAL MONITORS Type 2. New in Case. Less Valves. 8/-

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

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

POST OR CARRIAGE EXTRA. FULL LIST RADIO BOOKS, ETC. 3d.

SOUTHERN RADIO SUPPLY LTD.
11, LITTLE NEWPORT STREET, LONDON, W.C.2.
GERrard 6653

AMERICAN 35-FOOT AERIAL MASTS. 1½ in dia. in canvas holdall, £6/10/- (10/-). R.C.A. 5-element Yagi arrays, 420 m/cs, 35/- (4/6). **AMERICAN WHIP AERIALS,** 12ft., 4-section, 15/- (2/6) 15ft. 5-section, 20/- (2/6). **30-FOOT ONE PIECE WOOD POLES,** 4in. dia. throughout, hollow, light, round, smooth, 35/- (cost). **MIKE STANDS,** 3-section tripod base; 4ft. 6in. closes to 12in., 7/6 (3/6). **AMERICAN TRANSMITTER CABINETS,** 6ft. high, standard rack width, totally enclosed, full length rear door, £7 (20/-). **P.O. RACKS,** de luxe, 3in. by 1½ in., channel sides, heavy base, 36in. high, 40/- (10/-). 6ft. high, 90/- (15/-). **BENDIX SUPER POWER UNITS,** 230v. A.C. to 800v. 430 m/a fully smoothed rack mounting with four 5Z3, £8 (30/-*). **AMERICAN POWER SUPPLY UNITS.** Input 100/250v. A.C. or 12v. D.C. Output, 180v. 30 m/a smoothed, 120v. 100 m/a A.C. and 6.3v. 1½ A A.C., 1st grade, 25/- (7/6). D.C.9 Crystals, 1,000 Kc/s, octal, 20/- (1/-). **BENDIX PLATE TRANSFORMERS,** 230v. to 530-0-530 450 m/a, 1st grade, enclosed, 24 lbs., 35/- (7/6). **BENDIX SUPER CHOKES,** 11 H 270 m/a., 12 lbs., 15/- (5/-). **R.C.A. MODULATION DRIVER TRANSFORMERS** for ET4336, 15/- (2/6). **S.O.S. FILTERS,** pass 500 Kc/s., P.O. specification, 25/- (3/-). **WODEN POWER UNITS,** 190/260v. input, 2,500v. 300 m/a, fully smoothed out, fine quality; need wiring up, £12/10/- (30/-*). **POWER AMPLIFIERS,** 200/250v. input, 2 by PX25 output, less valves, 35/- (20/-*). **BENDIX 1,000 watt Auto Transformers,** 230/115v., finest quality, totally enclosed, 70/- (7/6). **WESTAT CABINET RECTIFIERS,** 100/250v. A.C. to 110v. 7A D.C., 75/- (10/-).

Please cross remittances Barclays Bank.
Amount in brackets is carriage England and Wales.

* Includes 10/- returnable wood case.

Vast Amount Ham Equipment
Full Lists available.

P. HARRIS, ORGANFORD, DORSET

Inventors

We are prepared to manufacture and place on the market at our own expense any article you have designed, which would be of commercial value.

Royalty will be paid on sales.

For full particulars write in first instance to Box No. 1843, Short Wave Magazine.

SMALL ADVERTISEMENTS, READERS—*continued*

BC-348, just realigned, perfect order, 6AJ7 1st RF (9 mA/v.), 6V6 output; requires power. Prefer buyer collects from Ipswich or Chelmsford. £15 (o.n.o.).—Box No. 2848, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: R1224A, excellent condition, £4 (o.n.o.); also TR.1196, in good condition, £2 10s.; two A.1134 and junction box, with valves, £1.—Franklin, 55 Newbridge Road, Bath, Somerset.

WANTED: "American" new boxed variable potentiometers, following sizes: Two 10,000 ohms, 1½ w., with on/off switch; two 100,000 ohms with on/off switch; four 500,000 ohms; two 66,000 ohms; two at 2 megohm. Good price paid for above. U.S.A. new boxed only wanted.—Write or send: G3DAM, 2 Church Street, Evesham, Wores.

WANTED: Late model U.S.A. Rx, brand-new or mint condition; NC-183D, NC-300, SX-101, or similar.—Write fullest details, price required: Box No. 1851, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

EDDYSTONE 750 Receiver; excellent appearance and performance; £40. Various xtals, meters, chokes, valves, SCR522 modulation transformers, mains transformers, 365 µF variable condensers, switches, rotary converters; s.a.e. list. — G3IDW, 136 Beech Avenue, Swindon, Wilts.

SX28 wanted, must be in good condition, up to £45 for genuine article.—Box No. 1858, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: CR-300, manual; good condition, but could do with realigning; £12. Components for power supply, £2. Prefer buyer collects.—T. Vickers, 88 Bk. Harrogate Road, Leeds, 7.

WANTED URGENTLY: Light-weight, sectional aerial mast, complete; also any books on suitable aerials and Amateur Radio, please.—Halls, 54 Victoria Avenue, Redfield, Bristol.

SPARES: Power supply, 260v. elect., two selenium rectifiers, 285v. 100 µF Cylcon var. Tx condensers. Valves: 2 MUL. 42, PT15. Offers? — 2 Whitehall Road, Grays, Essex.

WANTED: Communications Receiver, reasonably good condition, unmodified. 0.5—30 mc. SX28, AR88, 750 or similar. — Knight, 36 North Street, Chichester, Sussex.

FOR SALE: QST, March 1938 - April 1951, plus odd copies (total 166). **WANTED:** ZC1 Mark II and Class-D wavemeter.—Box No. 1856, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: BC-348, built-in S-meter, power pack, with 10+15-metre converter, £16 10s. (or offer); must sell. **WANTED:** AR77E Rx; must be in sound condition; up to £30 paid for genuine article.—Box No. 1855, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

MANUALS wanted: B28; Murphy V84C; Rx 1155A/B/N; H.M.V. TV 1804; BC-348. State price (all answered). — Box No. 1854, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SMALL ADVERTISEMENTS, READERS—*continued*

JERSEY HOLIDAY.—Stay at "The Lincoln," 3 St. Saviour's Road, near sea/town centre; s.a.e., please, for brochure.—Douglas Byrne, GC3KPO.

SALE: R1155, internal power pack and loud-speaker; also quantity radio magazines; £6 the lot, or offer?—17 Park View, Morden, Surrey.

FOR SALE: Hammarlund HQ129X Receiver for 220/240 AC, complete with matching speaker and instruction manual; coverage 540 kc to 31 mc, calibrated bandspread on 80, 40, 20 and 10 metres. Price £45 (or near offer).—C. E. Harvey, Littlecote, 5 St. John's Road, E. Oakley, Basingstoke, Hants.

R1155 with built-in P/Pack and output stage; new front panel; £5 10s., c.p. Other useful items.—Davies, Comberton, Cambridge.

SWOP: Pathscope 200B Projector, perfect, case, splicer, spare lamp, spools, etc., for CR100 (or sell £20). Also Pathscope "Vox" Talkie Projector, case, folding screen, folding stand, speaker re-wind/splicer, spools, manual, spares, excellent order, for best Tx offered in good working order (or sell, £45).—Contour House, Kingswear, Devon. (Phone 292).

SALE: CR-100 Receivers, perfect, matching speaker, 230v., £20 (or exchange for Tape Recorder).—Brewer, 33 Reynolds Close, Carshalton, Surrey. (Wallington 5586, evenings).

3-ELEMENT ROTARY BEAM with folded dipole radiator for 20 metres; 2 selsyns and motor with gear box, all clamps, brackets, nuts, bolts, etc.; £30.—G. Newton, Murieston House, Mibcalder, Midlothian.

A SUPERIOR Mobile Station based on modified mint ZC1, Mk. 1, with all fixed capacitors renewed, Pi-tank output, EF86 mike pre-amp., crystal mike, special whip, loading coil, capacity hat, tuning and control gear; consistent 300-mile mobile QSO's; £12.—G2ADR, 19 Fellbrook Avenue, Acomb, York. (Tel. 78283).

HRO with P/P rack mounting and coils, GC and HB/S, overhauled, original line up. Manchester area.—Box No. 1859, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

MINIMITTER Tx and ATU, xtal mike, £55; HRO B/S 80, 40, 20, £20; 15/10 converter, £2; Class-D wavemeter, 6v., AC, £5. As one lot, £75. All in excellent order; buyer collects.—James, 302 Carterknowle Road, Sheffield, 11. (Phone 50712).

S. 640 with "R.S.G.B." 2-metre converter and S-meter, in matching cabinet; £25 (or best offer). Many other units and some hi-fi gear, must be sold.—G3IJW, 7 Heversham Road, Bexleyheath, Kent.

PANDA Minibeam, as new, complete with instructions; cannot erect; £18. **WANTED:** Complete 10-metre mobile installation, 6v. system. Lancs.—Box No. 1853, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

EDDYSTONE 750, S-meter fitted, virtually new, £40 (buyer collects).—G5ML, Miles, Blackdown, Leamington Spa, Warks.

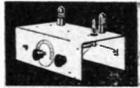
CALLING S.W. ENTHUSIASTS

COURSES FOR RADIO AMATEURS EXAMS & P.M.G. 1st & 2nd CLASS CERTIFICATES (THEORY)
Many other courses in Radio and Television Engineering;

Take our special home study courses which have been written by experts both in these subjects and in modern methods of postal instruction. **E.M.I. INSTITUTES** are part of a world-wide electronics organisation, and many former students testify that our tuition was invaluable in ensuring their success in examinations.

SPECIAL PRACTICAL KITS

are available as part of our Radio Courses. A typical course for beginners covers the design, construction and operation of a short wave 2-valve receiver. This equipment is supplied upon enrolment, and remains your property.



COURSES FROM 15/- PER MONTH

POST THIS COUPON TODAY

To E.M.I. INSTITUTES, Dept. 14R London W.4.

Please send FREE Brochure without obligation to:—

APR/57

NAME

BLOCK
CAPS
PLEASE

ADDRESS

Subject(s) of interest with/without equipment

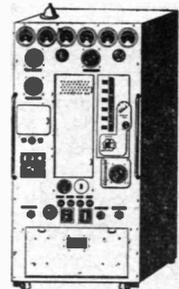
E.M.I. INSTITUTES

The only Postal College which is part of a world-wide industrial Organisation (Associated with "H.M.V." Marconiphone, etc. etc.)

**TRANSMITTER
NAVY MODEL**

TCK-7

Yours for only £10



American transmitters still in original packing cases. Designed for the Navy, these are really beautifully made and most impressive, standing 5ft. high by 2ft. wide and finished in instrument crackle. All meters and controls are on the front panel. The transmitter tunes over the range of 2 megacycles to 18 megacycles and it is designed for high speed precision communication without preliminary calling. Frequency control and stability is particularly good, being better than .005% under the worst conditions. Power output is 400 watts on CW and 100 watts on Phone. Tuning is very simple—a unit control mechanism gives a direct reading in frequency.

Complete with valves and instruction manual. Price £65 cash or £10 deposit and 12 payments of £5—carriage extra at cost.

NOTE: Power packs are not supplied with these, but full details of power requirements are given in the instruction manual.

View by appointment only

ELECTRONIC PRECISION EQUIPMENT LTD

(Dept. Q) Sutton Road, Eastbourne

SMALL ADVERTISEMENTS, READERS—continued

VHF Rx 14-valve Superhet. 100-150 mc; brand-new, in original screw-down felt-lined case.; Naval-type P.104; £5 10s. inc. case.—Diggle. Collingwood House, Stoke Damerel, Plymouth, Devon.

WANTED: Double Conversion Superhet. mint condition. FOR SALE: HRO Coils. TZ40. etc.—2 Cliff Road Gardens, Leeds. 6.

WANTED: Broadcaster Service Engineer Supplements. 1934-36, and Service Man's Manual, Vols. XIV and XV; Electrical Trading and Radio Marketing Service Engineer, 1940-45; Trader Service Sheets, 1934-39; Champion American Service Manuals, Vols. II and VI; Electrical and Radio Trading Service Chart Manuals, Vol. I to Vol. II.—Watts, 62 Belmore Road, Thorpe, Norwich.

SX²⁴, 550 kc—42 mc, good condition, £15 o.n.o. R103, no p/pack. £3. TU5B. 30/-. TU9B, £1.—Hargreaves, 15 Northgate, Bispham, Blackpool, Lancs.

BARGAIN SX²⁸, good condition, with manual, £25, buyer to arrange collection (London area).—Box No. 1857, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: Transformers, all either Woden or Gardners, as follows: 1000-750-0-750-1000v. 180 mA; 450-400-0-400-450 180 mA, 0-4-6.3v. 3A twice, 2-0-2v. 2A twice, 0-4-5v. 3A; 350-0-350v. 100 mA, 0-4-6.3v. 5A, 0-4-5v. 2.5A; Fil. 2-0-2v. 6A; Fil. 0.4-5-6.3v. 2A. Chokes: 5-25H 180 mA swingnig; 10H 180 mA; 20H 100 mA; 20H 60 mA; also Woden DT3 (3-to-1); also surplus transformer 12v. 3A; Rotary Converter 24v. DC in, 230v. AC 50 cycles 100 watts out; Crystal calibrator 1 mc, 100 kc, and 10 kc points. .01% accuracy, requires 250v. DC and 6.3v. AC. Marconi valve voltmeter TF 428B/1 (Valve voltmeter No. 2) 0-150v. in 5 ranges DC to 100 mc. Reasonable offers, please, to: G3HEE, 30 Priory Terrace, Stamford, Lincs. (Phone 3621).

SX²⁸ in good condition, manual, buyer to collect, £30. Woden U.M.2, £3. DT-1, £2.—51 Sundew Avenue, Shepherds Bush, London, W.12.

PANDA Minibeam, now unable to erect; assembled short time indoors only. £17 0s. 0d. Panda PR-120v. ECO with 6AM6's, 45/-. Dacora folding camera, speeds to 200, 5.6 lens, takes 2½-inch squares; in leather case as new £7 10s. 0d.—D. Heaps, Toll Gavel, Beverley, Yorks.

30/- offered for pair of AR88 alignment tools.—J. Jackson, 24 High Street, Crail, Fife.

SEND **NOW** FOR YOUR COPY OF

ELECTRONICS MADE EASY

For Amateurs, Radio Engineers, Hi-Fi enthusiasts and Electronics Engineers. 192 packed pages, over 500 drawings, diagrams and photographs.

POST
PAID
6/6

POPULAR MECHANICS, 109 Jermyrn St., London, S.W.1

ORDER FORM

Send at once "ELECTRONICS MADE EASY," remittance enclosed.

Name.....

Address.....

We want to buy:—

ALL USA TEST SETS PREFIXED "TS" and
APN3, APN9, ARC3, ARN7
ARTI3, BC22I, BC788C, CPN2
GRC9, TNI7, TNI8, TNI9

ALTHAM RADIO CO.

JERSEY HOUSE - JERSEY STREET
MANCHESTER 4

Telephone: Central 7834/5/6

Largest stocks in Europe of Government surplus material.

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

3000 STANDARD STOCK SIZES

H. ROLLET & CO., LTD.

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

SLOane 3463

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

Branches at LIVERPOOL, MANCHESTER, BIRMINGHAM, LEEDS

"No Quantity too Small"

G4GZ'S BARGAINS

VALVES: EA50, 1/6. 12SC7M, 2/6. SP61, VS70, 3/-. 6AG5, 6H6M, 6G6G, 2X2, EF50, 3/6. 6J6, 9006, EF36, EL32, TT11, 4/-. 6AC7M, 6AK5, 6C4, 6J5GT, EF39, 5/-. 1A5, 6CSM, 6K7G, EF50 (S), 5/6. 6J5M, 6/-. 5Y4G, 6F6M, 6K7M, 6SK7M, 6SN7GT, 6X4, 6/6. 3A4, 6AL5, 6AM6, 6F91, Z77, 7/-. 6BE6, 6SA7M, 6SG7M, 6SJ7M, 6SL7GT, 6SQ7M, 6XSQGT, 12A6M, 12C8M, 12SK7M, 12SR7M, 42, EF55, VR10/30, 7/6. 6AT6, 12AT6, EZ40, EZ80, UY41, 8/-. 2A3, 5U4G, 6AQ5, 6AU6, 6BA6, 7Y4, 12BE6, 12SQ7M, 35Z4GT, 50L6GT, EF37A, VR105/30, 12AU7, 8/6. 7B7, 7C5, 7C6, 12AU6, 12Q7GT, 12K7GT, 80, EF80, 9/-. 3A5, 5Z4G, 6L6G, 6Q7GT, 757, 12J7GT, 35L6GT, DAF96, DF96, DK96, DL96, DL33, DL35, ECC82, ECC83, KT33C, PL82, PY80, PY82, 9/6. 6AG7M, 6BF80, ECH81, ECC80, EF85, EF89, EL41, EM80, PY81, 10/-. 5R4GY, 6K8M, 20L1, 801A, EAF42, EBC41, ECC85, EF41, EL84, GZ32, PCC84, UAF42, UBC41, UCH42, UF41, UL41, 10/6. ECC84, PCF82, 11/-. 6BR7, 6L6M, ECF82, EY51, PL83, 11/6. 12AH8, PCF80, PCL83, R19, U25, 12/6. EY86, 13/6. ECF80, 14/6. 830B, 15/-. 446A, 17/6. 803, 20/-. 805, HK24G, 25/-. 805, 30/-. 813, 95/-.

TRANSISTORS. PNP type, red spot, 10/-; blue spot (RF), 15/-

COMMAND RECEIVERS BC454B. 3-6 Mc/s. Brand new in maker's cartons, with 6 valves, 45/- each, carriage paid.

RESISTANCE UNIT TYPE 231. Containing 12 heavy duty (10in. long) carbon non-inductive resistors. Just right for the Antenna Match. 32/6 each, carriage paid (excl. Eire & N. Ireland).

MIDGET MAINS TRANSFORMERS (same as size std. spkr. o/p). Input 230/250v., 220v. 20 mA, 6.3v. 0.6A O/P. Ditto, but 175v. 25 mA, both types, 11/9 each, post paid.

RF 24 UNITS. 20-30 Mc/s. New, with 3 SP61, 12/6 each, post paid.

PANL CRACKLE PAINT, 3/6 tin, post paid.

MIDGET 3-GANG VARIABLES. 55 + 55 + 35 pfd., 3/6 each.

300 OHM RIBBON FEEDER, 4d. yd. (min. order 36 yds.), plus 1/6 post.

Post 6d. under £1. S.A.E. enquiries, please.

JOHN ANGLIN

385 CLEETHORPE ROAD, GRIMSBY, Lincs.

Telephone 56315

G2AK THIS MONTH'S BARGAINS G2AK

Items for the MOBILEER

- 12 V MINIATURE ROTARY TRANSFORMERS. Output 360/310V, 30mA c.c.s. or 70mA i.c.a.s. Only 4½" x 2½" overall. Only 21/- each or £2 for 2, p. and p. 2/-.
- AMERICAN BREAST MIKES. Swivel head, push to talk and lock on switch. Excellent job. Only 12/6, p. and p. 1/6.

BRITISH BREAST MIKES complete with pair of H.R. 4000 Phones, in wooden carrying case, 8½" x 4½" x 7½" New W.D. stock. Unrepeatable at 17/6, p. and p. 2/-.

FOR PERSONAL PORTABLES 3" P.M. LOUDSPEAKERS, light-weight, only 9/11 each, plus 1/- p. and p.

COPPER WIRE: 14G. H/D 140ft., 17/- 70ft., 8/6, post and packing 2/-. Other lengths pro rata. Stranded 7/25, 140ft., 10/-; 70ft., 5/-, p. and p. 2/-.

ABSORPTION WAVEMETERS: 3.00 to 35.00 Mc/s in 3 Switched Bands. 3.5, 7, 14, 21 and 28 Mc/s Ham Bands marked on scale. Complete with indicator bulb. A MUST for any Ham shack. Only 17/6 each, post free.

RACK MOUNTING PANELS: 19" x 5½", 7", 8½" or 10", black crackle finish, 5/9, 6/6, 7/6, 9/- respectively, p. and p. 2/-.

RIBBED GLASS 3" AERIAL INSULATORS, 1/6 ea., or 6 for 7/6. 12 or more post free. Small shell porcelain 4½d. ea., or 4/- doz.

COLLINS MODULATION TRANSFORMERS. P.P. 807s, 20 watts audio to parr. 807s. Beautiful job. Only 12/6 post free. Very limited quantity available.

TWIN FEEDER: 300 ohm twin ribbon feeder similar K25, 6d. per yard, K35B Telcon (round), 1/6 per yard. Post on above feeder and cable 1/6 any length.

THE NEW GELOSO V.F.O. UNIT. Output on 80, 40, 20, 15 and 10 metres sufficient for fully driving pair of 807 or QVO6/20(6146) tubes. Complete with 8½" x 5" calibrated dial and escutchion. Price less tubes £7.17.6 Set of 3 tubes 24/-.

HEADPHONES, H.R. type, 4000 ohms, very sensitive. Only 12/6 pair, p. and p. 1/6. C.L.R. (low res.) 8/6, p. & p. 1/6.

AMERICAN 807 VALVES. New boxed, 7/6 or -4 for 25/-, post free.

TYPE 931A ELECTRON MULTIPLIERS. Only 35/- ea. or 2 for £3. Holders 2/-.

CONDENSERS. T.C.C. type 111. 8mfd, 1000V. List, over £3. Only 10/6 each, post 1/9. 8mfd, 750V, 5/6 each, post 1/6.

SMALL POWER UNITS in black metal case. 200/260V input, 200/250V 60/80mA output, also gives 6.3V 3A a.c. and 31V 3A d.c. Fitted with 6X5 rectifier. Fully smoothed and filtered. Only 50/-, post free.

TRANSMITTING TYPE TUNING CONDENSERS by E. F. Johnson, U.S.A. 500pF 1,500V rating. Ideal for Pi Output circuits. 15/-, post 1/-.

A good range of Components and Communication Receivers always available

Full range of DENCO, REPANCO and EDDYSTONE coils and components available

CHAS. H. YOUNG Ltd

No C.O.D. on Orders under £1 PLEASE PRINT YOUR NAME AND ADDRESS
Dept. "S," 110 Dale End, Birmingham CENTRAL 1635

HOME RADIO OF MITCHAM
for your
EDDYSTONE



'870' RECEIVER

Small dimensions, light-weight, and the attractive style make it the ideal dual purpose Domestic and Short Wave receiver. Equally at home ashore or afloat.

- ★ Two short wave bands, also medium and long
- ★ High grade gear-driven spinwheel tuning
- ★ Good quality and volume from high flux speaker
- ★ Clear horizontal scales with logging device

PRICE £34-16-0 including tax

May we send you full details of this latest product of the firm of EDDYSTONE which has concentrated for many years on the manufacture of high grade communication receivers.

HOME RADIO (MITCHAM) LTD
187, LONDON ROAD, MITCHAM, SURREY.
MIT. 3282

S. G. Brown
HEADPHONES FOR MARINE EQUIPMENT

and now



Every seagoing vessel in this electronic age relies on Marine Communication Equipment.

Our contribution is a specialised range of reliable Headphones which provide ships' operators with the clearest possible reception of all signals—Morse or speech.

S. G. Brown provide Headphones and associated equipment for all known purposes. Brochure "S" sent on request.

S.G. Brown, Ltd.
SHAKESPEARE STREET, WATFORD, HERTS
Telephone : Watford 7241

HENRY'S (Radio) Ltd

5 Harrow Rd., Paddington, W.2

PADDINGTON 1008/9 and 0401

Open Monday to Saturday 9-6. Thursday 1 p.m.
Send stamps for New 1956/7 28-page Catalogue.

OVER 50,000 VALVES IN STOCK

QUARTZ CRYSTALS



TYPE FT243 fundamental frequencies
120 TYPES, 5675 Kc/s. to 8650 (in steps of 25 Kc/s.).
80 TYPES, 5706 Kc/s. to 8340 Kc/s. in steps of 25 Kc/s.).

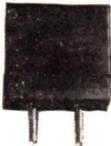
ALL BRAND NEW, 10/- Each

SPECIAL OFFER

Set 120 Crystals ... £15 0 0
Set 80 Crystals ... £10 0 0
Above are suitable for re-grinding.

TYPE FT241A 54th harmonic Crystals
80 TYPES, 20 Mc/s.—27.9 M/Mc/s. (in steps of 100 Kc/s.). Set of 80, £10
Also available: 32.5 Mc/s., 36.3 Mc/s., 36.6 Mc/s.; 32.6 Mc/s., 36.4 Mc/s., 36.7 Mc/s.; 32.7 Mc/s., 36.5 Mc/s.

ALL BRAND NEW, 7/6 Each
FT241A 200 kc/s. 10/-, 500 kc/s. 10/-
Crystal Holders for both Types 1/3 each.



TRANSMITTER/RECEIVER

Army Type 17 Mk. II

This well-known R/T Transceiver is offered complete with Valves, High Resistance Headphones, No. 3 Handmike and Instruction Book giving complete details and circuit, contained in strong cabinet. Variable tuning.

Frequency Range 44.0 to 61 Mc/s.
Range Approximately 3 to 8 miles.
Power requirements Standard 120v. H.T. and 2v. L.T.

Ideal for Civil Defence and communications.

BRAND NEW 59/6 CARR PAID

Calibrated Wavemeter for same 10/- extra.

SPECIAL REDUCTION FOR SETS OF VALVES

1A7GT, 1N5GT, 1H5GT, 1A5GT (or 1Q5GT or 3Q5GT)	37/6 Set
10 EF50 (Ex-Brand New Units) 5/- each	45/- "
10 EF50 (Red Sylvania, ex-new units) 6/- ea.	55/- "
6K8G, 6K7G, 6Q7G, 5Z4G, 6V6G,	35/- "
1R5, 1S5, 1T4, 1S4 or (384 or 3V4)	27/6 "
DK96, DP96, DAF96, DL96	32/6 "
6K8G, 6K7G, 6Q7G, 25A6G, 25Z5 (or 25Z6G)	37/6 "
12K8GT, 12K7GT, 12Q7GT, 35Z4GT, 35L6GT (or 50L6GT)	42/6 "
12SA7GT, 12SK7GT, 12SQ7GT, 35Z4GT, 35L6GT or 50L6GT	35/- "

TRANSMITTER/RECEIVER SCR 522

Comprising the well-known BC625 and BC624A. Units complete with 17 valves, types: 2-832, 3-12A6, 3-12SG7, 3-9003, 9002, 6G6G, 12J5GT, 12AH7GT, 12C8, 6S5T. The complete unit is in very good condition, having very useful parts including Relays, Transformers, Condensers, etc.

Less valves, £2/10/-, carr. paid.

With valves, £5/15/-, carr. paid

TRANSISTORS

JUNCTION TYPE P-N-P. British Manufactured.

A.F. Amplifier, 800 K/cs (Red Spot)	10/-
R.F. Mixer and Fre/Changer, 1.6 M/cs (Blue Spot)	15/-
R.F. and I.F. Amp. 2.5 M/cs (White Spot)	20/-

All Transistors Tested and Guaranteed.

B.T.H. Germanium Diode	1/6
Mullard Germanium Diodes, OA74	2/6

PRE-SELECTED TRANSISTOR-SEVEN PUSH-PULL PORTABLE SUPERHET

Just switch to your favourite Station. No Tuning, no Aerial or Earth. Pre-select 3 stations. Complete with all components and seven Transistors, 7 x 4 Elliptical speaker. Teletron Superhet Coils and I.F.T.'S. Powered by 7½v. dry battery which lasts for months. 150 Milliwatts output. All the above with Circuits etc. £9/17/6.

Or with Matched Mullard OC72's (200 Milliwatts Output) and 7 x 4 Elliptical High Resistance Speaker 30/- extra.

Suitable Plastic Cabinet easy to assemble 18/6

Call and hear demonstration model working.

"EAVESDROPPER" 3-TRANSISTOR PERSONAL PORTABLE

No Aerial or Earth Required. Pre-selected 2-Station Receiver.

We can supply all the components for building the above set as per "Radio Constructor." With plastic case, 77/6.

With Acos Mike, 90/-, Single Headphone, 4/6. With Miniature Hearing Aid, 92/6.

SPECIAL OFFER

Set of four Transistors including one R.F. Transistor 42/6
Set of six Transistors including one R.F. Transistor 60/-

TRANSISTOR SIGNAL TRACER

Complete Kit with 2 Transistors, Components, Plastic Case, and Phones with Circuit. 42/6.

TRANSISTOR SQUARE WAVE GENERATOR

Ideal for signal tracing. Complete Kit with 2 Transistors, Components, Plastic Case, and Circuit. 25/-.

MARCONI LIGHTWEIGHT LOW-RESISTANCE HEADPHONES

With 4-ft. lead and plug. Brand new. 10/- pair.

INDICATOR UNIT TYPE 102A

Unit contains VCR517 Cathode Ray 6in. tube, complete with Mu-Metal screen, 3 EF50, 4SP61 and 1 5U4G valves, 9 wire-wound volume controls and quantity of resistors and condensers. Offered Brand New (less relay) at 67/6. Plus 7/6 carr. "Radio-Constructor" scope circuit included.

MINIATURE TRANSMITTING STRIP "TYPE 81"

Size 7½in. x 6in. x 3in. Complete with Valves Type CV415, CV309, 2-6AM6, 2-7D9 and Quartz Crystal, 4,860 Kc/s. Fully wired with circuit. £4/10/- complete.

1355 RECEIVER

Complete with 11 valves 8-SP61, 5U4G, VU120, VR92. As specified for inexpensive T.V. In good condition, 27/6, carr. 5/-. R.F.24 10/-, R.F.25 12/6, R.F.26 25/- Brand new with valves, carr. 2/6.

TRANSISTOR PUSH-PULL AUDIO AMPLIFIER (150 Milliwatts Output)

Build this Push-Pull Amplifier, which is ideal for Crystal or Magnetic Pick-up Amplification, Baby Alarm, Microphone Amplifier, etc. Powered by 6-volt Dry Battery lasting for months. Complete Kit of Parts including 4 Transistors and all Components, with Circuit (less speaker), £4/10/-.

F.M. CONVERTER UNIT 88/100 Mc/s.

Containing 6 valves—2-6BA6, EB91, VR137, 2-EF54. Two I.F. stages and separate local oscillator, graduated Vernier tuning. Just plug in to your radio and obtain good listening on F.M. Voltage required 250v. 50M/A. and 6.3v. 2 amps. £7 . 19 . 6

CATHODE RAY TUBES

VCR139A, 2½in. C/R Tube, £1 15 0	
VCR97, Guaranteed full T/V picture (carr. 2/-)	£2 0 0
VCR517C, Guaranteed full T/V picture	£1 15 0
MU-METAL SCREENS for VCR97 or 517	10 0
VCR97, Slight cut-off, Carr. 2/-	15 0
3BP1, Brand New	£1 10 0

MINIATURE I.F. STRIP TYPE "373" 9-72 MEG.

Brand new miniature I.F. Strip size 10½in. x 2½in. x 3in. high. Valve line-up: 2-EF92; 3-EF91 and EB91. With circuit. With valves, 45/-.

42A INDICATOR UNIT

Containing VCR97 with Mu-Metal Screen. 21 Valves: 12-EF50, 4-SP61, 3-EA50, 2-EB34. Plus Pots, Switches, H.V. Cond., Resistors, Muirhead S/M Dial, Double Deck Chassis and Crystal. Brand New. Original Cases, 67/6 carr. free.