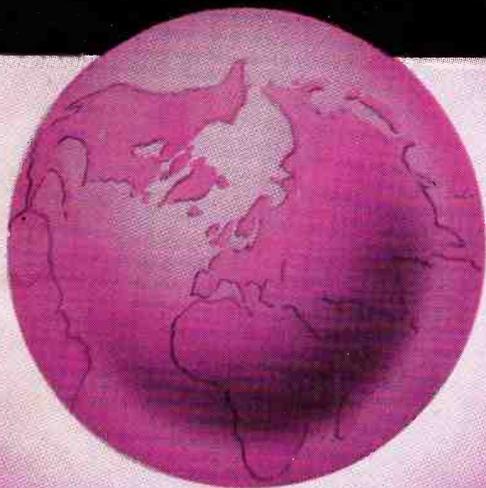


21-

The
SHORTWAVE
Magazine



**EXCLUSIVELY FOR THE
RADIO EXPERIMENTER &
TRANSMITTING AMATEUR**

VOL. VIII No. 8 OCTOBER 1950

H. WHITAKER G3SJ

10 YORKSHIRE STREET, BURNLEY Phone 4924

XTALS. The complete Xtal Kit in sealed cartons for the SCR 536 (BC611) Walkie Talkie. 14 xtals in all with 14 coils, 7 osc. and 7 final covering the complete freq. range of the unit. There are 7 tx. freqs. and a further 7 xtals spaced 455 kc for the receiver. All are in Ft 243 holders with $\frac{3}{8}$ " pin spacing. The complete range is as follows: 3885/4340, 4080/4535, 4280/4735, 4397/4852, 4840/5295, 5327/5782, 5437/5892 kc.

The complete kit including coils, 56/-, post free. Set of 14 xtals less coils, 48/-, set of 14 coils, 8/- Any pair of xtals, 8/-, with the exception of 5327-5 and 5295, these 7/6 each. All xtals are by leading U.S. makers.

XTALS. 1000 kc Bliley, Valpey or Somerset, standard $\frac{3}{8}$ " pin spacing, 20/- 100 kc RCA, Bliley, sub-standards, 17/6. Marconi, etc., 500 kc British $\frac{3}{8}$ " pin spacing, 6/- Western Elec. 500 kc $\frac{3}{8}$ " Ft 243 holders, 7/6.

XTALS. 3-5 Mc Band any spot freq., 15/-
FOR 144 Mc. Any freq. 8000 kc to 8110 kc Ft 243 fitting at 15/- A few Bendix $\frac{3}{8}$ " pin spacing 8007-69 kc at 12/6.

FOR 28 Mc. Any spot freq. from 7 Mc to 7500 kc at 12/6, with the following specials. 7200, 7225, 7250, 7275, 7300, 7325, 7350, 7375, 7400, 7425, 7450, 7475, 7500 kc at 7/6 each or 72/- per doz. All $\frac{1}{2}$ " Ft 243 holders.

FOR 7 Mc. 7000 to 7300 kc any spot freq. at 12/6, with the fone band specials as above.

6 Mc Band for 144. 6000 kc to 6083 kc any spot freq. at 12/6, Ft 243 holders.

FOR 21 Mc. 5250 to 5350 kc any spot freq., 12/6, Ft 243 holders.

TOP BAND. Double, 850 kc to 863-5 kc and 937 to 1038-5 kc, Ft 243 holders, by Western Elec. Prolific harmonic generators, Plated type, spot welded contacts, mounted in air gap, at 5/- each. To Commercial users and others. A complete range available from 2 Mc to 9 Mc in either $\frac{3}{8}$ " or $\frac{1}{2}$ " holders. The entire range by: RCA, Bliley, Valpey, Stand, etc., and all leading American manufacturers. Quantity quotations are available on request. Export enquiries welcomed.

VALVES RX AND TX. All are brand new in sealed cartons, and carry our full guarantee. 6J5gt 2/6, 24/- per doz. 813 22/6, 805 12/6, 832 12/6, 866/866a 10/6, HK257b 32/6, 860 17/- VU. 508 Vac rectifier 4v Fil. 2750v at 125 mills 8/- 807 RCA 6/-, 60/- doz. 955, 1625 4/-, 6L6g, 1622, 6J6, 8/- 6AG7, 6SG7, 6AG5, 80, 6C4, 7/6, 5Z4, 6N7, 6N7gt, 717a, 1S4, 6O7, 6K6, 6/-, 60/- doz. 6V6gt, 5W4, 6SK7met, 6SK7gt, 6J7met, 6K7, 6X5, 6C5met, 6C5gt, 6J5met, 6SH7 6SQ7, 1A5, 9001, 9004, 7Q7, 12C8, 12SR7, 12SG7, 12A6, at 5/-, 48/- doz. Sylvania Xtal Diodes 3/- VCR97 32/6. 100th at 30/-.

BLEEDERS, 50 watt/100 watt, per doz., well assorted, 12/-.

POWER UNIT. Type 247. Input 230/50cy, Output 500v at 300 mills plus 6-3v 3 amp. In grey steel ventilated cases. £3/19/6, carr. paid.

MORSE KEYS. U.S. Signal Corps. Flameproof. J5a, 2/6, 24/- doz. Ditto, Nr2 Mk2, 1/9, 18/- doz.

PILOT LAMPS. Small Bay, 6-3v, 12v or 28v, at 6/- doz.

MODULATION TRANSFORMERS. R.C.A. P.P. 805s to P.P. 813s, 60/-, carr. paid.

PARMEKO. 360 watts. 4500, 5000, 5500 ohms C.T. Sec. 1. 3550 ohms at 450 mills, Sec. 2. 6700 ohms 12 watts, 25/-.

THERMADOR. 400 watt. Pri. 6,700 ohms ct.—Sec. 4,500, 5,000, or 5,500 ohms, 7"×6"×5". Porcelain Standoffs, and completely screened at 50/- Woden, UMI, 2, 3, or 4, immediate delivery from stock.

PLATE TRANSFORMERS. Thermador, Primary 210/230v 50 cy. Secondary, 2280/1725/1420/0/1420/1725/2280 at 800 Mills. Porcelain standoffs. Sec. test volts 6,000. In original sealed crates, net weight 150 lb., £7/10/-, carr. paid.

R.C.A. 230v primary. Output 2000/1500/0/1500/2000 at 800 mills, £4/10/-.

HALLICRAFTER. Switched Primary 110/230v. S20.R. replacement, 30/-.

HALLICRAFTER. Output transformers. P.P. Primary. Separate High and Low impedance secondaries. 55CO19. 30/10,000 cy, 7/6 each.

BC 454 complete with Dynamotor, brand new and boxed at 50/-, carr. paid.

VOLUME CONTROLS. U.S.A. Long spindle, 12/- doz., short spindle, 6/- doz., 2k to 1 meg. Claristat. 10k plus 10k dual 12 watt, 2/6.

MINIATURE VAR. CONDENSERS. Ceramic. 15 pf to 100 pf, per doz., 10/-.

VALVE HOLDERS. All ceramic. Octal 1/-, 10/- doz. 807 1/3, 12/- doz. British 5-pin 1/-, 10/- doz. Ditto 7-pin 4/- doz. Johnson UX lock-in 4/- Ditto Jumbo 6/- 813 6/-.

AUTO TRANSFORMERS. Woden 100 watt, 20/- Met-Vick 500 watt completely screened in separate metal case with knock-out entry, 30/- Ex-Admiralty 2 kVA £2, 2½ kVA £5.

FILAMENT TRANSFORMERS. RCA, Input 230/50cy Output 10v, ct twice for a pair of 813s, terminal connections, and completely screened, 25/-

THERMADOR. Input 230/50 cy. Output 10v. ct 10 amp plus 10v. ct 8 amp potted, completely screened, at 30/- 1131 Filament trans. Suitable for a complete Tx, Input 230/50 cy, Output 7½v. for a pair of TZ40s, 7½v. for similar Tx final, 4v. 6 amp for rectifiers. 6-3v. 6 amp, 6-3v. 6 amp, at 25/-.

PLATE TRANS. 1131. Input 230/50 cy, Output 1100/0/1100 at 400 mills, 45/- 1131 smoothing chokes, 8hy 400 mills at 14/- RCA swinging chokes 5/15 hy at 450 mills, 20/-.

SMOOTHING CONDENSERS. TCC etc., 4mf 2000v. wkg 5×5×3, 5/-, ditto 4mf+2mf 2000v. wkg, 9×5×3, 7/6. Kellogg 4+4+4+2+1 mf 650v. wkg in brown crackle case with Dzus lid, condenser detachable from case, 7/6. 10mf 1000v. wkg 5×4×4½, 5/-.

MICA BI PASS. 350/1000v. wkg. 100 assorted, about 10 values, all normal sizes at 10/- per 100. Bakelite cased Cornell-Dubilier, Solar, etc., .005 8000v. wkg, 6/- .001 5000v. wkg, 2/-, 2500v wkg doz. assorted 10/-.

POWER SUPPLY DOOR SWITCHES. Completely screened in steel case, 230v. 3 amp with knock-outs for conduit or co-ax, break on opening door, 2/-.

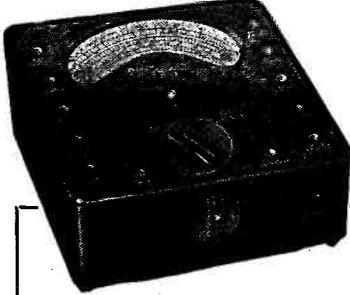
CONDENSERS. .1 350v wkg, 3/- doz. Cornell-Dubilier 20 mf 25v wkg tubular, 1/-, 10/- doz., ditto bath tub, 1/-, 10/- doz. Solar 40 mf 50v wkg, 1/3, 12/- doz., Cornell-Dubilier 40 mf 250v wkg, 1/6, 15/- doz. Mallory 1,000, or 1,500 mf 15v wkg, 1/-, 10/- doz. RCA 10 mf 50v wkg, 1/3. Miniature 8 mf 450v wkg met. can tubular, 2/-.

'AVO' Precision ELECTRICAL TESTING INSTRUMENTS

Appl. Trade Mark

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
 0—75 millivolts
 0—5 volts
 0—25 "
 0—100 "
 0—250 "
 0—500 "

A.C. VOLTAGE
 0—5 volts
 0—25 "
 0—100 "
 0—250 "
 0—500 "

D.C. CURRENT
 0—2.5 milliamps
 0—5 "
 0—25 "
 0—100 "
 0—500 "

RESISTANCE
 0—20,000 ohms
 0—100,000 "
 0—500,000 "
 0—2 megohms
 0—5 "
 0—10 "

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. × 3½ ins. × 1½ ins.
 Nett weight : 18 ozs.

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

Price : £8 : 10 : 0

The D.C. AVOMINOR

GUARANTEE

The registered TradeMark "Avo" is in itself a guarantee of high accuracy and superiority of design and craftsmanship. Every new Avominores is guaranteed by the Manufacturers against the remote possibility of defective materials or workmanship.

CURRENT
 0—3 milliamps.
 0—6 "
 0—30 "
 0—120 "
VOLTAGE
 0—8 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. × 3½ ins. × 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 :—

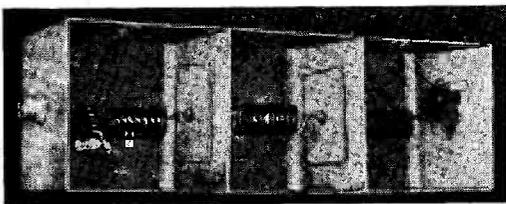
THE AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT CO., LTD.
 WINDER HOUSE · DOUGLAS STREET · LONDON · S.W.1 · TELEPHONE VICTORIA 2404/5

A.V.I.

BUTLER RADIO

ELECTRONIC ENGINEERS!

17 FIVE BELLS LANE, ROCHESTER, KENT



MODEL 2 F.L.

"M" derived end sections. Two constant "K" mid sections.

Price £2.0.0

including packing and postage within Gt. Britain.

TELEPHONE · CHATHAM 45256

**TX Harmonic Filter for
Elimination of T.V.I.**

THE BUTLER
**LOW PASS
FILTER**

- Provides high attenuation above 30 m/cs.
- Maximum attenuation in T.V. Bands.
- Negligible insertion loss.
- Standard 72-ohm Co-axial connections.
- Tests on production filter show 68db's down at 45m/cs.

Instructions with each filter.

THE AMATEUR RADIO SERVICE

MOORSIDE MILLS, LOMAX STREET, BURY. Phone: Bury 1778.

Valve Bargains of the month:—GJ50A, 2/3; 866/866A, 9/8; 805, 9/8. British 307 equivalent is the Osram KT80 with 5-pin Brit. ceramic base, our price, only 4/9; 6L6M, 7/-; 5U4G, 5/-; 6Z4, 5/-; 6V6, 5/-; HL23, 2/3.

RF. Chokes, 1.25 mh., new stock available, only 9d. each.

100pf. Ceramic insulated, air spaced, silver plated, midgeat variable condensers, 1" long shaft, panel mounting, brand new. Only 1/6.

Condensers. 4MFD 800v, 1/-; 6MFD 1,000v, 1/6; 0.01 T.O.C. Mica, 3d. each, or 2/6 doz.

Bleeders. 20K, 50K, 100K, 100 watt type vitreous, 2.5K 30 watt with fixing clips, all at 9d. each.

Bulgin type D.45 panel lamps, a credit to any equipment. 1/6 each.

1 Megohm midgeat potentiometers, 1" dia. with 2" shaft. 1/6 each.

0-500 ma. RF. ammeters, 2 1/4" square, brand new and boxed, 2/6 each.

9/16 Eddystons valve top caps, fit 813, 866, 805, etc., only 6d. each.

2 Meter Sig. Gen. Heart. (150-250 mcs., easily moded to 2 meters). Using racked plunger type attenuator and fitted with det. 20 as osc., and EA50 as monitor. All completely screened and very compact. These units are selling quickly so secure yours now for only 10/- plus 1/6 postage and packing.

10 Valve Holders, brand new (Amphenol), 5d. each, 4/9 per dozen.

Please include sufficient to cover postage and packing.

ANNOUNCING ANOTHER SERVICE FOR THE AMATEUR

Four Band 35 watt Pane Imounting Coil Turret. This turret is available in single and double ended types and is designed to switch the grid circuit of the "Q.R.O." P.A. or the anode circuit of your "Q.R.P." TX. The coils which are mounted directly on the contacts of the ceramic switch have coupling links suitably arranged and separately switched. Our price, 35/9.

High stability Clapp V.F.O. heart. The V.F.O. design is based on the popular Clapp circuit and has all the desirable characteristics thereof. Available in either of two ranges, 1.7-2 mcs. and 3-6.4 mcs. Tuning is arranged to give 180 degree rotation for full band coverage. The oscillator is built into a die cast metal case 4 1/4" high x 3 1/4" wide x 2" deep. Supply and output leads are brought out ready for connecting to supplies. The valve employed is a meta 18A07. Our price, 65/9.

Self-Contained Desk Type V.F.O. This unit incorporates our high stability Clapp V.F.O. Heart and is provided with buffer stage and self-contained power supplies. All mounted in attractive black wrinkle finished cabinet, 10 1/2" wide x 7" high x 6" deep with rounded front corners. Full vision dial calibrated direct in frequency. Price, £12/-.

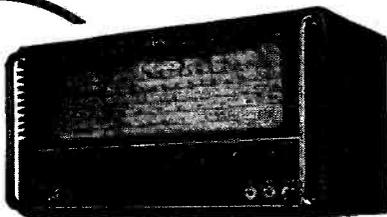
The above can be supplied with Xtal Calibrator and mixer giving 100KC. check points. A certificate of Xtal Accuracy is supplied satisfying G.F.O. requirements. Price complete, £17/10/-.

Further details on any of the above are available on application.

The **EDDYSTONE**

MODEL 750

DOUBLE SUPERHETERODYNE



COMMUNICATIONS RECEIVER

BUILT BY CRAFTSMEN WHO TAKE A PRIDE IN THEIR WORK

Well engineered, robustly constructed and possessing a specification which means top-line performance. Be sure to try this modern receiver at your local Eddystone depot—you will be very favourably impressed. Price **£49.10.0**. Write for full technical specification to

STRATTON & CO. LTD.

EDDYSTONE WORKS, ALVECHURCH ROAD, BIRMINGHAM, 31
 Telephone : Priority 2231/4
 Telegrams : Stratnoid, Birmingham

UNREPEATABLE OFFER! — *Limited Number Only*

Ambassador 4756 Chassis. British made, packed in maker's cartons, with full year's normal guarantee (valves 3 months). Ideal for Radiogram Conversions, or for use as semi-communication receivers.

SPECIFICATION.

The 4756 is a high quality five-valve A.C. superhet. There are six wavebands giving the following coverage :—

- | | |
|---------------------|-----------------------|
| (1) 200-550 metres. | (4) 20.0-32.6 metres. |
| (2) 52-130 metres. | (5) 14.3-20 metres. |
| (3) 32.5-52 metres. | (6) 9.4-14.3 metres. |

High gain permeability tuned IF's.

Mains voltage adjustments from 100-250 volts, 50 cycles.

Dial area : 8" x 8".

Chassis height to top of dial : 10½".

Chassis depth (dial to back) : 9½".

Controls : ¾" from front of dial.

Valve complement :—Mullard ECH35-EF39-EBC33-EL33-EZ35, or Mazda near equivalents.

Electrical bandspread on short wave ranges.

Sockets for extension loudspeaker and pick-up.

Special Tone Control circuit incorporating negative feed-back and giving wide frequency response from 60-8,500 C.P.S.+

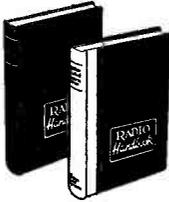
Price, including 10" P.M. Speaker (10,000 lines flux density), valves, all fittings and dial escutcheon. £21/10/-. Tax paid. No extra charge for carriage. Band (2) can be substituted to cover 1,000-1,940 metres if required, without additional charge.

VALLANCE'S

VALLANCE & DAVISON LTD

Dept. S.W.M. 144 BRIGGATE, LEEDS 1 Tel. : 29428/9

American Publications for the Amateur



RADIO HANDBOOK

Eleventh Edition, 1949. Theory with emphasis on Amateur Radio. 25s. Post 1s. 2d.

Twelfth Edition, 1950. Practical and Constructional Material only (*see previous advertisements*) for the Radio Amateur and Experimenter. *Immediate delivery.* 25s. Post 10d.

RADIO AMATEUR'S HANDBOOK

An A.R.R.L. publication. Now in its 27th Edition! 600 pages on Theory, Design, Construction and Practice. A leader in its class. *Immediate delivery.* 18s. 6d. Post 10d.

ANTENNA MANUAL

Design and Construction of Aerials of every kind, for Radio Amateurs, Engineers and Technicians. (300 pages). *Immediate delivery.* 27s. Post 10d.

ANTENNA HANDBOOK

Fifth Edition of the A.R.R.L.'s own publication on Aerial Theory and Installation. *Immediate delivery.* 11s. Post 7d.

SURPLUS CONVERSION MANUALS

Giving much detailed practical information on the adaptation of a wide range of American surplus items. Well illustrated with circuit diagrams, drawings and photographs. In two Vols. *Immediate delivery.* per Volume 21s. Post 5d.

HINTS & KINKS

Useful collection of technical ideas and practical workshop data, written up in shortened form. An A.R.R.L. publication. *Immediate delivery.* 11s. Post 5d.

RADIO AMATEUR CALL BOOK

The World's only directory of amateur stations—Over 100,000 callsigns and addresses, alphabetically—Constantly revised and kept up to date. *Immediate delivery.* Latest quarterly issue, 16s. Post 10d.

Any American Radio or Technical Publication Supplied. Ask for our Quotation

QST, the leading American monthly on Amateur Radio, established over 30 years ago. For a year of 12 issues 36s.

CQ, an independent American magazine for Radio Amateurs, monthly. 12 issues 29s.

AUDIO ENGINEERING

A monthly of quite unusual value and interest to all concerned with the design, construction and operation of audio equipment of every kind. 12 issues. 29s.

Suppliers of Technical Books and Publications to Schools, Universities, British and Colonial Government Departments.



GAGE & POLLARD, Publishers' Agents,

49 VICTORIA STREET, LONDON, S.W.1.

Abbey 5342

Benson's Better Bargains

BC453. Tuners. 3/6. Dynamotors 28v, 7/6. Set of 6 valves, 20/-. BC454/5; Chassis, 6/6. Coilpacks, 3/6; IFTs, 7/6 set. TRANSFORMERS: 230v input. 13v CT, 1 1/2, 7/6. Parmeko, shrouded. 620-0-620v tapped 550, 375; 250 ma 2x5v 3a, New, 39/6; 300-0-300 200 ma, 6v 5a, 5v 3a, 70v 100 ma, 20v 1/2, 28/6. RCA. Fully shrouded. Input 190/250v, 50c. Output 400-350-0-350-400 200 ma, 6-3v 6a, 5v 3a, 35/-. PP 6L6 to TZ40's RCA. New, 8/6. VIBRATOR PACKS. DC 6v to 190v 80 ma and 6v, 22/6. DC 6v to 150v 40 ma, 12/6. YAXLEYS: 3P3W3B, 3/6, 2P11W, 2P5W2B, 2/6, 4P2W, 1/-. MUIRHEAD SM DRIVE, 5/-. R1147 SM DRIVE, 5/-. CO-AX: PYE—Plugs/Sockets, 9d. pr., Double-ended skts, 1/-; "T" skts, 1/3; "T" skt/plugs, 1/-; Plugs (2) on 20 ft 1/2 in. co-ax (80ft), 3/6. VITREOUS RESISTORS. 35k 35w, 30k 25w, 400 ohms 20w 2-5 15w, 3k 12w, 30 ohms 30w, 3k 30w, each, 1/-. METAL RECTIFIERS: FW. 48v 2 1/2a, 15/6; 12v 6a, 22/6; HW 240v 80 ma, 5/-; F.W. 120v 30 ma, 3/6. FUSEHOLDERS panel, 1/-; Ruby indicators, 1/3; Toggles SP, 1/-; DP, 1/-; DPDT, 2/-; Mains (chassis), plug and socket, 2-pin 5a, 1/3. VAR. CONSENSERS. Spindled, ceramic miniatures, 25 pf, 1/3; 75 pf D.E., 1/6; 75 pf Twin, 2/6; 25 pf 3 gang, 4/6; 20 pf preset, 1/-. SPINDLE COUPLERS, STD, 1/2 in., 9d. Epicyclic drives SM, 1/3. METERS MC; 0/2 1/2a, 7/6; 0/1a, 5/-; 0/30a, 7/6; 0/100 ma 2 in. sq., 5/6; 0/500 uA, 5/-; 0/500 ma Thermo 3/6. B7G Cans, 3 for 1/-. VALVES—5R4GY, 6SL7, 5Z4G, 2C26, 6AC7, 6B8M, KTW63, EF36, EBC33, ML6, VU111, 6C4, 6J5M, VR91, 12SK7,

12SR7, 12SG7, 12AH7, 9003, EL32, RKR72, at 5/-. 6SG7, 6SH7, SP61, SP41, 9006, P61, 9D2, ARP12, AR8, VU120A, 2X2, at 3/6; VR21, VT90, 6H6, EA50, EB34, 7193, CV6, at 2/6; 5U4G, 5Z4M, 6X5, 12A6, 6J7, 6F6M, 6AG5, 7V7, EF54, 5Z3, Pen46, 6N7M, MU14, 2050, 3T4, IS4, IR5, 185, 6SN7, 6K7, 6AG7, 6Y6, QP21, 717A, 721A, VR105, VR150, AC6Pen, 6L6GA, 9002, at 6/6; PT15, 6V6, 6L7M, 6K8M, 6F7, 807, EC52, 3Q5, CV66, 6SA7, 25A6, ECH35, 1B24, 7Y4, 7C5, at 7/6; 6AK5, 6J6, 6L6M (1622), at 8/6. XTAL DIODES IN 22, 3/-. ANTENNA RELAYS. 12v DP/CO, 2/6. XTALS. Miniatures. 20 mcs to 38-7 mc in 100 kc steps, each 8/6. Octal based: 4-6, 5-5, 6-2 mc, 3/6, 2-5, 3-5, 8-0 mc, 5/-, 100 kc, 3-pin, 10/-, 455 kc, 7/6, 8-09 mc, 7/6. Various 2/8 mc (inc. BC610 types). Our selection, 5 for 10/6.

AERIAL INSULATORs. 3 in. ribbed. Pyrex, 1/-, 144 Mc CONVERTORS. Valves: 2/EF54, CV66, EC52. I.F. 16-5 mc with circ. mods., 22/6.

TX/RX. NEW. Black crackle, with 12 B7G v/holders., packed with miniature components. Size 15 in. x 7 in. x 6 in. T.U. type case, but practically plain front panel, 12/6.

CHASSIS 12 in. x 8 in. x 5 in. with 26 ceramic B7G valveholders & cans; miniature condensers & resistors, etc. 20/-.

AMPLIFIERS with 2/6AC7, 1/6AG7, 1/6L6G & 931A photocell, wired on aluminium chassis, 45/-.

INDUCTION MOTORS with blowers, 115v. condenser start/run, 6 in. x 4 in. dia. approx. 10/6.

Terms : C.W.O. CARR. PAID OVER 5/- . S.A.E. enquiries please.

W. A. BENSON, 308 RATHBONE ROAD, LIVERPOOL, 13

STONECROFT
1 6 0 4

RADIO CLEARANCE LTD.

27 TOTTENHAM COURT ROAD, W.1 MUS 9188

MEDIUM-WAVE PERSONAL RECEIVERS

3-valve medium-wave dry battery operated receiver, housed in smart bakelite box, size 7" x 6 1/2" x 5", with plastic carrying handle. T.R.F. circuit, using 3-1.T.4 valves, with reaction. Output to pair of lightweight H.R. phones, self contained. Frame aerial in lid, provision for external aerial, S.M. dial. Powered by self-contained dry batteries, I-W1435 and 2-U2's. Supplied brand new, with valves and batteries. Open the lid and it plays. Covers whole M.W. band. Purchase Tax paid. £3/19/6. Not ex-Govt. surplus.

MASTER OSCILLATORS

V.F.O. by Wilcox Gay, Type M.1 19467A. The last few of these well-known V.F.O.'s are offered, brand new, in original cartons, with accessories and instruction books at £3/15/-. carr. paid.

MOVING COIL METERS

Metal-cased 2" circular 0/15-600v (500 micro.A. F.S.D.), 6/6; 0-20A, 0-40A, with shunts, 5/-; 2" square bakelite cased, 0-1 mA, 8/6; 0-5mA, 6/-; 0-50mA, 7/-; 0-20v, 5/-; 2 1/2" circular bakelite cased, 0-30mA, 6/6; 0-160mA, 9/6; 0-200 mA, 9/6; 2 1/2" bakelite cased moving iron, 0-20v, 7/6.

ROTARY POWER UNITS

Type 104. 12v D.C. input, outputs 250v 65mA, 6-5v, 2-5A, D.C. P.M. rotary on chassis with cover, size 8 1/2" x 4 1/2" x 6 1/2", 6/6, post paid. Type 87, input 24v, output as Type 104, 5/6, post paid.

MAINS TRANSFORMERS

Primary 0-110/210/240v 50c/s. Sec., 300-0-300v, 80mA, 6-3v 2-5A, 4v 2A, 15/6, post paid.
Primary 200/250v 50 c/s. Sec. 293-0-293v, 60mA, 6-3v 2-5A, 6-3v -6A, 16/6, post paid.

SMOOTHING CHOKES

6H, 200mA, 100 Ω ... 6/-	5H, 200mA, 100 Ω ... 5/6
20H, 80mA, 350 Ω ... 6/6	8H, 250mA, 50Ω potted 10/-

LOUDSPEAKERS, P.M.

5", less trans., 9/6; 6 1/2", less trans., 11/-; 10", with trans., 21/-. All brand new boxed, with ali. speech coils. Post extra.

THE FINEST CORED SOLDERS IN THE WORLD—NOW PRESENTED IN a Complete Kit for every soldering job



Ask your usual retailer for the Multicore Solder Kit. In case of difficulty, send 2/- with name of your usual stockist.

At last—you can buy a complete range of Multicore Solders enabling you to do perfect soldering on your equipment, for only 2/-. The Multicore Solder Kit contains two specifications of Ersin Multicore Solder and two of Arax Multicore Solder, providing the right solder for all radio, television and electrical work, as well as for ordinary metals, soldering chassis construction, etc. Your workshop is not complete without the Multicore Solder Kit—the finest two-shillingsworth on the market.

The Multicore Solder Kit contains a carton of each of the following specifications:

Ersin Multicore Solder	4 ft.	60/40 alloy	18 S.W.G.
Ersin Multicore Solder	3 ft.	40/60 alloy	16 S.W.G.
Arax Multicore Solder	4 ft.	60/40 alloy	18 S.W.G.
Arax Multicore Solder	3 ft.	40/60 alloy	16 S.W.G.

These specifications, as well as other gauges of the same alloys, are also available for larger users in Ersin Multicore Size One and Arax Multicore Size Eight Cartons, price 5/- each.

MULTIGORE SOLDERS LTD., Mellier House, Albemarle St., London, W.1. REgent 1411

Lyons Radio Ltd.

3 GOLDHAWK ROAD (Dept. MS),
SHEPHERDS BUSH, LONDON, W.12
Telephone: Shepherds Bush 1729

ARTIFICIAL AERIALS TYPE 21. Designed for use with the R1154, TR1196, TR9 series, etc., this unit can easily be adapted for other Tx's. For both medium and high frequencies up to 100 watts loading at 5, 10 and 20 ohms for capacitances of 250, 150, 100 or 50 pfd. is provided. There are 4 Muirhead mica condensers fitted (250, 300, 150 and 100 pfd.) which alone should prove invaluable for those contemplating capacitance measuring gear construction. Assembled in a neat metal case $8\frac{1}{2} \times 7 \times 6\frac{1}{4}$ ". In brand new condition in maker's carton, complete with ballast lamp. Price 18/6, post 1/6.

MAINS TRANSFORMERS. Primary, 200-250v 50cps. Secondaries, 350-0-350v at 80mA., 0-4/5v at 2A., 0-4/6, 3v at 5A. Can be mounted upright, sideways or as drop-through chassis type. Brand new, fully guaranteed. Price 18/6, post 1/6.

THROAT MICROPHONES. Brand new and boxed. Price 2/6, post 6d.

HAND GENERATORS Mk.2. A manually operated generator, originally designed to provide the operating voltages for the American trans/rcvr., types 38 Mk.3 and 48, but, of course, suitable for a variety of purposes. Nominal rating is H.T. 162v D.C. at 60mA., and L.T. 3-1v. D.C. at 0-3A. Condition is brand new and perfect, supplied with instruction book, size $5\frac{1}{2} \times 5\frac{3}{4} \times 6\frac{1}{2}$ ". Price 25/-, carriage 2/6.

RECEIVER TYPE R3084. Easily modified for television sound or vision or as a 2 metre receiver. Supplied fitted with 7-VR91's (EF50's), 2-VR136's, 1-VR137, 1-VR92 (EA50), I.F. amplifier strip, aerial switching motor, etc. In good, used condition. Price 45/-, carriage 5/-.

MODULATION TRANSFORMERS TYPE T.102. Made by the Chicago Corp., U.S.A. Freq. response, 200 to 5,000 cps. ± 1 DB. Z. Primary 6,000 ohms, Z. Secondary, 6,000 ohms, both centre tapped. D.C. resis. Pri. 170 and Sec. 215 ohms. Audio power 20 watts, test volts 3,000. Size approx. $3\frac{1}{2} \times 2\frac{1}{2} \times 2\frac{1}{4}$ ". As new and unused. Price 12/6, post 1/3.

30ft. AERIAL MASTS TYPE 55. Consist of ten sections, 9 of stout ash wood and the top one of metal. Each of the 9 sections (overall length 3' 3", max. dia. $1\frac{1}{2}$ "), is finished with a metal socket and spigot so that all fit firmly together. Guy ropes, clamps, 3 sandbags (unfilled), etc., and illustrated card of assembly instructions are included so that absolutely nothing else is needed for the erection of this superb mast. Condition as new supplied in maker's case. Ideal for Field Days as well as permanent installation. Not a favourite item for the time of year but worth getting whilst limited stock still available and inexpensive. Price 45/-, carriage 4/6.

NEW ILLUSTRATED CATALOGUE of Gov. surplus bargains now ready, 3d. in stamps, please.

G2AK

This Month's Bargains

G2AK

POWER TRANSFORMERS. 620/550/375/0/375/550/620v at 200 mA. plus 250 mA at the 375v taps. Two separate windings for rectifiers of 5v at 3a each. Primary 230v 50c. Rated at 278 watts. Our price, 39/6, carriage paid.

MODULATION TRANSFORMERS. 360 watts. Prim. 5,500, 5,000 4,500 ct. Sec. 1 3550 at 450 ma. Sec. 2 6700 ohms 12 watts. Ideal for Plate and Screen modulation. Price only 27/6, carriage paid.

HEAVY DUTY L.F. CHOKES. Fully potted. 30 Hy. 100 ma. 150 ohms (Weight 14 lb). Price 13/6
20 Hy. 126 ma. 100 ohms (Weight 14 lb). Price 15/6
30 Hy. 150 ma. 150 ohms (Weight 18 lb). Price 17/6
All transformers are carriage paid except to Eire for which we must ask for 5/- extra.

100 kc Oscillator Units. Complete with Xtal and valve. Mounted on sub-chassis, wired ready to drop into your Rx, requires only HT and LT. Price 30/-.

Collins 7-valve communication Rx. Few only left, complete with 12v tubes, send for photo and details. Price £6/10/-, plus 10/- carriage.

Complete Noise Limiters, wired on small sub-chassis with 6H6 valve. 5/- each. Post free.

VIBRATOR PACKS. 6v input. Output 180v 40 ma. fully smoothed. Price 19/6 plus postage 1/6. 12v input. Output 300v 100 ma. fully smoothed.

19/6 plus postage 1/6. All packs are tested and sent out in working order.

SPECIAL FOR AR88 USERS. Matching Speakers, 2.5 ohms. Black crackle case. £3/15/0. Spare Crystals for D model only. 455 kcs., 15/- Sealed cartons of spare valves (14). £5.

TWIN FEEDER. 80 ohm. 5d. per yd. Twin Ribbon Feeder 300 ohm (Heavy duty) 5d. per yd. Co-ax Cable, 1/2" dia. 70 ohm 8d. per yd. Postage on above feeder and cable, 1/6, any length.

STATION LOG BOOKS. 200 pages printed one side only. Size 8 1/2" x 11". First-class paper and bound with heavy cover. Price, 17/6.

AMERICAN TELESCOPIC PLYWOOD MASTS. These excellent 30 ft. masts can be erected by two people in half an hour on tripod support. 5" dia. at base, 3" dia. at top, tripod 8' long 4" dia. Please write for photographs. Only £4/10/- each. Packing and carriage 10/-.

RECEIVERS TYPE 18. Covers 6-9 mcs and are for battery operation. New condition. Complete with four valves. Only 17/6 each.

Morse Keys. Small type on insulated base. 1/- each plus 6d. postage.

Billey SMC 100 100/1,000 kc dual crystals, 25/- R.C.A. 100 kc Crystals, 20/-.

Carriage paid on all orders over £1 except where stated. Please include small amount for orders under £1
PLEASE PRINT YOUR NAME and ADDRESS

CHAS. H. YOUNG, G2AK

All Callers to 110 Dale End, Birmingham CENTRAL 1635
Mail Orders to 102 Holloway Head, Birmingham MIDLAND 3254

TELCON R.F. CABLES



To meet the demand of Specialist amateur requirements a redesigned 300 ohm transmission line, having stabilised electrical characteristics in varying weather conditions, has been introduced.

ELECTRICAL CHARACTERISTICS

Nominal Impedance	300Ω
Capacity $\mu\mu\text{F}/\text{ft}$.	4.0
Attenuation db/100 ft. at 1 Mc/s	0.125
at 100 Mc/s	1.35
Power Handling Capacity at 100 Mc/s	550 watts.
Velocity Ratio	0.86

TYPE: FLEXIBLE TELCOTHENE INSULATED TRANSMISSION LINE

Further details of this and other R.F. Cables on application

THE TELEGRAPH CONSTRUCTION & MAINTENANCE CO. LTD

Head Office:

22 OLD BROAD ST., LONDON, E.C.2

Telephone: LONDON Wall 7104

FOUNDED 1884

Enquiries to:

TELCON WORKS, GREENWICH, S.E.10

Telephone: GREENWICH 3291



INEXPENSIVE TELEVISION

Is the title of the latest 48-page illustrated publication showing how a variety of ex-Govt. Radar Units can be converted readily and cheaply into efficient Television Receivers. Send only 2/9 for your copy, and a price list of the specified items.

RECEIVERS R.1355. As specified for above, complete with all valves and a copy of the book. ONLY 55/- (carriage etc., 7/6).

R.F. UNITS TYPE 25. For use with R.1355 for London reception. ONLY 17/6 (postage 1/6).

R.F. UNITS TYPE 28. For use on Sutton Coldfield frequency are all sold, but we can supply the RF Unit 27 with full details of modification by re-trimming only to cover Sutton Coldfield. ONLY 25/- (postage, etc., 1/6).

I.F. STRIP TYPE 194. Another of the units specified for Inexpensive Television. A first-class strip giving tremendous amplification, and well recommended for constructors who have built a Televisor but have come "unstuck" in the vision or sound receiver. Contains six valves VR65, and one each VR53 and VR92. Size 18" x 5" x 5". ONLY 45/- (postage, etc., 2/6). Copy of Inexpensive Television supplied free.

INDICATOR UNITS TYPE 6. As specified for above TV. Complete with valves and VCR97 O.R. Tube. BRAND NEW IN MAKER'S CRATES. ONLY 90/- (carriage, etc., 7/6).

INDICATOR UNITS TYPE 62. Contains 16 valves VR65, 2 of EB34, 2 of EA60, and a VCR97 Tube. ONLY 75/- (carriage, etc., 12/6).

TRANSFORMERS FOR "INEXPENSIVE TV", can be supplied as follows:—Time Bases and Vision Transformer 350-0-350v, 160ma, 5v, 2a, 6-3v, 6a, 6-3v, 3a, ONLY 36/- Sound Receiver Transformer 250-0-250v, 100ma, 5v, 3a, 6-3v, 6a, ONLY 27/6. EHT Transformer for VCR97 Tube, 2-0-2v, 1-1a, 2-0-2v, 2a, 2,500v, 5ma. ONLY 30/- Postage 1/6 per Transformer, please.

CONDENSERS. 1mfid 2,000v, tubular 2/6; 1mfid 3,000v, block, 4/6; 8mfid 450v, 2/-; 8 x 8mfid 450v, 2/9; or 6 for 15/-; 8 x 16mfid 450v, 4/-, or 6 for 22/6; 16 x 16mfid 450v, 4/6, or 6 for 25/-; 32mfid 350v, 2/9, or 6 for 15/- Postage please under 20/-.

CHOKES. 5h 200ma, 6/- 10h 100ma, 6/- 20h 80ma, 6/6. Postage 1/-.

AMPLIFIERS 3562A. An ex-R.A.F. amplifier containing 1 valve 5U4, 2 of 807, 1 of EF50, and 1 of EA50, also 2 chokes 10h 100ma, transformers, metal rectifiers, resistors, condensers, etc., etc. BRAND NEW IN MAKER'S CARTONS. ONLY 19/6 (carriage, 3/6).

Cash with order please, and print name and address clearly.

U.E.I. CORPN, Radio Corner, 138 Grays Inn Road, London, W.C.I.
(Phone : Terminus 7937)

Open until 1 p.m. Saturdays, we are two minutes from High Holborn (Chancery Lane Station) and 5 minutes by 'bus from King's Cross.

P.C.A. RADIO

HALLICRAFTERS. BC.610 (or HT.4B) operating over 2 Mc to 18 Mc and modified for 21 and 28 Mc. Crystal and VFO on all bands complete with speech amplifier, antenna tuning unit, exciter units and coils for all bands, set of x-tals specially made for BC.610 and new valves.

60W. TRANSCEIVERS, very compact, weight 13 lb., 829 output. 2 Mc to 8 Mc or 4 Mc to 16 Mc. Phone and key. High class superhet receivers. Complete with power pack for 110/220v A.C., and two rotary converters for 12v battery operation, two sets of aerials (dipole and counterpoise aerial), microphone, spare valves.

A.R.88 D's, S.27's, Hallicrafter's S.37 (VHF from 130 Mc—210 Mc), **AR.77's, HRO's** with power pack and coils.

All above items in excellent working condition with new valves, working demonstration on request.

TX VALVES. 803, 805, 807, 813, 814, 815, 829, 861, 866A, 6L6M and many others.

Large stock of transmitting condensers, crystals and other components. Alignment and repair of communication receivers and all other amateur equipment undertaken.

P.C.A. RADIO

Transmitter Div.: Cambridge Grove, The Arches, Hammersmith, W.6. Tel. RIV 3279.
Receiver Div.: 170 Goldhawk Road, Shepherds Bush, W.12. Tel. SHE 4946.

For Perfect Playing

S. G. BROWN
Precision

SAPPHIRE NEEDLES

The ideal reproducing medium for gramophone records. They give high fidelity reproduction with the minimum wear on the record.

Five types available to suit all types of pick-ups.

TYPE NO. 5. "Miniature Solid Sapphire" Needle for use with light-weight pick-ups.

This S. G. Brown needle gives a definite improvement in fidelity of reproduction due to its homogeneous nature.

PRICES

Nos. 1-4, 10/1 each. No. 5, 13/4 each.

Your local dealer can supply

In cases of difficulty, apply direct.

A "TIP" WORTH TAKING

An interesting and instructive Brochure giving technical details, valuable information and advice on the choice of a S. G. Brown precision Sapphire Needle to suit your pick-up, will be sent on request. Write Department "S."

S.G. Brown, Ltd.

SHAKESPEARE ST., WATFORD, HERTS.
Telephone : Watford 7241

OUR LATEST LIST
ILLUSTRATES

99

**DIFFERENT ITEMS OF
RADIO HARDWARE
& WORKSHOP MATERIALS**

Tags — Caps — Screws — Clips — Cleats —
holders — Grommets — Wire — Sleeving —
Flex — Solder — Plugs — Sockets —
Fuses, etc. All packed in generous 1/- pkts.
(post 3d.), or 12 pkts. for 10/- (post 6d.).

Lists free on request.

SATISFACTION
GUARANTEED
OR CASH
REFUNDED
INSTANTLY!

57th
RADIOCRAFT Ltd.
69-71 CHURCH GATE LEICESTER
G2R1 G3C9S G8BY1

PHONE
58927

**P. M. G.
CERTIFICATE**

NEXT EXAM—MAY '51

PREPARE NOW by taking our special POSTAL COURSE. Many former students testify that our tuition was invaluable in ensuring their success in previous examinations.

A FORMER STUDENT WRITES :

"I obtained a pass
I was a raw beginner at the commencement of the course ; this, I think, gives much credit to all concerned. Providing the student is prepared to do his best, I now know from experience that E.M.I. will do the rest. . . ."

Student No. 30,449.

Full details of this and other courses in FREE BOOKLET from:—

E.M.I. INSTITUTES, Dept. 14

10, Pembridge Square, Notting Hill Gate,
London, W.2. Telephone: BAYswater 5131/2

I.10a

RECEIVER 3547. In original maker's cases, these contain 15 EF50's, and 8 other valves, a midget motor, hundreds of useful parts, and a "Pye" 45 mc/s strip. ONLY £6/7/6.

POWER UNIT 21. These deliver 150v at 40 mA from 6v input. ONLY 15/6. A few store-soiled 8/6.

MIDGET MOTORS 2½" × 1½" dia.—12/28 AC/DC or 110v AC input ; detachable fans. 9/6.

RECEIVER 18. As previously advertised, complete with circuit, connecting data, phones and batteries. 25/- . Spare valves, 2/9 each.

TRANSFORMERS. Modulation, 6/6. Input 4/6.

H.T. BATTERIES. 94v HT & 1.3v LT, 6/6 ; 94v HT, 63v HT and 5.2v LT, 8/6.

MIDGET ACCUMULATORS. 3 AH, 2v, brand new ; 2/6 each, £1 per dozen.

RECEIVER 21. As previously advertised, complete with valves, circuit, and connecting data. 35/-

INDICATOR 198. In sealed maker's cartons, with VCR 138A (3") CRT, 8 useful valves, and a host of useful parts. ONLY £2.

AMERICAN TELEPHONES. With handset, bell and ringing generator, in stout webbing cases, 37/6 ; in solid leather cases, 45/-.

AMPLIFIER 1135A. Twin input, with EBC33, EK32, and EL32. Easily converted for P.A. or modulator, measuring 9" × 2½" × 6". Complete with circuit, 16/6.

NEW 1355's. In original maker's crates, with 11 valves, 55/-.

CONTROL BOX C-56/APX2. With two jewelled panel lights, four fuses, Yaxley switch, toggle switch, two pots, knobs, etc. New, they measure 5" × 6½" × 3". 4/3.

CONTROL BOX C-57/APX2. With three micro switches, two toggle switches, one pot (with switch), Yaxley switch, and two knobs, etc. New, measuring 5" × 4¼" × 3". 4/3.

RECEIVER 25. See Aug./Sept. '49 "SWM" for conversion details. Complete with six (6.3v) valves, circuit and OUR conversion data. 19/6.

CONTROL UNIT 214. In sealed maker's cartons, with 3 EF50's, two EB34's, one D1, 39 resistors, 17 condensers, 8 pots, Yaxley switch, heavy toggle switches, sockets, etc. ONLY 19/6.

POWER UNITS S41B. Made by Stratton's and providing 300v HT at 200 mA, these choke input units use separate HT and heater transformers, which are individually switched, the HT transformer being relay controlled in addition. A further 5v negative is available from a separate winding, and is rectified and smoothed for bias purposes. LT is 12v at 3A, and the units are housed in attractive grey crackle finish louvered cases, measuring 14" × 7" × 7½", and complete with two switches, red (HT) and green (LT) panel lights. Input, fuse protected, is 200-250v. ONLY 65/- . BRAND NEW and BOXED.

RADIO EXCHANGE CO.

9 CAULDWELL STREET, BEDFORD Phone 5568

Henry's
RADIO
COMPONENTS
& TELEPHONE
EQUIPMENT

5 HARROW ROAD, LONDON, W.2
PADdington 1008/9
0401

FREQUENCY CONTROL CRYSTALS. By American G.E. Co. Octal base fixing. Following frequencies only: 2,500 k/c, 3,500 k/c, 4,600 k/c, 6,200 k/c, 8,000 k/c, at 7/6 each only. **NEW CONDITION.**

EX-GOVT. VALVES. The following brand new and guaranteed valves are in stock—6J6 at 12/6, 6AK5 at 10/6, 6F7, 6FN46, 6L6 MG, at 10/- each. 20A66, 6SN7GT, 6F50, 6F54, 20A80, 6F55, 6L37, VU111, VU133, U18, 5T4, 6R4GY, RL18, 6AG5, 2M22A, VU120A, 6K8 all at 12/6 each. 6Z4, MU14, 6R7GT, 6J7GT, 6K8GT, ML4, 12BR7, 12BK7, 68A7GT, 68L7GT, 68J7, 68C7GT, 6C6, 6V6G or 6T, 7C7, T4, 7B6, 7C6, 12BR9A, 9D2, VP23, P2, 12A6, 8D4, 15D2, 6F36, 6F39, 6C93, 6K32, E132, 6X50T, 2X2, 6AC7, 6N7, 78, 9003, 1NGT, 6J5GT, 6C8, KTW61, DH33, 955, YDD2A, VB2B, AC/6FN, 220S6, 210DET, 6F8, KT9, U22 all at 6/6 each. Also 9002 and 1LN5GT, 8/6; 807, 7/-; 4D1, 5/-; 6A50, 5P61, 954, EB34, at 3/6 each. Di Diode at 2/3 only. And the midrange of 1-4v battery valves: 1T4 and 126, at 6/6 each. 1B3 and 1B4, at 7/6, 3/4, at 9/- each. Most of these valves are boxed. Please note for current popular circuits we also have in stock 1D8GT, at 15/3; and H1VAC XH at 10/6. Both these latter are new and boxed. In addition we have over 10,000 new boxed BVA valves in stock at current Board of Trade prices. Let us have your enquiries.

TX VALVES. Westinghouse 812, at 50/-; 805, ATP4, at 10/-; 832, at 15/-; 866A at 15/-; Klystron 723A/B at 22/6; 829B at 59/6. All brand new and boxed.

VERY SPECIAL. Standard Telephones H4/200 EHT pencil rectifiers, brand new, 2,400V 3mA, at 15/- each. **ALSO—**The very latest slider pots, as used in all the latest T/V receivers. Bank of 4, comprising 2 of 10 K, 1 each 100 ohm, 500 ohm. Only 6/- complete. Not repeatable.

WAVE-FORM GENERATOR TYPE 24. EX-AM. Including, 6 SP61, 4 EF38, 2 EB34 and one CV116. Also relays, transformers, pots, condensers and resistors. The whole contained in metal box size 114 x 118 x 87. In clean condition, an absolute bargain at 25/-, plus 3/6 packing and carriage.

A.M. RECEIVER UNIT, TYPE 161. Comprising RL37, 2 EF54 and EC92. Coils, relay and many condensers and resistors. The whole in metal box, size 84 x 61 x 32". New, a bargain at only 15/-, carriage paid.

INDICATOR UNIT TYPE 198. Containing VCR 138A 3 1/2" tube, 3 VR65, 1VR54, 1 VR92, 2 high-speed relays, volume controls and 101 res. and condensers. Absolutely brand new. Carriage paid, 22/-.

No. 18 SET, RECEIVER PORTION. A four-wave superhet receiver operating from 6-9 Mc/s (33m-50m). Valve line-up: 2 6R12 (VP23), and AR8 (HL23DD). Requires only 120V H.T., 9v G.B. and 2v L.T., in perfect condition, only 17/6, plus 1/6 packing and carriage. An absolute bargain. Suitable brand new headphones can be supplied at 3/6 per pair.

N.B.—Each receiver is tested working, prior to despatch.

RECEIVER TYPE 26. The receiver portion of the T/R 1198. Covers 4-3-67 Mc/s, and makes an ideal basis for an all-wave receiver, as per "Practical Wireless", August issue. Complete with valves types EF36(2), EF39(2), EK32 and EB38. Supplied complete with necessary conversion data for home use. Only 22/6. Chassis only, 9/6.

BAKELITE RECEIVER CABINETS. An extremely advantageous purchase, enables us to offer the following:— Attractive brown bakelite cabinet, size 15" x 8 1/2" high x 7 1/2" deep, complete with chassis drilled for standard five-valve superhet, back, 3-wave glass dial and back plate. Chassis and cabinet are designed for 6 1/4" speaker, and all standard components. Price complete is 25/- only. Limited quantity.

SPECIAL VALUE IN MAINS TRANSFORMERS. Parmeko Input 110/250v, 250-0-250, 90 m/a 6-3v 3a, 5v 2a, half shrouded drop through type. Electrostatic screen. Price 15/- only, plus 9d. post. Limited quantity.

MIDGET '0005 mfd. TWO-GANG TUNING CONDENSER. Size only 2 1/4" x 1 1/4" x 1 1/4". Capacity guaranteed, standard length 1/2" spindle, complete with mounting bracket, less trimmers 6/6, or complete with "built-in" trimmers, 7/6 each plus 6d. post.

R.1356 RECEIVERS. We have been fortunate in securing a further limited quantity of these receivers. These are brand new and unused. Price 55/- (plus 5/- carriage).

R.1356 MAINS TRANSFORMER. 200/250v. input. Outputs 250-0-250, at 120 m/a, 6-3v, at 7a, 5v, at 3a. Fully shrouded top chassis mounting and guaranteed 100 per cent. Only 28/6.

"DENCO" ALIGNMENT OSCILLATOR D.A.O.I. This unit provides a modulated signal for the alignment of I.F. amplifiers and associated circuits.

The two standard frequencies of 465 Kc/s and 1,000 Kc/s are selected at the turn of a switch.

All supplies are derived from one U.10 coil and one 12BR battery inside the unit. Consumption of 50 m/a. Also valve type DL92 is used. Dimensions of case: width 3 1/2", depth 2 1/4", height 4 1/2". Price only 39/6, post free.

R3515 I.F. STRIP. A complete I.F. unit, comprising 6 SP61 I.F. Stage, tuned to 15-6 Mc/s, 1 EA50 diode detector and 1 EF36 or EF39 output or video stage. A few modifications only are required to adapt this unit which will give pictures of extremely good quality. Price complete with valves, and fool-proof modification instructions, is 46/-, plus 5/- packing and carriage. Limited quantity only.

I.F. TRANSFORMERS. Manufacturer's surplus. Iron-cored 465 Kc/s. Size 4" x 1 1/4" x 1 1/4". Pair 8/6. Whilst They Last!

VCR97. Brand new, suspended in wooden crate, 35/-, carriage paid.

MU-METAL Screen for above, few only at 7/6 each.

WHITE MASKS for above, rectangular, rubber, 7/6 each.

SPECIAL LATE EXTRA.

ELECTRIC AUTOMATIC RECORD CHANGERS! Quantity strictly limited.

THE COLLARO GATE CHANGER. A.C. mains, 100-250v. 50 cycles. Plays eight records, mixed 10" and 12". The dimensions of Uniplate are 10" wide by 14". Depth below Uniplate 4 1/4". Height above Uniplate, 5 1/4". With magnetic pick-up. Brand new. Price, including purchase tax, 27/10/-.

SANGAMO-WESTON. Ex-Govt. 0-1 m/a. M/c meters. 2 1/2" panel-mounting. Absolutely brand new, 15/- each only.

5 KV ELECTROSTATIC VOLTMETER. 0-5 KV, panel-mounting, 3 1/2" scale, brand new, 50/- each.

A SIGNAL TRACER at minimum cost. An easy-to-build unit that can be used for R.F., I.F. and Audio signal tracing, without any switching or tuning. Highly sensitive, easy to build, responds to signals picked up from an ordinary receiving aerial. The circuit is that of a high-gain, 3-stage resistance-coupled audio frequency amplifier, with a 5" speaker in the Output of the Power Amplifier stage.

We shall be pleased to supply a complete kit for the construction of the above, right down to the last nut and bolt, for the low price of 62/18/6. Concise instructions and circuit are supplied. If preferred, circuit and instructions only can be supplied for 1/6 post free. All items may be purchased separately. This is a highly efficient instrument, and a MUST for every radio man.

Send stamp for current Component List. Probably the most comprehensive in the trade

● OUR REPUTATION IS YOUR GUARANTEE ●

INDEX TO
ADVERTISERS

	<i>Page</i>
Adcola	582
Amateur Radio Service	522
Anglin, T. J.	582
Ashworth, H.	580
Automatic Coil Winder	521
Barnes Radio	582
Bensons	525
B.I.E.T.	578
Brookes Crystals, Ltd.	577
Brown, S. G.	528
Burnham Electronic.	578
Butler Radio.	522
Candler System.	581
Clydesdale Supply Co. Ltd.	
<i>Cover tv</i>	
Easibind.	584
Electrad Radio.	577
Electradix Radios.	576
E.M.I.	529
Fields	584
Ford	584
Frith Radiocraft	529
G.S.V. Co.	578
Gage & Pollard.	524
H.A.C. Short-Wave Products	582
Henleys	577
Henry's	530
Hoile, A. C.	583
H.P. Radio Services Ltd.	580
Johnsons	583
Lawrence, G.	<i>Cover III</i>
Lyons Radio.	526
Marks, C.	576
Multicore	526
P.C.A. Wireless.	528
Pearson, M. J.	584
Premier Radio	532
Pullin (M.I.)	579
Radio & Elec. Mart.	579
Radio Clearance	525
Radio Exchange	529
Radio Servicing Co.	579
Radio Supply Co.	580
Reosound	580
Rock Radio	583
Rollett, H.	583
Samsons Surplus Stores	581
Small Advertisements.	581-584
Smith, H. L.	578
Southern Radio	576
Stratton	523
T.C.M.	527
U.E.I. Corp.	528
Vallance & Davison Ltd.	523
Whitaker, H.	<i>Cover II</i>
Young	527

SHORT WAVE MAGAZINE

FOR THE RADIO AMATEUR & AMATEUR RADIO

Vol VIII OCTOBER 1950 No. 87

CONTENTS

	<i>Page</i>
Editorial	533
Super Modulation, by D. Abbott (G6TA).....	534
Single-Valve VFO Driver, by R. Young (G3BTP).....	537
Feeder Design and Tuning.....	539
Station Control, by G. P. Anderson (G2QY).....	542
Improving Screen Modulation, by H. J. Beach (GM8BO)..	544
One Stick—But Four Wires, by H. Tee (G8UA).....	546
DX Commentary, by L. H. Thomas, M.B.E. (G6QB).....	548
Portrait Gallery—G5BY.....	554
First Class Operators' Club.....	555
Choice of Crystal Frequency in VHF Converters, by G. B. Moss (G4NB)	556
IF Amplifier Noise, by W. J. Crawley (G2IQ).....	558
VHF Bands, by E. J. Williams, B.Sc. (G2XC).....	559
G1BF Here.....	567
On Soldering Aluminium, by Rev. F. Ness, M.A. (G3ESV)..	568
Here and There.....	569
New QTH's	570
Other Man's Station—G2FWA.....	571
The Month with the Clubs—From Reports.....	572

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

Advertisement Manager : P. H. FALKNER

Assistant Editor : L. H. THOMAS, M.B.E. (G6QB)

Published the Friday following the first Wednesday each month at 53 Victoria Street, London, S.W.1 Telephone : Abbey 2384.

Annual Subscription : Inland 20s. Abroad 22s. post paid

Copyright Reserved throughout the World

AUTHORS' MS

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

THE SHORT WAVE LISTENER ASSOCIATED WITH THIS
MAGAZINE IS SPECIALLY FOR THE RECEIVING ENTHUSIAST

PREMIER RADIO

MORRIS AND CO. (RADIO) LTD.,
Please note change of address

All Post Orders To: 740 HIGH ROAD, TOTTENHAM,
LONDON, N.17 (Tottenham 5371/2/3)

152 & 153 FLEET STREET (Central 2833)

207 EDGWARE ROAD, W.2 (Ambassadors 4033)
(OPEN UNTIL 6 p.m. SATURDAYS)

PREMIER TELEVISOR KITS FOR LONDON AND BIRMINGHAM USING 9" OR 12" MAGNETIC C.R. TUBES

£19.19.0 including all parts, valves and loud-
(Car., etc., 15/-) speaker, but excluding C.R. TUBE

The Vision Receiver, 4 R.F. stages (EF54s), Diode Detector and Noise Limiter (6H6) Video valve (EF54). Complete Kit with valves, £3/16/0. Carriage 2/6.

The Sound Receiver, 3 R.F. stages (6SH7s), Double Diode Triode (6Q7), which acts as Detector and L.F. Amplifier, Noise Limiter (EA50), output valve (6V6). Complete Kit with valves, £3/10/- Carriage 2/6.

The Time Bases, blocking oscillators on Line (6SH7 and 807) and Frame (VR137 and 6V6). E.H.T. from Line Output Transformer, 10in. P.M. Speaker, Sync. separators 6H6 and 6V6. Complete Kit with valves, £8/15/6. Carriage 5/-.

The Power Supply, double wound transformer isolating the receiver from the mains. Rectifier 5U4G. Complete Kit with valves, £4/16/6. Carriage 5/-.

The following Sensitivity figures prove that the Premier Televisor Kit is capable of reception at greater distances than any other Standard Commercial Kit or Receiver whether T.R.F. or Superhet.

VISION RECEIVER

Sensitivity : 25 μ v for 15v peak to peak measured at the Anode of the Video Valve.
Sound Rejection : Better than 40 db.
Adjacent Sound Rejection : Midland Model. Better than 50 db.

SOUND RECEIVER

Sensitivity : 20 μ v.
Vision Rejection : Better than 50 db.

CONSTRUCTION BOOK 3/-.

PREMIER MIDGET RADIO KITS

Re-designed, easier than ever to assemble. These kits are now supplied with point to point wiring diagrams, all parts are supplied including attractive plastic cabinet 12" x 5" x 6", loudspeaker, valves, etc. Illuminated glass dial with new wave lengths. 190-540, 1,000-2,000 metres. For use on 200-250v mains. 6K7, 6SH7, and CV1510 beam power output valves in the A.C. and 6K7, 6SH7 and 12A6 valves in the A.C./D.C. model, both use metal rectifiers.

Please state if A.C. or A.C./D.C. is required.
Complete kit, £4/19/6, including Purchase Tax.

PREMIER 3-BAND MIDGET SUPERHET KIT

Re-designed to receive the short, medium, and long wavebands, 16-50, 194-540, 1000-2,000, with point to point wiring diagrams. A.C. valve line up, 6K8, 6K7, 6Q7 and CV1510 beam power output. A.C./D.C. is the same excepting the output valve which is 12A6. Please state which is required. Metal rectifiers are used in both models, and they are for use on 200-250v mains. Complete with cabinet as illustrated, loudspeaker, valves and all parts.
£6/19/6, including Purchase Tax.

We are now supplying NEW LONG RANGE TELEVISOR KITS (ELECTROSTATIC TUBE)

For the London or Birmingham frequencies at the same price as the standard kit

— £17/17/0 —

Five Easy to Assemble Kits are supplied :

Vision Receiver with valves, carriage 2/6 ..	£3/13/6
Sound Receiver with valves, carriage 2/6 ..	£2/14/6
Time Base, with valves, carriage 2/6 ..	£2/ 7/6
Power Supply Unit, with valves, carriage 5/-	£6/3/0
Tube Assembly, carriage and packing 2/6 ..	£2/18/6

This unit includes the VCR97 Tube, Tube Fittings and Socket and a 6in. PM Moving Coil Speaker with closed field for Television.

The Instruction Book costs 2/6, but is credited if a Kit for the complete Televisor is purchased.

Any of these Kits may be purchased separately ; in fact, any single part can be supplied. A complete priced list of all parts will be found in the Instruction Book.

20 Valves are used, the coils are all wound and every part is tested. All you need to build a complete Televisor Receiver are a screwdriver, a pair of pliers, a soldering iron and the ability to read a theoretical diagram.

WORKING MODELS CAN BE SEEN DURING TRANSMITTING HOURS AT OUR FLEET STREET AND EDGWARE ROAD BRANCHES.

VALVES. We have large stocks of new boxed valves at very low prices. All exempt from Purchase Tax 11C6, 11D5, 11LN5, 154, 155, 1N5, 1T4, 3A4, 3D6, 5U4, 5Y4G, 5Z4, 6AC7, 6AG7, 6C5, 6F8, 6J5, 6J7G, 6K7, 6K8, 6N7, 6Q7, 6SA7, 6S7, 6SK7, 6SC7, 6SL7, 6SN7, 6U5, 6V6, 717A, 12A6, 9003, 9005, VR55 (EBC33), VT52 (EL32), VR56 (EF36), VR57 (EK32), VR116, VR136 (EF54), VR137 (E52), CV66 (RL37) CV1120 (SU2150A), CV1137 (RL16), CV1068 (AW4), CV189 (U19), CV2941 (EL50), VU39, 807, HYVAC XY, HYVAC XW, KT61, KTW61, U50, 6P6, AW4, 4060A, all 6/6. 6H6, 6SH7, 7193, VR78 (D1), all 2/6. VR54 (EB24), VR65 (SP61), VR92 (EA50), VR95 (954), VT121 (955), CV649 (956), CV102 (Xtal Diode), 1626, all 3/6. 6X5, HL23, RL18, VU111, VU133, VU134, CV6, CV73 (11E3), CV1189 (AC6 Pen), CV659 (1625), CV639 (843), NS2, DQP, BL63 (CV1102), 1616, CV67 (klystron), U17 (CV1113), PT25H (CV1046), all 5/-. 1Q5, 1C5, 6C4, 6J6, 6AB7 6SQ7, 6SG7, all 6/6. 2X2, U74, CV1262 (GU1), CV1141 (GD14B), GU50 (CV1072), VT30 (CV1030), VR91 (EF50), all 7/6. 5V4, 6B8G, 25Y5, 25Z6, 2050, VT127 (Pen 46), CV1075 (KT66) (matched pairs, 18/6), all 8/6. 6L6, P27/500 (PX25), 705A, 832, CV662 (8012), DET5, all 10/-. 803, 10/-, 805, 10/-, 931A, 30/-, CV186, 40/-, CV19 (EHHT), 60/-, 861, 60/-, 838, 15/-, CV15 (EL266), 40/-, HY114B (CV3505), 15/-, MR300/E (CV3558), 15/-, E1232 (CV92), 20/-.

C.R. TUBES

VCR517E, 20/-; VCR522, 15/-; ACR8, 15/-.

OUR NEW SUMMER CATALOGUE NOW READY—PRICE 6d.

SHORT WAVE MAGAZINE

FOR THE RADIO AMATEUR AND AMATEUR RADIO

E D I T O R I A L

Conditions

At about this time of year, we begin to look forward to what is regarded as the winter DX season. The HF bands should be opening again, and altogether there is a feeling of expectancy and a sense of anticipation.

But this season things will be a little different. We are likely to find that the LF bands, 1.7 and 3.5 mc, will be more interesting, in the DX sense, than Ten and Twenty. For we are still on the down-slope of the sunspot cycle which, judging by previous experience, tends to produce better and more consistent DX working on the longer wavelengths.

It is a curious fact and a remarkable coincidence that the shape of this curve was just about right when exploration of what were then the higher frequencies started, 'way back in 1922-23. We now know that the early DX working in the 90-180 metre region would not have been possible if the peak of conditions, in terms of the sunspot cycle, had not happened to coincide with the first tentative efforts to open up amateur working on wavelengths below 200 metres. And as the pioneers went lower in wavelength during the years following, they were in effect chasing this peak—until it almost seemed that "the shorter the wavelength the better the DX" could be regarded as the axiom for the future.

In general terms, what we shall find this season is a reversal of this tendency. A band like Eighty will give DX results even better than it did last year, and real DX should also be possible on the Top Band. Present indications are that the cyclic variation is being well maintained and that the HF bands will not be as reliable as they were during the winter of 1949-50.

*Austin Foss/R
66FD*

SUPER MODULATION

Some Notes on the System

By D. ABBOTT (G6TA)

WITH any normal method of amplitude modulation the average power used when modulating 100 per cent. is one-and-a-half times as much as that used in the unmodulated condition. For this reason it is impossible, whatever system is used, to get "something for nothing". The additional power must come either from the modulator in the form of audio, or from the HT unit which supplies the power amplifier.

The four usual methods of modulation are effected by altering, at audio frequency, the voltage which exists on the control grid, the screen grid, the suppressor grid or on the anode. The last of these methods, which is the best, is unfortunately much the most expensive.

To the new comer who has just received his 150-watt telephony licence, the cost of a modulator capable of producing about 80 watts of audio is quite formidable. Built with good components, it may be anything up to £30 or even more. The beginner, therefore, often turns to one of the first three systems mentioned above.

Some Comparisons

Unfortunately, in order to obtain a good percentage of modulation with these systems, it is then necessary to run the PA valve or valves comparatively inefficiently. As an example, the figures in the table are given for a British-made pentode. In each case the HT is 1,000 volts.

Type of Modulation	RF Carrier in Watts
Anode	60
Screen grid	40
Control grid	16
Suppressor grid	15

As these are the actual figures given by the manufacturer, it appears that unless anode modulation is employed, the chances of working that elusive DX station on 'phone are much less than they could be.

For the past 18 months, the writer has been carrying out experiments with various systems which fall under the heading of what is now colloquially called "Super Modulation". Attention was at first directed to the methods of Doherty, Terman and Woodyard. Fig. 1 shows a simplified circuit diagram of one of

The principle of "Super Modulation" is being more and more discussed on both sides of the Atlantic. Fundamentally, it enables a high level of modulation to be obtained with reasonable output but low audio power; this is one of the factors that make Super Modulation an attractive proposition from the amateur point of view.—Editor.

Doherty's methods. The general principle is that V1, which is called the carrier valve, supplies the unmodulated carrier, and V2, known as the peak valve, supplies about half of the positive peak of the modulation cycle and also during this part of the cycle lowers the anode load of V1, thereby enabling V1 to supply the other half of the positive modulation.

During the negative half of the audio cycle V2 is idle and contributes nothing while V1 is controlled by the modulated RF grid drive.

The operation of the circuit is involved and will not be given in full in this article. For any reader who is interested enough to wish to try out this system, it can be pointed out that L3 acts as a quarter-wave transformer and introduces a $\pi/2$ phase shift between the anodes of V1 and V2, hence the necessity of the phase shift network in the grid circuits. V1 is biased to cut-off and V2 is biased so that it just draws no anode current with unmodulated drive. It is not possible to give component values as these depend on the frequency to be used. The data below Fig. 1 will enable them to be worked out, however.

It will be appreciated that changing frequency from one amateur band to another will, unless extensive alterations are made in component values, result in different phase relationships between V1 and V2, thereby upsetting the whole system. Although this type of circuit is capable of excellent results on one spot frequency, for the reasons just mentioned it seems of little use to the average amateur.

The Taylor System

In all "Super Modulation" systems the procedure is the same, in as much as they employ a carrier valve and a peak valve. Various methods have been advocated for changing the power on the peak valve. The best known is that due to Taylor, which has received some publicity in the U.S.A. When the Taylor system is used on frequencies such as 14 and 28 mc it has the disadvantage that the two valves are in parallel.

In the method to be described, although the valves cannot accurately be said to run in push-pull as they work asymmetrically, the advantage is that their inter-electrode capaci-

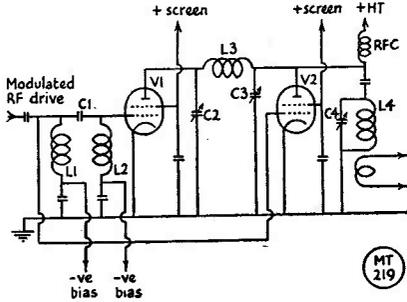


Fig. 1. If the effective load of L4, C4 with aerial connected is R1 ohms, then $\omega L3 = 2R$; $1/\omega C2 = 2R$; and $1/\omega C3 = 2R$. If the grid input resistance of V1 is Rg ohms, then $\omega L1 = Rg$; $\omega L2 = Rg$; and $1/\omega C1 = Rg$. There should be no mutual inductance between L1 and L2.

ties are in series across the tuned circuits.

Fig. 2 shows a normal push-pull amplifier using two 807 valves running at about 100 watts. It must be emphasised that when employing 807's there is a danger of parasitic oscillations occurring, and for this reason it is recommended that the circuit of Fig. 2 be wired up first and thoroughly tested out for any instability before proceeding further. The usual screening precautions should be taken including metal "collars" placed round the lower parts of the 807's. The use of split-stator grid and anode condensers and the symmetrical placing of components is essential. The anti-parasitic chokes may consist of 20 turns of 30-gauge enamel on 100-ohm $\frac{1}{2}$ -watt resistors. The particular lay-out will, of course, control the self-inductance and capacity of the wiring, and a slight change in the APC's may be necessary.

Complete stability must be obtained without any neutralising being used as when the circuit is modified for "Super" modulation the valves do not work symmetrically and any form of neutralising will be rendered ineffective.

The Modifications

Having got the normal PA working absolutely satisfactorily the necessary alterations should be made to convert the circuit

Table of Values

Fig. 2. Push-pull 807 PA Circuit for Modification

- C1, C4 = 50 + 50 μ F
- C2, C3 = 0.001 μ F
- R1, R2 = 100 ohms
- APC = Anti-parasitic chokes (see text)
- RFC = RF choke 2 $\frac{1}{2}$ mH
- M1 = 0-10 mA
- M2, M3 = 0-100 mA
- V1, V2 = 807

to that of Fig. 3. To start with, condenser C6 should be omitted and the modulation transformer secondary impedance adjusted to work into an impedance of about 15,000 ohms. With a grid drive of 6mA, and using a dummy load in place of the aerial, the HT should be switched on and the anode tuning condenser rapidly tuned to resonance by watching for a dip in the reading of the milliammeter in the cathode of V1, which is the carrier valve. The coupling to the load should then be varied until V1 draws about 75 mA. It will be noticed that V2 takes very little current due to the fact that its screen is at earth potential.

If audio power is now supplied from the modulator, the cathode current of V1 will fall slightly, but that of V2 will increase considerably. It will be very convenient if the RF output can be checked on an oscilloscope. If sufficient audio is applied the modulation will expand the envelope satisfactorily but it is improbable that a perfect trapezoidal pattern will be obtained. The condenser C6 should now be connected in circuit and the variable resistor R5 adjusted for the best wave form.

If an oscilloscope is not available a phone monitor may be used. It should be borne in mind, however, that with this system, too much audio or an incorrect adjustment of R5 can cause serious overmodulation and distortion. For this reason an early check-up with an obliquing local amateur should be carried out.

Only a comparatively few watts of audio are required and a 6N7 valve run in Class-B with zero bias and about 275 volts HT would make a suitable final valve in the modulator. Although it is not intended to give a detailed

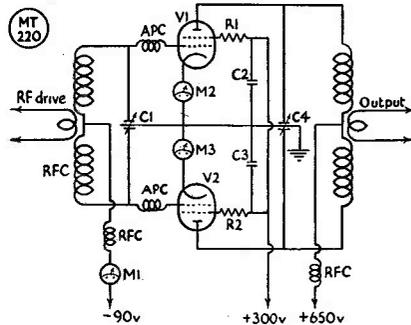


Fig. 2. Basic circuit to which Super Modulation can be applied by the modifications shown in Fig. 3. As explained in the article it is better to get this circuit working correctly before attempting the modifications—and the anti-parasitic chokes APC are essential.

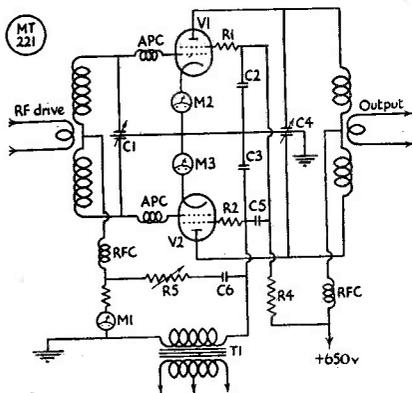


Fig. 3. The circuit as used by G6TA, derived from Fig. 2. All necessary values are given in the tables and results discussed in the text.

Table of Values

Fig. 3. Circuit modified for Super Modulation

C1, C4 =	As Fig. 2
C2, C3 =	As Fig. 2
C5 =	2 μ F
C6 =	0.1 μ F
R1, R2 =	As Fig. 2
R3 =	20,000 ohms
R4 =	50,000 ohms
R5 =	20,000 ohms variable
RFC =	As Fig. 2
APC =	see text
T1 =	Modulation transformer
M1, M2, M3 =	As Fig. 2
V1, V2 =	As Fig. 2

description of a possible modulator, the writer (using a transverse current microphone) employed a 6SJ7-6J5-6N7 line-up quite satisfactorily. For other microphones giving less output another stage of voltage amplification might be needed.

It will be realised that the load on the modulator over an audio cycle varies considerably and for this reason a fixed bleeder resistor, if placed across the modulation transformer secondary, will improve the speech quality slightly. This resistor should be 5-watt rating and values from 20,000 to 50,000 ohms may be tried. Altering this

resistor will of course change the impedance into which the modulation transformer "looks" and it will be necessary to vary the ratio of the latter.

As different makes of 807 valves differ somewhat in their characteristics a further slight improvement in the speech quality may be effected by altering the 50,000-ohm resistor in the screen of V1 a little. Incorporating a speech clipper in the modulator would enable a high level of modulation to be maintained without the risk of going "over the top."

Some Results

Having described this method of modulation a few facts on its performance will be of interest. It will be noticed that the quiescent carrier power is only about 50 watts and a few of the QRO fraternity may look askance. However, it must be remembered that the difference, at a distant receiver, between 50 watts and 100 watts is only half an S-point.

Consider now what happens when modulation is applied. When using that 100 watts to a normal pair of 807's anode modulated with say 50 watts of audio and assuming an RF efficiency of 75 per cent., the aerial power will increase from 75 to 112½ watts when 100 per cent. modulation is taking place. In fact, the power being used to convey intelligence is 37½ watts. With "Super Modulation" however, assuming an efficiency of only 60 per cent. for screen-plus-grid modulation, our RF power on full modulation will increase from 30 watts to 45 watts due to V1 and from zero to 35 watts due to V2. In other words, the difference between the fully modulated and the unmodulated output is as much as 50 watts—and that with only a few watts of audio. This "controlled carrier" effect will be found most effective in minimising heterodyne interference.

During the period September 1949 until March 1950, the writer carried out extensive tests with two transmitters. The circuit just described was used in one and a normal anode-plus-screen modulated arrangement in the other. Although the quiescent carrier of the second was just double that of the first it was found that the transmitter using "Super Modulation" was nearly always considered easier to read by the distant station.

R.A.F. AT THE RADIO EXHIBITION

One of the exhibitors at the recent Radio Show at Castle Bromwich was the Royal Air Force, the exhibit being designed to show how radio communication and radar are used to control and direct flying operations, in both the offensive and defensive roles. In appearing

at the Exhibition with demonstrations of this kind, the Service was acknowledging the great debt it owes to the scientists and technicians who have made—and are still making—such a large contribution to the fighting efficiency and technical superiority of the R.A.F.

Construction

The driver is built into the chassis and case of a dismantled Wilcox-Gay crystal multiplier—although any sturdy case lending itself to rigid construction would be suitable.

Existing components were used where possible, the tuning condenser and meter being retained *in situ*, but the valve holder and supports required inversion to bring the 807 anode above the chassis. Under chassis components are those associated with the screen and frequency-determining circuits, and those above the chassis with the output circuit. An exception is the plug-in coil, which is above the chassis, but no complications arose due to its position. Power is fed to the driver by the original Jones connector, which protrudes through the back of the case.

All wiring the vibration of which might cause frequency variation is carried out in 14 SWG tinned copper, other wiring being in 14/36 flexible PVC-covered wire.

Setting Up and Operating

At the writer's station, the VFO driver is used to excite an 807 PA to 25 watts input. This PA has a tuned grid circuit capacity coupled to the driver, permitting doubling in the PA grid circuit to obtain 3.5 mc drive from a 1.7 mc fundamental, and doubling to 14 mc or quadrupling to 28 mc from a 7.0 mc fundamental. To obtain drive at 7 mc it is usual to quadruple from 1.7 mc to keep the PA grid current to a reasonable figure.

The PA and driver are connected by 3 in. of large-diameter co-axial cable, a greater length seriously affecting the drive obtainable at 28 mc.

Results

In practice, no noticeable drift has been observed after a warm-up period of ten minutes. During this period the drift is some 300 cycles or less at 1.7 mc. No keying filters have been found necessary, the grid decoupling network being sufficient to reduce clicks to negligible proportions. The figures given in the table are representative of the drive obtained when operating an 807 PA with 80 volts fixed bias, 20,000-ohm grid resistor and choke, and 400 volts at the anode, the PA being unloaded.

To date, the only reports received, in more than five months' operation, have been T9 or T9x, with no sign of clicks or chirp on any band.

Conclusion

The construction and handling of the VFO have brought out three points not normally discussed in the considerations of VFO

VFO Freq. Band	PA Grid Circuit	Grid Current	Output Freq.
1.7 mc	Choke only	2.5 mA	1.7 mc
1.7 mc	3.5 mc	5 mA	3.5 mc
1.7 mc	7 mc	2 mA	7 mc
7 mc	Choke only	1.5 mA	7 mc
7 mc	14 mc	2.5 mA	14 mc
7 mc	28 mc	1 mA	28 mc

design. These are :

- (1) That a dial of greater reduction ratio than 4-to-1 is a handicap in contest work;
- (2) Buffers are not essential, providing that a power oscillator with good isolation is used, and
- (3) An accurately calibrated VFO is not necessary, since the terms of an amateur licence call for an accurate independent frequency check on all transmissions.

Consequently, providing reasonable care is taken in the design and construction, a single-valve driver with moderate power drain will cover the most rigid requirements of the majority of amateur transmitters.

★ ★ ★

COMMERCIAL TRANSMITTING EXHIBIT

One of the Stands at Castle Bromwich which attracted the attention of a number of interested amateur operators was that on which Standard Telephones and Cables, Ltd., were showing a complete 20 kW transmitter, typical of the equipment supplied on many foreign contracts. The design of this transmitter is such that it can be used either for straight sound broadcasting, high-power CW working or picture transmission. In fact, all that one would need to complete "the rig" would be a few rhombics firing in the right directions and a couple of decent receivers !

BIT OF HISTORY

The Derby and District Amateur Radio Society is fortunate in having on its present roll one of the founder members of the original Derby Wireless Club, which first came into being in 1911. On June 14 last, this member (Mr. A. T. Lee) gave the Society a most interesting talk on his experiences and the methods of those early days, describing among many other quaint devices that of having two buckets, one on the floor and the other let down into it by a cord over a pulley, to form a variable condenser. Members of the Club were readily accepted by the Services during the first World War, and amateur activities were commenced again in 1922. We acknowledge the July issues of *Experimental Radio Derby* as the source of these notes.

FEEDER DESIGN AND TUNING

Getting the RF Into the Aerial

A TRANSMITTING aerial system is erected for the purpose of radiating signals of the greatest possible strength. The directional properties of the various types of aerial are well known and the average amateur invariably studies their polar diagrams and chooses an arrangement which suits both the particular geographical layout of his garden and also gives him optimum radiation in certain directions which he requires. The result is the erection of a dipole, W8JK, parasitic beam, rhombic or one of the other well-known types. Whatever type is finally decided upon has to be fed with RF power from the transmitter and the purpose of this article is to give some practical advice on feeder line installation. The writer is particularly concerned with lines of the "600 ohm open-wire" type, but the points made about these apply almost equally to tuned feeders, the popular 300-ohm and 75-ohm ribbon feeders and, of course, feeders constructed from coaxial cable, although the latter have certain problems of their own, notably concerned with "balance."

A perfect feeder system would transmit all the available power from the transmitter to the aerial and would not in any way modify the radiation pattern of the aerial nor would it contribute any radiation itself. Feeder line radiation gives rise to strong local RF fields within the station, with consequent pick-up on house wiring and so on and this, in turn, can produce TVI and BCI to an alarming degree as well as wasting power which should be going into the aerial proper. A tremendous number of TV and BC interference complaints could have been avoided by careful feeder design.

Conductor Spacing

One point must be made quite clear at the outset. If exactly equal and opposite currents flow in the two conductors of a feeder line no radiation will occur provided that the spacing between the conductors is kept to a small fraction of a wavelength, e.g. 1/50th of a wavelength or less. In other words, the standing-wave ratio on the line is immaterial from the point of view of feeder radiation, but any unbalance between the two wires is of vital importance and cannot be tolerated. The

It is possible to get results of a kind with almost any sort of aerial conforming approximately to established designs, and generations of amateurs have been misled thereby. But much better results can be obtained by proper attention to the layout of the aerial and its feeder system, if the principles involved are thoroughly understood. This article deals with the subject of feeder design from the practical point of view.—
Editor.

whole aerial and feeder system should therefore be symmetrical throughout; Zepp feeds, Windoms and the like, whilst admittedly they can be balanced, are definitely prone to feeder radiation troubles; if at all possible, they should be avoided in preference to symmetrical systems. Dipole, parasitic beam, W8JK beam, rhombic, two half-waves in phase, lazy-H aeriels and similar systems can all be symmetrical and are therefore a first choice in amateur work. Incidentally, "End-ons," W3EDP's and all forms of "AOG" radiate from their point of connection to the transmitter and their use merely invites BCL and TVI complaints. In the interests of symmetry it is very important to bring the feeder away from an aerial at right angles for at least the first half wavelength; obviously, the feeder must lie in the radiation field of the aerial and currents will thus be induced in the feeder wires. These induced currents are only of no consequence if they are equal and opposite in the two conductors, and this can

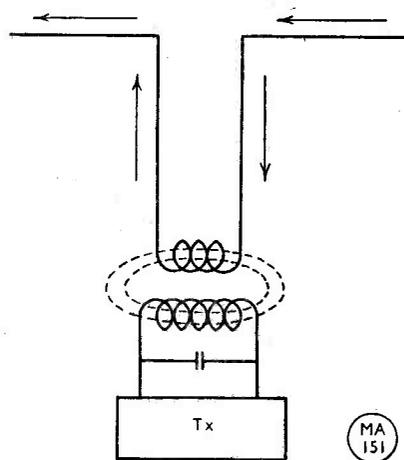


Fig. 1. Dipole and feeder system excited by inductive coupling. Instantaneous current distribution is as shown by the arrows. Note that equal and opposite currents appear in the feeder line.

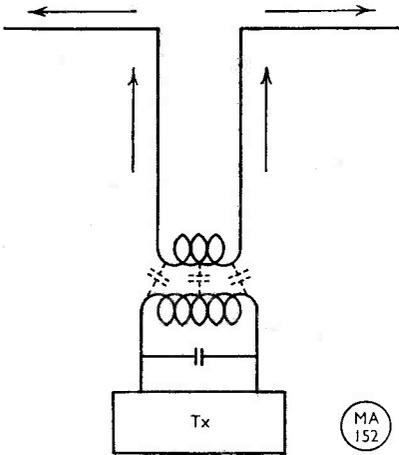


Fig. 2. The effect of stray capacity coupling from the transmitter; the dipole and its feeder are excited in a spurious mode, with in-phase currents appearing on the feeder line.

only be the case when the feeder leaves the centre of the aerial at right angles.

Practical Cases

Consider the simple case of Fig. 1, which shows a dipole and feeder inductively coupled to a transmitter, the current distribution being shown diagrammatically by the arrows. This is the theoretically correct arrangement, but it cannot be achieved in practice merely by inductively coupling the feeders to the transmitter tank circuit. What actually happens is shown in Fig. 2. Inevitably, capacitive coupling must exist between the tank coil and the coupling loop and it will be seen that in-phase currents occur on the feeder system and the whole length of the feeder plus aerial tends to operate as a Marconi against ground. In practice, of course, a combination of inductive and capacitive coupling exists and whilst the aerial itself is excited as a dipole there is considerable unbalance in the feeder currents with consequent feeder radiation. Obviously, if the coupling coil and the tank coil could be electrostatically screened from one another without upsetting the inductive coupling, the capacity coupling shown in Fig. 2 could be removed and the system would work correctly.

Fortunately, a device known as a Faraday Screen has just the required property—it forms an electrostatic shield without modifying the inductive field. Basically, a Faraday screen consists of an earthed "comb" which is placed between the coils to be coupled.

Naturally a complete metallic mesh cannot be used, otherwise inductive coupling would occur between the exciting coil and the screen itself and both inductive and capacitive fields would be shielded. An open metallic comb is a very inconvenient device to use for this purpose, but fortunately an effective Faraday screen in the form of a screened coupling loop can be constructed very simply as shown in Fig. 3; the diagram explains the construction of such a loop far more effectively than words. The length of unscreened inner conductor AB should be kept as short as possible and the earth connection at A should be stout and directly down to the transmitter chassis.

Coupling Arrangements

An aerial coupling unit should always be used to couple a transmitter to an aerial system—never be content with the lazy man's method of pushing a few turns of a link coil into the transmitter tank circuit. This is merely asking for capacity coupling with consequent in-phase feeder currents; even with screened coupling loops the method is undesirable. From the point of view of harmonic radiation it is almost the worst possible arrangement simply because the link

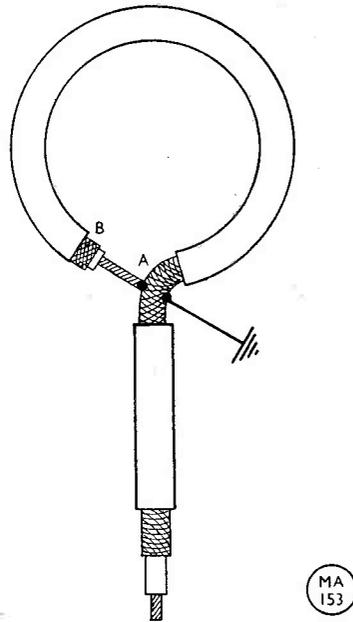


Fig. 3. Suitable screened coupling loop constructed from a length of coax, as described in the text.

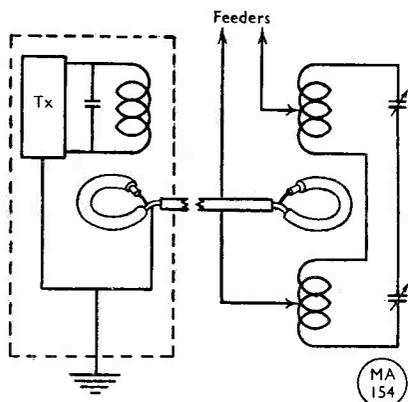


Fig. 4. Typical aerial tuning unit coupled to the transmitter using coax and two screened loops as Fig. 3.

coil-to-tank coil capacity offers a low impedance to the higher frequencies of the harmonics which may be present in the tank circuit and invites them to excite the aerial with in-phase currents and thus radiate. Fig. 4 shows a typical aerial tuning unit fed with a low impedance coaxial line via screened coupling loops. The length of the coaxial line is unimportant but multiples of a quarter-wave should be avoided, if possible, because a quarter wavelength of cable grounded at one end has a high impedance at the other end and thus the whole aerial running unit could be "live" to RF. This state of affairs could excite the system as a Marconi.

Incidentally, all link coupled stages within the transmitter itself should be coupled by means of screened pick-up loops earthed at one end, as in the case of the aerial tuner coupling. This has a very beneficial effect on harmonic reduction and general transmitter stability.

Cutting to Resonance

It is clear that if the total length of wire from one end of an aerial system to its centre, where the feeder is connected, and down the feeder to the aerial tuning unit happens to be a half-wave or a multiple of a half-wave, the whole system could be resonant in a manner for which it was not designed. Furthermore, the impedance at the aerial tuner end in this spurious mode of resonance would be high and any very small capacitative coupling from the transmitter or tuner would excite the spurious mode with the greatest of ease. One's immediate reaction would be to adjust the feeder length so that the total length of wire from one end of the aerial right down to the tuner terminals becomes an odd

multiple of one quarter wavelength. This would, of course, prevent a resonance at the spurious mode on the fundamental frequency but, unfortunately, an odd number of quarter waves on the fundamental is equal to a number of half waves on the second harmonic. This fact is inescapable and the only thing which can be done is to cut a compromise length of feeder in the hope that neither fundamental nor harmonics will excite the spurious mode. As a result of experiment it has been found that the best compromise total length from the end of the aerial back to the feeder connection and down the feeder to the aerial tuner is slightly less than an odd multiple of one-eighth wave on the fundamental. This is, of course, a compromise length but it does, in practice, take care of the possibility of high impedance points (at the spurious mode) appearing at the aerial tuner end of the feeders.

Having discussed briefly the steps which should always be taken to ensure correct functioning of an aerial feeder system, a note on a simple method of detecting the presence of spurious modes of resonance may be of interest.

Detecting Spurious Effects

The first indication that something is amiss is unbalanced current readings in the two legs of the feeder, but it is unwise to accept meter

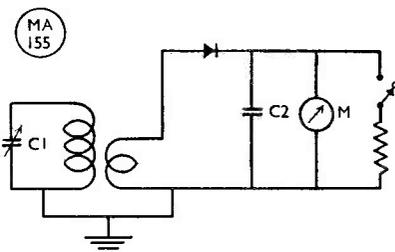


Fig. 5. A simple RF detector for investigation of current distribution along feeder and aerial systems, as discussed in the article. C1, C2 are .0001 μ F and M is 0.1 mA

readings taken at one place only in a feeder system. Circumstances may give rise to readings which appear to be satisfactory even though very bad out-of-balance is present. Always add in, temporarily, an extra one-eighth wave of feeder and take a second pair of readings—these may be quite revealing!

A small RF detector of the type shown in Fig. 5 (built in a screened box apart from the plug-in coil) is an extremely useful piece of test gear. A set of coils can be made to cover a wide band of frequencies and the presence of

fundamental and harmonics can be checked with ease. The switch and resistance across the meter serve to reduce the sensitivity when required and the rectifier X may be of the crystal diode type.

To test for in-phase feeder currents with this instrument, merely short circuit the aerial tuner coil and the end of the aerial feeders, thus removing all inductive coupling and leaving any capacitative coupling unaffected. Switch on the transmitter at low power and explore the feeders for fundamental and harmonic RF. Any readings obtained are

clearly due to aerial operation on a spurious mode and the steps outlined in this article should be put into effect; the improvement in general "handling" and the reduction of TVI and BCI, to say nothing of RF feedback and other objectionable effects within the station, will be really well worth while. There is something very satisfying in the knowledge that all the usable RF generated by the transmitter is really getting into the aerial system proper and not being squandered in power lines, local telephone lines or being shot skywards from radiating feeders.

STATION CONTROL

Switch-Relay System For Speedy Operation

By G. P. ANDERSON (G2QY)

DURING a recent station overhaul, considerable thought was given to operating control, and in this article the system adopted is outlined. It has proved very satisfactory, providing push-to-talk control, enabling break-in to be used, and including a means of adjusting the VFO frequency without interfering with reception or energising the transmitter, a signal from the VFO just strong enough to be identified being heard in the receiver. It also allows of remote operation of the transmitter.

Control is obtained by means of a 3-way switch of the type found on the surplus market. Alternatively a rotary switch could be used, but the writer finds the "key" type of switch more convenient for rapid operation.

The facilities provided may be summarised by indicating the conditions prevailing for each position of the switch:

Control Position	Receiver	VFO	Transmitter
1. Receive + VFO	On	On	Off
2. Receive ..	On	Off	Off
3. Transmit ..	Off	On	On

The control circuit also mutes the receiver when the transmitter is on, and disconnects the input to the modulator when the transmitter is off, to prevent the audio feedback that can occur if a loudspeaker is in use.

Examination of the diagram, Fig. 1, in conjunction with the following notes should make the method of operation clear. A/4 is a

We all have our own ideas about station control—which means, essentially, change-over switching. Since no two amateur stations are alike in detail, each problem is an individual one. But descriptions of control methods used by others are always helpful and frequently inspire improvements in one's own system.—Editor.

high resistance relay, obtainable on the surplus market; the original model had a resistance of 2,000 ohms, and was provided with several change-over contacts; the exact types required will depend upon the facilities to be catered for, or the circuit may be adapted to suit the relay available. In the circuit shown, three "make" and one "break" contact are used. The resistor R is required to limit the current flowing through the relay to such a value that it just closes firmly, and can conveniently be made variable until the correct value has been found. The relay is actuated from the 350 volt (or other comparatively low voltage) HT supply to the transmitter, and the power for energising the aerial change-over relay is obtained from the same source. (In the writer's case, the aerial relay is a surplus Type 77 modified by rewinding to operate from a low current, again through a suitable series resistor).

The control unit consists of the 3-way switch (2-pole 3-way) referred to above, and is fitted conveniently on the operating desk, in the microphone preamplifier unit.

General Description

In order to describe the working of the unit, it is proposed to consider the conditions for each position of the switch, taking the normal receive position first.

Receive.—Relay A not operated, contacts as shown in Fig. 1.

- (1) No HT (350 volts) on transmitter.
- (2) No 350 volts on aerial relay; aerial on receiver.
- (3) Input to modulator short-circuited via A.4.
- (4) VFO off.

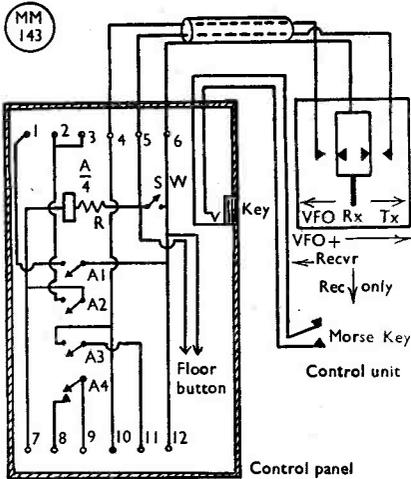


Fig. 1. General arrangement of the switching and control system devised by G2QY and discussed in the text. The key for the connections is given separately.

Receive + V.F.O.

(1) and (3) as above.

(4) VFO on, by earth on Tag 10 (via Tag 4 and control unit).

Transmit.—Relay A operated via earth on Tag 5 through control unit.

Contact A1: Mutes receiver by applying a negative voltage from an external source to the AVC line of the receiver.

Contact A2: Applies 350 volts HT to Transmitter (Tag 2). Applies 350 volts HT to Aerial Relay (Tag 3).

Contact A3: Connects VFO, by earth on Tag 10.

Contact A4: Short-circuit removed from Mod. input.

The control of the VFO may be seen by reference to Fig. 2, which shows the first amplifying valve of a VFO described recently in this *Magazine* (June 1950). The idea is equally applicable to other designs.

It should be observed here that since it is probable that the 350-volt supply that is broken to switch the transmitter will only supply the earlier stages, the PA and other stages should be biased to cut-off in the absence of drive, since the HT will be left on them when the control is in the "receive" positions.

Fig. 1 also shows connections for a Morse key; this may be run conveniently in the same multi-way cable as the control circuits, helping in keeping the wiring neat.

It will be seen that the conditions described under the "transmit" position of the control switch are achieved by applying a short-circuit across Tags 5 and 6 of the control panel.

Control Panel Connections

Fig. 1

- Tag 1 = Rx muting (see text)
- Tag 2 = 350-volt HT, Tx
- Tag 3 = 350-volt, Aerial c/o
- Tag 4 = As shown
- Tag 5 = As shown
- Tag 6 = As shown
- Tag 7 = 350-volt HT supply
- Tag 8 = Mod. input
- Tag 9 = Mod. input
- Tag 10 = VFO cathode } see
- Tag 11 = VFO earth } Fig. 2
- Tag 12 = Earth, HT—

Where it is desired to keep the hands free during operation of the transmitter, it is convenient to use a small foot-operated switch, connected as shown to Tags 5 and 6; a door bell-push is quite satisfactory for this purpose. The switch shown on the panel as SW is to provide local control for adjustments if the control unit is some distance from the transmitter.

Results

The control unit described has proved extremely useful in generally speeding up station operation, particularly in contests, and does enable easy push-to-talk operation. An experience with it may serve to illustrate this point. During a 'phone contact with a ZD4 during which we were much troubled by interference, the ZD4 announced the usual "QRX I'll check your channel". The writer flipped his transmitter on to offer to change frequency, whereupon the ZD4 came back and said the channel would soon be clear "as the station on there was going to QSY! QRX again". That was sorted out quickly enough and the contact continued on push-to-talk lines, dodging interference when necessary and obviating long repeats. Semi-BK on CW is equally simple, by switching to receive (or removing your foot from the floor button) between sentences.

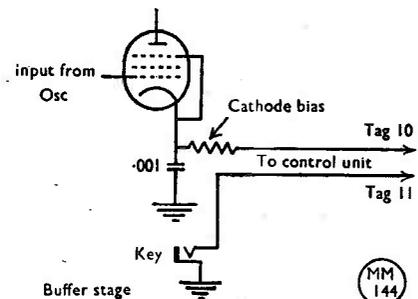


Fig. 2. The VFO connections in the control circuit.

IMPROVING SCREEN MODULATION

Further Variations on the Original Circuit

By H. J. BEACH (GM8BO)

IT will be appreciated by those who have conducted experiments with screen control that in order to maintain symmetry over the modulation cycle, the DC potential of the screen must be reduced to a lower value than would normally be used for anode modulated Class-C telephony.

The writer discussed this point in an article which appeared in the January 1950 issue of the *Short Wave Magazine*; and it was seen that owing to the necessary reduction of the screen voltage, the power output of the PA, for a given valve or valves, was somewhat reduced.

The following points, although rather in the nature of a recapitulation, are mentioned here in order to form a basis for the discussion to follow. When applying modulation to the screen grid, the audio cycle will be symmetrical only if the DC screen potential is reduced to such a value as to permit the positive half cycle excursion to be of the same amplitude as the negative half cycle.

A limitation of the positive audio peak is imposed by the anode potential; and it will be seen that if the ratio V_a/V_{g_2} is small, then the permissible amount of audio superimposed on the screen must also be small. From the foregoing we deduce that (a) Either the screen potential must be reduced to a value such that a reasonable depth of modulation, say, 70 per cent., may be applied symmetrically, with a consequent loss of RF output power, or (b) If the anode potential could be raised simultaneously with the application of each positive audio half cycle, then the DC screen potential could be raised in proportion, thus maintaining symmetry of the modulation cycle, and also, an equally important point, the RF output would be greater.

In order to fulfil the requirements laid down at (b), experiments have been carried out with a combination of screen and control grid modulation, the operation and circuitry of which is described in the following notes.

Theory of Operation

It was seen from the foregoing that if the anode potential of the PA was raised during

Screen control is a method whereby good modulation can be obtained with audio driving power much lower than is required for conventional high level systems. The author discusses further the practical application of SAM control and shows how efficiency can be increased by a simple modification.—Editor.

each positive audio half cycle applied to the screen, a modulation depth of a high order could be obtained, whilst maintaining complete symmetry.

If a small proportion of the modulation is applied to the PA control grid or grids, and arranged such that it is applied simultaneously with the modulation on the screen, but reversed in phase by 180 deg., then it will be seen that the control grid becomes negative at the instant that the screen becomes positive. The effect of making G1 negative is to reduce the current through the valve and the anode load; then, by Ohm's Law, the potential at the anode will approach that of the supply by an amount proportional to the change of I_a .

Since V_a has now been raised, a larger positive audio voltage excursion is permissible on the screen, which, if V_a is increased sufficiently, will enable us to reap the benefit in two directions: (a) The modulation cycle will remain symmetrical to a depth of the order of 95 per cent., and (b) The DC screen voltage can be raised, yielding a greater RF output from the PA than hitherto possible with modulation applied to the screen only.

The method employed by the writer to achieve this condition is shown in Fig. 1, but the following comments will assist in clarifying its operation.

The transmitter at GM8BO consists of a VFO, coupled by a low impedance link to a remotely situated buffer/doubler push-pull PA unit, with the audio gear below; the circuit of the latter appeared in the April 1950 issue of the *Short Wave Magazine*. The modulation applied to the control grids of the 807 PA is fed via the buffer/doubler valve, V1 of Fig. 1; it will be seen that V1 is anode modulated, which results in the RF drive to the control grids of the 807's rising and falling in sympathy; this will be recognised as the well-known low level method of modulation.

At first sight, it is perhaps not quite obvious how V1 derives an audio component from the primary of the modulation transformer, inasmuch as it is connected to the "cold" end of the winding from an audio point of view. Along any load in the anode circuit of a valve, whether it is resistive or reactive, there exists an AC potential gradient, which is a maximum at the anode. In normal practice

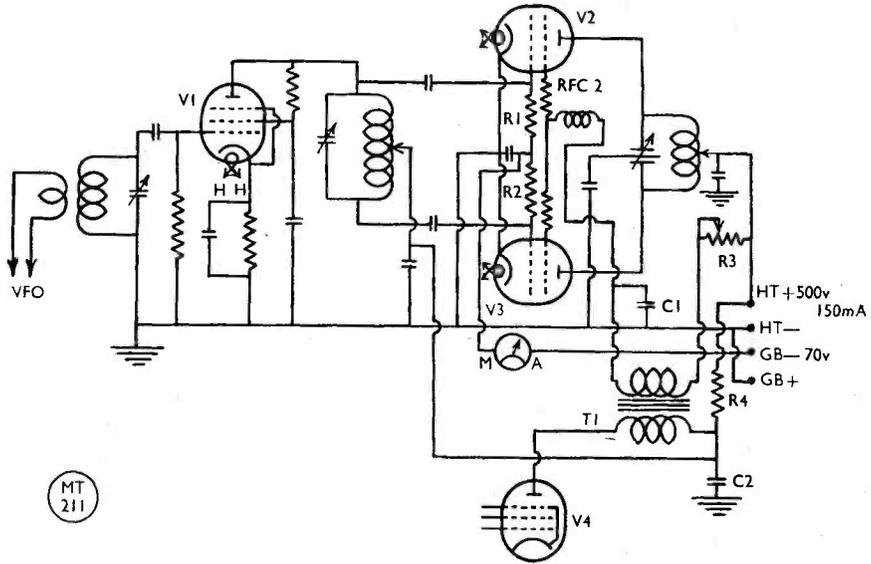


Fig. 1. The buffer-doubler PA circuit, showing connections for screen and control grid modulation of the push-pull 807's. The values given in the table are those directly affecting the operation of the system; otherwise, the circuit follows normal practice. (See also *Short Wave Magazine*, January and April, 1950.)

one usually ensures that the HT end of the load is entirely free from residual audio potentials, by filtering via a condenser having a low reactance to the speech frequencies.

The usual precautions mentioned above are employed in the writers' transmitter (see circuit), but even so, it was found by examination that a small residual audio component, of the order of a few volts only, became manifest at the HT end of the modulation transformer primary, and, in the particular set-up under discussion, was found just sufficient to provide the correct amount of control grid swing of the 807's.

Having regard to the correct phase relationship between the screen and control grid audio components, it will be seen from the circuit that the modulation transformer secondary will have either a zero or 180 deg. shift with respect to the primary, depending upon which way round it is connected. The out-of-phase condition, as mentioned earlier, is the one required; and this cannot be mistaken as the effect on the modulation is quite marked. Before commenting on the setting-up procedure for this type of modulation, further mention should be made of the method of modulating the buffer/doubler, with suggestions for alternative connections for varying the amount of audio applied. From Fig. 1 it will be seen that the 6V6 modulator (V4),

Table of Values

Fig. 1. Circuit for Screen and Control Grid Modulation

- C1 = 0.002 μ F mica, 1000-volt working
- C2 = 16 μ F electrolytic, 350-volt working
- R1, R2 = 25,000 ohms 1 watt
- R3 = 50,000 ohms wire wound potentiometer, 5 watts
- R4 = 5,000 ohms vitreous wire wound, 20 watts
- T1 = Woden UM.1 modulation transformer
- RFC1 = RF choke 2.5 mH
- V1 = EF50
- V2, V3 = 807
- V4 = 6V6

and the buffer/doubler (V1), are fed from a common HT supply, via the series dropper R4; now inasmuch as V1 derives its HT supply effectively from the anode load of V4, then obviously any fluctuations due to speech frequencies will serve to modulate the anode of V1. In the writer's transmitter, V1 is an EF50, but in the event of a different type of valve being used as the buffer (requiring a greater audio swing than can be derived from the HT end of the load) then provision can be made for this by tapping up the modulation transformer primary toward the anode, as shown in Fig. 2.

Setting-Up Procedure

If the PA derives its bias from grid leaks, and therefore varies with the drive, there is a

limit to the amount of drive which can be applied to the 807's.

It has been seen that 95 per cent. modulation with perfect symmetry can be obtained; but, as is the case with control grid modulation alone, over-driving results in downward modulation; and carried to excess, breaking of the carrier.

The system should preferably be set up by injecting a sinusoidal signal, of amplitude known to simulate the mean output level of the microphone, from an audio signal generator; and the screen potential and grid drive for the 807's adjusted for optimum conditions. With 450 volts on the anodes of the 807's, the writer has driven the PA up to 35 watts, whilst maintaining complete symmetry over the modulation cycle, at a depth of 95 per cent. Using V1 as a doubler has no adverse effect whatsoever on the operation of the system, the output on 28 mc being quite as good as on the fundamental.

Results

The control-and-screen grid system of modulation described above, although perhaps not entirely original, offers further scope for amateurs who wish to experiment along these lines; and, furthermore, is guaranteed to give excellent speech quality with full modulation, together with a great saving in power and equipment.

A PA efficiency of 70 per cent. has been realised with the writer's transmitter, and, having thoroughly tested the system over a period of many months, it has been decided that a 15- or 20-watt modulator is quite un-

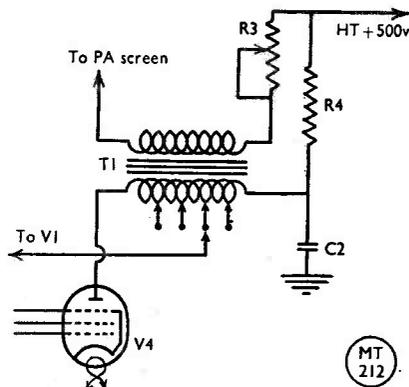


Fig. 2. The 6V6 modulator and modulation transformer as shown here illustrate the method of tapping the HT feed for V1 towards the anode of V4, thus providing a greater audio swing at the control grids of V2, V3.

necessary to effect solid contacts.

All W districts, VK, and Africa were worked during the 1949-50 winter season on 28 mc, and 14 mc stations are now continuing to give excellent reports.

Although the RF output of the PA does not differ much from that claimed for screen modulation alone, the advantage is in this: That the *average* modulation depth afforded by the system described is far greater; and it is this latter point which is so important in making one's transmission heard through heavy interference.

ONE STICK—BUT FOUR WIRES

Making the Most of Aerial Space

By H. TEE (G8UA)

WHEN it comes to aerials most amateurs are too conservative. They will spend months of hard work, not to mention large sums of hard-earned money on a QRO transmitter—and then are content with only one aerial. The usual reason given is that they have space for one mast only, so . . . only one aerial. Here at G8UA, there is but one 33-ft. dural

mast; nevertheless, four aerials are in use: A 67-ft. Windom, a 14 mc doublet, a 14 mc folded dipole, and a 28 mc dipole. How is it done with the one mast? Easy When you enter your favourite restaurant do you see only one overcoat per coat-rack? No. They hang the coats round the rack, don't they? Well, do the same with your aerials—hang them round your mast.

Fig. 1 shows the present lay-out at G8UA. The distance between the mast and the chimney is just over 100 ft., so two horizontals (the Windom and the 14 mc doublet) are slung in line in the usual manner. From the top of the mast are hung two verticals—the 14 mc and the 28 mc folded dipoles. Of course, they are not perfectly vertical (the vertical line is taken by the mast) but they are near enough to the vertical to have the characteristics of vertical aerials, *i.e.* low-angle radiation, and omni-directivity.

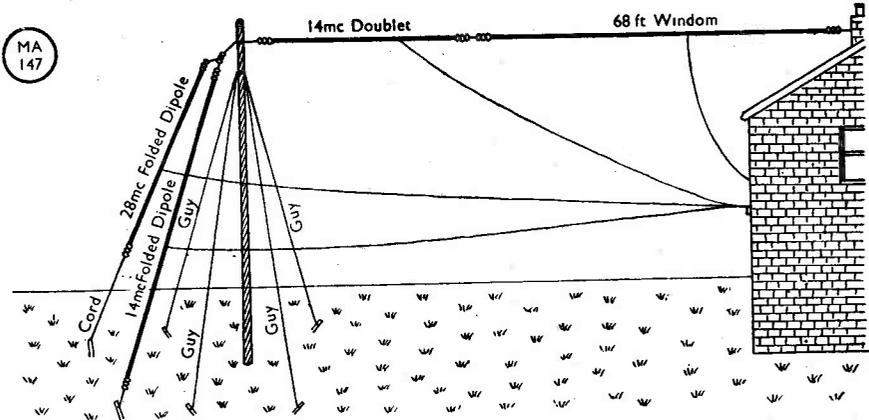


Fig. 1. Having noticed how coats can be hung round a hat-stand, G8UA decided to use his mast as a suspension for vertical aerials, somewhat in the manner shown in the sketch. His system consists actually of four separate aerials—two vertical, and two horizontal. Vertical or near-vertical aerials have the great advantage, on the HF bands, of almost omni-directional radiation.

The two horizontal aerials were first slung from one halyard at the front of the mast, to the house. From the second halyard, at the rear of the mast (Fig. 2), were suspended the two folded dipoles. These latter were anchored at the lower ends to short stakes in the ground—in the case of the 28 mc folded dipole a cord was used to secure the lower end of the aerial to the stake.

It is fully realised that many readers will not be so fortunate as to have a length of 100 ft. in the garden. But with 66 ft., or even less, a good selection of aerials is possible. For a 66 ft. length an all-wave aerial such as a Zepp or a "VS1AA" may be used, with vertical 14 and 28 mc half-waves. Or as an alternative if you do not have the space for 66 ft. in the hori-

zontal direction, there is the excellent all-band, non-directional tilted folded dipole as described by W1BRK in *QST* for June 1949; this aerial is claimed to be effective on all bands from 7 to 28 mc, and requires only 44 ft. in the horizontal direction.

An arrangement of vertical aerials in close proximity to a metal mast and metal guys will cause the theorist to purse his lips and shake a doubtful head. But if every amateur worried too much about theory our bands would be empty, except for the commercials.

And if you really want a *de luxe* lay-out, why not try some vertical beams hung from the halyards? A 28 mc beam with wire elements should present no difficulties, and even a 14 mc single-section W8JK with the ends bent inwards is quite feasible.

So if you feel your style is cramped with only one aerial, hang them round your mast. Some people collect stamps, coins, match-box covers, and even QSL cards. Why not collect aerials?

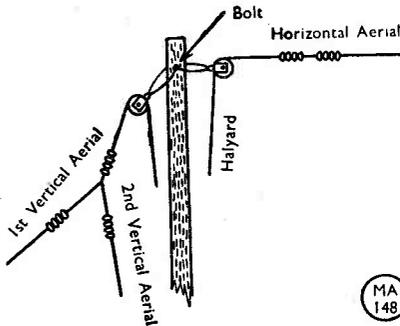


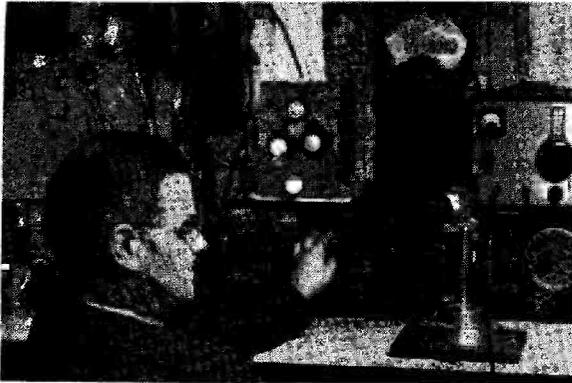
Fig. 2. General idea of the tie-up at the top of the mast, allowing independent lowering of the two sets of aerials.



RADIO AMATEUR COURSE

A course for those in the Sussex area within reach of Brighton wishing to take the Radio Amateurs' Examination has been arranged at the Preston Technical Institute, Preston Road, Brighton. Both radio theory up to R.A.E. standard and Morse instruction are given under the direction of F. R. Canning, A.M.I.E.E. (G6YJ), and the classes will run until next May. Detailed information can be obtained from the Principal at the address stated.

MA
148



DX COMMENTARY

CALLS HEARD, WORKED & QSL'd

ONCE again we have to report that DX conditions have been far from well. The patient shows little tendency to recover from his recent prolonged illness, and further bulletins will be issued from time to time.

All this, of course, was to be expected, and we are not yet in the trough of the long-term cycle which decides the state of our bands. We'll be worse before we're better!

One saving factor is this: That for the DX man it often happens that "bad" conditions are better than "good" ones. There is some DX there, and it is more easily heard simply because it is more conspicuous. The chief annoyance is still the prevalence of short-skip conditions, which continue to pack in the EA's, I's, OK's, UA's and Scandinavians at appalling strengths for most of the day.

When conditions are "good," however, we have the whole band full of loud DX signals, which makes anyone searching for new countries waste an awful lot of time listening to old ones. As things are now, he knows that most of the really weak signals are likely to be worth a good look.

As an example, let us quote the morning of September 15. Between 14100 and 14000 the band-population was something like this: Twenty or thirty strong Europeans; a similar number of weakish G's; VK9JC and three VR2's (2AS, 2BU and 2AA). Now and then, a ZL or VK, but not many. But had the band been full of ZL's and VK's in the manner usually associated with "good" condi-

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

tions, those VR2's would have been very difficult to spot. As it was, they stuck out like spikes.

So, if you want cheering up, just reflect on the fact that bad conditions may be better than good ones. Dig your way through those short-skippers and see what you can find—but don't, *please*, sit down and call CQ DX on top of a VR2 who is already doing the same thing for you. Two of them, on that morning, were neatly "paired" with G's calling CQ; both the VR2's were calling CQ Europe, too. (As we once remarked, if you can't hear 'em you can't work 'em).

DX on Twenty

The 14 mc band, as usual, bears the brunt of the attack, although Forty is attracting a little more attention at last. But Twenty is still the band for popularity, and here is the usually summary of the doings thereon.

G3BDQ (St. Leonards) worked VS1DY, ZS3R, ZS's, ZE's, VQ2 and 4, FF8JC and LP2J (Jan Mayen Island) in the course of a few days. G5FA (London, N.11) raised ZS3K for a new one, together with VS1's and 2's, ZE, KG6, YI and ZC4. (By the way, all the MD7's appear to have become ZC4's). On 14 mc phone G5FA raised EA6AR and IS1EHM.

G2BJY (West Bromwich) sums up the state of the band by saying that the Continent (of

Europe) has provided wonderful signals at all times of the day, but that there *have* been times when it was possible to work DX with 25 watts. He raised VU2LJ (1600), FQ8AC (2100) and CX6AD (2130), along with some ZS's and W's.

Reporting for the first time is G3GUM (Formby), but he is an old friend and has been a keen listener since 1926, or earlier, so we naturally don't dismiss him as a novice. In his first four weeks, using an 807, he has raised MI3, ZE, KH6, VP6, OY, YI, VS1, VU, VS7, LU and lots of VK's and ZL's 'GUM has found the band terribly unstable, with signals suddenly appearing from someone apparently about four doors away and turning out to be from the other side of the country.

G3ATU (Roker) can be depended upon to wrinkle something out, and this time he emerges with ZS8MK and MD9AA for new ones, but thinks Twenty has been in a "deplorable" state. Further up North, GM3CSM (Glasgow) adds all these for new ones: EA6, PJ5, LZ, VP8AK, GD, KR6, KG4, CR5AC, FY8, FP8, CR4 and YI. He has received his cards from VP7NM, EA6AF, PJ5CW, KG4AD, FP8AC and CR5AC, but would like to know if anyone has ever had a QSL from FQ8SN, F9QV/FC, AR8AB and 8MR, 3V8AG, 8AN and 8AJ, UP2AA or 2KBC, and EL3A? (We ourselves can confess to AR8AB, 3V8AN and UP2AA!) 'CSM also worked HL1US (a few hours before the invasion started), and SU1UU, who is ex-MS4UU and MI3UU. He will, by now, be EQ3UU, and asks us to mention it so that people won't be saying "there goes another phoney."

GW2CLP (Swansea) works the band only between 0600 and 0730 BST. During that period he found a new one (YK1AH) and was surprised to have heard ZS1BV come back to a CQ at 0645. And on August 23, with a dead band at 0630, the VK's suddenly piled in at 0700 and for 25 minutes the LF end was thick with them, after which it all went dead again. 'CLP also tells us that HZ1KE informed him that H.H. Prince Abdullah Feizal will shortly be on the air as HZ1AF. This is confirmed by the fact that some SWL's have reported hearing H.H. on the air from HZ1KE.

G8PL (London, N.W.3) has worked YA2B, who has all the marks of being a genuine YA (for a change!) He is said to be W2SN, working in Kabul, and says QSL to Box 25 in that city, or to W2SN in U.S.A. He has been heard quite a lot, so let us hope he turns out O.K. Others worked by 'PL were CM2PD, 6OK and 6NF, FM8AD, FQ8AC and TG9AD—all with the indoor aerial.

G2HKU (Sheerness) collected ZE3JL and 3JQ, VQ4KRL and ZC4XP. He has heard ZS7C several times, but no luck as yet.

G3ESY (Hereford) raised VP8AO, VP5AL, KH6, 3V, OX, ST and others including LX1JW who, we believe, is genuine and QSL's. Another unusual one was ZD4AB at 0700 GMT.

And that seems to be all the 14 mc news, the only other snippets worthy of mention being that HV1A is on both phone and CW and appears to be genuine; that 9S4AR and 9S4AX are supposed to be in the Saar, but we refuse to count them as a separate country; and that W's have been heard calling 6V6AA, whoever *he* may be.

Forty Livens Up

You could have knocked us out with a sledge-hammer when we heard VP8AK and VP8AP QRM-ing one another on 7 mc at 2300 one night, but since then it has become quite a commonplace event. From G3BDQ comes some useful gen: All the following are active on 7 mc, mostly from 2345 GMT onwards—VP8AJ (Port Lockroy), 8AQ (Port Stanley), 8AK (Deception Island), 8AL (Argentine Island) and 8AP (South Orkneys). They are very active and keep a good watch; we were again somewhat knocked out when we called a PY on about 7050 and had VP8AK come back to us instead!

G5FA heard VP8AP and worked LZ1KZ, KP4KD and CN8XD; G3ATU was lucky and worked the first-mentioned (with 5FA



The subject of this photograph is amateur station PZZ, of South Norwood, London, and was taken in 1912. The owner is now better known as G3HT of Edgware. At that time, his "non-synchronous rotary discharger," energised from a home-built transformer giving 3,000 volts across the secondary, was tuned to 450 metres. And somewhere in the photograph is that "Marconi-type sliding jigger." Those were the days!

FOUR BAND DX

Station	Total Score*	3-5 mc	7 mc	14 mc	28 mc	Total Countries	Power
W2QHH	437	72	70	193	102	196	35
G6QB	436	41	77	185	133	207	150
G3ATU	387	26	73	188	100	195	150
G2WW	348	21	52	170	105	181	150
G5FA	318	19	95	135	69	147	150
G3FNJ	280	24	46	118	92	145	150
G6BB	256	25	61	118	52	132	10/85
G8PW	241	15	60	108	58	122	25/100
G2BJY	234	4	24	102	104	142	25
ZBIAR	233	31	45	113	44	120	150
G3FGT	222	32	37	102	51	119	60/100
G8VG	217	24	57	110	26	124	60/75
G2YS	214	24	33	117	40	130	150
G3ABG	204	22	54	122	6	123	150
G6QX	197	16	29	106	46	120	30/150
G2FYT	191	5	31	124	31	131	150
G3FXB	188	21	48	88	31	101	25
G6TC	170	11	43	98	18	107	20/75
G2HKU	166	1	42	110	13	120	4/25
G2VJ	160	4	13	87	56	104	150
G6AT	159	21	46	91	1	97	100
GM3EST	147	20	23	102	2	106	150
G2DHV	144	22	20	91	11	94	25/60

★ Sum of the four Band Totals

sadly listening in the background!) But 'ATU describes Forty thus-wise: "Numerous rumba bands, tango orchestras, women singing loudly in Spanish, jamming stations and other rude noises. Heard, also, a few genuine amateur stations, all CW." Worked, VP8AP, TAIT (0001), VK6DJ (2315) and numerous ZL's (around 0800 GMT).

Further comment from G3ATU: "I give a quiet smile when I read the complaints of VS1's and VS6's about replying to G CQ's on Forty and being ignored. Boy, they should listen at *this end*." Another factor, of course, is that the average G on 40 is not DX conscious, and has his receiver gain set at a comfortable "local" level.

G2HKU's 25 watts have raised YV6AO CO3BU, ZL, W and VE. And he has heard

FM8AD and TI2PZ on the band. G8VG (Dartford) worked KZ5IP and had a call from LX1ZA, who says he is genuine (unlike the previous LX1ZA also worked by G8VG!) This one received his licence on September 2, and was using 0.75 watt. 'VG also complains about the state of the band, what with Broadcast (genuine) and further "Broadcast" (amateur spitch variety), service stations and all the rest.

Underneath this junk is some nice DX—sometimes. But don't *all start* getting on the band, for goodness' sake, There's plenty on it already. Now if we only had the use of that 21 mc band they promised us five years ago. . .

Top Band Topics

The big news on the Top Band is that TA3FAS is active on 1815 kc. G2PL (Wallington) worked him on both phone and CW on September 7. TA3FAS was RST 58/99; nice work from 'PL again, and doubtless many will follow in his footsteps ere long.

G8JC (Worcester) says that Top-Band activity is increasing in that part of the world, with G3NL, 3FQC, 3GHL, 3BGR and 8JC himself all doing their stuff. G2YS (Chester), after his victorious battle with G6AB in the year-long Marathon, has decided that he has gaps in the other bands that need filling, so he is forsaking the Top Band for a while, although he will be representing the local Club in the MCC next month.

G8NF (Huddersfield) has worked 58 countries and 14 countries up to date. We are no longer carrying a table showing these achievements, but keep tabs on your total scores, which may possibly be wanted later on!

The Month on Ten

Negative reports are the order of the day for 28 mc; may be it will have staged a comeback by the time you read this, but it seems doubtful whether the band is really going to function at all this season. A great pity if it doesn't—if only for the fact that all its normal traffic will be spread over the other bands, to the detriment of same!

G2BJY comments that by this time twelve months ago it was wide open; this year it has been full of short-skip and noise, mostly the latter. GM3CSM makes a plea for more CW on the band, which, of course, is logical enough if conditions are going to be bad. The average phone signal which one would pass over in good times as only being R3 and S4 would probably get a 569 report at least on CW.

Personally, we think that if only more people would *use* the CW end of the band (on CW, naturally!) some good QSO's would result. As it is, the band is full of stations

who give it one look and then don't even bother to send a tentative CQ.

Contests and All That

You will note that the Four-Band Table has an unfamiliar look about it this month. We have added an extra column representing the "Total Score," being the sum of the country totals on the four bands. This, of course, gives a measure of the all-round work of a station and really makes a good scoring criterion for a Four-Bander. Another figure that it would be interesting to know is the number of countries worked on *all four bands*; but before we know where we are we shall be having large country-totals on the Top Band and therefore shall have to consider a Five-Band Table.

By now the VK/ZL Contest has run half its course, but you still have time to get in and work them. Here are the details:

September 22, 1200 GMT to September 24, 1200 GMT—CW.
 September 29, 1200 GMT to October 1, 1200 GMT—Phone.
 October 6, 1200 GMT to October 8, 1200 GMT—CW.
 October 13, 1200 GMT to October 15, 1200 GMT—Phone.

This is closely followed by the CQ International DX Contest, as follows:

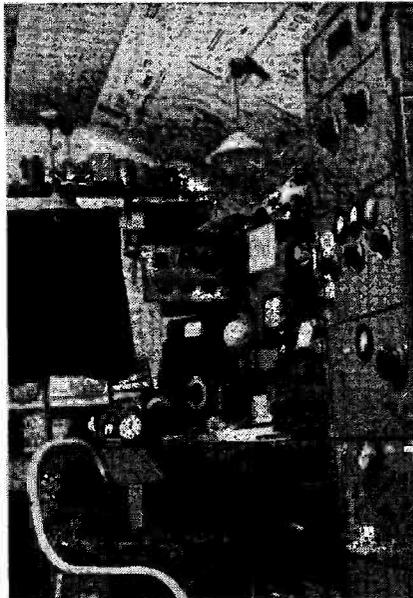
October 28, 0200 GMT to October 30, 0200 GMT—Phone.
 November 4, 0200 GMT to November 6, 0200 GMT—CW

The only other Contest that we wot of in the near future is our own "MCC" (Magazine Club Contest), which runs on the Top Band from November 11 until November 19 between the hours of 1700 and 2300 each day. If you want to work lots of Top Band stations, go up there and give some points to the Clubs, but *please don't call "CQ MCC"*—leave that to the stations taking part. If you do it, it misleads them into thinking that you are a Club station.

Country-Counting

We were surprised, but none the less gratified, to observe the venomous comments with which our suggested methods of scoring (as quoted last month) were received. With one accord the customers cry "For Heaven's Sake leave things alone!" The consensus of opinion is that the present system is full of faults and anomalies, but it is at least widely known and accepted. Furthermore (and this we note with a little gentle amusement) the change over to another scoring system would mean hasty searching through logs to find out just what one *had* worked, and the idea of this seems to be extraordinarily unpopular in some quarters!

So, with a sigh of relief, we announce that things stay as they are. But you *may* count



The recently rebuilt station of G2HKU, Sheerness, Kent, who copes with 230-volt DC mains. Operating mainly on 14 mc, results at the beginning of August were 119 countries in 35 Zones, and 42 States, using 25 watts into a dipole.

Newfoundland/Labrador (VO) as a separate country from Canada if you worked it before April, 1949. So stick back those "ones" that some of you deducted, and we, at any rate, will accept a VO contact, before the fusion, as a contact with a separate country.

Operating Habits

G6BB (London, S.W.2), commenting on The Old Timer's recent plea for some faster CW operating and cackle-cutting, suggests that "OM" saves a lot of fuss about names, is shorter, and more in keeping with the tradition of our hobby. Personally we agree, but the Christian-name habit has dug down pretty deep now; so much so that a DX station will often tell you his name before he even gives you an RST. 'BB also suggests that it is not discourteous or even curt to sign off with "73 CUL GN OM" instead of "Best wishes and best of luck and FB DX Archibald OB."

Further suggestion: That KN should be rigidly used to denote that a QSO is in progress (as, indeed, it should be) and that VA (or SK) should really mean an end to a QSO and not just the first attempt to get away, as it so often

ZONES WORKED LISTING

POST WAR

Station	Z	C	Station	Z	C
Phone and CW			Phone and CW		
G6ZO	WAZ	222	G3ABG	37	123
G6RH	WAZ	222	ZBIAR	37	120
G6QB	WAZ	207	G2GM	37	108
G2FSR	WAZ	196	G2FYT	36	131
G3ATU	WAZ	195	G2YS	36	130
G4CP	WAZ	195			
G3DO	WAZ	191	G2HKU	35	120
G8IG	WAZ	181	G6QX	35	120
G5YV	WAZ	172	4X4CJ	35	114
G2VD	WAZ	168	GM3EST	35	110
G3BI	WAZ	162	G6TC	35	107
G3AAM	WAZ	154			
G3YF	WAZ	152	G3FGT	34	119
G3AZ	WAZ	133	G6AT	34	97
G8IP	WAZ	132	G2DHV	34	94
G5BJ	WAZ	126			
G5VU	WAZ	124	GM3CVZ	32	100
G2WW	40	181	G2BBI	30	98
G3TK	40	162			
G3FNJ	40	145	Phone only		
G6BB	40	132	G3DO	37	154
G3BNE	40	128	G6WX	37	128
G5MR	40	125	G2WW	36	120
GM3CSM	39	158	G3COJ	35	115
G3DCU	39	148	G2VJ	33	104
G5FA	39	147	G2BBI	30	95
G3BDQ	39	138			
G3CVG	39	136			
G2BJY	38	142			
G3COJ	38	142			
G3AIM	38	130			
G8PW	38	122			

does now. For the record, here are G6BB's resolutions for the future :

- To call CQ (if ever) at not less than 15 w.p.m.
- Not to answer a slow CQ (unless it is from a new country !)
- To send singles on receipt of an R5 report.
- Not to give his name unless pressed.

Many will find fault with these ; but we have a feeling that if everybody began to observe them we should begin to see a bit of cleaning-up.

Miscellany

G3COJ (Hull) didn't find it difficult to work FP8 : he heard a station signing F?? and gave a half-hearted call of just that—F??—and (you've guessed it) back came FP8AC. Then FP8AF returned to a CQ. He was running 6 watts to a 3D6 and the receiver was a 3A5. 'COJ has an ingenious pair of aerials. For 7 mc he uses a "one-element bi-directional fixed beam," and for 14 mc he has an array stacked "O over O over 1," the bottom one being 45 ft. high. The top one (fortunately imaginary) requires a pair of 112-ft. masts (also imaginary). Work it out for yourselves, then.

G6AT (Hampton Hill) is the proud possessor of a card from 3A1A, and adds that he has recently received one from DL4FS with "3A1B" printed on it as an alternative call—so look out. He is also W9SRB, and the name Guy Kane, for the record.

GM3CSM also supports the plea for correct use of VA and KN, and would like still more QLM, QML, "10 u," "10 d" and the like. He suspects that a lot of the pile-ups are caused by stations calling DX which they haven't even heard, in the hope that they will hear it coming back to them. (We must admit to calling a DX station with a purely imaginary call-sign the other day, breaking off short and listening ; yes, there were five Europeans calling the non-existent station. An interesting experiment, this, and, we think, justified for the purposes of research !) Perhaps some of these guys endlessly calling CQ expect to hear a station of that name coming back to them ?

G3FXB (Hove) has realised his ambition of making his Century with 25 watts, and enjoyed a QSO with VP3YG, who was running only 5 watts. But 'FXB is now back-sliding to the extent of rebuilding for 100 watts of phone and CW with P/P 807's. Ah, well, it happens to all of us some time.

G3AMM (Scunthorpe) tells us that SU1MR is genuine (and others have said the same, his cards having arrived). 'AMM worked VK1RB (Macquarie) on 14 mc phone at 0700 one morning, and has now worked VK3ASD 100 times on 14 mc phone !

GC2CNC (Jersey) offers a slight excuse for fellows who don't answer CQ's, for he knows what local noise can be (machines and cars). Many others must be so situated, and are suspected of being rotten operators or of having punk receivers.

From Overseas

A new station on the air in Southern Rhodesia is ZE3JP, who is ex-G8JJ (see panel for his QTH). For the first time in his life he finds he has space for a rhombic or two, and his main gear is *en route*. At present he is on with 20 watts and a temporary dipole. Look out for ZE3JP after 1800 GMT on either 14050 or 14106 kc.

VU2JP (Munnar, Travancore) asks us to mention that he is in the Southern Zone of India (for those who are out after their EDXC). His frequencies are 14030 for CW and 14234 for phone, also occasionally on VFO. He will be on 14 and 28 mc from 1130 GMT onwards, and Sundays from 0800 GMT onwards.

Concerning the Top Band Transatlantic Tests, W1BB, who is doing the bulk of the organising on the other side, writes to say that the FCC has just announced the use of

the band 1750-1800 kc as a local "disaster communications service" band. This will not necessarily affect the tests, as it has not yet gone into effect. 'BB adds the rather sad news that W2WFZ (who was going to be on the Top Band with a *beam*) is now in Korea and it is hardly likely that he will be back for the 1951 Tests.

The former MD7DC is now home again (see panel for QTH) and will be on the air occasionally from G3CHR at Garats Hay Camp, near Loughborough. He says that if anyone is short of an MD7DC card he will be only too glad to oblige; just drop him a line at the QTH given.

ZL3MH (Harewood Airport) writes that ZK1BC and ZM6AK are just as keen to work G's as we are to raise them; but the main complication is that the W's are at a maximum in the Pacific at the sort of time when ZK1BC and ZM6AK are filtering through to Europe. The only solution, therefore, is to keep trying. Incidentally, ZL3OZ is ex-VK9NR and lives a scant 20 yards from ZL3MH.

Arising from the note in the August issue about personal contacts, an interesting letter from G2APN (VS1DK, Singapore) reveals that he has a special appointment that takes him continuously to all parts of the world; in the space of but one month, he was able to make personal QSO with a VU7, VU2, I1, VS6, KR6 and a JA2! G2APN admits that this was somewhat of an exceptional journey, but nevertheless, he has met amateurs from CE to PK1 on their own stamping grounds. Now temporarily on the air as VS1DK, during August he managed 144 contacts with 37 countries—he is on most evenings and anxious to work G's, especially in Surrey and Hampshire.

Piracy Corner

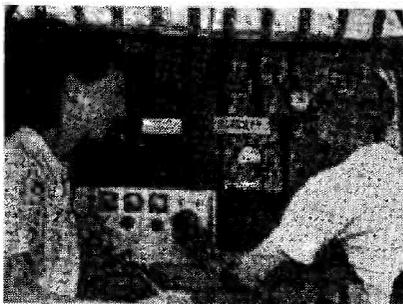
The notorious Brighton pirate (ex "SU2AF") has broken out again with the call ZA1B and the QTH of "Box 4, Tirana." He apparently succeeded in getting the W's in a panic, early in September. "Wanted" notices will shortly be pasted up for this man.

G2LX (Washingborough, Lincoln) has been in South Africa and Southern Rhodesia since 1947, but on return finds QSL's for G2LX coming in from all over the place. He hopes the pirate will leave the call alone now—the real owner will be using it.

G3BWM (Broadstairs) has been off the air for a long time, but has received SWL reports of activity. He, too, hopes to resume shortly—preferably without having to share his call with someone else.

Another Award!

Yet another one for the 'chasers is announced, this time from Cuba. A certificate



In the "Here and There" feature for November, 1949, we mentioned G3FSZ and G3DQC, the husband-and-wife station at High Wycombe, Bucks., both operators being licensed in their own right. Here they are at G3DQC/P, with G3FSZ on the left.

or diploma will be awarded to all amateurs who work the eight radio districts of Cuba, and a similar award will be available to SWL's. The eight QSL's must be sent to the QSL Bureau, Box 136, Santa Clara, Cuba. Any band, CW or Phone. This announcement

DX QTH's

- AR8PP Box 49, Beirut, Lebanon.
- HB9CM P. Gander, Vogelsang 67, Biel, Switzerland.
- HSIAS Pratin Thong Thap, Signal Corps, Bangkok, Siam.
- KW6AL c/o C.A.A., Wake Island.
- ex-MD7DC Cpl. J. Howse, Cadre, 10 W.T.S., Royal Sigs., Garats Hay Camp, Loughborough, Leics.
- PK5CC } Indonesian Airways, Bandjermasin,
- PK5JT } South Borneo.
- PK6LN Box 76, Macassar, Celebes.
- TF5TP T. Palsson, Hafnarstraeti 39, Akureyri.
- VP8AD Reuben Maclaren, Radio ZBH, South Georgia Island.
- VR2BG Cpl. D. C. Rummings, RNZAF, Suva, Fiji Is.
- VS1BJ Royal Sigs. Amateur Radio Club, Tyersall Camp, Singapore.
- VS1DE Maj. A. Eden (G3HAE), R.E. Officers' Mess, Gillman Barracks, Singapore.
- VS6BW J. E. Cowley (G3AQZ), Box 541, Hong Kong.
- VU7AH K. V. C. Rajan, Box 10, Tumkur, South India.
- YS1MS 57 Avenue Espana, San Salvador.
- ZE3JP Lt.-Col. C. R. Dickenson, Box 37, Causeway, Salisbury, S.R.
- ZS8MK Dr. R. L. Markham, Qachas Nek, Basutoland.

comes from Dr. Nilo S. Faria, President of the A.R.A.L.V.

Referring back to the WAE (Worked All Europe) Certificate mentioned last month, some of the keener Four-Band types have discovered that their scores already total well over the 100 mark, so they are eligible for the Certificate. We really must engage ourselves on the monumental work of compiling a master list of all the DX Certificates that it is possible to accumulate from the various parts of the world. One thing is certain: That the keener DX-chasers could prepare the whole of their

wall-area in the average shack by this means, without resorting to the use of QSL cards. This is just as well, because, in the course of accumulating the certificates, the QSL's would seldom be at home!

Deadline for next month is first post on October 10, and for the following issue, November 14. Address everything to DX Commentary, *Short Wave Magazine*, 53 Victoria Street, London, S.W.1. Until then, Good Hunting, BCNU and 73.

P.S. Conditions really do seem to be improving!

Portrait Gallery

G5BY

HILTON O'HEFFERNAN, of G5BY came on the air in 1925, and has been almost continuously active ever since. He is now best known for his VHF activities, which have brought his station a surprising number of "Firsts," but time was when he was a DX man and equally prominent by virtue of his achievements in that sphere.

G5BY was the first G to work Japan, Alaska and British Columbia, and the first British station to obtain a WAC Certificate for telephony—this, in 1930. Then, in 1935, he was the first G to work two-way telephony with the U.S.A. on 28 mc. These various laurels were gained from Croydon, Surrey, and it was from the same location that Hilton won seven consecutive ARRL DX Contests. Truly an outstanding record.

During the war he served in the Engineering Division of the BBC, and since then the station has been at Bolt Tail, South Devon. From this location another impressive array of records has been piled up, including the first 58 mc contacts with North Africa and the first and only 50 mc contacts with South Africa.

British DX records for 145 mc were set up within a few days of the opening of the band—successively 224, 236 and 287 miles; the European record of 379 miles (with PAØZQ) came shortly after. This was later extended to 470 miles.



The most recent successes have been on the 70 cm band, on which the world's record was established at 119 miles in March, 1950. This has since been increased to 132 miles and, in June, to 161 miles.

In case one should think that G5BY has no time for other activities than radio record-breaking, we hasten to add that he describes them as "Tennis, contract bridge, and driving a fast sports car"! And he has also contributed many useful technical articles to the pages of the *Short Wave Magazine*.

FIRST CLASS OPERATORS' CLUB

President :
GERALD MARCUSE, GZNM

Hon. Secretary :
Capt. A. M. H. FERGUS, G2ZC

Asst. Hon. Secretary :
J. E. CATT, G5PS

Towards the end of August, another milestone was passed in the history of the FOC when the 300th member was elected to the roll.

In terms of the entire amateur fraternity this is not a large figure—but in the sense that all members faithfully undertake, before election, to uphold the best traditions of Amateur Radio (apart from maintaining a high standard of operating), the figure is not insignificant. None of us is perfect, but it can be said that within the Club there is a serious effort to respect the undertaking given upon election.

Activity

As a Club, the FOC does not enter for contests and the like, since this need is covered by events organised for members by the Club itself. But month after month we see individual members well to the fore in published reports covering amateur activities in general.

In the September issue of *Short Wave Magazine*, G2YS emerges as winner of the Top Band Marathon. In the Four Band DX Table, the first three places are held by FOC members, with others placed 5th, 8th, 9th and 10th. In the Zones Worked List those in a row near the top are all FOC members, and others also feature in the Two-Metre Achievement Tables.

It is also of interest to note that G3FEX (FOC) was able to assist in a sea rescue operation recently, once again proving that Amateur Radio has a practical side of value to the community.

Club Contests

Full details of the FOC's own Marathon and DX Contests, for members only, were included in Circular Letter 37, a copy of which has been posted to every individual. Anyone who did not receive this C/L, or who has mislaid the particulars, may have information regarding these Contests on application to G2ZC.

The FOC Dinner

From bookings already made, we are assured of a representative gathering at the annual dinner, to be held in London on Saturday November 25 next. It is probable

that we shall have four of our PAØ members present in the overseas contingent. Those nearer home who intend to come are asked to make their reservations as early as possible, as we must have some idea of final numbers well before the date. While everyone knows it is usually possible to squeeze in the odd one at the last moment, when this "odd one" becomes an odd 17 who decide to appear without giving notice, it is a very different matter!

Circular Letters

G5PS is now producing a regular issue of the C/L, posted at the beginning of each month. Members on the rota system (as distinct from those who pay the small annual charge for their own individual copies) are earnestly requested to consult the new Membership List when forwarding the C/L—and to keep the List up to date by incorporating the changes of address notified in each C/L. Any member not receiving his copy of the C/L by the last week in the month is asked to notify G5PS.

Election Notice

In accordance with the Rules of the Club, the following new members are declared elected to the active membership list of the First Class Operators' Club:

E. F. Lawden, VQ3SS (Dar-es-Salaam); G. H. McKenzie, VE1PA (Lakeburn, N.B.); D. L. Wood, G3DSW (Romford); P. Wingrave, G3FGR (Amsbury); N. A. Gwynn Jones, G3BHE (Malvern); E. Jacobsson, SM5DZ (Linköping); J. G. Stonestreet, G2JN (Canterbury); J. D. Heys, G3BDQ (St. Leonards-on-Sea); and N. A. K. Albret, OZ6M (Soeborg).

All communications respecting the First Class Operators' Club should be addressed direct to Capt. A. M. H. Fergus, G2ZC, 89 West Street, Farnham, Surrey. (Tel: Farnham Surrey 6067.)

DX OPERATING MANUAL

Having sent a consignment of copies of the *DX Operating Manual* out to our Brazilian agents, we were interested to have a note from them that in the card block on p.27 (in which a WAC selection is shown) appears the QSL of the only Brazilian amateur who is blind—PY1AJ, who lost his sight in 1918, and is one of the oldest PY's in that country.

CHOICE OF CRYSTAL FREQUENCY IN VHF CONVERTERS

Elimination of Spurious Beats in the IF Range

By G. B. MOSS (G4NB)

THE opinion of leading VHF workers in this country appears to be as equally divided on the relative merits of crystal-controlled as opposed to self-excited oscillators in two-metre converters, as does that of their American counterparts upon the vexed question as to which form of polarisation they shall adopt in the design of their beam systems. Fortunately, in this country we have agreement on that. The writer, having deliberated the converter problem for some time, finally settled for the crystal-controlled type, using a Squier oscillator and dual-triode multiplier for the injection frequency

Now, it is not the present intention to add further fuel to the controversy as to which type is best, but to attempt to exonerate the crystal-controlled type from blame which can fairly be levelled at it under certain circumstances—namely, that of producing spurious beats from strong local signals. The writer is aware of at least two other cases in which this trouble is experienced.

The effect was tolerated until a DX contact was spoiled by spurious S5/6 signal wiping out the desired station. This, combined with the fact that more locals were coming on to two metres, and all improving their signals—better beams and so on, until spurious signals could be heard from at least five locals—convinced the writer that something had better be done, and quickly.

A quick check one evening using the 8 mc CO in the transmitter and the AR88 alone showed that the main receiver was beyond suspicion. The 8 mc signal was arranged to give an S9-plus signal and the image could only be detected with the BFO in

It was then noted that strong local stations produced spurious signals at various difference frequencies, and, not (as at first had been thought) by a fixed difference frequency. Stations low in frequency in the band produced spurious responses higher up, and in one case a signal well up in the band produced a lower frequency beat.

One of the disadvantages of using a crystal-controlled oscillator in a VHF converter is the appearance of unwanted beat notes in the tuned IF range. This article suggests how the trouble can be largely overcome by proper choice of fundamental crystal frequency.—Editor.

At this point it should be explained that an IF of 7.5 to 9.5 mc was in use as the means of covering 144 to 146 mc, and that the converter crystal had been carefully ground in order to measure received signals with reasonable accuracy. The injection frequency to the mixer was on the low side of the signal frequency and was therefore 136.5 mc.

Procedure

The next step was to log the frequencies of as many local stations as possible, with their spurious beats produced by the converter, and to record them for reference purposes.

Turning attention next to the crystal oscillator and its various harmonics, it becomes necessary to enumerate them to discover which may have any adverse effect. Remembering that the Squier oscillator was in use, and that it oscillates only at the third overtone of the fundamental crystal frequency, we have the harmonics shown in Table 1 all present in varying degrees in the injection coil, when the fundamental crystal frequency is 5687.5 kc.

TABLE 1

17.0625 mc
34.1250 mc
51.1875 mc
68.25 mc
85.3125 mc
102.375 mc
119.4375 mc
136.5 mc
153.5625 mc

Those harmonics still higher in frequency need not be considered in this instance.

Clearly, any oscillator harmonic which beats with a signal in the band 144-146 mc to produce a difference frequency falling in the chosen variable IF range is going to cause trouble. In the case under discussion the 153.5625 mc harmonic will do so, and in Table 3 are set out some local signal frequencies showing calculated spurious response frequencies appearing at the points shown on the main receiver.

After preparing this table it was found that the calculated spurious responses agreed very closely with those previously logged. Apparently, the relatively small amount of RF produced at 153 mc was sufficient injection

voltage to the mixer to produce in some cases unwanted signals of S5 to 6 !

Solution

It was decided that the most satisfactory solution lay in choosing a higher crystal frequency and so spacing the harmonics farther apart. Desiring to retain the same IF of approximately 8-10 mc, and so using an injection frequency of 136 mc, the next step is to 68 mc, then dividing by three twice from 22.66 mc to a fundamental of 7,555.5 kc. The harmonics are then as in Table 2.

TABLE 2

22-666 mc	45.333 mc
	68-0 mc
90-666 mc	113.333 mc
	136-0 mc
158-666 mc	

The 113 mc harmonic would produce an IF of approximately 31 mc, and the 158 mc harmonic an IF of about 14 mc with a signal frequency of 144 mc, and so should prove satisfactory.

It is possible that the 45 mc harmonic might cause TVI in the London area, but if the shielding is reasonably good and all power leads by-passed, it may not be troublesome. In any case no circuit is actually tuned to this frequency. The frequencies in bold type are those to which the various stages are tuned. The alternative is to use a crystal of the order of 5 or 6 mc with a different IF, working through the process as described until a frequency is found which clears the local TV channel and is free from spurious effects.

The Result

It was now necessary to prove whether the difficulty had been overcome and so a rapid search was made in the crystal box and one of 7,650 kc disclosed. This worked out to an inconvenient IF of approximately 6.4 to 8.4 mc, but was close enough to use without having to resort to major modifications. Surprisingly enough it oscillated correctly in the original circuit by merely adjusting the oscillator trimmer. The multiplier stages were then lined up with the aid of the station "gimmick." In a matter of minutes the locals were again S9 plus—albeit on a different IF. And there were *no spurious signals*.

The trouble expended in working out so many different crystal frequencies and various IF ranges, covering several large sheets of paper with figures in doing so, had another and totally unexpected reward—because the converter now has an improved signal-to-noise ratio. It is perceptibly quieter than before and

the reason can only be that the noise brought in at the other injection frequency has at last been eliminated.

Although the process of deciding on a crystal frequency may appear somewhat laborious, it is not so in practice once the fundamentals have been grasped, and after a few false starts it becomes simplicity itself—especially where a pet IF range is in mind. If the slight disadvantage of tuning backwards on the main receiver dial is no trouble to some, then, of course, an injection frequency on the high side of the signal may be used which widens the scope of choice still more.

It should not be overlooked that the Squier circuit does not oscillate at *exactly* three times the marked crystal frequency, unless the crystal used is specifically calibrated for over-tone use. This is because the mode of operation differs and the final injection frequency can be expected to be some 50 kc lower in frequency than calculated. This is of little consequence in such receivers as the S640, where a band set and a band spread dial are used, but in other receivers which have a main reading dial directly coupled to a logging dial, notably the AR88, it can prove annoying. If no crystal grinding can be contemplated the only solution is to obtain a crystal some 2 to 3 kc higher than estimated.

Alternative Solution

Another approach to the problem can be by inserting tuned traps in the crystal multiplier stages, and reducing the strength of the unwanted harmonic in the same manner as a transmitter is treated for TVI. Inserting a buffer amplifier between the mixer and multiplier output stages, and ensuring that the buffer and multipliers are running in Class-A, should

TABLE 3

SIGNAL FREQ. mc	IF or Main Receiver Readings, mc	
	True Response	Spurious Response
144.45 ..	144.45	153.5625
	136.5	144.45
144.54 ..	144.54	153.5625
	136.5	144.54
144.584 ..	144.584	153.5625
	136.5	144.584
145.2 ..	145.2	153.5625
	136.5	145.2
145.5 ..	145.5	153.5625
	136.5	145.5

Table showing how spurious beats were produced at varying differences in frequency between wanted and spurious signals.

assist materially. The classic test to determine if Class-A operation has been achieved still holds in this case—simply insert a meter in the HT feed to each anode in turn and reduce the drive from the oscillator until there is no change in anode current with drive on or off. The buffer amplifier will boost up the injection voltage to more than is necessary for a 6J6 mixer—and this offers an excellent opportunity to insert a variable control in the HT line to adjust for optimum signal-to-noise ratio whilst

listening to a weak signal.

All this is unquestionably more trouble than an SEO, but it is only straightforward practice and the dividends are undoubted. With an overtone crystal in the region of 40 mc designed to “go off” in the Squier circuit at the third overtone, our spurious beat troubles would be at an end.

In conclusion, the author would like to express his indebtedness to G3ABA for his helpful suggestions in this matter.

IF AMPLIFIER NOISE

As It Affects VHF Converter Performance

By W. J. CRAWLEY (G2IQ)

SOME misconceptions appear to exist with regard to the efficiency of the IF amplifier in the Two-Metre receiver. Most amateurs use a converter for Two, working into some kind of receiver at a lower frequency—usually between 5 and 15 mc. The writer has several times heard it said that a particular receiver is “noisy as an IF amplifier” and that better results would be obtained on Two if a quieter receiver (or IF amplifier) were used.

It has been explained in a previous article (*Short Wave Magazine*, June 1949) describing the method of measuring the Noise Factor of any receiver, that generally speaking by far the most important consideration determining the overall noise figure of the receiver is its first valve and the associated circuitry.

Bearing this in mind, let us consider the two-metre converter and receiver into which it feeds as one receiver; the whole then appears as a double conversion superhet with the signal frequency amplifiers and first detector embodied in the converter. The first

stage in the big receiver then becomes the first IF amplifying stage and its first valve may actually be three or four stages removed from the aerial.

It can be shown that in a receiver of this type, where there is appreciable gain from the initial stages and where the band-width is comparatively narrow, the contribution to overall receiver noise from third or fourth stages is negligible.

The overall Noise Factor of such a receiver as defined by Friis (“Noise Figures of Radio Receivers,” *Proc. Inst. Radio Eng.*, N.Y., 32, 1944) is

$$N_r = N_1 + \frac{N_2 - 1}{G_1} + \frac{N_3 - 1}{G_1 G_2} \dots \text{et seq.}$$

G_1 = Gain of first stage

G_2 = Gain of second stage

N_1 = Noise Power of first stage

It can be seen from this equation that only under conditions of very poor performance in the first stage does second-stage noise become troublesome, and that the chances of third-stage noise affecting overall receiver performance are very remote.

Do not worry unduly, then, about that receiver which when used alone is noisy. It may be with aerial on, as it was originally intended to be used. But if the converter that you put in front of it is anything like a converter, there should be enough gain prior to the main receiver to overcome the initial receiver noise.

CABLE EXHIBITION—SCIENCE MUSEUM

The laying of the first submarine cable across the Channel on August 28, 1850, was far more than a scientific achievement. It gave birth to international communication in the wider sense, and it ushered in a new era of social relations which, in the course of the century, have changed the face of civilisation. The Exhibition, now open at the Science Museum, South Kensington, London, S.W.7, not only commemorates the laying of this first cable by the pioneering brothers Brett, but also

illustrates the development of submarine cables and telegraph practice during the last 100 years. Many working exhibits are included and during certain hours visitors will be able to originate overseas cablegrams. The Exhibition, which is open daily from 10 a.m. to 6 p.m. (Sundays 2.30 p.m. to 6 p.m.) will continue until October 28 and admission is free. It should not be missed by those having any practical interest in telegraphy—so go and see it if you can.

VHF BANDS

By E. J. WILLIAMS, B.Sc. (G2XC)

*New EDX Record on Two—
November VHF Contest—
Survey of Activity and Conditions—
Steady Progress on Seventycems*

ONCE again a new 2-metre record must be recorded in these columns, and our heartiest congratulations go to G2BMZ (Torquay) and the two operators at DL4XS/3KE for their excellent 520-mile phone contact at S7 in the early hours of September 13. Conditions between DL and the South Coast of England had been good from at least 2200 BST, and possible earlier, as the London TV had been far above average strength throughout the evening in the Portsmouth area. An S9-plus-25 dB report was obtained even by G2XC when he worked the DL at 2240, over a distance of around 420 miles, but it was not until 0015 that the record was broken. DL4CK and DL4DD were understood to be up at the time but nothing was heard of them. The following evening DL4XS/3KE was worked by G6LK and others as early as 2030, but after 2230 conditions deteriorated rapidly as a trough of low pressure moved in from the West. It was gathered that the 2-metre band was open from DL into HB, I and OK. Amongst those known to have worked DL4XS were G3BNC, G3BHS, G3EBW, G3DIV/A, G4AU, G5WP and G6LK, while in a quick report from DL4XS/3KE, forwarded via G2BID, they state 19 G's as having been worked during the period September 12-13 on a frequency of 144.45 mc; minimum-maximum DX distances were 365-520 miles, with all signals S7 or better. For the DL's, the good patch reached as far North as Cambridge, but nothing was heard of Midlands stations. All this occurred when the weather was excellent, with a high pressure area over Northern Europe and the Channel.

A trough of low pressure which did not entirely wipe out DX occurred on the evening

of September 6, when with a strong gale blowing and pouring rain over the whole country G2CPL (Lowestoft) was a good readable signal on the South Coast and in Somerset. G2CPL has become a remarkably consistent signal in these areas and is still there when conditions have eliminated all other DX from East Anglia. On the evening in question two other signals were heard from the Cambridgeshire area, but both so weak as to be only occasionally readable. So perhaps it would be hardly accurate to call conditions good. However, at G2XC we were just a little surprised.

Other good evenings were August 22, when GW3EJM was the star station in the London and Southern parts of the country; September 9, between East Anglia and South Coast; and September 10 between Lancashire, Yorkshire and South Coast.

This Year's Contest

In this space appears the announcement covering our VHF Contest next month, which we very much hope will have the widespread support it has always enjoyed in previous years. The only factor on which none of us can prognosticate is Old Man Condx, but with a little support from him it should be another case of "good time had by all." Anyway, please be there to join in.

Schedules

There still appears to be some doubt in the minds of a number of our correspondents as to our "official" attitude towards schedules. May we therefore, *once again*, emphasize that the operators of regular schedules on the VHF bands are making a very worthwhile contribution to our general knowledge of these frequencies. They have proved beyond all doubt that certain paths of the order of 100 to 200 miles will provide good communication under almost all weather conditions. Similar tests proved the same thing on 5 metres. (For example, the well-known schedule between G5BY and G6FO during the pre-war years.) In addition, schedules provide a consistent source of signals for a number of observers and

THE SHORT WAVE MAGAZINE

Two-Metre Contest

RULES

- (1) The period of the Contest will be Saturday, November 11, 1200 GMT, to Sunday, November 12, 2359 GMT.
- (2) Points will be claimed for contacts from the home location only, using the 144-146 mc band. Contacts with Continental stations will count for points.
- (3) Exchange of RST, reference number and QTH will constitute a contact.
- (4) Contacts may be made on either Phone or CW, but no extra points will be allowed for Phone QSO's as distinct from CW contacts, and only one contact with any particular station may be claimed for points.
- (5) Every contestant will allot himself or herself a three-figure reference number, which will remain unchanged during the period of the Contest. This reference number will be sent before the RST or RS report, in the following manner: 342RST569, or 342R5S6 in the case of a Phone report. The reference number *must* be given with the report outwards in every counting QSO. Contacts with *non-contestants* who cannot give a reference number may be claimed, provided a report and QTH are received.
- (6) Scoring will be on the following basis:—

Up to 25 miles	1 point
25 to 50 miles	2 points
50 to 75 miles	3 points
75 to 100 miles	5 points
100 to 150 miles	8 points
150 to 200 miles	12 points
200 miles and over	20 points

plus five points for each additional ten miles of distance; proportions of these additional 10-mile distances will not count for points in proportion.

No bonus or multiplier points will be scored on a county basis.
- (7) Point-to-point distances will be taken from the Ordnance Survey "Ten-Mile" Map of Great Britain, or calculated from the National Grid References when these are known. In the case of foreign stations the distance will be calculated from the latitude and longitude of the station.
- (8) No Contest QSO may be pre-arranged, nor may contacts be passed on from one station to another. These practices will be grounds for disqualification.
- (9) The exchange of reference numbers *prior* to the Contest is forbidden, and will be reason for disqualification.
- (10) Results should be sent to reach E. J. Williams, G2XC, *Short Wave Magazine*, 53 Victoria Street, London, S.W.1, by November 20, 1950, latest, set out as follows:—
 - (a) Running log for period of Contest, showing only contacts claimed to count, with time of working, reference number in, RST in, RST out, QTH of station worked, distance and points claimed. The contestant's own reference number should be clearly marked at the top of each log sheet, and the total score at the end of the log.
 - (b) The National Grid Reference of the contestant's station, if known.
 - (c) A brief description of the equipment used, and notes on impressions and experiences of the Contest.
- (11) Entries from Continental stations are invited and, if sufficient are received, national winners for the various countries concerned will be determined.

Results of the Contest will be given in the January, 1951, issue of the *Short Wave Magazine* with a preliminary comment in the December, 1950, issue.

so enable a rapid check to be made on new converters, aerials and so on. The logs at these stations must contain a wealth of information which it is hoped will one day be tabulated and presented to the VHF world in general.

Schedule working does not appeal to everyone, however, nor is it the only way of gathering information on conditions. Moreover it is liable, unless watched carefully, to give a somewhat misleading idea of general propagation characteristics. Results obtained by some of the schedule operators would suggest that conditions are almost uniformly good; in fact, poor conditions would seem to be unknown. But because two particular stations can work over a 200-mile path, night after night, it does not necessarily mean that *any* two stations at the same distance can do likewise. Nor is it just a case of equipment or activity. *Location* plays a major part. There is plenty of activity in South Hampshire, yet it would appear to be extremely rare for these signals to be heard in the Midlands or North.

Therefore, while agreeing that the DX schedules are providing an invaluable service, your conductor would not be prepared to castigate operators who cannot or do not keep regular schedules, nor can he agree that the reliability of the better known schedules *proves* that other stations are inactive or not enthusiastic. The list of 97 stations put in this month by one operator, covering calls heard or worked during five weeks of August and September, should refute any suggestion of general inactivity or lack of interest!

Two Metre News

The news that GC2CNC and GC3FSN are preparing to become active on two metres will be welcomed everywhere. Both of them have SCR522 receivers and are building transmitters to the G5BY design. Their frequencies will be in Zones H and I.

On the mainland, G5QA (Exeter) continues to run his daily schedule with G4RX, but most of his available time has been occupied with the construction of a stacked array. He is on 145-62 mc every night at 1900 BST beaming North-East. G3GSE (Kingsbury) would like to hear less moaning about lack of activity. He considers that all of us should accept activity in the same way as we have to accept conditions. G2AOL (Oxford) found results so poor during the July 2 contest week-end that he decided to clear the decks and start again. The beam has been overhauled, and a new converter (built for his father) proved so good that a second one is now planned for his own use. It uses push-pull 6J6 RF, push-push 6J6 mixer and crystal-controlled local injection.

G3EHY (Banwell) considers conditions have been better than the weather would have suggested. The 100-mile schedule with

GW2ADZ has been easy going in the early evening, while the late-evening effort with G2CPL only failed eight times.

G8IL (Salisbury) sends some interesting reflections at the end of one year's operation on 144 mc. Among his points are that the newcomer to the band nearly always underrates reliable range, and is surprised at the strength and consistency of signals up to 40 miles or so. He has found local screening, up to a mile or so, a controlling factor but more distant high

TWO METRES	
COUNTIES WORKED SINCE SEPTEMBER 1, 1949	
Starting Figure, 14	
Worked	Station
43	G3BLP, G6NB
42	G2OI
39	G3EHY, G6XM
38	G3WW, G4HT
36	G2HCG
35	G3ABA, G3CGQ
34	G2XC, G3COJ, G3DUP, G8SB
33	G5UD
32	G3BK
31	G2AJ
30	G3BOB, G3VM
29	G2CIW, G2XS, GW2ADZ
28	G2CPL, G8IL, G8IP
26	G2FNW, G3BHS, G3FII, G8QC
24	G3FXG, G6VC
23	G3AVO/A, G3GSE
22	G6CI
21	G2NH, G5DS
20	G3GBO
19	G3EJL, G5PY, G6CB
17	G3ANB, G3BNC
16	G3CAZ, G5LI, G8VR, GW5SA
15	G2AOL, G4LX, G4MR, G4RK, G5MR, G5SK
14	G2HDZ, G3CWW, G3DCC

NOTE: These are the final figures for this table which was run for one year to August 31, 1950.

TWO-METRE ACTIVITY REPORT

G6PJ, Sheffield, Yorks.

HEARD: G2HCG, 2IQ, 2MA, 3EHY, 3FAN, 3FUM, 5CP, 5RW, 6NB, 6VX, 6XM.

G3AVO/A, Upwood, Hunts.

WORKED: G2AIO, 2ANT, 2IQ, 3AEP, 3COJ, 3DUP, 5RP, 5UD, 6XM.

HEARD: G2AVR, 2LQ, 2XC, 3EHY, 4CI, 4HT, 5UM, 6YP, 6WU. (August 26 to September 6.)

G4MR, Slough, Bucks. (NGR 41/988792.)

WORKED: G2AHP, 2BMI, 2BUJ, 2CIW, 2CPL, 2DD, 2DTO, 2FMF, 2KF, 2UJ, 2XC, 2XV, 2YC, 3AHB, 3BHS, 3BOB, 3BTP/P, 3BVA, 3CDJ, 3CFB, 3CKX, 3EEL, 3EHY, 3FSD, 3GBO, 3GSE, 4AP, 4HT, 5AS, 5DS, 5UF, 5YM, 6HG, 6LO/A, 6XM, 6YP, 8KZ, 8TB.

HEARD: F8GH 8MX, 8OD, G2IQ, 2UQ, 3ABH, 3AEX, 3AUS, 3BLP, 3CFR, 3COJ, 3CQG, 3DAH, 3DGN, 3DT, 3EBW, 3ENI, 3FD, 3FIH, 3FUM, 3GDR, 3GHI, 3GTH, 3MI, 3SM, 3VM, 3WW, 4AU, 4CI, 4DC, 4KD, 4MW, 5AA, 5IB, 5MA, 5PY, 5RP, 5TP, 5UD, 6AG, 6CP, 6HD, 6KB, 6LX, 6NR, 6SC, 6UH, 6VX, 6WU, 8IL, 8GX, 8QC. (August 2 to September 10.)

G4HT, Ealing, Middlesex.

WORKED: F8MX, G2ATK, 2AVR, 2CPL, 2IQ, 2XC, 2XV, 3ABA, 3AHT, 3AKU, 3CFR, 3COJ, 3DIV/A, 3DUP, 3ENS, 3VM, 4MW, 5RP, 5UD, 5UF, 6CW, 6LI, 6ZQ, GW2ADZ.

HEARD: F8GH, G6TF. (August 12 to September 12.)

G2AOL, Otford, Kent.

HEARD: F8AA, 8LO, 8MX, G2IQ, 2XC, 2FNNW, 3ABA, 3BNC, 3BMU, 3DUP, 3EHY, 3FAN, 4MW. (September 9 to 12.)

G3EHY, Banwell, Somerset.

WORKED: G2ADR, 2CIW, 2CPL, 2DD, 2HCG, 2HDZ, 2OI, 2XV, 3AHT, 3ATZ, 3BJQ, 3BOB, 3BVJ, 3CGE, 3CGQ, 3COJ, 3DA, 3DAH, 3DJQ, 3DUP, 3EJL, 3FIH, 3FMJ, 3GOP, 3MA, 3VM, 3WW, 3YH, 4CI, 4DC, 4GR, 4HT, 4MR, 4RK, 46BM, 5CP, 5DS, 5LI, 5MA/P, 6LK, 6LO/A, 6NB, 6WU, 6XM, 6ZQ, 8IL, 8ML, 8SB, GW2ADZ, 3EJM, 3KY. (August 14 to September 11.)

G3GSE, Kingsbury, Middlesex.

WORKED: F8GH, 8MX, G2CPL, 2DTO, 2XV, 3ABH, 3BVA, 3CKX, 3COJ, 3DGN, 3DIV/A, 3DT, 3EIV, 3GBO, 3MI, 4CI, 4MR, 5DS, 5NF, 5UF, 6HG, 6SC, 6VC, 6WU, 8TB, PAØPN.

HEARD: G2AOK/A, 2FNNW, 2IQ, 2XC, 3EHY, 8SY.

G3WW, Wimblington, Cambs.

WORKED: G2AHP, 2AIO, 2ANT, 2FNNW, 2FQP, 2HCG, 2HDZ, 2XV, 3ABA, 3AEP, 3AEX, 3AKU, 3AVO/A, 3BK, 3COJ, 3CXD, 3DUP, 3EBW, 3EHY, 3VM, 3GBU, 3GRD, 4CI, 4MW, 5BM, 5DS, 5NF, 5RW, 5SA, 5UD, 6VX, 6XM, 6YP, 8DM/A, 8KZ, 8SY, 8VR. (August 14 to September 10.)

G2JU, West Wittering, Sussex.

WORKED: G2MC, 3ARL, 3BHS, 3BNC, 3CFR, 3FAN, 5BY, 5UF, 8LY.

HEARD: G2BMZ, 3AWY, 5MR, 6LK, 6XM. (July 8 to August 27.)

G3FIH, Radstock, Somerset.

WORKED: G3BLP, 3CGE, 3EHY, 3EJL, 3FMO, 4OZ, 5MA, 5UF, 6XM.

HEARD: G2CIW, 2XC, 3BOB, 3GBO, 4AU, 4CI, 4HT, 4KD, 4RX, 5LI, 5RB, 8DM/A, 8IL, GW3EJM. (August 17 to September 12.)

G3AKU, St. Ives, Hunts. (NGR 52/316715.)

WORKED: G2AIO, 2ANT, 2FQP, 2HCG, 2IQ, 2MA, 3AEP, 3AVO/A, 3CGQ, 3COJ, 3DMU, 3DUP, 3EHY, 3WW, 4CI, 4HT, 4MW, 5IG, 5MA, 5UD, 5UM, 6LL, 6VX, 6XM, 6YP, 8SY.

HEARD: G2OI, 3AHT, 3GBO, 5DS, 5LK, 5UF, 6LX, 8GL, 8MZ.

SEVENTY-CENTIMETRE ACTIVITY REPORT

G4CG, Wimbledon, Surrey.

WORKED: G2CIW, 2FKZ, 2FKZ/P, 2RD, 2OY, 2WS/A, 3ANA, 3FP, 3FLL/A, 5DT, 5TP.

HEARD: G2DD, 3FNL.

G2RD, Wallington, Surrey.

WORKED: G2CIW, 2FKZ, 3FP, 4CG, 5TP.

G2CIW, Romford, Essex.

WORKED: G2FKZ, 2FKZ/P, 2RD, 3FP, 3FNL, 3EIV, 3FZL/A, 4CG.

G2QY, Pinner, Middlesex.

WORKED: G2DD, 2FKZ, 3FP, 3FZL, 4CG, 5PY, 8GX.

HEARD: G4HT (harmonic.)

ground has little or no effect. In locally unscreened directions stations up to 200 miles or so are remarkably reliable. The Zone Plan he considers to be about as good a scheme as could be devised, but feels that there is much room for improved operating technique. Lastly, he has found the year to be full of interest from both operating and experimental aspects and a pleasant change from the hectic DX bands. Among his more recent DX achievements have been G3COJ and F8GH, both at 200 miles or more. G8IL also had the pleasure of giving F9RL (Fecamp) his first 2-metre QSO.

G4MR (Slough) wishes to obtain a crystal between 8037 and 8047 kc and can offer an 8080 kc rock in exchange ($\frac{1}{2}$ -in. spacing).

G3GHI (Purley) has a 12-ele. beam, while the receiver consists of 9003 RF, 9003 mixer and 9002 osc. into a BC624 modified to a double superhet; 25 watts to an 832 completes the line-up. G5LI (Hamsstead) has been hearing G3EHY, G5UF and G8IL consistently, and hopes to have a 4-ele. Yagi aloft soon to replace the dipole. At G2AHP (Perivale) the new 12-element array continues to perform well. Several new stations have been heard, and a number of DX calls have been logged during the quieter early evening period. G2HDZ (Pinner) has 12 to 15 watts to an SCR522 Tx, and a modified R1132 receiver, the modifications consisting of three 6J6 stages at the front end, and adjusted IF stages to give adequate selectivity; he regrets the present tendency to

intolerance of other people's opinions !

G6CB (Wimbledon) apparently dissatisfied with his own results has been along to G3BLP to see how it is done. He says the recipe is "400 feet or so high, plus 16 elements, plus triple conversion, plus snappy gadgets." G3GBO (Denham) offers to send a second QSL to anyone who failed to receive the first ; he has just attained VHFCC. He has a schedule with G3EBW (Hurst Green) every evening at 2300, and recently worked F8MX for his first Frenchman.

G2JU (West Wittering) is active week-ends only using phone and CW. The aerial is in the loft but a contact with G5BY suggests it is not inefficient. A new converter employs two GG triodes, series injection to the mixer, and crystal-control. G3ENI (Abingdon) using 20 watts to an 832, a Cubical Quad and a 2-ele. Yagi, would appreciate contacts ; his receiver is a 6J6 mixer-osc into BC348.

G5JU (Birmingham) says conditions have been extraordinarily bad with him during the past few months. He listens most evenings but rarely hears anything except G3BLP and G3EHY. G3AEP (Whittlesey), just in Cambridgeshire, is running 15 watts to the usual 832 with a 5-element Yagi ; he is having his crystal reground into Zone G and will then be regularly active. G3WW (Wimblington) though busy doing much rebuilding has been active almost daily on the band, and found conditions good at times to the South and West. A midday contact on two metres was made with GW5SA at 175 miles as a result of a test arranged on 3.7 mc. In all, 22 counties have been worked in less than a month—which makes one wonder if activity is really as poor as some people imagine. G3AVO/A (Upwood) reports his cascade type converter is now giving satisfaction ; the outstanding signals with him are G6VX from London area, and G6XM on phone. G3AKU (St. Ives) has his aerial up at 30 ft., which means just 40 ft. a.s.l. His G2IQ type converter keeps the noise level down effectively ; he says he gets 90 per cent. QSL's from Russians, but only 20 per cent. from 2-metre G's ! Tips on TVI-proofing the SCR522 would be appreciated.

G3VM (Norwich) finds late evening working an impossibility, but sees no way to persuade others to come on earlier. No good periods were experienced in Norwich during the month in spite of spending more than the usual amount of time on the band. Tests to the North during the Aurora display in August produced nothing exciting.

G3COJ (Hull) points out that a number of calls mentioned in the "Two Metre Activity Report" last month were not included in the "Activity by Counties" table. The answer most likely is that we did not know what counties they were in ! This happens every

TWO METRES	
ALL TIME COUNTIES WORKED LIST	
Starting Figure, 14	
From Fixed QTH only	
Worked	Station
48	G2OI (149)
46	G3BLP (317)
43	G3EHY (192), G5WP, G6NB
42	G3COJ (129)
41	G2NH (283), G5MA
40	G3ABA (151)
39	G6XM (208)
38	G2IQ, G3WW, G4HT (284), G5BY
36	G2XC, G3CGQ, G3CXD
35	G4LU, GW2ADZ
34	G3VM, G4AU (201), G4DC, G5BM, G8SB
33	G3DMU (115), G5JU
32	G3BK, G8WV
31	G2CPL (168), G2XS (136)
30	G2CIW (221), G6LK, G8SM (172)
29	G5NF, G8IP (207)
28	G6VC, G8IL (131)
27	G3DAH, G8QY
26	{ G2ADR, G2FNW, G3BW, G3BH8, G3FLI, G6UH (212), G8QC (126)
25	G6WT
24	G3FXG, G8KL
23	G2NM, G3AVO/A, G3BOB G3EJL, G3GSE (153)
22	G4RK, G6CI
21	G2FME, G5DS
20	G3GBO (152), G8KZ
19	G5SK, G5PY, G6CB
18	G3AKU, GM3OL
17	G3ANB, GM3BDA
16	G4LX, G5LI (121), G5MR, GW5SA
15	G2ANT, G3CWW, G4RX G4MR, G8VR
14	G2AHP (125), G2HDZ, G3CAZ, G4NB

NOTE : Figures in brackets after call are number of different stations worked; starting figure, 100.

TWO-METRE ACTIVITY BY ZONES AND COUNTIES

(Based on reports for current issue only)

Zone A (144.0 to 144.2 mc)	Huntingdonshire : G2FQP, G3AKU, G3AVO/A
<i>Nil</i>	Norfolk : G3VM, G5UD
Zone C (144.2 to 144.4 mc)	Northamptonshire : G2HCG, G3DUP
Durham : G2FO, G8AO	Suffolk : G2APL, G4PV, G5MI
Lancashire : G2OI, G3DA, G6LC, G8SB	
Northumberland : G3CYY, G4LX	Zone H (145.25 to 145.5 mc)
Yorkshire : G2ADR, G2IQ, G2MA, G3ALY, G3COJ, G3CUJ, G5GX, G6PJ, G6TF, G8IC, G8SJ	Berkshire : G5RP, G6OH, G8DM/A
	Dorset : G3ABH, G4OZ, G5UF
Zone D (145.8 to 146 mc)	Gloucestershire : G2AOK/A, G3MA, G3YH, G5BM, G6ZQ, G8ML
<i>Nil</i>	Hampshire : G2XC, G3ARL, G3AWY, G3BHS, G3BNC, G3CFR, G3CGE, G3DEP, G3EJL, G3FAN, G3GOP, G6XM
Zone E (144.4 to 144.65 mc)	Oxfordshire : G3ENI, G5TP
Cheshire : G3ATZ, G3FMI, G5CP	Wiltshire : G2BUJ, G8IL
Derbyshire : G5RW	
Leicestershire : G2FNW, G2RI, G3ENS	Zone I (145.5 to 145.65 mc)
Lincolnshire : G3DMU, G4OF, G5BD, G6LI	Devon : G2BMZ, G5BY, G5OA
Nottinghamshire : G3DGG, G3BPD, G6CW	Somerset : G3EHY, G3FIH, G3FMO, G4RX
Rutland : G3ALC	
Staffordshire : G3CXD	Zone J (144.85 to 145.25 mc)
Warwickshire : G2ATK, G3ABA, G3BJQ, G3BVJ, G4RK, G5JU, G5PP, G5SK, G6CI	Essex : G2CIW, G3ANB, G3FIJ
	Kent : G2AOL, G2AVR, G2KF, G2UJ, G3BOB, G3BVA, G3CAZ, G3DAH, G6VC, G6VX
Zone F (145.65 to 145.8 mc)	London County : G2DTO, G3EIW, G3FXG, G4AU, G4DC, G5LI, G5PY, G6WU
Glamorganshire : GW3EJM, GW5SA	Middlesex : G2AHP, G2DD, G2HDZ, G2YC, G3CKX, G3DGN, G3GSE, G4HT, G4KD, G6UH
Monmouthshire : G4GR	Surrey : G2ANT, G2MV, G3BLP, G3GHI, G4CG, G4CI, G5DS, G5LK, G5MA, G5NF, G6CB, G6LK, G6LX, G6SC
Montgomeryshire : GW2ADZ	Sussex : G2JU, G2MC, G3DIV/A, G3EBW, G5RO
Shropshire : G3AHT	
	Note : Frequency areas given above are in accordance with the Two-Metre Zone Plan, as accepted by the majority of VHF operators. A few stations are not conforming.
Zone G (144.65 to 144.85 mc)	
Bedfordshire : G3DCQ	
Buckinghamshire : G3GBO, G4MR, G6NB, G8QC	
Cambridgeshire : G2AIQ, G2XV, G3AEP, G3WW, G4MW, G5IG, G8SY	
Hertfordshire : G3GDR, G5UM, G6LL	

month ; usually there are a dozen or more calls reported as heard on the band that have to be omitted as no indication is given of QTH, and they are not in the latest Call Book.

G3COJ is now using a 15-element beam, one reflector having fallen off. G2OI (Eccles) describes conditions as very poor during the last month, only the more reliable Southern stations being heard or worked. Congratulations to him, however, on taking first place in the "All-time" Counties Worked list ; this is a very fine achievement. G6PJ (Sheffield) is using a 6J6 type converter and a 5-element Yagi. He is active after TV and gives G3EHY, G6NB and G6VX as outstanding signals with him.

Seventycems

So far as is known no seventy-centimetre records were achieved during the good Continental opening on 2 metres on September 12/13, although information was obtained from DL4XS/3KE that they would be active on 70 cm in about a month's time. Other news from Europe is that PAØLU (434), PAØZQ (434.9) and PAØPN (434.7) are transmitting daily for five minutes at 2000 and 2100 GMT and subsequently listen for replies ; they are beamed on G. (This news was kindly sent on by G3ANB.) F8OL is also operating a schedule beamed on the London area ; he calls on 435 mc nightly at 1930 GMT until 1940 and

then listens for ten minutes. A test on conditions is made at 1915 on 145 mc when a five-minute call is put out, followed by five minutes' listening on that band. Horizontal polarisation is in use.

G2QY (Pinner) transmits nightly at 2215 BST (or GMT when in force) beaming West or South-West (435-13). During the tests on August 20 he was portable at Princes Risborough and worked G8QY/P near Coventry at 60.8 miles; he is anxious for schedules. G4CG (Wimbledon) has a CV53 tripler driven from his 144 mc Tx and in turn driving a CV53 PA with an input of 7 watts. The receiver is a modified G3MY circuit; a 10-element Yagi is used as aerial, and is fed with 80-ohm coax in conjunction with a detuning sleeve at the aerial end. Activity has been fair during the month.

G2CIW (Romford) has had 24 two-way contacts on 70 cm in the last four weeks with 8 different stations; he asks where are all these stations who keep promising to be on in a week or so, and wants a list of really active stations. The G2CIW receiver has been vastly improved by replacing the Lecher lines with a coaxial line. G6LK (Cranleigh) is another who has made noticeable improvements to the receiver. Cavity tuning is being used and oscillator injection is now at 408 mc. He comments that best results are being obtained with a much higher crystal current than when harmonic injection was employed, and that these results are vastly superior to those previously obtained.

G5PY (Clapham Park) has had several new contacts including G2DD and G2QY. His R1359 is performing well and a R1294 is to be tried as a comparison. G2RD (Wallington) is on 435.5 mc using a CV53 doubler as the final stage. Two receivers in use are R1294 and ASB8; he is active Wednesday evenings and Sunday mornings, and would welcome schedules for any evening.

G3DSV (Highams Park) reports having put to rest his 70 cm SEO Tx after 18 months of operation, during which its greatest DX achievement was 11 miles. A new CC rig finishing with an 832 has been built, and will feed either a multi-element Yagi or a corner reflector. The converter is much the same as that in use at G2XC. The 70 cm frequency at G3DSV is 432.4158 mc; he enquires about the stability of FT243 mounted crystals when used in power circuits.

In an interesting report G8SB (Horwich, Lancs.) says that his 70 cm signals have been received in Liverpool by G3DA at 22 miles, and G2OI in Eccles has heard G3DA—but G8SB himself could receive neither of them. So off he went down to G3AHT at Oswestry, and schedules on 430 mc were arranged with GW2ADZ and G4LU, using the 8SB 70 cm

converter at the G3AHT end; this worked out as hoped, good signals being received from both stations. G8SB is now hoping to bring off his first 70 cm QSO, and will be putting up a 16-ele. beam to help matters along.

G5BY (Bolt Tail) found August 21 the only evening worth reporting when he received G3CGE (Southampton) at RST569 and worked him cross-band. G3CFR (Bournemouth) was also worked cross-band and a two-way contact was made with G3EJL. G3ABH was putting in an RST 559 harmonic all the evening, his fundamental being on 145 mc. In the Midlands, G3IS (Rugby), who has been inactive due to illness, sends a welcome report and is now operating on 433.08 mc with an 832 tripler and a 4-by-4 stack; his receiver is a copy of the G5BY circuit. G3IS has heard G3BUR/P at 36 miles and G3BJQ (3 miles). Together with many others, G3IS asks for a special 70 cm activity night each week. There is a variety of suggested periods, but Thursday (which coincides with a TV repeat evening) is requested by several. We are very glad to support the idea and suggest that as many as possible should be active on 70 cm every Thursday between 1930 and 2230 hours.

G2OI (Eccles) has spent much time on 70 cm and some crossband contacts have been made. He has found a valve diode to be much more sensitive than a crystal in a concentric line converter and a 6J6 mixer circuit is now under way; feeder losses in wet weather have also been giving some trouble. Before his beam collapsed in a gale, G3COJ (Hull) had heard G3APY/P at 65 miles, using a 6J4 RF stage ahead of a G3EJL converter. On the transmitter side G3COJ finds an 832 tripler works more efficiently when fixed bias is used than with grid-leak bias only.

Others who are hoping to be active on 70 cm before long include G2AOL (Oxford), G3AVO/A (Upwood), G3GBO (Denham) and G5L1 (Hampstead).

G3BUR/P was out on Walton Hill on August 20 under very adverse weather conditions, but contacts were made with G3APY/P (Ambergate, 50 miles), G4LU (Oswestry, 51 miles), G8JI (Kings Norton, 6 miles), and G8QY/P (Meriden, 19 miles). Their signals were also heard by GW2ADZ. The receiver in use was an ASB8, much modified, with 50 kc bandwidth and oscillators run from dry batteries to eliminate drift on standby periods. The transmitter was CC and the final a CV53 doubler running at 5 watts, into a "City-Slicker" type of aerial.

Those Xtal Diodes !

Last month's comments on crystal diodes have brought a number of letters of disapproval. It certainly shows that the

easiest way of obtaining information is to publish erroneous statements! Everyone then rushes in with a mass of data which would have been quite unobtainable in any other way!

However, we must apologise to those who were misled by the remarks on p. 504, September, regarding CV numbers of crystals—and it must be said here that it was not the fault of the very efficient stand-in who wrote last month's "VHF Bands" for us. Many thanks to all those who have written to correct the error. It is hoped to discuss crystal diodes briefly next month, but in the meantime the remarks made last time on the subject should be ignored, except to note that the CV226 is not suitable of 70 cm operation, as it was designed as a "noise source." But CV253 and CV291 should, we understand, be excellent.

A number of comments have also come in regarding the equipment described last month in the writer's "Getting going on Seventycems" article. Two of them call for some further explanation: The superiority of the 9002 over the 6J6 was entirely a matter of a clean note, and nothing more; and the degree of coupling of the aerial circuit in the converter to the mixer lines was exactly as described, namely, as tight as possible. The coupling loop is run right along the lines, separated only by the insulation on the wire. It is in fact fixed firmly against the lines.

Sayings of the Month

"I have never heard G5BY. Is this a record?" (G3AKU) . . . "I think there's a nasty absorbing layer over my QTH." (G6CB) . . . "If the weather continues wet I may soon get on 144 and 420 mc. If it gets fine again I shall carry on gardening." (G8QX) . . . "The Band Plan is just good plain commonsense." (G3AVO/A) . . . "Regarding G4LX's remarks last month, I might say that from here *any* contact is considered as something special." (G3VM) . . . "I notice the absence of GC's on the band. They might produce some interesting DX." (G3GHI) . . . "Anyone who works, or hears me, can be certain of a card, *in return for theirs.*" (GC2CNC) . . . "It's not much use people saying they won't work those in the wrong part of the band if they keep on doing it. It's as bad as promising to QSL." (G3AKU) . . . "QSL's!! From the correspondence, I seem to be lucky at about 40 per cent. returns." (G3AVO/A) . . . "The string broke on the 5-over-5 Yagi just when I needed it!" (G3WW) . . . "An 832! I don't believe it!" (DL4XS commenting on G2XC's two metre signal).

The Tables

The "Counties Worked since September 1, 1949" Table is finalised this month and next time will be replaced by the first list of the



The two-metre beam on its tower at G3VM, Costessey, Norwich.

coming 12 months. Congratulations to the high scorers for 1949-50; it has been most interesting to watch progress as the months went by—and our own thanks are due to those who have so consistently supported this Table.

Claims have already been received for the 1950-51 listing, which rather goes to show how erroneous are some of the opinions that get around regarding activity and conditions.

It is also good to see that this month we have made an encouraging start with what one hopes will be the regular appearance of a 70 cm Calls Heard listing. Thanks G2CIW, G2QY, G2RD and G4CG.

In Conclusion

Last, but certainly not least, your conductor would like to thank "Stand-in" for the effort that enabled him to take a short holiday last month; comments from readers tell how well the job was done. Next month's news, views, claims, suggestions, criticisms and opinions should be posted to reach E. J. Williams, G2XC, *Short Wave Magazine*, 53 Victoria Street, London S.W.1, by October 11 latest. Though once again it is tight, please try and hit that date. With you again on November 3.

Become a Direct Subscriber

G1BF

All Clever Stuff!

ONCE again heavy mail including interesting letter from new DX chum, signing ANØDE—very subtle. He says: Remember meeting your pal MOIFFI out East during last war, real FB type with permanently bloodshot eyes. (*Susie, QRX?*)

Another letter, signed 73ES88, from keen beginner saying Starting new c/s sequence to make DX bands more interesting. Am in partial agreement of course but consider ample scope yet for exotic calls without confusing issue this way. In future DX chums asked apply OMØTO (this of course is me G1BF) for selection DX calls—and pse do not send in cards decorated jolly roger, sketches Susie in beach wear and similar deviations from path strict rectitude.

My T20 still pumping full bore and can now get dull red glow in loop-lamp held near filament xformer, about same as near tank coil. This shows RF everywhere as it should be. From this it is easy step forward to heat filament T20 from RF generated in tank, thus producing self-sustaining PA requiring only regular dose 2000 volts on plate at 50-cycle intervals to maintain condition. Filament T20 connected across small winding in field tank coil, with adjustment marked "Pick up Amps," and process started by connecting heater xformer to T20 through RF chokes then switching off LT when filament glowing really well. No other technical writer yet formulated this new principle valve technique. Just mention idea to show why it is imperative beginners watch this space for real gen on what makes it tick.

Am now being plagued by DX-hungry types in Zone 16 for skeds famous station OMØTO (this of course is me G1BF). All

CARDS IN THE BOX

The operators whose QTH's we want this time for the delivery of cards held for them in our QSL Bureau are as below. Please send a large S.A.E., with name and callsign, to BCM/QSL, London, W.C.1. Callsign/addresses can also be inserted in "New QTH's" if a note to that effect is made when sending envelopes; this will ensure eventual appearance in the *Radio Amateur Call Book*.

G2AOJ, 2BGA, 2KQ, 2VY, 3ABY, 3AGE, 3BQD, 3FGN, 3GDL, 3GFN, 3GLX, 3GNH, 3GPZ, 3GQW, 3GUV, 3HCC, 6GU, GM3EDY.



"... T20 running a bit warm, OM ..."

cards say "Pse pse dr dr OB OB ur ur QSL QSL tnx tnx Popoff Father of Radio." Box 88 now gummed up QSL's for OMØTO. All reports say "Ur RST589x vy vy FB dr OM pse QSL tnx". This gives lie to accusation jealous locals PP1PPP and SS5SS that signal OMØTO indistinguishable from QRM by local vacuum cleaner with loose pin connections. Laugh this off by some crack like it takes a buzz-saw note to fetch in the Real Stuff.

Editor says this feature makes him think so more sound advice next month.

(Readers may be assured that we are doing our best to reclaim this space.—Editor.)



MICRO-WAVE TV LINK

Contract for the new radio link for Scottish TV (Manchester to Edinburgh route) has been placed with Standard Telephones & Cables, Ltd., who first demonstrated micro-wave working across the Channel as long ago as 1931. This new link involves an overall distance of 245 miles, and the contract includes the design, construction and installation of seven unattended automatic repeater stations, arranged to work strictly over line-of-sight paths. The transmitting and receiving gear will be duplicated at each station, and the reserve equipment will be brought into operation automatically on failure of any corresponding part of the apparatus. Additionally, the system will include automatic supervision to give a complete picture, at one main control point, of operating conditions over the whole route.

ON SOLDERING ALUMINIUM

Getting the Technique

By Rev. F. NESS, M.A. (G3ESV)

ALL amateurs soon become adept at the soft-soldering work that is an essential part of every constructional job to-day. In fact, it is no exaggeration to say that without the technique of the soldered joint, modern radio (not to mention radar) would be virtually impossible. Those whose experience dates back to the 20's will remember the way every component had its row of brass terminals; wiring up was done with sixteenth-inch *square* wire, arranged in fancy geometrical patterns, and with no attempt at securing short leads. But now, try to imagine a modern communications receiver with nut-and-bolt connections throughout!

So, while nobody to-day hesitates to reach for his iron and his resin-cored solder when it's a question of wiring a receiver or transmitter, most amateurs still dodge the job of soldering anything made of aluminium. Yet once the technique has been acquired, the thing is dead easy, and the result is both neat and strong.

How To Do It

Let us suppose that the corners of an aluminium chassis are to be soldered up. A chassis should always be strengthened in this way, because if adjacent sides are not fastened together somehow, they invariably show an unsightly gape when any weight is placed on the chassis. To fasten angle pieces in place with rivets or nuts and bolts is a time-consuming job.

The materials required are simple. A stick of special aluminium solder costs a shilling or so. The writer has found "Fermo" solder the easiest to use. Sometimes a sheet of instructions is given with the stick; this should be thrown away at once. The usual instructions are calculated to reduce one to a state bordering on frenzy if any attempt is made to follow them.

Instead, select an old worn-out file from the junk box. Almost anything will do, provided it is not too big. (But once it has been used for this job, it will be no good for anything else.) No flux is needed. But it is essential to have a source of "clean" heat. An ordinary soldering iron is quite useless, as

the bit temperature is far below the melting point of the special solder used. The best form of heat is a gas flame, and the writer uses a Bunsen burner. If one has gas in the house, then a Bunsen burner (available from the bigger chemists, such as Boots) is a useful tool, as it can be used for brazing and other big jobs as well. A paraffin blow-lamp should do the job just as well if properly handled, but the writer has never used one.

Setting Up

Assume then, that the materials are all ready. Tap the edges of the chassis together to give a neat butt-joint. Then prop it up firmly on the corner to be soldered (make your own arrangements to avoid setting the shack on fire) so that the joint lies horizontally. Play the flame on it for a minute or two to get the whole chassis thoroughly heated. Snip off half an inch of solder and drop it into place. Get the end of the file pretty hot at the same time. After a minute or two the solder will go soft and then fluid. Here is where you have to get weaving! With the hot end of the file, start scratching at the V of the joint, to uncover clean, unoxidised metal. As you scratch, poke the solder into place with the same movement. It will be found that the solder will not adhere to any but an absolutely *new, fresh* surface. Therefore, it is no use trying to save time by filing or scraping the job first. Long before the aluminium gets hot enough, the surface will be oxidised again.

So the secret of success is to heat the metal first, then scrape the necessary area clean bit by bit, and simultaneously rub the solder into place with the end of the file. Work as fast as you can and keep the flame playing on the actual joint all the time. The solder flows into place easily and cleanly when you get the knack of it. As soon as the joint is made, remove the flame and let the chassis cool naturally. Then turn it round to the next corner and repeat "*da capo al fine*" as the I's say. Because of the scraping necessary, it pays to support the job firmly before starting. Prop it up on a few bricks; or jam it in a corner of the fire-place. But the line of the joint must be kept horizontal or the solder will run off.

Once the trick has been learnt, a chassis can be soldered in 10 minutes. This is *far* less than the time required to cut four angle pieces, drill 16 holes and knock in eight rivets—the minimum number of operations for a satisfactory job. One word of warning may not be out of place. A mad-hot chassis looks exactly like a stone-cold one. So be careful how you get hold of the job after soldering!

Here and There

Publication Note

It is very much regretted that, in common with many other weekly and monthly periodicals, we were unable to publish the issue of our companion *Short Wave Listener & Television Review* dated October, and due out on September 21. The resumption of work in London printing offices did not come soon enough for us to catch this date. Consequently, the next issue of *Short Wave Listener & Television Review* will be combined for October-November and will appear as soon as possible after October 19, the normal date for the November issue.

As readers will of course understand, the situation is not one over which we have any control. However, we are extending the subscriptions of all who obtain *Short Wave Listener & Television Review* direct from us—and, of course, all BSWL members—by the period covering the unavoidable break.

Slight Correction

In the note in this space last month giving the 6F12 equivalents, the Cossor SP6 was included in the list. We are informed by the Technical Service Department of A. C. Cossor, Ltd., London, N.5, that the SP6 is no longer an extant type, having been replaced by the 6AM6—a change in name but not in function.

The Club Contest

The Fifth Annual 1.7 mc Club Transmitting Contest, organised by *Short Wave Magazine*, and now always known as "MCC", will take place this year, during the period November 11-19 inclusive, when the Top Band will be shaken by lusty calls of "CQ MCC". But this identification should be used by *participating Club stations only*, since bonus points are earned by Clubs working each other. In previous years, a certain amount of harmless confusion has been caused by non-Club stations calling "CQ MCC" simply with the idea of giving Clubs a contact. We shall, of course, be only too pleased (and so will the Clubs) if as many stations as possible come up with this intention, but we would also be greatly obliged if all operators not actually in the Contest keep to straight procedure.

Butler Harmonic Filter

We are glad to mention the new Butler Low Pass Filter for the suppression of TVI by amateur band transmitters. Consisting of two

constant-K mid sections with M-derived end sections, very high attenuation is achieved on frequencies above 30 mc, with negligible insertion loss on the operating frequency. The in-and-out connections are for 72-ohm cable. Write Butler Radio, 17 Five Bells Lane, Rochester, Kent, for prices and further data.

Making Sure

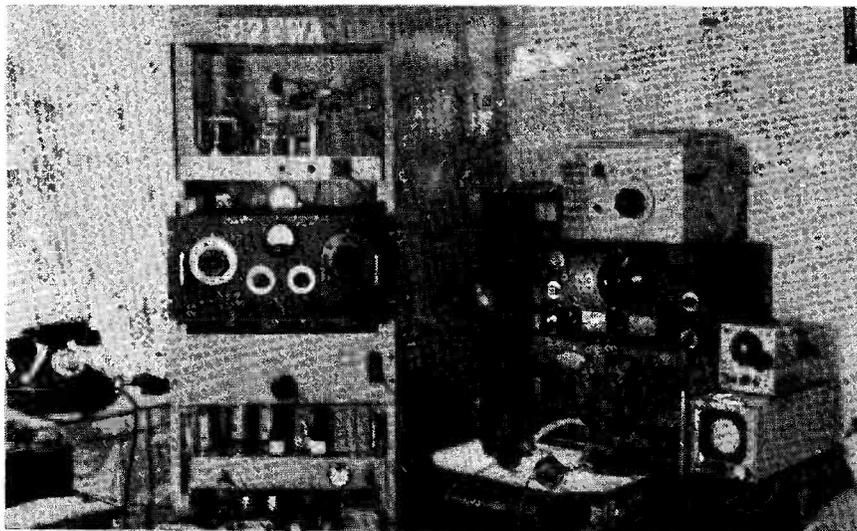
Readers who may be experiencing difficulty in getting the *Short Wave Magazine* locally, and on time, can obtain it direct from us by subscription. This costs 20s. post free for a year of 12 issues, and mailing on the day of publication each month is guaranteed. Write the Circulation Manager, Short Wave Magazine, Ltd., 53 Victoria Street, London, S.W.1. Those who prefer it can take out a six months' subscription for 11s.

New QTH's

As previously explained, we are the U.K. forwarding agents for the American publishers of the *Radio Amateur Call Book*, the remarkable quarterly compilation which lists all known amateur stations throughout the world. We undertake to airmail to them all new G QTH's and changes of address, provided they are sent in to us by the owner of the callsign. All these addresses also appear in our "New QTH" feature. And since another R.A.E. result promises many new G stations, calls should be notified immediately on issue so that they can be published as soon as possible.

Radio Courses for Amateurs

Excellent courses organised in conjunction with the Essex County Council are available for those who can get to the Ilford Literary Institute (near Gants Hill on the Central London Tube). Entitled the Radio Amateurs' Examination, Morse and Codes of Practice, Amateur Radio Refresher Course, Amateur Transmitter Course and Amateur Television, each is for two hours one evening a week, over a period of from three to eight months, depending on the subject. The fees amount to a few shillings only, and the courses provide an excellent opportunity for amateurs living in the London area to gain a sound knowledge of their hobby. Write C. H. Lamborn Edwards, A.M.I.E.E. (G8TL), 10 Chepstow Crescent, Newbury Park, Ilford, Essex. (*Seven Kings* 7384.)



The other man's station G2FWA

THIS is another of those "corner-of-a-bedroom" stations which of necessity has to be kept as neat and tidy as possible. G2FWA is owned by S. E. Janes, 72 Kimberley Road, Croydon, Surrey, who was licensed AA before the war, full transmitting facilities being granted immediately upon the resumption early in 1946.

The rack on the left carries the 7-14-28 mc transmitter, normally run at 50 watts to a pair of 809's. The exciter (second shelf down) consists of an 89 ECO feeding into a switched 6N7 to give output on either 7 or 14 mc, followed by an 807 operated straight on these two bands or as a doubler to 28 mc. Next comes the stabilised power supply for the ECO driver, and below it the modulator unit complete, with a pair of 807's in push-pull at the output end. The remaining shelves in the rack accommodate the power supply units for the various sections of the transmitter.

Above the receivers is the 10-watt CW/Phone transmitter for Eighty and the Top Band; this Tx is actually designed for portable working, and has done duty as such for field day events during the last three years.

On the receiving side, G2FWA runs an HRO with 6AK5 preamplifier, and a Q5'er is also available. The Hallicrafters "Sky Champion" is employed as monitor receiver and for listening to broadcast, and an additional item for station monitoring is an oscilloscope used as a modulation indicator,

automatically brought-in when the control relays are at "send."

G2FWA remarks that as he has not a great deal of spare time for radio, little constructional work is undertaken in order to leave him free to be on the air as much as possible. So his is an "operator station" with the engineering side getting less attention.

NEW COMMUNICATIONS RECEIVER GUIDE

We have recently been looking through a copy of an excellent new publication entitled *Post-War Communications Receiver Manual*, which gives all the essential data on a wide range of American receiving equipment (including Aircraft and Marine Radio receivers) placed on the general market since 1945. The treatment covers full circuit details, placement of all parts, chassis and panel appearance photographs, parts list, alignment details and dial cord stringing procedure for 30 different receiver types in the communications category and 24 in the Aircraft and Marine list. The types covered are Collins, Hallicrafters (S38-SX43 series complete), Hammarlund, National, Airadio, Harvey, Heath, Jefferson-Travis, Learadio, Motorola and Ranger. The resulting make-up is a large volume of 300 pages. The price in this country is 27s. 6d. (plus 10d. postage) and orders can be placed with Gage & Pollard, Publishers' Agents, 49 Victoria Street, London, S.W.1.

The Month with the Clubs

FROM REPORTS RECEIVED

All interested Clubs will by now be well acquainted with the full details of the Fifth Annual *Magazine* Club Contest, to be held between November 11 and November 19. If any other Clubs wish to participate, and have not received copies of the Rules and Entry Form, they still have time to do so by applying to the office at once for them.

We require advice of entry by **October 10** at the latest, stating the call-sign to be used, whether it be that of the Club or of a member's station. From this information we shall publish an acceptance list in the November issue.

Address your advice of entry, together with next month's Club reports, to "Club Secretary," *Short Wave Magazine*, 53 Victoria Street, London, S.W.1, by first post on **October 10**.

And now follow this month's reports, from 31 Clubs.

Bournemouth Radio and Television Society.—The shack has been redecorated and a new 150-watt rig will be on the air shortly (G3FVU). The first of the series of lectures for the new season will be given on October 19, 7.45 p.m. The subject will be Interference Suppression and TV Aerials. Members are preparing to take part in MCC and are looking forward to the winter season.

Brentwood and District Amateur Radio Society.—This Club is still active and plans are under way for the winter. Membership has decreased slightly, but it is hoped to rectify this tendency. On October 27 G5RV is lecturing on TVI, and a few other local Clubs are being invited. Meetings are held fortnightly and the Club Tx, G3FSM is occasionally active on the Top Band.

Clifton Amateur Radio Society.—The new session started off with a General Meeting at which the Hon. Sec. and his Assistant were re-elected. Three members were successful in the recent RAE; the Club's "rig" is being hotted up

for MCC and plenty of operators have volunteered for duty. Membership now stands at 40.

East Surrey Radio Club.—The September meeting was the first in the Club's new headquarters and was well attended. G2MV lectured on Impedance Matching. The Club now plans to run a stand at a local Hobbies Exhibition; in October members are invited to visit G2AJS at Caterham; and future meetings will include a film show and the Club Dinner, when the cup will be presented to the winner of the DX Receiving Contest.

Edinburgh Amateur Radio Club.—The AGM on September 13 started the new season, and meetings will continue throughout the winter, every Wednesday at 7.30 in Unity House, 4 Hillside Crescent, Edinburgh. It is hoped to have the Club Tx on the air every second meeting, alternate evenings being devoted to lectures and the like.

Eccles and District Amateur Radio Society.—Meetings are held every Monday, 7.30 p.m.,

at the Eccles House Club. The Tx is nearing completion, the PMG has granted a licence and the call-sign is awaited. Members spent an enjoyable day at Castle Bromwich on September 9.

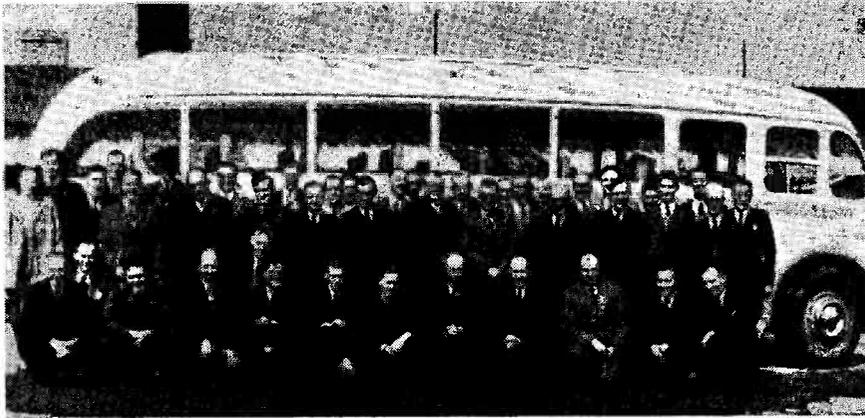
Forfar and District Amateur Radio Club.—Although adjourned for the summer months, this Club, we are informed by the Hon. Sec., is very much alive, and hopes to enter for MCC

Grafton Radio Society.—The new session has opened and meetings are held on Mondays, Wednesdays and Fridays at 7.30 p.m. On October 27 G2BCX will lecture on "Taylor Super-Modulation" and visitors are cordially invited. Morse classes are also being organised for three evenings a week.

Gravesend Amateur Radio Society.—Weekly informal meetings have been held during the summer, with occasional talks from visiting amateurs. VQ4HJP, home on leave from Kenya, has been among the members most of the time. A comprehensive programme is being arranged for the winter.

Guilford Girls' School Amateur Radio Club, Nottingham.—This Club was formed mostly from girls in their final year, and many of these have now left; the Club is being reformed round a nucleus of younger members who were enrolled during the year. The number of members is limited to 20, and keenness is such that it is difficult to select the favoured score! The Club Tx, G3FYN, is on the air, mostly at lunch times and early evenings. See panel for Secretary's QTH.

Radio Society of Harrow.—Meetings are being well attended again after the holidays, and a number of new members have joined. Nearly all who sat for the RAE were successful, including Mr. Webster, a blind member who builds his own gear. Meetings are on October 12 and 26 (Practical Nights); October 5 and 19 are given up to lectures and demonstrations. On November 2 there will be a debate on



Spen Valley always do it in style and comfort when they fix an outing. At the Cranwell Hamfest recently, the party included 20 of their fully licensed members.

QRP v. QRO. Visitors will be welcome any Thursday evening at Eastcote Lane Primary School, South Harrow.

Kingston and District Amateur Radio Society.—Meetings are still well attended, and a recent Junk Sale has improved the financial position a lot. October dates are the 11th and 25th, the first being the AGM, at Penrhyn House, 7.30 p.m. Winter programmes are under consideration.

Mansfield District Radio Society.—The September meeting was well attended; there was a discussion on Club activities, a Junk Sale, and final arrangements were made for a visit to Rugby Radio. A new Secretary was also appointed (see panel for QTH).

Portsmouth and District Radio Society.—Several successful meetings were held recently, the highlight being a visit to the Thames Valley Club on August 27. The Club is running a stand at the Meccano Club Exhibition, Carnegie Library, on October 4. G2DZT, a member, is busy building a transmitter-receiver for another member who is in hospital. Membership stands at 34, but additions will be welcomed by the Hon. Sec.

QAU Club, Channel Islands.—This newly-formed Club has been meeting every week since its foundation, and recently has had the company of G2FLK and a friend from London. The reason for its formation was a desire on the part of GC amateurs to enter for MCC! Prior to this, informal meetings have been held by the GC's ever since 1946. Secretary's QTH in panel.

Reading Radio Society.—At recent meetings members heard a talk on the construction of an FM receiver, which was demonstrated on the BBC's 91 mc FM transmission, and a talk on Electronics, particularly the development of the valve. October meetings are on the 12th (Film), 14th (Instructional Section) and 28th (Discussion on RAE Questions). The Hamfest has been provisionally fixed for November 19.

Rotherham and District Radio Club.—Meetings have continued during the summer on an informal basis, but the full winter session has now started. On October 11 there is to be a demonstration of members' gear; on the 18th a talk and demonstration on Communication Receiver Design by G6ZA; and on the 25th,

Hints and Tips on Constructional Work. It is also hoped to arrange a dinner and social during November.

South-East London Technical College Radio Society.—This Club is licensed with the call G3CMQ, and meets fortnightly at the S.E.L.T.C., Lewisham Way, S.E.4, beginning on Tuesday, October 3, at 6.45 p.m. Past and present students will be welcomed in the shack at the top of the D.C.S. building. RAE courses will be run every Friday from September 29, in the main building.

Sheffield Amateur Radio Club.—Interest and attendances have been good during the summer months. A visit to the Neepsend Electricity Generating Station has been arranged for October 18; numbers are limited and applications should be made without delay.

Slade Radio Society.—Forthcoming events are: October 13, Annual Junk Sale; October 27, Lecture, "Music and Sound in Films"; November 10, Annual Dinner. Meetings begin at 7.45 p.m. and new members or visitors will be cordially welcomed.

South Manchester Radio Club.—Numbers are still on the



A group representative of the Southend and District Radio Society.

increase and regular meetings are held at the Church Schools, Northenden, every other Friday at 7.30. Results of the RAE were very gratifying, and a high proportion of members succeeded. In October there is to be a Hamfest at Parker's Cafe, Catley (on the 7th), but

all tickets are already sold. In November the first inter-Club DX contest will be run, with members competing for a cup presented by G3BMF.

Sutton and Cheam Radio Society.—The Club station, G3GFA, has been on the air

with a B2 loaned by a member; more ambitious gear, it is hoped, will be installed later. The Club is running an Annual Constructional Competition again this year, but full details are not yet available regarding conditions—to follow next month.

NAMES AND ADDRESSES OF CLUB SECRETARIES

BOURNEMOUTH : F.G. Hamshere, 99 Elmes Road, Winton, Bournemouth.
BRENTWOOD : J. F. Moseley, G2CIW, 45 Geoffrey Avenue, Harold Park, Romford, Essex.
BRIGHTON : L. Hobden, 17 Hartington Road, Brighton.
CLIFTON : W. A. Martin, G3FVG, 21 Brixton Hill, London, S.W.2.
COVENTRY : K. Lines, 142 Shorncliffe Road, Coventry.
EAST SURREY : L. Knight, G5LK, Radiohme, Madeira Walk, Reigate.
ECCELES : E. Rayson, 11 Hartington Road, Winton, Lancs.
EDINBURGH : D. A. E. Samson, GM3EQY, 56 Elm Row, Edinburgh, 7.
FORFAR : A. F. Ferguson, 3 Osnaburg Street, Forfar.
GRAFTON : W. H. C. Jennings, G3AHB, Grafton LCC School, Eburne Road, London, N.7.
GRAVESEND : R. Appleton, 23 Laurel Avenue, Gravesend.
GUILFORD GIRLS' SCHOOL : S. Read, G2ATM, Guilford Girls' School, Nottingham.
HARROW : S. C. J. Phillips, 131 Belmont Road, Harrow Weald.
KINGSTON : R. Babbs, 28 Grove Lane, Kingston, Surrey.
MANSFIELD : A. W. Fowler, G3FR, Windsor, Cowpasture Lane, Sutton-in-Ashfield, Notts.
MIDLAND : A. W. Rhodes, 135 Woolmore Road, Birmingham, 23.
PORTSMOUTH : M. W. Pearce, G3BSR, 58 Hollam Road, Milton, Portsmouth.
QAU (CHANNEL ISLANDS) : Miss Valerie Hunt, Woodshiel, Millbrook, St. Lawrence, Jersey.
READING : L. Hensford, G2BHS, 30 Boston Avenue, Reading.
ROTHERHAM : R. A. Watson, G3AYS, 147 Fitzwilliam Road, Rotherham.
S.E. LONDON TECHNICAL COLLEGE : The Secretary S.E.L.T.C., Lewisham Way, London, S.E.4.
SHEFFIELD : E. Walker, G2LT, 11a Welwyn Close, Intake, Sheffield.
SLADE : C. N. Smart, 110 Woolmore Road, Birmingham, 23.
SOUTH MANCHESTER : M. I. Wilks, G3FSW, 57 Longley Lane, Northenden, Manchester.
STOURBRIDGE : W. A. Higgins, 28 Kingsley Road, Kingswinford, Brierley Hill, Staffs.
SUTTON AND CHEAM : R. I. Clews, G3CDK, 1 Hurstcourt Road, Sutton.
WAKEFIELD : W. Farrar, G3ESP, Holmcroft, Durkar, Wakefield.
WANSTEAD : R. J. C. Broadbent, G3AAJ, Wanstead House, The Green, London, E.11.
WARRINGTON : J. Speakman, Davyhulme Cottage, Dark Lane, Whitley, near Warrington.
WIRRAL : R. A. Browning, 24 Norbury Avenue, Bebington, Cheshire.
WORCESTER : J. Morris-Casey, G8JC, c/o Brookhill Farm, Ladywood, Droitwich, Worcs.

Wakefield and District Amateur Radio Society.—The winter programme started on September 20, and from that date meetings will be held fortnightly until next April. A full programme is in print, and it includes the six Mullard Film Strips on Valves, and two on TV. Remaining meetings are devoted to lectures and discussions. On October 18 Film Strip No. 2 is being shown; on November 1 there is to be a Junk Sale.

Wanstead and Woodford Radio Society.—The AGM will be held on October 31, 8 p.m., at Wanstead House. Beginners' classes are being well attended, and some old hands turn up as well! Future talks are on Plastics (G3AAJ) and Taylor Super Modulation (G2BCX). Committee has suggested a "Swap-Table" idea for future meetings, and has also ruled that no one may bid at a Junk Sale unless he has placed some gear for sale himself.

Warrington and District Radio Society.—The Field Day at the end of August was enjoyed by many members, and 35 contacts were made. A series of talks on Mathematics in Radio has begun, and slow Morse transmissions have also been organised. Three members have passed the RAE and hope to be on the air very shortly.

Wirral Amateur Radio Society.—Recent talks were on Modulating the Carrier (G8BM) and TV Receivers (G3AKW). The winter programme is under consideration. October meetings are on the 11th and 25th, both at the YMCA, Room 3, Whetstone Lane, Birkenhead, beginning at 7.30 p.m.

Worcester and District Amateur Radio Club.—Weekly meetings kept up to good strength through the summer, and now the winter programme is being prepared, with an accent on construc-



The technical class at a meeting of the South Manchester Radio Club—a happy party, seemingly, with G6DN (standing, left) and G3EON (standing, right) as lecturers.

tional work. Any reader visiting Worcester is given a warm welcome at the Club; will all interested note that meetings are now on Fridays, not Thursdays as before. Anyone willing to give a talk is earnestly asked to get in touch with the Secretary, stating the subject and the date of visit.

Brighton and District Radio Club.—After an informal August, the autumn programme has been organised, the October subjects being Principles of Radar and A Compact Top-Band Tx. All Sussex amateurs and their friends are invited to a Hamfest on October 21 at the Golden Cross Hotel, Western Road, Brighton. Further details from the Hon. Sec.

Stourbridge and District Amateur Radio Society.—They meet the first Tuesday in each month at King Edward VI School, Stourbridge. At that held on September 5 a series of six films dealing with Elementary Electronics was shown, by courtesy of the Midlands Electricity Board. Members were so impressed that further film-shows have been arranged.

Coventry Amateur Radio Society.—Fortnightly meetings continue at the BTH Social Club, Holyhead Road, the next being on October 9 and 23. On the 20th G6CJ will be giving his well-known lecture on Aerials, with a practical demonstration—this should be seen by all who can possibly manage to attend. For it, the meeting will be at Priory High School, Wheatley Street, Coventry, at 7.30 p.m. and non-members of CARS should apply for tickets before October 16 (see panel for Secretary's QTH). CARS Committee has decided that Club activities should be extended to cover Radio Control of Models and Listening Groups, as well as the more usual activities of a local radio society. All members who sat for the RAE this year have passed and now await their call-signs.

Midland Amateur Radio Society.—They will be holding their annual dinner on November 4 at 6.30 p.m., at the Imperial, in Birmingham. Visitors and particularly ladies are specially welcome, as this is by way of being the social highlight of the MARS year, and is a well-organised affair.

Always mention the Short Wave Magazine when writing to Advertisers—It Helps You, Helps Them and Helps Us

C. MARKS & CO.

30 COMMERCIAL ROAD, NEWPORT, MON. Phone: 4711
Also at 25 WYNDHAM ARCADE, CARDIFF

This Month's Special Offer!

AMPLIFIER UNIT 3562A. Containing 5 valves (2 807's, 1 EF50, 1 EA50, 1 5U4G). Selenium rectifier, jack socket, potentiometer, 2 500-cycle transformers, etc. Brand new, in original cartons, 19/6 each, plus 2/6 carriage. Also

OSCILLOSCOPE UNIT TYPE 198. Contains 4 VR65's, 1 VR54, 3 EA50's, VCR 138, C.R.T. with mu-metal screen, 13 potentiometers, high voltage condensers, delay-networks, etc. The ideal unit for making a compact oscilloscope. Brand new in sealed cartons. 35/- each plus 5/- carriage.

TRANSMITTERS. TWO METRE TYPES. SCR522 TRANSMITTER CHASSIS (less valves), coupled with modulation transformer, audio choke, meter switch, 2 meter plugs. 10/- each.

VHF JAMMING TX AND MODULATOR. Contains the essentials for a compact F.B. 2m rig. Hosts of useful parts, as advertised in last month's "Mag". Less valves. 15/6 each.

FOR THE 70 CM ENTHUSIAST. The APO9 transmitter offers endless scope. Contains 931A photo cell multiplier, 2 6AC7's, 1 6AG7, 2 807's. Cavity type tuning on the 8012 heaters, suggests use as a push-pull P.A., with cathode drive. With this unit we supply 2 brand new boxed 8012 valves. Limited quantity at 65/- each. Carr. paid. All Mail Order to Newport please.

RECEIVERS. The APS13, partly stripped by the Ministry, makes an ideal TV vision and sound (combined) receiver. Contains 12 miniature B7G valve holders, 10 miniature IF cans, 24 v dynamotor relay, etc. (6AG5 valves used in IF's). Limited quantity, less valves, 16/6 each.

NO. 38 SET. Walkie-talkie, with 4 ARP12 valves, less the send-receive switch and ATP4 valve. 10/6 each. Circuit diagram, 1/- ATP4 valve, 6/6 each.

THIS MONTH'S VALVE OFFER. EA50, IN21, IN22, at 2/6 each; 12SL7, at 4/6 each; 6AC7, 6AG7, 717A, 12SH7, 807, EF50, VU133, 12A6, at 5/- each; 5U4G, at 5/6 each; 25A6, at 6/6 each; 8012, at 7/6 each.

SPECIAL OFFER. 1625's at 3/9 each, or 6 for £1. Octal valve holders in amphenol (international), 5/- per doz.

ELECTROLYTIC CONDENSERS. 8 M.F.D. 450v wkg. micropack, at 2/- each; 8 x 24 mfd, 2/6 type. 450v wkg. at 2/6 each; 5 for 10/-.

HEAVY-DUTY WIRE WOUND POTS. Approx. 600 ohm, wound on ceramic former, 1" shaft, ideal for bridges or heavy duty work. 3/6 each. "NIFE" ACCS. 15 AH at 2.5v. In good condition, 6/6 each, or 66/- per doz.

LEAD ACID ACCUMULATORS. 10 A.H., 2v. Brand new, at 3/9 each.

Under 10/- please add postage.

SOUTHERN RADIO'S WIRELESS BARGAINS
R.3515 TELEVISION UNITS. 21 valves with 6-stage 14 m.c. I.F. strip, recommended for ideal T.V. conversion by all experts. Brand new in original wooden cases. £3/10/-.

R.1335 RECEIVERS. Brand new and unused, as specified for Inexpensive Television. £3/5/-.

T.R.1196. 6-Valve superhet receivers. Perfect and guaranteed. With circuit. 22/6, plus 1/4.

BENDIX COMMAND RECEIVERS. B.C.454 (49-100 metres), B.C.455 (39.49 metres). Complete with 6 valves. Perfect condition, 35/- each, plus 1/4.

THROAT MICROPHONES. With Lead and Plug—Magnetic. 3/6.

CONTROL CABLES, 14 ft., with adaptors or B.C.453/4/5. 9/6 each.

R.A.F. BOMBSIGHT COMPUTERS. Complete, brand new, with motors, gyro gears, blowers, etc., etc. Ideal for model makers, etc. The best component value ever offered. 55/- each, plus 5/-.

LUFBRA HOLE CUTTERS. Adjustable from 1/4" to 3/4" for use on wood, metal, plastics, etc. 5/6.

CONTACTOR TIME SWITCHES. By Smith or Venner. 10-hour movement with thermostatic control. 2 impulses per second. Complete in sound-proof case. 10/-, plus 1/4.

HAND GENERATORS. 6 volts at 5 amps. Complete with crank. 20/-.

LUCAS GENERATORS. 12 volts input, 480 volts output at 40 m.a. 10/-.

RADIO COMPASS INDICATORS, with internal Selsyn motor. 3" dial, 13/6; 5" dial, 15/6.

RESISTANCES. 100 assorted capacities. All useful sizes from 1/2 to 3 watts. 9/- per 100.

CONDENSERS. 100 Assorted. All useful sizes up to 2 microfarad. Tubular and mica. 15/- per 100.

ALL GOODS PREVIOUSLY ADVERTISED STILL AVAILABLE. Full list of Radio Publications, 2½d.

Please note new address:—

SOUTHERN RADIO SUPPLY LTD.
11 Little Newport St., London, W.C.2. Gerrard 6653

More Excellent Bargains!

DYNAMOS.—12 V. 50 A. D.C., shunt-wound, ball bearing, new surplus stock, 2,500 r.p.m., £8/10/-; 12 V. 10 A. C.A.V. 12 V. 10 A., 1,425 r.p.m., shunt, 40/-; carriage on any dynamo 5/-.

WAVEMETER. Model 99.—New, in box 8¼" x 8¼" x 8", fitted variable inductance with heavy knob and scale, trimmer condenser, fixed condenser, on/off switch, valve holder and space for batteries (without microammeter), 12/8, plus 2/6 postage and packing.

PRECISION Temperature Control Ovens for Quartz Crystals, etc.—230 V. 50 c/s., will give a stability with suitable crystals of better than 2 parts in a million. Fitted precision thermostat and thermometer. Temp. adjustable 40 to 60 deg., size 6¼" x 6¼" x 10", £4/17/8.

VARIACS. ZENITH variac Transformer, several sizes in stock, write for list "V.W."

OHMMETERS.—Bench type for high-speed production. Six ranges, 0-100 to 0-10 Mc/s., fitted large 8" meter for quick and accurate reading. Ranges selected by push button, 200/250 V. 40/100 c/s., £25. Write for descriptive leaflet on Ohmmeters.

CATHODE RAY TUBES.—V.C.R. 97, new and crated, 35/-.

TRANSFORMERS.—B.T.H. 200/230/250 V. input, 2 V. 20 A. and 75 V. 6 A. with 15 taps output, 45/-, carriage 5/-. Foster Transformer, 100 watts 50 V. 2 A. output, 230 V. 50 c/s. input, 15/-, carriage 2/.

PARTS.—10 lb. useful oddments for the junk box. All clean, dismantled from Government and other surplus apparatus, 7/6 post free. (For home buyers only.)

SIGNAL GENERATORS. Type 101.—Frequency range 370-640 Mc/s. Internal square wave mod. Provision for pulse mod. Power supply 200/250v 50 c/s. or 80v 300/2,000 c/s., nominal output 10 milli-volts.

VARIABLE SLIDE RESISTANCE.—152 ohms 2 amps, 35/-; 1,000 ohms, 0-6 to 0-16 amps, 27/-; 20 ohms 2-5 amps, 15/-; 300 ohms 1/2 amp., 12/6.

ELECTRADIX RADIOS

214 QUEENSTOWN ROAD, LONDON, S.W.8

Telephone: MACaulay 2159.

*Make a better
job of it!*
with the



**HENLEY
SOLON**
TRADE MARK

**ELECTRIC
SOLDERING
IRONS**

*5
models*

CONSTANT
HEAT

ALL THE
HEAT IS
IN THE BIT

PERFECT
BALANCE FOR
EASY HANDLING

ALL CONNECTIONS
HOUSED AT END OF
HANDLE AWAY FROM
THE HEAT

CORD GRIP SECURES
FLEXIBLE (prevents twist
or pull being transmitted
to internal wiring)

Write for Folder Y.10.
**W. T. HENLEY'S TELEGRAPH
WORKS CO. LTD.,**
51-53 Hatton Garden, London, E.C.1

NEW BOXED VALVES. 813, 715B, 393A, 27/6; 803, 805, 15/-; EP92, 9D6, X65, TP25, TP22, EL33, KT33C, KT61, PEN383, 3Q4, 25L6GT, 25Z6GT, 10/-; 801, 884, 6L6M, 6K8GT, 6C6, 6D6, 6AG7M, 6L7G, 68A7M, ECH35, EM34, VP133, HL133DD, VP4, 8P4, MV8/PEN/B, MS/PEN/B, 8P1320, TDD13, Y63, U18, 210VPT, 8P210, PEN220A, PEN25, QP21, 1A5, 1C5, 1L4, 3A4, 8/6; 1R5, 1T4, 185, 384, 0Z4, 8AG5, 68L7GT, KTW61, DH63, DL63, 7D5, 15D2, ATP4, 8130, 7/6; 6K7GT, 6K7M, 6Q7GT, 6V6GT, 6V6M, 5Z4M, 6X5G, 5U4G, 6AC7M, 6C4, 6P6G, 6J7M, 6SN7GT, 6N7M, 6Y6G, 72, 73, 80, 807, 1616, 1642, 9002, 6/6; 6B8G, 6C5GT, 6K7G, 68G7M, 6U7G, VP23, HL23DD, VU111, VU133, 5/-; 954, 955, 4/-; Unboxed but guaranteed. EA50, 2/8; EP36, EL32, TT11, ML6, 8D2, VP23, 6AC7M, 6SH7M, 12A6M, 128C7M, ATP7, KT44, AC6PEN, 42MPT, 4/-; EF39, EBC33, 5R4GY, 6U4G, 9001, 9003, 5/-; 6AK5, PT15, 7/6.

ELECTROLYTIC CONDENSERS (as previous advert), Meters, as previous advert., and "0-1ma, 2" scale, 7/6."

TEST FRODS, with leads and plugs, 3/- pair.

FILAMENT TRANSFORMERS. 6.3v.-1.5a, and 12.6v.-.75a, 7/6.

METAL RECTIFIERS. 12v.-1a, 7/6.

MIDGET SMOOTHING CHOKES. 40ma, 10h., 2/6.

VOLUME CONTROLS, less switch, 1" diam., 50k, 100k, 250k, 1/6; 1meg., 1meg., 2/-.

Satisfaction or money back. Most items recently advertised still available; many other lines; free list on application.

Please add postage on orders under £1.

ELECTRAD RADIO,
64 St. Victoria Street, Belfast, N.I.

CRYSTALS

OF OUTSTANDING QUALITY

Type "G"
Frequency ranges :
100 Kc/s to 400 Kc/s, 3 Mc/s to
20 Mc/s. Evacuated glass
envelope having B7G valve
base, with crystal connected
across pins Nos. 3 and 7.



Type "S"
Frequency
range :
100 Kc/s to
15 Mc/s. Black
bakelite case
1 1/2" high, 1 1/2"
wide, 3/8" thick,
with two 1/4" diameter pins spaced
3/8" apart.

**BROOKES
CRYSTALS LIMITED**

10 Stockwell Street, Greenwich,
London, S.E.10
Phone: Greenwich 1828. Grams: Xtals
Green, London. Cables: Xtals, London.

Come to SMITH'S of EDGWARE ROAD

THE FRIENDLY SHOP

FOR ALL RADIO COMPONENTS

We stock everything the constructor needs—our 25 years' experience of handling radio parts and accessories enables us to select the best of the regular lines and the more useful items from the surplus market in:

Loudspeakers and Phones	Valves and CR Tubes
Transformers and Chokes	Cabinets and Cases
Meters and Test Equipment	Capacitors and Resistors
Pickups and Turntables	Coils and Formers
Switches and Dials	Plugs and Sockets
Metalwork and Bakelite	Aerials and Insulators
Books and Tools	Motors and Generators
Valve Holders and Cans	Wires and Cables
Metal Rectifiers	Panel Lights and Fuses
Sleeving, Nuts and Bolts, Tags, Clips, Grommets and all other end pieces.	

NOTHING TOO LARGE—NOTHING TOO SMALL

Everything you need under one roof—Including all the parts specified for the popular "Viewmaster" Home-built Televisor both London and Birmingham models.

Send for list of our "Electro-Voice" range of Transformers and Choke—"As good as the best, yet cost little more than the cheapest!" (No general catalogue available).

H. L. SMITH & Co. Ltd. 287/9 Edgware Rd., London, W.2

Telephone: Paddington 3891. Hours 9 till 6 (Thursday, 1 o'clock)

Near Edgware Road Stations, Metropolitan and Bakerloo

Vibroplex type bug keys, new and boxed. 60/- each.

An-Aps.3 radar receiving sets, complete with two remote indicators and power supply unit, also control panel, new and boxed with instruction book. £20 each.

Telatypes by Siemens, working order. £40.

New Dictaphone Shaver, complete. £25.

Rack-mounted audio oscillators. 1mw into 600 ohms, in steps 200 to 3,000 cycles. £6.

Onan power plant, new and boxed, 12v 2,000 watt, complete with cables and instruction book. £25.

Type SM BTW selsyns, 230 volt, 50 cycle. Per pair £5.

230v nine r.p.m. reversing induction motors. 75/-.

U.S.A. motor generators, 210v, 60 cycle, in 110v d.c. 8 amp and 230v d.c. 4 amp output, complete in mounting rack with push-button control, new. £20.

Wilcox Gay vfo's, 2 to 10 mcs, complete instruction book and two 807's. £5.

Mushroom airfield lights, ideal for yachts and bulkhead lighting, complete with bulbs and connectors. 12/- each.

Evershed meggers, new and unused, 120 meg., 500 volt. £12.

One only transmitter consol, six bays, completely enclosed on heavy rubber-tyred casters. £12.

Our latest audio low-pass filters in kit form, sharp 3,000 cycle cut off down 60 db., for use as speech slipper or S.S.S.C., complete, three chokes totally shielded with resistor and capacitors and circuit diagram. 50/- each.

BURNHAM ELECTRONICS

8 Ravine Road, Boscombe, Hants.

OPPORTUNITIES IN RADIO



Get this FREE Book!

"ENGINEERING OPPORTUNITIES" reveals how you can become technically qualified at home for a highly paid key appointment in the vast Radio and Television industry. In 176 pages of intensely interesting matter it includes full details of our up-to-the-minute home study courses in all branches of RADIO AND TELEVISION, A.M.Brit. I.R.E. City and Guilds, Special Television, Servicing, Sound-film Projection, Short Wave, High Frequency and General Wireless Courses.

We definitely guarantee

"NO PASS—NO FEE"

If you're earning less than £10 a week this enlightening book is for you. Write for your copy to-day. It will be sent FREE and without obligation.

BRITISH INSTITUTE OF ENGINEERING TECHNOLOGY

149 Shakespeare House.

17-19 Stratford Place, London, W.1 **BIET**

G.S.V. (MARINE & COMMERCIAL) LTD.

IMMEDIATE DELIVERY of all amateur and television arrays.

Lightweight Uncorroddible Beam Arrays (Prov. Pat.). BT328 28 mcs. 3-element T-match, 300 ohms feed-impedance, or BFD328 28 mcs. 3-element folded dipole, 70-80 ohms feed-impedance, both 1" dia. boom and 3" dia. elements, weight, including 3 ft. rotation-stub 15 lbs., £5/10/-.

BFD444, 145 mcs. 4-element folded dipole, 70-80 ohms feed-impedance, spaced 0.2, £3/17/6.

BFD344. 3-element version of above, £3/5/-.
DUAL 14 and 28 ARRAY. 3-element T-match for 14 mcs., spaced 0.1 and 3-element folded dipole for 28 mcs., spaced 0.1 and 0.15, on welded lattice cradle of 1" x 1" x 1" light steel, 14" x 1" x 1", with detachable outriggers, £26/-.

Television Arrays, London or Midlands
Frequency TVFL. Four element high-gain array, with 10 ft. mast and stayed boom, £7/5/-.

TVTL. Three-element folded dipole array, complete with 6 ft. mast, £6/-.

TVRL. Folded dipole and reflector, with 6 ft. lightweight mast, £5.

Coax dipoles, corner reflectors, broad band arrays, etc., etc. Price on application.

Packing and carriage paid anywhere in Great Britain on all save cradled array.

All communications to Head Office :-

395 High Street, Chatham, Kent

Telephone: Chatham 3253/5

THE RADIO & ELECTRICAL MART

of 253-B PORTOBELLO ROAD, LONDON, W.11

Remember, money back guarantee. Phone : Park 6026 Please add postage when writing.

Valves. 5U4G, 6Q7GT, 6/6; V960 EHT rectifiers, 5kv 10ma, 6/6; 9001, 9002, 9003, 5/-; metal 6K7, 5/6; 954, 955, 3/6; 6V6, 6C8, 807, 7/6 each; 1S5-1S4, 6/6; 1T4-1R5, 7/6. Y63 Tuning Eye, 8/-; 354, 8/6; 6L6, 10/6; 117Z6, 12/6. All post paid. 6SH7's better than EF50's, 4/6.

Selenium Rectifiers. H. W. 250v 60mA, 4/6; 120mA, 6/6; 120A, 6/6. F.W.6 or 12v 1.5A, 10/6; 6 or 12v 4A, 25/-. Postage 6d. on each.

New and Boxed P.M. Speakers

6", 12/6 each, plus 1/- postage.

8", 16/- each, plus 1/- postage.

10", 20/- each, plus 1/- postage.

New IN34 Crystal Diode Cartridges, 5/3. Post paid.

Type R1359 Receiver Power Pack. In grey steel case 8" x 9" x 6 1/2", contains two separate complete power units with outputs of 390v at 80 mA and 300v at 60mA. Each with 6.3v 3A LT. Price £4/12/6.

Mains Transformers. Input, 200/240v, output 6.3v 1.5A, 7/6. Post 9d. 4v 8A, 25/6, post 9d. 300-0-300v 80ma, 6.3v 3.5A, 5v 2.5A, 21/6, also 350-0-350v, at same price, post 1/-. Special 230/4 or 6v 4A, 6/10. Post paid.

Multi-Ratio Output Trans., 30 watts, 25/-, post 10d.

New Miniature Condensers, in all. cans, 450v 8 mfd., 3/6. 16x8 mfd., 8x8 mfd. and 32 mfd., 16x16 mfd., 4/10 each. Post paid. 32x32 mfd., 350v, 6/-.

TU9B Unjts. Complete in black crackle cases, 17/6. Carriage paid.

New 0-500 Microammeters, 2" 500ohm internal resistance, 7/6 each. Post 6d.

U.S. Carbon Microphones, as used with Type 58 sets, 2/6. Post 6d.

Phone Adaptors. Converts low impedance phones to high impedance, 1/6.

New Brown's Moving Reed Phones, 6/6 pair. Post paid. Finest made.

M/C Microphones, 5/6. Post paid.

Trans., to match, 5/6. Post paid.

RF24 Units. Converted to 28 mcs band, variable tuned with 100-1 geared SM. dial. Complete with plug and leads for immediate use. £2/5/-. Post paid.

New Army Morse Keys, 2/10, post paid.

Army Morse Key & Buzzer Set, 4/10, post paid

A.M. Mains Transformers. Input 230v. Output 500-0-500v 200mA.

6.3v 4A C.T., 5v 3A, 4v 3A. Price 35/- + 2/6. Input 200/240. Output 6.3v 5.5A, 6.3v 7.5A, 6.3v 8.5A, 35/- + 2/6.

Input 230v. Output 350-0-350v 250 mA, 5v 5A, 25/- + 2/6.

0-250 Milliammeters, 2 1/2", 10/-. Post paid.

New Crystal Microphone Inserts. Arcos or Brush, 8/6 each. Post paid.

New Crystal Pick-Ups. "BAI," "Piezotone," 26/- each. Post paid.

New Crystal Pick-Up Head Inserts, 8/6 each. Post paid.

New G.E.C. Trans. Double Wound. 250 watt, 230/115v, in grey steel cases, 47/6. Carriage paid.

No.19 TX/RX Sets complete (less leads), in excellent condition, £15. Carriage extra.

YOU CAN RELY ON US FOR BRAND NEW, CLEAN, COMPETITIVE COMPONENTS. IMMEDIATE DISPATCH

VALVES

In addition to our large stock we again have a few of the following:—6L6 (Metal), 10/-; 6AM6, 9/8; 6AL5, 7/8; 6C4, 6/8; 6C5gt, 6/-; ECC32, 10/-; EL32 (Mullard), 6/6; 7Y4, 7/8; 7C5, 6/-; VU39a, 7/8; EL35, 7/6; EL33, 10/-; CL33, 10/-; 12K7gt, 10/-; EF39, 10/-; 6D5, 7/6; EB41, 6/-; EL42, 8/6.

CONDENSERS

High Voltage New Surplus:—4,000v .25mfd, 2/6; 5,000v .01mfd All. tube 1 1/2" x 6", 3/6.

ALADDIN FORMERS

1" diam. with core, 7d.; 1 1/4" diam. with core, 10d.; 1 1/2" with core as specified in "Portable Televisors", by Bradley, 9d.

FILAMENT TRANSFORMERS

Finished in green crackle and of very small dimensions, 210/240v to 6.3v at 1.5a, 8/6; 210/240v to 4v 3a, 12/6; 210v/240v to 12v 3a, 8/6.

LIGHTWEIGHT SPEAKERS

Shallow with very small magnet. Brand new, 3", 12/6; 5", 10/6; 8", 15/-; 10", 21/-.

MIDGET COILPACKS

465K/cs, MW/LW, 25/-; MW/SW, 25/-; LW/MW/SW, 28/6. Very small, totally enclosed. Ideal for car radio, midgets, etc.

SELENIUM RECTIFIERS

250v at 75 m.a. New and checked at this rating, 5/6 each.

SPEAKER TRANSFORMERS

Goodmans. 55 : 1, 4/6; midget mains pentode, 3/9; super midget for personals to match 384, DL92, 4/3.

CHASSIS

New, polished, 20SWG Tinplate chassis 14" x 9" x 2 1/2", four sides and soldered, 7/6, post 9d.

Don't forget some postage, chaps.

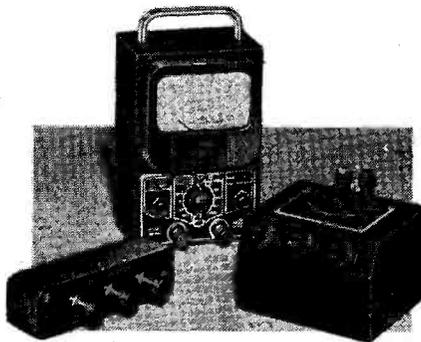
RADIO SERVICING CO.

Dept. M/O, 444 Wandsworth Road, Clapham, S.W.8.

M A Caudy 4155

CATALOGUE No. 7, available, 21d. stamp

26, 28 Tram, 77, 77A Bus. 100 yds. Wandsworth Road S.R. Station. Open till 6.30 p.m. 1 o'clock Wednesday



CONSISTENTLY *Accurate* PULLIN SERIES 100 TEST SET

Sensitivity 10,000 ohms/volt with A.C./D.C. Voltage Multiplier for 2,500v and 5,000v. Volts A.C. and D.C. Range : 10, 25, 100, 250, 500, 1,000. Milliamps D.C. only : 2.5, 10, 25, 100, 500. Ohms : 0-10,000 and 0-1 megohm. A.C. Current Transformer. Range : 0-0.25, 0-0.1, 0-5, 1-0, 5-0, 25-0 amps.

We can give early deliveries.

Address all enquiries to :

MEASURING INSTRUMENTS (PULLIN) LTD.
DEPT. T, ELECTRIC WORKS, WINCHESTER ST.,
LONDON, W.3. Telephone : ACOm 4651/3 and 4995

MAINS TRANSFORMERS, SCREENED, FULLY INTERLEAVED AND IMPREGNATED

Half Shrouded—	
H.S.63.	Input 200/250v. Output 250/0/250v. 60 m/a. 6-3v 3 amps, 5v 2 amps .. 15/6
H.S.40.	Windings as above 4v 4 amps, 4v 2 amps .. 15/6
H.S.2.	Input 200/250v. Output 250/0/250v. 80 m/a .. 17/6
H.S.30.	Input 200/250v. Output 300/0/300v. 80 m/a .. 17/6
H.S.3.	Input 200/250v. Output 350/0/350v. 80 m/a .. 17/6
H.S.2X.	Input 200/250v. Output 250/0/250v. 100 m/a .. 19/6
H.S.30X.	Input 200/250v. Output 300/0/300v. 100 m/a .. 19/6
H.S.3X.	Input 200/250v. Output 350/0/350v. 100 m/a .. 19/6
Fully Shrouded—	
F.S.2.	Input 200/250v. Output 250/0/250v. 80 m/a .. 19/6
F.S.30.	Input 200/250v. Output 300/0/300v. 80 m/a .. 19/6
F.S.3.	Input 200/250v. Output 350/0/350v. 80 m/a .. 19/6
F.S.2X.	Input 200/250v. Output 250/0/250v. 100 m/a .. 21/6
F.S.30X.	Input 200/250v. Output 300/0/300v. 100 m/a .. 21/6
F.S.3X.	Input 200/250v. Output 350/0/350v. 100 m/a .. 21/6
All above have 6 3-4-0v at 4 amps, 5-4-0v. at 2 amps.	
F.S.43.	Input 200/250v. Output 425/0/425v. 200 m/a, 6-3v 4 amps C.T. 6-3v 4 amps C.T. 5v 3 amps .. 42/6
H.S.6.	Input 200/250v. Output 250/0/250v. 80 m/a, 6-3v, 6 amps C.T. 5v 3 amps. Half-shrouded For Receiver R1355 .. 24/6
Framed, Flying Leads—	
F.30X.	Input 200/250v. Output 300/0/300v. 80 m/a, 6-3v 7 amps, 5v 2 amps .. 26/6
FB150.	Input 200/250v. Output 350/0/350v. 150 m/a, 6-3v 3 amps C.T. 5v 3 amps. Half-shrouded .. 25/9
H8120.	Input 200/250v. Output 350/0/350v. 120 m/a, 6-3v 2 amps C.T. 6-3v 2 amps C.T. 5v 3 amps Fully shrouded .. 27/6
FB150.	Input 200/250v. Output 350/0/350v. 150 m/a, 6-3v 2 amps C.T. 6-3v 2 amps C.T. 5v 3 amps Fully shrouded .. 28/9
FILAMENT TRANSFORMERS	
F.5.	Input 200/250v. 6-3v at 10 amp, 5v at 10 amp, 10v at 5 amp, 12-6v at 5 amp. Framed Flying Leads .. 31/6
F.U.6.	Input 200/250v. 0-2-4-6-6-3v at
F.29.	Input 200/250v. 0-2-4-6-6-3v at Clamped 2 amps .. 9/- Flying Leads 4 amps .. 15/-
F.6.	Input 200/250v. 6-3v 2 amps .. 7/6
F.12.	Input 200/250v. 12-0v. Tapped at 6-3v 3 amps .. 15/6
F.24.	Input 200/250v. 24v tapped at 12v 3 amps .. 21/6
C.W.O. (add 1/- in the £ for carriage). All orders over £2 carr. paid	
H. ASHWORTH (Dept. S.W.) 676 Great Horton Road, Bradford, Yorks.	

RADIO SUPPLY CO. OFFER

Brand New Guaranteed Goods

ELECTROLYTICS. Smfd 450v Small Met. Tubes, 1/10 : 8-16mfd 450v Caps, 3/8 ; 16-16mfd 450v Midget Caps, 3/11.

MAINS TRANSFORMERS. Fully Interleaved and Impregnated. Primaries 200-230-250v Screened.

Drop Through Types with Top Shroud	
260-0-260v 70m.a. 6-3v 3a, 5v 2a ..	12/11
250-0-250v 70m.a. 6-3v 2a, 5v 2a, Midget 2 1/2-3 1/2 ins. ..	15/6
350-0-350v 70m.a. 6-3v 2a, 5v 2a ..	15/6
350-0-350v 80m.a. 6-3v 3a, 5v 2a ..	17/6
350-0-350v 100m.a. 6-3v 4a, 5v 3a ..	19/6
350-0-350v 150m.a. 6-3v 4a, 5v 3a ..	25/9

Fully Shrouded Upright Mounting Types	
250-0-250v 60m.a. 6-3v 2a, 5v 2a, Midget 2 1/2-3 ins. ..	15/6
350-0-350v 100m.a. 6-3v-4v 4a C.T., 0-4-5v 3a ..	21/9
350-0-350v 150m.a., 6-3v 2a, 6-3v 3a, 5v 2a ..	27/9
425-0-425v 200m.a. 6-3v-4v 4a C.T., 6-3v-4v 4a C.T. 0-4-5v 3a ..	42/6

SMOOTHING CHOKES. 40m.a. 360 ohms 10h, 3/3 ; 60m.a. 400 ohms 15h, 4/3 ; 80m.a. 350 ohms 12h, 5/3 ; 100m.a. 100 ohms 10h, 6/8 ; 200m.a. 5h 100 ohms, 6/11 ; 250m.a. 100 ohms 10-15h Potted, 11/8.

FILAMENT TRANSFORMERS. Inputs 200-250v 6-3v 2a, 7/6 each, 63/- doz ; 0-4-6-3v 2a, 7/9 each ; 12v 1a, 7/11 each.

SELENIUM RECTIFIERS. 250v 75m.a. H.W. C.T. 3-4 ins., 4/6 ; 12v 1a H.W. C.T., 1/8 each, 10/6 doz.

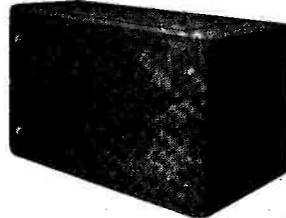
EX. GOV. TUBULAR CONDENSERS. In Sealed Protectives. 1mfd 350v Dabiller, 2/9 doz ; 1mfd 500v T.C.C., 3/3 doz.

ULTRA 8-in. M.E. SPEAKERS WITH 5000-ohm TRANS. Field 1000 ohms .. 15/9 each

STANDARD PENTODE OUTPUT TRANS. 5000 ohms, Small Size, 2/5.

RE. GOV. VALVES (NEW). Boxed 954, 955, 2/6 ; 6J5GT, 2/11 ; 6N7GT, 4/11 ; VU11, 4/8 ; 5Z4Mat, 5/8 ; 6K7GT, 6V6G, 6J7G, 6U4G, 6P6C, 6AG7, 9/11 ; 6Q7, 807, 6K2Met, 1/4, 6/6 ; 25A6G, 25L6GT, 1T4, 6/11 ; 1K5, 384, 68N7GT, U22, 12K7, 7/6. C.W.O. or C.O.D. over £1. Postage extra under £2. Callers Welcome 9 a.m. to 5.30 p.m. Closed 1.0 p.m. Sat.

RADIO SUPPLY CO.
15 Queen Square, Leeds, 2



BACK MOUNTING CABINET FOR 19" PANEL

CABINET to accommodate one 19" x 10 1/4" x 1 1/4" steel rack panel with 17" x 12" x 2 1/4" chassis and angle brackets in 18G. steel ; panel secured by four chromium plated screws. Approximate overall dimensions 21" x 12 1/4" x 11 1/4" high, louvred on back, having radiused front corners and rubber feet .. £3 15 0
Two carrying handles Extra 6 0
Recessed lid, 14" x 8" in top Extra 10 0
Pack-flat export version Extra 12 6
FINISHES : Black, grey or brown wrinkle enamel.

CARRIAGE : Paid to towns in the United Kingdom.
Illustrated Lists and Trade Terms on application.

REOSOUND ENGINEERING & ELECTRICAL COMPANY

"REOSOUND WORKS,"
COLESHILL ROAD, SUTTON COLDFIELD
Tel. : SUT. 4685.
Grams. : Reosound, Sutton Coldfield.

Quality Equipment for the Advanced Amateur

AR88 and AR88LF. Guaranteed brand new condition. Crated and sent passenger train. Carriage paid, £45 each.

R107 COMPLETE. The Famous Army Communication Receiver. 1.2 to 17.5 mcs (17-250m), perfect order and condition, 11 gns. carriage paid. Few less case, perfect in every respect, 9 gns.

Q-MAX B4/40 TRANSMITTER. List price £75. SHOP SOILED ONLY. Guaranteed brand new, £50.
R107. Fine order and condition. £13/10/-. Carriage paid.

1155 RECEIVERS. Absolutely brand new in Transit Cases. The best you have ever seen. £9/10/-. carriage 7/6.

12-VOLT CAR RADIO. Comprises an ex-Govt. 6-valve Command Receiver. Expertly modified to tune the medium wave band. 5" P.M. Loud Speaker (separate from receiver). Very fine performance. £5/10/-. carriage paid.

TU6B, TUBB, TU9B. New condition. Less outer case. 10/- each, carriage paid. Prompt despatch. Satisfaction guaranteed.

H. P. RADIO SERVICES LTD.,

Britain's Leading Radio Mail Order House,
55 County Road, Walton, Liverpool, 4
Estab. : 1935. Tel. : Aintree 1445
Staff Call Signs:—G3DLV, G3GDL

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.

TRADE

QSL's and LOGS by MINERVA. The best there are. Samples from Minerva Press, Elm Park, Essex.

AMERICAN MAGAZINES. One year post free. *Radio Electronics*, 32/3. *Audio Engineering*, 28/6. *Radio & Television News*, 36/-. *Popular Science*, 28/6. Stamp for list from **WILLEN LTD.** (Dept. 62), 101 Fleet Street, London, E.C.4.

QSL CARDS and LOG BOOKS. APPROVED G.P.O. SAMPLES FREE. **ATKINSON BROS., PRINTERS, ELLAND, YORKS.**

WIRELESS TELEGRAPHY. Attendance and postal courses.—Dept. F. Wireless School, Manor Gardens, Holloway, N.7. (ARC. 3694).

TRANSFORMERS are our business. Lowest prices, highest quality. Write for complete price lists. Rewinds a speciality.—W.D.T., 77 Gt. Western Street, Manchester, 16.

VALVES wanted for cash.—Types VU39, 6K8, 6L6, 723A/B, 829B, 832, 6J6, 6AK5, 1R5, IS5, IT4.—Details to Box 786.

WANTED: New surplus valves of all descriptions, large or small quantities. Tubes type 725A, 723A/B, 829B, 1B24 or 1B22. All types of test instruments. Selsyns, Magslips, Receivers and transmitters. Best prices. Immediate settlement.—Write Box No. 810.

SURPLUS valves—all new and boxed. 6V6, 5Z4, 6J7, 6F6, 2X2, VU111, 6B8, 6AC7, 6X3, KT44, 5U4, EBC33, 4I, 6SK7, 6SO7, 6N7, EF39, HP4106, 6K7, 6SH7, AC6PEN, 6Q7, all at 5/6 each. Morganite V/C w/s $\frac{1}{2}$, 1, 2 Meg, 4/-; Silver Mica Condensers all values, 3/6 dozen, 0001, 0002, 0003, 0004, 0005, moulded, 3/6 dozen. 5" Rola L/T, 10/6. 8" Plessey L/T, 11/6. 10" Rola L/T, 21/-. 10" Plessey L/T, 17/6. Send for lists.—Alpha Radio Supply Co., 5-6 Vinces Chas., Victoria Square, Leeds, 1.

FOR PA or aerial coupler coils. Eddystone (Cat. 1091/2) frequence base and sub-base, five plugs, three sockets, 2/9 pair.—G2CKW, 203 Hollydale Road, London, S.E.15.

BC624 Rx and BC625 Tx complete, in perfect condition, ideal 2-metre job, £2/15/-. Eddystone 640, new, £18. 1154, 4-band Tx, new, 43. BC348 modified, £13.—G13GDN, 27 Oakwood Place, Portadown, N. Ireland.

WANTED.—AR88LF Receivers and RA34 power units in brand new or "as new" condition. Advise quantity and price to Box No. 823.

WANTED.—BC-610 Hallicrafter transmitters; SX-28's, AR-88's, receivers and spare parts for the above. Best prices.—Write Box 850, c/o Spiers Service, 69 Fleet Street, E.C.4.

WANTED.—Junction boxes for Hallicrafter transmitters JB-70-A, also Antennae tuning units BC-729-A and T-50 microphones.—PCA Radio, The Arches, Cambridge Grove, W.6. (Tel. RIV. 3279.)

BLACK Crackle paint, beautiful finish, stove or air dried. Enough for 10 sq. ft. 2s., post free. Satisfaction guaranteed.—Geoff. Wheatley, G8QB, 80 Millmead Road, Margate.

THE CANDLER SYSTEM will train you for your MORSE CODE TEST

Read the following extracts from unsolicited letters sent us by Candler students:—

Ref. No. 3795. (First five lessons). "I recently passed my G.P.O. Amateurs' Morse Examination after your first five lessons." (Junior Course)

Ref. No. 2245. (Glad to announce.) "I am glad to announce that I recently passed the F.M.G. Special Exam, and as you will see on my report, my speeds are now far ahead of the speeds needed in the examination. I therefore walked through the telegraphy part." (Junior Course)

Ref. 2573. (A really wonderful course). "I feel it my duty to express my appreciation for a really wonderful course. Before taking the course my 'solid' receiving speed was about 18 to 18 w.p.m., this I copied letter by letter—and was I nervous." To-day I can copy 25 to 26 w.p.m. at one word behind. I can read 30 to 35 w.p.m. as easily as reading a book. Frankly I think that all the 'profit' I have gained from the Candler System cannot be represented by—so many words per minute; but, rather as a lifetime's experience gained in a few weeks. It has been said, 'you have to pay to learn'—true, but with Candler you pay so little and learn so much." (Advanced Course)

There are Candler Courses for the absolute Beginner and for Operators desiring to increase their accuracy and speed in the Receiving and Sending of the Morse Code.

Full details of Candler Courses are given in the

"BOOK OF FACTS"

Sent post free on request.

Courses on Cash or Monthly Payment Terms.

THE CANDLER SYSTEM CO.

(55s.w) 121 Kingsway, London, W.C.2

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

SAMSONS SURPLUS STORES

36-FT. AERIAL MASTS

R.A.F. type 50. Complete kit consists of nine tubular sections, length 4 ft., dia. 2 in., set of pickets, top plate guys and all fittings. Brand new in canvas carrying case, £4, plus carriage 7/6.

ALKALINE BATTERIES

Brand new, made by Britannia Batteries Ltd. Bank of ten cells with a total voltage of 11.5v at 45 Ah. All fitted into wooden case. Dimensions 27 $\frac{1}{2}$ " x 9" x 6". Limited supply only. £7/10/-, carriage 7/6.

MINIATURE VALVES

Hivac XH, 7/6; 6AG5, 10/6; IT4, 6/-; 9003 5/-; 6J5GT/G, 4/6; 5U4G, 6/6; U15, 8/6; Base, 1/6. All valves supplied as new. Postage 9d.

HEAVY DUTY FILAMENT TRANSFORMERS

Prim. 200-240v, 50 cy., Sec. 6.3v, 15 amp. Brand new 15/-, postage 1/6.

H.D. TRANSFORMERS

Prim. 200-240v, 50 cy., Sec. tapped at 14v and 20v 20 amps. 37/6, postage 2/-.

CRYSTAL LAPEL MIKES

Brand new guaranteed microphones, highly sensitive, 12/6, post 9d.

HOWARD-BUTLER VOLTMETERS

First grade voltmeter, 150v D.C. Accuracy 1 per cent. In handsome test meter type case with carrying strap, dimensions 6 $\frac{1}{2}$ " x 6 $\frac{1}{2}$ " x 3 $\frac{1}{2}$ ". Finely calibrated 6 $\frac{1}{2}$ " scale. Brand new. 52/6 each, post 1/6.

169/171 EDGWARE RD

LONDON, W.2. Tel. PAD 7851

125 Tottenham Court Rd. Tel. EU5 4982

All mail orders to our Edgware Rd. branch, please
HUNDREDS OF BARGAINS FOR CALLERS

SMALL ADVERTISEMENTS

READERS'—continued

AR88D S-meter, RCA cabinet speaker, manual, an FB Rx, first offer near £50 secures. Seen any time. S.640, £18. 1155 modified, £7. Rx 1115, 300-600 mc, GG RF, bandspread, £5/10/-.—Taylor, 41 Main Road, Lake, Sandown, I.O.W.

50/75 watt Phone-CW Tx, complete with VFO and power pack, compact, ideal flat dweller, £16. S.A.E. details. New Corsor DB CRT, £3. PV1-35's, £1. DET 12's, 15/-.—G3AAK, 44 Croft Road, Swindon.

SELL or exchange, R.1116A, with eliminator rectifier, plugs, etc., £7/10/-, R.1224A, new, £5/15/-, R.1132A, new, £4/19/6. Wanted, CW/Phone Tx or AC amateur band receiver. Offers, fullest details.—Bartlett, Whitland, Carmarthenshire.

BC3480 internal P/P, speaker and phones. 25w CW CO/PA Tx with 350v P/p, all circuits metered. Also 20 valves DET 12, 809, 807, 1625, 6L6, etc. £20 the lot.—Robinson, 155 Bishop Street, Londonderry, Northern Ireland.

ARMY 19 set, Tx/Rx 2.0 to 8 mc. 807 output, 15 valves, complete, good condition. £15. Tiny Tim petrol electric generator, 12v to run set. £10. 1154 Tx, modified for xtal control, £5.—Box No. 816.

WANTED.—American BC639A VHF receiver, preferably with manual.—Hollis, 143 Lymington Avenue, Leigh-on-Sea, Essex.

HAMBANDER, as new, £10. Woden mains trans. 750v, 250 mA, 45/-, C.E.G. 100 kc, bar, £1. 5-section, 42-ft. steel mast, less guys, £2.—4 Boardman Road, Manchester, 8.

R107 built-in clock, S-meter, manual, 28 mc converter with p/p, radio globe, £12 the lot, or exchange for enlarger or good camera.—Lister, 13 Silver Royd Grove, Leeds, 12.

CANADIAN 52 receiver, 1.75-16 mc in 3 bands with loudspeaker, xtal calibrator, switched volt/S-meter. 230v power pack, EL32 output added. New condition. Prefer buyer collects. South London. Offers about £13.—Box No. 817.

WANTED AR88D or HRO, must be perfect. SX25 part exchange or sell £25 or offer. BC222 28 mc trans./receiver, £5 or offer; 4-poster steel rack, 3 ft., 30/-, Commercial 'scope or Panadaptor wanted, must be perfect.—Box No. 818.

URGENTLY wanted. HRO Bandsread coils. Offers to G3GMZ, 12 Kingsmead Avenue, Tolworth, Surbiton, Surrey.

AR88D Fitted S-Meter, alignment tools, excellent condition, £45. Will exchange for complete HRO, 100 kc-30 mc with bandsread coils, plus £15.—Box No. 822.

EDDYSTONE S640. Stabilised Oscillator, good condition, £18. Buyer collects, all letters answered.—G3BPE, 35 Bladindon Drive, Bexley, Kent.

VALVES: 807, 4/6; 6J5, 2/6; DI, VU111, VR130^QP21, 2/-; CV6, 1/6; 210LF, 1/-. Please add 6d. postage.—G3FXB, 26 Landseer Det, Hove, 4, Sussex.

6J6, 8/6; 6AK5, 832A, 7/6. Brand new, boxed, £20.—Box No. 819.

SCR522 VHF Tx/Rx, 110-150 mc. BC733, mc. ARN5, VHF Superhet Crystal Rx, 332-335 mc. All complete, unmodified, as new, manuals included, £5 each.—Box No. 820.

RADIO **G200** Announces

12V IBBATOR UNIT NO. 4* (Ex-No. 22 Set). Rated 12v D.C. input. 325v at 80mA out. Contains 4 metal rectifiers, 4-pin vibrator, transformer, chokes, etc. Ideal for car radio, supply etc. Price 25/-, plus 3/- carriage.

BUTLER LOW PASS FILTER TYPE 2 F/L. Stop TV1 22/0 incl. postage.

NEW SURELUX VALVES. 6AL5, 8/6; 6BA6, 6BE6, 9/-; 6U4, 10/-; 6F12, 6F14, 12/6; 6LD20, 10/-; 6Y31, 15/-; 1N5, 12A6, 12SK7, 6SN7Gt, 7C5, 7W7, 3A4, 6Q7G, 717A, 6/6; 6F8, W81, X81, VR91 (EF50), 5/8; NR74, AC6Pen, VR91 sylvania, VR136 (EF54), 6/9; VR78 (D1), VR92 (EA50), 3/8; N81, Neon stabilizer 73-143-205 and 283v, 12/9. Send 1d stamp for list.

TRADE AND OVERSEAS ENQUIRIES INVITED

ARTHUR HOILE 55 UNION STREET, MAIDSTONE · KENT

Phone: 3155

BRASS, COPPER, DURAL, ALUMINIUM, BRONZE

ROD, BAR, SHEET, TUBE, STRIP, WIRE

3,000 Standard Stock Sizes

NO QUANTITY TOO SMALL

List on Application

H. ROLLET & CO. LTD.

London, 6 Chesham Place, S.W.1. Liverpool, Kirkby Estate SLOane 3463. Simonswood 3271

ROCK RADIO (G3LN)

VALVES. 832, 13/6; 2A3, 7/6; 6L6M, 8/6; 807, 6/-; 803, 805, 11/9; 5U4, 6/9; EF50, EF54, 4/6; EL32, EF36, 3/9; 5Z4, 5/9; 6X5, 5/3; 6J5, 3/3; EA50, 2/.

DURAL TUBE. 1" x 16 s.w.g., 8d. ft.; 1" x 16, 7d.; 1/2" x 20, 4d.; 1/2" x 20 alum, 3d.; 1/2" x 18, 3d.; small stocks, please quote alternatives, car extra.

FEEDER. 300 ohm HD, 70 ohm 5d. yd.; 70 ohm co-ax 1/2" dia., best quality, 7d. yd.; all car. extra.

3" MAGSLIPS, 50/100v ac, 17/6 pr. **METERS**, 350mA TC, 3/8; 40v MC, 3/8. **TX CONDENSERS**, 146 pf 4kV, 3/8. **CHOKES**, midget 5H, 2/-; swinging 3-6/4-2H 150mA, 5/-. **PO** standard jack plugs 4d., large type 4-way plugs and sockets 6d. pr. **CERAMIC SWITCHES** for 150 watts, 3-bank 2-way, 5/-, or 3 for 12/8; 2-bank 3/6, or 3 for 9/-, **COPPER WIRE**, 12 to 44 swg, enam., DSC, LEWMEX and LITZ, see previous ads 1164 TX, 3-band, new in crate, 45/10/-.

We stock Eddystone, Denco, components.

1801 Pershore Road, Birmingham, 30. Kin 2787.

DELIVERY FROM STOCK

No Waiting—By Return Post

NEW RADIOCRAFT "DX-2" RX

Superb new kit, price only 78/6. A.C. operated 2v, using EF50's and latest miniature Eddystone Coils.

NEW "GLOBE-KING" 0-V-0 RX

Acclaimed one of the finest single valve receivers yet! Ideal for beginner or miniature enthusiast. A precision kit, complete with valve, coils, etc., for only 49/6. 2½d. stamp brings illustrated catalogue.

JOHNSONS (RADIO) MACCLESFIELD

M. & J. PEARSON,

263 Gallowgate, Glasgow, C.4.

Offer the following clearance lines:—

100 K/G Crystals, Biley and E.C.A., 12/6 each. Selenium rectifiers, full wave 24v 4 amp, 25/- ea.; 12v 4 amp, 13/-
 Ex-U.S. Tuning Units. Range C and D, enclosed in black cracked case, 12" x 9 1/2" x 8 1/2", with handles, 15/- each.
 New Transformers. Input 220-240v. Output 350-0-350, 80M.A., 6-3 and 4v, 5 amp, 5v 2 amp, 16/- each.
 Ferranti 0-500 Micro-Ammeters, 2 1/2" flush type. New and boxed special offer, 18/6 each. Modulation transformer, dual input and output 360 watt, and 12 watt, multi-tapped primary, totally enclosed, 7" x 7" x 7", weight 30 lbs., make by Parmeko, 25/- ea. Choke, 10 Henry, 650 M/A. Totally enclosed, 7" x 7" x 7". Weight 30 lbs. Made by Parmeko, 25/-, Swinging choke, 3-6 to 4-2H, 250 M.A. Totally enclosed, 4 1/2" x 3 1/2" x 4". Weight 7 lbs. "Parmeko," 7/8 each. American Loran indicator. Less valves and tube. Contains a host of components, including 24 Ceramux valves and solder. High voltage condensers, switches, etc., 17/6.

All prices include carriage or post.

Cash with Order and please write name clearly.

—EASIBINDERS—

for THE "SHORT WAVE MAGAZINE"

Bind your issues in the Easibinder. By a simple operation the journals are inserted with a steel wire, and at once become a neatly bound volume for the Bookshelf.

The Easibinder is bound in green cloth, and gold-blocked with title and year on the spine. It will hold 12 issues. (One volume.)

PRICE 11/3 (Post Free)

A Binder can be sent on approval if requested. When ordering please state the years to be blocked.

EASIBIND LTD

PILOT HOUSE, MALLOW STREET, LONDON, E.C.1

10 Valve Superhet VHF Receiver. Covers 110-150 mcs. (R2B/ARC5). Modifies to 144 mcs. Complete in metal case, size 14" x 7" x 4 1/2". 45/-, plus 3/ post.

Command Receivers, 6 Valve Superhet, 1 RF, 2 IF, covers 3-6 megs, 12v input, converts to Car Radio. 45/-, plus 3/ post.

Mains Transformers. 150.0.150 at 100 mills. 4/-, plus 1/4 post.
 Similar, 150.0.150 and 0, 10, 20, 30 and 40v, all at 70 mills. 4/- plus 1/4 post.

Converted 3515 Television Strip for Sutton Coldfield. Covers Sound and Vision. Only £5/10/-, post 7/6.
 Write for details.

FIELD'S

435-7 Stratford Road, Sparkhill, Birmingham 11
 and
 68 Hurst Street, Birmingham 11. MID. 3619

BRAND NEW EX-GOVT. VALVES !

The following valves are brand new and in their original cartons :
 8006, 5/-; 6J50GT, 3/8; 2C26, 2C20A, 2X2, 605, 6N7GT, 4/9;
 6AC7, 6J6, 6BK7, 6BK7GT, 5/8; 6KT, 6K7GT, 5/8; 5Y43,
 824, 6F6G, 807, 0/8; 7V7, 0/6; 6C8, 7/-; 6J6, 10/-; 810,
 27/6.

The following are brand new, but in plain cartons or unboxed :
 12EG, 2/-; 6RH7, 3/6; 12SH7, 4/-; 2C26, 6SK7, 4/9; 6B8,
 12XJ7, 12SK7, 12SK7GT, EC53, 7/6; 5/-; 5R4GY, 824, 5U4G,
 12BG7, VR105, 5/9; 6F6G, 6J7, 6V6GT, 6V6, 6Y6G, 0/-;
 6BA7, 0/8; 6C4, 0/6; 80, 7/-; 1829, 7/6; 6L6G, 6J6, 7/9;
 6N075, 0/6.

ADMIRALTY WAVEMETERS 682A (2, 250-3, 150 Mcs) contain EC53, EA50, Y31, magnetic eye and 12V BF50's, also 200:1 slow-motion dial and numerous components in sturdy grey case. Weight 23 lbs. Price 31/-, plus 4/6 carriage.

Please add postage on valve orders less than 15/-.

J. E. FORD,

278 Portland Street, Southport

SMALL ADVERTISEMENTS

TRADE—continued

EDDYSTONE S640 Receiver for sale, £17/10/-.
 This receiver is in immaculate condition and has been used for a few hours only; it will be carefully packed and sent carriage paid on receipt of cash. Guaranteed.—Davey, Zwicky, Avenue Road, Freshwater, I.O.W.

FOR sale. Eddystone 640, as new, with speaker and phones, £16 or offer? TU6B, good condition, 10/-, TU6B, converted into VFO, 20/-.—W. English, 578 Glasgow Road, Clydebank, nr. Glasgow, Scotland.

WANTED. HRO or any other good receiver, full particulars.—Box No. 821.

WANTED. Instruction book for the AR88LF. Loan or purchase, G3DFS, 20 Oakwood Road, Sutton Coldfield, Warwickshire.

FOR Sale. Telefunken Rx, 14 valves, AC or 12v DC, Panoramic tuning twin crystal filter, etc. Working 1.5-25 mc, spare tubes, cheap, £9. HRO coils and bandspread, 10, 20, 40, 80, one general 100, £10. Full set coils for Eddystone 358, £6. Wanted Panoramic viewer, 455 kc, if good order. SX28A Rx, good order, wooden cabinet and sep. speaker, cheap, £22/10/-. Carriage paid, write only.—S. Gabriel, 10 Abbotsford Place, Glasgow, C.5.

A MATEUR going QRT. Power unit Type 285, 400v/250 mA, 2,000v/20 mA, 6.3v/5A, 6.3v/3A. C. 230/200v input, 50/-, Power unit Type 3, rack mounting, 250/300v 100 mA, 6.3v 4A, 35/-, Tuning unit CAY 47155, 1500-3000 kc, 7/6. 700v 200 mA power pack, on aluminium chassis, 15/-, Signal generator Type 505, 430 kc to 15 mc, with artificial aerial and RF/AF output meter contained in one unit, practically new, £5. N-H 3 range frequency meter and wave meter/phone monitor, 3000-19000 kc, in carrying case with diode and probe, £2/10/-. Also Oscilloscope, valve-voltmeter, valves, etc. Send reasonable carriage.—21 Milner Road, Morden, Surrey.

FOR Sale.—Hallicrafters SX28A, with manual, £65. AR88LF, late model, manual, nearest £45. Both receivers unmarked, in original mint condition inside and out.—G3DAM, Offenham Road, Evesham.

3BZ Transmitter for sale, £4/10/-. Also Voigt 2-ft. Tractrix Horn, 35/-, or offers. Both very good condition.—Knight, 132 Elgar Avenue, Tolworth, Surrey. (Elmbridge 6931.)

WELDED steel tower 32 ft. high, 5 ft. square base, 1-ft. square top, dismantles into two 16 ft. lengths. Offers, G3COI, 59 Darlington Street, Wolverhampton, (Phone 35332.)

AR88LF unused, maker's case, buyer collects, £39/10/-.—10 Wake Green Road, Birmingham. (South 0958.)

PROP-PITCH motor 24v. AC, £2/10/-. C.P. BC453, new, £2/10/-. TU5B with case, new, £1/10/-. Shaftsbury Extal Mic and stand, £3.—GM3BHY, Moulin, Balmoral Road, Blairgowrie.

G3EGS selling Marconi CNY2 transmitter/receiver. Complete Phone/CW.7 Station for 40/80/160 from AC mains, with microphone and key, £20. R103A, £7.—47 Lindsford Road, Birmingham, 30. (KIN 3268.)

HALLICRAFTERS Super Skyrider SX17, 13 valves, 1A-mains, continuous 5 to 550 metres, crystal, S-meter, BFO. Excellent appearance, working well. Delivery arranged, £30 or near offer.—2 Wolverhampton Road, Codsall, Staffs.

EDDYSTONE 640. Immaculate condition, unscratched, just over one year old. Stabilised frequency changer. Little used. Phones. £21.—Box No. 824.

LAWRENCES

A guarantee of satisfaction with everything we sell

NEW VALVES. At 2/9, 7193, EA50, LD210, LP 220, SP41. At 4/-, 6J5GT, 6SH7, PM2, EB34, VU120. At 5/-, 2X2, 2C26A, 6SL7, 7V7, 12A6, 12C8, 12A87, 12J5, 12SH7, 12SG7, 12SR7, 28D7, 37, 713A, 865, 956, 9006, ARP12, AR8, P61, SP61, 8D2, V872, VT52. At 6/6, 3Q5GT, 5R4, 5U4G, 5Y3G, 5Z3, 5Z4M, 6AB7, 6C5, 6C8, 6J5, 6K6, 6K7GT, 6Q7GT, 6SK7, 6SJ7, 6SN7, 6B8, 6SQ7, 6V6GT, 6V6G, 6X5GT, 6Y6G, 807, 957, 9001, 9002, 9003, EBC33, EF36, EF50, EC52, EL35, AU5, NR77, KTZ41, RL37, VS70, VT60A, VU111, VR91, VR137. At 7/6, 1A5, 1R5, 1S4, 1S5, 3B26, 6AC7, 6AG5, 6AG7, 6B4, 5C4, 6F6, 6F7, 6J7, 6K7, 6K8, 6L7, 6N7, 6SA7, 6SF5, 6SG7, 6V6M, 9D6, PEN46, 72, 73, 83V, 2050, 2051, EF39, CV66, ECH35, 1625, VU39. At 10/-, 6L6, 717A, 6J6, 1616, P27/500, PX25. At 15/-, 832, 866A, 721A, 724A, 1B24, 3FP7. At 17/6, XFG1. At 25/-, 811, 8025. At 27/6, 813, 931A (Photo. cell.), 9013A. At 35/-, 715B, 805, VCR97. At 45/-, 829B, SCPI. At 50/-, 2J22 (complete with magnets). At 75/-, 723A/B. All guaranteed. Two or more valves post free, otherwise add 6d. postage.

NEW RCA TRANSFORMERS. Primary 0-190-210-230-250v. 50-60 cs. Secs.: 400-350-0-350-400v @ 150 mA, 6-3v 6A, CT, 5v 3A. Screened, fully shrouded. A complete amplifier circuit for 6L6 in push/pull, with colour codes, etc., is included. A superb product new in maker's carton. Price, 35/-.

NEW METAL STORAGE CABINETS. Of improved design, fitted with 12 sliding drawers. Overall dimensions, 10½" × 7½" × 6", extremely useful for segregation and neat storage of small parts. Price 17/6 each.

NEW CATHODE RAY INDICATORS TYPE LD 11/APS4. A small American unit containing two valves, 6J6 and 3" CRT, 3FP7, precision components, etc. In makers' cartons, 35/-.

NEW BULLEN HIGH-SPEED TELEGRAPH KEYS TYPE 26003A. A very popular type, fully enclosed with precise contact adjustment. Black wrinkle finish. 7/6.

NEW AMERICAN STAR IDENTIFICATION INSTRUMENTS. Complete with charts for all latitudes in Northern and Southern hemispheres. Accurate in all parts of the world. In leather case, 5/-.

NEW FIFTEEN-INCH JENSEN AUDITORIUM SPEAKERS. Energised type A-15, Orthodynamic. Exceptional freq. response. Flux density 12980 gauss. Gap energy 7.5 million ergs. Listed at \$89. A bargain at £7 10 0 each.

NEW TX CHOKES. 10H. 200mA. Resistance 77 ohms. Potted, with high insulation terminals made by RCA, UTC, etc. Too good to miss at 12/6.

RECEIVERS TYPE 161. Employs four B96 valves. Fitted with 4-band rotary turret UHF coils which are electrically rotated. Less valves, 7/6 each.

NEW MARCONI WAVEMETERS TYPE G94. A laboratory class instrument of the highest quality. Tuning range 170-430 mcs, easily extended for 70 cm amateur band. Silver-plated RF components, HRO type tuning dial. Contain many valves including EF50, voltmeter diode, etc., complete with calibration charts, plugs, in fitted mahogany transit cases. New and perfect. £7, carriage paid, and insured.

NEW PHOTO MULTIPLIER CELLS TYPE 931A. High vacuum type, with high response in visible region. Great sensitivity, low noise level, freedom from distortion, low dark current and small size. Ideal for film scanning, colorimetric measurement. Spectrography, astronomical measurements. Alpha particle counting and facsimile transmission, etc. Equivalent to Type 27M1. Complete with special 11-pin holder and circuit. New, 27/6.

VHF DIPOLE ASSEMBLY. Part of Rebecca installation. Streamlined junction box. Parasitic reflector element, suitable for mod. to TV antenna or 70 cms. 3/6.

INTERFERENCE SUPPRESSORS. Fitted in aerial lead-in to set. Small unit in screening can, 1" × 1½" × 2½". 3/9.

AERIAL LIGHTNING ARRESTORS. Highly efficient, sealed in evacuated glass tube. Complete with insulated holder. 3/6.

NEW HIGH-GRADE CERAMIC WAVE CHANGE SWITCHES. Compact size, floating rotor. Single-pole 3-way or single pole 6-way. Either type, 3/6.

RCA FOCUSING COILS. For electro-magnetic tubes with neck dia. up to 1.5", 6/6. Deflector coil assembly to match, 6/6.

NEW CENTIMETRIC COMPONENTS. For 1, 3 and 10 cm bands. Klystrons, gas gaps, launching sections and wave guide sections. Free list on request.

MISCELLANEOUS CLEARANCE BARGAINS. New Bulgin toggle switches. SPST, plated, 1/9. DPST rotary, 1/9. Midget output transformers, 40-1 UTC, USA, 2/6. Magnetron magnets, 9 lb., 5/-. Blower units, 24v, powerful air blast, precision motor, 4/9. Command receiver spares—enquiries invited, HF chokes, 1/-. Skyrod whip aerials with base insulator, 9 ft., 7/-. Transmitting crystals from 3/6. BC 453-4-5 control panels, 7/6. Tannoy microphones, 2/-. VHF receivers BC 624, ideal for two metres. Less valves, 6/-. carr. 2/6. Co-ax. connectors with 2 Pye plugs, 2/-. VCR 97 tube holders, 3/6. RX No. 19 control panels, 3/6. Dynamotors type 33 6-12v, 200v, 5/-. Sperry bomb-sight computers. Contains countless bearings, pinions, motors, lenses, 50/-. Moving coil headphones with MC mike, 5/3. American micro switches, 2/9. New 500-watt auto transformers shrouded, 37/6. New National HRO vibrator power packs, 12v, 25/-. Rack mounts for BC 453 sets, etc. Single 6/6, double 7/-. triple 7/6. Experienced export shippers. All prices include U.K. carriage. Terms C.W.O. Satisfaction guaranteed or money immediately refunded.

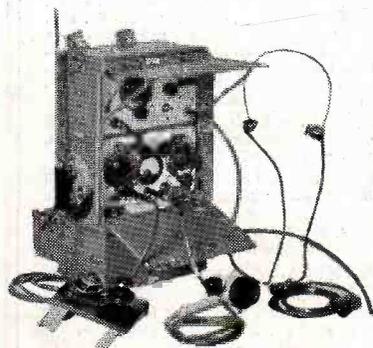
LAWRENCES, 61 BYROM STREET, LIVERPOOL, 3. CENTRAL 4430

CLYDESDALE

Bargains in Ez-Services Radio and Electronic Equipment

NOW THAT YOU ARE A LICENSED AMATEUR

You are allowed to operate a station on CW with an input of up to 10 watts. You will require a transmitter, a receiver, and a band marker or wavemeter. The American WIRELESS SET No. 48 Mk1. provides the operator with a complete 40-metre rig which can be used in any QTH, and fulfils these requirements, and is especially suitable for the "Ham" who is without an AC main power supply—the '48 is battery powered. Once you have completed that QRP year on CW the "48" can be kept as a stand-by, or a field-day rig.



The "48" has a frequency range of 6-9 mc/s (33.3-50 M.) and comprises a transmitter equipped for 'FON or CW operation, VFO control, driving a pair of 1299's in the final at an approximate input of 8 watts, and features a built-in modulator and a 1,000 kc/s freq. standard complete with crystal, and a "netting" device which allows the transmitter to be VFO'd spot on to any signal received without the Tx final being operated. A morse key and microphone is supplied.

The receiver is a 6-valve superhet which is extremely selective and sensitive, and covers the freq. range of the Tx. It has an RF stage, BFO and AGC with provisions for use of M/C headphones (also supplied).

A hand-driven generator is supplied for emergencies and it is suggested that this generator could be driven by a motor and so give constant power in place of the batteries when the Tx/Rx is not used as a portable. Spare valves, a 10-ft. sectional rod aerial, battery containers, etc. are also supplied.

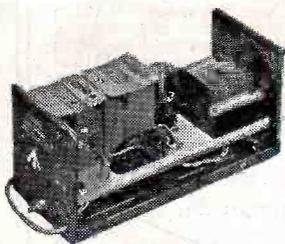
Dimensions of Tx/Rx as one unit : $11\frac{1}{2} \times 10\frac{1}{2} \times 17\frac{1}{2}$ ins.

Clydesdale's Price only **£14 10 0** Post paid

HAM NOTE.—GM3ASM (Staff) operated this unit with a 99 ft. long wire and made numerous 100 per cent. QSO's on both CW and "Fon" with OZ, SM, LA, GM, GW, and G stations.

POWER UNIT

An extremely handy A.C. Mains Power Unit by Stratton Co., complete and ready to plug into a



mains supply of 0-200/250v 40/60 cy. A.C. With an output of 175v at 60 m/a H.T. and 12.5v/2.5A L.T. A necessity in any experimenter's workshop or "Ham's" shack.

Totally enclosed in louvred metal cabinet, $11\frac{1}{2} \times 5\frac{1}{2} \times 4\frac{1}{2}$ in.

Clydesdale's Price only **39/6** each Post paid

YOUR FULL POWER LICENCE

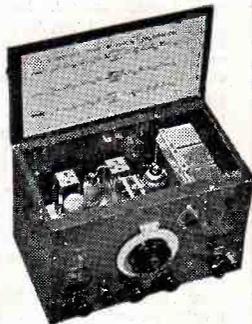
The POWER UNIT 247 will provide you with enough volts/current for a 120 watt final, and if a pair of justifiably famous 807's (our price 10/6 each) are used in the final you have the heater supply laid on, for the "247" will provide you with 600 volts D.C. H.T. at 200 m/a and 6.3 volts at 3 amps L.T., and it is worth remembering that the Modulator can be powered by one of these units.

The "247" employs a 580-0-580v/200 m/a, 6.3v/3 amps transformer with an 0-230v A.C. primary, condenser input, single choke filter, 5U4 rectifier, and pilot lamp. Enclosed in a louvred metal case finished in grey with chrome carrying handles. $11 \times 9\frac{1}{2} \times 7\frac{1}{2}$ in. The "247" is an extremely compact "Power Egg."

Clydesdale's Price only **£2 19 6** each Carriage paid

NOW READY

Complete illustrated List No. 7. Send 6d. to cover distribution cost. Please print name and address.



STILL AVAILABLE

The R.1224A 5-valve battery-powered receiver with real communications features. An extremely sensitive set tuning "SHIPPING," "TOP BAND 160," "80" and "40" metres. This is YOUR receiver!

Clydesdale's Price only **£5 19 6** each Post paid

Order direct from :—

'Phone : SOUTH 2706/9

CLYDESDALE SUPPLY CO LTD • 2 BRIDGE STREET GLASGOW - C.5

VISIT OUR BRANCHES IN SCOTLAND, ENGLAND AND NORTHERN IRELAND

Printed in Great Britain by Lochend Printing Co., Ltd., London, S.W.9, for the Proprietors and Publishers The Short Wave Magazine, Ltd., 53 Victoria Street, London, S.W.1. The Short Wave Magazine is obtainable abroad through the following : Continental Publishers & Distributors, Ltd.; William Dawson & Son, Ltd.; CANADA—Imperial News Co., of Canada; AUSTRALIA AND NEW ZEALAND—Gordon & Gotch, Ltd.; AMERICA—International News Company, 131 Varick Street, New York. Registered for transmission to Canada and Newfoundland by Magazine Post. October, 1950.