

The SHORT WAVE Magazine

VOL. XXIV

JULY, 1966

NUMBER 5

KW ELECTRONICS

EUROPE'S LEADING MANUFACTURER
OF EQUIPMENT FOR THE RADIO AMATEUR

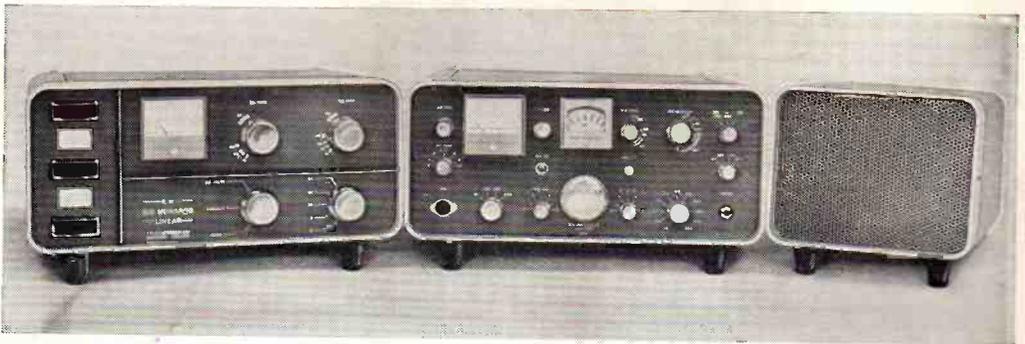
KW2000 plus **KW600** =
TRANSCEIVER LINEAR AMPLIFIER

SIGNAL PUNCH

KW2000 (90 watts)
complete for only **£173**
PSU **£32**

KW2000A (180 watts)
complete for only **£195**
PSU **£40**

KW600 Linear Amplifier
complete with PSU **£115**



Available from stock: For maximum signal punch, using the maximum power permitted by the GPO—the KW600 Linear Amplifier is unbeatable; and can be driven by either the KW2000 or KW2000A, S.S.B. Transceivers.

Illustration shows a smart and powerful station, the KW2000 and KW600 with PSU—styled in the new 'G' line. (Cabinets with lift-up inspection lids, handsomely finished in two-tone grey stoved-enamel.)

Continued Success
KW "VANGUARD" TRANSMITTER
for AM and CW
Price 10-80M **£69. 6. 0**
10-160M **£73. 10. 0**

CONTACT YOUR LOCAL DISTRIBUTOR
G. FRANCIS — Newark. **LONG BROTHERS** — Dunkineedy, Co. Donogal.
G. W. SMITH & CO. (Radio) LTD.—London. **W. J. McCONAGHIE**—
Bangor. **CHAS. H. YOUNG LTD.**—Birmingham. **L. HARDY**—Aberdeen.
J. A. TWEEDY LTD. — Chesterfield. **PETER SEYMOUR LTD.** — Hull.

Outstanding Success
THE KW "YESPA" TRANSMITTER
"A good buy," says G3EDD.
10-160 metres SSB, CW and AM.
Price **£110**. Power Supply **£25**

K.W. ELECTRONICS Ltd.,

1 HEATH STREET, DARTFORD, KENT

Phone: **DARTFORD 25574**
Cables: **KAYDUBLEW, Dartford**



Eddystone RECEIVER

OF MAJOR INTEREST TO ALL RADIO ENTHUSIASTS

EC 10 transistorized communications receiver

A most efficient transistorized communications receiver of light weight, compact dimensions, and capable of a really good performance. Five ranges give continuous coverage from 550 kc/s to 30 Mc/s (545 to 10 metres), and included are the medium-wave broadcast band, the marine (coastal) band from 1500 to 3000 kc/s, and all the short-wave broadcast bands. Also available are the six major amateur bands and many services in between.

The EC10 receiver accepts normal AM telephony and CW telegraphy, a special filter being provided to increase selectivity (and also reduce noise) in the CW mode, as is often desirable. Single sideband signals can



be successfully resolved by appropriate setting of the BFO for carrier reinsertion. A total of 13 transistors and diodes is used, leading to high sensitivity and consistent results on all ranges. The main scales occupy a length of nine inches and are clearly calibrated direct in frequency. The standard Eddystone precision slow-motion drive controls the tuning, which is exceptionally smooth and light to handle. An auxiliary logging scale permits dial settings of chosen stations to be recorded.

An internal speaker gives good aural quality and a comparatively high audio output is available—one can easily believe the set is mains operated. For personal listening, a telephone headset can be plugged into the socket on the front panel, the speaker then being out of action.

Alternative aerial sockets are provided, for dipole, long wire, or short rod or wire. Power is derived from six cells housed in a separate detachable compartment. Current consumption is related to audio output and, for long life, HP2-type heavy-duty cells are recommended.

The receiver is housed in a metal cabinet, and, with robust construction throughout, it will stand up to hard usage over a long period with a high degree of reliability. The finish is an attractive two-tone grey. The dimensions are width 12½", height 6¾", depth 8"; weight with batteries is 14 lb.

Eddystone Radio Limited

Eddystone Works, Alvechurch Road, Birmingham 31

Telephone: Priory 2231 · Cables: Eddystone Birmingham · Telex: 33770

LTD/JEDS

We are the Antenna People

**TRAP
MASTER**



V-3 Jr.

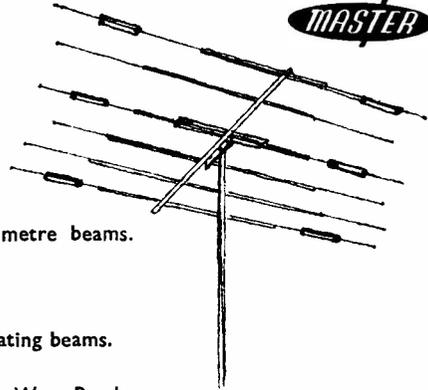
SOME OF OUR ANTENNAS

VERTICALS : RV-4. 10, 15, 20 and 40 metres.
V-4-6. 10, 15, 20 and 40 metres.
V-3 Jr. 10, 15 and 20 metres.
VTD Jr. 10, 15 and 20 metres.
TW-3X. El Toro. 20, 40 and 80 metres.
TA-31 Jr. 10, 15 and 20 metres. Also Horizontal.
MA-3. Mobile Whip. 10, 15 and 20 metres.

HORIZONTALS: TA-33 Jr. TA-32 Jr. 10, 15 and 20 metre beams.
A-142. 14 element, 2 metre beam.
A-203-C. 20 metre monoband beam.
A-315. 15 metre monoband beam.
A-310. 10 metre monoband beam.
TA-33, TA-32 and TA-36. 10, 15 and 20 metre 2 kW rating beams.
TD-3 Jr. 10, 15 and 20 metres. Trapped dipole.

Short Wave Listeners' Antennas: SWL-7 Broadcast Short Wave Bands.
RD-5 Ham Bands. 10, 15, 20, 40 and 80 metres.

Accessories : D-4BCA. Base loading coil for 80 metres with V-4-6.
AK-60. Masthead Adaptor.
Polythene, cord and rope.
Rotators.
Coax cable and twin feeder.
S.W.R. indicators.
Towers.



TA-36

Send for complete Catalogue, containing full details of Antennas and other technical information. 25 pages 1/-.

Telephone: Costessey 2861, orders only

Mosley Electronics Ltd. 40, Valley Road, New Costessey, Norwich, Norfolk Nor. 26K

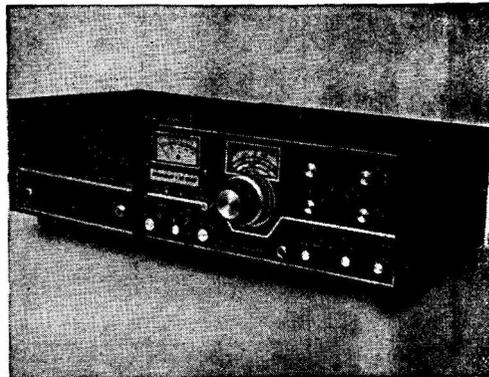
SWAN THE MOST RELIABLE AMATEUR TRANSCEIVER EVER MANUFACTURED. ASK THE AMATEUR WHO OWNS ONE

Sideband suppression :
40 dB.

Carrier suppression :
50 dB.

Lower sideband 80m.-40m.

Upper 20-15-10m. (opposite sideband kit available).



Basic transceiver with A.C. supply/speaker, £250

● Big Signal well in excess of 400w. P.E.P. SSB, up to 320w. C.W., 125w. A.M.

Precision dual ratio tuning.

Full coverage of all bands 80-10 Mtrs.

Immediate delivery. Top allowances on modern trade-in equipment.

First class after sales service.

Latest brochures available from your supplier.

Full range of accessories :

100 Kc. calibrator kit £9. 10

Opposite sideband kit £8. 15

Transistor V.O.X. ... £16. 0

Remote V.F.O. with 22 adaptor for up to 200 Kc. split frequency working ... £50. 0

Remote V.F.O. with 22 adaptor for full band split frequency working ... £57. 0

We have now appointed the following Agents
Central London: G. W. Smith & Co. North West London: Philadelphian Electronics, 188 Broadhurst Gardens, N.W.6.
Midlands: J. B. Lowe, 115 Cavendish Road, Matlock, Derbyshire. Scotland: L. Hardie, 542 George St., Aberdeen.

PETER SEYMOUR LTD
410 BEVERLEY ROAD, HULL, YORKSHIRE
Tel. 41938 (43353 after 7.30)

HOME RADIO LTD. 187 LONDON ROAD, MITCHAM, SURREY 'Phone MIT 3282

BARGAINS GALORE !!

Hurry ! Hurry ! Hurry ! Many of the bargains we are offering (at a fraction of their correct value) are single items, so seize your pen Now and don't lose the chance of a lifetime. Remember, it's "First come, first served." Avoid disappointment and send today. Please add 2/6 postage and packing.

Here we are :

SMOOTHING CONDENSERS

8 Mf. 1000V. TCC Visconol 17/6

TUNING CONDENSERS

Eddystone 35Pf Butterfly 6/6
Eddystone 160Pf Single 3/6
500Pf Twin gang 6/-

However if you are after run of the mill items such as resistors, condensers, coils, chokes, transformers, why not send for our catalogue ? 210 pages, 5800 items. Price 7/6 plus 1/6 postage. Each catalogue contains 5 vouchers worth a total of 5/- if used as directed. Send your P.O. or cheque for 9/- with the coupon on the right.

Eddystone TRANSMITTING CONDENSERS

Cat. No.

815 60Pf single 1600V. (list 16/-) 10/-
818 31-31Pf Butterfly (list 24/-) 15/-
834 100-100Pf Differential 2500V. (list 51/6) 31/6

TRIMMING CONDENSERS

50Pf 3500V. 2/-
Jackson C.801 type Air dielectric 20Pf ... 1/6
Jackson " " " " 50Pf ... 1/6
Jackson " " " " 100Pf ... 1/9

HIGH VOLTAGE CONDENSERS

3Pf 4kV. 1/6
200Pf 10kV. 4/-
1000Pf 3kV. 2/6

Please write your name and address in block capitals

NAME

ADDRESS

Home Radio Ltd., Dept. SW, 187 London Rd., Mitcham, Surrey

AMATEUR RADIO
CHAS. H. YOUNG LTD.

MIDLAND AGENTS
FOR

- ★ **EDDYSTONE**
RECEIVERS & COMPONENTS
- ★ **NATIONAL**
RECEIVERS & TRANSCEIVERS
- ★ **GREEN EQUIPMENT**
- ★ **KW EQUIPMENT**
- ★ **MOSLEY AERIALS**
- ★ **WITHERS**

- **H.P. FACILITIES AVAILABLE**
- **PART EXCHANGES**

AERIAL EQUIPMENT

TWIN FEEDER. 300 ohm twin ribbon feeder similar K25, 6d. per yard. 75 ohm twin feeder, 6d. per yard. Post on above feeders and cable, 2/- any length.

COPPER WIRE, 14G, H/D, 140ft., 30/-; 70ft., 16/- Post and packing 3/3. Other lengths pro rata.

FEEDER SPREADERS. 6" Ceramic type F.S., 10d. each. Postage 2/6 up to 12.

CERAMIC CENTRE PIECE for dipoles, Type AT, 1/6 each. P. & P. 1/-.

2 METRE BEAM, 5 ELEMENT W.S. YAGI. Complete in box with 1" to 2 1/2" masthead bracket. Price 49/- P. & P. 4/-.

SUPER AERIAL, 70/80 ohm coax, 300 watt very low loss, 2/3 per yard. 50 ohm 300 watt, 2/6 per yard. P. & P. 2/6.

TOUGH POLYTHENE LINE, type ML1 (100lb), 2d. per yd. or 12/6 per 100 yds. Type ML2 (220lb), 4d. per yd. or 25/- per 100 yds., ML4 (400lb), 6d. per yd. Ideal for Guys, L.W. Supports, Halyards, etc. Postage 1/6 on all line.

ABSORPTION WAVEMETERS. 3.00 to 35.00 Mc/s. in 3 Switched Bands. 3.5, 7, 14, 21 and 28 Mc/s. Ham Bands marked on scale. Complete with indicator bulb. A MUST for any Ham Shack. ONLY 25/- EACH. Post free.

BANDCHECKER MONITOR. 3.00-35.00 Mc/s. in 3 switched Bands. 0-1 mA indicator. Monitor Socket. Very sensitive, £3/13/6. P. & P. 3/6.

VARIABLE CONDENSERS. All brass with ceramic end plates and ball race bearings. 50Pf, 5/9; 100, 6/6; 160, 7/6; 240, 8/6; and 300Pf, 10/6. Extension for ganging. P. & P. 2/-.

RACK MOUNTING PANELS: 19" x 5 1/2", 7", 8 1/2", or 10 1/2", black crackle finish, 5/9, 6/6, 7/6, 9/- respectively. P. & P. 3/-.

30 WATT MOD. TRANS. 2 x 807 mod. to 807 R.F. Few only, 18/6 each. P. & P. 3/6.

K.W. FROM STOCK

VESPA, £110 PSU. £25
2000, £173 PSU. £32
2000A, £195 PSU. £40

TERMS AND EXCHANGES

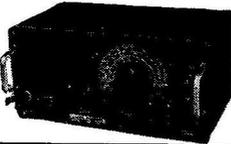
CHAS. H. YOUNG LTD
170-172 Corporation St., Birmingham 4

Please print your address. No C.O.D. under £1. 'phone CEN 1635

P.C.R.3. RECEIVERS

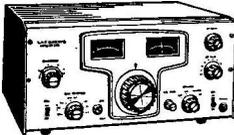
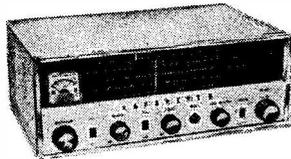
Absolutely brand new. Three wavebands, 190-550 metres and 2.2-23 Mc/s. With circuit, £8/19/6. Carr. 10/6. Plug in power supply 12v. DC, 19/6; 230v. AC, 35/-

P.C.R.1. Receivers. With built-in speaker. Covering long wave, medium wave and short wave. 6-18 Mc/s. £8/19/6. Carr. 10/6.



HAM-1. 4 BAND COMMUNICATION RECEIVER

Four wavebands covering 535 kc/s.-30 Mc/s. Five valve superhet circuit. Incorporates S meter, B.F.O., BANDSPREAD TUNING, BUILT-IN 4" SPEAKER, FERRITE AERIAL AND EXTERNAL TELESCOPIC AERIAL. Operation 220/240v. AC. Supplied brand new with handbook, £16/16/-, carr. 10/-.

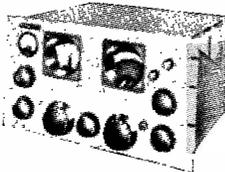


HA.350 10-80 METRE AMATEUR RECEIVER

A superb receiver. Dual conversion with mechanical filter. 12 valves, crystal controlled osc., product detector, 100 kc/s. crystal calibrator, crystal B.F.O., A.N.L., "S" meter. Rock like stability. Brand new and guaranteed. 75 gns. S.A.E. for full details.

HAMMARLUND SP-600IX COMMUNICATIONS RECEIVER

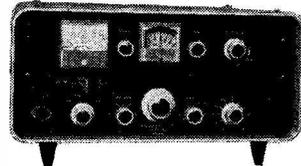
High quality professional dual conversion communication receivers available for the first time in this country at a reasonable price. Frequency range 540 kc/s.-54 Mc/s. in 6 bands, variable tuning or 6 channel crystal controlled. 2.5 watt output into 600 ohms. Input 110/230v. AC. 20 valve circuit incorporating Xtal filter, B.F.O., A.N.L., S meter, etc. Size 19" x 12" x 22". List £520. Offered in excellent condition, fully tested and checked, £100 each.



K.W. EQUIPMENT

VESPA TRANSMITTER
10-160 metres SSB, CW and AM, £110. Power supply, £25.

IMMEDIATE DELIVERY



ALSO AVAILABLE: KW 2000, £173. PSU, £32. KW 2000A, £195. PSU, £40 KW 600 Linear Amp., £115

GREEN EQUIPMENT IN STOCK

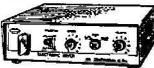
TRM5 RECEIVER, £35; SPEAKER AND DC UNIT, £6; AC P.S.U., £5. Mk. V CONVERTERS, 4m., £10; 2m., £12; 70cm., £18

SWAN-350 10-80 METRE TRANSCEIVER

400 watts P.E.P. Complete with AC metre supply consul, £250 ex-stock. S.A.E. for details.

MODEL DA-1 TRANSISTORISED FULLY AUTOMATIC ELECTRONIC KEYS

230v. AC or Battery operated, £16/10/-, P.P. 6/-, also Precision automatic bug keys, £4/10/- P.P. 3/6.



SILICON RECTIFIERS

200 P.I.V. 200 mA ... 2/6
400v. P.I.V. 3 amp ... 7/6
1,000v. P.I.V. 500 mA ... 7/6
800v. P.I.V. 500 mA ... 5/6
400v. P.I.V. 500 mA ... 3/6
800v. P.I.V. 5 amp ... 7/6
70v. P.I.V. 1 amp ... 3/6
150v. P.I.V. 165 mA ... 1/-
Discount for quantities. Post extra.

LONDAX COAXIAL AERIAL CHANGEOVER RELAYS

24v. DC. Complete junction box as used for TR 1985 TX. Brand new boxed, 39/6, carr. 4/6.

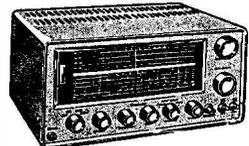
MAIN LONDON AGENTS FOR CODAR EQUIPMENT

CR70A, Communication Receiver ...	19 10 0
CR45 Receiver Kit ...	9 10 0
PR30 Preselector ...	5 10 0
PR30X Self powered ...	7 4 0
RQ10 "Q" Multiplier ...	6 15 0
RQ10X Self powered ...	8 8 0
AT5 Amateur TX ...	16 10 0
AT5 Mains P.S.U. ...	8 0 0
AT5 12v. Transistor P.S.U. ...	11 5 0
AT5 Remote control and Aerial Switching Unit ...	2 7 6
T.28 2-band Receiver ...	15 10 0
CC-40 Station Control Unit ...	6 10 0
	Postage extra

NATIONAL HRO COILS

Set of 9 general coverage coils, covering 50 kc/s.-30 Mc/s., £10/10/-, carr. 10/-, also HRO dials, 27/6, P.P. 1/6.

HA.230 DE LUXE GENERAL COVERAGE RECEIVER. Wonderful value. 8 valves + rectifier. Coverage 550 kc/s.-30 Mc/s. 1 RF and 2 IF stages, "Q" multiplier, B.F.O., A.N.L., "S" meter, electrical bandspread, aerial trimmer, etc. Brand new and guaranteed, £33. S.A.E. for full details. Also available in easy to assemble semi-kit form at 25 gns.



HA.55A AIRCRAFT RECEIVER

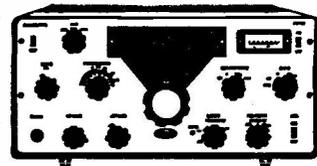
108-136 Mc/s. High selectivity and sensitivity. Incorporates 2 RF stages including 6CW4 Nuvistor, 8 tubes for 11 tube performance, solid state power supply, adjustable squelch control, slide rule dial, built-in 4" speaker and front panel phone jack, 220/240v. AC. Supplied brand new and guaranteed. £19/7/6, carriage 10/-.

HA.63 GENERAL COVERAGE RECEIVER
7 valves — Rectifier, 4 Bands 550 kc/s. — 31 Mc/s. "S" Meter-B.F.O.-A.N.L.-Bandspread Tuning 200/250v. AC. Brand New, 24 gns., carr. paid.



STAR SR.600 AMATEUR COMMUNICATION RECEIVER

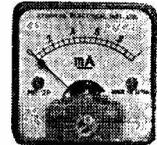
New crystal controlled triple conversion de luxe 80-10 metre band receiver. Extremely high sensitivity, selectivity and stability. Special features include 3 I.F. stages, crystal controlled oscillator, 4 section L/C filter, "S" meter, B.F.O., A.N.L., 100 kc/s. crystal calibrator, etc. Supplied brand new and guaranteed. 95 gns. S.A.E. for full details.



108-176 Mc/s. Ground Plane Antenna, 59/6.

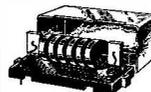
CLEAR PLASTIC PANEL METERS

First grade quality, Moving Coil panel meters, available ex-stock. S.A.E. for illustrated leaflet. Discounts for quantity. Available as follows. Type MR. 38P. 1 21/32" square fronts.



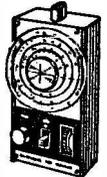
50µA	32/6	1mA	22/6	200mA	22/6	10v DC	22/6	750v DC	22/6
100µA	29/6	2mA	22/6	300mA	22/6	20v DC	22/6	15v AC	22/6
200µA	27/6	5mA	22/6	500mA	22/6	50v DC	22/6	50v AC	22/6
500µA	25/-	10mA	22/6	750mA	22/6	100v DC	22/6	150v AC	22/6
50-50µA	29/6	20mA	22/6	1A	DC 22/6	150v DC	22/6	300v AC	22/6
100-0-100µA	27/6	50mA	22/6	2A	DC 22/6	150v DC	22/6	500v AC	22/6
500-0-500µA	22/6	100mA	22/6	5A	DC 22/6	300v DC	22/6	500v AC	22/6
1-0-1mA	22/6	150mA	22/6	3v	DC 22/6	500v DC	22/6	"S" Meter	29/6

Larger sizes available — send for lists



PRECISION MECHANICAL FILTER

As used in HA.350 Receiver. For superb selectivity. For 455 kc/s. I.F. provides 60 dB attenuator at 2.5 kc/s. either side. Complete adjacent channel rejection, £9/19/6, post paid.



Compact true one hand operation. Frequency range 1-7-180 Mc/s. 230v. AC operation. Supplied complete with all coils and instructions, £12/10/-, carr. 5/-.

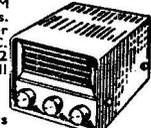


NUVISTOR GRID DIP METER

Signal strength meter using VTVM principles. Calibrated in S units. Sensitivity and zero adjustments for any superhet receiver with AVC. Requires 150-200 volt and 6 or 12 volt. Complete with valve and full instructions, 59/6. P.P. 2/6.

TM-59'er "S" METER

Signal strength meter using VTVM principles. Calibrated in S units. Sensitivity and zero adjustments for any superhet receiver with AVC. Requires 150-200 volt and 6 or 12 volt. Complete with valve and full instructions, 59/6. P.P. 2/6.



DE LUXE V.F.O.

5 bands covering 80-10 metres. Employs high "Q" series tuned Clapp Osc. High output of 10-20 volts to drive any TX. Large slide rule dial. Dual impedance O/P. 230v. AC operation. Size 6 1/2" x 5 1/2" x 7 1/2". Supplied complete with all instructions, £13/19/6, carr. 7/6.

TRANSISTORISED FIELD STRENGTH METER

3 bands, 2.5 to 57 Mc/s., permits easy tune up for max. transmitter output. Earphone jack to monitor audio. £4/19/6 each. P.P. 2/6.

OPEN
9 a.m.—6 p.m.
EVERY DAY
MON. to SAT.

G. W. SMITH & CO. (RADIO) LTD.

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

PART
EXCHANGES
WELCOME

BEST IN VHF-TW COMMUNICATOR

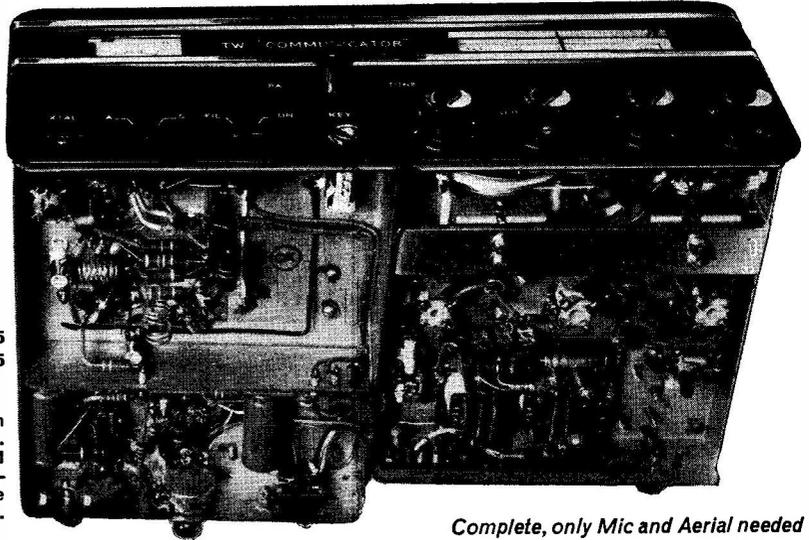
THE TW RANGE OF SELF-CONTAINED TRANSCEIVERS

- ALL TRANSISTOR RECEIVER
- 10-15W TRANSMITTER
QQVO.3-10 P.A.
- EASILY INSTALLED
- SIZE 12" x 4½" x 7"
- SINGLE BAND UNIT
- 12 VOLT DC OPERATION
- HIGH LEVEL MODULATION
- PUSH TO TALK OPERATION

COMMUNICATOR 2 144-146 Mc/s. £75
COMMUNICATOR 4 70.1-70.7 Mc/s. £75

Write for illustrated leaflet.

ALSO AVAILABLE—TW-2 10w. TX with high level mod., companion mains P.S.U.
TW Nuvistor Converter. TW70 CM A2521 Converter. Solid state Converters. 2 metre and 160 metre Mobile Receivers. TW Top Bander 10w. TX. 2 metre Solid state V.F.O.



Complete, only Mic and Aerial needed



T. WITHERS (ELECTRONICS)

15, GILBERT STREET · ENFIELD · MIDDLESEX Waltham Cross 26638

PETER SEYMOUR LTD.

All items in stock at time of going to press

	£	s.	d.
EDDYSTONE EA12. 160-10 Mtrs. amateur bands only.			
As new	135	0	0
EDDYSTONE 750. 480 Kc.-32 Mc/s. dual conversion 1-6 and 85 Kc. I.F.	45	0	0
EDDYSTONE 680. 480 Kc.-32 Mc/s. Built-in "S" meter xtal filter, etc.	45	0	0
AR88D. As new with manual and original "S" meter	65	0	0
NCX3 and power unit. 80, 40, 20. 200W. P.E.P.	135	0	0
KW200 and P.S.U./spkr. unit. Mint	160	0	0
COLLINS 51J-2. 500 Kc.-30 Mc/s., 1 Kc. dial accuracy	195	0	0
HALLICRAFTERS HT40. 40 75W. AM/CW.	25	0	0
GREEN IA600. Linear, 80-10 Mtrs.	45	0	0
TRAP SETS. Full encapsulated in epoxy resin 80-10 Mtrs. and ideal receiving or transmitting aerial system per pair	2	5	0
A DE LUXE AM/CW 55B Transmitter American Heathkit Apache TX1E and matching 5B10 Adaptor European mains input, factory made at a cost of over £200, as brand new throughout	140	0	0
New equipment available FROM STOCK. Top trade in allowances. Hire purchase terms available on items from £35. 25% deposit.			
KW VESPA. 160-10 Mtrs. SSB/CW/AM, with P.S.U.	135	0	0
KW2000. 160-10 Mtrs. SSB/CW, with P.S.U., 90W. P.E.P.	205	0	0
KW2000A. 160-10 Mtrs. SSB/CW, with P.S.U. 180W. P.E.P.	235	0	0
SWAN 350. 80-10 Mtrs. Full coverage, 400W. P.E.P.	250	0	0
H.A. 350. 80-10 Mtrs. Dual conversion, with mechanical filter	78	15	0
BY100 Equivalents			each 4 6
RF45 field strength indicators with telescopic antenna	2	5	0
Japanese semi-automatic bug keys, 5-50 w.p.m.	4	12	6
SWAN 400. 400W. P.E.P. 80-10 Mtrs.	295	0	0

410 BEVERLEY RD., HULL, YORKSHIRE

Telephone: HULL 41938 (43353 after 7.30 p.m.)

N. W. ELECTRICS G3MAX

AR88D REBUILT MODEL WITH PLASTIC WIRING, fully checked and reconditioned, completely realigned, £55, carriage paid.

12v. TRANSISTOR P.S.U. 220 or 300v. 100 mA output, silicon bridge rectifier, choke/capacitor smoothing, £8/19/6, p.p. 3/6.

LOG BOOKS, 7/-, post paid.

OC171 (CV7089), 3/6, post paid.

PCR RECEIVER VIBRATOR POWER UNIT. New, with 12 volt supply lead and plug, 25/-, post paid.

Range of Aluminium Chassis 2½" high. S.A.E. for list.

300 ohm ribbon feeder, Flexible Conductors, 6d. yd., post 1/6

H.R.O. spares and power supplies in stock, S.A.E. for list.

Morse Keys, American Type J37, lead and jack plug, 5/-, p.p. 1/6.

Set of 4 valves for W1191 Wavemeter, 10/-, plus 2/6 p.p.

807 moulded valve holders, 6/- per doz., post paid.

0-002 and 0-01 µF metalmite 1,000 volt, 6/- doz., post paid.

AF116 and 117 Mullard transistors, 4/- each, post paid.

Mullard BY100 800 P.I.V. 5A, 5/-, p.p. 6d.

Low resistance phones, 7/6, p.p. 2/-.

Noise Limiter Kit for TCS receiver, store soiled, 5/-, post paid.

AR88 Mains standby and AVC/N.L. switches, 4/- each, post paid.

HALSON MOBILE AERIALS, £6/10/-.

T.W. EQUIPMENT AVAILABLE

Range of **STANDARDS** and **H.F. XTALS** available
EDDYSTONE RECEIVERS AND COMPONENTS, CODAR, DENCO, REPANCO, etc. We welcome all enquiries however small
Stamped addressed envelope please.

52 GT. ANCOATS STREET
MANCHESTER 4
CENTral 6276

**INDEX TO
ADVERTISERS**

	PAGE
B. J. Ayres & Co.	309
Britec, Ltd.	311
Cathodeon Crystals, Ltd. ...	314
Charles H. Young	258
Contacto Switchgear, Ltd.	262, 309
D. Cursons	311
Data Publications, Ltd. ...	311
Daystrom	<i>cover iv</i>
Eddystone Radio	<i>cover ii</i>
E.M.S.A.C., Ltd.	310
Finnigan Speciality Paints ...	310
George Francis	314
G3HSC (Morse Records) ...	320
G.W.M. Radio	317
Halson Radio Services ...	311
Henry's Radio	311
Home Radio	258
A. Imhof, Ltd.	317
K.W. Electronics	<i>front cover</i>
Labgear, Ltd.	315
J. B. Lowe	319
JXK Converters	310
Mosley Electronics	257
N.W. Electrics	260
Partridge Electronics, Ltd. ...	315
Peter Seymour, Ltd.	257, 260
Philadelphian Electronics, Ltd.	312
RCA Great Britain, Ltd. ...	313
Short Wave (Hull)	312
Small Advertisements	312-320
Smith & Co., Ltd.	259
Stephens-James, Ltd.	316
S.S.B. Products	316
S.W.M. Publications 262, 310, 311, 318, 320, <i>cover iii</i>	
J. & A. Tweedy, Ltd.	310
Withers	260
John Williams Electronics, Ltd.	310
Yukan Products	311, 319

SHORT WAVE MAGAZINE

(GB3SWM)

Vol. XXIV

JULY, 1966

No. 273

CONTENTS

	Page
L. H. Thomas, M.B.E. (G6QB) — <i>An Appreciation</i>	263
High-Performance Transistor Converter for Two Metres, <i>by R. C. Hills, B.Sc. (Eng.), B.Eng. (G3HRH)</i>	266
Aerial Feed Considerations, <i>by F. G. Rayer, Assoc. I.E.R.E. (G3OGR)</i> ...	273
Practical Lecher-Line System, <i>by D. Gilmour (VE7YG)</i>	277
VHF Bands, <i>by A. J. Devon</i>	279
Communication and DX News	283
The Other Man's Station—G3TXW	289
Discussing Single Sideband, Part VII, <i>by B. A. Watling (G3RNL)</i> ...	290
The Mobile Scene	294
"SWL"— <i>Listener Feature</i>	297
Specially on The Air	301
The Month with The Clubs— <i>From Reports</i>	302
New QTH's	308

Managing Editor: AUSTIN FORSYTH, O.B.E. (G6FO/G3SWM)

Advertising: Maria Greenwood

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

Annual Subscription: Home and Overseas 42s. (\$6.00 U.S.) post paid

Editorial Address: Short Wave Magazine, BUCKINGHAM, England

AUTHORS' MSS

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

© Short Wave Magazine Ltd.

MAPS

AMATEUR RADIO MAP OF WORLD

Mercator Projection — Much DX Information — In Colour. Second Edition, 8s. 6d.

DX ZONE MAP

(New edition) 14s. 9d.

RADIO AMATEUR MAP OF THE U.S.A.

State boundaries and prefixes, size 16in. by 36in., paper, 4s. 9d.

RADIO AMATEUR'S WORLD ATLAS

In booklet form, Mercator projection, for desk use. Gives Zones and Prefixes, 10s. 9d.

CALL BOOKS

"G's" only, 6s. 7d.

SUMMER EDITION

"DX Listings," 27s. "U.S. Listings," 45s.
The two together, covering the World, 67/6

LOG BOOKS

A.R.R.L.

(Spiral bound), 8s. 6d.

A.R.R.L.

(Minilog) 4in. by 6in., 5s. 6d.

R.S.G.B.

(Replaces Webbs Type), 7s. 3d.

MORSE COURSES

G3HSC Rhythm Method of Morse Tuition

Complete Course with three 3 speed L.P. records with books ... 84/-

Beginner's Course with two 3 speed L.P. records with book ... 60/6

Single, 12" L.P. Beginner's with book 50/-

Single, 12" L.P. Advanced with book 50/-

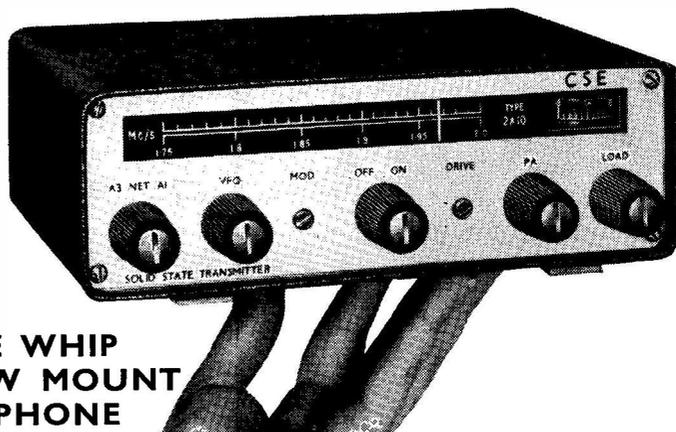
Three speed simulated GPO test. 7in. d.s. E.P. record ... 11/6

Available from **SHORT WAVE MAGAZINE**

Publications Dept., 55 Victoria Street, London S.W.1 · Abbey 5341

SOLID STATE TRANSMITTER

type 2A10
£43.7.0 U.K.



UNIQUE TUNED MOBILE WHIP
WITH INSTANT WINDOW MOUNT
AND MOBILE LIP MICROPHONE
AS OPTIONAL EXTRAS

MOBILE—PORTABLE—FIXED

- * Direct 12 volt operation
- * Supply + or — earthed
- * Circuit protection
- * High efficiency
- * Silicon transistors
- * Wide temp. range
- * Clean A3 and A1 operation
- * Pi-tuned output
- * 1 Amp. nominal!
- * Economical
- * Designed reliability
- * Light and compact

WIDEN YOUR HORIZON FROM ANY LOCATION WITH THE CSE 2A10

CONTACTOR SWITCHGEAR (ELECTRONICS) LTD. MOORFIELD RD.
WOLVERHAMPTON, STAFFS. Telephone: Wolverhampton 23883 Ext. 1.



C711

The SHORT-WAVE Magazine

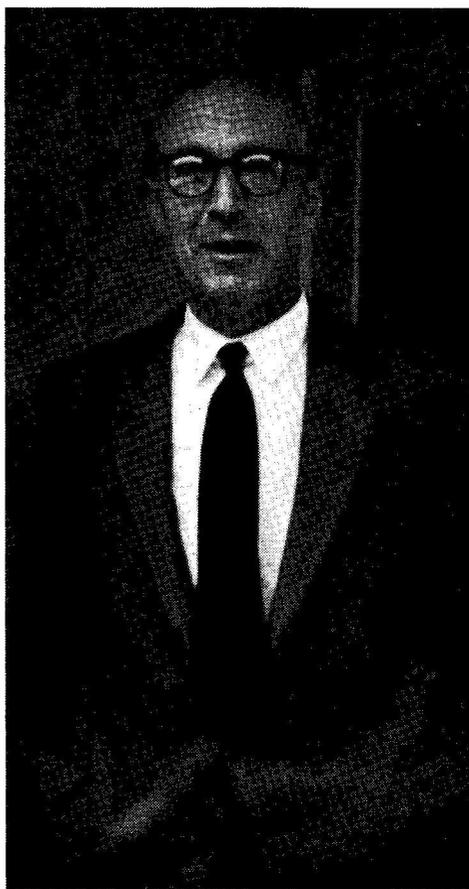
An Appreciation

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

The grievous news in the June issue brought us many sincere tributes to the late Laurence Howard Thomas, MBE, G6QB, of Hastings, Sussex. He died on May 27, in his 60th year. His passing came as a great shock to all his friends and regular contacts the world over. For he was one of the best-known exponents of the art of Amateur Radio.

But in fact very few people knew Tommy really intimately — he was one of those rather solitary and somewhat independent characters who are quite happy in their own company. A bachelor, he lived alone and had no very near relations. A cultivated and highly intelligent individual, he was widely read and kept himself well informed of affairs and happenings outside his two main practical interests, Music and Amateur Radio. His erudition showed in everything he wrote—and for more than 40 years he was a prolific and successful writer on all aspects of Amateur Radio.

The earliest of his offerings that we can trace was in *Experimental Wireless* for July 1925, in which an item entitled "Low-Power Experiments at 6QB" discusses results with an HT supply derived from 36 pocket-lamp batteries in series, to give 150v. for a DER valve in a Hartley SEO circuit, using an aerial-counterpoise radiating system "on a wavelength of 150 metres." With what even in 1925 would have been regarded as a pretty basic rig, he was working all Europe and North America—with an input (from those dry batteries) of just four watts. And the kick-



As he was known and will be remembered by so many of his friends — a recent photograph of Laurence Howard Thomas, MBE, G6QB, Hastings, Sussex, 1906-1966. "He turned in clean copy and never missed a deadline."

An interesting picture of many years ago, and found in Tommy's archives—6QB tuning a 1-V-1 for his sister. Judging by the receiver, this could have been taken about 1928. At that time, the Thomas family lived at Thornton Heath, Surrey.



line to the article reads "this power is never likely to be exceeded at 6QB"!

All this was more than 40 years ago. He was licensed as 6QB in 1923, before the international-intermediate system of prefixes had been established. Tommy's second call sign, allotted for portable work, was 6LT, later used for some extraordinary experiments in an aircraft and from the summit of Snowdon. And it will probably astonish many present RSGB members to know that in 1928 he was on the general committee of the then RSGB Council, formed from an amalgam of the old Radio Transmitters' Society with the Transmitting & Relay Section of the RSGB. Among those on that committee still with us were Royle (G2WJ), Alford (G2DX), Clarricoats (G6CL) and Courtenay-Price (GW2OP). All the others have passed on, and they included names like Marcuse (2NM), Simmonds (2OD), Ostermeyer (5AR), Nickless (2KT) and Bevan

Swift (2TI), each of whom has his name and his niche in the history of Amateur Radio.

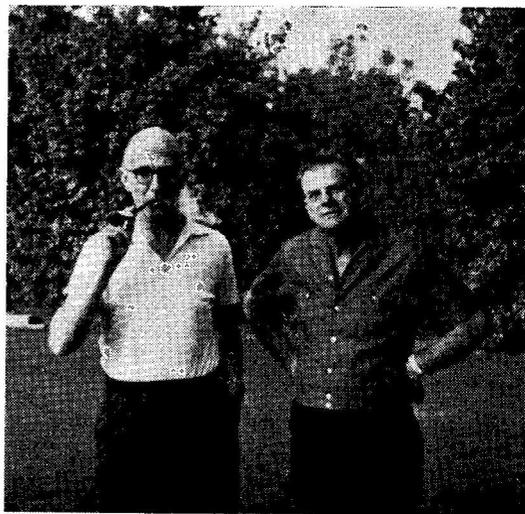
From his start with *Experimental Wireless*, 'way back in 1925, Tommy by the late 20's and early 30's had become a regular contributor on radio amateur activities and technique to such periodicals as *Popular Wireless* (in which he was "W.L.S.") *Wireless Weekly*, *Modern Wireless* and *Wireless World*—all of which at that time were giving full coverage to Amateur Radio.

During the mid-War period Tommy was also developing his musical interests and aptitude—as a minor composer and a talented performer, he had become assistant organist at the Crystal Palace, London. The years went on, as G6QB on the air, writing his pieces on Amateur Radio, and as Howard Thomas the organist. During this period, he was also associated with the Hammond Organ Co., and he travelled in India and the States on their business.

When Hitler's War came in 1939, like so many of the rest of us at that time Tommy volunteered for service and joined the then 26 (Signals) Group, R.A.F., as a civilian technician; he was soon commissioned as an officer in the Signals Branch, with special responsibilities for the maintenance and operation of the radar screen which played such a vital part in the Battle of Britain and the Fighter Command defence system for the protection of this country. About the time when 26 Group became the famous 60 (Signals) Group—and later still, what is now Signals Command of the Royal Air Force—he was posted to the United States (not then fully in the War) to assist the Americans in establishing their own radar screen from Florida up the East Coast. By 1945, when he left the Service on demobilisation, he had become a squadron-leader and been awarded the MBE for his work with 60 Group.

It was then that Tommy's long association with SHORT WAVE MAGAZINE began—a close collaboration which continued unbroken for 20 years, with harmony, trust, loyalty and respect on both sides. His work for the *Magazine* was always meticulous, accurate and reliable, and he was a stickler for the right use of language. He turned in clean copy, and never missed a deadline. As a professional writer with proper pride in his craft, he realised the importance of all this for the smooth working of our organisation and the punctual appearance of each month's issue. Though he was quite capable of producing the odd technical article when required, he was in this later period essentially a feature-writer with a developed style of his own, which over the years has given pleasure to countless thousands of readers—not least for his pawky sense of humour.

As Tommy himself was the first to admit, he was very fortunate in that he was able to make his living from the two pursuits he enjoyed most, Music and Amateur Radio. But it was his own talent and hard work that made it possible. He was wont to say that "100 watts of audio makes a nice change from 100 watts of RF." This was because in parallel with his *Magazine* work he was regular organist to the Hastings Corporation, and performed publicly in their White Rock Pavilion and Sun Lounge during the summer months, and for various theatrical performances and visiting shows during the winter—all of which made him many friends among the leading lights of show business. He was also on the BBC's roll of organists and broadcast in his turn when the BBC Theatre Organ was a regular feature of the Light Programme. With a wide range, a large repertoire and a deep knowledge of music, he could play anything on piano or organ, from church music to the popular tunes of the day. His own musical equipment included a very fine



Tommy, G6QB (left), with his great friend Gene Royer, W6EBG — taken by W6VX when G6QB was on his visit to California in October 1964. For several years, G6QB/W6EBG kept almost a daily schedule on the 14 mc band, this always being conducted on CW. Among his many accomplishments, Tommy was a very fine operator, with a fluent and easy Morse style, at any speed and on any type of key, which always made his signal stand out. It is fitting that the very last entry in his log records a QSO with W6EBG, at 1530z on May 13.

grand piano and the latest in recording, hi-fi and stereo apparatus.

He lived a full, happy and purposeful life, making a large contribution in the two fields of activity to which he was dedicated, Music and Amateur Radio. On the radio side he was a past-president of the First-Class Operators' Club, of which he was a founder-member, and of the American A1-Operators Club, membership of both being by invitation only and confined to those who by their on-the-air performance show that they uphold the best traditions of Amateur Radio.

* * * *

The proceedings on Thursday, June 2, went off quietly and with dignity, in the presence of a representative gathering—and, what Tommy would particularly have liked, it was a perfect summer's day, with the glorious Sussex countryside looking its very best, for he was a great lover of the country and the Sussex scene. The service was taken by a local parson friend, and he spoke a short, simple but very moving eulogy for Tommy, G6QB. Then, it was all over.

A.J.F.

HIGH PERFORMANCE TRANSISTOR CONVERTER FOR TWO METRES

SENSITIVE DOUBLE-CONVERSION
DESIGN — NO BIRDIES IN THE
TUNING

R. C. HILLS, B.Sc.(Eng.), C.Eng. (G3HRH)

As well as offering a practical circuit for efficient reception on two metres, this article is an interesting and very useful discussion on VHF converter design considerations in general. An important point brought out by our contributor is that transistors having good characteristics at UHF do not necessarily retain them at VHF even though the operating frequency is much lower.—Editor.

THE increasing availability of transistors at reasonable prices and with adequate performance at VHF has made the design and construction of all-transistor converters for 145 mc as cheap and painless as their earlier valve counterparts. Certain aspects of their design, particularly small size and low power consumption, make them an ideal proposition for mobile operation, and the converter to be described in this article was developed for that purpose. Before commencing this project the author had literally never set soldering iron to transistor and was completely inexperienced in the techniques of miniature construction and handling of semi-conductors. Nevertheless, by careful reading of earlier articles both in SHORT WAVE MAGAZINE and elsewhere on converter designs, the unit was developed in what can only be described as a very painless procedure and totally without any of the disasters said to lurk over the head of the user of semi-conductor devices!

Basic Requirements

The design of an ideal VHF converter presupposes the satisfying of a number of basic requirements. These can broadly be summarised as: (i) low noise figure; (ii) good oscillator stability; (iii) freedom from spurious responses; (iv) good image rejection; and (v) freedom from cross-modulation and overload. Some of these are relatively easy to achieve, others nigh impossible within the scope of amateur construction and measurement. In order to design the overall converter we must examine each in turn and decide what must be incorporated into the individual stages of the converter to achieve the desired performance.

(i) *Low Noise Figure*: The overall noise figure of the converter is largely governed by an appropriate choice of transistor for the first stage of RF amplification preceding the mixer. If the performance of that stage is particularly good, and it does not contribute

to a significant degrading of the signal/noise ratio, it will also be necessary to consider the noise figure of the mixer stage as well. This assumes that there is only one stage of amplification before the mixer—which is preferable and will be explained later. The noise figure of the mixer stage itself is also determined largely by the choice of transistor, although the amount of noise generated due to the oscillator injection also makes a contribution.

The mere use of semi-conductors in these stages is a good beginning, since anything thermal like a valve is a potential source of noise in its own right. Apart from this, the choice of RF and mixer transistors is largely one of economics, and as usual the last fractions of a dB are the most expensive to obtain, requiring the more sophisticated devices to achieve them. There is in this respect a current trend which is worthy of comment. Amateurs have been brought up to know that, in the context of thermionic devices, a valve which has a superior noise performance at UHF will maintain that superiority (possibly to a lesser degree) at VHF. This is not the case with present transistors. The curve of noise performance for a typical VHF transistor has an optimum range of frequency for lowest noise figure, which degrades on either side of that range, *i.e.*, working at lower than optimum frequency, the noise figure may well become worse than that achieved optimally. A number of people have taken to using UHF transistors such as the AF186, AF139, GM0290 in 145 mc converters in the belief that they must represent the best achievable. In fact, these are designed typically for the reception of Band IV/Band V television (470-890 mc) in the case of "entertainment" types like the AF186, and as good if not better performance can be obtained on 145 mc using the more lowly AF180 types, intended for Band III television tuners (175-215 mc).

Apart from the correct choice of transistor for the RF and mixer stages, there is a further potential source of noise which can to some extent be eliminated. A certain amount of noise is in fact received by the aerial, loosely described as "path" noise, and more or less uniformly distributed across the frequency spectrum. This will give rise at the mixer output to two coincident components of noise, representing the noise input to the converter at signal frequency and the noise input to the converter at image frequency. If we can reduce the amount of noise passing through the RF stage at image frequency, we can effectively reduce the noise which appears within the pass-band at the first IF. This reduction of the image noise can only be achieved by increasing the selectivity of the signal frequency tuned circuits. This is difficult because (a) Their inherent loaded Q is quite low, and (b) Because we require them to have a wide bandwidth anyway to pass the whole 2 mc of the band without undue attenuation at the band edges. We can, however, improve the effective selectivity, in terms of image response, by choosing a sufficiently high first IF so that the image noise is far removed from signal frequency and effectively attenuated by even the relatively broadly tuned signal frequency circuits. For example,

a first IF or 5 mc would place the image noise only 10 mc away from the signal at which frequency the discrimination exercised by the tuned circuit would be marginal. A first IF of 40 mc would place the image noise 80 mc away from the signal, at which separation the attenuation would be significant, and the total IF noise not much greater than that within the signal frequency pass-band. There is an added bonus that any problems from strong aircraft signals in the band 100-136 mc will no longer fall within the first IF pass-band as image signals; conversely, care must be exercised in the choice of first IF to ensure that the selected image frequency does not fall on the channel of the local TV transmitter!

(ii) *Good Oscillator Stability*: Again, the absence of any thermionic heat generating device contributes to this requirement by maintaining an even temperature around the crystal (a crystal oscillator is essential to success). Other factors to be considered are the appropriate oscillator circuit which avoids unduly large demands upon the output of that stage and does not involve excessive crystal currents, and the use of a good quality crystal and holder. An oven is

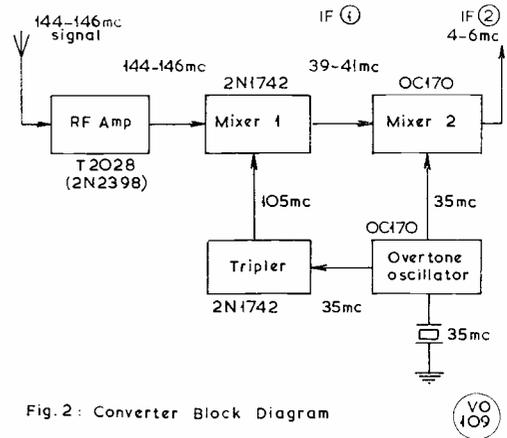


Fig. 2: Converter Block Diagram

Fig. 2. Block diagram of the G3HRH Converter.

not considered justified in a converter for mobile use, although it would be desirable in a fixed converter, which would for ultimate stability be much more sophisticated in its design in any case, involving "outboard" oscillator sections locked to high-stability reference signals.

(iii) *Freedom From Spurious Responses*: The primary cause of the spurious responses, the bugbear of many VHF converters, is the co-existence of a whole miscellany of oscillators, of relatively low fundamental frequency and rich in harmonic content. These mix and remix with the signal frequency (and among themselves) to produce a considerable number of spurious responses throughout the required pass-band, either as oscillator "birdies" (direct reception of an oscillator harmonic or derivative) or as multiple reception of an incoming station, whose signal mixes in turn with the different oscillator components to appear at several points within the tunable IF frequency range.

The solution to this problem is a fairly straightforward one. Merely reduce the number of oscillators around the equipment, and start each off at as high a frequency as possible. The ready availability of 3rd overtone crystals in the 35 mc range provides an immediate answer, providing as they do only frequency components only at 35, 70, 105 and 140 mc. A better solution is a more expensive 5th overtone crystal at 70 mc, but there is in fact an advantage in having oscillator injection at 105 mc available. This advantage is exploited to effect in the next section.

There is one point of which to beware when contemplating the construction of a complete receiver using semi-conductors. In any oscillator using a transistor, the base-emitter diode acts as a very efficient non-linear harmonic generator, with the result that the oscillator output tends to be rich in harmonic content. It is possible for the range of audible harmonics from one oscillator to extend up

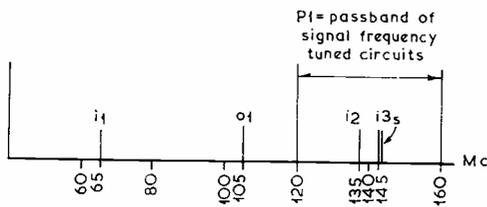


Figure 1 (A)

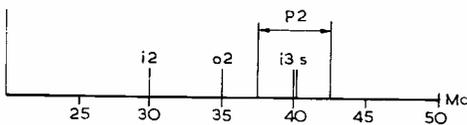


Figure 1 (B)

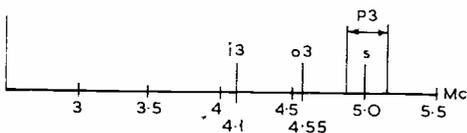


Figure 1 (C)

Fig. 1 (A). Spectrum at first frequency conversion, where i_1 is first image; i_2 second image; i_3 third image; o_1 first oscillator (crystal); and s is the signal on 145 mc. (B) Spectrum at second frequency conversion, where o_2 is second oscillator (xtal), and P_2 passband on 1st IF (broadband). (C), spectrum at third frequency conversion, the tunable IF section. The tuned third oscillator is o_3 , and P_3 is the passband of the second IF.

VO 108

into the tuning range of the *preceding* mixing process, thus giving rise to a spurious signal. Similarly, the BFO may have sufficient harmonic content to produce a whole family of carriers across the tunable IF range. These effects can be minimised by (a) Using transistors with as low an f_T as possible consistent with stable oscillation at the desired frequency, thus giving a built-in low-pass filter action, and (b) Running the oscillators at the lowest workable level to reduce the overall output of harmonics.

(iv) *Good Image Rejection*: In achieving the requirements of (i) and (iii) by the means suggested, the image rejection has already been improved. The use of a relatively high first IF of, say, 40 mc, has secured a large degree of rejection of the first image, and by judicious choice of the second IF it is possible to secure adequate rejection of the second image. The fundamental adjacent-signal selectivity required by a receiver to be used in the presently crowded 145 mc band (during contests, anyway!) dictates a reasonably low final IF, typically 465 kc, and this in turn dictates the use of a relatively low tunable IF in order to secure adequate rejection of the second image, by virtue of the selectivity of the circuits in the tunable IF section. A reasonable compromise is to cover the band over the range 4-6 mc. This also permits direct calibration of the main receiver dial, and curiously enough also requires a 35 mc crystal oscillator as the basis of the injection chain.

We have seen then that in order to achieve adequate rejection of the first image (a high first IF) and of the second image (a low tunable IF) we are faced with an *impasse*. However, by noting that both these requirements can be served by a common crystal oscillator chain, it is possible to adapt the conventional single-conversion converter into a double-conversion job, which will meet *all* the requirements of image rejection with the addition only of one mixer stage.

Anyone who doubts the need for superlative image rejection at all times has never had to contend with the conditions prevailing at a reasonable site in S.E. England during a period of high activity on the two-metre band, when the last image of some signals can be 100 dB down on the fundamental signal, and still give a good signal at the "wrong" end of the band.

The arrangement of signal, image and oscillator frequencies is shown for various stages through the converter in Figs. 1 (A)-(C). Fig. 1 (C) is of course not applicable to the actual converter, but follows from the choice of IF output frequencies from the converter. Note that i_3 falls within the 2 mc band which has been converted down from 144-146 mc, initially to 39-41 mc and finally to 4-6 mc. A strong two-metre station on 144.1 mc is, therefore, a potential image signal on 145.0 mc, and relies solely on the selectivity of the tuned circuits at 5 mc to achieve its rejection.

(v) *Freedom From Cross-Modulation and Overload*: This is one of the most difficult aspects of converter design, and the author does not claim any

Table of Values

Fig. 3. Circuit complete of the G3HRH Converter

C1 = 470 $\mu\mu\text{F}$	R8 = 100,000 ohms
C2, C3, C8 = 1-6 $\mu\mu\text{F}$, var.	R9 = 4,700 ohms
C4, C5, C6, C9, C10, C14, C16, C17, C19 = -001 μF , feed thru	R10, R14, R15 = 100 ohms
C7, C12, C13, C15, C18 = -001 μF	R11 = 33 ohms
C11 = 27 $\mu\mu\text{F}$	R16 = 22,000 ohms
R1, R17 = 10,000 ohms	R18 = 330 ohms
R2 = 47,000 ohms	X1 = 35 mc, HC/6U xtal
R3 = 47 ohms	D1 = 5-6v. zener, OAZ202
R4 = 39,000 ohms	RLA = As required for c/o
R5 = 3,900 ohms	Tr1 = T2028, Philco (2N2398)
R6, R19 = 470 ohms	Tr2, Tr5 = OC170
R7, R12, R13 = 1,000 ohms	Tr3, Tr4 = 2N1742

Notes: All resistors rated $\frac{1}{4}$ th watt. C2, C3, C8 are 1-6 $\mu\mu\text{F}$ Mullard tubular. C4-C19 as listed soldered feed-through type. CS1 is Ae. point and CS2 to Rx.

TABLE OF COIL DATA

- L1, L2 — Four turns 22g. tinned copper wire, self supporting.
- L3 — 36 turns 26g. enamelled, close-wound on $\frac{1}{4}$ in. o.d. former, with dust core.
- L4 — Two turns 26g. at cold end of L3.
- L5 — One turn 22g. tinned copper, self supporting.
- L6 — 4 $\frac{1}{2}$ turns 22g. tinned copper, self supporting.
- L7 — 40 turns 26g. enamelled, close-wound on $\frac{1}{4}$ in. o.d. former, with dust core.
- L8 — Two turns 26g. at cold end L7.
- L9, L10 — Selected to tune 5 mc, two-turn link.

Note: Values as given are near-enough but will require final adjustment (trim, squeeze in or pull out) to resonate correctly in individual converters having differing strays.

original ideas for solving this problem. A sure way to aggravate it is to have too much gain before the really selective tuned circuits—this means that more than one RF stage before the first mixer is definitely out. Those who insist on preceding an AF186 by an AF139 stage are simply looking for trouble from cross-modulation. Apart from restricting the signal levels appearing at the non-linear first mixer, all that can be done is to improve the linearity of the RF amplifier itself, and the author does not feel qualified to comment on this aspect from his very limited experience with transistors. Sufficient to say that the converter to be described is no worse, and possibly a little better, than the main station valve converter—which uses a single 6CW4 in front of a 6BQ7A mixer—both in respect of overloading and cross-modulation from strong signals. This is attributed to good fortune rather than clever circuit design and choice of component values!

So far this discussion has been concerned with the ways of achieving the desirable requirements of a two-metre converter. The rest of the discussion will cover in detail the design and construction of a transistorised converter which attempts to achieve the idealised performance suggested by the foregoing.

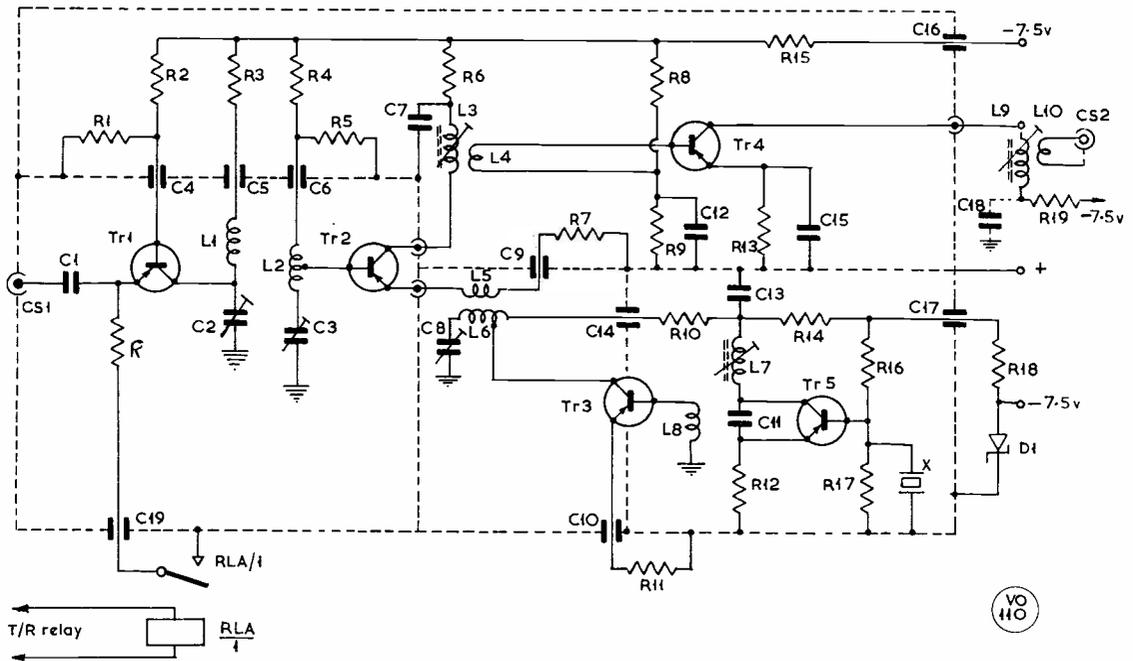


Fig. 3. Main circuit diagram for the G3HRH Converter.

PRACTICAL CONVERTER

The block diagram of the final converter is shown in Fig. 2. A low noise *Philco* T2028 RF stage precedes a 2N1742 mixer, which is injected at 105 mc from a similar tripler in the oscillator chain. The output signals in the range 39-41 mc are fed straight into a second mixer using an OC170. This is injected at 35 mc from the basic overtone crystal oscillator using another OC170, to give a final output IF of 4-6 mc. The full circuit diagram is given in Fig. 3.

Electrical Design (i)—Oscillator Chain

The oscillator stage uses an OC170 (Tr5) in an overtone circuit with a 35-000 mc HC/6U crystal. The circuit of Fig. 4(b) is slightly unusual, but has been found by the author to be more reliable in securing correct overtone oscillation than the conventional circuit shown in Fig. 4(a). In this latter case the feedback necessary to sustain oscillation is secured by the link winding in the emitter circuit, which is coupled to the output tuned circuit collector winding in the correct phase to secure regeneration. This link winding is in series with the crystal, and the theory of operation is that at all frequencies other than the series resonance of the crystal, it presents a sufficiently high impedance in series with the link, effectively to open circuit the feedback voltage on the emitter and prevent oscillation; at series resonance the crystal impedance is very low and the feedback voltage is "switched on." In practice the shunt capacity of the

crystal holder and the associated wiring is often sufficiently high to cause a permanent short across the crystal, of sufficiently low impedance to permit the stage to oscillate at any frequency determined by the frequency to which the collector circuit is tuned. In this condition it is frequently difficult or even impossible to persuade the oscillator to lock to the crystal, and the stability becomes only that of a normal "tuned collector" oscillator in a free-running condition.

In the preferred circuit of Fig 4(b), the feedback voltage to the emitter is supplied by the small coupling capacitor, but the stage is fundamentally degenerate due to the absence of base decoupling, and will, therefore, not oscillate. By using the series resonance of the crystal to decouple the base, it is possible to permit the stage to oscillate at that resonant frequency alone, the loop gain being sufficient to sustain oscillation only at that frequency. The shunt stray capacities of the crystal holder and wiring are in themselves insufficient adequately to decouple the base and increase the stage gain to the point of oscillation. In the author's opinion the fundamental principle of the circuit of Fig. 4(b) is to be preferred, namely that of a stage which is normally quiescent, and oscillates only at the desired frequency, rather than one as in Fig. 4(a), which is free to oscillate at all frequencies and relies solely upon the crystal anti-resonance to attenuate the feedback.

To identify that the oscillator stage is running in

the correct locked mode, listen to it on a receiver. But many people have a receiver, with a BFO, which tunes to 35 mc, but anyone working the four-metre band has a receiver which covers 70/-70.7 mc, and can easily be tuned down an extra 100 kc to find the second harmonic of the overtone oscillator. With the oscillator running, and the four-metre receiver tuned to 70.0 mc, adjust the core in L7 until a beat note is heard. This will shift rapidly in frequency as the core is screwed towards the correct position, and as the correct overtone mode is locked in, the change of beat note with slug position will suddenly become less rapid, altering relatively slowly, until the core has passed through the resonant position of L7, and the oscillator unlocks as the frequency of L7 shifts away once again from the resonant frequency of the crystal. If the amount of feedback obtained via C11 is correct, the stage should cease to oscillate on either side of the overtone frequency, within a turn or two of the slug in the unlocked condition.

The suggested value for C11 is 2.7 μF but a little experimentation in the range 1-10 μF will possibly produce more nearly the ideal condition. In order to listen to the oscillator, it is sufficient merely to place an "open" coaxial plug near L7, the other end of this cable being plugged into the aerial socket of the four-metre converter. It is advisable to ensure, by switching the oscillator stage on and off successively, that it always starts up in the locked condition; any difficulty in this respect should be overcome by slight adjustment to the slug in L7 to find the most stable setting.

The other stage in the oscillator chain is a 2N1742 Tr3 working as a common-emitter tripler. The base is link coupled to the collector circuit of Tr5, and returned to earth. In this way the emitter bias resistor R11 is included in the base-emitter diode circuit and will afford a degree of protection against excessive base current if the stage is overdriven. The alternative arrangement would be to return the base winding directly to the emitter, which could result in heavy current flow limited only by the resistance of the diode junction. The collector circuit of Tr3 is conventional, and resonates at 105 mc. Adjustment of this circuit is best undertaken using an absorption wavemeter, to ensure that the stage is tripling correctly; within the range of adjustment of C8 it is possible to select the fourth harmonic of the overtone frequency in error, which would give an incorrect injection frequency of 140 mc, and cause the converter to revert to single conversion, delivering 4.6 mc from the first mixer instead of the second—embarrassing! It is, of course, true that, even when the collector of Tr2 is correctly tuned to 105 mc, there will still be a small component present at 140 mc, which will inject into the first mixer. However, any output of that mixer at 4.6 mc will be greatly attenuated by the 40 mc tuned circuit of the first IF, and what little does reach the second mixer will pass through to appear at its collector in phase with the wanted 4.6 mc signal anyway, and will not, therefore, appreciably degrade the converter performance. The low proportion of 4.6 mc signal appearing in the collector circuit of the first mixer can

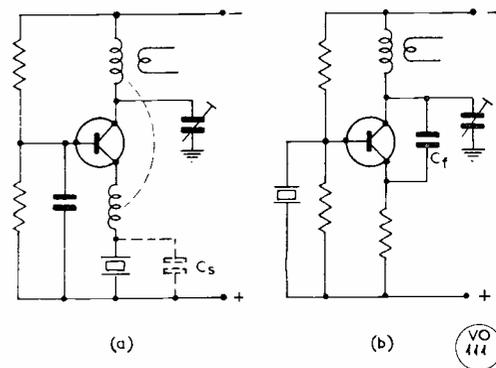


Fig. 4. Alternative overtone crystal oscillator circuits. In (A) C_s represents stray holder capacities. In (B), C_f is a feedback condenser, of about 2.7 μF .

be verified by attempting to align the 40 mc tuned circuit using an incoming 145 mc signal at the front end. This will be found a quite precise adjustment, whereas it would have little effect upon the final output if an appreciable signal at 5 mc were being generated in the first mixing stage, to pass through the second mixer and become a significant part of the total output signal at 5 mc.

The supply rail to the two oscillator stages is divorced from that feeding the rest of the converter, in order that the oscillator may be allowed to run continuously, with consequently improved long term stability. Additionally the supply is zener stabilised at 5.6 volts, through R18 and D1.

Electrical Design (ii)—Signal Chain

The first stage in the signal chain is a T2028 (2N2398) Tr1 run in grounded base configuration as a signal frequency amplifier. This mode was selected in preference to common emitter operation, to achieve stability without the need for neutralisation. The noise performance in either mode is approximately the same, but the stage gain is less in the chosen method. This is considered a reasonable price to pay for the circuit simplicity which results. The input impedance is low, and it suffices to connect the 70-ohm aerial input directly to the emitter through a 470 μF isolating capacitor C1. The emitter is isolated at signal frequencies by R5, which also serves to provide some emitter bias. The base is grounded as directly as possible through a .001 μF feed-through capacitor, and biased by a conventional potentiometer network R2 and R1. The collector tuned circuit is conventional, and is decoupled by R3 and a .001 μF feed-through. In order to avoid possible burn-out of the emitter-base diode, should a fault develop in the aerial change-over relay, it is arranged that the emitter DC return through R5 is by way of a pair of normally-closed contacts on a miniature relay. This is energised simultaneously with the aerial relay, to open the emitter circuit under "transmit" conditions, and prevent the flow of excessive base current. This, together with the disconnection of the supply

rail from the signal section of the converter, should provide adequate protection against the unexpected presence of large RF voltages at the aerial socket, from an associated transmitter. The first mixer Tr2 is a 2N1742, operated in common-emitter configuration, with emitter injection *via* a single turn link L5 coupled to L6 in the oscillator section. The biasing arrangements are conventional, and the collector tuned circuit is slug-adjusted to resonate at 40 mc. The natural bandwidth of the coil as described in the component table is adequate for the two megacycles of the band, and no damping is required.

The second mixer Tr4 is an OC170, again operated in common emitter configuration. Injection is, in this stage, effectively into the base, and achieved solely by the mutual coupling between the collector coil L3 of Tr2 and the oscillator coil L7 which resonates at 35 mc. The injection by this method has been found to be adequate, and it avoids the need for further link windings on L7.

The output circuit of Tr4 can be arranged to suit individual requirements. In the case of the converter built by the author, this forms part of a complete transistorised receiver, and it was most convenient to couple the output from Tr4 *via* a two turn link on the first coil of the tunable IF section and hence to the supply rail. For those intending to use the

converter as an outboard unit (with a separate main receiver as tunable IF) it will be more convenient to install a single tuned circuit at 5 mc, in the collector of Tr4, using the same circuitry as for Tr2. The low impedance output can be taken from a one or two turn link on this coil. It may be necessary artificially to increase the damping by means of a shunt resistor of say 4.7K to obtain the full two megacycles bandwidth required.

The supply rail for the signal chain is not stabilised, individual stages being decoupled by low value resistors and .001 μ F capacitors as required.

Mechanical Design

The converter is constructed in a rectangular box of 22g copper sheet, with an open top. The box is divided longitudinally by a partition, and there are also minor partitions on the one side of the main one. Principal dimensions are given in Fig. 5, but these are not critical (unless stated) and may be varied to suit individual convenience. The general layout is shown in Fig. 6, and although the author has chosen this as a preferred arrangement, some latitude is again permissible. Broadly speaking, the main partition is used to carry the .001 μ F soldered feed-through condensers which are used profusely in the decoupling circuits, and these in turn provide anchor points to which the bias and supply resistors

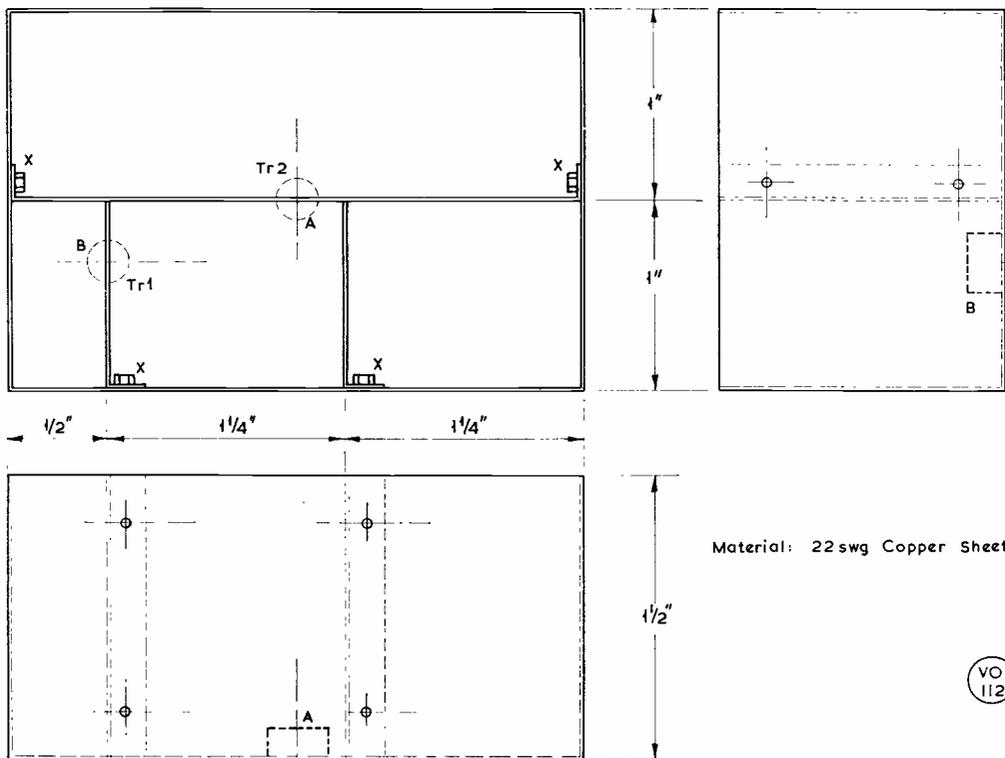


Fig. 5. General arrangement of open-top box with screens.

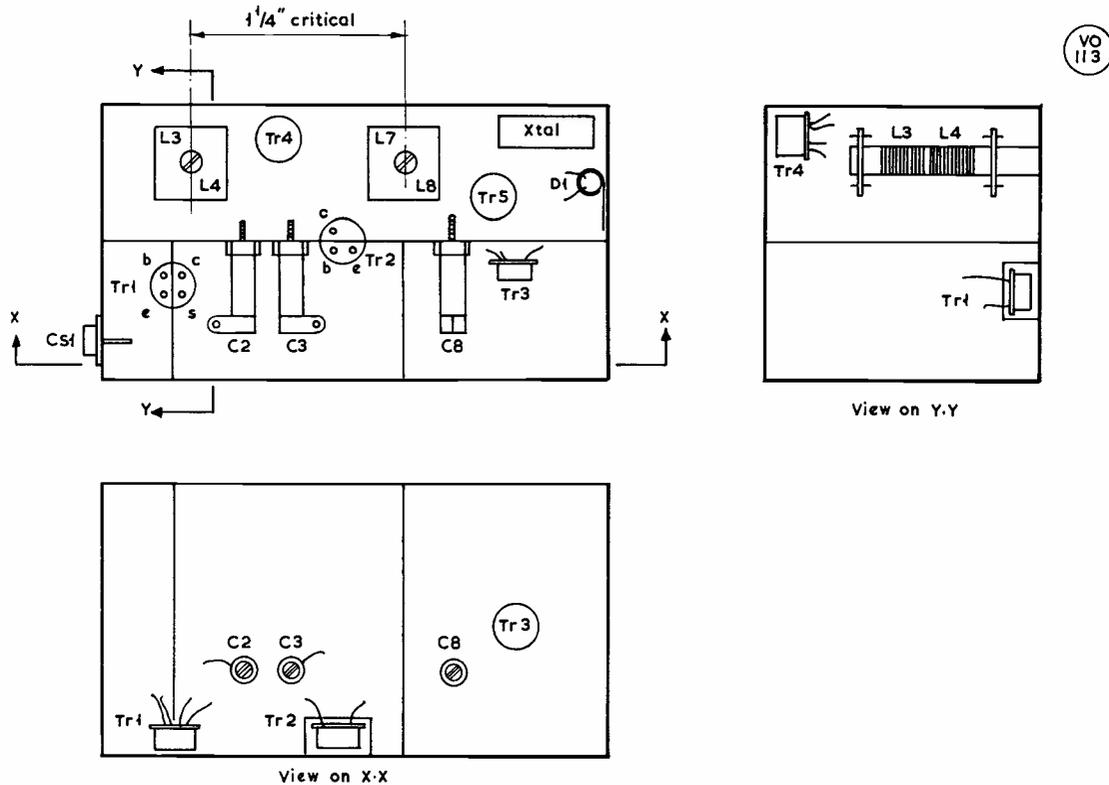


Fig. 6. General layout of components for the Converter.

may be soldered, to form a matrix on one side of the partition. On the same side of the partition are located the oscillator and second mixer transistors (both OC170), together with their respective collector coils, and the HC/6U crystal. The coupling between the two coils should be maintained at the spacing given on the diagram to ensure adequate injection to the second mixer. Small rectangular holes are cut in the bottom of the main partition, to accommodate the oscillator tripler, and first mixer transistors (both 2N1742). These are trapped between the screen and the bottom of the box, with their collector leads on the opposite side of the screen from the base and emitter connections. This is, of course, quite permissible since the cases of *all* the transistors used in the converter are isolated from all electrodes. *Note*: In order to assemble the screen partition in the box *after* the transistors have been wired in, it is necessary to make this a "bolted-in" partition rather than a fully soldered job.

The minor partitions may be soldered to the main one, and the whole assembled into the box in an advanced state, with all three transistors in place. The first of the smaller screens is cut out to straddle the T2028 amplifier transistor, in the same way that the main screen divides the input and output circuits

of the 2N1742 stages. The T2028 should be so positioned that the length of the base lead to the decoupling capacitor is as short as possible. The other small screen divides the oscillator tripler stage from the first mixer input circuit, and carries a p.t.f.e. bush through which passes the connection from the emitter of Tr2 to the link winding L5 coupled to L6.

The earthing ends of the tubular trimmers are also bolted through the main partition, and small holes are provided in the long side of the converter box, to permit a trimming tool to be passed through to adjust these trimmers during alignment.

All leads passing through the screens are carried on .001 μ F feed-through solder-in capacitors, or on the spill of a p.t.f.e. bush where RF isolation is required. The layout of the components in the converter is compact though not cramped, and the reader is advised to plan with some care the order of assembly, to achieve the easiest results. Generally, as much as possible should be assembled around the various screens forming the partition assembly. Likewise the lower frequency coils on formers, together with their associated components, should be assembled in the box in the absence of the partitions, checking from time to time that the latter can still

be fitted into place. Lastly the partitions should be bolted in, using hank-bushes on the partitions for preference to avoid fiddling with nuts inside the converter. The few remaining connections may then be soldered to complete the assembly.

Alignment

The alignment of the converter is quite straightforward. The oscillator circuits should be set up using a receiver and an absorption wavemeter as described earlier. The signal frequency circuits can then be tuned for maximum signal at mid-band, using either a signal generator, or an incoming 145 mc signal as available. All circuits should resonate without difficulty at their design frequencies. If any problems arise, they should be checked out with

a grid-dip meter.

Performance

Measurements have been made on the performance of the converter, but the author does not intend to invite disputes by stating figures. Sufficient to say that they compare very favourably with any other converter yet measured, particularly in the way of sensitivity, image rejection, and freedom from spurious responses.

Using a short vertical aerial indoors at the author's QTH, over 20 stations within a radius of 30-40 miles have been copied on a typical weekday evening, and the signal from GB3VHF at a distance of 50 miles is just detectable using only the open coaxial aerial socket—it is S9 on a 6in. screwdriver!

AERIAL FEED CONSIDERATIONS

**IN THE SINGLE-WIRE
CONTEXT**

F. G. RAYER, Assoc. I.E.R.E. (G3OGR)

It might have been expected that the very practical article by the late G6QB, in our June issue, just about covered the ground as regards end-fed systems. But our present contributor shows that the subject can be taken still further—indeed, the general topic of Aerials is virtually inexhaustible.—Editor.

AN end fed aerial is usually easily erected, and the simplest way to work all bands. It is normally possible to use any length of wire successfully, on all bands from 160 to 10, if a suitable method of feeding is adopted. A new operator who wishes to try all bands should find an end fed aerial extremely handy.

The behaviour of such an aerial depends largely on its wave-length at the working frequency. Feed impedance and other characteristics can be expected to change enormously from band to band.

Fig. 1 shows a half-wave aerial A, fed from the transmitter at Tx. Current reaches a maximum at the centre, and a minimum at the ends. Voltage is at maximum at the ends, and minimum at the centre. When the aerial is fed at X current is low and voltage high. In other words, feed point X is high impedance. The actual value could be several thousand ohms.

If the wire were only half this length, it would be a $\frac{1}{4}$ -wave, fed at Y. Current is large, but voltage small, so this feed point is low impedance. It may be under 40 ohms. Should the length be some intermediate one such as Z, both current and voltage have intermediate values.

At B, the same wire is used at twice the original frequency. Feed point X is high impedance, as before. Point Y would also be high impedance on

this band. A length from the free end to Z would be low impedance (high current, low voltage). At C, the aerial is used on three times the original frequency, so once again the feed impedance at points such as Y and Z has changed.

Difficulties in using end-fed aerials usually arise because the feed point impedance cannot be handled by the transmitter, or because the changes in impedance encountered with changes in frequency are not appreciated. As a result, the aerial does not load the transmitter correctly. This does not mean that either aerial or transmitter is in any way at fault. Fortunately, the difficulty is easily overcome.

Aerial Length

Various typical lengths for end-fed aerials are often listed. These are usually a $\frac{1}{4}$ -wave, $\frac{1}{2}$ -wave, or

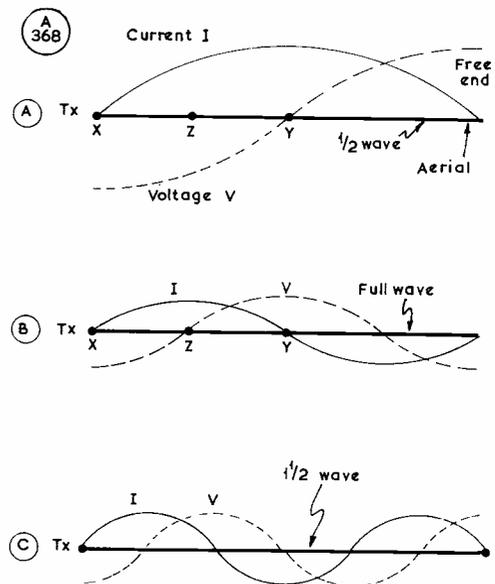


Fig. 1: Current and Voltage at half wave and multiples

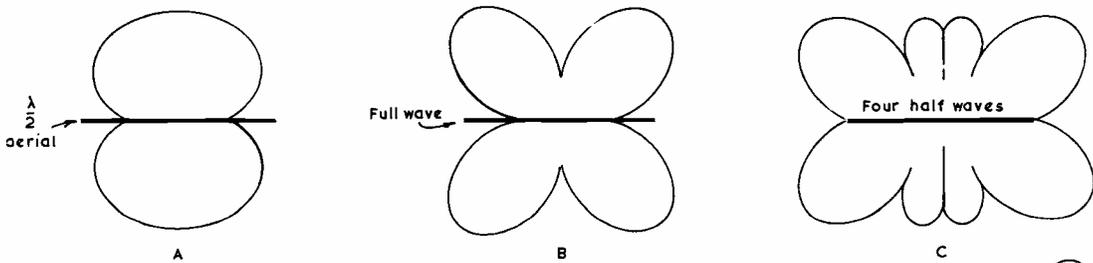


Fig. 2 : Directivity of half wave and harmonic aerials

A
369

some near multiple of $\frac{1}{2}$ -waves. In Fig. 1, the same wire is shown as one $\frac{1}{2}$ -wave at the lowest frequency, A; two $\frac{1}{2}$ -waves at twice this frequency, B; and three $\frac{1}{2}$ -waves at three times the frequency, C.

If the aerial is a $\frac{1}{2}$ -wave or some multiple, the fed point has little reactance. The use of an aerial of such a length that it is resonant as a half-wave (or harmonically) may simplify feeding due to this lack of reactance. Except for this, these particular lengths offer no advantage, and do not result in "better signal strength" from the transmitter. So it is wholly practical to put up *any* length of wire, and deal with its reactance and impedance problems in the comfort of the shack.

Due to end effects, a length of wire cut as a $\frac{1}{2}$ -wave for one frequency is not exactly two $\frac{1}{2}$ -waves on twice the frequency. So computed lengths are generally a compromise. A typical popular length is 135 to 138ft. This works out as follows :

- | | |
|---------------------------|---------------------------------|
| 160m. $\frac{1}{2}$ -wave | 20m. four $\frac{1}{2}$ -waves |
| 80m. $\frac{1}{2}$ -wave | 15m. six $\frac{1}{2}$ -waves |
| 40m. full wave | 10m. eight $\frac{1}{2}$ -waves |

At this point it is worth noting that the end-fed aerial may begin to offer some gain over a dipole, in its favoured directions. The power gain depends on the length, being approximately 1 dB for three $\frac{1}{2}$ -waves, up to 6.3 dB for sixteen $\frac{1}{2}$ -waves.

Space usually prevents much gain on low or medium frequency bands, but a little gain is often easily practicable on the higher frequencies. For example, the gain of a wire twelve $\frac{1}{2}$ -waves long (5 dB) is similar to that of a two-element Yagi type beam. So it may be worth while to put up the longest wire circumstances allow.

Materials and Erection

These items scarcely need mention. Hard drawn 14g. copper wire is popular. The lighter flexible 7/26g. wire costs less, and seems satisfactory up to a maximum span of 150ft. or so. Any joints need to be soldered. A ribbon insulator is used at each suspension point. The gain of the aerial (if any) is for the straight horizontal portion only. But the length (if known or calculated) is for the whole system, including lead-in.

Height helps, though quite low aerials often work

surprisingly well. Polythene line can run to each suspension point. One such point is usually found at a chimney or eaves, and another at a pole, tree or other building. Various bent configurations often prove suitable, if space is limited.

The down lead should be clear of walls, and the lead-in needs to be well insulated.

Directivity

If alternative positions are available for the supports, it may be useful to consider which direction is preferable. When the aerial is a half-wave long at operating frequency, radiation is strongest at right angles to the wire, A in Fig. 2.

When the wire is full-wave at working frequency, lobes appear at about 50° to the wire axis, B in Fig. 2. For three $\frac{1}{2}$ -waves, these lobes are at about 42° to the wire, with a central lobe at 90°. For four $\frac{1}{2}$ -waves, the main lobes are even more in line with the wire, at about 38°, and minor lobes arise at about 75°, C in Fig. 2.

The main lobes are at roughly 28° for six $\frac{1}{2}$ -waves; about 25° for eight $\frac{1}{2}$ -waves; and at 20° or so for twelve $\frac{1}{2}$ -waves. More and more minor lobes fill up between the main lobes, as the number

Length Feet	END FED AERIALS					
	Approximate number of $\frac{1}{2}$ -wavelengths for Band					
	160m.	80m.	40m.	20m.	15m.	10m.
33½			$\frac{1}{2}$ -wave	1		2
68		$\frac{1}{2}$ -wave	1	2	3	4
91½					4	
103				3		6
137	$\frac{1}{2}$ -wave	1	2	4	6	8
172				5		10
207			3	6	9	12

of $\frac{1}{2}$ -waves increases. A $\frac{1}{2}$ -wave aerial on 80 metres would resemble Sketch A. On 40m. the same wire would resemble B, while on 20 metres the directivity would be as C.

The pattern in Fig 2 can be rotated with the aerial wire as an axis. For example, if the main lobes are at 25 degrees to the wire in the horizontal plane, the angle relative to that of the wire grows smaller in this plane as the elevation increases. With the pattern rotated 90°, the lobe is radiating directly in line with the wire, but at an elevation of 25 degrees.

Exact results depend on height and other factors, but when the aerial is some wavelengths long, maximum radiation is more and more in line with the wire, and at lower angles. This is most useful for DX. For best long distance results, the bearing is preferably the angles mentioned above, or slightly less. Minor lobes often found to give better signal strength than a dipole.

Transmitter Loading

Most transmitters nowadays have an adjustable PI-output circuit. This can often work into a wide range of impedances, and deal with considerable reactance. If normal adjustment of the PA and load condensers of the transmitter allows suitable loading of the PA, with the aerial connected directly to the transmitter, *no* increase in signal strength will be secured by using a tuner or Z-match. This method of working is often used for Top Band or perhaps 80 metres, for simplicity.

Since the end-fed aerial works well on harmonics, some kind of output tuner is often wise, even if it is not always required to obtain suitable loading. If the aerial will not load the transmitter, then such a tuner, or some impedance matching circuit, becomes essential.

The Z-Match Device

Numerous circuits can be used to allow the impedance, Z, of the aerial to be matched to the transmitter output. All will be found to give the same signal strength, when constructed as units of comparable efficiency, and correctly adjusted.

Some means of getting an indication is useful. The simplest is an RF meter placed in the aerial lead. If the aerial/earth system and operating frequency remain unchanged, maximum radiated signal will coincide with maximum aerial current, as shown by the meter.

If the operating frequency is changed, this will alter the meter reading. For the same RF power, current shown will be quite low for high impedances, but much larger for low impedances. As impedance changes from band to band (Fig. 1) lower meter readings are expected when the aerial length is near a $\frac{1}{2}$ -wave, or multiple of $\frac{1}{2}$ -waves.

The RF meter can be a 350 mA or similar type for low power and high impedance, or a 2-amp. instrument for higher power and lower impedances. It is placed in the aerial lead (*not* between the transmitter and any tuner or Z-match). Adjustments

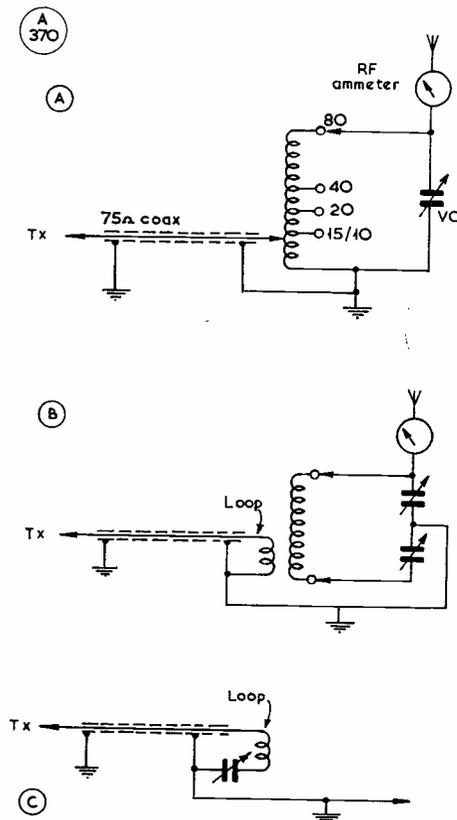


Fig.3 : Tuner circuits to feed $\frac{1}{2}$ aerials

to the transmitter (or tuner) are to secure maximum aerial current.

If the aerial is a $\frac{1}{2}$ -wave or multiple of $\frac{1}{2}$ -waves on each band its feed impedance will always be high and it can be operated from a parallel tuned circuit. In these circumstances, A in Fig. 3 is satisfactory. The band is selected with a clip, or rotary switch. The latter is convenient, taps being soldered to the coil. One coil will cover 80, 40, 20, and 15/10 metres combined. (The Eddystone ribbed former $2\frac{1}{2}$ in. in diameter and taking 26 turns over a $3\frac{1}{2}$ in. winding length, is suitable). VC can be 100 $\mu\mu$ F to 200 $\mu\mu$ F or so, and taps are placed so that it is almost fully open for 10, 15 and 20 metres. Plate spacing needs to equal that of the PA tuning condenser.

A co-axial lead is usually convenient for the transmitter, and can normally be tapped 2 or 3 tuns up the coil from earth. A coupling coil, overwound with stout insulating wire, gives similar results.

At B in Fig. 3 a 2-gang or 2-section capacitor is used instead, and is less likely to spark over with the same plate spacing as A. The transmitter coupl-

ing loop is overwound on the centre of the coil. For higher frequency bands, taps are clipped or switched towards the centre by equal amounts. All tuner coils should be of stout wire—16 or 18 gauge, or even 14g. aerial wire.

If the receiver is for 75 ohms input, and the transmitter will work into 75 ohms (most will) tapings can be found by tuning the receiver to a transmission in the required band, and peaking VC on the tuner for best signal strength on the S-meter.

SWR Indicator.

If a standing wave indicator is available, it can be included in the coax lead from transmitter to tuner. The tuner is adjusted for *minimum* reflected power.

This coax lead is usually only a few feet long, and the transmitter *pi*-tank can of course deal with standing waves, so it will be found that the presence of standing waves on this line need not reduce power radiated from the aerial by any detectable amount. So the SWR indicator is in no way essential.

A capacitor may be added in series with the coupling loop, C in Fig. 3. This allows adjustment of coupling and reactance. The loop and capacitance should give resonance at the working frequency. So 1000 $\mu\mu\text{F}$, or $\cdot 001 \mu\text{F}$ (2/500 $\mu\mu\text{F}$ ganged receiver-type condenser) is necessary for 80 metres or 500 $\mu\mu\text{F}$ with extra turns on the loop. For higher frequencies, 500 $\mu\mu\text{F}$ or 250 $\mu\mu\text{F}$ will suffice. The coil taps and capacitors are adjusted for least reflected power, easily done with the SWF indicator.

Low Impedances

At Fig 3, circuit A can feed into aerials of lower impedance. VC is placed across so much of the coil as is required for the band in use, and the aerial connection is tapped down the coil. If the impedance is fairly low the tapping point can be critical.

Series tuning, Fig. 4, is preferable for low impedances. If VC Fig. 3, A, has flexible leads with slips, Fig. 4 can be quickly arranged. Should the aerial be something around 137ft., to be used as a quarter-wave on 160 metres only, then a 160m. tuner is best constructed, and a 500 $\mu\mu\text{F}$ capacitor may be fitted. The coil can resemble the transmitter tank, or be about 45 turns of 20g. wire occupying 2½in. on a 1½in. diameter former. The transmitter can go to a tapping X, or coupling winding Y, which can usually be some 7 to 12 turns or so.

With low impedance feed to an aerial, a good low-resistance earth becomes important. With high impedance feed, resistance in the earthing system only causes small losses.

The actual resonant frequency of an aerial depends somewhat on bends and local objects. An aerial supposed to be a number of ½-waves long on an HF band may when tested prove not to have the expected high impedance feed point on these frequencies. Even two or three feet change in effective length can make an important difference on the 10, 15 or 20m. bands.

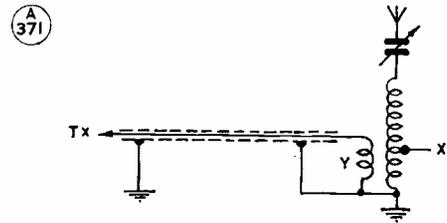


Fig. 4: Series tuning for ¼ wave aerials.

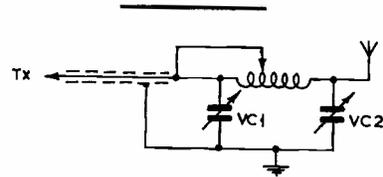


Fig. 5: Pi type Z-Match.

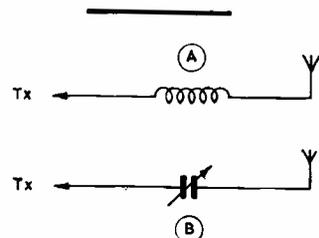


Fig. 6: Simple means of loading for one or two aerials

Pi Z-Match

A tuner as in Fig. 5 can match any aerial to a 75 ohms or similar coax line from the transmitter. The coil (or portion in use) resembles that of the PA coil for that band. VC1 can be a 2/500 $\mu\mu\text{F}$ receiver type condenser. VC2 can resemble that in Fig. 3, A, for medium to high impedance feed points. Lower impedances and lower frequencies require more capacity here.

With a short coax lead from the transmitter, VC1 can be omitted, thus obtaining a simpler L-type impedance matching circuit. Using this, a transmitter can be loaded to full input by an aerial only a few feet long, if necessary. But do not expect signal strength to equal that of a longer aerial!

For One Band

Sometimes operation is wanted on one band only—for example, 160m. If the aerial erected does not permit correct loading, some simple cure, for this band only, may be sought.

If the aerial is shorter than resonant length (very probable on 160) a coil may be placed in series with it, as at A in Fig. 6. This can be scramble wound single flex or other fairly stout insulated wire. Estimate to get something like the inductance of the PA tank for the band, and change or tap this as necessary.

Should the aerial be too long for a higher fre-

quency band, it can be effectively shortened by a series condenser, B in Fig. 6. This, or a coil, can be left permanently connected.

Reception

For general reception, any wire can be connected directly to the receiver. But for maximum sensitivity, a tuner or matching unit will give much improved results—it considerably increases signal strength if the original match was poor.

For receivers with 75-ohm input (CR-150, EA-12, 888A, 940, 960, 840C, etc.) a tuner as used

to match the 75 ohm coax output of the transmitter is satisfactory. The same tuner can be used for reception and transmission, by placing the relay or switch in the coax lead. This also does for the CR-100 (100 ohms).

Receivers with higher impedance input, such as the 680, 750, 740 (400 ohms), 640 (300 ohms) or HDO (500 ohms) may need a separate tuner or matching unit, depending on the aerial and bands worked. Matching units for reception only can resemble those shown here, but need only use receiver-type components.

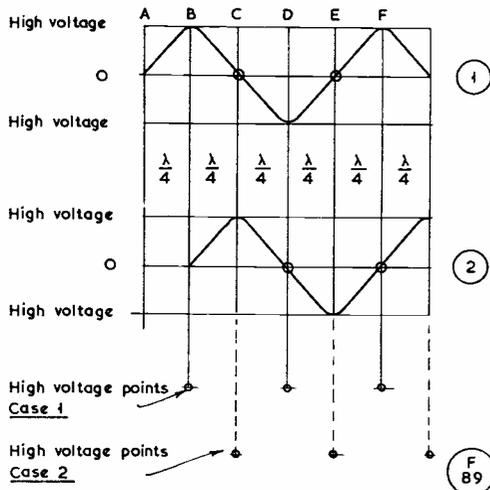
PRACTICAL LECHER-LINE SYSTEM

FOR VHF MEASUREMENTS

D. GILMOUR (VE7YG)

LECHER lines (pronounced "lecker") consist of a section of transmission line, a length scale and a sliding bar. In operation the slider should indicate at least two voltage points on the scale, the distance between these points being a half-wavelength of the standing wave on the transmission line.

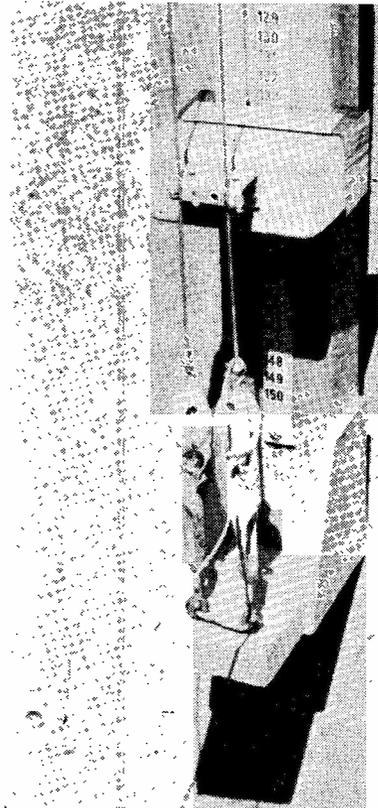
Usually the transmission line is made of bare or



Voltage and current antinodes (points of maxima) on a Lecher line system, maximum current appearing at points O. A half-wave could be measured, physically in centimetres, between points B-D, or D-F, or C-E.

tinned copper wires, insulated at each end. The scale is best in metric measure (because wavelength is thought of in metres and centimetres) whilst the slider is a shorting device.

From the diagram it will be realised that the



A view of the foot end of the Lecher line system described by VE7YG. Other methods of mounting could be used.

Always mention "Short Wave Magazine" when writing to Advertisers — it helps you, helps them and helps us

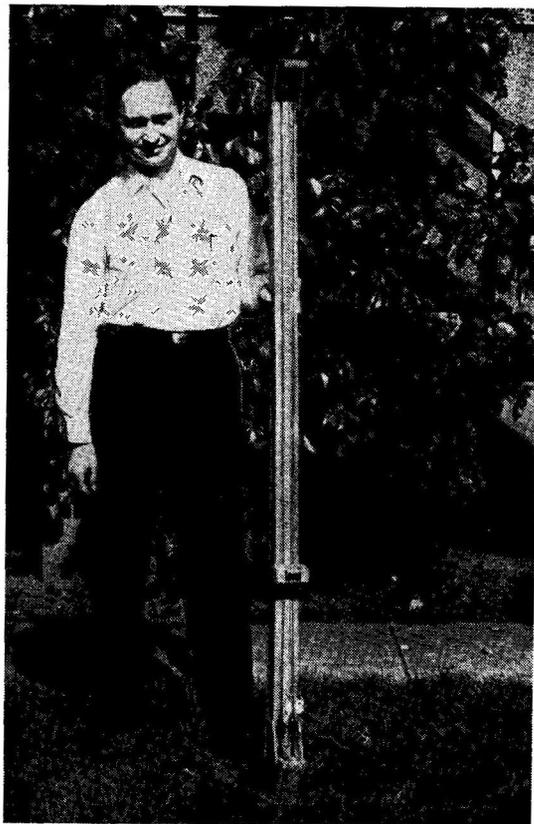
David Gilmour, VE7YG, with the complete Lecher-line assembly for direct measurements at VHF. The size shown is convenient for the two-metre band and higher frequencies.

length of the lines should not be less than three quarter-wavelengths of the lowest frequency for which the lines are to be used. For use at two metres (150 mc) the minimum length is thus $1\frac{1}{2}$ metres or, say, 60 inches.

A base capable of supporting ends firmly mounted is needed, which in turn take tight-stretched 18 or 20g. wires, will dictate use of reasonable wood, about $2\frac{1}{2}$ in. x $1\frac{1}{2}$ in. x $5\frac{1}{2}$ ft. being suggested. A plastic tape 150 cm. on one side, inches on the other side, can be obtained as a gauge. The slider consists of a shorting bar mounted on a wooden block and is easy to fabricate although probe loops for coupling to detectors and meter indicators offer alternatives.

How accurate Lecher lines are depends upon the users. One handbook suggests: "0.1 per cent with care"; another states "only 1 per cent accuracy can be expected." But both agree that the best coupling is the loosest!

Some readers may question the over-simplification of the operation as described and point out that we may be dealing with *null* points or *maxima* or that they may turn out to be current points instead of voltage points, otherwise known as nodes or anti-nodes, e.g. a point of maximum voltage is described as a *Voltage Anti-node*. The handbooks suggest how Lecher lines should be used, and the illustration shows what a completed line system can look like.



G3CED/M/HA, BUDAPEST

Touring Europe on a special export selling and demonstration mission, George Partridge, G3CED, of Partridge Electronics, Ltd. and the "Joystick", has achieved the distinction of being the first amateur from the West to obtain a local licence from the Hungarian authorities—and for /M operation, too! He was running a KW-2000 transceiver and the new Coda-Mobile equipment, mounted in his Ford van, with the mobile Joystick on the roof. From Budapest, contacts were made with stations all over Europe. Well done, George!

FAREWELL SAFARI—92nd SIGNAL Regt.

With the reorganisation of the whole basis of the Territorial Army, many units will disappear altogether and others will be merged. Among those affected are the Signals groups, which have many active amateurs in their ranks. It is understood that these particular units are to be formed into one, and there will be a loss both of identity and membership. One of those so affected is 92nd Signal Regt., A.E.R., with 16 licensed amateurs in their own

Amateur Radio club. By way of valediction they are organising an exercise called "Final Fling", when their station GM3SIG/P, with GM3LOV/P, will be on from the County of Nairn during July 9-10 (the weekend after you see this). Operating only on Top Band (1920 kc) and two metres, they will be looking for contacts with all comers—and Nairn is a pretty rare county, anyway. As G3LOV puts it "We are determined to go out in a blaze of glory after many years of amateur activity". And it is a very sad and disturbing thing that it has to be so.

GETTING TO KNOW YOU

One of the most remarkable publications in our Book List is the *Ham's Interpreter*, which gives basic radio terms and expressions, in the Amateur Radio context, in no less than ten languages—if you include Esperanto. It is also a pronouncing dictionary, so that by careful study you can learn to express yourself in, say, quite tolerable Spanish even if you've never been nearer to EA than Beachy Head. The price is but 8s. 6d. post free, and ex-stock, of the Publications Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

VHF BANDS

A. J. DEVON

FIRST, of course, an apology for last month's non-appearance, explained on p.224 of the June issue. Those "circumstances outside our control" were—as many readers have gathered—directly connected with the unhappy, untimely and totally unexpected passing of our old friend and colleague G6QB. What it came to was that, at the very shortest notice, A.J.D. had to write his features for the June issue. This in turn meant that it was just not possible also to produce "VHF Bands" in the time available.

As to what has been happening since last time out, the quick answer is "Quite a lot, though the level of activity generally was not enough to make the most of the conditions." As is always the case, the period of fine and settled weather produced stable paths over GDX and nearer EDX distances, but there did not seem to be enough stations on to take full advantage of the openings. This kind of thing has often happened in the past, and is one of the lesser mysteries of the pattern of VHF activity. The best period was from towards the end of May till the early part of June, with

OZ's getting into the Home Counties area and SM's identified as far west as Bristol. G2JF (Ashford, Kent) reports hearing the Norwegian beacon LA4VHF on 145.3 mc, coming through most of the day on May 28. On the worked EDX side, "John Fox" records interesting contacts with DM2BLI and DJ8WV/M, using only 80 milliW to a transistor rig. And as an instance of licensing reciprocity, G2JF mentions hearing PA9EH/DJ1EH, on Texal Island.

Band Plan Revised

The revised version of the Two-Metre Band Plan is set out in full on p.280—and do please read the small print! What it comes to for most people is "no change," but on the other hand it does provide for a CW area at the LF end (100 kc exclusive), as on all other amateur bands, while catering for the SSB interest with the channel at the HF edge of the Zone 7 allocation; the important point here is that this brings the U.K. Sideband frequency into line with what already obtains in Europe.

One of the objects of the revision is to provide for that situation when VFO working—or, if not actual VFO operation, then frequency hopping by having a number of switched crystals—becomes more general. There are those who are not happy at the prospect of "VFO's swishing about the band," but the fact remains that this is an operating technique that is certain to be developed on VHF just as we have seen it on the HF bands. By the same token, there are also those who consider that we should have been using the VFO technique on two metres long ago. And as stated in the small print, p.280, the idea is that you call CQ in your Zone, listen on your freq., and if not answered, look for a CC station in another Zone calling *you*, and net on *him*. Alternatively, if wishing to answer a station outside your own Zone, you can net on to him right away, reverting to your normal frequency at the end of the QSO. For the regular xtal-controlled operator, not using VFO, the point to remember is that as VFO becomes

more usual, he also is liable to be called on *his own frequency*.

As already implied, the whole exercise can be regarded as an almost painless revision to bring the Band Plan—or rather, the thinking behind the Plan—right up-to-date, with the hope that no further revision will be necessary for a term of years. Operators new to two metres, or getting ready to come on, are earnestly adjured to make sure their crystals put them in the correct Zone. For those at the VFO-design stage, remember that good frequency measurement and calibration become a *sine qua non* if a VFO is to be used really successfully. You simply have to be able to measure your own frequency, and the other chap's, to that degree of accuracy that enables you to re-set a frequency to within a few kilocycles.

Finally, on the subject of the Band Plan, let it be made plain that what you see here on p.280 has been fully agreed with the RSGB, all along the line. Several meetings were held, and there was much exchange of paper, before the Plan was agreed and finalised for publication.

DX-Pedition Notes

The season for getting out and about /P is now right with us, and there are several interesting expeditions planned for the next few weeks. But first, a note about G3BHT/M/LX, who has been in Luxembourg, accompanied by G3ORK, and due to pack up on July 2; unfortunately, because of our June absence, this could not be publicised in advance, though it was to hand in time—for which we apologise to G3BHT (*QTHR*).

A little foray into Huntingdon on July 10, this being a rarish county, and the frequency is 433.26 mc, signing G8AHE/P on Phone and G3OVA/P on CW. The same county is also to be visited during July, but running 4 metres, by G3NSM/A; skeds can be arranged by getting in touch with A. McHenry, G13NSM, c/o Batchelors, George Street, Huntingdon.

For the fortnight July 15-31,

GM8ANY/P will be in various Scottish counties, open for skeds with any 70 cm. station, any time, frequency 433.08 mc, using good gear; the sked arrangements are in the hands of G6RKU/T (QTHR), and all letters will be answered promptly.

Then, for the week July 23-30, some ten or so keen chaps will be taking G3KMI/P up to Cumberland (and possibly into other northern counties) this being a combined Guildford/Southampton party. The bands to be worked are 4 metres (70.28 mc) and two metres (145+ mc), with xtals for other frequencies as necessary. Skeds are invited for both bands, and can be arranged through G3TCU (QTHR).

A station signing EI9BF will be in operation on 4m./2m. from the counties of Donegal, Sligo, Galway, and Dublin for the period July 21 to August 3, the motivation being by G3MWZ (QTHR)—who hastens to add that he is now way related to "G9BF"!

Another GM expedition is fixed for Roxburgh, July 25; Berwick, July 27; East Lothian, July 29; West Lothian, July 31; Bute, August 2; Argyll, August 4; and Clackmannan, August 6, using CW only on 144.082 mc, signing GM3TQZ/P, assisted by G3TQD, and running 60w. to a pair of 10-ele Yagis stacked. For sked arrangements, get in touch with G3TQZ (QTHR). If you are going to be at home on any of those dates and need any of the counties on offer—(do we need those counties! — Ed.) see what you can do—but remember, you must be able to do it on CW!

Some UHF Notes

From G3HWR (London), some interesting notes on the UHF doings of the G5FK group (G.E.C., Wembley), where they have gear going well on 23 cm. (1296 mc) and on 13 cm. (2300 mc). The G5FK Tx gives half-a-watt of RF on 2301.75 mc, CW and NBFM, and the converter is a CC job covering 2300-2310 mc, into a BRT-400; their aerial is an 18in. paraboloid at 25ft. G3RPE has a nice converter for 13 cm., into an R.107. While the UHF work is naturally very

much in the experimental stage (at least they can work each other!), the 23 cm. equipment is giving very good results outside the local area—indeed, G5FK has now accounted for 8 counties and 18 stations on 1296 mc. G3HWR has been digging into the archives, and can list about 16S regularly active on the 23-cm. band; another dozen or so fully equipped but not on very often; and an additional 40S in various stages of getting going or showing interest. According to G3HWR, of all this lot, some 34 UHF types are taking the 23-cm. band seriously. And that is not at all a bad total, which will probably surprise many

readers who have been on VHF for years.

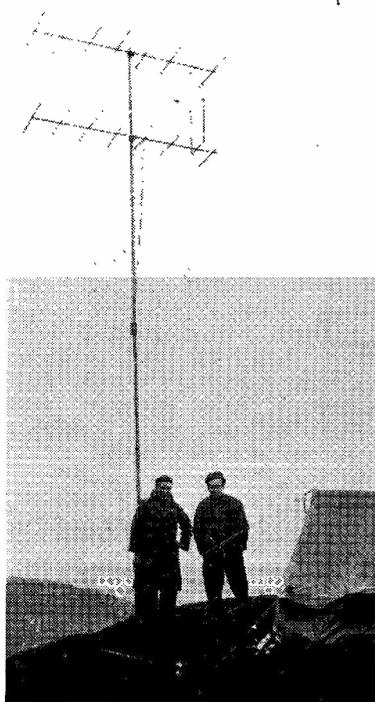
The *Oscar Project* boys still keep hard at it, and though the unfortunate *Oscar IV* is still occasionally heard on the tracker frequency, it is all but forgotten. The *Oscar V* plans envisage 2m./10m. coverage, plus beacons on the 432 and 1296 mc bands. Another idea is an *Oscar* in a near-synchronous orbit (fixed in space)—but while the ground work is well in hand, it all depends upon the availability of launch vehicles to carry these amateur packages as passengers—and it says a great deal for the skill, influence, salesmanship and pertinacity of the

TWO-METRE BAND PLAN — U.K.

Effective August 1st, 1966

Zone 1	144.0-144.1 mc	CW only, for any district.
Zone 2	144.1-144.25 mc	Cornwall, Devon, Somerset, Berkshire, Dorset, Hampshire, Wiltshire, Channel Islands.
Zone 3	144.25-144.5 mc	Brecon, Cardigan, Carmarthen, Glamorgan, Gloucester, Hereford, Monmouth, Pembroke, Radnor, Worcester.
Zone 4	144.5-144.7 mc	Kent, Surrey, Sussex.
Zone 5	144.7-145.1 mc	Bedford, Buckingham, Essex, Hertford, London GLC, Middlesex.
Zone 6	145.1-145.3 mc	Cambridge, Huntingdon, Leicester, Norfolk, Northampton, Oxford, Rutland, Suffolk, Warwick.
	145.41 mc	SSB Spot Frequency, any district.
Zone 7	145.3-145.5 mc	Anglesey, Carnarvon, Cheshire, Denbigh, Flint, Merioneth, Montgomery, Shropshire, Stafford.
Zone 8	145.5-145.8 mc	Derby, Lancashire, Lincoln, Nottingham, Yorkshire.
Zone 9	145.8-146.0 mc	All Scotland, Northern Ireland, Isle of Man, Cumberland, Co. Durham, Northumberland, Westmorland.

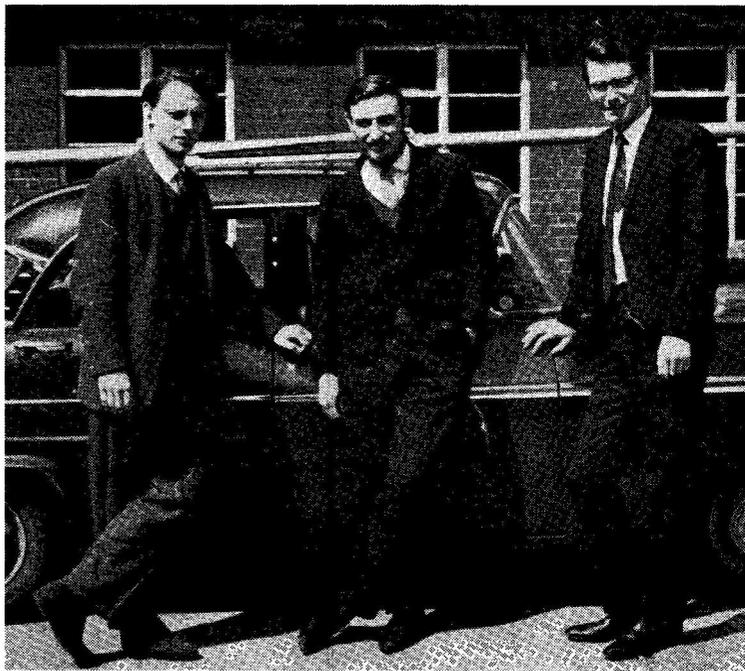
Notes: Zone 1 area is for CW exclusively, all districts, but A1 can also be used in own Zone. The SSB allocation is in accordance with Continental practice and thus becomes the international SSB channel. Stations using VFO can net outside their Zone when answering CQ calls—but should always call their CQ's in the correct Zone and then listen first on their own frequency. Beacon stations and guard channels must be avoided when changing frequency.



Project Oscar Group, Sunnyvale, Calif., that they have got the sympathy and support of the U.S. military authorities for launch facilities. The work has now become so heavy, and there is so much involved on the technical side, that wisely the Group has started to decentralise to other similar organisations in Australia and Canada. The European plans for an Oscar Project, *Euro-Oscar*, were outlined in this space in the May issue.

EA/EI "First" by MS

Trying the *Cetids* meteor shower over May 19-21 and also the *Persids* during June 4-6, EA4AO (Madrid) and EI2A (Navan) completed their first QSO on May 20, repeating this each day June 4-6, with strong signals up to S7, on sustained bursts of up to a minute or more. The propagation factor during these showers was so high that signals were heard consistently before and after the sked times. All QSO's were completed within two hours. Another interesting point is that EI2A was only running 100w., on 145-235 mc,



Left to right: G8AEG, G3UCN and G3RJH, who signed GW3RJH/P from the Sugar Loaf, Abergavenny, Mon., during the recent two-metre event. Nothing spectacular was worked in the way of DX (says the report), the total being 101 stations at medium distances. The whole affair was a lot of hard work for them as, not being able to get the cars to the chosen site, they had to hump all the gear (including a P-E set!) the last quarter-mile up the mountain. Their Rx was a nuvistor converter into an AR88D (another rather lumpy item for portable work!), with a 20-watt Tx, the aerial being a slot-fed 8/8, at 20ft. elevation on the top of the Sugar Loaf—seen at left.

his beam being a slot-fed 8-over-8; EA4AO was on 144-900 mc, from his city location in Madrid. So congratulations to them both on another very fine two-metre "first"—and a special round of applause for EI2A, for it was his very first DX contact by meteor-scatter propagation!

This sort of work depends upon a number of factors—often discussed in these pages—and not least upon an efficient aerial system. You can have everything right inside, in the way of frequency control, receiver efficiency, maximum power availability and the fortitude to put in concentrated hours at ungodly times, but in the end it all depends on a really effective aerial system outside. In the U.K., these arrays are either J-Beam systems, or based upon J-Beam design for high-gain directive beams. It is therefore of interest to note that in future, to ensure fullest effi-

ciency, all J-Beam VHF band aerial systems for two metres will be supplied with a balun for correct matching, whether for single multi-element units, or into the much higher-gain stacked arrays. J-Beam Aerials, Ltd. are also offering a new wide-band design for the 70-centimetre band, the *Parabeam*, which in effect will give nearly the same radiation performance off one 18-ele aerial as is normally obtainable from an amateur-fabricated 18-ele arrangement in two stacks. All these J-Beam designs come from a well-equipped antenna laboratory, with full test facilities under simulated as well as practical conditions. In fact, the economically-priced J-Beam designs for the amateur VHF bands are made possible only because a highly successful commercial product has dominated the domestic TV-aerial market for the best part of 20 years. And your A.J.D., who talks

from the sort of information one gets over the grape-vine through the old-boy net, can add that at long last J-Beam Ltd. have got round to thinking about the lower-frequency bands, the first aerial now in the Lab. being a 4-ele configuration for 10 metres. This will be a very useful addition to their range.

Items of VHF Interest

Has anyone on two metres had more than 2,000 sked contacts over a GDX path? When you come to look at the record of G8VZ (Princes Risborough, Bucks.) with G3JWQ (Ripley, Derbs.), the answer is *Yes*. By June 5, they had clocked up 2,122 contacts, extending over years,

with no more than 12 watts input at the G8VZ end, over a distance of a good 100 miles. As well as this, by patient work on the band, Jack has also covered all G/GW counties with his QRP. Being now retired, G8VZ will have more time for VHF, so we can expect that his 12 watts will be pushed out still further.

THREE-BAND ANNUAL VHF TABLE

September 1965 to August 1966

Station	FOUR METRES		TWO METRES		70 CENTIMETRES		TOTAL pts.
	Counties	Countries	Counties	Countries	Counties	Countries	
G3EDD	31	3	60	17	32	4	224
G3HRH	24	3	52	12	20	3	187
G3LAS	25	3	46	10	17	3	172
G3OWA	27	3	37	8	19	1	165
G3FIJ	18	2	37	12	19	4	158
EI6AS	23	6	33	7	9	4	137
G5FK	22	3	12	3	21	2	134
G3AHB	6	1	39	11	20	3	133
G3NNG	—	—	47	11	21	4	133
G2AXI	20	3	40	10	11	1	132
G3PTM	—	—	41	10	23	3	129
G3KQF	—	—	33	8	26	3	128
G5SUM	15	2	30	7	16	2	125
G3SKR	36	6	10	2	—	—	96
G3EKP	12	5	15	4	9	3	89
G3TLB	8	1	52	13	—	—	83
G8ACB	—	—	—	—	23	4	81
G3RST	8	1	49	17	—	—	75
G3HWR	12	2	14	2	8	1	71
G2CIW	—	—	14	9	32	6	61
G8ACE	—	—	—	—	19	1	60
G3UFA	8	1	40	10	—	—	60
G3FNM	2	1	43	8	—	—	57
G3KMI	15	1	18	4	—	—	54
G3UCS	—	—	34	5	—	—	39
G3UFQ	—	—	28	8	—	—	36
G3OUL	8	2	14	2	5	2	33
GW3CBY	3	2	19	4	—	—	33
GW3PWH	4	2	17	4	—	—	33

Scores are since September 1, 1965, and will accrue until August 31 this year. Position is shown by last-column total, as aggregate of all scores. Own county and country score as one each. Entries may be made for a single band, any two, or all three. Last-column totals shown above include bonus gained from multipliers (x2 for 70 mc, and x3 for 430 mc) effective during April 1-May 31, and now taken into aggregate. No further multipliers will be announced before Table closes for year on August 31. Till then, scores will increase only by points gained on band(s) worked.

The Liverpool Univ. Group are running G3OUL on all VHF bands, from a new shack in the Students' Union building (and your A.J.D. can think of about fifteen University groups who could be doing the same) with three-VHF-band beam arrays on the roof at a height of 80ft. above ground. What this has brought G3OUL in one week on the VHF air is shown in the Three-Band Annual, opposite.

For many years, G2CIW (Northfield, Birmingham) has been one of our regular correspondents, mainly in the UHF context. But with a change of QTH, Jack says that he will be giving it a rest for a bit—apart from the turmoil of a change, and the domestic upheaval, he will be in difficulties for antennae. But he has the feeling that the bug will bite again—*of course it will!*

G3FYR (Orpington, Kent), in a thoughtful letter bringing out many points about TVI, the commercialism that has crept into Amateur Radio, and the ascendancy of the Big Boys on the VHF bands, says that his personal attitude to communication on two metres is exactly typified by what was said on p.32 of the March issue: "You can be perfectly happy just working locals without any TVI problems."

As regards the Tabular Matter shown this time, it is (we hope) all up-to-date, with about 30 movements taken in. But even at that, your A.J.D. could demand another couple of pages to show all the other Tables, such as Two-Metre Countries, the Seventy-Centimetre All Time, Two-Metre Firsts, and the Two-Metre All Time. Sorry, we have now run out of space again! **August Deadline, July 22. 73 de A.J.D.**

COMMUNICATION and DX NEWS

THE tragic irony of G6QB's preliminary paragraphs last month, on the subject of a "serendipity constant" of other amateurs as light-heartedly contrasted with his own, was underlined for the writer when going through the correspondence for this feature, and reading the expressions of shock and sorrow which formed the opening paragraph of almost every letter, emphasising, each in a different way, the affection felt for G6QB by his friends, his acquaintances, and right through to those who only knew him through the written word.

Your present conductor has none of that twenty years of experience of writing a piece such as this and can only say that even though he has none of Tommy's knowledge of the bands, of the doings thereupon, and of human nature in general—which so informed this feature in the past—nevertheless he will be doing his best by all the letters that come his way.

Reading through the mail before commencing the writing of these paragraphs, one is immediately struck by the difference in the matter of what constitutes DX to different operators. One supposes, that as a criterion of DX, sheer distance had ceased to have much meaning by the end of the twenties for the top-notch operators; on the other hand, would we not all admit, if we are honest, that the greatest DX thrill of all was the very first contact we made, probably by a sked, with a local down the road, on Top Band or Eighty, after sweating it out for hours trying to make it load up and not quite knowing what "loading it up" meant. Not far behind that thrill comes the first QSO on one of the HF bands. After one has worked a ZL, and

proved to one's own satisfaction that it is possible to circle the globe, the thrill seems to get less, or is it that one becomes a trifle blasé?

Boris, Vlad, and Ivan

G3IDG takes us gently to task for the comments (last month) on these chaps, and enquires what *their* reactions to a series of ump-teen U.K. QSO's might possibly be. Does their magazine *Radio* contain similar acid comments about John Bull, Taffy, Pat and Mac? As he says, they are not even using their own alphabet, and after all they only get the same from us in the way of

rubber-stamp QSO's as we get from them. Or do they think we are like our London policemen ("wonderful") because we prefer working W, PY, VK and so on, to working *them*?

G3IDG also points out that WAZ was originated by R9 *Magazine* as far back as November, 1934 in much the same form as it exists in today, but for some reason it did not catch on. However, it was re-introduced in *Radio* (all same R9) of January, 1937. In the four years before it was suspended by Hitler's War, only three stations made WAZ (ON4AU, J5CC and G2ZQ). However, since it was reactivated in January, 1947 by *CQ Magazine*, the Cowan's successor to *Radio* and R9, 2,687 certificates have gone out to adorn shack walls—

FIVE-BAND DX TABLE

(New Cycle)

Starting Date: January 1, 1966

Station	Countries	28 mc	21 mc	14 mc	7 mc	3.5 mc
G3NMH	175	45	89	159	—	—
G3UML	169	55	69	145	26	29
GM3KLA	80	11	62	22	37	38
G3IAR	99	10	58	57	38	32
G3LZQ	131	2	52	110	24	16
G3IGW	100	1	48	55	44	42
GM3RFR	74	2	36	53	20	6
9VILP	35	14	22	24	21	21
G3UDR	76	5	20	46	2	18
G3UBI	49	2	10	26	5	25
VP8HJ	67	3	8	65	5	1
G3PQF	53	7	5	6	41	24
G3VDL	48	3	4	31	24	9
G13GTR	15	1	3	10	6	7
G3RJB	44	—	—	36	—	22

Note: Placings for this month are based on "21 mc" column.

as anyone who gets *CQ* would know.

"CQ" WW Contest Results

The advance results for this Contest, both CW and Phone, are to hand from WIWY, covering of course the 1965 affair. Taking the Phone section first, there are, as usual, no U.K. stations represented in the Top Ten, or the Top Six for the Multi-Operator sections, the sole Continental single-band leader being GW3PMR for 1.8 mc. Winner of the All-Band Single-operator was CX2CO, with 1,815,288 points, and all the Top Ten were in excess of half a million. Apart from G3DYY, the other G entries were no more than five-digit scores. In the Multi-Operator, Single-Transmitter section the leader of the Top Six was ET3USA at 1,222,843, the first three being over the million mark. High U.K. scorers were G5BK, G1SXXG, and GW3NWV, of whom the last named topped the half-million mark, as against his score of 403,782 last time round.

Turning now to the CW end of the battle, we can congratulate G's on winning two of the single-band Continental leaderships—G3HCT on 21 mc and G3IGW for Top Band. Leader of the Top Ten was VR2EW, with a score of near as dammit two and a half million—yes, this is the single operator category! He was followed home by CX2CO who made 1,252,275. A handsome win, but CX2CO is to be congratulated on such an all-round performance. In the Top Six Multi-Operator Single Transmitter category once again we find ET3USA sitting on the heap, this time just a hair over the million mark, and all the six at better than 750,000. In the all-band single-operator category, the best U.K. effort was by G3FKM, and in the multi-operator single-transmitter section, G3SSO at better than half a million, G13GAL and GM3GUJ. As far as the multi-operator multi-transmitter effort was concerned the cupboard seems bare, no G calls being mentioned.

WIWY comments that the entry

was up by nearly 20 per cent for the Phone end and "slightly up due to poor conditions" for the CW session. Your scribe would only comment that if a score of two-and-a-half mega-points says the bands were poor, what should we expect when the bands are good?

Around the Bands

The Editor was insistent that your scribe should "be himself" for this piece, so we will look at Forty first, because it seems the easiest. G3PQF says he is on the band most evenings with "the group" and finds the VK's are starting to show (this report is one of several that were found at G6QB's too late for inclusion in last month's offering). G3PQF asks that stations do not tune up on 7045 kc while the DX is coming through and also mentions that calls of "break, break, break" at 5 & 9++ are bad for the eardrums when gains are turned right up in an effort to hear the DX. A query is ZD8ARP who startles G3PQF by coming in regularly at 5 & 9 off the end of his dipole.

Mike of G3IGW offers EA8ET, UF6DR, VP6BW and PY stations without comment. From GM3SVK up in the Shetlands we hear that he has been having some success on 40 metres; in the evening it is full of the usual crop of Europeans of one sort and another, opening up later to yield a few nice ones such as PY4WJP, UT5PX, HV1CN, 5A3TX, UO5WT, PY7AKQ, and PY7APS. He also mentions as an oddity "U5ARTEK," claiming to be in Artek in Crimea, this latter being also mentioned by SWL chasers of prefixes. All this little lot were hooked with the aid of the key. Your conductor can only add to that a cautionary tale: It was felt that the rig should be known to work on Forty, and so it was loaded up into the long-wire and a rapid test made by calling a Klub that happened to be on the frequency sporting a 565 signal. No joy, so a quick check was made to prove the RF was going out. A few seconds and a burnt

finger later we tried again on the same Klub, still merrily calling CQ, but still no result. Disgusted, we tuned up the band to see if there was anyone else who might come back—and what did we find?—30 kc away, the same call but now one had in all fairness to admit it was T9. A quick check showed that the two signals were in fact one and the same. A pity because, some of the rarer *oblasts* (Russian counties) are only to be found on this band for some obscure reason only they can know.

Getting On

Having taken the plunge, and found the water not too bad, let us now turn our attention to 20m. G2DC was one of those whose May letter (for the June issue) went adrift; however, he says that gardening and field day preparations were taking most of his time and goes on to offer VK, ZL, KH6, KL7, VE6, and the occasional VR popping up, all this being between 0630-0830z. Most of his letter is taken up with discussion of the reasons for the shortage of VR signals in this country, when DX-peditions in the area always seem to get over to U.K. for quite long spells. Lloyd (W6KG/G5ACH) explained that the average Pacific station found all their DX wants by way of VK, ZL, and West Coast W's, and were of the opinion that to work Europe required a special effort with little or no hope of success. G2DC says when these types saw the W6KG log they were dumbfounded. Now the seed has been sown, who knows, it might bear fruit.

G3LZQ's letter also refers to the previous period; he found time to put in 20 hours of operating during the *CQ* SSB contest, with a yield of 75 countries in 29 Zones from 295 QSO's, all on 20 and 15 metres, using the ground plane aerial. Normal operating has been mainly in the hours 0700-0900 and 2000-2359 weekdays plus the weekends, as his list shows. He offers VP1, VP2, VP9, 6Y5, 9Y4, HC8JG, TG8FA, TG9AD, YS1, EL2AT, ET3AC.

TU2BA, 6O6, 7X2, 9L1, HZ1AB, HL9US, UJ8, UM8, KX6BQ, LA3P/P, OHØNI *plus* the hordes of "usual DX"—all of which makes your conductor think his own aerial must be "dis." Another fine list on CW from G3LZQ is shorter but contains VU3KS, VP5AR, HP1AC, CP5EN, CM1AR, and is modest enough to include VK and ZL.

From G3IGW, a shorter list, covering all bands 160m. to Two, all on the key. For 20m., Mike offers CO2JB, CR6DX, HK3RQ, KZ5, KV4AA, O A 4 K F, UAØKUV, VP8HJ and 7G1A. From GM3JDR, a short note and a couple of long lists—all on Twenty, but of course a separate list for CW and Phone. He remarks that to him the Pacific DX is somewhat of a rarity, but he manages UAØ and JA regularly. Apart from these the SSB list contains such things as HZ1AB, ZD8RD, MP4BDP, 9J2FK, HH8BO, 9M6, HL9, OHØNF, LA3P/P, 6O6BLO, EP2TR, and a horde of other goodies. As for the CW list, it offers such things as 4X4JO, HK3ADO, SU1DL, MP4BEU, HS1JB, 7X2SX, JD7IP, and for a real tongue-twister, JA2GKK/MM/9M2—oh, well!

G3SVW enquires about TA1AX, at 1730 GMT on about 1405 kc, not mentioned in any other letters. Sounds a little as though it might be one of "Them," but any suggestions will be appreciated. A couple of cryptic comments from overseas—from VP8HJ a card with a new Table

TOP BAND LADDER

(G3T-- and G3U-- stations only)

Starting Date, January 1, 1966

Station	Countries	Countries
G3UAN	65	13
G3UTS	64	10
G3UBW	61	17
G3TXZ	55	11
G3TTK	43	12
G3UMK	39	7
G3USE	37	8
G3UCS	36	?



This nice-looking station is G3UCV, operated by Ronald Cartwright, 617 York Road, Leeds, 9. Though he passed the RAE in 1950, it was not till last year that the licence was finally taken out. After much experimenting with a variety of gear, the outfit settled on and shown here consists of a Heathkit Mohawk receiver, with a Tiger T.100 Tx, coupled by Z-match into a multi-band doublet type of aerial. The ancillaries consist of an SWR bridge, field strength meter, and a Class-D wavemeter. His QSL cards are reproduced from the outsize design seen on the wall, using the photographic method described in the March 1961 issue of "Short Wave Magazine."

entry, which just says "Condx vy poor hr," and from VE5HP a mystic note saying "Watch for me in a month on 14130 kc," which would seem to imply that something should happen on or about July 11.

From G3NOF we hear that his best contacts were with CR6GQ, FO8AG, HS1JG, KS6BX, VP2AZ, YA3TNC, ZD9BE, UM8FZ, 9M6AP, and 9V1LK. G3NOF says just about everything has been on Twenty during the month up to the time of his letter; all the DX he refers to as heard or worked was on SSB.

The 21 mc Band

Fifteen metres seems to be trying quite hard judging by the letters. G3NOF found FH8CD around midday with an S9 signal, and as late as midnight has brought forth VK3ABA in response to a CQ. The pick of the crop on this band for G3NOF were TU2AM, ZD7RH, ZS8L, 7Q7PS, 9J2GR, plus of course the usual W, ZS, and EU contacts. G3LZQ says, quite simply, that "things are on the upward grade." To prove his point he mentions OD5BZ, OD5EL,

MP4TBO, SVØWF, 7Q7PS, OHØNI, 9Q5FV, and a heap of other calls, all on Sideband, while for the CW side the log shows UF6FB, SVØWH and W5GUZ (at a time when there was not a single W on the rest of the band) also 9V1MK, 9K2AD, and UI8MV. G3IGW makes no comment, but worked HI8XAL, UD6KPB, TR8AG, and 9Q5LJ.

Up North, GM3SVK seems to have been having a joytime on the band; in the period May 1-23 he added some 46 countries to his total score on 15 metres, but he points out that up there they get a couple of hours of extra daylight which helps in the matter of raising the DX to the East. All his collection was gleaned on CW and included ZD8TV, FL8RA, VP9, HK7, 9V1, CX1, CO2, HC1, HI7, CP5EZ and much else besides. One query in the list is "ZP5LS," which could be a typing error for ZS5LS. Also from the Shetlands, comes a very nice letter from GM3KLA, who says he has recently dabbled for the first time ever on 21 mc; in a few days on the band, using a Heathkit DX-40U on CW and a 40m. inverted-V aerial, he rang

the bell to the tune of 52 countries. The band was doing its best for G3NMH also; he says it was open to W6, 7 and W0 up till midnight, and live in some direction or other pretty well all the time, but does not specify in more detail.

Only one mention of 3.5 mc in the current clip, from G3IGW, who says he worked TF3PI and East Coast W stations on CW.

The 160-metre Band

Top Band, of course, has its crop of faithful friends. G3IGW says "HB9TT—sorry, thats all!" G3UAN writes in to say that he has been forced to QRT temporarily owing to the onset of the exam-swatting season, but hopes to be on again at the end of June. He uses an HE-40 four-valve receiver and a home-brewed 160/80m. transmitter, but is planning to build a new receiver, pro-

bably to the G3HTA design as in SHORT WAVE MAGAZINE. Still, the old one managed to produce 4U1ITU, HB9's, DL, PAO, OH2BC and 46 different OK/OL stations, all on an aerial which is described as being 20ft. high, and having a 70ft. top, with a further 70ft. of wire around the garden fence for loading, worked against a water-pipe and a few aluminium chassis buried in a flower bed. This device was good enough to get an SWL report of reception of Top Band CW signals from as far as the Persian Gulf. The autumn programme includes a 50ft. vertical aerial erection in the garden, so it will be interesting to see what G3UAN can produce next season in the way of Top Band DX.

G3UBW has been at the same game of "improvements"—in his case it is an alteration to the aerial system to give about 90 feet of semi-vertical section

(neighbours permitting, of course) for use when time permits, during the coming season. A recent QSL came in from 9H1AE, to bring G3UBW up to 15 countries confirmed on Top Band. G3SVW reports "no change" for the band, and says this is in the main because he has been experimenting with the Vackar oscillator circuit.

Still on Top Band matters, we have a letter from G2NJ, which mentions that on June 9 GM3MXN/A was working from Rothesay (Isle of Bute), and this one is also mentioned by GW3PMR who, like G2NJ, is mainly concerned with registering in the Tables.

Ten Metres

Ten Metres this month deserves a paragraph or two all to itself, with almost as many correspondents as there are for 14 mc. G3UML's letter landed here just as this paragraph was being started, and so is the first one to cover. Laurie mentions QSO's with G, GI, GM, PA, ON and such as being rather peculiar ultra-short skip contacts; one of these was a four-way for G3UML with two other G's and a YV1! Among the DX calls in his list, to mention but a few, we see 4X4, LU, 5Z4, 5N2, CR6, 5H3, and a whole raft of others. G3NMH has reservations about the band; he has found a preponderance of short-skip and a shortage of real DX. G3PQF expresses much the same sort of opinion . . . "it always seems to be *yesterday* the band was open, or worse even, open only to some parts of the country and not others"—Murphy's Law again. G3NOF worked Europeans, and heard TG9EP at 0001 and HI8XTM at 2230; DX QSO's were with VS9AJC, 5Z4AA, 7X2AH. On the other side of the argument, we find that G3IDG worked 38 countries on 10 metres during the month, and of the contacts specifically noted in his letter we find a majority were on CW. Including CR6 and CR7, CX1, EL2, 4X4, 6W8, 9H1, 9J2, 9Q5, and others, as it does, certainly lends point to G3IDG's statement that 28 mc was generally in good shape.

FIVE-BAND DX TABLE

(All Time)

Station	Countries	28 mc	21 mc	14 mc	7 mc	3.5mc
G2DC	329	170	291	317	170	112
GI3IVJ	325	181	263	319	103	83
G3NOF	288	132	194	272	34	39
G3KMQ	237	10	99	212	101	55
G3UML	220	59	107	205	50	33
G3LZQ	200	55	122	165	57	29
G3IGW	195	123	133	157	119	74
VP8HJ	178	8	57	174	26	11
G8DI	162	67	100	141	74	43
G3UDR	152	29	76	122	4	38
GM3RFR	126	8	65	104	41	15
G3RJB	121	11	26	113	50	22
G3UBI	103	10	26	113	50	22
G3IDG	102	61	71	54	27	18
GM3KLA	96	11	62	29	73	40
G3PQF	91	12	25	39	65	46
GM3SVK	?	1	55	6	23	2

Note: Placings this month are based on "Countries" column.

G3IGW makes no comment, but mentions a QSO with 9J2DT.

Expeditions

From the Worcester & District ARC comes news of an expedition to activate some of the rare Scottish counties. Operations will last from July 25 till August 7, using Top Band and VHF, on the basis of staying in each county for two days, running Top Band and VHF on alternate days, commencing with 160m. on July 25, using the callsign GM3TQD/P. Skeds can be arranged by writing to G3TQD or G3TQZ, QTHR.

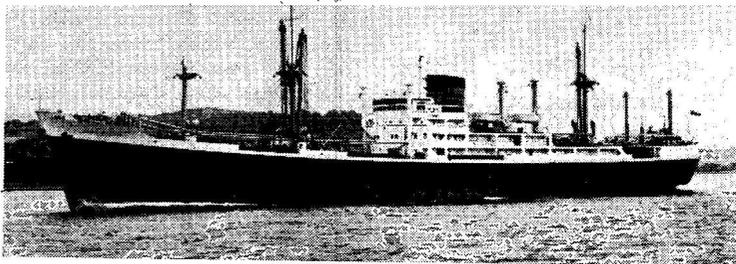
Again on Top Band and VHF we have it that during the week July 23-30, the University of Southampton ARC will be out /P in Cumberland, using the Club call G3KMI or possibly members' own, as may be necessary. In the latter case the likely call will be G3TVW/P; adjacent counties may also be put on the map.

From G3UGF we have a last-minute letter saying that during the period July 23 to August 7, they hope to mount a full-scale onset on the Emerald Isle, both EI and GI; there is only one snag—which is that all the ferries have been booked solid since Christmas—so they would “welcome any bright ideas.” If they do get there, they will be on all bands 1.8-144 mc with gear for CW/AM/SSB. If all else fails the expedition will be transferred to rare counties in Scotland.

We hear that there is a *chance* that on July 29 Rockall may be on the air for a period of 4-10 hours. The transmitting frequencies will be 14125 kc, listening around 14250 kc. It is also believed that 7095 kc will be listened on, transmitting on 7085 kc, once per hour, on the hour. Only thing we can't tell you is the callsign to be used, although it may well be GB3RAF.

Working Hours

G3LZQ comes back on this one, and comments that he is one of



A good looking ship designed for a particular job of work always makes a nice picture. The m.v. “Clan Malcolm” happens also to carry the station of D. J. Oakden, G3UFO, whose home QTH is in Irby, Cheshire.

the “so-called” lucky ones who do not work set hours or days, but he often wishes he could swap to be on in the evenings, early mornings or even the weekends. He says it would be nice to get home in the evenings and have five or six hours on the bands each night; while he agrees that it is nice to “be alone” reaping in the DX, he also asks what do you do when the HF bands are flat or full of short-skip and funny noises. Point taken, but on the other hand, how do you get five or six hours on the air each night without also finding a way into the doghouse in the process? Seems to your conductor that you have a better chance of getting more time in the shack if you work *irregular* hours, if only for the reason that operating time tends to get split up into more short spells which the XYL does not notice.

Spurious Emissions

G3IDG remarks on the number of “sub-fundamental” emissions to be heard in the area 1750-1800 kc, which used to be part of Top Band a few years ago. Apart from a couple of /P “undertones” which were heard (this was NFD weekend) there were several from fixed stations working on 80 metres, some from as far as 30 miles away in day-

light, which does seem a bit much. Your scribe has checked the same band, in a different part of the country, and has much the same sort of thing to report. A lot of it is caused by the fact that a *pi*-coupler is a lowpass filter, and usually a suitable aerial coupler will bring them down to an acceptably low level. G3IDG points out that way back in 1950-'51 reception from F, LA, ON, PA and SM was logged by this mode.

Piracy

G3TUX writes in to say that his call is being misused by some character on 14 mc AM Phone, which the real G3TUX does not use. What worries G3TUX is the possibility that the pirate may be radiating a shocking signal, and of course the possibility of the OM being accused of not QSL'ing. The answer to the latter one surely is to send the card back whence it came with a note across the front to the effect that QSO was with a pirate. Your conductor had a few bad cards in a couple of years ago, and wrote to the senders (all in W4 incidentally) asking them to look out for The Thing and point out the error of its ways. Coincidence or not, we have not had a dud card in since.

Bits and Pieces

G3NOF mentions ZD9BE as being the Postmaster, Customs Officer, Radio Operator, and what-have-you, on Tristan da Cunha. Versatility, this, and a thing the absence of which so bedevils our Western civilisation.

A long and interesting letter

Reporting the HF Bands

TOP BAND COUNTRIES LADDER

Station	Confirmed	Worked
<i>Phone and CW</i>		
G2CUZ	98	98
G2NJ	98	98
GM3KLA	98	98
GM3IKD	98	98
G3PLQ	92	95
G3SED	82	92
G3NTI	80	81
G3SWH	70	80
G3PPE	67	80
GW3PMR	67	76
G3UBW	64	80
G3SVW	57	75
G3IDG	55	59
GW3TLW	55	70
G3SHY	53	71
G3TSS	43	53
G3UVR	42	63
G3KPT	41	70
G3SQX	34	64
<i>Phone only</i>		
G2NJ	61	62
G3PLQ	55	58
G3MDW	44	64
G3RTU	35	37
GW3PMR	20	42

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

from G3VGW, who has now been "translated" into ZD8RB. On the subject of band conditions on Ascension Is., he says that there is virtually no short-skip, and he finds Ten and Fifteen are always open to the UK. Twenty is very good to the Pacific with the KX6 stations particularly

strong, while on Forty, the EU's can be heard between the cracks in the wall of commercials on the band (which is as bad there as it is over here). Eighty and Top Band are extremely noisy due to the distant storms which are always about. The obtaining of a licence is quite easy for a G, as the Administration issues a licence which is confirmed by the authorities in St. Helena, allowing 100 watts on all bands, including six metres. ZD8RB himself hopes to be active soon using a K.W. Vespa and Racal RA-71 receiver, but is expecting to have four 250 kW HF transmitters nearby shortly, which will, as he puts it, "raise problems." He says that every organisation on Ascension is in some way connected with radio, which accounts for the rather larger proportion of amateurs on the island.

Ways and Means

From G3UGF we have a card mentioning how good Ten has been of late. At the Texas Instruments Rally he copied Portuguese West Africa on his 100 mW Eagle transceiver on 28.5 mc at 59+. This was followed at Barford St. John by CT1, F9, DJ, etc. also at 59. On May 27 he was having his QSO with the locals on it QRM'd out by the DX the device was producing. Now, he keeps it by him all the time and when it starts to play G3UGF darts into the shack, fires up the big rig and works the stuff! The pocket Rx has been doing all of this on its 4ft. whip aerial.

Ladders and Things

G3UML suggests that the Five-Band (All-Time) Table should be

withdrawn, to be replaced by a new Ten-Metre Table for Zones and Countries. He argues that the majority of the scores on the All-Time were amassed one, two or more sunspot cycles ago. Your scribe would argue, on the other hand, that this is just the very thing that makes the All-Time such an interesting Table. However, we are always open to be convinced, on matters like these.

What is DX?

A plea for tolerance at this point. Most of you had been with Tommy for a long time, and he, therefore, knew what was the cream of your lists *to you*, and in selecting made his mentions to suit. Your new scribe is not yet entirely knowledgeable in that direction, obviously, and can only select on the basis of what *he* feels *you* regard as the plums coupled with what, from his location, he himself would like to have worked. We hope you will continue to support this feature as you did in G6QB's time, and we will be glad to have your criticisms of this effort; as long as the *antis* are all in opposite directions we will know we are on something approaching the right track!

Deadline

And now we come to the sign-off. We hope you have not been too disappointed and await your letters. For the next issue, Pse send all your views, news, gossip, ideas, comments, and what-you-will, to "Communication and DX News" SHORT WAVE MAGAZINE, BUCKINGHAM, England to arrive not later than **July 18**. Till next time *73, gd DX*, and lots of luck.

E.P.E.

SUMMER EDITION—"CALL BOOK"

The current edition of the international *Radio Amateur Call Book*, in its two sections—"U.S. Listings" at 45s. and "DX Listings", 27s.—is now available, for delivery from stock. The *Call Book* is in two versions simply because, as the directory to the amateur stations of the whole world, nearly 400,000 in all, it would not be reasonably possible to contain them all, with call sign, name and address, in a single volume. Hence, it is divided conveniently into two separate sections, "U.S. Listings" covering American amateur stations only, and "DX Listings", for the rest of the world. Since licensed American

radio amateurs total about twice all others put together, the U.S. version is the larger book. Either section of the *Call Book*—which, being issued quarterly, is right up-to-date—gives a lot of incidental information, such as QSL bureaux address for each country, its location in the Zone system, and lists of country prefixes. Everyone working, or listening to, even mild DX needs the *Call Book*—not necessarily each quarterly issue, but once a year at least. To make the QRK a bit easier, we do a package deal of the two editions together, U.S. and DX, at 67s. 6d. post free. Publications Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.



THE OTHER MAN'S STATION

G3TXW

THE station of Paul Williment, G3TXW, is established at 14 Templegate Close, Whitkirk, Leeds 15. Paul has been licensed since February, 1965, and is thus a newcomer to the amateur fraternity even though he was a short wave listener for four years before taking the RAE.

Prime interest is in the VHF bands, but operation for the first ten months was on Top Band and Eighty, which gave excellent experience and a wonderful chance to make an acquaintance with some of the locals.

Activity is now exclusively on two metres—and G3TXW is *not* one of those who appear only during openings and contests!

The Tx is entirely home-brew and runs 90 watts to a QQV06-40A, with a quarter-wave tuned line in the tank circuit. The PA is modulated plate-and-screen by a pair of KT88's, in Class-AB1 fixed bias, the modulator incorporating low level clipping and frequency selective circuitry in order to restrict the bandwidth.

The receiving side consists of an E88CC converter

with grounded-grid mixer fed into a KT-340 modified for improved mechanical and electrical stability.

The aerial system for two metres is an 8-element Yagi with a remote rotator.

Comparative tests have shown that the performance of stacked arrays is so superior to flat-tops that by the time this appears in print, an efficient stacked array should have been erected.

The design of a special tunable IF/AF amplifier for converters has started. This is to be an advanced conception, with a balanced mixer and a crystal/VFO local oscillator. The tunable IF is to incorporate facilities for the efficient detection of AM/CW/SSB/NBFM—the latter being regarded as a necessity due to the increasing number of stations using NBFM on the VHF bands.

Future plans include equipment for the 430 mc band on which there is considerable local interest in the Yorkshire area, although activity is still low.

Results on two metres so far have been quite encouraging with G, GM, GW and GD worked, and a total of 26 counties covered in four months.

"Short Wave Magazine" covers the whole field of Amateur Radio, has been established for nearly 30 years, is independent and unsubsidised, and circulates in 80 countries outside the U.K.

DISCUSSING SINGLE SIDEBAND

DESIGN CONSIDERATIONS FOR MEDIUM POWER LINEAR AMPLIFIERS

Part VII

B. A. WATLING (G3RNL)

Previous articles in this series—covering the theory, design and operation of Sideband transmitters in some detail—appeared in our issues for December (1965), January, February, April, May and June. Together, they form a complete and up-to-date treatment of the subject in its amateur context.—
Editor.

AFTER deciding the class of operation and configuration of a linear to suit one's requirements, next comes the problem of choosing the valve(s) and component values. The most important factor governing the efficiency of the amplifier is the output tank circuit. This, of course, applies to Class-C amplifiers as well as linears. Most PA's nowadays use *pi*-tank output circuits designed to match 50 or 75 ohm coaxial lines. The design of these is quite simple but, unless you have an inductance bridge, you must be prepared to do some coil pruning. Consider first the *pi*-tank tuning capacitor. In order to calculate this, one must take into account the Q of the tank circuit, the load resistance that the anode "sees" and the frequency. The anode load resistance, RL, is generally quoted by the manufacturer. If this is for two valves in push-pull then the figure quoted should be halved for a single valve. For two valves in parallel the figure for a single valve should be halved. Two 6146's in push-pull AB1 operation with an anode voltage of 750 volts should have an anode load resistance of 8000 ohms. For a single valve RL is equal to 400 ohms and for two valves in parallel it will be 2000 ohms. Calculation of *pi*-tank components is performed by rearranging and substituting known values in the various formulae.

Fig. 1 shows the problem diagrammatically. Ro is the impedance of the transmission line to which we wish to match the valve (50 ohms or 75 ohms).

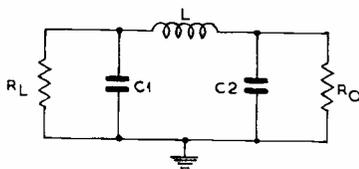


Fig. 1: Design of Pi tank circuit

T
455

RL is, as previously mentioned, quoted in the manufacturer's data; however, if this is not available then it must be calculated. No apology is made for the following maths. It is necessary!

An approximate (but near enough) and simple formula for the calculation of RL for valves operating in Class-AB1 or Class-B is:—

$$RL = \frac{1.8 Va}{3 Ia(\text{mA})} \text{ Kohm for Class-AB1}$$

$$RL = \frac{1.8 Va}{4 Ia(\text{mA})} \text{ Kohm for Class-B}$$

where Va is the anode supply voltage and Ia is the maximum signal indicated anode current in milliamps.

Assume the following requirements and constants for the old-faithful 6146 in Class-AB1:

Anode Volts	750v.
Max. sig. anode current (Ia)	110 mA
To match	50 ohms
Band	80 metres

$$\text{Then } RL = \frac{1.8 \times 750}{3 \times 110} = 4,000 \text{ ohms, near enough}$$

To calculate the value of C1 (Fig. 1) first its reactance must be found by the formula:

$$Xc_1 = \frac{R_L}{Q}$$

The value of Q should be between 10 and 20 so, for convenience, assume the value of 15.

$$\begin{aligned} \text{Then } Xc_1 &= \frac{4000}{15} \\ &= 267 \text{ ohms} \end{aligned}$$

The value of C1 can now be calculated by rearranging and substituting in the following formula:

$$Xc = \frac{1}{2 \pi f c}$$

$$\text{From this } C1 = \frac{10^6}{2 \pi f Xc} \mu\mu\text{F, where } f \text{ is in megacycles,}$$

$$\text{being } \frac{10^6}{6.3 \times 3.5 \times 267} \mu\mu\text{F, or } 167 \mu\mu\text{F (C1)}$$

For the calculation of C2 the relationship

$$\frac{Xc_1}{Xc_2} = \sqrt{\frac{R_L}{R_O}} \text{ must be rearranged for } Xc_2$$

and then calculated.

$$\text{First, } \frac{R_L}{R_o} = \sqrt{\frac{4000}{50}} = \sqrt{80}, \text{ or } 9 \text{ ohms.}$$

$$\text{Then, } \frac{X_{C1}}{X_{C2}} = 9$$

$$X_{C2} = \frac{X_{C1}}{9} \text{ ohms}$$

$$= \frac{267}{9} \text{ ohms, say } 30 \text{ ohms.}$$

$$\text{Again, } X_c = \frac{1}{2 \pi f c}$$

$$C_2 = \frac{10^6}{2 f X_c} \mu\mu\text{F, where } f \text{ is in megacycles}$$

$$\text{which is } \frac{10^6}{6.3 \times 3.5 \times 30} \mu\mu\text{F, say } 1300 \mu\mu\text{F}(C_2)$$

Don't be put off by all the figures and signs. It's easier than learning CW, you know! Try an example for yourself! Take an 807 in Class-AB1 with 600 volts on the anode and a maximum signal anode current of 70 mA. The answers should be approximately $C_1=130 \mu\mu\text{F}$, and $C_2=1300 \mu\mu\text{F}$, for 80 metres.

The importance of using the correct values of *pi*-tank components cannot be overstressed. If these are not right, severe distortion can result, let alone the lack of output. Correct values will also mean less harmonic output from the linear—important for TVI prevention.

The value of inductance generally is a matter of trial and error. It should be adjusted until tank resonance occurs at the correct value of C_1 . If an

inductance bridge is available the required value can be calculated. Its reactance should be the same as that of C_1 . The formula $X_L=2\pi fL$ can be

$$\text{rearranged to } L = \frac{X_L}{2\pi f} \mu\text{H where } f \text{ is in mega-}$$

cycles. For the previous example quoted of a single 6146 for 80 metres then:

$$L = \frac{267}{6.3 \times 3.5} = 12 \mu\text{H, near enough.}$$

Circuit Details

Once the valve has been selected and the *pi*-tank components calculated now come the circuit details. Consider first grid-driven low power AB1 Linears. Again, of course, the 6146 is a useful example. Fig. 2 Consider first grid-driven low power AB1 Linears. along with the previous stage an EF80 driver. Before connecting the anode and screen supplies to the PA it must be neutralised. Neutralisation is necessary to overcome the effects of internal anode-to-grid capacities which form a positive feedback path, causing the PA to oscillate. Not only this, but neutralisation also counteracts the effect of positive feedback caused by insufficient shielding between the input and output. This does not mean that you can use any old layout and get away with it by more neutralisation. Remember, this is negative feedback and as such will reduce the gain of the stage by a proportional amount.

The way in which this is achieved is by taking off the anode of the PA a small amount of signal and feeding this back to the "cold" end of the previous tuned circuit so that it will appear at the grid in anti-phase to the signal. NC is adjustable so that the amount of feedback required can be set up accurately. C_1 , the decoupling capacitor must be reduced in value so that it will not look like a complete short circuit to the fed back signal, yet will still adequately decouple the tuned circuit. Typical values are between $300 \mu\mu\text{F}$ and $0.001 \mu\text{F}$. The higher value C_1 has, the more NC must be, hence the efficiency of the stage will be reduced. Typical values of NC will be about $5 \mu\mu\text{F}$ and could be left out completely for low frequency rigs providing the screening between input and output is nearly perfect. If neutralising is not performed when it is required, this will show up as maximum output of the PO not coinciding with a dip in anode current. This is why linear PA's *must* always be tuned for *maximum output* and not for a dip. For a single band rig this is not so important as the PA can be neutralised for that band, but even so it may not be perfect all over the band. Multi-band PA's should be neutralised on the highest frequency band used, as this is where instability is most likely.

Setting up NC then should be carried out with

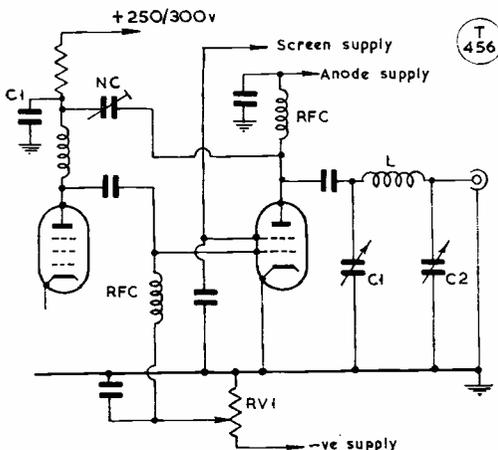


Fig. 2: Typical Class-AB1 Linear Amplifier

the PA anode and screen supplies removed and the transmitter switched on with full carrier inserted, driving the valve hard into grid current. An indication of RF output is required and this is probably easiest accomplished by taking the output from the linear direct to the station receiver and using the S-meter as an indication. The PA tuning should be adjusted for maximum output first and then NC must be adjusted for minimum output. The PA should then again be adjusted for maximum output and the whole procedure repeated until the best *null* is obtained. It is important to keep checking the PA tuning because if this is not spot-on the phase of the output will not be exactly 180° different from the input signal, hence more negative feedback will be required than is really necessary.

Setting up the PA

Getting back to the simple linear of Fig. 2, when neutralising is complete the PA anode and screen supplies should be connected. With no signal input at the grid RV1 should be adjusted so that the zero signal standing current of the PA is that recommended. In the case of a single 6146, the makers say 12 mA, which should correspond to approximately -50 volts on the grid. This means that 50 volts of RF is required at the grid to drive the PA to maximum. However, in the interests of less distortion a 6146 should be biased further up the curve, to 25 mA standing current.

Tuning the PA must be done carefully. The 6146 is quite a robust valve, but some other types will not stand a single frequency input driving the valve to maximum for more than a second or so. Tuning is probably safest done with two tones of equal amplitude. If this is not possible then the

procedure for tuning is to insert a small amount of carrier first and adjust the loading and tuning condensers for maximum output. Then, and this process must only be carried out for two or three seconds at a time, carrier should be inserted until the valve is just driven into grid current and the PA tuned for maximum output.

The load that the PA "sees" must be purely resistive. If not instability may result. It is generally stated that a linear PA should not be used with a load where the SWR is worse than 2:1. Generally, this is correct because a feeder having a 2:1 SWR means that the aerial impedance is reactive as well as resistive. It's the reactive component which causes instability in the PA. You could use an aerial where the SWR is much higher than 2:1 providing the reactance the PA "sees" is small.

With a correctly designed PA in Class-AB1, the anode current should increase smoothly as carrier is inserted up to the point when the grid begins to draw current. At this point the anode current should remain substantially constant and should only increase perhaps one or two milliamps when the carrier is increased, driving the valve hard into the grid current region. If the anode current does increase when the valve is driven into grid current then then cause is probably the bad design of the *pi*-tank.

The following statement may raise a few eyebrows. A lot of talk is heard like "a 'scope is essential if you're going Sideband". This is *not* necessarily so! An oscilloscope is really only needed when you are setting up a PA whose characteristics you don't know. If you follow the operational recommendation given in this series then a good clean signal should be emitted from your station.

TABLE I

Typical AB1 Operating Characteristics of various readily available Valves.

Valve Type	V _a volts	V _{g2} volts	I _{ao} * mA	I _{g2} mA	I _a max. mA	I _{g2} max. mA	Nominal V _g volts	Approx. RL ohms	Approx. p.e.p. o/p watts
807 } 1625 }	600	300	18	0.3	70	8	-34	5400	28
	750	300	15	0.3	70	8	-35	6800	36
1646 } QV06-20A }	600	200	14	0.5	114	14	-50	3000	47
	750	195	12	0.5	110	13	-50	4000	60
6HF5	800		14		250		-80	2000	115
813	2500	750	25		145	27	-95	10000	245
4X150A	1000	300	50	0	225	11	-50	2600	115
	1500	300	50	0	225	11	-50	3900	200
	1800	200	50	0	225	11	-50	4600	250

*The figures given for zero signal anode current are for maximum efficiency in Class-AB1 with maximum acceptable distortion. Less distortion will be achieved by increasing this value to about 80% of the anode dissipation of the valve in use.

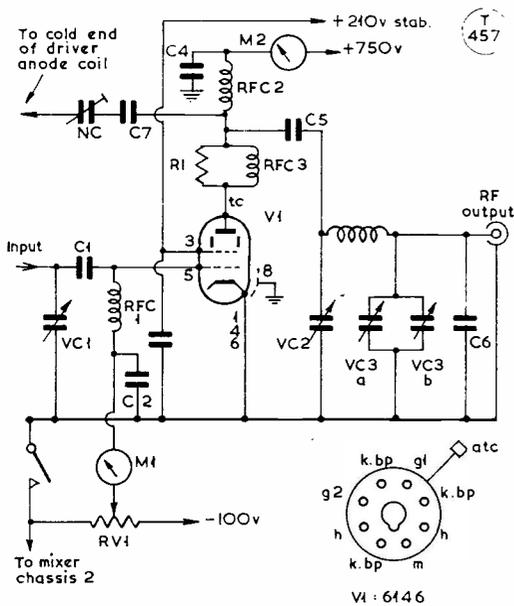


Fig. 3. Typical Class-AB1 linear amplifier, using a 6146, for the 80-metre band. For working on several bands, the pi-tank could be switched. C6 should be in circuit for 80m. and switched out for the higher frequency bands.

it can be done. (Nine 6146's in parallel would provide the required output but this is hardly a practical proposition!) However, recently some U.S. colour-TV line output valves ("sweep tubes" in American) have become available at very reasonable prices, comparable in fact with surplus 6146's. These are designed for low-voltage high-current applications and have a high anode dissipation. The most popular of these is the 6HF5, obtainable from *Magazine* advertisers. With four of these in parallel and an anode supply of 800 volts the combined maximum anode current is about 1 amp, and the output will easily reach the maximum allowed in this country. One 6HF5 will give just over 100 watts p.e.p. output; about the same as two 6146's! You may think that this valve is a big one. Not so. It is of all-glass construction with a 12-pin base and about the same size as a 6146; just slightly taller in fact. Various other valves are possible and Table 1 gives a few of these with typical operation figures for Class-AB1.

A simple linear suitable to be driven by one of the mixer/amplifiers described in Part 5 of this series is shown in Fig. 3. For higher powers two valves in parallel can be used with the same component values except of course the pi-tank coil. Next time high-power linear amplifiers will be discussed—that is to say, those suitable to follow low power amplifiers having an output of 50 to 100 watts.

NOTE OF APOLOGY—JUNE ISSUE

We were very sorry to find that a number of our direct subscribers either did not receive their copy of the June issue, or got it very late. While it is easy to say "it was not our fault, as all copies went out on time in the usual way" (which they did), it is in fact very difficult to get at the cause of this failure, more especially as the incidence was random. We can only hope that it does not happen again. So far as we are concerned, there is no known reason why it should—and we can only repeat that any instance of late delivery should be taken up immediately with the local head postmaster, with the wrapper as evidence. If this bears the date prior to the day of publication, then clearly it is a matter for the G.P.O. We have the closest liaison with the despatching office—posting being in bulk on the morning of the Thursday before the Friday of publication—and the position is checked every month.

NOTICE—R.A.E. COURSES

With the August issue, as usual we shall start publishing lists of centres up and down the country—night schools, technical colleges and institutes for further education—at which tuition is offered for the Radio Amateur Examination, Subject No.55 in the City and Guilds of London syllabus. At most centres, the course opens with the winter session, starting about mid-September. All authorities interested are invited to let us have the details for publication. Those already notified are being held for the first list to appear next month.

With AB1 linears an easily recognisable "over modulation" indicator is a grid current meter. The PA should be "talked up" until the grid current meter just, and only just, lifts off zero.

Now comes the decision, which the writer thinks is the most difficult part of the job, on which valve(s) to use for your PA. If your rig is for 160 metres only then the choice is simple. An 807 in Class-AB1 and 600 volts on the anode will provide you with the full output allowed (26.67 watts p.e.p.), or a 6146 with about 350/400 volts on it will do the same. The difficult choice comes when deciding for the higher allowed power (400 watts p.e.p. output) on the HF bands.

Does one go for a low-power AB1 linear that can easily be driven by the exciter and then follow this with a high power Class-B grounded grid linear, or does one go the whole way and build into the rig a high power Class-AB1 linear? (Remember AB1 amplifiers are easy to drive as they require no driving power.) The choice is yours! One or two points to remember is that AB1 linears are about 20 per cent less efficient than Class-B linears. This means that for a given input power the output of an AB1 linear will be less than a Class-B amplifier. This point needs thinking about in the light of power supply requirements. Talking about power supplies, some people say that they don't like the idea of a few kilovolts floating about in the shack. This can be overcome by using several lower voltage valves in parallel. The power transformer for this type of PA becomes a little more difficult to come by but

• • • The Mobile Scene • • •

Though the weather we were having during June was just right for Mobile Rallies, the long-term Wx forecast does not look so good—never mind, it won't dampen the enthusiasm of organisers, even if it may thin the crowds a bit.

We are always glad to have good photographs of Rally events, and a report from the organisers. This is not being arranged in quite the same way as in previous years—it has been decided to leave the reporting and the photography entirely to local initiative. If a Rally is worth organising and publicising in this space, it must surely be worth a report to us after the event. So it is no bad thing for one member of the committee to make this reporting, immediately following the Rally, his special responsibility. As regards pictures, these should be black-and-white, with fully descriptive notes on a separate sheet—and callsigns quoted *accurately!* As these pictures also are needed in good time, it is no use sending them in weeks (or, as has happened in some cases, months) later "because the roll wasn't finished." We pay at a generous rate for photographs we can use.

Events now scheduled are listed here, with essential details where these have been given in time.

July 10: Wessex Amateur Radio Group Mobile Rally at Hurn Airport, near Bournemouth, in conjunction with the British Aircraft Corporation

Radio Club. There will be plenty to see and do, as this is also the B.A.C. Open Day. For information apply: W. G. West, G3MKN, 23 Palmer Road, Poole, Dorset.

July 10: South Shields (Co. Durham) Mobile Rally, at Bents Park Recreation Ground, Coast Road, South Shields, with talk-in by G3DDI on 160m. (around 1.9 mc) from 11.0 a.m., and by G3SFL on 145.8 mc after mid-day. The Rally programme will commence at 2.0 p.m., and will include competitions for /M's, motorists and visitors. Refreshments available on site. Information from: D. Forster, G3KZZ, 41 Marlborough Street, South Shields, Co. Durham.

July 17: Worcester & District Amateur Radio Club Mobile Picnic, Upton-on-Severn, Worcs.

July 24: Cornish R.A.C. annual Mobile Rally at Pentire Headland, Newquay, Cornwall, opening at 11.00 a.m. with talk-in on 2.80-160m. Close to



G3TPB makes it plain on which band he is mobile! Seen at the ARMS Rally at Barford on May 22, and taken by G3OMU of Basingstoke; his own car is on the left in this picture.



The talk-in station for the Saltash Mobile Rally on Whit-Monday signed GB3SAL and was operated by husband-and-wife G3TDN (nearest camera) and G3TCJ (headphones). More than half the mobiles present were on 160m., but the fact that the other half used different bands shows that T/B no longer reigns supreme for mobile operation.



At the Calstock Mobile Rally on Whit-Monday, for which they had a fine, warm day, the reception point displayed the QSL cards of those present. About 80 licensed amateurs signed in, of whom nearly 40 were mobiles, all bands 160 metres to 70 centimetres being covered.

safe and sandy beaches, with adequate cover if wet. There will be an equipment display and what are described as "sideshows." Details from: M. J. Harvey, Oak Farm, Carnon Downs, Truro, Cornwall.

August 14: Derby & District Amateur Radio Society ninth annual Mobile Rally, Rykneld Schools, Derby, with a large programme of events, starting at 2.30 p.m., including an exhibition of amateur equipment, *Karati* demonstration, field events and competitions, grand prize draw, junk sale, etc., etc. Talk-in will be by G3ERD/A on 160m., and by G2DJ/A on 2m. and 4m. Admission and parking are free, with ample parking space and indoor accommodation if wet. Refreshments available on site. Hon. Organiser: T. Darn, G3FGY, Sandham Lodge, 1 Sandham Lane, Ripley (2972), Derbyshire.

August 14: Plymouth Radio Club Mobile Picnic, at Yelverton, near Plymouth, when all the South Devon clubs join for a get-together. Details: E. Fallon, G3SGV, 8 Queens Road, Plymouth.

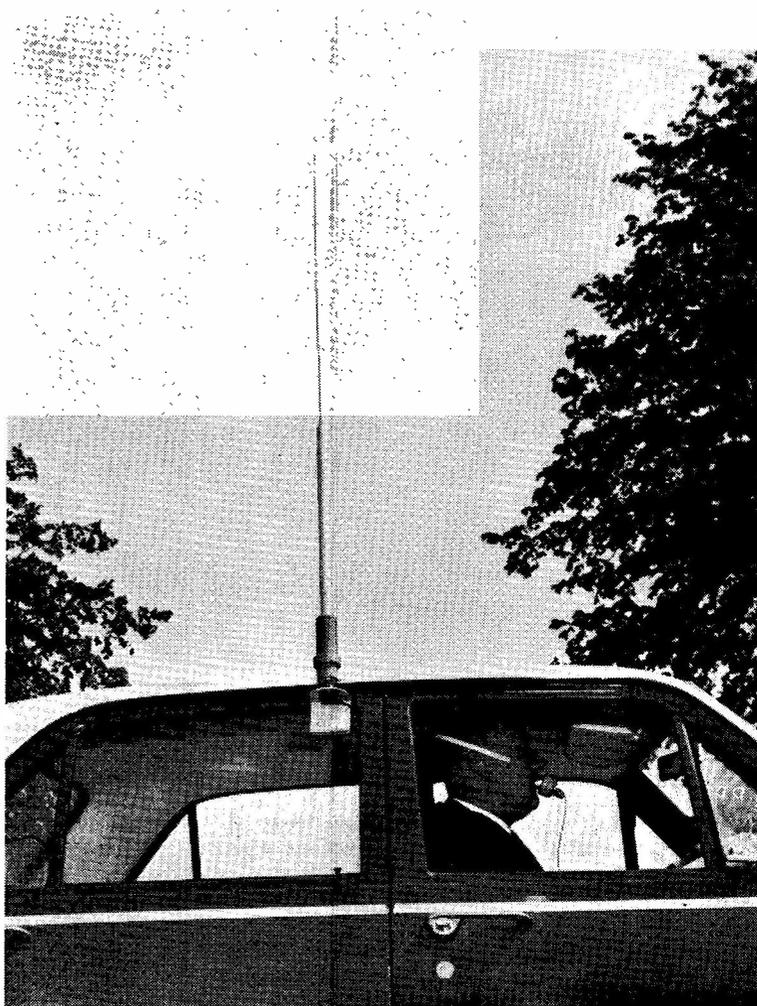
August 28: Bromsgrove & District A.R.C. Mobile Picnic (no further details).

August 29: (Bank Holiday). Peterborough Mobile Rally, by the swimming-pool on the riverside, with



At the Calstock Mobile Rally, organised by the Saltash and District Amateur Radio Club, G8AFA of Yeovil had an interesting portable rig for the 70-centimetre band.

The aerial fitting and the microphone assembly offered with the Contactor Switchgear transmitter for 160m., the 2A10. Price of the aerial is £9 15s. and of the microphone £2 17s. 11d. The latter is ingeniously mounted on a light and pliable headband, making an easy and comfortable fit. As suggested by the picture, this enables the driver to observe those two essential rules of motoring: "Eyes on the road and hands on the wheel."



plenty of free parking and picnic space; no entrance fee. Talk-in stations will be G3DQW on 1980 kc, G3RED on 70 mc, and G3EEL on two metres. Further information from: D. Byrne, G3KPO, Jersey House, Eye, Peterborough, Northants.

September 4: Swindon & District A.R.C. Mobile Picnic at Lidiard Park, just outside Swindon, Wilts. (*details later*).

September 11: RSGB booking, Woburn.

September 16-18: International Amateur Convention and Mobile Rally at Knokke, Belgium, with three-day programme of meetings, demonstrations, parties and tours, at all-in prices. U.K. amateurs can obtain full information from: V. Claeys, ON4UM, Hoogstraat 68, Beersel, Belgium.

September 25: Harlow Mobile Rally.

DEATH IN A BLIZZARD

It was announced by the Colonial Office on June 10 that "two members of the British Antarctic Survey lost their lives while on a sledging trip on the west coast of the Antarctic peninsular." One was named as John Fraser Noel, the radio officer. He was, in fact, GW3SZI, of Llanishen, Cardiff, and was only 24 years old when he and his companion were overwhelmed. They lie buried on Stonnington Island, near where they were found.

IN THE HONOURS LIST

The Birthday Honours List included a well-deserved knighthood for Martin Ryle, Professor of Radio Astronomy at the University of Cambridge, for his contributions to science. He is 47 years of age, and holds the amateur callsign G3CY.



SHORT WAVE LISTENER FEATURE

NOTE ON QSL'S—READERS' RIGS— RECEIVING SIDEBAND SIGNALS—NEWS AND QUERIES—COMMENT ON THE MAIL

A NEW conductor takes over the writing of this piece, as a result of the sad event referred to elsewhere in the *Magazine*, and the consequent reshuffling of the work—from being a reader to a writer of a particular piece is a far cry, and the problems are magnified by the high standards set by previous contributors.

Which gives an excuse, if one were needed, for remarking on the size of the file from which the column is derived—nearly 50 letters—the vast majority of which contain news, views, and interesting general chat, as well as claims for the HPX Ladder.

QSL'ing

A long and thoughtful letter comes in from *Harry Pain*, 9V1MT, on this subject. He says that out of 122 reports from SWL's since the beginning of the year only 30% were of any use to him as a transmitting amateur. He adds that over half of them only gave his report, and made no mention of the station he was working; in no case was the report less than QSA5-6, and only one was on his 40-metre signals. As he says, he knows he is "getting out" (172 countries in 13 months on Twenty alone) so an SWL report must have something of interest to justify a QSL card. It is a fact that a card received from one of the SWL's with a high "success-ratio" stands out a mile from the run-of-the-mill SWL reports.

As far as this writer is concerned, the prize specimen of a bad report was the one that said: "I heard you on 80, can I visit your shack to collect my QSL card?"!

How Do You Hear Them?

A surprising number of your letters talk about receivers. *N. Flatman* (*Ipswich*) uses an R-1155, backed up by a MW BC set which is used as a sort of Q'5er, by taking out the 560 kc IF signal from the '1155, and feeding it into the front of the BC Rx. As he says, it is bulky, but it works, and after all that is what matters. *Keith Evans* (*Shepperton*) thinks it would be a good idea if everybody entering the Table were to describe their receiver, so that the gear used by the leading stations can be compared. He runs an HE-30, and has an Eddystone 888A in prospect. He has passed the RAE (good show, Keith) and is now hoping to complete with the Morse Test in July. *Richard de Buis* (*Felixstowe*) writes to say that since his last

report he has disposed of his BC-348 in favour of a Trio JR-60, and is delighted. He is one of the few who logs CW as well as 'phone, and he comments that that way there is always something of interest going on. *John Hunt* (*Leeds*) gives his new score for the Table, and enquires, somewhat plaintively, what gear T. R. Popham uses, and how on earth does he get so many prefixes? (My guess, OM, is a set of crystal filter ears and a good, well-matched aerial system).

From *Andrew Niblock* (*Ilkeston*) comes a short letter and a long list. The letter is interesting in that Andrew seems to be having a certain amount of trouble in taking AM signals with his HA-350; he is having to receive them by switching to SSB and using the exalted carrier method. After all, Andrew, you can't have it both ways—the main reason for your difficulty is almost certainly the degree of selectivity provided in this receiver by the mechanical filter, and this will give you stations which with lower selectivity would just disappear in QRM. It certainly shows up the quality of some of the AM signals stability-wise, though. *Bill Felton* (*Lincoln*) also has an HA-350, acquired since he last reported, and expresses unqualified praise for it. He has also a new aerial up, a 17ft. vertical whip, which he proposes to convert at a later date into a ground-plane. You will probably be surprised at the improvement when you get some radials up, OM.

A new chum is *John Tozer* (*Plymouth*) who says he is a member of Saltash and District ARS. He has recently acquired an HA-230 Rx, *vice* the Ferguson BC set; he gives a list of 220 prefixes heard on the BC set in three months, and has used the HA-230 to bring the total up to 296 in a further fortnight.

Colin Squires of *Saltash* is editor of the *Tamar Pegasus* which, with the organisation chores in connection with the Saltash ARS Mobile Rally, has cut down his list somewhat. However, he comments on R. Coate's observations last time about VK on 40 metres, and says he heard them as recently as May 20. The best time for them, he says, is 0600-0630 GMT, when they may peak to S7 to him. He also mentions G3AOO as the only EU station to show any interest in these VK's.

Examinations and Such

Several readers mention the incidence of studies and examinations on their activity. *A. Jones*

(Cardiff) has been an SWL for about eight years but has been held off taking the RAE by GCE and professional examination study. Nonetheless, he puts in a nice list, received with the help of an AR88LF, a Geloso converter, plus ATU, pre-selector, and a 16ft. vertical aerial; a new IF/AF strip is being built for use with the converter. The RAE has been taken and the Morse test contemplated; go to it OM, and best of luck. *D. Mortimer (Gloucester)* sends in a short list and says he is all but QRT temporarily due to Finals, but of course he will be back with us when peace is restored. Another one who is in the exam fashion is *John Fitzgerald*, who writes in from an address near Birmingham, at a spot where your aged conductor did his courting, years ago when it was all green fields. His listening, however, is done from home, which for John is Gt. Missenden, Bucks.

Queries

R. Wyatt (Basildon) wants to know what country 9V1 is and also the location of Tannu Tuva. Well, 9V1 is Singapore, and Tannu-Tuva is in Zone 19, although, like you, your conductor has never seen it marked on an atlas page. SWL Wyatt is one of several correspondents who raise queries of one sort and another, the majority of which can best be handled by reprinting the HPX rules again. *Brian Smith (Ruislip Manor)* puts in a list of 214 heard in the short time of a fortnight, and remarks that he was VS9OM, and VS9AS, which accounts for the expertise. He still has the old VS9 rig but has been QRT for a long time due to work QRM—the worst sort, isn't it, OM?—but is aiming to take the RAE in December. He says that chasing prefixes has really made the "bug" bite again, and has also noticed the number of new prefixes that have shown up since he was on the air; there are various places from which one can glean (fairly) up-to-date information on the current set-up, for instance the *Callbooks*, the *ARRL Handbook*, the *Zone Map*, etc., etc. although new ones are appearing all the time.

Reception of SSB

G. Bowden (Crawley) writes to put in his first entry for the HPX Table, with a very nice list of prefixes all heard on PCR-3, and remarks on the lack of bandspread with this receiver. He asks for more information on the method of receiving SSB by injecting a signal from an external oscillator, as mentioned last month by D. H. Foster. The trick is quite simple. You generate a signal at the frequency of the SSB signal it is desired to receive, and couple it to the aerial loosely, along with the signal from the aerial. Fine adjustment of the locally-generated signal or beat, frequency-wise to the frequency of the missing carrier of the SSB signal, and slight adjustment of the coupling should do the necessary. The local signal must be very stable and is best derived from a BC-221 or other wavemeter type device, which of course is one reason why it is not more often used. After all,

the receiver BFO works at a lower frequency, and hence is more likely to be stable, apart from the fact that most receivers already have a BFO. An external BFO at 465 kc can of course be fitted to your Rx and the coupling adjusted to give correct injection to resolve SSB, if this is preferred. Most of the older receivers could do with more injection, in the writer's experience, and unless care is taken in increasing the amount of injection the BFO has a tendency to pull when the modification is tried out. The best way of receiving SSB involves opening up the AF gain to maximum, and controlling the volume purely by use of the RF/IF gain until the signal cleans up. To set the BFO to the correct frequency, select an S9 SSB signal, tune it in carefully with the BFO off for maximum S-meter deflection and then switch the BFO on again, cut out the AVC, reduce the RF gain as far as possible without losing the signal and adjust the BFO until the speech cleans up, and mark the setting, remembering that there will be two such settings, one for USB, and one for LSB. As to which setting is normal on which band,

HPX LADDER

(Starting January 1, 1960)

Qualifying Score 200

SWL	PREFIXES	SWL	PREFIXES
PHONE ONLY		PHONE ONLY	
P. A. Cayless (Exeter)	911	H. M. Graham (Harefield)	336
T. R. Popham (Exeter)	909	A. D. Jones (Chertsey)	334
D. Douglas (Dundee)	894	D. J. Mortimer (Gloucester)	333
A. W. Nielson (Glasgow)	737	S. Wilson (Ossett)	332
S. Foster (Lincoln)	699	B. Macklin (Winchester)	330
R. G. Preston (Norwich)	560	D. Edwards (Coaville)	327
E. R. Chilvers (Lydney)	552	J. Dixon	
J. Hart (Leeds)	539	(Barrow-in-Furness)	303
P. Milloy (Doncaster)	532	C. Freeman (Nuthall)	303
A. Huggett (Lamberhurst)	528	C. Warburton (Sale)	297
C. Squires (Saltash)	514	J. Tozer (Plymouth)	296
J. Singleton (Hull)	514	J. Hodgson (Gainsboro')	293
A. Niblock (Ilkeston)	504	G. Watson (Sheffield)	289
D. Rollitt (Navenby)	491	J. W. Thompson (Tollerton)	288
K. C. Staddon (Stroud)	487	P. Freeman (Chessington)	286
G. Wyllie (Johnstone)	477	Miss P. Longbone (Hull)	284
G. S. Taylor		A. Jones (Cardiff)	283
(Wolverhampton)	474	K. F. Ballinger (Worcester)	277
C. Edwards (Warwick)	472	R. Wyatt (Basildon)	270
W. Felton (Lincoln)	467	D. Poulter (AM only)	269
W. Smith (West Bromwich)	466	D. Nichols	263
J. Fitzgerald (Gt. Missenden)	465	K. Evans (Shepperton)	261
W. Moncrieff (Hampton)	462	G. Cowling (Goole)	258
P. Baxter (Winchester)	460	Mrs. J. Davis (Stroud)	254
A. D. Jones (Chertsey)	440	A. Marriott	
C. Sparrow (Mill Hill)	440	(Bishops Stortford)	231
D. Fitzgerald (Dublin)	439	R. T. Sutton (Birmingham)	219
D. G. Cooke (Nottingham)	419	S. Shaw (Stockport)	218
C. P. Martin (Chertsey)	418	E. K. Law (Walsall)	217
C. D. Morris		G. Bowden (Crawley)	207
(Tenbury Wells)	410	N. Bradley (Stevenage)	203
S. Hardisty (Accrington)	403	B. Walker (Doncaster)	202
T. Pinch (Plymouth)	403	A. Niblock (AM only)	201
R. Coates (Lancaster)	400		
P. A. Cayless (AM only)	398		
D. G. Evans (Neath)	398		
W. Chaffer (Edgware)	393	P. J. Lennard (Worthing)	599
A. Parker (Chesham)	391	C. Harrington (Hounslow)	592
A. G. Scott (Liverpool)	384	D. Douglas (Dundee)	548
C. Cullen (Dublin)	375	R. de Buis (Felixstowe)	415
P. Crust (Loughborough)	375	S. Wilson (Ossett)	412
D. Parker (Redditch)	357	D. H. Foster (Rainham)	401
G. Case (Widnes)	356	M. Woolin (Leeds)	356
B. J. Turner (Westcliff)	346	P. Etheridge (Hull)	303
Mrs. M. Worbey (Dartford)	345	H. Wyllie (Johnstone)	214
		B. A. Smith (Ruislip Manor)	215

(Note: Listings include only recent claims. Failure to report for two consecutive issues of "SWL" will entail removal from the table. Next list, September issue—deadline July 29.)

Probably there are not many SWL's equipped for radio-teleprinter reception, but here is one of them. The SWL/RTTY equipment operated by E. Double, 1632 Great Cambridge Road, Enfield, Middlesex. The printer is a Creed 7B, the T.U. the FSY.I.I. with its PSU, and his receiver is a Hammarlund HQ-100A.



the rule to remember is LSB below 10 mc and USB on the higher frequency bands.

Aerials

Several correspondents mention aerials and their problems, and *Glyn Watson (Sheffield)* actually had to close his letter to go and save his from falling down. *James Brown (Llandaff)* sent in a chatty letter right on the dead-line. He has altered an RF-24 unit to act as a converter on the HF bands, feeding into the 19 Set. He sends a sketch of his "aerial farm" and explains how a friend helped to get the line up over the roof with the aid of a cast from a fishing rod. Your friend must be better than mine, James, as the top 20 feet of my tree still have not succumbed. James defends the 80-metre DX net strongly in his letter.

An amusing letter from *Des Walsh (Co. Tipperary)* about his "Tintenna" complete with sketch, and would like to hear from P. S. Mackenzie regarding the problems of getting a tincan aerial erected. Print your address, OM, in your next letter, so that we know where to forward any mail, and please, chaps, if you want to get in touch with each other through the column, *don't* if you can do it direct, and if you must, then please include a stamp, and envelope, so that we can forward it as quickly as possible, without slowing down the compilation of the column. Reverting back to aerials, *David Rollitt (Navenby, Lincs.)* lost his ground-plane last February, and has only just got it back up; he has had to be satisfied with a dipole in the meantime. He had a visit from SWL's Bill Felton and Stew Foster on Whit Monday so doubtless there was a good old ragchew.

Next appearance of this feature—September 1966. All correspondence and photographs (of SWL stations and equipment) by July 29, addressed to Editorial Department, SHORT WAVE MAGAZINE, BUCKINGHAM, England. Head the letter "SWL."

Power and S-Points

D. H. Foster (Rainham, Essex) writes in and mentions he heard 9Y4VT at S9 on Twenty one night, running 180 watts. He then put his 1200-watt linear on and the signal came up about an S-point. A study of a decibel power ratio table will show you why, although it has to be admitted that having the extra power is very handy in QRM. SWL Foster is getting started on DX/TV and hopes to send details of his results next time.

Reciprocal Licensing

B. Walker (Doncaster) and others have commented on the callsigns given to these chaps operating in G-land. As far as their status in HPX is concerned, they are all "G5 plus three's" and therefore can only count as such; the bit on the end is, after all only administration doing its job, making simple things difficult. Any sort of contest work must be *out* for a chap with a callsign like GW5ZZZ/AC4CBC/P. Just imagine trying to send *that* at 4 a.m. on a Field Day. If your scribe's experience is anything to go by it is all one can do to stay awake, and remember not to send one's own callsign accidentally.

YL's and XYL's

Two entries this month to record. *Mrs. M. Worbey (Dartford, Kent)* sends in a list of 83 additional prefixes, with no other comments; on the other hand, a most amusing letter jointly by *Miss P. Longbone* and *J. Singleton*. Your conductor must admit to having a mite of difficulty in telling "t'other from which" but both have a long list for HPX. You are quite right, Pat, there are others about to swell the numbers, but they must be shy, because they don't report although they read this piece.

Here and There

David Fitzgerald (Ballymena) has QRM from the AF output of low-flying Boeing 707, B.A.C. 111, and other noisy aircraft. He is doing some TV

DX-chasing and has recorded Sweden, Spain, and France, all during May 21-22, using the whole of the domestic TV set-up with no mods. whatever. *Alastair White (Chester)* says that he was hoping to be able to take CW at 12 w.p.m. in time for Field Day. However, his HPX list has been shortened by the swotting necessary before his O-Levels. From *Plymouth*, *Trevor Pinch* writes in to say that his best catch of the month was HM2BD, RS55, on a five-foot piece of wire. He has put up a new aerial, comprising a 67ft. wire at 24ft. up, and a 12-foot whip on top, to make the beginning of an aerial farm.

P. Freeman (Chessington) heard CEØZ1 call four times in succession about 2130 clock on Twenty SSB, before an ON5 went back to him, in spite of an S7 signal. *Geoff Cowling (Goole)* has a very-much modified CR-100 which seems to be doing quite well. He says that both Fifteen and Twenty have been worthwhile, while Ten has been more lively of late—an opinion echoed by *H. Graham (Harefield)* who describes some of them as “whoppers”. He reports a radio “blackout” which suddenly descended on Twenty between 2243 and 2247 GMT on May 21 but did not affect Top Band. Wonder if anyone else noticed this one?

D. J. Turner changed his mind about modifying the receiver and built a CC converter for the HF bands instead with which he is putting *Westcliff-on-Sea* on the SWL map. He uses a preselector in between the converter and the main Rx, and the next project is going to be to get more IF selectivity. IF selectivity has also been the preoccupation of *R. Coates (Lancaster)* who has put a Q-Multiplier in his TCS and is quite pleased with it, albeit when it oscillates it makes such a rumpus that it frightens him to death. He reports a ZAØRK in his HPX list and wonders about whether it is genuine. Does anyone else know of this one?

Charles Harrington (Hounslow) sends in his CW HPX list, and comments that it is about time P. J. Lennard got his license and passed off the Table as all of his predecessors have done—except of course Charles Harrington himself. *P. D. G. Milloy (Doncaster)* sends in some more pictures of the rig, unfortunately not sharp enough for reproduction, which show a nice set-up based on the HRO, considerably modified, and a collection of longwire, dipole, and vertical aerials. He wants the next SLP to be on Ten and Fifteen metres with a multiplier of two for all scored on Ten.

D. Walsh (Co. Tipperary) points out that PAØAA has a regular routine of fast and slow morse, DX news, weather forecasts, and what-have-you, on Friday evenings on 3.6 mc. Talking about licensing regulations, he mentions that the new EI licensee has his first year restricted to 25 watts and CW on Forty and Twenty. He says that perhaps this will be changed when the rules are modernised. Maybe, OM, but, you know, when the “CW year” was abolished in this country it was surprising how many lousy phone signals sprouted all over the place—and still do, for that matter. The plain truth is that CW is the only way that is available to the

SWL • • • • •

continued

average chap of proving satisfactorily that a transmitter RF side is fit to be amplitude modulated without a load of test gear; apart from which half of the phone-only boys are such poor operators that a snappy CW op. can have a couple of DX contacts while the phone man is working round to deciding how to clear his throat.

SWL Walsh mentions Top Band in his letter and remarks that few stations are audible much above 1910 kc. He thinks the band should be altered to be 1750-1900 kc and reckons the loss of 50 kc would be more than counterbalanced by the gain in useful space in between other users of the band.

John Baxter (Tottenham) says the local net is going to QSY from Top Band to Ten because 10 metres is opening up; looks like they hope to emulate the DX on Eighty. *Colin Morris* likes this feature (it is to be hoped he still thinks the same after reading this offering) and he describes his receiver as “home-brew” using an Electroniques front-end. This machine is being replaced by a G3HTA Rx, which is still in the distillation stage. Aerial is a Joystick indoors, and an indoor 10-metre dipole. Another new correspondent who raises a whole wad of queries is *Phil Ashton (Stowmarket)* who has been keen for a long time but has only lately been able to acquire a CR-100 which he is now preparing to modify. As to his list of phonies most of them can be explained away by misreadings of callsigns, a habit which has cost your conductor many a contest point ere now. As to how to submit lists the writer is not greatly worried, although if they are put into alphabetical order it does save time checking and also it makes it possible easily to compare one log against another. Phil’s final remark is “T. R. Popham 909, here we come” so it sounds as though the battle is about to be joined. *Stewart Foster* sends in a list which brings him up to 699, one short of his immediate target. *Stewart* proposes to bring Lincoln to the fore by setting himself a target of 1000 for HPX, and in the next sentence he says he will be effectively QRT for the next three months. Scaring the opposition?

T. Dixon (Barrow-in-Furness) has suffered from QRM for the past couple of months and suspects it is coming from the local shipyard. To counteract the tendency of some entrants to specialise in AM, SWL Dixon is proposing to become 100% SSB with his lists in future. He suggests that the HPX Table should become an “Annual” affair and feels this would give the new boys a chance to pit themselves against the old-timers.

Keith Ballinger (Worcester) re-enters the Table after some errors in his list had made him drop out until they were sorted. He raises the question of the MP4 stations, and queries our earlier ruling on these, adducing a lot of evidence to support him, and that most of the Worcester Club agree

with his opinion. The only point that arises is that one can disagree with rules any time and it's hard to produce a set of rules for HPX that will not have the odd inconsistency *if the rules are applied consistently themselves*. To reverse our original stand would raise another anomaly, in fact more than one, and so, Keith, we are sticking to our guns. Incidentally, OM, TVI from the HRO is a well-known problem and there is a standard remedy which is illustrated in the *Amateur Radio Handbook*, on page 453. Keith is thinking of going SWL/M and would like to hear of anyone else who has tried this mode.

John Hodgson, who sends in a large list this month, queries a VW6 calling CQ DX on Top Band. Sounds a little misguided to me OM, most likely a refugee from the RAE. But never mind, they are good for a chuckle, if nothing else.

The final letter in the pile is from *Pete Cayless (Exeter)* who offers 397 in the AM-only list and 911 in the AM-and-SSB list. He says the most exciting event for him was a visit from ex-G3MJV who is settling in Exeter, and will be coming back on the air on all bands soon. Pete says his QSL return is up to about 60% compared with the 15% of four years ago, which rather goes to confirm the remarks from 9V1MT quoted above.

Well, chaps that's about it for this time. Deadline for next time, is July 29, addressed SWL, SHORT WAVE MAGAZINE, BUCKINGHAM—and please, everyone, save your conductor's time by *printing* your name and address on the front sheet of your letters, and numbering the other pages. You would be surprised what a help it is when the file has been dropped and has to be put back in order. *Good Hunting es 73*.

SPECIALLY ON THE AIR

As noted on p.224 of the June issue of SHORT WAVE MAGAZINE, we are glad to give space for radio amateur groups laying on a station for active operation under the public gaze. This is never as easy as it sounds and takes a lot more organisation than might be supposed. Always, there are last-minute difficulties about the supply of gear, where to rig the aerial, the availability of operators and the problem of a very high local noise level, making anything less than 9++ phone QSO's difficult—and a difficult contact is totally incomprehensible to the uninitiated bystander (who is really wondering what all the noise is about). This can be countered to a certain extent by arranging headphone feed-out at a number of points, with sufficient suppression to make a normal amateur-band QSO easier to follow. But it still takes time, trouble and a lot of co-operation to make it work properly.

The public-occasion events of which we have news are now as follows:

GB3DCL, July 2-10: At the Sports Pavilion of the Distillers Co., Ltd., Saltend, near Hull, Yorkshire, in connection with their Annual Gala Day, and arranged jointly by the D.C.L. Amateur Electronics Section and the Hull & District A.R.S. Operation from noon to midnight on all suitable bands 10-160m., AM/CW/SSB. Calls G3PJR and G3UIF will also be used. For QSL's, skeds and details, write: M. Ellis, G3PJR, 351 Willerby Road, Hull, Yorkshire.

GB3PAS, July 19-21: At Peterborough Agricultural Show, a demonstration station working 80m. and other bands. All visitors welcome at the Sports & Hobbies section. Further details from G3KPO, *QTHR*.

G3SFG, July 21-23: Operated by the Southgate Radio Club at the Finchley Carnival, Victoria Park, London, N.3. Station will be equipped

for all bands 10-160m. and possibly VHF, with main activity on Saturday, 23rd. Visitors and skeds welcomed; get in touch with G3MBL, G3TDM or G3TXA, all *QTHR*.

GB3AMI, July 21-28: Laid on by the G.E.C. (Coventry) Apprentice Association, for the Warwickshire Scout International Camp at Packington Park, near Birmingham. Stations GB3AMI and G3SPY/A will be in operation 24 hours a day throughout the period, on 10-15-20-80m. To ensure interesting contacts, to be made before a large Scout audience, skeds are invited and can be arranged with: P. Cleall, G8AFN, 28 Oldham Avenue, Wyken, Coventry, Warwickshire.

GB3WIJ, July 29-August 7: Operated by the Salisbury & District Short Wave Club for the Wiltshire International Jamboree at Ogbourne St. George, when about 2,000 Scouts from several countries will be present. Contacts and skeds will be welcomed, and can be fixed with: D. Hobbs, G3OBW, 5 Norfolk Road, Salisbury, Wilts.

GB3FRC, August 13-15: Organised by the Fylingdales Radio Club in connection with the Amateur Radio exhibition at Spa Gates, Whitby, Yorkshire N.R., running commercial gear on all bands 15-80m. All contacts will be QSL'd with special care and visitors will be made very welcome. Details from: W. Burton, hon. secretary, Fylingdales R.C., 14 Westbourne Road, Castle Park, Whitby, Yorkshire.

August 29 (Bank Holiday): Station to be established for Redbourn Annual Fair, running Top Band AM and SSB on HF, 10.0 a.m. to 6.0 p.m. (Callsign to be notified.) Fair will be signposted, with easy access from A5 and M1; all visitors welcome, and contacts will be QSL'd by special card. Further information from: L. S. Duffy, G3TXP, 60 Snatchup, Redbourn, St. Albans, Herts.

THE MONTH WITH THE CLUBS

By "Club Secretary"

(Deadline for August Issue: July 15)

(Please address all reports for this feature to "Club Secretary," Editorial Dept., SHORT WAVE MAGAZINE, Buckingham.)

CLUBS may come into existence, flourish awhile, and then for no apparent reason, wither away and die completely or become moribund for long periods. The reasons are many and varied, but one of the most important is that a Club should have "leadership" from its officials and that they should be allowed to get on with the job with a minimum of interference between AGM's, and a maximum of support in the way of response to a "call for volunteers."

Another asset to an active and flourishing Club is a news-sheet, particularly as so many of the really successful Clubs only seem to meet once a month, or at most, fortnightly. One newsletter we knew of used to come out about a week before the Club meeting, as a posted reminder of what was on the programme. The problem with such a scheme is to find someone to compile it and someone to type the stencils and turn the handle. The editor must have the persuasiveness of a high-pressure salesman, with the muscles of a professional heavyweight if his newsletter is not to die for want of contributions and news; he also has to pursue an independent course, the while accurately reflecting the committee's policy for the Club. It must cost nothing, and put the professional job to shame, if some of the members are not going to call for its demise as an economy measure at each and every AGM. Withal, the man must be able to write better English prose than anyone else in the Club, because in the end he will have to do the whole lot himself!

And yet, amazingly, the vast majority of the sheets sent to us each month seem to be done by people who meet at least most of the qualifications outlined, and have lots more in other directions, and the number that turn up each month seems to suggest that in every Club there is a literary lion trying to break out. Why not find him?

ACTIVITY REPORTS

Now, from the preamble, to the matters in hand. **West Kent ARS** meet at the Adult Education Centre in Monson Road, Tunbridge Wells, on July 1 to discuss SSB, on July 15 to watch a film show, and again on the 29th, when they will have a talk and discussion by G3PAH on Radio-Teleprinters; all these meetings commence at 7.30 p.m. **Basildon** and **District ARS** make no mention of their programme; they are preoccupied with the exhibition station they

are putting on at the Shell Club, Corringham, on July 9, when they will have GB3BRS on the three LF bands, CW and Phone. Contacts will be QSL'd with a special card for the occasion.

St. Helens Electronics Society close their programme at the date of this issue but are reopening in early September, all being well, and on August 6 they hope to operate for the Pilkington Gala Day—but they need more operators and would appreciate offers of help.

Cornish Radio Amateur Club seem to meet on



Norman Pride (right) who has for many years been honorary secretary of the very successful Spen Valley Amateur Radio Society, welcoming Mr. L. Allen of the BBC as guest speaker at the Club's recent annual dinner.

the first Thursday of the month, the July session being devoted to a talk on fault-finding by their president, G3XC, while for August they have G2BHW on "Crystal Oscillators" and an extremely interesting programme forecast for the future.

Purley get together on the third and first Friday in each month, the latter being the time for lectures, films and so on, while the first evening each month is kept as a "natter nite." The July lecture, on the 15th, will be by G3JQN, who is to talk about VHF and UHF, at the Railwaymen's Hall, 58 Whytecliffe Road, Purley. They specially say that visitors and new members are welcome.

Sad News

G3TNJ from **Crawley** writes in sorrow to explain that the picture on p.171 in the May issue was never seen by Mrs. Braint, owing to her sad death, suddenly, on April 14, and goes on to describe how Beatrice had not only helped him to get his ticket, but had, with her husband, helped G3TNJ over a period of twenty-five years, to cope with disabilities, and later, blindness, the while she herself coped with an almost incredible series of illnesses and misfortunes. No wonder the **Crawley** Club people were proud to see her put in an entry in the Constructional Contest and to give her a prize. Nevertheless, "the show must go on" and **Crawley** announce that they will be having an informal Mobile Evening on the Hogs Back, between Guildford and Farnham, on Wednesday, July 27, with everyone welcomed.

Newark Short Wave Club report only their past programme, which is a pity, but mention that they have just lashed out on a petrol generator for field days, and used it as inspiration for one of their lectures. They go beyond merely welcoming new members—they will welcome other clubs. Unfortunately, they do not specify where they meet, but doubtless a word to their hon. sec. will bring all the dope.

Surrey gather at the Blacksmiths Arms, South Croydon, on July 12, to hear G3DGN (who, incidentally, will have travelled over from Harlow for this occasion) talk about "Communication with

Light," whilst on August 9 G2YL will be talking and showing slides about W and VE lands; this latter event results in an invitation to YL's and XYL's.

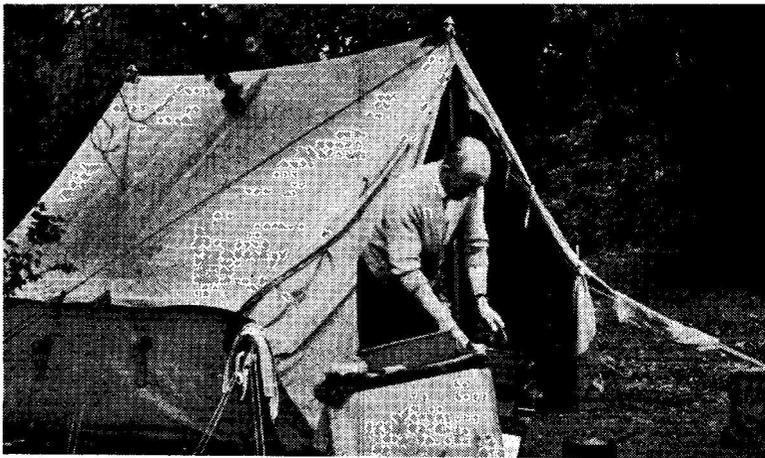
Northern Heights are determined to see that we know *their* future arrangements, and to that end send us a membership card, showing an intensive and interesting programme; in the near future there is a visit, on July 7, to Emley Moor TV station to see the 625-line gear, followed by a ragchew night on July 20, then a lecture on a "Beginners Station" by G3VEK, slated for August 3. A "Pea-and-Pie Supper" sounds interesting, as does a lecture by their minute secretary, Mrs. Mary Shaw, G3OMM, on "Transmission of Sound on a Light Beam."

Shefford have had a change of secretary (*see* panel) after ten years' service by the previous incumbent, G3IXG. The Club meets every Thursday at Shefford Church Hall at 7.45 for Morse Practice followed by the meeting proper at 8.0 p.m., an unusual but worthwhile routine. Incidentally, we notice that both Shefford and Stevenage Clubs seem to be drawing on Letchworth for members and officers—wonder how long it will be before they catch on and get together to form a Club in Letchworth?

The June meeting for **Cheshunt** featured a talk on Aerials by G3GBL, followed by a Junk Sale at which members bought material said to be "priceless." For July there is a talk on SSB, speaker not specified, but in August there will be *no* meeting—normal place and date are the Methodist Church Hall, Cheshunt, on the first Friday of each month at 8.0 p.m., with visitors specially welcome.

Saltash appear to have been in dire trouble—we gather that the Rally they held on Whit Monday was attended by G9BO. They say that Stinker was, in fact, there, but lost his nerve for the first time in recorded history and did not disclose himself. After such a reverse, Saltash had better look out, as G9BO usually gets his own back. On July 5 they have a mobile competition called "No Hiding Place" with apologies to Lockhart, while on July 29 members are

You might never believe it but this is the organiser and manager of the International Communications (Amateur Radio) Exhibition, on a recent weekend outing—Phil Thorogood, G4KD, assisting (in the culinary dept.) Edgware and D.R.S. at their field day camp.



committed to bring along their problems for group discussion.

A contrast to this light-hearted fooling at **Thames Valley**, where they have August 3 set aside to hear the secretary, G3JKA, lecturing on Tranceiver Circuitry. Unfortunately, G3JKA forgot the essential matter of the Club's address for meetings, and the writer's records are no more helpful.

Southgate held their June session at Parkwood School, Wood Green, London, N.22, when they heard Mr. Smith of the GPO on the very important matter of licence conditions; however, they do not specify the subject for July and we can only remark that judging by their past programme it should be interesting.

The next port of call is **Reigate**, who report the sad death of their secretary, Denis Thom, G3NKT, who was a founder member and had been hon. sec. since the Club was formed back in 1959. D. Thom, G3NKS, has stepped into the breach *pro tem*. The next meeting will be on July 21 at the George and Dragon, Cromwell Road, Redhill, when there is to be a demonstration of members' UHF equipment. A recent meeting involved a Junk Sale, and the auctioneer remarks that he can remember certain boxes of valves appearing many many times before!

Reading ARC had their last get-together on June 7, to judge by secret ballot a Construction Contest, which was won by G3TOQ with a SSB Transmitter described as "superb"; the best effort by a non-licensed member was a fully transistorised MW, LW, and Top Band receiver. The total entry was no less

than thirty-two items for the two trophies, the Nash Cup going to G3TOQ and the Hill Cup to SWL J. Green, for the winning items mentioned. No details of future events are to hand.

New Club—British Rail

A long and interesting letter from Mr. H. A. J. Gray, regarding the proposal to form a **British Rail Amateur Radio Society**, from which we gather that there are such specialist Clubs already in existence in several countries, and also a call book. One wonders if they would be interested in having associate members who are not connected with railways but are railway-lovers? Membership is open to anyone, serving or retired, connected in any way with British Rail, or its ancillaries such as the Docks Board. Those interested should contact Mr. Gray at the address shown in the panel; if a copy of the call book is desired, send an envelope 18in. by 10in. stamped 8d. and self-addressed, to R. New, 29 Little Dock Lane, Honicknowle, Plymouth, Devon. We shall be interested to hear how this effort progresses.

A brief note from **Silverthorn** advises that they have a special-activity station, signing G3SRA/A at Ridgeway Park, Chingford, in connection with the annual "Chingford Day," when, beside operating on two metres and Top Band, they also will have a display of home-constructed electronic equipment. However, no details are given of the regular meetings or their venue.

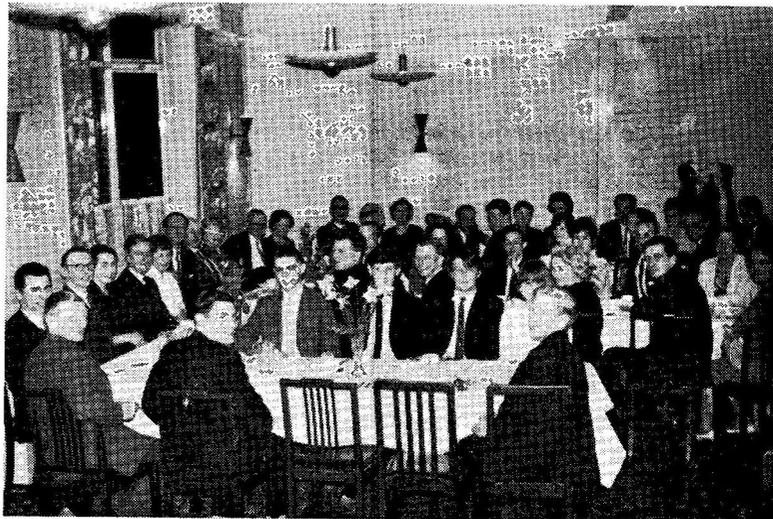
Yeovil are proposing a visit to Hinkley Point Nuclear Power Station on June 29, and on July 6

Names and Addresses of Club Secretaries reporting in this issue:

ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, Acton, London, W.3.
 AERE (HARWELL): V. J. Galpin, Building 347.3, AERE, Harwell, Didcot, Berks.
 ARMS: N. A. S. Fitch, G3FPK, 79 Murchison Road, London, E.10.
 BASILDON: C. Roberson, G8AAO, Milestone Cottage, London Road, Wickford (2462), Essex.
 BRIGHTON (Tech. Coll.): R. A. Bravery, G3SKI, 7 Cope Hill, Brighton, 5.
 BRITISH RAIL: H. Gray, Eleven, Swanton Drive, East Dereham, Norfolk.
 BROMSGROVE: J. K. Harvey, 22 Elm Grove, Bromsgrove, Worcs.
 CARDIFF: N. Graham, GW3OAY, 23 The Rise, Llanishen, Cardiff.
 CHESHUNT: A. Webb, 3 Roseneath Walk, Enfield, Middlesex.
 CORNISH: M. J. Harvey, Oak Farm, Carnon Downs, Truro, Cornwall.
 CRAWLEY: R. G. B. Vaughan, G3FRV, 5 Filbert Crescent, Gossops Green, Crawley (23359), Sussex.
 CRAY VALLEY: C. W. Davis—*QTH wanted*.
 CRYSTAL PALACE: G. M. C. Stone, G3FZL, 10 Liphook Crescent, London, S.E.23. (*FO Rest Hill 694?*)
 EDGWARE: G. S. Fitton, G3RAA, 18 Beverley Drive, Edgware, Middx.
 FAREHAM: N. Carless, G3EER, 16 Waterloo Road, Alverstoke, Gosport, Hants.
 GRAFTON: A. W. H. Wennell, G2CJN, 145 Uxendon Hill, Wembley Park, Middx.
 MAGNUS: R. Wallwork, G3JNK, Magnus Grammar School, Newark, Notts.
 MAIDENHEAD: E. C. Palmer, G3FVC, 57 Headington Road, Maidenhead, Berks.
 NEWARK: G. Francis, G3TWW, 93 Balderton Court, Newark, Notts.
 NORFOLK: A. Marcantonio, G3TLC, 10 Hellesdon Mill Lane, Norwich (45244), Norfolk, NOR.21L.
 NORTHERN HEIGHTS: A. Robinson, G3MDW, Candy Cabin, Ogden, Halifax (64329), Yorkshire.

NORTH KENT: C. W. Westwood, G3VFD, 25 Knoll Road, Bexley, Kent.
 PLYMOUTH: E. J. Fallon, G3SGV, 8 Queens Road, Plymouth, Devon.
 PURLEY: A. Frost, G3FTQ, 62 Gonville Road, Thornton Heath, Surrey.
 RAIBC: Mrs. Frances Woolley, G3LWY, 331 Wigan Lane, Wigan, Lancs.
 READING: N. W. Austin, G2FQR, 20 Worcester Close, Reading, Berks.
 REIGATE: D. Thom, G3NKS, 12 Willow Road, Redhill, Surrey.
 ST. HELENS: B. Hardy, 198 Knowsley Road, St. Helens, Lancs.
 SALTASH: D. Bowers, 95 Grenfell Avenue, Saltash, Cornwall.
 SCOTLAND (Radio Club of): A. Barnes, GMLTB, 7 South Park Terrace, Glasgow, W.2.
 SHEFFORD: D. A. Pike, 32 Lawrence Avenue, Letchworth, Herts.
 SILVERTHORN: V. W. Dobbs, G3SBX, 11 Horsley Road, Chingford, London, E.4.
 SOUTHGATE: R. Wilkinson, G3TXA, 23 Ashridge Gardens, Palmers Green, London, N.13. (*PALmers Green 4592*.)
 SOUTH LONDON MOBILE: B. Negri, G3LXN, 17 Voltaire Road, Clapham, London, S.W.4.
 SURREY: R. Morrison, G3KGA, 33 Sefton Road, Croydon, Surrey. (*ADDISCOMBE 5982*.)
 THAMES VALLEY: K. Rogers, G3AIU, 21 Links Road, Epsom, Surrey.
 VERULAM: G. Slaughter, G3PAO, 6 Leggats Wood Avenue, Watford, Herts.
 WAKEFIELD: E. Price, G3TQV, 23 Elmwood Grove, Horbury, Wakefield, Yorkshire.
 WAMRAC: Rev. A. W. Shepherd, G3NGF, 1 North Street, Crewe (2558), Cheshire.
 WEST KENT: R. Trevitt, G3SSE, 28 Delves Avenue, Tunbridge Wells, Kent.
 WOLVERHAMPTON: J. Rickwood, G3JJR, 852 Stafford Road, Fordhouses (3338), Wolverhampton, Staffs.
 YEOVIL: D. L. McLean, G3NOF, 9 Cedar Grove, Yeovil, Somerset.

More than 50 members and friends attended the recent annual dinner of the Spen Valley Amateur Radio Society. Spen Valley is one of the most active of the many Clubs in the North of England.



they will be listening to a tape lecture on "Amateur TV." Plans are in hand for the VHF Field Day, and, of course, they have, as individuals, visited many of the mobile rallies.

Cray Valley have a lively newsletter (*QUA*) and in the current issue there is a lot of gen on the June programme but nothing as to dates for July. There is a rather good effort in the newsletter about the method of using the QRA Locator system. The Club Hq. is at Eltham Congregational Church Hall, 1 Court Road, London, S.E.9.

On July 19 a lecture by W. G. Dyer, G3GEH, about "Power Supplies for London Transport" will form the meat for the **Acton, Brentford & Chiswick** occasion. It sound a little as though the Club propose to go QRO with the Club Station, and are looking for ideas. The meeting will be held at 66 High Road, Chiswick, and kick-off will be at 7.30; this is one of the Clubs that make a point of mentioning that visitors will be welcomed.

Harlow and District have not reported (the organisation man is still on holiday at the time of writing this piece) but they have their own Hq. in Mark Hall Barn, on First Avenue, with a positively gigantic sign on the wall. They meet on Tuesdays and Thursdays, with a Junior Section session on Friday evenings, the latter being run by G3PRN (to whom all inquiries should go) the former being the main nights to which all are welcome, both Senior and Junior.

Wolverhampton ARS come in with a copy of their newsletter which gives details of meetings up to early October. In July 4, they make a departure by leaving their Hq. in order to run a meeting at the Connaught Hotel, when they will be addressed by G5BJ, whose theme will be "The Early Days of Police Radio." The normal Club Hq. is at Neachells Cottage, Stockwell Road, Tettenhall, Wolverhampton.

The Amateur Radio Club of **Nottingham** will be meeting as usual each Tuesday in July, although nothing in the way of a formal programme has been arranged. They say they were very disappointed with their results in NFD, insofar as two stations were laid on, both using KW-2000's, but only a total of three operators turned up during the whole of the 24-hour period. The Club evenings are held at Woodthorpe House, Mansfield Road, Nottingham, starting at 7.15.

Norfolk ARC meet at old Lakenham Hall, Norwich, and for July 4 they have a /P evening fixed, followed by a family picnic on the 17th, and a lecture on the 18th, grandly entitled "Metal Fabrication Technique." Whether you accept this as the name of the process, or know it as plain tin-bashing, there is no doubt that the prime requirement is not so much a good supply of tools as a well-filled first-aid box, and possibly a comprehensive swear-box!

Maidenhead say they have no formal meetings laid on for July or August, as the East Berks College will be closed for the summer vacations. However, on July 2 they are going to visit the Post Office Radio Station at Bearley, near Stratford-on-Avon, to see one of the main point-to-point receiving stations in the U.K., where they also test out the prototypes of new, advanced receivers. In August, on a date yet to be finalised, they are to visit the U.S.A.F. Base at High Wycombe, where they track the Tiroso satellites, and make weather maps from the information thus gleaned. In conclusion they say they would be pleased to pass on the information about themselves to anyone in the district who has not yet heard of them—see panel for secretary's QTH.

Another newsletter, this time from A.E.R.E. **Harwell**, who call theirs *QAV*. The Editorial seems to take a rather pessimistic view of their present position, as they have lost half their numbers, largely through the incidence of work and study pressures,

although we feel that a lot of it could be due to that demoralisation that comes before the annual holiday. They always want to see new faces, any time, and your conductor ventures to predict all may yet be well.

Brighton Tech. College send in a very brief and hurried note (so much so we had a job to read it) from which we gather they are on show at the College Open Days on June 30 and July 1, with G3TCB on all bands Top to Ten, AM-CW-SSB.

From **South London Mobile Club** we have details of the June programme, at their Hq., Clapham Manor Baths, Clapham Manor Street, London, S.W.4, but nothing about the meetings for July. They mention the idea of the Association of Clubs (themselves, Wimbledon and Purley), which we discussed at length in last month's piece.

RAIBC send their *Radial* from which your conductor noted with pleasure that G3ESR and G3LWY had visited G3TIO, Ken, and SWL Dick Boydell, who is making good progress towards a licence. There must be a "meeting" of this Club somewhere pretty well every day, and as for the formal ones these are of course held on Tuesdays at 10 a.m. and Wednesdays at 2 p.m., on the Club net frequency which is around 3.7 mc. Knowing how many SWL members listen in, apart from the hard core of licensed Invalid and Bedfast members transmitting, the writer can only say he wishes you a perpetually clear channel.

WAMRAC also have to hold their meetings over the air, and as they are world-wide in their coverage the frequencies are chosen accordingly; for G's the frequency is 1865 or 1910 kc, Sundays 2115-2145 GMT, or, on Eighty, 3665 kc, Saturdays 0800 GMT, Sundays 1300 GMT. ZS net is on 3780 kc at 0630 SAST (0430 GMT), while the W net is on 3890 kc (out of the U.K. band) at 0800 EST (1300z).

Verulam move into their new Hq., the Cavalier Hall, St. Albans, for July 20, when G4GA will give

his talk on "Bridging the Gap," the period just before and during Hitler's War as it affected Amateur Radio. The St. Albans boys also express themselves as being pretty pleased with their NFD effort, quite a lot of the exotic stuff having been worked on the DX bands.

The **Crystal Palace** report makes it clear that they have an operator problem where contest working is concerned—the difficulty nowadays with many Clubs is finding CW operators of the quality and ability required for competitive events. At Crystal Palace, they have plans to deal with this problem.

For **Plymouth Radio Club (G3PRC)**, a very full programme has been drawn up for the coming year, one project being the complete rebuild of the Club station. Plymouth run a constructional class, under the direction of G3TSE, and this has enrolled no less than a dozen members to undertake various items of equipment.

Fareham & District A.R.C. are now well established in their new club-room at the Community Association Hq., Portchester. The group was fortunate to have presented to them a complete station rig, consisting of an AR88D, an LF-band Tx, and a 4-metre transceiver. With more than a dozen licensed members, their call G3VEF can be heard on Sunday evenings. With various activities planned, indoor and outdoor, Fareham feel that "the future holds great promise." FB!

Future meeting nights for **Edgware & District R.S.** are July 11 and 25, at John Keble Hall, Church Close, Deans Lane, Edgware. Their NFD entry, in contrast to some others we have heard of, is reported as having been "well supported by members and visitors."

On July 20, **South Birmingham** will gather to discuss the club room, the shack and matters relating, this being at the Scout Hut, Pershore Road, Selly Park. Before that, they join with Bromsgrove on July 8 for the Heathkit lecture and demonstration.

Taken at the AGM, Northern Heights, earlier this year — left to right, G3FQH, retiring chairman; G3UI, inducted to the chair for the new session; G3UGF, and an SWL shortly due for his callsign.



CLUB PUBLICATIONS

We acknowledge with thanks the receipt of the following Club Publications.

ARMS (*Mobile News*); **Foundation for Amateur Radio** (*Autocall*); **Cornish** (*Cornish Link*); **Purley** (*Splatter*); **Ex-G Radio Club** (*Bulletin*); **Surrey** (*Monthly News*); **Southgate** (*Newsletter*); **Reigate** (*Feedback*); **Aeronautical Centre, Oklahoma** (*Collector and Emitter*); **Cray Valley** (*QUA*); **Wolverhampton** (*Newsletter*); **AERE** (*Harwell*) (*Newsletter*); **RAIBC** (*Radial*); **WAMRAC** (*Circular Letter*); **Radio Club of Scotland** (*GM Magazine*); **First-Class Operators Club** (*Circular Letter*); **Saltash** (*Tamar Pegasus*); and **South Birmingham** (*QSP*).

Bromsgrove & District ARC put G3VGG/A on the 80m. air for the local football club fête on Whit-Monday, and in four hours made 40 contacts. At the June AGM the chairman, G2CLN, was re-elected, with G3TQM as treasurer. It was decided that from July an extra monthly meeting would be arranged to put various Club constructional projects in hand. Their next session is on July 8, at the Co-op Room, High Street, Bromsgrove, when Daystrom, Ltd., will be demonstrating a wide range of Heathkit apparatus.

The report from **Wakefield & District ARS** records the sudden passing of their member, G3SDE, who will be a great loss, as the Club is now going great guns, with six new members, G3VRD just licensed, and three more who took the May R.A.E. They hope to run a station for the Wakefield Agricultural Show in August.

North Kent report successful field day results, and also that considerable interest in VHF/UHF is being shown by members. The July meetings are: 14th, for a visit to the Shell Centre; and on the 28th, at 7.30 p.m., Congregational Hall, Bexleyheath.

Grafton Radio Society will be holding their field day on July 17, with G3AFT/P in action all day, mainly on 160m. and possibly also 80m., the site being Tumulus Hill, Hampstead Heath—as always,

any visitors will be most welcome.

As its title implies, **Cardiff Radio Contest Club** is very contest-minded; they put two stations in for NFD, doing “reasonably well,” and will be going in for a Top Band affair during July 9-10, possibly from an advantageous location up in the Brecon Beacons. Next meeting, July 4, Griffin Inn, Lisvane, that following being on August 1, same place and time, 8.0 p.m.

The field day event went well for **Magnus Radio Society**, the station being visited by many parents, friends and ex-members (this being a school club). An interesting programme is in hand for the remainder of the session.

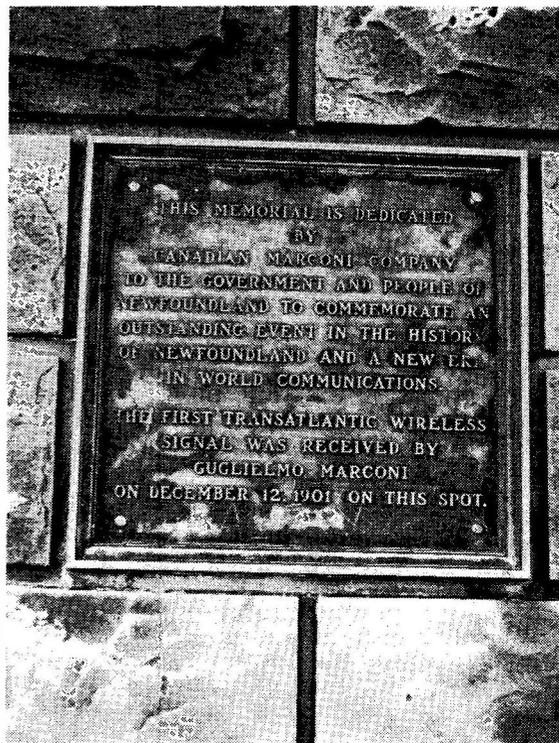
Just a Reminder

And that's about it for this time. It only remains for us to mention that this feature is often read by folk who have no idea where the local lads meet, and so it is important that you let us have *advance* information wherever possible—and if not at least a note of meeting dates, times and location and also of course the hon. secretary's full QTH for the panel.

If you don't type the letter, please try and write legibly, so as to reduce the risk of silly errors at within the deadlines, these being **July 15** for the August issue, and **August 12** for September, addressed simply: Club Secretary, SHORT WAVE MAGAZINE, BUCKINGHAM.



The well-known Marconi memorial stone at Poldhu, Cornwall, is matched by another on the other side of the Atlantic, at Signal Hill, St. John's, Newfoundland, where Marconi had his receiving station. The plaque on the right is set into the stone shown above.



NEW QTH'S

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

G3UTH/A, M. R. Gosselin, 18 Queens Road, Fareham, Hants.

G3UTH, M. R. Gosselin, Ivy Lodge, Grouville Hill, Jersey.

G3UYL, D. S. Knott, Woodvale, Lansdowne Close, Leek, Staffs.

G3VBA, K. H. Hatton, 49 The Briars, Kempston, Bedford.

G3VBG, B. A. Morris, School House, 24 Walhouse Street, Cannock, Staffs.

G3VBQ, D. Wright, 178 Moredon Road, Moredon, Swindon, Wilts.

G3VCP, Crystal Palace and District Radio Club, c/o G. M. C. Stone, 10 Liphook Crescent, Forest Hill, London, S.E.23.

GW3VEO, M. L. Jeremy, 22 St. John's Road, Manselton, Swansea, Glam.

G3VES, H. Martin, 1 Cades Lane, Farley Hill Estate, Luton, Beds.

G3VGC, G. H. Crump, 80 Lenard Road, London, S.E.20.

G3VGF, C. Angell, School House, The College, Malvern, Worcs.

G3VGU, J. C. Outen, 31 Carlton Road, Woodside Estate, Grays, Essex.

G3VHD, C. J. Dodd, 2 Little Aston Road, Harold Wood, Romford, Essex.

GW3VHG, G. Hughes, Brynmor, Brynteg, Anglesey.

G13VHY, D. K. Lester, 1B Riverdale House, Dunmurry, Belfast.

G3VIJ, G. W. Perkins, 35 Kingstown Road, Carlisle, Cumberland.

G3VIV, R. H. Hannaford, 3 Devonshire Road, Bathampton, Bath, Somerset.

G3VIZ, J. R. McKellar, 18 Cheney Street, Eastcote, Pinner, Middlesex. (Tel: PIN 7516.)

GMSABN/KP4BRY, S. H. Fried, U.S. Naval Radio Station, Thurso, Caithness, or QSL via NAVRADSTA, F.P.O. New York, New York, 09516, U.S.A.

G6ACF/T, W. G. Taylor, 23 New Brunswick Street, Horwich, Bolton, Lancs.

G8ANJ, J. L. Oliver, 37 Kelvin Avenue, London, N.13.

GW8AOH, J. A. Hawkins, 91 Havard Road, Llanely, Carmar.

G8APF, D. A. Chaplin, 40 Gloucester Avenue, Nuthall, Notts. (Tel: Nottingham 271332.)

G8APG, D. White, 14 Landscape Dene, Helsby, via Warrington, Lancs. (Tel: Helsby 2625.)

G8APR, W. Bradley, 1 Kildare Crescent, Kirkholt, Rochdale, Lancs.

CHANGE OF ADDRESS

G2BAM, C. H. P. Verrinder, The Manor House, Woollard, Blandford, Dorset.

G3AYZ, J. F. Turner, The School House, Maypole Road, Tiptree, Colchester, Essex.

G3BN, A. E. Sutton, 254 Entwisle Road, Rochdale, Lancs.

G3BRT, G. O. J. Parfitt, 10 Burlington Road, Redland, Bristol 6.

GM3DIQ, W. C. Bradford, Lynburn, Carlops, Peebles-shire, by Penicuik, Midlothian.

G3EXU, J. W. Cunliffe, 62 St. Andrews Avenue, Preston, Lancs. (Tel: Preston 28117.)

G3GEW, H. Jordan, The Anchor Inn, Newcastle, Craven Arms, Shropshire.

G3HFP, T. Worton, 9 Callon Avenue, Blackbrook, St. Helens, Lancs. (Tel: St. Helens 23903.)

GW3IJU, E. Briggs, c/o Sgts.' Mess, R.A.F. Station, Valley, Anglesey.

G3JHM, D. T. Hayter, 4 Newling Way, High Salvington, Worthing, Sussex.

G3JIE, D. C. Youngs, Homefield, Westfield Road, East Dereham, Norfolk.

G3JNB, V. E. Brand, 17 Southwood Gardens, Hinchley Wood, Esher, Surrey.

G3KMA, R. Balister, 8 Holly Bush Lane, Hampton, Middlesex.

G3KXL, C. V. Kempster, 4A Gorse Hall Close, Dukinfield, Cheshire.

G3LYT, W. J. T. Fennell, 10 Liscombe Road, Dunstable, Beds.

G3NBX, A. W. Phillips, 68 Fort Austin Avenue, Crownhill, Plymouth, Devon.

G3NNO, M. T. George-Powell, 82 Forest Avenue, Starbeck, Harrogate, Yorkshire.

G3OAH, P. R. Whittlestone, 20 Lyon Avenue, New Milton, Hants.

G3RHL, B. W. Rous, 8 Green Dell, Hales Place, Canterbury, Kent.

G3RJC, G. R. J. Cole, 8 Cherry Tree Road, Staplehill, Burton-on-Trent, Staffs.

G3SGH, J. R. Hewitt, 114 Canterbury Road, Kennington, Ashford, Kent.

G3SQM, A. Smith, 5 Varnells Terrace, Hambleton, Henley-on-Thames, Oxon. (Tel: Hambleton 443.)

G3TTG, V. Batchelor, c/o Sgts.' Mess, R.A.F. Station, St. Mawgan, Newquay, Cornwall.

G3TZL, P. A. Bowen, 18 Queens Road, Fareham, Hants.

G3USB, R. J. Baker, 32 Harbour Avenue, Comberton, Cambs.

G3UUM, A. M. Page, 19 Boulsworth Crescent, Nelson, Lancs. (Tel: Nelson 65142.)

G3UVB, D. F. Barnes, 45 Heath Lane, Bladon, Oxford.

GW3VL, P. R. Jenkins, May Cottage, Caerphilly Mountain, Glam.

G5LY, K. C. Lay, Plot 226, Riders Bolt, Hurchington Manor Estate, Bexhill-on-Sea, Sussex.

AMENDMENTS

G3HTY, E. M. Kerr, The Bower, Far Forest, Kidderminster, Worcs.

G3VBI, H. R. Christopher, 7 Rutland Road, Hook, Goole, Yorkshire.

AERIAL FEEDER CABLES

75 ohm balanced twin feeder. Loss per 100ft., 1.9 dB at 10 Mc/s., 6d. per yard.
 300 ohm balanced twin feeder. Loss per 100ft., 0.36 dB at 10 Mc/s., 6d. per yard.
 75 ohm coaxial feeder (standard). Loss per 100ft., 2.5 dB at 50 Mc/s., 9d. per yard.
 75 ohms coaxial feeder (low loss). Loss per 100ft., 3.3 dB at 200 Mc/s., 1/8 per yard.
 500 ohm coaxial feeder. Loss per 100ft., 1.3 dB at 10 Mc/s., 1/6 per yard.
 P.P. 2/- on any order.

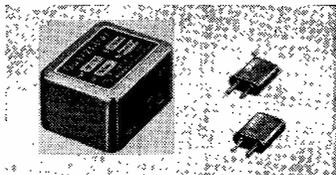
COAXIAL CONNECTORS



SO-239 PL-259 UG-175/U

PL-259 coaxial plug, 5/-. P.P. 6d.
 PL-259F (PTFE insulation), 7/6. P.P. 6d.
 SO-239 coaxial socket, 5/-. P.P. 6d.
 SO-239F (PTFE insulation), 7/6. P.P. 6d.
 M-359 right-angle bend, 2/6. P.P. 6d.
 UG-175/U reducer, 1/3. P.P. 4d.
 UG-176/U reducer, 1/3. P.P. 4d.
 Orders over £1 post free.

K.V.G. MINIATURE CRYSTAL FILTERS



Models XF-9A and XF-9B have bandwidths (-6 dB) of 2.5 and 2.4 kc/s., shape factors of 1:1.7 (6:50 dB) and 1:1.9 (6:60 dB) and stop band attenuation better than 45 and 80 dB respectively. Centre frequency 9.0 Mc/s. Prices (including carrier crystals and sockets) are £15.15.0 and £19.10.0 respectively. Write or phone for data sheet.

BARGAIN PACKS

Resistors. 100 well assorted values and types. 1/w. to 2w., 1% to 10%, hy-stabs., etc. A super buy at 7/6. P.P. 1/6.
CAPACITORS. 100 well assorted silver micas, ceramics, papers, electrolytics, air-spaced variables, etc. at only 10/-. P.P. 1/6.

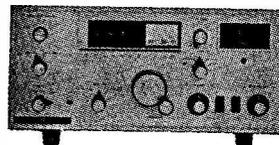
TRANSMITTING-TYPE VARIABLE CAPACITORS

245 pF variable air-spaced capacitors. Gold plated vanes. Ideal for A.T.U., Z-match, etc. A really beautiful job and only 7/6 (the gold must be worth a fortune). P.P. 1/6.

MODULATION TRANSFORMERS

	£	s.	d.
UM0 (10 watts of audio) P.P. 3/3	3	3	0
UM1 (30w.) ... P.P. 4/-	4	3	0
UM2 (60w.) ... P.P. 5/6	5	10	0
UM3 (120w.) ... P.P. 6/6	6	4	0

NATIONAL TRANSCEIVER NCX5 MKII



Write or phone for complete details of this feature-packed 10 to 80 metres 200 watts PEP station.
 Price NCX-5 MKII, £235.10.1.

BRIAN J. AYRES & CO.

8 HARTFIELD ROAD, WIMBLEDON, LONDON, S.W.19

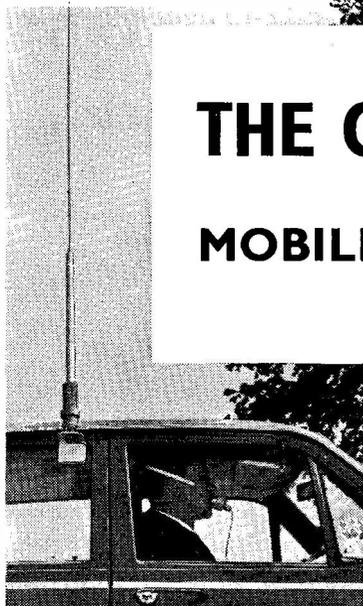
100 yards from Wimbledon station

Tel.: WIMbledon 6063

Open Monday to Saturday, 9 a.m.—6 p.m.

THE C.S.E. TYPE 2. A.T.M.A.

MOBILE - PORTABLE - FIXED ANTENNA



STAR FEATURES

- * Instant optimum loading.
- * Any frequency 1.8-2 Mc/s.
- * Instant tuning ring.
- * Simple installation - no holes! for
- * Instant window mounting.
- * Special nylon clad window bracket.
- * Instant demounting for inconspicuous parking.
- * Safe at speed - no detuning.
- * Instant sleek appearance to any car.
- * Proven performance - wintered permanent installation.
- * Instant full telescopic extension - no adjustment.
- * Simply dip tank - rotate tuning ring to load.
- * Instant operation - no dismantling from car.
- * Mount /M window or wing. /P on fence. /A at window.
- * Instant satisfaction - another C.S.E. quality communications product.
- * Length 70 inches overall.
- * Only £9.15.0 U.K. Post and packing paid.

SPECIAL SAFETY MOBILE LIP MICROPHONE ONLY £2.17.11 P & P PAID

CONTACTOR SWITCHGEAR (ELECTRONICS) LTD. MOORFIELD RD, WOLVERHAMPTON, STAFFS. Telephone: Wolverhampton 23883 Ext. 1.



G3ZY **G3ZY**
J. & A. TWEEDY (Electronic Supplies) Ltd.
 Appointed Dealer and Stockist
 EDDYSTONE, K.W. ELECTRONICS, GREEN, CODAR, EAGLE, Etc.
 J. D. PRODUCTS (CHESTERFIELD) TRANSISTORISED EQUIPMENT

New Equipment
 KW 2000 £173, A.C. p.s.u. £32, D.C. p.s.u. £32.
 KW 2000A £195, A.C. p.s.u. £40, D.C. p.s.u. £40.
 KW 600 Linear £115.
 KW Vespa £110, A.C. p.s.u. £25.
 Eddystone Edometer £19. 10.
 Eddystone EA12 £185.
 Eddystone EC10 £48.
 Eddystone 840C £66.

STARR SR550 ham band D.S/HET 58 gns.
 TRJO JR60U G.C. & B.S. include 144 mc/s. 59 gns.
 LAFAYETTE HA350 xtal front end 75 gns.
 HA63A 24 gns.

Used Equipment
 Panda Cub £30.
 Heathkit RA1 £32. 10.
 Heathkit DX100U (as new) £65.
 Heathkit DX35 £17. 10.
 Hammarlund HQ170A with auto transformer, spotless condition £110.

Trimmers
 Wingrove & Rogers air spaced 0.5 to 25PF 6d. each.

H.P. TERMS AVAILABLE TRADE-INS ACCEPTED

64 LORDSMILL STREET, CHESTERFIELD, DERBYSHIRE
 Tel: Chesterfield 4982 or Holmewood 506 (Evenings)

EMSAC — SWBI

Standing Wave Bridge ; 160-2 metres ; 50 ohm (" mod kit " included for 72 ohm) ; Diecast case ; Excellent long term stability ; Consumes negligible power ; Standard coaxial socket terminations (two plugs supplied). Other terminations to order.

The price £5. 8. 0. P. & P. 2/6.

ELECTRONIC AND MECHANICAL SUB-ASSEMBLY CO., LTD.
 Dept. S. 73 FRENCHGATE, RICHMOND, YORKSHIRE

FEW COPIES OF
THE A.R.R.L. RADIO AMATEUR HANDBOOK
 1965 EITION
REDUCED TO CLEAR
 30s. (post free)

SHORT WAVE MAGAZINE LIMITED,
 55 Victoria Street, London, S.W.1.

NEW TRANSISTOR CATALOGUE

Please send two shillings for Catalogue

marlison 'Dual-tone' 49/- test oscillators

Printed circuit construction. 9v. batt. conns. for PP3. Output : 100mV, 10K ohms, co-ax socket (1 Kc and 2.5 Kc standard) mixed, but separately switched. Suitable for testing 5SB transmitters. Easily mounted or built into other equipment. 3½" x 1½".

JOHN WILLIAMS ELECTRONICS LIMITED
 176 HAGLEY ROAD, HALESOWEN, BIRMINGHAM

HAMMERITE HAMMER PATTERN BRUSH PAINT FOR PANELS, METALWORK, ETC.
 3/6 TIN ● JUST BRUSH ON ●

COLOURS: blue, silver, black, or bronze.
 2½oz. tins, 3/6, ½ pint, 7/6, 1 pint, 15/-, ½ gallon, 35/-,* 1 gallon 58/-,* Carr. up to 5/-, 9d., up to 10/-, 1/9, over 10/-, 2/9. *Sent by road.

No order too large or too small. All receive prompt attention. **HAMMERITE** produces the cellular pattern known as hammer finish. Just brush on, dries in 20 minutes, withstands 150 C, oil, water etc. Ideal for prototypes, overhauls etc. Economical to use, easily applied by unskilled labour to any size job, covers 40 sq. ft. per pint, no primer needed.

RETURN OF POST SERVICE, Monday to Friday.
 From your component shop or direct from manufacturers:

FINNIGAN SPECIALITY PAINTS (SW)
 MICKLEY SQUARE, STOCKSFIELD, NORTHUMBERLAND
 Tel.: Stocksfield 2280

JXK CONVERTERS

TRANSISTOR EQUIPMENT

70cm. Preamplifier. 2 x Texas GM290. 4.5 dB NF. 25 dB gain. 3 strip lines. Internal PP3 battery and on/off switch £7

70cm. Converter. 2x Texas GM290 RF. 4.5 dB NF. GM290 mixer 35 dB gain £14

2m. 4M Converter. 2 x GM290 RF. 3dB NF. GM290 mixer. 35 dB gain £12

SWR Indicator/Modulation monitor/RF output meter. 450 mc. max. Trough line construction. GEX66 UHF diodes. 75 ohms £6

Speech Compressor/Preamplifier. High or low impedance mic. input 10 dB increase in average transmitter output. Prevents overmodulation and flattopping. Adjustable compression. Internal PP3 battery and in-out switch £6

Crystal Marker. Megacycle marker signals to 450 mc. £6

VHF Noise Generator. IN21 UHF silicon diode ... £5

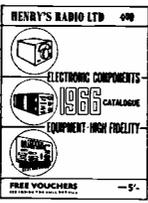
All units are mounted in Aluminium instrument cases size 4½" x 2½" x 1½" in silver grey hammer finish.

Please add 3/9 post and packing per item.

S.A.E. for further details

Texas Instruments GM290 UHF transistors, 19/6. GEX 66 UHF diodes, 7/6. 2C39A, £4 ; base, 15/- Silverplating.

P. H. STRUDWICK (G3JXK)
 PEEL HOUSE, PORTERS LANE, OSPRINGE,
 FAVERSHAM, KENT

<p>QUARTZ CRYSTALS</p> <p>100 Kc/s. R.C.A. ... 15/- 500 Kc/s. 10X ... 15/- 100 + 1000 Kc/s. ... 22/6 1000 Kc/s. HC/6U ... 25/- 27-255 Kc/s. HC/6U 15/-</p> <p>NEW 1966 16 Page Illustrated List of Valves, Transistors, Crystals, Rectifiers, Zeners, etc. 1/- Post Paid.</p>	<p>CATALOGUE</p> <p>NEW 150 PAGE fully illustrated CATALOGUE 6/- post paid With discount vouchers worth 6/- when used</p>	 <p>HENRY'S RADIO LTD</p> <p>ELECTRONIC COMPONENTS</p> <p>EQUIPMENT - HIGH FACILITY</p> <p>FREE VOUCHERS</p>
<p>HENRY'S RADIO Ltd. PAD 1008/9 303 EDGWARE ROAD, LONDON, W.2 Mon.-Sat. 9-6 p.m. Thurs. 9-1 p.m.</p>		

YUKAN SO PROFESSIONAL
SELF-SPRAY THE YUKAN
 AEROSOL WAY!

GET THIS AIR DRYING Hammer Finish

NOW!

Open all day Saturday



Closed Thursday afternoons

YUKAN Aerosol spraykit contains 16 ozs. fine quality durable easy instant spray. No stove baking required. Available in grey, blue, gold, bronze at 14/11 at our counter or 15/11, carr. paid, per push-button self-spray can. **SPECIAL OFFER:** 1 can plus optional transferable snap-on trigger handle (value 5/-) for 18/11, carr. paid.

Choice of 13 self-spray plain colours and primer (Motor car quality) also available.
 Please enclose cheque or P.O. for total amount to:

YUKAN Dept. SWM/6
 307a Edgware Rd., London, W.2

Set of 6 N.P.N. 300 mc/s. 1w. S.T.C. SILICON PLANNER TRANSISTORS, 20/- set.
 Set of 4 SUN SOLAR CELLS plus 24 page book of experiments, 11/- set.
 ZENER DIODES: 1/2w. 3/6, 1.5w. 5/-, 7w. 6/-, 4.7v. to 30v.
 AF114, AF115, AF116, AF117, OC170, OC171, 4/- each.
 ACY22, BY100, AFZ11, T1166, GET7, GET8, GET9, 5/- each.
 Plus many others, send 6d. stamp for Lists:—

D. CURSONS
 78 BROAD STREET, CANTERBURY, KENT

Open all day Saturday



TELECOM MK. II
 Pocket size. V.H.F. 118-136 Mc/s

AIRCRAFT-BAND TRANSISTOR RECEIVER
 complete with telescopic aerial, loud-speaker and battery
£26 . 0 . 0
 carr. paid in U.K.

BRITEC LIMITED
 17 Charing Cross Road
 London, WC2. Whitehall 3070

ANNOUNCING!

NEW "DX ZONE MAP"

Revised to October, 1965. Reprinted in four colours, on durable paper for wall mounting, 35in. wide by 25in. deep. Giving essential DX information—bearing and distance of all parts of the world relative to the U.K. The 40 Zone areas into which the world is divided for Amateur Radio purposes, with major prefixes listed separately. Distance scale in miles and kilometres. Time scale in GMT. Marking of Lat./Long. close enough for accurate plotting. About 1,000 place names, mainly the unusual ones, and most of the rare islands.

Immediate delivery from stock
 Price 14s. 9d.
 including postage and special packing in postal tube to avoid damage in transit.

Publications Dept.
 Short Wave Magazine Ltd., 55 Victoria Street,
 London, S.W.1. (ABBEY 5341/2)

HALSON MOBILE ANTENNA

Going Mobile. Then you need the most unobtrusive and efficient aerial.

Complete with one band coil. **£6.10.0**
 Extra coils £3.10.0 plus 3/6 P. and P.

THE ORIGINAL DESIGNERS OF THIS ANTENNA SYSTEM

Send now to:

HALSON RADIO
 2 SEFTON STREET, BLACKPOOL
 Telephone 20441.

SELECTED BOOKS

Amateur Radio Handbook, R.S.G.B. ...	36/6
Communications Receivers, pamphlet ...	3/5
Guide to Amateur Radio ...	5/7
Radio Amateur Call Book, U.K. only ...	6/7
Radio Amateur Examination Manual ...	5/9
SSB Equipment, pamphlet ...	3/5
Technical Topics for the Radio Amateur	10/8

All the above mentioned titles plus many others available from:

PUBLICATIONS DEPT.
 Short Wave Magazine, 55, Victoria Street,
 London, S.W.1

THE Radio Constructor

The July issue, ON SALE NOW, features

TRANSISTORISED T.R.F. RADIO RECEIVER

Many other constructional articles

From your newsagent 2s. 3d. per copy
 or 2s. 9d. post paid from:

DATA PUBLICATIONS LTD., 57 MAIDA VALE, LONDON, W.9.

PHILADELPHIAN ELECTRONICS LIMITED

FOR FIRST CLASS COMMUNICATION EQUIPMENT

All items in stock at time of going to press

New or used mint condition

	£	s.	d.
Drake 2-B, Q Mult. Speaker, crystal calibrator	95	0	0
Eddystone 680X	65	0	0
Eddystone 540A	28	10	0
AR88D exceptionally good condition	45	0	0
KW2000A. Speaker, power supply	160	0	0
Swan 350. Brand new, latest models	250	0	0
Heathkit SB10U	30	0	0
LA600 Linear	65	0	0
Pye Reporter. Suitable for 4 metres	6	0	0

All equipment guaranteed, easy terms arranged

Mail order or by appointment Tel. MALda Vale 6638

PHILADELPHIAN ELECTRONICS LTD.
188 Broadhurst Gardens, London, N.W.6

SHORT WAVE (HULL)

G5GX

	£	s.	d.
Second-hand			
EDDYSTONE 750. Double superhet, 550-30 mcs. ...	39	0	0
EDDYSTONE 840C. Excellent condition. 550 kcs. to 30 mcs.	42	0	0
FT 241 XTALS. Channels 1-15, 17, 20-24, 67, 71, 73, 76, 77, 79. Singles of 273, 275, 276, 280, 309, 351, 352, 369, 370, 371	4	0	0

	£	s.	d.
New Equipment			
STAR SR550. 1.8 to 54 mcs., 7 bands, double conversion, product detector, Xtal Calibrator	61	19	0
EDDYSTONE EB 35. Transistorised, VHF/FM, Long, Medium and Short	59	7	6
EDDYSTONE 840C	66	0	0
EDDYSTONE 940	133	0	0
EDDYSTONE EC 10. Transistor receiver	48	0	0
EDDYSTONE EA 12. Amateur bands receiver... ..	185	0	0

	£	s.	d.
Professional type Receivers (to order only)			
EDDYSTONE 850/4. 10 kcs-600 kcs. in 6 bands. Audio filter, 2 Xtal filters, AC mains 100/125 and 200/250volts, 40/60cycles	220	0	0
EDDYSTONE 770R/11. 19-165 mcs., 20 valves, rack or table version	231	0	0
EDDYSTONE 830/7. 300 kcs-30 mcs. in 9 bands, CW/AM/SSB. Selectivity continuously variable, separate detector for SSB, Xtal filter for CW. Single conversion up to 1.5 mcs. and double above 1.5 mcs. S meter	275	0	0
EDDYSTONE 770U/11. 150-500 mcs. in 6 bands. AM/FM, Double conversion	330	0	0
EDDYSTONE 990S. Fully transistorised single conversion, AM/FM, 230-870 mcs. 12 volt DC from inbuilt AC mains or dry cells or Accumulator	345	0	0
EDDYSTONE 880/2. 400 kcs-30.5 mcs. in 30 bands. AM/CW/SSB. First Osc. is Xtal controlled. Xtal Cal., 3 Xtal filters available, IF selectivity variable	580	0	0
PANORAMIC UNITS. Eddystone	195	0	0

Carriage extra on all the above

£65 allowed on your Eddystone 888A against a new EA 12 Radio Control gear by Grundig, REP, MacGregor, O.S., etc. Models by Keil, Veron, Frog, Graupner, Ripmax, etc.

Wanted—your modern receivers, SSB gear, etc.

24a NEWLAND AVENUE, HULL

Telephone : 408953

SMALL ADVERTISEMENTS

(“SITUATIONS” AND “TRADE”)

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

VACANCY

AN Opening occurs for a young licensed amateur for interesting electronic assembly work on amateur and professional electronic and communications equipment. The work includes prototype assembly and testing. Some experience with transistor equipment would be an advantage. We also require an engineer for VHF/UHF transmitter and transistor receiver testing. Applications, which will be treated confidentially, should give full details of qualifications and experience, and addressed to:—Managing Director, Green E.C.E., Ltd., 79-91 Braemar Road, London, N.15.

TRADE

QSL Cards and Log Books, GPO approved, cheapest and best. Prompt delivery. Samples from:—Atkinson Bros., Printers, Looe, Cornwall.

GOVERNMENT Surplus Electrical and Radio Equipment. Our new catalogue No. 16 ready now, 2s. 6d. post free. Cost refunded on first purchase of goods over £2 value.—Arthur Sallis Radio Control, Ltd., 93 North Road, Brighton, Sussex.

THE UNIVERSAL Z-Match Co., Ltd., will be starting production shortly, and the new 1966 Couplers will be available soon. This coupler will match ANY Aerial to ANY Transmitter, with negligible loss. Enquiries with s.a.e. please to:—Universal Z-Match Co., Ltd., 18 Queens Road, Fareham, Hants.

VALVES: 4X150A and 2C39, used but OK, 20s. each; ECC81, ECC82, ECC83, all 3s. each, post free. Mobile Power Supplies, all 12v. input, 60-watt output rating, DC o/p voltage to your specification, £12 10s. M. & G. SSB Transceiver, 90w. p.e.p., 20-80-160m., priced at £85, s.a.e. leaflet. All types of transformers, electronic equipment, etc., manufactured to your requirements; send s.a.e. for quotation.—M. & G. Electronics, 23 Boscombe Grove, Bournemouth (37184), Hants.

ONLY £6 18s. A new-style Preselector for SWL's, giving 25 dB gain and covering 1.8 to 32 mc, with built in antenna tuner, and self-powered. This will bring your receiver to life and practically solve your aerial problems by tuning almost anything to resonance. Send s.a.e. for details.—Hamgear Electronics, 29 Carlyle Road, Norwich, Norfolk.

READERS' ADVERTISEMENTS

3d. per word, min. charge 5/-. payable with order. Add 25% for Bold Face (Heavy Type). Please write clearly, using full punctuation and recognised abbreviations. No responsibility accepted for transcription errors. Box Numbers 1/6 Extra. Replies to Box Numbers should be addressed to The Short Wave Magazine, 55 Victoria Street, London, S.W.1.

SALE: Coils for the HRO, full set with the exception of the 1.7 to 4.0 mc pack, but including bandspread for 10, 20 and 40 metres; eight coils in all; price £10.—Davies, 9 Crossfields, High Erroll, Nr. Wellington, Shropshire.

FOR SALE: R.209 receiver, with a few mods., £7. Codar PR-30X Preselector, new, £5. KW-160 Top Band AM/CW Tx, £15. Marconi heavy morse key, 40s. Auto-transformer, rated 500 watts, 40s. Sold as separate items, or The Lot for £28.—Tanner, 64 Westbrook Road, Heston, Middlesex. (Tel. HOUnslow 1016.)

SMALL ADVERTISEMENTS, READERS—*continued*

LEAVING HOME: Must find good billet for tape equipment, valves, half-built rigs, etc., etc. Many items. Call after 5.30 p.m.—Craddock, G8AGR, 11 Sanderson Road, Jesmond, Newcastle-on-Tyne, 2.

FOR SALE: Complete SSB station, including Sphinx Tx with Delta control unit, price £55. Also KW-77 Rx, at £85. All in mint condition.—G3THZ, 15 Hall Green Road, West Bromwich, Staffs.

SALE or EXCHANGE: Pye PTC 703D 4-metre base station, 25w. Tx, with grid, PA and mod. percentage metering; Rx, narrow-band IF, +/- 15 kc, with S-meter, muting, facility for remote-control operation, etc.; finish in metallic blue and chrome, 100% condition; asking £35, or EXCHANGE for good AR88D, G2DAF-type Rx; 50w. 70 cm. Tx and mod.; 70 cm. Rx, or W.H.Y.? Deliver up to 60 miles.—White, G8APG, 14 Landscape Dene, Helsby (2625), via Warrington, Lancs.

WANTED: B.44, modified or unmodified, with or without PSU. Other two-metre and four-metre gear also required. Your price paid. Full details, please.—Box No. 4317, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

EXCHANGE: A Lafayette HE-80, 14-valve receiver, incorporating S-meter, 100 kc calibrator, Q-Multiplier, takes SSB, coverage 540 kc to 30 mc, and 48 to 54 mc (6-metre band), FOR an AR88D, in perfect and unmodified condition. You to deliver and collect.—Lyons, 5 East Street, Leigh-on-Sea, Essex.

SELLING: AR88, with manual, £35. HRO Junior, with PSU, speaker, BS coils for 7, 14, 21 and 28 mc, plus 6 other coils, with manual, in good condition, £16. R.107, in new condition, with manual, £9. Lafayette 83A, with manual, £20. Preselector, internal PSU, £6. No. 15 set, PSU, in new condition, manual, £10. PCR Rx, new PSU, £8. ARR-3 complete with valves, £3. Two RF-24 and two RF-26 converters, complete with valves, £3.—Port, 11 Bournemouth, Ham Street, Nr. Ashford, Kent.

OFFERING: CR-100/8 receiver, in perfect condition, with speaker, £25. Bought brand-new in sealed box Feb. 1965. Can deliver 50 miles.—Harris, 575 King Lane, Leeds, 17 (Ring Leeds 686576.)

SALE: Heathkit Apache Tx, 10 to 80 metres, 180w. CW, 150w. phone, requires Heathkit SB-10U (or similar adaptor) for SSB, in perfect condition, £50 or near offer.—Stringer, 76 Cuckfield Road, Hurstpierpoint (3127), Sussex.

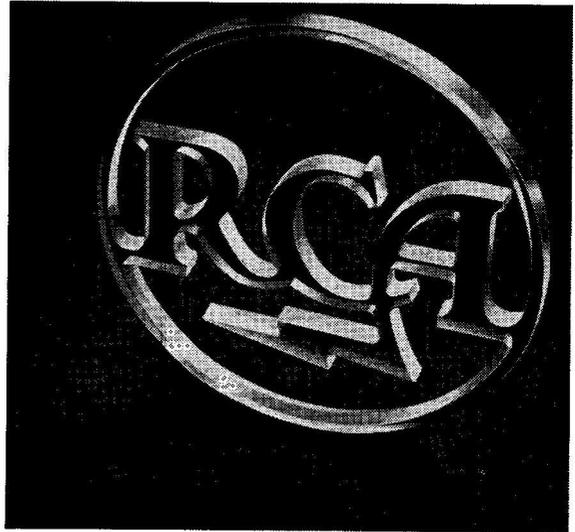
SALE or EXCHANGE: The finest two-metre station, consisting of T.W. VFO, TW2-120, special 2/xtal T.W. Converter, KW-77 and speaker (with home-constructed PSU for Tx), EXCHANGE for KW-2000 and AC/PSU, or £170. Also would EXCHANGE my Heathkit RA-1 for your RG-1. Prefer buyers inspect and collect, but could deliver and collect to 75 miles.—G3TCG, QTHR.

FOR SALE: Lafayette HA-350, with crystal calibrator and xtal, aerial tuner unit and speaker in cabinet, with headphones, manual and original carton, price £60 or near offer.—Overdale, Flat 1, Cavendish Road East, The Park, Nottingham.

WANTED: Latest type Hammarlund HQ-170A must be as new and unmodified; please send particulars when bought, etc.—Box No. 4318, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: New cabinet for AR88 receiver.
SELLING: Two cases of CR-300, enough spare parts for rebuild, £3 the lot, HRO dial and mechanism, new, £2.—Port, 11 Bournemouth, Ham Street, Nr. Ashford, Kent.

OFFERING: KW-2000A, with AC/PSU, Shure 401A mic, TH3 array, CDR AR22 rotator, with control unit, K.W. Match, K.W. LPF, and straight Morse key in brass.—Offers to: Scobie, GM3UBT, 52 Kinloss Park, Cupar, Fife.



RCA Great Britain is a subsidiary of the Radio Corporation of America. The Company's activities cover a wide field of design, development, manufacture and service of electrical and electronic equipment. It is specially noted for its work on the design and manufacture of equipments for recording and re-recording sound, for sound reinforcement systems and for the full range of products required to equip film and television studios and for cinemas and theatres. Associated with these activities is the manufacture of language laboratories. The Company's activities include the development of colour receivers and test equipment for the requirements of the various standards and systems now in existence.

The Company's capability for service ranges from major projects such as the operation and maintenance of the Ballistic Missile Early Warning System at Fylingdales down to the less complex work of cinema service. Service centres in the United Kingdom and Eire provide full geographical cover and the Company is prepared to provide service to those requiring support of any form of electrical or electronic equipment. A large force of mobile engineers is in constant operation overseas installing and maintaining various forms of communication installations.

As sole distributor in the United Kingdom of RCA products the Company is able to supply advanced types of semiconductors, integrated circuits, valves, tubes and capital electronic equipment including video tape recorders, colour and monochrome cameras, broadcast and television transmitters, mobile television units and any other item from the catalogue of the Parent Company.

All enquiries for products or service should be addressed to RCA Great Britain Limited, Lincoln Way, Windmill Road, Sunbury-on-Thames, Middlesex.



The Most Trusted Name in Electronics

RCA GREAT BRITAIN LIMITED, Sales Division,
Lincoln Way, Windmill Road, Sunbury-on-Thames
Telephone: Sunbury 5511

ASSOCIATE COMPANY OF RADIO CORPORATION OF AMERICA.

GEORGE FRANCIS G3TWW

VKS KR6 JA LU VKS HL ZS6
 W6 VK4 VE VS6
 VK7 W1 DU YS PY VS9
 ZP 9VI ZL KH6 CR6 KL7

These and many more can be worked if you use KW equipment

FULL KW RANGE IN STOCK

Station can be seen working using KW equipment at home QTH

Semi Automatic Bug Keys, £4/10/-; Morse Keys, 5/-; Panel Meters, 50 μ A, 32/6; 100 μ A, 29/6; 500 μ A, 25/-; MA's Rangers, all 22/6; TK500, £7/17/6; Pocket Test Meters, PT34, 39/6; 6146, 41/-; 6146B, 50/-; 572B, £7/10/-; Resistance Sub Box, 24/3; Cap. Box, 35/-; Shure 444, £9/10/-; Lapel Mics, 10/-; Hand Mics, 15/-; wick press switch 19/11; BM3, 35/-; 100C, 36/3; MC70, 50/-; ACS45, 26/-; M18, £4/14/6; MM71, 15/-; CM70, 33/9; DF12, £4/14/6; DF3, 75/-; DF12, £6; Floor stands and table stand available. Solder Solder Irons—£15, 26/-; £25, 27/4; Solder £d., 2/6; 3/6; 100ft. pvc Wire, solid and stranded, 3/6; 75ft. pvc Slinging, 3/9. Printed Circuit Board, 1 1/2" x 3 1/2" and 5 1/2" x 8 1/2", 2/- each. Bakelite Sheets, 6" x 4", 10d.; 8" x 6", 1/5; 10" x 7", 2/-; 12" x 8", 3/-; Veraboard, 2 1/2" x 5 1/2", 3/7; American Coax Plugs—PL259, PTFE, 7/6; Sockets, 8/-; Instrument Knobs, 3" 1/6; 1 1/2", 2/-; 1 1/4", 2/7; 2 1/2", 4/5; Pointer Knobs, 1 1/2", 1/3; 1 1/4", 1/6; Round Knobs 3", 9d.; 1 1/2", 1d.; 1 1/4", 1/-; Mains Neons, 3/9; Signal Lampholders, 2/-; EGG Insulators, 6d. Transistors AF117, 6/6; AF114, 6/9; OC45, 4/6; OC71 and 82, 4/2; 10C81D + 2 + OC81, 9/9; Coax Cables, 300 Ω , 6d. yd.; 72 Ω , 7d. yd.; Low loss, 1/10; 52 Ω , 1/1 per yd. Low loss 2/1 per yd.

Agent for KW, TW, JXK, FIF Mobile Whips, Eddystone, etc.

No order too small. Part Exchanges. Goods despatched return of post.

93 Balderton Gate, Newark, Notts.

Tel. Newark 4733. After 6 p.m. 2578.

SMALL ADVERTISEMENTS, READERS—continued

FOR SALE: Wavemeter Type 1665, cavity tuning, 1350 to 2900 mc, with micrometer control of direct calibration, 100 microamp meter, CV101 detector, case marked but instrument in mint condition, £5. Wavemeter Type BC-609D, coaxial, coverage 145 to 235 mc, with 100 microamp meter, valve detector, DC amplifier and calibration charts, £3. Slotted line Test Set 56A/AP, with transit case and instructions, in first-class condition, £40. Slotted line CPR/62 ABD, Rectifier Unit CPR/50 ABY, for 110v, with cables, spares and transit case, in mint condition, £5. Power Meter TS 70/AP, 200 to 700 mc, with spares, instructions and transit case, £25 UHF Signal Generator. Type CYK/60 ACE, LAD TS/14/AP, coverage 3200 to 3270 mc, in excellent condition, £12. Echo Box TS 61/AP, for S-band, tuned or untuned, with diode detector and meter, dipole, cables and transit case (damaged), instrument OK, £4. New RT37/PPN2 beacon Tx/Rx, range 214-234 mc. 8-13 watts, with internal PSU, valves 1R5, 5X3A5, 3X1S5, and instruction book, 50s. Canadian 58 Set, complete with PSU and spares, £5. German Tx, 27.2 to 33.4 mc. with single-control tuning, 12v. heaters, internal mod, and MCW, £4. Midget Rx, 5 1/2in. by 5 1/2in. by 12in., coverage 5 to 18 mc. 7/1.4v. valves. case unpainted; Tx to match. CC. with 832 PA and 6v. heaters, £10 the pair. R.C.A. ET-4336 xtal multiplier unit M19468, less valve and meter, 20s. R.C.A. ET-4336 master oscillator unit M19467A, less valve, 20s. R.1132A receiver, 50s. Absorption wavemeter Type W.6103, neon indication, tuning 1.5 to 9.0 mc, 15s. McMurdo-Silver Micro-Match, 70 to 300 ohms, for SWR power and impedance measurements, £5. ASB8 RF section, with 446A valve, modified for 70 cm., 25s. Pan-Adaptor, BC-1031C, suit 465 kc IF receiver, in mint condition, £20. Wavemeter Type W.1185A, coverage 20 to 100 mc. 230v., with xtal calibrator and charts, £4. R.1294 UHF receiver, 500 to 3000 mc, with 230v. PSU, requires attention, £4. UHF Pulse Power Meter, Type TS 226/AP, 110v. input, peak power 10 watts to 1 kW, 40s. Please add extra for postage; s.a.e. for enquiries, list of valves, etc.—Hobbs, G3JQN, 111 Kilmartin Avenue, Norbury, London, S.W.16. (Tel. POLlards 1764.)

STILL LISTING Gear for Sale. G3TZL and G3CUTH apologise for delays. 813's 40s.; 250TH, £6; TZ40's, 25s.; many other Tx and Rx valves; also condensers, resistors and crystals. One each of the following: Tiger TR-100, 150w. AM/CW, 1961 model, best offer over £60; Tiger CW Tx, 60 watts CW only, best offer £35; Olympic T-50X, 100w. AM/CW, best offer over £55; Marconi Type 52 Tx, 350w. AM/CW/MCW, best offer £8. BC-312N, requires a little attention, £15. Full details any item on request; also various odd units, PSU's, etc.: please send s.a.e. for full lists.—Bowen, G3TZL, 18 Queens Road, Fareham, Hants.

WANTED: RTTY, Creed 3X, 7B or similar T.U. and PSU, appearance immaterial, must be cheap, and work FB. Collect up to 60 miles.—Coates, 23 Pinewood Avenue, Brookhouse, Lancaster.

SALE: Frequency Meter Type LM-13, with matching mains PSU, and calibration/instruction book, £16 10s. Maintenance manual for all LM type Freq. Meters, 30s.—G3JFC, QTHR.

SALE: Home-built version of the K.W. Valiant Tx, 30 to 80 metres, with built in low-pass filter, price £12, or will EXCHANGE for Codar A.T.5 transmitter.—Lock, GW3GNL, Craiglea, Pontrials Close, Colverhouse Cross, Cardiff, South Wales.

AMATEUR Selling up. Send s.a.e. for list.—AG3SDI, QTHR.

FOR SALE: Six-over-Six two-metre J-Beam, £3 10s. PSU rated 1000v. 500 mA, £5. Tx for 160m., 2/6AQ5 mod. with Woden UM ϕ xformer, TT11 PA, with 2/EZ81 PSU, in TU5 crackle-finish case with silver hammer panel, price £12.—G3PJK, QTHR. (Tel. MID 2631).

QUARTZ CRYSTAL UNITS

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

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

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

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

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

PROFESSIONALLY MADE FOR THE AMATEUR

Other frequencies available on request. Send cash with order stating your exact requirements.

These crystals are made to your order and are not Government surplus stock.

CATHODEON CRYSTALS LTD. Linton, Cambridge

SMALL ADVERTISEMENTS, READERS—continued

FOR SALE: Eddystone 840C receiver, as new and in mint condition, £32. Marconi 52 Set, with PSU, £8. R.1155 Rx, with PSU, perfect, £6.—Purbrick, 1 Cobham Street, Gravesend, Kent.

SALE: R.C.A. AR77 receiver, needs o/p xformer, but can be heard working, £6. Heathkit GDO with eight coils, £7 10s. Jason wobblator with built-in 'scope, £12 10s. Advance Audio Signal Generator, Model HI, £15. Two pairs QCC B7G 460 kc IF filter crystals, bandwidth 2.5 kc, brand new, £5 10s. R.1132 receiver, with built in PSU, £4. AVO-8 Testmeter, £12. Seven Electronics IFT's and BFO Coil, 460 kc, 50s. Callers welcome, but please phone first.—Loveland, 34 Crockford Park Road, Addlestone, Surrey. (Ring Weybridge 47556, day; or 47669, evening.)

FOR SALE: Eddystone EA-12 receiver, 16 months old, complete with manual and plinth/speaker unit, little used and absolutely as brand new, £145.—Davies, Arden, Maes-y-Bryn, Ruddlan, Flintshire, North Wales.

OFFERS for 4ft. cabinet containing Racal SA-18 Spectrum Analyser, Backward-Wave Oscillator for 2100 to 3800 mc, with PSU, on three rack-mounting chassis.—Spence, Physics Dept., The University, Newcastle-on-Tyne.

SALE: LP Filter, Type 12, 20s. R.1475 Rx, less valves and needs ATU, £2. Aerial position indicator, 115v. 50 c/s Selsyn, 360-deg. 6in. dial, 20s. Rack mounting 6in. home-made 'scope, 8 modern valves, with circuit but no PSU, 30s. Valves: 813, 20s.; 2C39A, 30s.; pair 15E UHF triodes, 20s.; pair 8011 UHF triodes, 20s.; 832 with holder, 10s. Transformers: R.C.A. 5000v. CT, 400 mA, £5. T.1154 xomner, 2400v. 200 mA, 30s.; 1160v. 100 mA + 6.3v. + 5v., 15s.; Parmeko 315v. + 6.3v. + 5v., with choke, 15s.; Woden swinging choke 5/25 Hy 250 mA, 15s. Woden choke 20 Hy 150 mA, 12s. 6d. RF-26 Unit, less dial, but does work, 10s. Meters, 3½in. FR: 100 microamp., 100 mA, 250 mA, 60-0-60 mA, 10s. each; 0-1 mA, 5in. by 4½in., 20s.; Blower 24v., 10s. Mains blower, 20s. Five-watt amplifier, £3. Range Calibrator Type 4807, with 20 valves, klystron, 3 cm. horn and mains PSU, £5. Punch head for Creed 45 Perferator, 20s. Rotary converter, 24v. in, 115v. 400 c/s 7.5 amps. out, £2. Coax aerial relay, 10s. Six new relays, 20s. the lot. R.1147B VHF Rx, 7 valves, 30s. Scrap R.1155 receiver, 30s. Any offers for any item, and all post free.—Spence, 16 Firwood Crescent, High Spen, Rowlands Gill, Co. Durham.

SELLING: A T.W. Mobile Rx, as new, for £15.—32 Elliott Road, Chiswick (6976), London. W.4.

URGENTLY WANTED: An R.C.A. AR77E, must be in mint condition. Top cash price paid. Letters only.—Brookes, 29 Baldwyn's Park, Bexley, Kent.

SALE: Hallicrafters SX-101A, with R.47 speaker, 230-115v. transformer, all in mint condition, £110. Labgear LG.50 Tx, 807 PA, clamper faulty; also Class-D Wavemeter, 6v. AC, like new, £25.—Mrs. Helen Aird, 24 Academy Street, Alloa, Scotland. (Gear being moved into Northants mid-July.)

MUST SELL by Mid-July: AR88D, recently overhauled, £38. VHF array comprising 8-ele two-metre and 3-ele four-metre beams, with CDR rotator and control unit, 100ft. coax (x2) and rotator lead, two 9ft. x 1½in. mast sections, £25. Pair nine-transistor walkie-talkies, 28.5 mc, £15. G. & D. two-metre converter, 4 to 6 mc IF, £7 10s. Pye 4-metre Tx, 6L6 modulator and new PA valve, £9. Free delivery 100 miles radius London.—Harris, 107 Cozens Road, Ware (3532), Herts.

SELLING: A rebuilt, modified CR-100 Rx, with relay controlled variable muting, S-meter, new and realigned coil pack, including speaker, and in excellent condition. Price £18, no offers.—Farkasch, 6 Hall Farm Road, Benfleet, Essex. (Tel. South Benfleet 3705.)

THE ONE-SIXTY TWIN TRANSMITTER



E.5140 £15. 15. 0. 1.8-2.0 Mc/s 10 watts.

HIGH LEVEL MODULATION FOR "PUNCH"—SWITCHED NETTING—FIRST CLASS C.W.—ILLUMINATED DIAL WITH BIG, EASY TO READ FIGURES FOR MOBILE SAFETY.

Possesses every feature required for both mobile and base station use—NOT a compromise.

Instantly transferrable from car to home with plug and socket connection to either model E.5141 12v. D.C. Power Unit or model E.5142 A.C. Mains Power Unit.

NO CONTROL UNIT TO BE BOUGHT AS AN EXTRA—ALL RELAYS BUILT IN, including aerial change over and receiver muting.

- | | |
|-----------------------------|----------------|
| A.C. POWER UNIT E.5142 | PRICE £7. 7. 0 |
| 12v. D.C. POWER UNIT E.5141 | PRICE £8. 0. 0 |
| SPEECH COMPRESSOR E.5143 | PRICE £5. 0. 0 |
| MOBILE CONVERTER E.5144 | PRICE £5. 5. 0 |

LABGEAR LIMITED

CROMWELL ROAD, CAMBRIDGE
Tel. 47301 (4 lines) STD code OCA3



Smooth operators use a JOYSTICK antenna!

Get with it! Send for the new brochure and a stack of testimonials

Fartridge Electronics Ltd.
Caister House
Prospect Road
Broadstairs, Kent

NAME

CALL SIGN

ADDRESS

SW7

S.S.B. PRODUCTS DERBY

"SPHINX" TX. S.S.B./A.M./C.W. 160M, 80M (40M), 20M. 70 watts P.E.P. Built-in PWR Unit. Handbuilt. Most reliable, £78. Unbeatable value.

"CANNON-BALL" TX. S.S.B./A.M./C.W. 160M. Only 8" x 6" x 6". 260v. H.T. 100 M./A. 6v. or 12v. models. (80M version available), £28/10/-. Range at least 500 Mls.

"DELTA" control unit. Co-ax c/o. plus 2 sep. c/o. contacts and make pair with press to talk button. A.C. mains 1/P, £7/5/-.

"NAPOLEON" S.W.R. bridge. 160M to 10M. 72-80 ohm. Small, robust. 800W to 10W sensitivity control. Only £5/5/-.

"SILPLUG" replaces 5 volt Rects. in Rx's and TX's. 500v. one, 39/6. 750v. one, 49/6 plus 1/- P. & P. Reduces heat and drift. They fit 888A, etc., etc.

"PYRAMID" Linear. Parts. 600-0-600v. 1 amp. impregnated trans., 10 gns. plus 10/- carr. Fils. trans. 6v. 12 amp., £3/5/-, 6HF5 tubes, 31/6 each. Bases 4/- each. Cabinets 95/- each, etc.

"SCARAB" Filter Kit. All parts inc. Carrier Xtal—436-1 kc/s. 250-3,500 c.p.s. S.B. suppression on speech 35 dBs., £6/19/6. Ready made and aligned, £8/7/6.

"HA350" Receivers. 160-10M., 80 gns. (Conversion professionally done. Internal), 80-10M, 75 gns. 100 kc/s. calibrator, 35/-, Speaker, 55/- plus P. & P.

"BUG" KEY. Very robust and adjustable, 85/- plus 3/6. P. & P. Best type available.

"KEYER" Automatic transistorised. Many other facilities, £16/10/- plus 5/- P. & P. Beautifully made.

"BRAND NEW" British 6146 valves, only 30/- each, 1/- P. & P.

DYNAMIC "MIC's" 99/- ea. BM3 MIC's, 37/6 ea., 3/- P. & P.

"RECONDITIONED" RX's and TX's in stock. 888A mint. 750, CR100, AR88's, SX73, RX80, etc., etc. Sphinx TX's and Valiant.

CLOSED DOWN JULY 2/16th HOLIDAYS

"S.A.E. WITH ALL ENQUIRIES PLEASE!"

PLEASE add postage or carriage!

7A EDWARD STREET DERBY
4 2 9 9

STEPHENS-JAMES LTD.

Your North Western Agents for KW Electronics, Codar, Joystick

Part exchanges. H.P. terms arranged on all orders over £30.

Latest models—Eagle and Lafayette in stock.

KW2000 and A.C. P.s.u., £205. KW Vespa and P.s.u., £135
KW600 Linear, £115. KW Vanguard 160-10, £73/10/-
KW SWR Bridge, £8/10/-, KW Balun, 35/-

CODAR Equipment		"JOYSTICK" Distributors		Full range of Joystick antennas and tuning units. Trade supplied. £ s. d.
£	s. d.	£	s. d.	
AT5 Transmitter ...	16 10 0	Morse Keys ...	6 0	
AT5 A.C. P.s.u. ...	8 10 0	Semi-automatic bug		
AT5 D.C. P.s.u. ...	11 5 0	Keys ...	4 12 6	
Mobile Control Unit	2 7 6	Lapel Mics ...	10 0	
PR30 Preselector ...	5 10 0	CM52 Crystal Mics	1 0 0	
PR30X Self powered	7 4 0	with PTT switch	4 5 0	
RQ10"Q" Multiplier	6 15 0	Shure 201 Mics ...	4 5 0	
RQ10X Self powered	8 8 0	Egg insulators ...	6	
T28 Mobile Receiver	15 10 0			

NATIONAL and EDDYSTONE equipment supplied

Latest FR-100B Sommerkamp Sidebander Receiver. Full 500 Kc. coverage all bands, 80-10 metres. Two mechanical filters, one crystal filter, £110.

FL-100 Sommerkamp Transmitter SSB/AM/CW 120 watts PEP. Complete with internal P.s.u. Matching unit with FR-100 receiver can be used as a transceiver, £130.

HA350 Dual Conversion 80-10 metres, 75 gns. Matching speaker, 55/-, SR600 Triple Conversion Receiver, 95 gns. HA55 Aircraft Receiver, £19/7/6, KT340 Receiver Kit, 25 gns. Lafayette Grid Dip Meter, £12/12/6.

Eddystone EC10, mint condition, £38. Creed 7B Teleprinter with P.s.u., £17/10/-, B46 Receiver, £8. CR45, £7. Heathkit GDO, £8. KW Vanguard 80-10, £40. National NC121 Receiver, £45. Latest G3FIF Mk. 2 Mobile Whips. New design. Fibre glass whip section. Colours to match your car, 7 gns. Extra coils available all bands, £4.

Postage or carriage extra, S.A.E. enquiries please:

70 PRIORY ROAD, ANFIELD, LIVERPOOL 4 (ANField 3141)

SMALL ADVERTISEMENTS, READERS—continued

SALE: J-Beam array, consisting of 8-ele Yagi for two metres, varnished, 40s. Digital clock, 12-hour type, £3. A.2599, 20s. All carriage paid.—Denman, G3MEW, 17 Testcombe Road, Alverstoke, Gosport, Hants.

OFFERING: Modified R.107 Rx, with S-meter, ECL80 output stage, Q-multiplier, external 3-ohm speaker, etc., £9 10s. Carriage arranged.—Ballard, G3UTT, 27 Taylor Street, Southborough, Kent.

SALE OR EXCHANGE: Amateur-bands only receivers, SR-550 double conversion, with product detector and crystal calibrator; also a Heathkit RA-1, both brand new; either to be sold or EXCHANGED for an R.C.A. AR88D in mint condition, with cash adjustment.—Watton, 39 Oakdale Drive, Wrosee, Shipley, Yorkshire.

SALE: AR88D in mint condition, £34. G2DAF-type Mk. I Tx, 180w. p.e.p., nice appearance, SSB section OK, RF side needs realignment, with PSU, £30. KW-76 mobile Rx, with mains PSU, £25. G. & D. Mk. III two-metre converter, 28 to 30 mc IF, 12v. heaters, £5. T.W. Topmobile 160m. Rx, £12. PSU giving 1250v. 250 mA, with 600v. stabilised o/p, suitable for 813 PA, £4. All items "or near offer."—Gibbs, G3OZH, 29 The Vineyard, Welwyn Garden City, Herts.

FOR SALE: KW-77 receiver, serial No. 164, in perfect condition; best offer over £70 will be accepted; purchaser must collect.—Heys, G3BDQ, 418 The Ridge, St. Leonards-on-Sea, Sussex.

WANTED: 70 cm. Tx, Rx, Ae system and data, also any ideas for mobile.—Jarvis, G8APX, Valley Farm, Witlesham, Ipswich, Suffolk.

SELLING: K.W. Vanguard Tx, 10 to 80m. coverage, with special Gelson xtal mixer VFO, price £50. K.W. 75-ohm low-pass filter, 40s. B.44 Mk. II, with mic. and plugs, £5. Mic. 45, 20s. Bandspread coils for HRO, 10, 20, 40 and 80m., £12 the set. Prefer buyers collect.—Jones, GW3TMP, 3 Bryn Cld. Leeswood, Mold, Flintshire.

WANTED: VCR-516A, 09J, CV-1596 CRT; QQQ06-40A. SALE: QY3-125, 6146, new CM30 Jap mic., Gelson xtal mic.—G3AAJ, QTHR. (Tel. WANstead 6741).

WANTED: Transformer, 230v. in, 1250-0-1250v. at 500 mA out. Price and size, please; all letters answered.—Spencer, G3UOD, 24 Rising Brook, Stafford.

SALE: Transmitter, AM/CW 100w., Gelson 4/102 into TT21 PA, Chinese-copy of Vanguard, with separate modulator and PSU's, price £20, s.a.e. for full details.—Hayes, G3JBU, 31 Beverley Crescent, Northampton.

SELLING: Excellent HRO-MX, with mains PSU, matching speaker, three coils covering 160m., 80m. BS, 20m., 15m., 10m. BS, only £20, delivered free 50 miles. Also 30ft. aerial mast in 3ft. sections, with 14ft. whip end, 50s., buyer collects.—Knights, G3TQY, Ashar, Cross Road, Tadworth (3247), Surrey. (Ring after 7.0 p.m.)

WANTED: Following items, R.1475, BC-348, CR-100/B.28, and Oscilloscope, all in good condition and working order.—Baldwinson, 33 Cherry Close, Tulse Hill Estate, London, S.W.2.

SALE: In good working order, R.1155 with Air Min. type PSU, price £8 or near offer; buyer collects.—Howe, 24 Edith Avenue, Fordham (397), Cambs.

EXCHANGE: For Pentax, Edixa or similar class SLR (with FAD), a rare Siemens professional receiver, in nickel-plated construction, coverage 1.5 to 30 mc continuously by seven-band turret tuner, imported originally at cost of £400. Inspect first.—Rowbottom, 29 Legion Street, South Milford, Nr. Leeds, Yorkshire.

SALE: Hammarlund HQ-170A receiver, eighteen months old but as new, price £95. Prefer buyer tests and collects.—Kavanagh, 27 Sandringham Road, Swindon (6885), Wilts. (Ring evenings.)

SMALL ADVERTISEMENTS, READERS—continued

WE CANNOT Take Camera or other non-Radio advertisements without a clear description of the apparatus and an offer for Exchange with radio equipment. Insertions in this space are strictly "radio interest only."—Advertisement Dept., Short Wave Magazine, Ltd.

GOING TRANSCEIVER: Selling an HRO Rx, giving Top Band to 15m. coverage, front-ended with B7G types, including product detector, bandspread coils for 15-20-80m., and PSU; a BC-3480, internal 85 kc second IF and separate PSU; both these receivers look a bit rough but work well, a fair price at £10 each; you inspect and collect. AVO-8 Testmeter, good condition, £10. Advance Type 62 Signal Generator, coverage 150 kc to 220 mc on fundamentals, in excellent condition, cost £38, accept £11. Modulation xformers, 100w. 1.7:1, also similar 150w., both potted, neat 7s. 6d. each. Grundig condenser mic. GCM3, 6 gns. new, for 30s. New AUY10, 15s. And now a 20-metre Sideband Tx, with 8 mc half-lattice filter, pair 813's in ABI, with LV/PSU built in, works FB; take it away for £7 10s. Open to offers on all items.—Atkins, G3HQG, 1 Quarry Vale Grove, Sheffield 12 (398882), Yorkshire (King after July 3.)

WANTED: A first-class Communications Rx, also an SSB Transmitter; would consider Transceiver. Other items required include Frequency Meter, Absorption Wavemeter, and Post Office type heavy-duty Morse key. Have FOR SALE some Hi-Fi equipment.—36 Hart Road, Byfleet, Surrey.

SALE: Top Band 3F1F type whip, slightly damaged, used three months, price £3 10s. A.T.5 Tx mains PSU, with relay switching, £5. Twelve-inch 15w. speaker, 40s. Two-metre aerial, as in "Short Wave Magazine" for Oct. '64, professionally constructed, 40s. Unused Jap bug key, 50s. HRO dial, 10s. Coils for HRO Rx, coverage 50 kc to 30 mc inclusive, £6. HRO chassis and front panel, with all brackets, 50s. HRO cabinet, 15s. Rotary transformer, 12v. input, 490v. 65 mA output, 15s. Rotary turret type coil pack, coverage 1.5 to 30 mc, 40s. Two brand-new Woden UMI mod. xformers, 50s. All "or near offer." Also other items in general shack clearance.—Cowdery, G3UKB, 275 Church Road, Hayes, Middlesex.

SELLING: Heathkit RA-1 receiver, little used and in as-new condition, £33; will deliver around 30 miles. Also a G. & D. two-metre converter, self contained, £5 or near offer.—Clarke, 162 Redhouse Lane, Aldridge, Walsall, Staffs.

FOR SALE: C.52 receiver, coverage 1.75 to 16 mc, in beautiful condition, with xtal calibrator, mains PSU, spare set of valves, and headphones. Price £10 or near offer. Ring Millward, Sevenoaks 55540.

SALE: BC-348R receiver, very sensitive and in good condition, coverage 1.5 to 18 mc in five bands, with internal PSU, £12. Also a Panda Cub Tx, good, £25. Buyers to collect, or would deliver locally.—Fletcher, G3TVM, 10 Cedar Walk, Bottis-ham, Cambs.

WANTED: An Eddystone 680X Receiver.—Webb, 89 Berridge Road, Sheerness, Kent.

IN VERY Good Condition, a National NCX-3 Transceiver, with spare valves, delivered to 50 miles, price £100.—G3LBA, QTHR (or ring Cobham 2623).

SALE: Three Band I/III tuner units, £4 each. Three 460 kc IF amplifier units, 40s. each. Three-watt 40m. Tx, £20. Two-watt Tx for 70 mc, £15. Portable UHF Rx, 470-850 mc, £25; all foregoing fully transistorised and brand new. Also, in excellent condition, a Heathkit DX-40U Tx, £25; Eddy-stone 770R receiver, £100; VCR 70 to 150 mc receiver, £65; Marconi Type TF-791 Deviation Meter, coverage 10 to 150 mc, £30; Heathkit AF Wattmeter, £20; AF Signal Generator, £30; Heathkit VF-1U VFO, £15. Also dozens of boxed valves, fundamental and overtone crystals; send s.a.e. for list and enquiries.—Box No. 4319, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

G. W. M. RADIO LTD.

"SOLO" instant heat Low Voltage Soldering Tool. Trigger fed magazine for resin cored solder. Fitted in metal box with transformer for 110 volts A.C., spare parts and solder. Supplied with dropper unit for 230 volts A.C. operation, 14/- post paid, or less dropper, 8/-, post paid. May also be disconnected from transformer and used direct from 6 volt battery.

FIELD TELEPHONES, type "L", new in original packing, 50/-, post paid, or in good used condition, 40/-, post paid.

ORIGINAL DRY BATTERIES for 38 and 18 Walkie-Talkie sets, recent manufacture, 7/6, post 3/6 any number.

AVOMETERS, Model 48A with High Voltage and High Current shunts in fitted case, £14, carriage paid. Model "D" or 47A, £12, post paid. All overhauled and complete with Test Certificate.

PLIERS. Universal 8", Linesmans 7" and 8", Loop forming Round Nose 6" and Side Cutters 6", all new surplus, 4/6, post 1/6 or 50/-dozen, post paid.

CAR AMMETERS, 30 amps. Charge/discharge, 1 1/2" dia., 10/-, post paid.

METERS, 100 ma. 3" round, 10/-, post paid.

COSSOR GANGING OSCILLATOR, £7/10/-, carriage paid.

CANADIAN MARCONI 52 RECEIVERS. 1.75 to 16 mc/s. New condition. Less outer case, £10/10/- or with ZE12 power unit for 230/115 volts A.C. and connecting cable, £13/10/-, both carriage paid.

10 watt MODULATION TRANSFORMERS suit pair 6V6 5000 ohms to 2500 ohms, 12/6, post paid. Ceramic insulated 3 gang Variables, 56 x 56 x 35 PF. 3/6, post 1/6.

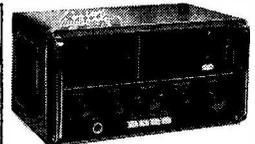
CLASS "D" WAVEMETERS, £3 5s., carriage paid.

WHIP AERIALS. Eight 4ft. sections and heavy base. Will make up to 24ft. max. 35/-, carriage paid.

All equipment offered is complete but not tested unless otherwise stated. Carriage charges quoted are for England and Wales only. Telephone Worthing 9097. Terms: Cash with order. Early closing Wednesday.

40-42 PORTLAND RD., WORTHING, SUSSEX

IMHOFS FOR EDDYSTONE



VISIT THE EDDYSTONE DEPARTMENT AT IMHOFS
SEE, HEAR AND COMPARE ALL MODELS WORKING SIDE BY SIDE ON PERMANENT DEMONSTRATION
SAME DAY DESPATCH TO ANY PART OF THE WORLD
FREE DELIVERY IN THE U.K.
GUARANTEED AFTER SALES SERVICE
SEND TODAY FOR FULL DETAILS

See it now at Imhofs the Eddystone EC10 transistorised receiver for communications work. £48 come to Imhofs for other Eddystone receivers, including
EB.35 EA.12
£59.7.6 £185
840.C 940
£66.0.0 £133
—also Eddystone die-cast instrument boxes and slow motion dials. All items can be sent abroad, tax free, under our personal and direct trouble - free export schemes.

IMHOFS

main Eddystone retail distributors for London area

Alfred Imhof Ltd. Dept. 11/7, 112/116 New Oxford Street, London, W.C.1. MUS. 7878.

MORE TITLES AVAILABLE FROM STOCK

AMATEUR RADIO ANTENNA HANDBOOK. 157 pages (by H. D. Hooton, W6YTH)	24/-
AMATEUR RADIO (by F. G. Rayer, G3OGR)	31/6
BEGINNER'S GUIDE TO RADIO (Newnes)	9/-
BEGINNER'S GUIDE TO COLOUR TELEVISION (Newnes)	15/8
BEGINNER'S GUIDE TO ELECTRONICS	15/6
DICTIONARY OF ELECTRONICS (Penguin Books)	8/-
ELECTRICAL HOBBIES (Collins)	5/6
ELEMENTS OF RADIO ENGINEERING (Cleaver-Hume)	15/10
HAM ANTENNA CONSTRUCTION PROJECTS. 157 pages (Sams)	24/-
HANDBOOK OF HAM RADIO CIRCUITS (by W9CGA)	24/-
INTRODUCTION TO VALVES (Iliffe's)	9/4
RADIO ASTRONOMY FOR AMATEURS. 220 pages (by Frank Hyde)	26/6
REMOTE CONTROL BY RADIO (Phillips)	10/9
RADIO & ELECTRONIC HOBBIES (by F. C. Judd, G2BCX)	22/-
SHOP & SHACK SHORTCUTS (by W6TNS)	32/-
SHORT WAVE AMATEUR RADIO (by PA0HH, Phillips Technical Library)	22/-
TECHNICAL TOPICS FOR THE RADIO AMATEUR (R.S.G.B.)	10/8

SHORT WAVE MAGAZINE

55 VICTORIA STREET : LONDON, S.W.1
PUBLICATIONS DEPARTMENT

SMALL ADVERTISEMENTS, READERS—continued

SELLING: An immaculate Hammarlund HQ-170, covering all amateur bands Top to 6 metres, hardly used and a fine Sideband receiver, serviced by K.W. Electronics, complete with manual and in original packaging, price £70, carriage paid.—Box No. 4327, Short Wave Magazine Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: Top Band Command Rx, 12-volt, ready for mobile, £7. B.44 Mk. II, with xtal, microphone and manual, £7. Mobile transistor PSU, 12v. input, £3. Mobile 80m. Command Rx, 12-volt, with BFO, NL and AF/RF gains, £5. Johnson roller coaster Tx coil, new, 25s. Dynamotor, 12-volt, 17s. 6d. HRO 80m. coil, new, 32s. 6d. Hallicrafters HT-7 Crystal Calibrator, with manual, £5. Hallicrafters S-meter, 30s. AR88D mains transformer, new, 45s. Type TS-34/AP Oscilloscope in case, with spare tube, cables and manual, £15. Command Rx, 234 mc, 20s. Beam rotator unit with selsyn, new, £4. Wheatstone Bridge, 40s. Beam compass, 25s. New and boxed 52 Set PSU, £4. Various other items, including two-metre and four-metre fixed and mobile equipment, s.a.e. enquiries. Postage extra all items.—Box No. 4320, Short Wave Magazine Ltd., 55 Victoria Street, London, S.W.1.

WANTED: For two metres, Pye Reporter PTC-117 (high band), or other similar radiophone equipment, including base stations, etc. Number required by local amateurs, but will buy in singles. Details and price.—Mallows, GW3TSM, 8 Channel View, Sketty Park, Swansea, Glam., South Wales. (Ring OSWS 24100.)

IMPECUNIOUS Undergraduate Needs The Cash! Selling a nice Gelo G.207DR double conversion Rx, in very good condition, coverage 10 to 160m., offered at £28 or near offer.—Fox, 124 Bladindon Drive, Bexley, Kent. (Ring Bexleyheath 7946, evenings.)

FOR SALE: Due to Going Abroad, a National HRO -5T receiver in perfect condition, with nine general-coverage coils and its PSU, £25. Crystal-controlled 40m. 20-watt Tx, with PSU, ideal for a beginner, £4 complete. New Magnavox Type 363 Tape Deck, cost 10 gns., accept 8 gns.; amplifier to match, 30s.—Hanley, G3VAC, 81 New Road, Chilworth, Guildford, Surrey.

SELLING: In new condition, KW-2000 with Labgear transistorised speech compressor adapted to suit and Shure ceramic press-talk stick microphone, £165. KW-600 Linear Amplifier, new condition, £90. Hallicrafters SX-28 receiver, realigned as handbook, with new p/p output xformer, £15. Mosley wire tri-band dipole, 40s. Buyers collect.—Tucker, G3FTA, 4 St. Margarets Road, St. Leonards-on-Sea, Sussex.

SALE: Commercially built HE-30, in mint condition, covering 160m. to ten metres, with bandspread, and including manual, price £18, carriage extra.—Moore, 15 Waverley Gardens, Melksham, Wiltshire.

WANTED: GDO and 430 mc gear. **SELLING:** An R.E.E. 144 mc tunable Rx/Tx, with mic., Halo aerial, and PSU, only needs 12 mc xtal, £25, post paid.—Box No. 4321, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

MASSIVE CLEARANCE at Lowest Prices! Buyers to collect, a Hallicrafters SX-28 at £15; an R.A.C. AR77, £12; Eddystone S.640 Rx, £9; also a Model 7 Avometer, a VFO, relays, transformers, variable condensers, electrolytics, crystals, meters, selsyn units, valves and many other etceteras, listed for an s.a.e.—St. Leger, G3VDL, Warmbrook House, Long Walk, Chalfont St. Giles, Bucks.

FOR SALE: Genuine late-model K.W. Gelo Con-verter, 10 to 80 metres, in perfect condition, £12. Hallicrafters S-20R, a "Sky Champion" in good and unmodified condition, £8. Eddystone S.640 receiver, unmodified, in good condition, £12. Carriage extra all items.—Schofield, 19 Kendal Avenue, Stratford-on-Avon, Warwickshire.

SMALL ADVERTISEMENTS, READERS—continued

SALE: Fixed or Mobile station for two metres, comprising Hamobile Tx/Rx with interchangeable mains PSU and 12v. battery converter, complete with circuitry and constructional details, free delivery, price £20 or near offer.—Box No. 4322, Short Wave Magazine Ltd., 55 Victoria Street, London, S.W.1.

SELLING: G.E.C. BRT-402E, with chassis cover and manual, £60, buyer collects or add carriage. Would EXCHANGE for a very good AR88D, with cash adjustment.—Hattersley, Hill Top, Galley Lane, Holyoorside, Chesterfield (6040), Derbyshire. (Ring 6 to 8.30 p.m.)

SALE: Minimitter MR-44/II receiver, little used, price £35.—Bance, 126 White Hart Lane, London, N.17. (Tel: TOTTENHAM 3951.)

BARGAIN: Modified with S-meter, noise limiter, spare valves and handbook, a CR-100 at £10. Hear and collect, or deliver Southend, Essex area.—Box No. 4324, Short Wave Magazine Ltd., 55 Victoria Street, London, S.W.1.

SALE: Self-supporting 33ft. Tower, welded in three sections, all steel, professionally built, price £15 or W.H.Y.—Hamer, 7 Arundel Road, Cheylesmore, Coventry, Warwickshire.

WANTED: Nova-Tech Nova PAL portable radio in any condition if price is right.—Box No. 4325, Short Wave Magazine Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Crystal for 4.6 mc, any type. **SALE:** Vertical Aerial, Mk. I, 32ft. plus whip end, 3 gns. each, or brand new and unused 5 gns., carriage paid. Aerial tuning units at 20s. each, post 5s.—Box No. 4326, Short Wave Magazine Ltd., 55 Victoria Street, London, S.W.1.

SALE: Heathkit RA-1 Rx, with matching speaker and recently aligned professionally, price £30. Beginners Morse Record and key, 20s.—Wilson, GM3VCQ, 28 Cross Street, Fraserburgh, Scotland.

WANTED: Following equipment—SSB Transceiver for HF bands, also three-band beam with rotator and indicator, for which fair price will be paid, with collection at reasonable distance.—Taylor, 82 Victoria Drive, Bognor Regis (5254), Sussex.

SALE: Two R.1155 receivers, with PSU and output stages, £7 each. Eddystone 358 Rx, with nine coils and PSU, £11. Hallicrafters S-36A Rx, coverage 27 to 145 mc, £25. Matching Panadaptor for the S-36A, in mint condition, offers? HE-30 receiver, 550 kc to 30 mc, £25. Geloso converter, 10 to 80 metres, in mint condition, price £14. Grampian public address amplifier, with radio and monitor, needs couple o/p valves, offers? Converters RF-25, RF-27 and another, 25s. Old type Vauxhall car radio, £4.

WANTED: Good receiver, also R.216 VHF Rx.—Earnshaw, 104 Hunter Street, Middleton (5272), Manchester.

WANTED: Modern portable Tx/Rx for LF bands, working A1 or A1/A3. Must be compact and efficient, for mains or battery operation. (A 1966 version of the well-known B2 set is envisaged.) Good price for the right thing. Offers to:—Box No. 4328, Short Wave Magazine Ltd., 55 Victoria Street, London, S.W.1.

BALUNS for 10 to 160m., 50 to 80 ohms, 1:1 ratio rated 1 kW p.e.p., G3HZP design as described, 15s. each, post free.—G3HZP, QTHR.

YUKAN SELF-SPRAY **AIR DRYING** **MODERN WRINKLE (CRACKLE) FINISH** **EGG SHELL**

Black same price as Hammer finishes (see our main advert., page 311)

Like our hammers?
Now have a crack
at our **WRINKLES!**

J. B. LOWE 51 Wellington Street
Matlock, Derbyshire

Tel.: Matlock 430

I am very happy to announce that I have moved into different premises in Wellington Street. Very nice too—right on top of that hill with lots of space for a tower and quad. Provided the Town and Country Planners don't get unpleasant—"No, sir, a neat little BBC2 aerial on the roof would not actually be just as good." . . . "Why not, sir? Well, it's this business about impedance matching, radiation resistance and that jazz." . . . "No, sir, I'm not trying to make a monkey out of you." . . . "Oh, well, if you feel like that . . ." Guess I'll have to resign myself to 1296 Mc/s. only.

Incidentally, you wont have much difficulty in finding my place—there's only about two shops in Wellington Street. Just keep agoin' up that steep hill and as everyone invariably (and quite erroneously) says, you can't miss it. There you will find a magnificent array of highly expensive new 'uns along with a remarkable selection of second-hand stuff, among which you will see some of the crummiest old clunkers you have ever clapped eyes on. To say nothing of the fantastic selection of surplus junk, all of which I personally guarantee to be utterly useless. However, in spite of all my warnings, you keep coming back for more punishment.

Bill's Emporium, I should add, has loads of shelf space which I would like to fill up with stuff that I can sell at enormous profit, so any of your stuff that you want to sell—offer it to me, I might even buy it. If I don't buy it I can always sell it for you on a small (heh, heh!) commission. Actually, I like doing this because it increases my stock without delving into capital (Honest, this boy, even if he is slightly psychotic). For this reason my commission is very small.

HOURS. Daily 9 to 5.30 except Wednesday and Thursday and I will open Sunday by appointment. The Wed. and Thur. bit, by the way, gives me a chance to get around to Government Surplus sales to view the revolting stuff on Wednesday and bid for some of the less objectionable of it on Thursday (for some reason these sales are almost invariably on a Thursday). Anyway, if you want me to get you an AR88D at the right price, shurrup and don't argue.

I am not yet on the phone at the shop, but you can always phone me in the evenings at Matlock 430—as soon as the G.P.O. cough up a phone at the shop, I'll let you know.

STOCK. Pretty much the same as last month—in the new line I have the NCX5 Swan 350 and KW2000 transceivers, Codar AT5 transmitter, Lafayette HA350, HA230, KT340 and HA55A (aircraft Rx.—quite good, too) receivers. I also keep the Lafayette 455 kc/s. mechanical filter in stock and also the XF-9A and XF-9B superb 9 Mc/s. crystal filter. Codar PR30X also in stock. Also stocking the new Sommerkamp line of SSB/AM/CW separate Rx's and Tx's. Take it from me, lads these are winners. I wont push them—I don't have to. Please form an orderly queue."

Second-hand :

Collins 75S1 as new £175. Hallicrafters SX117 mint, £125.

Hallicrafters HT41 linear, £100. KW500 linear, £55.

Hallicrafters HA5 v.f.o., £30. GEC BRT432, £17/10/-.

Minimitter mobile Tx, £10. Minimitter Top-2-7, £22/10/-.

Codar CR70A as new, £15.

Minimitter de luxe 150W. AM/CW, £40.

Sphinx, £45. KW Valiant, £20.

CR100 a beauty, £20. R.107, £10. Codar PR30X, £5/10/-.

Heathkit "Mohawk"—Ham band heavyweight champ, £75.

AR88D a good one, £45.

Surplus :

A goodly selection of capacitors, chokes, coils, keys, relays, resistors, switches, vibrators, terminal boards, variometers, etc., etc.

Send me a s.a.e. and I'll send you my stock lists by return amongst which you are bound (I hope) to find something you want.

Hire Purchase : a pleasure (especially to the Credit Co.).

Trade-ins : indubitably. I try and give the best allowance in the business.

Postage : please send enough extra to cover the postage—I will refund the balance, honest.

73 de bill VE8DP/G3UBO

SMALL ADVERTISEMENTS, READERS—continued

WANTED: In good condition, a Geloso VFO unit or similar, preferably including 160m.—Baldock, 19 Theydon Avenue, Woburn Sands, Bletchley, Bucks.

WANTED: An Eddystone VHF Receiver Type 770R, 19 to 165 mc, or would consider any continuous coverage receiver for similar range, in good condition with no modifications; must include two-metre and four-metre bands.—Box No. 4329, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SELLING: K.W. Valiant Tx, as new and unused, 10 to 160m., £30. Minimitter TR-7 160m. transistor mobile Rx, 160m., £30. Minimitter TR-7 160m. transistor mobile Rx, with Q-multiplier, £9. Hudson AM/250/F Base Station, consisting Tx/Rx/PSU less crystals, in good condition, suitable for 4-metre modification, £12; also Hudson AM/350/M mobile Tx/Rx/dynamotor, with crystals for 70.26 mc, in fairly good condition, suitable 4-metre modification, £10, or £20 the pair. BC-625A/624A Tx/Rx (SCR-522) with valves, for two-metre modification, £3; another, less valves, in fair condition, £2, or £4 10s. the pair. Foregoing items delivered 50 miles, otherwise carriage and packing extra. Prop-pitch motor, with heading indicator, 360-degree potentiometer, and 24v. 15-amp. selenium bridge rectifier, £10 the lot. Dynamotors: 12-volt, giving 440v. at 200 mA, £3; another, rated 350v. 180 mA, 40s., or £4 the pair. Four RS Hy-grade electrolytics, 16 mF 600v. working, 30s. the lot. Two Parmeko C-core chokes, new, 10 Hy 250 mA 100-ohm, 40s. each. Gresham C-core mains xformer, 200-250 x 10v. in, secondaries 450-400-0-400-450v. at 250 mA, also 0-4.5v. 3A, 0-4-6-3v. 3A, and 0-4-6-3v. 4A. twice, £4.—Thompson, G3MQT, 8 Coventry Road, St. Leonards-on-Sea, Sussex.

BARGAIN: For full break-in operation, Dow-Key valve type T/R switch, model DKC/TRP, rated 1 kW, 110v. AC operation, acts as pre-amp on "receive," with plugs and suitable auto-transformer, price £6 10s. (cost £12 10s.).—Stone, 18 Glenluce Road, Blackheath, London, S.E.3.

SALE: Eddystone S.640 receiver, unmodified, in fresh condition and perfect working order, with S-meter and handbook, price £23. Delivery over 75 miles extra.—Scott, 16 Tanyard Drive, Hale Barns, Altrincham, Cheshire.

WANTED: Eddystone 940 receiver. Must be in recent new condition, and viewable reasonable radius London; also wanted Eddystone EB.35 AM/FM Transistor Receiver.—Box No. 4330, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Drake-2B, 2BQ, Vibroplex bug, must be perfect. All letters answered.—Flood, 90 Warren Wood Road, Rochester, Kent.

WANTED: Late model Viceroy, must be in absolute mint condition. Also required a BC-221, in similar condition. Fullest details, price, etc.—G3CZS, QTHR.

FOR SALE: Heathkit RA-1 receiver, very little used and as new, £26. Q-Multiplier, Heathkit model QPM-16 to suit RA-1, £5 10s. Eddystone model EC-10, as new, £30. All with instruction books. Buyer collects.—Copage, 83 Willclare Road, Sheldon, Birmingham, 26.

WANTED: Dow-Key aerial relay, AR88D output transformer, Eddystone 750 receiver. Fullest details to—Edson, 24 Wrenbeck Avenue, Otley, Yorkshire.

WANTED: Cheap 20-metre CW Tx. **SALE:** Miniature 'scope type CT.52.—Anders, G3TYB, 29 Newtown, Ashford, Kent.

SALE: Command BC-453 as Q5'er, complete with valves, unmodified, £5. Labgear transistorised speech compressor, with battery, £3. AR88 speaker, 17s. 6d. Following valves, used but serviceable, all 2s. 6d. each, past free: 6AB7, 6AC7, 6SA7, 6SN7, 6SG7, 6SL7, 6BB, 6K7, 6J7, 6K8, 6Q7, 6V6, 12J5, 25A6, 25Z6, SP61, EF50, 807, and 811.—Michaelson, G3RDG, 40 The Vale, London, N.W.11. (Ring SPEedwell 8831.)

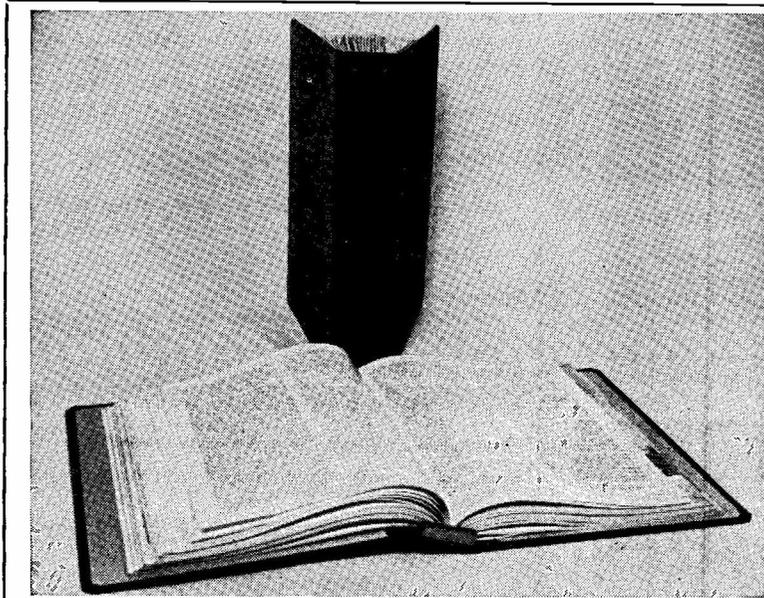
WANTED: National HRO-MX receiver or R.C.A. AR88D Rx; must be in perfect order and condition.—Box No. 4331, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

MORSE MADE EASY !!

The famous RHYTHM RECORDED COURSE cuts practice time down to an absolute minimum!

One student, aged 20, took only 13 DAYS and another, aged 71, took 6 WEEKS to obtain a G.P.O. pass certificate. If you wish to read Morse easily and naturally, please enclose 8d. in stamps for full explanatory booklet to:

G3HSC/F, 45 Green Lane, Purley, Surrey

**CREATE YOUR OWN REFERENCE LIBRARY**

by binding copies of Short Wave Magazine in the "EASIBINDER."

The "EASIBINDER" is designed to bind 12 copies of the Magazine as you receive them month by month, eventually providing a handsomely bound volume for the bookshelf.

No need to wait until twelve copies are assembled. As each copy is received, it is quickly and simply inserted into the binder. Whether partially or completely filled, the binder is equally effective, giving the appearance of a book, with each page opening flat.

Strongly made with stiff covers and attractively bound in maroon Leathercloth and Milskin, the binders have only the title gold blocked on the spine.

Price 14s. 0d. post free.

**PUBLICATIONS DEPARTMENT
SHORT WAVE MAGAZINE
55 VICTORIA STREET,
LONDON, S.W.1**

TECHNICAL PUBLICATIONS
LATEST ISSUES

	Post Free
AMATEUR RADIO CIRCUITS BOOK (by R.S.G.B.)	8s. 0d.
AMATEUR RADIO HANDBOOK (R.S.G.B.)	36s. 6d.
ANTENNA ROUND UP (by CQ)	25s. 0d.
ANTENNA HANDBOOK (A.R.R.L., 10th Edition)	19s. 6d.
BASIC MATHEMATICS FOR RADIO AND ELECTRONICS	18s. 3d.
BEAM ANTENNA HANDBOOK, New Edition	28s. 0d.
BETTER SHORT WAVE RECEPTION	24s. 0d.
CHART OF INTERNATIONAL FREQUENCY ALLOCATIONS—GENEVA, 1960 (Official, 10 Kc. to 40 Gc., 51" x 34", wall mounting)	8s. 6d.
COMMUNICATION RECEIVERS	3s. 5d.
CQ ANTHOLOGY 45-52	16s. 9d.
CQ ANTHOLOGY (1952—1959)	25s. 0d.
COURSE IN RADIO FUNDAMENTALS (A.R.R.L.)	10s. 6d.
ELECTRONIC CIRCUITS HANDBOOK	24s. 0d.
FOUNDATIONS OF WIRELESS	22s. 3d.
FUNDAMENTALS OF SINGLE SIDEBAND (Collins)	48s. 6d.
GETTING STARTED WITH TRANSISTORS (GERNSBACK)	28s. 6d.
GUIDE TO AMATEUR RADIO (New Edition)	5s. 7d.
GUIDE TO BROADCASTING STATIONS (Iliffe)	5s. 6d.
HINTS AND KINKS Vol. 6	11s. 0d.
HOW TO BECOME A RADIO AMATEUR (A.R.R.L.)	10s. 0d.
HOW TO IMPROVE SHORT WAVE RECEPTION	20s. 0d.
HOW TO LISTEN TO THE WORLD (1965 Edition)	20s. 0d.
LEARNING MORSE	1s. 9d.
LEARNING THE RADIO TELEGRAPH CODE (A.R.R.L.)	4s. 6d.
MANUAL OF TRANSISTOR CIRCUITS (Mullard)	13s. 6d.
MOBILE HANDBOOK (Published by CQ)	24s. 0d.
MOBILE MANUAL (Published by A.R.R.L.)	24s. 6d.
NEW RTTY HANDBOOK	32s. 0d.
NEWS FROM AROUND THE WORLD (1966)	15s. 0d.
NEW SIDEBAND HANDBOOK (by CQ)	25s. 6d.
NOVICE HANDBOOK, Tx and Rx, 150 pages	23s. 6d.
OPERATING AN AMATEUR RADIO STATION (A.R.R.L.)	2s. 8d.
PORTABLE TRANSISTOR RECEIVER	3s. 0d.
QUAD ANTENNA	23s. 0d.
RADIO AMATEUR EXAMINATION MANUAL	5s. 9d.
RADIO AMATEUR HANDBOOK (A.R.R.L.), 1966	Paper 42s. 6d. Buckram 52s. 6d.
RADIO AMATEUR OPERATOR'S HANDBOOK (Data Publications)	5s. 6d.
RADIO AMATEUR CALL BOOK, U.K. only	6s. 7d.
RADIO CONTROL MANUAL	25s. 0d.
RADIO CONTROL FOR MODELS (F. C. Judd)	16s. 0d.
RADIO DATA REFERENCE BOOK	14s. 0d.
RADIO HANDBOOK (Wm. I. Orr)	86s. 0d.
S9 SIGNALS	8s. 6d.
SHORT WAVE RECEIVERS FOR THE BEGINNER (Data Pubs.)	6s. 6d.
SHORT WAVE RADIO AND THE IONOSPHERE (Iliffe)	11s. 9d.
SINGLE SIDEBAND FOR THE RADIO AMATEUR (A.R.R.L.) (4th Edition)	22s. 6d.
STEREO HANDBOOK	11s. 4d.
SURPLUS SCHEMATICS (Published by CQ)	21s. 0d.
SURPLUS HANDBOOK (Editors and Engineers)	24s. 0d.
SURPLUS CONVERSION HANDBOOK (including "Command Sets") New!	24s. 0d.
SURPLUS CONVERSION MANUAL Vols. I, II and III, each	24s. 0d.
TECHNICAL TOPICS FOR THE RADIO AMATEUR	10s. 8d.
TELEVISION EXPLAINED (Iliffe)	13s. 6d.
TRANSISTOR RADIO CIRCUITRY AND SERVICING (Mullard)	5s. 9d.
TRANSISTORS THEORY AND PRACTICE (R. P. Turner)	23s. 0d.
TRANSISTOR TECHNIQUES (Gernsback)	12s. 6d.
TRANSISTOR RADIO HANDBOOK (Editors and Engineers)	45s. 0d.
UNDERSTANDING AMATEUR RADIO	19s. 6d.
VHF HANDBOOK (Orr W6SAD)	24s. 0d.
VHF MANUAL by A.R.R.L.	21s. 6d.
VHF FOR THE RADIO AMATEUR (CQ)	28s. 0d.
WORLD MEDIUM WAVE GUIDE (1966)	15s. 0d.
WORLD RADIO HANDBOOK (1966)	29s. 0d.

Available from Stock SHORT WAVE MAGAZINE

Publications Dept., 55 Victoria St., London S.W.1 · Abbey 5341



The first choice of Radio Amateurs throughout the World

AMERICAN HEATHKIT SSB EQUIPMENT

"The world's most advanced Amateur Equipment"

Prices quoted are Mail Order and include duty, carriage and current import levy where applicable



Monitor 'Scope, HO-10E



Transceiver HW-12



Receiver SB-300E



Transmitter, SB-400E

FILTER-TYPE SINGLE BAND SSB TRANSCEIVER, Models. For the 80, 40, or 20 metre bands. 200 W. P.E.P. input TX. 1 μ V sensitivity RX. Employs easy-to-build printed board techniques, with pre-aligned circuits. Power Req.: 800v. D.C. at 250 mA., 250v. D.C. at 100 mA., 125v. D.C. at 5 mA, 12v. A.C. or D.C. at 3-75A.

Models HW-12 (80m.) £67.10.0 Kit
HW-22 (40m.), HW-32 (20m.) £66.0.0 either Kit
GH12. Push Talk Microphone £4.0.0 Assembled

3" MONITOR 'SCOPE, Model HO-10E. A must for the SSB station. Gives at-a-glance, visual indication of your transmitted signal and the incoming signal, displaying envelope patterns. Built-in two-tone generator ensures a clean output signal. Power Req.: 115/230v. A.C. 50/60 c/s. £38.10.0 Kit

2 METRE TRANSCEIVER, HW-30. Input 5 watts c.c. Tunable regenerative Rx. Compact size. 12v. power supply available. £25.0.0 Kit

NEW! 80-10m. TRANSCEIVER, Model SB-100. Send for full details. £198.0.0 Kit

Suitable Power Supply, Model H.P.23E. £24.10.0 Kit

AMATEUR BANDS 80-10m. RECEIVER, Model SB-300E. This de-luxe receiver offers unsurpassed value to the Radio Amateur. Of advanced concept, employing up-to-date design and construction techniques, its ultimate specification ensures unparalleled performance. Full specification and details on request. Weight 22lb. Power Req.: 115/230v. A.C. 50/60 c/s. 50 watt. Size: 17 $\frac{1}{2}$ " x 6 $\frac{3}{8}$ " x 13 $\frac{3}{8}$ ". £139.0.0 Kit (Less speaker)

AMATEUR TRANSMITTER, Model SB-400E. This transmitter is designed for "lock-in" facility with the SB-300E. A self-powered filter type Tx covering the "Amateur" bands, 80 to 10 m. with a P.E.P. of 180 watts. Weight 33lb. Power Req.: 115/230v. A.C. 50/60 c/s. Size: 14 $\frac{1}{2}$ " x 6 $\frac{3}{8}$ " x 13 $\frac{3}{8}$ ". £179.0.0 Kit

LINEAR AMPLIFIER, Model SB-200. Covers 80-10m. 1200 W. P.E.P. input SSB—1000 W. C.W. Solid state power supply. 120 or 240v. A.C. £112.0.0 Kit

THE WORLD'S SMALLEST KILOWATT LINEAR. The Heathkit, Model HA-14. 80-10m. Provides 1000 W. P.E.P. input power. Size only 3 $\frac{1}{8}$ " x 12 $\frac{1}{8}$ " x 10" deep. Weight 9lb. Power supply available. £56.5.0 Kit

Please send for the FREE British Heathkit catalogue



AMATEUR BANDS RECEIVER, Model RA-1. Covers all amateur bands 10-160 metres. Half-lattice crystal filter at 1.6 Mc/s. I.F. Provision for fixed, portable or mobile uses. Switched USB and LSB for SSB. £39.6.6 Kit £52.10. Assembled

OPTIONAL EXTRAS. Crystal Calibrator CL-1 £4.12.0 Kit
Loudspeaker Cabinet SG-4 £1.9.6. Loudspeaker £1.4.5 incl. P.T.

AMATEUR TRANSMITTER, Model DX-40U. From 80-10 m. Power input 75 W., CW., 60 W. peak, C.C. phone. Output 40 W. to aerial. £33.19.0 Kit £45.8.0 Assembled

S.S.B. ADAPTOR, Model SB-10U. For use with most A.M. transmitters. Less than 3 W. R.F. input power required for 10 W. output. Operation on 80, 40, 20, 15 and 10 m. on U.S.B., L.B.S. or D.S.B. £39.5.0 Kit £54.18.0 Assembled

"MOHICAN" GENERAL COVERAGE RECEIVER, Model GC-1U. In the forefront of design with 4 piezo-electric transistors, 10 transistors, variable tuned B.F.O. and Zener diode stabiliser. £37.17.6 Kit £45.17.6 Assembled

Suitable Battery Eliminator, Model UBE-1 £2.17.6 Kit

REFLECTED POWER METER, Model HM-11U. Indicates Antenna/Transmitter match. £8.5.0 Kit £10.10.0 Assembled

HIGH-SENSITIVITY GENERAL COVERAGE RECEIVER, Model RG-1. A high performance, low cost receiver for the discriminating short-wave listener. Frequency coverage from 600 Kc/s. to 1.5 Mc/s. and 1.7 Mc/s. to 32 Mc/s. Send for details. £39.16.0 Kit £53.0.0 Assembled



AMATEUR TRANSMITTER, Model DX-100U. Covers all amateur bands from 160-10 metres, 150 watts D.C. input. Own power supply. £79.10.0 Kit £104.15.0 Assembled

Q MULTIPLIER KIT, Model QPM-1. May be used with receivers having 450-470 Kc/s. I.F. Provides either additional selectivity or signal rejection. Self powered. Model QPM-16 for 1.6 Mc/s. I.F. Either model £8.10.0 Kit £12.14.0 Assembled

GRID-DIP METER, Model GD-1U. Continuous coverage 1-8 to 250 Mc/s. Self-contained. £19.6 Kit £13.19.6 Assembled

VARIABLE FREQ. OSCILLATOR, Model VF-1U. Calibrated 160-10m. fund. outputs on 160 and 40 m. Ideal for our DX-40U and similar TX. £10.17.6 Kit £15.19.6 Assembled

To DAYSTROM Ltd., Dept. SW-7 Gloucester, England

Please send me

FREE BRITISH HEATHKIT CATALOGUE (Yes/No)

AMATEUR RADIO BROCHURE (Yes/No)

American Heathkit Catalogue 1/- ... (Yes/No)

Full details of model(s)

NAME

(Block Capitals)

ADDRESS

SW7

WELCOME TO OUR LONDON HEATHKIT CENTRE

Showroom and retail stores at
233 Tottenham Court Road.

Tel. MUSeum 7349

Open Mon.-Sat. 9 a.m.-5.30 p.m.

(Thurs. 11 a.m.-2.30 p.m.)

WHEN YOU ARE IN TOWN, WE HOPE THAT YOU WILL VISIT US THERE.

SEND FOR LATEST CATALOGUE for full detail of Test Instruments, HiFi and other models.