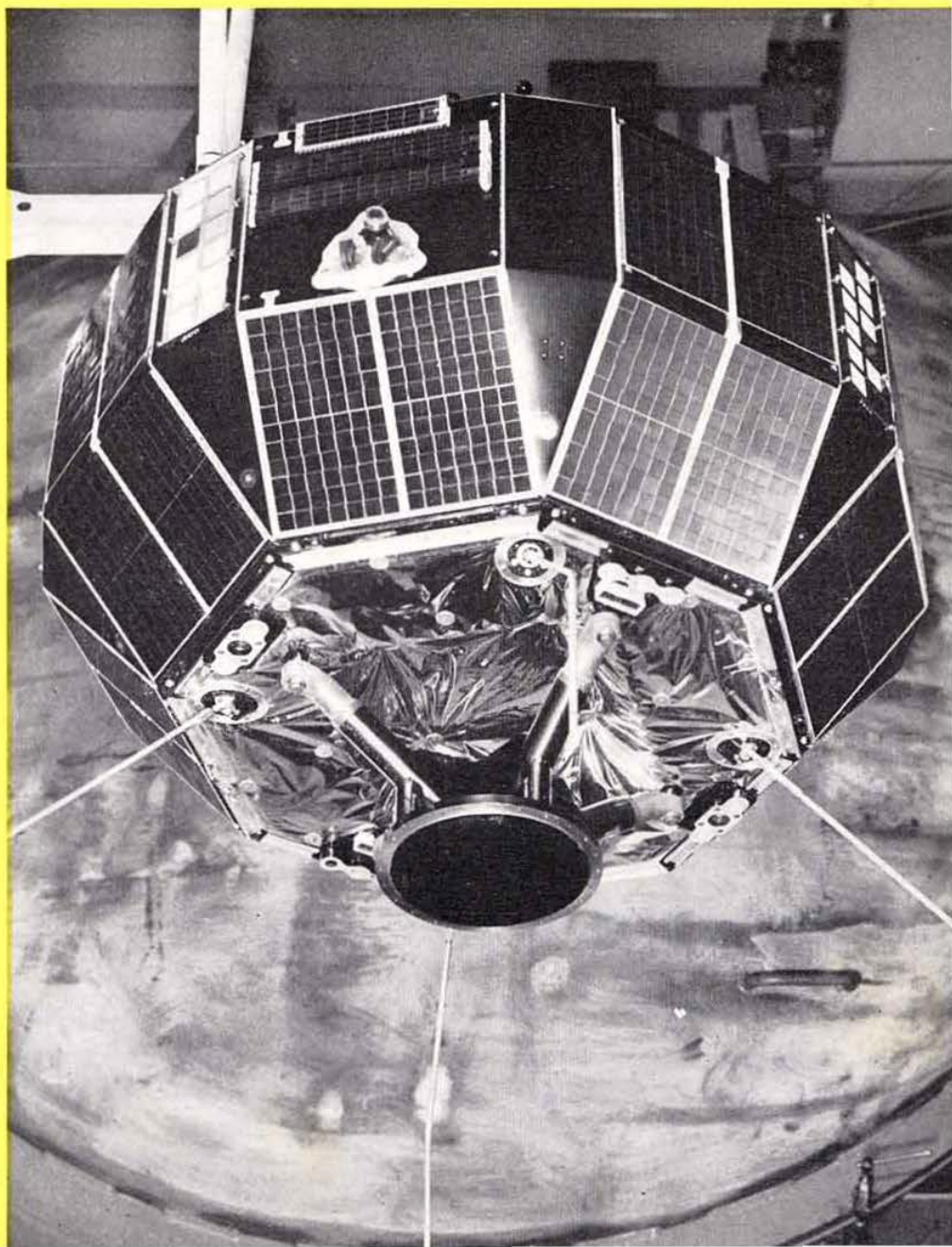


December 1971

radio communication

Journal of the
Radio Society
of
Great Britain





All equipment available through
accredited agents

World-wide leading manufacturer for the Radio Amateur

Long established to give you reliable service

EXPERT FREE ADVICE DIRECT FROM THE MANUFACTURER

An impressive new 'G' Line Series from KW —ex-stock



KW 107 Antenna
Tuning System

KW 202 RECEIVER, 10-160 metres SSB/AM/CW, with Mechanical Filter, built in 'Q' Multiplier (Peak & Null), 500kHz VFO covering all bands. Two Speed VFO Drive. Excellent Sig/Noise and sensitivity performance. Very attractive (similar in appearance to KW2000B). 100kHz Crystal Calibrator price £140 carriage extra.

KW 204 TRANSMITTER, 10-160 metres SSB/AM/CW. Successor to the famous KW "Vespa"—Perfectly matches the KW202

Receiver and is similar in appearance. 180 watts p.e.p. from trust-worthy 6146's. Built-in Power Supply. Provides "side tone" cw monitoring. A beautiful compact efficient unit. Price £142 carriage extra.

KW 202
Speaker

2 Great Transceivers DELIVERY IMMEDIATELY, FROM STOCK

KW2000B 10-160 metres SSB
TRANSCIVER: 180 watts PEP
10-160 metres, complete with A.C.
P.S.U., VOX P.T.T., I.R.T./I.T.T.

£240

carriage extra

- Two-speed VFO drive
- Improved VFO Read-out
- New, precise metering
- Attractive panel layout
- D.C. P.S.U. for mobile
- Break-in c.w.

KW ATLANTA 10-80 metres

£200

carriage extra

KW Atlanta and A.C. P.S.U.

- Extremely good audio (crystal filters fitted)
- 500 watt PEP SSB Transceiver
- Operation on all amateur bands from 10 to 80 metres
- A.N.L. and A.L.C.
- 100kHz Crystal Calibrator
- Two speed VFO drive
- Built in speaker

Both transceivers available with remote VFO unit

MATCHING—KW1000 LINEAR AMPLIFIER for KW 204 and KW 2000B—also available. 1200 watt pep max. Pair T160L/572B tubes including 2.5kv Power Unit built-in to KW2000B style cabinet £135 carriage extra.

KW 101—Standing-Wave-Ratio meter £9.25. **KW103 SWR/Power meter** 0-100 & 0-1000 watts £12.50*. **KW 103 with Dummy Load and Coax Lead** £20.50*. **KW 105 Antenna Tuning System** including E-Z Match, SWR Ind., Dummy Load, Antenna Switch, 5 position, £36.00*. Also **KW Trap Dipole** with twin feeder and 4 other types (only the original Trap from KW is good enough for you). **KW E-Z Match ATV**, **KW Low Pass Filters**, **KW & HZP Baluns**, etc.

KW for HY-GAIN, MOSLEY, G-WHIP, POLYQUAD, WEBSTER, HUSTLER ANTENNAS. SHURE Microphones, CDR Rotators. VIBROPLEX Keys, etc.

We also offer a range of "Trade in" equipment—Checked through our Service Department.

Write for details today

K.W. ELECTRONICS LIMITED :

1 HEATH STREET, DARTFORD, KENT
Telephone: Dartford 25574 Cables: Kaydublew Dartford

EASY TERMS ON EQUIPMENT AVAILABLE OVER 12, 18 OR 24 MONTHS

December 1971

radio communication

Volume 47 No 12

Price 30p

EDITOR

A. W. Hutchinson, MAIE

EDITORIAL ASSISTANT

Jane C. Ramella

DRAUGHTSMAN

Derek E. Cole

EDITORIAL PANEL

J. P. Hawker, G3VA

G. R. Jessop, G6JP

R. F. Stevens, G2BVN

FRONT COVER

Prospero, Britain's satellite launched in October 1971. For details see page 837

CONTENTS

- 818 Seasonal message from the President. QTC
- 819 President of RSGB for 1972
- 820 Just look at the weather! (Part 2)—Rev P. W. Sollom, OSB, BSc (Eng), PhD, G3BGL
- 827 Equipment review—Burns Electronics solid-state fm detector module Type FMD-1—W. H. Allen, MBE, G2UJ
- 828 The G3EEZ 9cm converter—A. Wakeman, G3EEZ
- 832 Adding a switchable gain control to a KW201 receiver—H. J. Manning, MIMC, G3XOM
- 833 Equipment review—The Yaesu-Musen FF50DX low-pass filter—B. Priestley, BSc, G3JGO
- 834 Ideas for noise limiters for a.m. receivers—D. A. Tong, BSc, PhD, G8ENN
- 837 The G3TVU/G8BDO 20MHz dfm. Some random comments—J. A. Share, G3OKA. British satellite in orbit. Book review
- 838 Technical Topics—Pat Hawker, G3VA
- 844 Four Metres and Down—Jack Hum, G5UM
- 849 Microwaves—1,000MHz and up—Dr D. S. Evans, G3RPE
- 850 The Month on the Air—John Allaway, G3FKM
- 855 Jamboree on the Air 1971
- 856 Council Proceedings. Representation 1972-4
- 857 Obituaries. Looking ahead. Contests Calendar. Your Opinion
- 858 Raynet—S. W. Law, G3PAZ
- 859 Contest News
- 860 VHF NFD 1971 Results
- 864 RSGB slow morse practice transmissions
- 865 Club News
- 870 Members' Ads

Radio Communication (incorporating *The RSGB Bulletin*) is published by The Radio Society of Great Britain as its official journal and is posted to all members of the Society on the first Tuesday of each month

Contributions and all correspondence concerning the content of *Radio Communication* should be addressed to: The Editor, *Radio Communication*, 35 Doughty Street, London WC1N 2AE. Tel 01-837 8688.

Closing date for contributions, unless otherwise notified: 4th of month preceding month of publication.

Advertising, other than Members' Ads, should be addressed to: Mrs P. D. Harvey, Sawell & Sons Ltd, 4 Ludgate Circus, London EC4. Tel 01-353 4353.



©RADIO SOCIETY OF
GREAT BRITAIN 1971

MODEL SB-102 TRANSCEIVER KIT

New transistorised L.M.O.—retains features of SB 101—180 watts PEP SSB—170 watts CW input 80-10 metres—Requires external PSU (HP-23A or HP-13A).

Price £196 Carr. 80p.

SB-200 LINEAR AMPLIFIER KIT

80-10 metres—1200 watts PEP SSB input—1000 watts CW output—pre-tuned input—internal PSU 120/240 VAC.

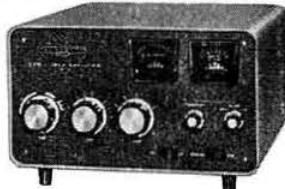
Price £119 Carr. 90p.

SB-301 AMATEUR BANDS RECEIVER KIT

80-10 metres—Stability less than 100Hz per hour—Visual dial accuracy less than 200Hz—Sensitivity 0.3μV for 10dB S+N—N LSB, USB, CW, RTTY, 120/240 VAC.



Price £125 Carr. 70p.

SB-220 LINEAR AMPLIFIER KIT

80-10 metres, 2000 watts PEP SSB input 1kw on CW & RTTY—Requires only 100 watts drive—pre-tuned pi-input—fully metered—110/240 VAC built in PSU.

Price £165 Carr. £1.30

HW-101 5 BAND SSC-CW TRANSCEIVER KIT

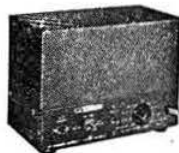
High performance, minimum cost—80-10 metres—170 watts C.W., 180 watts PEP—Solid state L.M.O.—Less than 100Hz drift—Requires PSU (HP-23A-HP-13A).

Price £125 Carr. 70p.

HW SERIES SSB TRANSCEIVERS KIT

HW series Single Band Transceivers New Styling—Upper or lower side-band—200 watts PEP input—Choice of HW12A (80m), or HW-32A (20m)—requires external PSU (HP-23A or HP-13A).

Price HW-12A £64.50 Carr. 60p. HW-32A £66.50 Carr. 60p.

HP-23A AC PSU KIT (800VDC-300VDC 12.6V AC-130V BIAS)

110/240 VAC

Price £22.50

Carr. 70p.

**HP-13A MOBILE PSU**

12-16 volts DC in 800 & 300 VDC plus—130v bias. Price £35 Carr. 45p.

RF RELATIVE POWER METER, PM-2

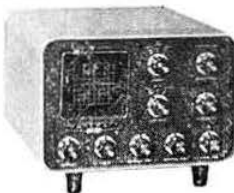
Frequency range: from 100kHz to over 250 MHz. 0.3 volt RMS at the aerial. Operates from radiated transmitter signal. Magnetic base. Kit K/PM-2 Price £7.50 Carr 25p.

100KC CRYSTAL CALIBRATOR NO-20

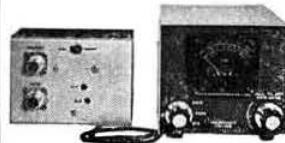
This small transistorised 100kHz crystal calibrator, produces a signal every 100kHz through 54MHz. Uses 9v battery (not supplied). Kit K/HD-20 £8.00 Carr. 25p.

SB-610 SIGNAL MONITOR KIT

Shows quality of signals transmitted and received—160-10 metres—15 watts to 1kw—Operates with receiver IF's 50 kcs to 6MHz—120/240 operation.



Price £46 Carr. 45p.

IN LINE WATT METER and SWR BRIDGE KIT HM-102

Measures RF output 10 to 2000 watts accuracy $\pm 10\%$ of full scale.

Price £15.50 Carr. 35p.

PLEASE ADDRESS ALL ENQUIRIES & CORRESPONDENCE:

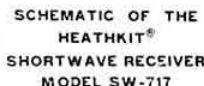
HEATH (Gloucester) LTD.

GLoucester
GL2-6EE Tel: 29451



a Schlumberger Company

We know it's different



—But now you know what's inside

SW 717 SPECIFICATIONS: Frequency Coverage: Band A. 550 kHz to 1500 kHz. Band B. 1.5 MHz to 4 MHz. Band C. 4 MHz to 10 MHz. Band D. 10 MHz to 30 MHz. Meter indicates relative signal strength. Headphone jack, Headphones or an external speaker. Loudspeaker built-in. **Controls:** VOLUME with on-off switch. MODE (am, standby and CW) BFO. MAIN TUNING. BANDSPREAD TUNING. ANL (on-off). **Transistor Complement.** 40673: mixer and RF amplifier. 2N3393: audio preamplifier. 2N5232A: i-f amplifier. AGC amplifier. MPF 105: oscillator. S2090: final audio amplifier. S2091: S2091: final audio amplifier. X20A829 Audio driver. **Power Supply:** Transformer operated. Full wave bridge rectifier. **Power Requirements:** 120 VAC or 240 VAC 50/60 Hz 6 watts. Order your SW-717 4 band AM/SW Receiver today, tune in on the world through SWL.

Kit K/SW-717 £29.80 Carr. 60 P.

Amateurs in Netherlands. Why not visit the Heathkit Centre,
Pieter Calaan Laan 106-110, Amsterdam.

Identify your integrated circuits!

8-page supplement integrated circuit survey

Get the facts
you need to identify and use the
mass of linear and digital integrated
circuits now available. Classified tables of
data and applications information
are given in this special supplement!

logical radio control

Explains how integrated circuits are used to great
advantage in coding and decoding proportional
radio control functions for models. Wiring is
simplified with printed circuit cards making control
systems small enough for a wide range of models.

digital dice

There's no need to throw the dice . . . just press the
button and see the random 'throw' indicator light up.

**PRACTICAL
ELECTRONICS**

December issue out now

20p

GO MOSLEY BRITISH AND BEST

MUSTANG

BEAM TALK

TRAP
MASTER

10, 15 and 20 metres—
HIGH POWER—2 kW pep. LIGHT WEIGHT—28 lbs.
LOW WIND LOADING—90 lbs. Price £38
Carriage mainland £1.50

SHORT WAVE LISTENERS. Get the best Antennae as used by most commercial users for monitoring:

Broadcast Short Wave Bands: SWL7
Ham Bands 10-80 metres: RD-5
Rotary Dipole, 10, 15 and 20: TA-31 Jr

FOR ALL ANTENNA DETAILS:
Send for complete Handbook, containing full details and prices of Antennas and other technical information. 25 pages, 15p
Refundable upon purchase of an ANTENNA.

**FOR HIGHEST VALUE—BUY ANTENNAE
MANUFACTURED 100% IN ENGLAND**

**WE ARE THE ANTENNA
PEOPLE**
ROTATORS, TOWERS,
CABLES, INSULATORS, Etc.

ATLAS
ELAN
TA-33 Jr
TA-32 Jr. A-315
TA-31 Jr. A-215
MUSTANG
V-3 Jr. A-310
VTD-3 Jr. A-210
TD-3 Jr. TW-3X

Mosley U.S.A. types also available

ADMINISTRATIVE ADDRESS ONLY

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

RADIO COMPONENTS SUPPLIERS **J. BIRKETT** 25 THE STRAIT LINCOLN

Tel: 20767

SUB-MINIATURE 100 P.I.V. 5 amp SILICON BRIDGES @ 50p ea.
DUAL NPN 300 MHz TRANSISTORS with suggested application data for Silicon Controlled Switch or Programmable Unijunction Transistor. 12p each, 5 for 50p 12 for 90p.
COMMUNICATION series of I.C.'s for Experimental use only consisting of 1xR.F., 3xI.F., 2xV.O.G.D., 2xAGC, 1xMike amp, 2xDouble Balanced Modulator, 1xMixer. The 12 I.C.'s with circuits for £2-75.
MULLARD FET BFW 10 (Sim. to 2N 3819) 25p each 5 for £1.
MULLARD FET BFW 11 25p each.
14 Lead Dual In Line NPN Transistor Package containing one Matched Pair plus 3 Single Transistors. All 600 MHz, untested with circuit. 5 for 50p.
FT 241 200 KHz CRYSTALS @ 32p each.
SPECIAL 100 P.I.V. 150 amp SILICON RECTIFIERS @ £2-75 each.
SUB-MINIATURE 5K Pre-sets 5p each 10 for 40p.
TRANSISTOR ELECTROLYTICS -64uf 64v.w., 4uf 10v.w., 25uf 25v.w., 80uf 25v.w. All at 5 for 15p.
TRANSISTOR DISC CERAMICS 1-8pf 50v.w., 3-3pf 50v.w., 4-7pf 100v.w., 10pf 50v.w., 100pf 100v.w., 1000pf 50v.w., 01uf 18v.w., 022uf 18v.w., 047uf 12v.w., 1uf 18v.w., 1uf 20v.w., 2-2pf 3v.w., All types at 10 for 15p.
SUB-MINIATURE ARDENTE 2 Pole 5 way, 2 Bank ROTARY SWITCHES @ 22p each.
UNTESTED F.M. I.F. I.C. AMPLIFIERS like TAA 570, 5 for 50p with circuit.
BRANDED WIDE BAND I.F. AMPLIFIERS 10 to 100 MHz with connections @ 20p each.
ITT VARI-CAP DIODES type BA 110 @ 20p each.
SGS NPN 600 MHz Transistors type BF 160 @ 71p each.
SPECIAL DISC CERAMICS MINIATURE 500 pf at 8K.V.w 20p doz.
TRIACS 400 P.I.V. 2 amp @ 30p. 600 P.I.V. 2 amp @ 40p. X Band GUNN DIODES @ £1-50, J Band GUNN DIODES @ £1-50 MULLARD TRANSISTORS AC 128 @ 12p, AC 176 @ 15p. SO239 UHF SOCKETS @ 15p each.



JACKSONS

Ball Drive Dial

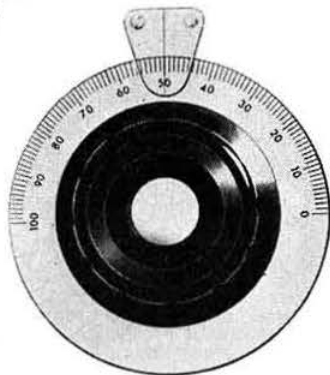
★ A powerful reduction drive 6:1 ratio totally enclosed within the attractive knob.

★ Provides a fine adjustment mechanism without taking up any space within the equipment.

★ Satin Anodised aluminium dial is reversible.

★ Supplied complete with cursor.

Catalogue No. 4489/C.



Write for literature:

JACKSON BROTHERS (London) LIMITED

DEPARTMENT KINGSWAY, WADDON, CROYDON CR9 4DG

Tel: 01-688 2754/5

Grams: Wallico, Croydon.

U.S. OFFICE: M. SWEDGAL,

258 Broadway, New York, N.Y., 10007

The MSK-5 SQUEEZE-KEY

(from Electronic Design AS.—OZ7BO)

Gives you better sending with greater ease and perfect character formation

Featuring

- DOT MEMORY
- SINGLE DOT INJECTION
- NO WEIGHT CONTROL
- CONTINUOUSLY VARIABLE SPEED CONTROL
- NOISELESS REED RELAY
- MAINS OR BATTERY OPERATION



£29.50

+ 25p P. & P.

For further details write to:

XB-ELECTRO, 16 Northbrook Road, Caversham Park Village, Reading, or phone Kidmore End (073-525) 2195

CW ——— SPACEMARK ——— RTTY



NEW SAMSON ETM-3 SQUEEZE-KEYER

Cuts keying effort—makes such characters as C, Q, Y, F, L, AR, SK, etc. with fewer paddle movements. Use either as normal twin-paddle auto keyer or as iambic-mode squeeze-keyer.

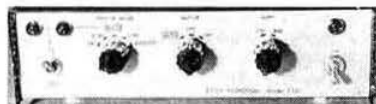
● 4 ICs, 6 transistors, 2 diodes. ● Built-in AC PSU. ● Constant 1:3 dash-dot ratio. ● Compact, weighs only 2½ lbs. **LIKE THE WELL-KNOWN SAMSON ETM-2** (used by coast stations and by big ships all over the world) it has: ● Watchmaker-assembled keying-lever movement. ● Silent reed-relay (400V, 1A contacts). ● Sidetone. ● TUNE button. £24.75 post-paid UK.

Still selling... **SAMSON ETM-2** Keyer, £21 (£22.20 with mercury batts.). **SAMSON STA** Speaker/Amplifier for ETM-2/ETM-3, £2.75. **JUNKER** Precision hand key, superb professional model, £8.95. **BAUER** keying/paddle unit for your El-Bug, £2.75.

Stamp or large SAE will bring you 18-page Catalogue RP6 with all the details.

SPACEMARK LTD. 14 PICCADILLY, MANCHESTER 1. (061-237 0817).

Model TTU solid-state FSK CONVERTER-KEYER



For two-way RTTY all you add is a transmitter/receiver and a surplus teleprinter (they're cheap!). The TTU gives you instant all-in-one-box RTTY. ● Superb performance even under poor band conditions. ● Sophisticated state-of-the-art circuitry—Integrated circuit, 45 semi-conductors, Butterworth filters. ● Switched for 170/850 Hz shifts, copies any shift from 1000 Hz down to a few Hz. ● Offers automatic control of printer, Autostart and Bell-Auto. ● For transmission, choice of 170/850 Hz FSK/AFSK. £115 post-paid UK.

RTTYers will also be interested in... **ST-5** and **ST-6** complete kits or PCBs. Ready-tuned **BUTTERWORTH** filters. 88mH **TOROIDS**, 75p per pair post-paid. **PRINT-SET DL6EQ RTTY TU** Basi-kit, BP & M/S Filters, Tuning Indicator, AFSK—and other **PRINTSET** VHF, SSB, CRO and El-Bug Basi-kits.



**OUR
AESU MUSEN DISTRIBUTOR**

WESTERN ELECTRONICS



*Wishes you
Seasonal Greetings*

THE YAESU RANGE IS SECOND TO NONE; LIKE OUR SERVICE!

SPARES: We carry a full stock of factory recommended spares and more besides!
SERVICE: We do all labour FREE on warranty claims.
GUARANTEE: We maintain the YAESU 12 months guarantee.
DELIVERY: We deliver within 24 hrs. of receipt of order of items which are in stock. This is the **fastest delivery service in the country** and costs £1 per parcel only! 48 hr. service to Scotland and remote places.
(Phone Hilary or Susan first if you like and check our stock to avoid disappointment).

NEW! THE YAESU YC-305 FREQUENCY COUNTER

★ YAESU MUSEN ANNOUNCE A NEW DIGITAL FREQUENCY COUNTER

- ★ Counts to 30 MHz.
- ★ 8 digit capability.

- ★ Operates on 12v. D.C. or 234v. A.C.
- ★ Read-out to ONE HERTZ.

Set the range switch to MHz and read to the nearest KHz or put the range switch to kHz and read down to the last Hz. Overrange and MHz/kHz indicators light up to give the correct range. 25 Texas Instruments IC's are used and the time base is 1 MHz crystal controlled. Size (cm.) : 22w. x 8h. x 27d. Weight: 3.5Kg. Price **£97.50** (s.a.e. for details)

NEW! THE YAESU FT 401 TRANSCEIVER

The New FT401 is basically an FT560 with NOISE BLANKER and BLOWER COOLED PA added as well as CW filter. This transceiver has all the following features as standard.

- ★ 560w. p.e.p. input on SSB.
- ★ Fully adjustable VOX.
- ★ Receiver offset tuning ± 5 kHz.
- ★ Extra WWV Band.
- ★ VFO switching to split frequency (with FV401)

- ★ 1Kz read-out 10-80m.
- ★ Break-in CW operation.
- ★ 25 and 100 kHz calibration points.
- ★ 2 spare band positions.
- ★ Superb audio quality.

Price, **£215.**

We invite you to examine closely the excellent VFO linearity, stability and superb engineering in all Yaesu equipment. Compare it with the most expensive of other makes! You'll have to agree, "It's first class."

New YAESU prices carriage paid by Securicor 24hr. service.

FT101 Transceiver	£240.00
SP101 Speakers	£10.00
FV101 Remote VFO	£38.00
FT200 Transceiver	£134.00
FP200 AC PSU	£38.00
FV200 Remote VFO	£38.00
FR400 DX Receiver	£120.00

FR400SDX Receiver	£160.00
FL400 Transmitter	£140.00
FT560 Transceiver	£195.00
FL2000B Linear amp 1200w	£135.00
FL2500 Linear amp	£118.00
FT2F 2m Transceiver	£84.00
FP2AC AC PSU for FT2F	£25.00

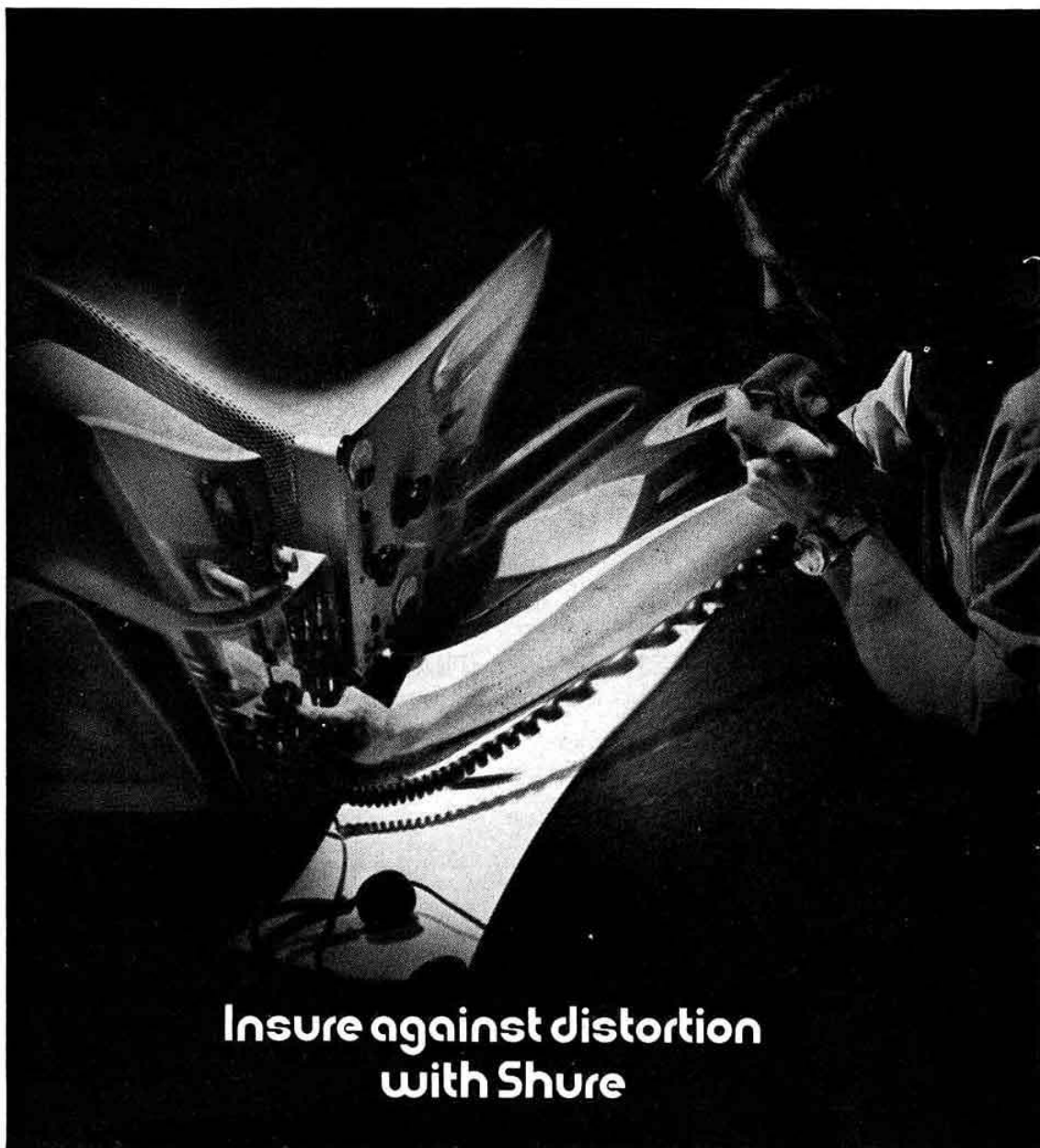
IDEAS FOR CHRISTMAS!

OSKER POWER METER (see Nov ad.) **£18.50.** CALSON 602, **£18.50.** '222' **£8.50.**
 747 AM/FM—VHF/AIR portable receiver. **£12.00.** Just the thing for the XYL in the kitchen (as well as /P!).
 HEADPHONES. Danavox 15 ohm. Steto - clip type. These do not make the ears ache like the large padded types, **£2.50** post paid.

LONDON AGENT—Roger Wilkins. Tel.: 01-845 6290 After 6.0 p.m.
 Hours of business Mon.-Fri. 9-1 p.m. 2-5.30 p.m. Saturday by appointment.
 *Your "one stop" single source of towers mast antennas etc.
 *Money saving "package deal" on purchase of mast, rotator and antenna.
 *Largest range in the U.K.
 Send for the catalogue/price list for ideas and stock items 15 pence.

WESTERN ELECTRONICS (U.K.) LTD.

OSBORNE ROAD, TOTTEN, SOUTHAMPTON, SO4 4DN, ENGLAND.
TEL.: TOTTEN 4930 and 2785. CABLES: 'AERIAL' SOUTHAMPTON



Insure against distortion with Shure

Shure Model 444—
controlled magnetic
microphone specially
designed for radio
communications applications
with special response
characteristic giving optimum
speech intelligibility.



Please send me full information on **RC5**
Shure Communications Microphones.
Name _____
Address _____

Tel: _____



SHURE

Shure Electronics Ltd.
84 Blackfriars Rd., London SE1. Tel: 01-928 3424

RADIO SOCIETY OF GREAT BRITAIN

FOUNDED 1913

INCORPORATED 1926

MEMBER SOCIETY

INTERNATIONAL AMATEUR RADIO UNION

PATRON: HRH THE PRINCE PHILIP, DUKE OF EDINBURGH, KG

COUNCIL 1971

PRESIDENT

EXECUTIVE VICE-PRESIDENT

IMMEDIATE PAST-PRESIDENT

HONORARY TREASURER

F. C. Ward, G2CVV

R. J. Hughes, TD, DLC, G3GVV

J. A. Saxton, DSc, PhD, CEng, FIEE, FInstP

A. C. Morris, AACCA, G3SWT

ORDINARY ELECTED MEMBERS

E. J. Allaway, MB, ChB, MRCS, LRCP, G3FKM

B. D. A. Armstrong, G3EDD

E. G. Ingram, GM6IZ

G. R. Jessop, CEng, MIERE, G6JP

L. E. Newnham, BSc, G6NZ

R. F. Stevens, G2BVN

G. M. C. Stone, CEng, MIEE, MIERE, G3FZL

E. W. Yeomanson, G3IIR

MEMBERS ELECTED BY ZONES

J. Bazley, G3HCT

W. F. McGonigle, G1GXP

C. H. Parsons, GW8NP

J. R. Petty, G4JW

W. A. Scarr, MA, FBIS, G2WS

A. W. Smith, GM3AEL

GENERAL MANAGER AND SECRETARY

D. A. Findlay, FCA, G3BZG

EDITOR

A. W. Hutchinson, MAIE

REGIONAL REPRESENTATIVES

Region 1.—North Western

Region 2.—North Eastern

Region 3.—West Midlands

Region 4.—East Midlands

Region 5.—Eastern

Region 6.—South Central

Region 7.—London

Region 8.—South Eastern

Region 9.—South Western

Region 10.—South Wales

Region 11.—North Wales

Region 12.—North-East Scotland

Region 13.—South-East Scotland

Region 14.—West Scotland

Region 15.—Northern Ireland

Region 16.—East Anglia

Region 17.—Southern

B. O'Brien, G2AMV, "Tanglewood", Anthony's Way, Heswall, Wirral, Cheshire.

K. Sketheway, BRS20185, 51 Baret Road, Walkergate, Newcastle upon Tyne.

R. W. Fisher, G3PWJ, 47 Elmhurst Drive, Kingswinford, Brierley Hill, Staffs.

T. Darn, G3FGY, "Sandham Lodge", Sandham Lane, Ripley, Derbyshire.

S. J. Granfield, G5BQ, St Lukes, 47 Warren Road, Cambridge.

L. W. Lewis, G8ML, 34 Cleavelands Avenue, Cheltenham, Glos.

P. A. Thorogood, G4KD, 35 Gibbs Green, Edgware, Middlesex.

D. N. T. Williams, G3MDO, "Seletar", New House Lane, Thanington, Canterbury, Kent.

J. Thorn, G3PQE, 43 Hill Road, Weston-super-Mare, Somerset.

D. M. Thomas, GW3RWX, 88 Cefn Graig, Rhiwbina, Cardiff CF4 6JZ.

P. H. Hudson, GW3IEQ, "Silhill", Dinas Dinlle, Llandwrog, Caernarvon.

G. M. Grant, GM3UKG, Easter Bogs, Clochan, Buckie, Banffshire.

V. W. Stewart, GM3OWU, 9 Juniper Avenue, Juniper Green, Midlothian EH14 5EG.

N. G. Cox, GM3MUY, 191 Maxwell Avenue, Westerton, Bearsden, Glasgow.

J. Thompson, G1ILV, "Albany", Newry Road, Armagh, N. Ireland.

W. J. Green, G3FBA, 29 Oaklands, Old Buckenham, Attleborough, Norfolk.

C. Sharpe, G2HIF, 20 Harcourt Road, Wantage, Berks.

CERTIFICATES MANAGER (HF)

CERTIFICATES MANAGER (VHF)

HISTORIAN

INTRUDER WATCH ORGANIZER

QSL BUREAU MANAGER

RECORDED LECTURE LIBRARY

CURATOR

SLOW MORSE PRACTICE

TRANSMISSIONS ORGANIZER

TRPHIES MANAGER

VHF MANAGER

C. R. Emary, G5GH, Westbury End, Finmere, Buckingham.

Jack Hum, G5UM, 27 Ingarsby Lane, Houghton-on-the-Hill, Leicester LE7 9JJ.

L. E. Newnham, G6NZ, 17 Washington Road, Emsworth, Hants.

C. J. Thomas, G3PSM, 65 Charlton Drive, High Green, Sheffield S30 4PA.

A. O. Milne, G2MI, 29 Kechill Gardens, Bromley, Kent.

A. O. Milne, G2MI, 29 Kechill Gardens, Bromley, Kent.

M. A. C. MacBrayne, G3KGU, 25 Purlieu Way, Theydon Bois, Essex.

P. Carey, G3UXH, 99 Bell's Lane, Hoo St Werburgh, Rochester, Kent.

G. M. C. Stone, G3FZL, 11 Liphook Crescent, Forest Hill, London SE23.

A Seasonal Message From The President



MY term of office is rapidly drawing to a close and I take this opportunity to say how proud I have been to serve as the RSGB's thirty-seventh President. It is an honour which I had never expected and I can only hope that I have done justice in keeping with Society tradition.

It has not been a year without problems: staff difficulties, postal troubles and, in keeping with ever-increasing prices, an inevitable rise in our own subscription. Nevertheless our membership is very healthy and ever-increasing, but I would like to see every member do his utmost to enrol one other so that our membership could be doubled.

I have tried to make personal contact with as many of you as possible during my various travels, and I would like to thank everyone at home and overseas who has helped me in my task and who has in other ways contributed to the success of the Society during 1971, in particular the YLs and XYLs who allow us to pursue our wonderful hobby of amateur radio.

I wish you all, friends old and new, a most enjoyable Christmas and a very happy and prosperous 1972.

F. C. Ward

QTC

AMATEUR RADIO NEWS

Society publications, Region 10

In an attempt to economize on postage and packing costs, both for the Society and for the individual, Mr. C. H. Parsons, GW8NP, 90 Maesycod Road, Heath, Cardiff, has agreed to hold stocks of Society publications, maps etc. for sale at cover price for individual collection from his QTH. It is thought that visitors from the more distant parts of the region could collect for a group and thus effect considerable savings. Either a postcard, or a telephone call to Cardiff 68768, will ensure that material is available and ready for collection at times convenient to the purchaser. If this experiment is a success, it could well be extended with considerable benefit to the Society.

"Just look at the weather"

The attention of members is drawn to the terms of the Amateur Sound Licence and the section of Statutory Instrument No 548 of 1970, section 3, *Exemption from Licence*. In neither the amateur licence nor the subsequent statutory instrument is there provision for the reception of signals from earth satellites. Those who wish to avail themselves of this facility should formally request permission from the Ministry of Posts and Telecommunications, A & S.L.B., Waterloo Bridge House, Waterloo Road, London SE1 8UA.

Morse Test fee

The general manager has received the following letter dated 11 November 1971 from the Radio Regulatory Department of the Ministry of Posts and Telecommunications:

Dear Mr Findlay,

AMATEUR MORSE TEST

In my letter of July 27, 1970 about the Morse Test fee I said that the fee of 10s had remained unchanged since 1956; that the cost of conducting the test was more than three times that amount; that to avoid an unreasonable increase the fee would be doubled to £1 from 1st October 1970; and that although we could not guarantee there would be no further increases we hoped to hold the fee at £1 for at least twelve months.

I am afraid that further review shows that the total costs involved in conducting the tests are approximately twice the total revenue received from a £1 fee and we shall, therefore, bring the fee up to an economic level by increasing it to £2 from 1st January 1972.

Would you please inform your members accordingly and that we intend to review the fee again in 1972/73.

Yours sincerely

G. A. Wootton

Ely and District Radio Society

It is proposed to form an Ely and District Radio Society and anyone in that locality interested in the project is asked to contact Mr P. R. Brown, A6775, 59 Fieldside, Ely, Cambs, or G3KKC, QTHR.

There will be an initial meeting at 7.30pm on 10 December at the Ely Adult Centre on which it is proposed to base the society.

President of RSGB for 1972

Mr R. J. Hughes, TD, DLC, G3GVV



Mr R. J. Hughes
operating
G4AJS

Taking office on 1 January 1972 as President of RSGB will be Mr R. J. Hughes, Council member for Zone C since 1968. He joined the Society in 1949, was first licensed in 1950, and is active on all bands from 3.5 to 144MHz.

Currently a member of the following committees of the Society: MPT Liaison, Finance & Staff, Membership & Representation, and Education, Mr Hughes is also a member of the IARU Working Group and of the RAE Advisory Committee of the City & Guilds of London Institute.

After service with the RAF from 1940 to 1946 he was a member of the RAuxAF until 1957, following which he served in Royal Signals (TA and AER) as second-in-command of the regiment.

Mr Hughes is now Director of Technology at Tonbridge School and runs the school's radio club, G4AJS.

Q multiplier coils

Enquiries are frequently received concerning a source of supply of coils suitable for use in Q multiplier units operating at the standard intermediate frequencies. These are now available from **Electronic Techniques (Anglia) Ltd.** Type HQ4 is the main tuning coil (equivalent to the former Electronics QL4) and HQ10 for cancelling the reactance of the connecting coaxial cable (equivalent to QL10). Prices are 50p for each coil plus 5p postage. A suitable trimmer is available for 7½p. The address of Electronic Techniques (Anglia) Ltd is Viking Works, Kirton Green, Kirton, Ipswich, Suffolk.

RSGB Dinner Club

The next meeting of the RSGB Dinner Club will be at the Kingsley Hotel, Bloomsbury Way, London WC1, on Friday 10 December 1971 at 7.30 for 8pm. The Kingsley Hotel is a few minutes' walk from Holborn tube station and there is ample car parking space in the vicinity. The cost of the dinner is £1.70 and bookings accompanied by a remittance may be sent to Mrs Sheila Evans at RSGB headquarters. Please note that bookings must close 24 hours before the dinner.

All RSGB members are welcome to this informal occasion and a particular invitation is extended to overseas amateurs who may be visiting London.

Installation of President 1972

Mr R. J. Hughes, TD, DLC, G3GVV, will be installed as the thirty-eighth President of the Society during the course of a social evening on

Friday 7 January 1972

at the

**Bonington Hotel, Southampton Row
London WC1**

commencing at 7.30 pm

Admission will be by ticket, available on request (with sae) from Society headquarters. Tickets are restricted to two per member.

Advertising rates

The cost of commercial advertisements in *Radio Communication* will be increased with effect from 1 January 1972. It is with reluctance that this step has been taken but the publishers cannot continue to bear the whole of the recent increases which have affected paper and printing.

The following figures show the increases in recent years related to the composing costs only (not including paper and machining) of a ½-page advertisement:

January 1967: £6.48

March 1970: £7.95

December 1970: £9.95

August 1971: £10.60

During the same period the advertisement rate for a half page appearing every month has increased from £14.50 to £17. These figures will provide some indication of the way in which revenue has lagged behind cost.

A recent investigation has shown that when all costs related to advertising are taken into account, and which include composing, machining, paper, clerical work and advertising agent's commission, the Society has in fact lost money on certain types of advertisements. Obviously this state of affairs cannot continue. A letter giving details of the new rates is being sent to all those who advertise in *Radio Communication*.

RAIBC

With immediate effect, all correspondence concerning the Radio Amateur Invalid and Bedfast Club should be addressed to the honorary secretary, Mrs Frances Woolley, G3LWY, at her new address: Woodclose, Penselwood, Wincanton, Somerset.

The club now has close on 400 members in 13 countries and will celebrate its 18th anniversary next year. It extends a welcome to licensed amateurs and swls anywhere who are handicapped in any way. Membership is free and the club's newsletter *Radial* is sent monthly for a small sum to help cover printing and postage costs.

The honorary secretary will be pleased to hear from prospective members, supporters or representatives.

"VHF-UHF Manual"

Readers should note the following corrections: Chapter 10, page 10. 18, fig 10. 42. Capacitor shown as 56pF should be 6.8pF and the resistor shown as 470Ω should be 4.7Ω. The tuning capacitor used in the prototype was a Polar (Wingrove and Rodgers) C18-11 having a minimum capacitance of 3pF and a swing of 6.5pF.

JUST LOOK AT THE WEATHER!

Part 2. Making pictures from the APT signal

by REV P. W. SOLLUM, OSB, BSc (Eng), PhD, G3BGL*

THE principle of a photographic system for printing APT pictures is as follows: the picture is built up on the screen of a cathode ray tube by a slow-motion process that is exactly similar to a tv picture—the spot is scanned over the screen by two timebases, horizontally by the line timebase at four lines/s, and vertically by the frame timebase once in 160s or 200s depending on the type of satellite. During this process the brightness of the spot is varied by the video signal. Throughout the period of one frame an exposure is made on photographic bromide paper, which is then developed, fixed and dried to produce the finished print about five minutes later. The print is a positive because the video signal is applied to form a negative image on the crt. One of the timebases scans backwards compared with the normal tv system to provide the lateral inversion required on the negative. By this method a 3½in by 3½in print can be turned out at an average cost in materials of about 2p, or a 2in by 2in print for 1p, which is low enough to tolerate considerable wastage in experimenting.

The whole photographic process can be performed in the yellow/orange light of a darkroom safelight, so can be

demonstrated and operated easily, and all the red warning lights on power supplies can be left glowing for safety. There are no problems in setting up the whole system in a school laboratory darkroom, but it might be rather cramped or inconvenient in the cupboard under the stairs or the bathroom at home! However, some drawing pins and black paper would soon make the average radio shack dark enough for the purpose if the photographic operating area is kept away from any slight chinks of light leakage.

The critical feature of the system is the line synchronization technique. In the method described here, the video carrier is divided, or counted down, from 2,400Hz to 4Hz to control the line scan. The peak-white pulse sent by the satellite cannot be used directly since it is indistinguishable at times from certain cloud features in the video waveform.

As mentioned in Part 1, there are four sub-project headings under which the picture printing system will be described: picture tube adaptation and power supply, scanning circuit construction, line synchronization arrangements, and photographic requirements. Each of these could be planned on a multi-purpose basis, for other applications of the apparatus will readily suggest themselves, particularly in a school laboratory. Two items of test equipment are almost indispensable for undertaking these projects: an oscilloscope

* Douai Abbey, Upper Woolhampton, Reading, RG7 5TH.

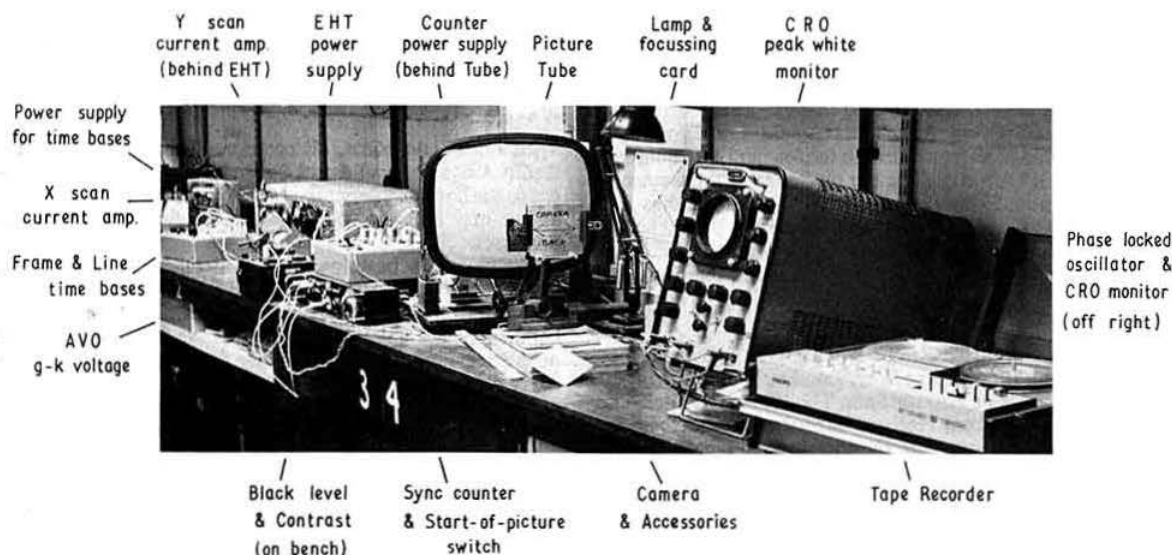
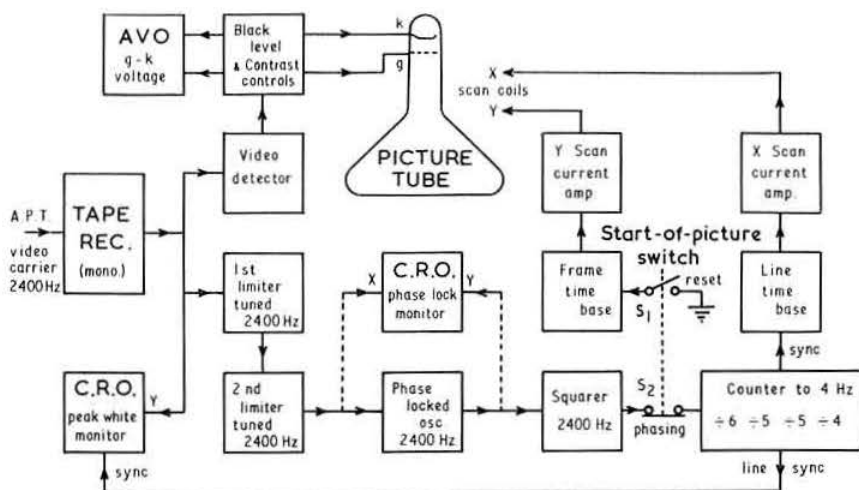


Fig 8. The apparatus for photographic printing of APT. A few items are off the picture or hidden, but the kind of set-up that grows from a separate-unit approach to construction is well illustrated. Many interconnecting leads are required and care must be taken to avoid induction of mains hum

Fig 9. A block diagram of the complete APT picture system. The control, limiter, and oscillator blocks employ only one pentode or double triode each. The blocks on the right each employ several transistors, so the diagram illustrates the functional requirements, not the total stages involved



and a high resistance multimeter; but it would be a stimulating challenge to get along with less expensive instruments. A tape recorder with a recording of an APT signal is essential as a signal generator for test purposes.

Picture tube adaptation and power supply

An old tv tube is ideal as the picture tube for the system because its white-glowing screen phosphor has high actinic value for photography, and because such tubes are readily available from a dealer's junk yard or from friends who have just bought the latest model. One might have to try more than one to get a tube with good emission, an undamaged screen and no heater cathode leakage. The tube should be obtained complete with its scan coils, focusing and centring devices, and ion trap magnet. If one has the choice, a flatter face tube will give less distortion of the photographic image; a smaller tube will need a less lethal eht supply; a smaller scan angle will require less current in the deflection coils. There is a type of old tv set in which the tube is beautifully mounted on a baseboard, and the cabinet is removed by sliding it forward—the baseboard fits in grooves in the sides of the cabinet. A good mounting is important as accidents involving implosion of the tube could be serious.

An elegant arrangement is the AW43-80 tube, 17in diagonal, mounted in this way. Whatever its tv service requires, at 10kV eht it produces excellent APT pictures 8in square, keeping to the flattest part of the screen. It also requires about 300V between first anode and cathode; the grid cut-off occurs about -60V, and peak white around -54V. Scan coil resistances of 4Ω and 6Ω give rather different deflection sensitivities, and the exact current requirements for the chosen picture size must be determined by experiment; about $\pm 400\text{mA}$ ($2\frac{1}{2}\text{V}$) might be typical. Care should be taken not to burn the screen when testing the tube: a heater winding connected via a resistor to a scan coil would keep the spot moving.

The line scan system of the old tv might be salvaged intact for the eht power supply, but an extra scan coil assembly would be required: one to complete the old line timebase circuit, one for the APT scan. The original arrangements for the first anode and the brightness control might

also be salvaged, and some modification made to the video input circuit. Care would be necessary to couple the APT signal from the tape recorder via an isolating transformer because of the live tv chassis.

Fig 8 illustrates apparatus in which separate units perform each function in the system. There the eht power supply can be seen as a large piece of equipment, built for general laboratory use, with variac control of output voltage, and a built-in kilovolt meter. A half-wave voltage doubler circuit and an oil-filled 4kV transformer are employed. Old polythene 1lb solder reels are used for some of the eht insulators and mountings. The same unit also houses a 400V supply with a 300V stabilized output to supply the brightness and video circuits. The picture tube has its own heater winding to avoid leakage or breakdown as the cathode is operated about 120V above earth.

The most critical adjustment of the picture tube is its ion trap. The photographic emulsion is very sensitive to uneven illumination in different parts of the screen, and this is a difficult point to check scientifically except by scanning the screen with the timebases and exposing a piece of bromide paper, keeping the grid-cathode voltage constant.

The video detector is housed with the black-level and contrast controls in one unit. Fig 9 shows in block form how the functions of these circuits fit into the system, and the black box unit may be seen in Fig 8. The extension-speaker output of the tape recorder is stepped up by a push-pull valve type of af output transformer working backwards, and is applied to a full-wave rectifier circuit. The rectified output may be used unsmoothed to produce a positive image on the picture tube, each half cycle pulsing the brightness up to the correct white level, but with negative polarity there is need for a *small* smoothing capacitor if a good black is to be produced (ie white on the print). A time constant of about 0.2ms may be suitable.

A meter showing the grid-cathode voltage of the picture tube is essential for exposure control. The no-parallax mirror of the AVO makes it an ideal instrument as small errors in setting a relatively large bias voltage are capable of spoiling a picture. The contrast control should be calibrated with an arbitrary scale so that its setting can be repeated.

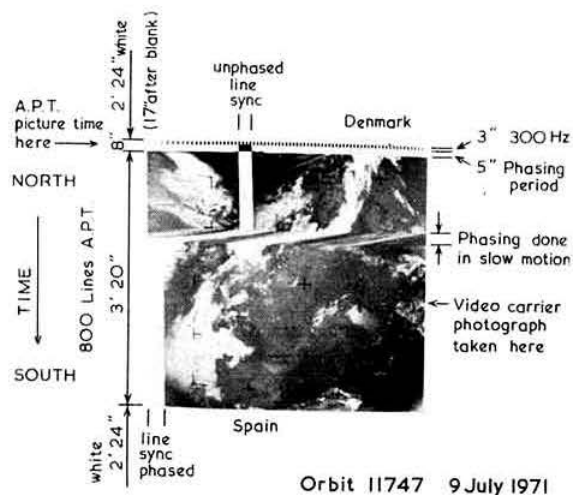


Fig 10. An illustration of the method of phasing—adjusting the position of the line sync pulse by allowing it to slip to the edge of the print. The picture also shows the ESSA-8 sequence, and is the picture from which the video waveform (Fig 5) was photographed. Most of the European coastline from Spain to the Adriatic, and from Portugal to Holland is visible but hazy. A frontal line of cloud obscures most of England. The central + mark is over the French-German border, near Strasbourg

Scanning circuit construction

It is difficult to think in terms of picture scanning without using the concept of timebases, but the provision of video data on a 2,400Hz sub-carrier in the APT signal makes the concept redundant. There are 600 cycles of the subcarrier in each line, and each cycle has a peak amplitude appropriate to the brightness at its position along the line. These positions were scanned in the satellite by a timebase and can therefore be reconstructed by another synchronized timebase, but they can also be reconstructed by stepping the spot $\frac{1}{600}$ of the line width across the screen at the arrival of each successive bit (cycle) of video data. Then each bit of video data will be in the correct position whether or not the bits of video data arrive at precisely regular intervals of time. The need for a time standard at the receiver is then eliminated, and irregular tape speed has no effect on the linearity of the reproduction. The scanning waveform is thus a staircase of 600 steps of equal height, but not necessarily equal time, in which each step is synchronized with the arrival of the appropriate bit of video data.

The circuits required for step-synchronized line scanning are based on the diode pump circuit with a transistor used to linearize the staircase waveform: a reference to this type of circuit is given in the appendix. This approach to line scanning is in every way superior to a timebase system—especially in economy of components, ease of adjustment and reliability in operation. The illustrations for this article were, however, made with timebase scanning circuits, and show that the conventional tv approach is capable of very good results.

In tv technique, a constant velocity scan is required to produce pictures having uniform scale, and to ensure uniform brightness conditions throughout the picture. The

principle is simple enough: a capacitor is charged with a constant current, so its potential rises uniformly with time. This voltage is used to control the current in the scan coil. When a determined limit has been reached, a trigger circuit operates to discharge the capacitor, and the cycle recommences. In practice it may be found difficult to get a really linear relationship between the control voltage and the current in the scan coil. In this case it may be possible to linearize the scan by generating an inverse curvature, the timing capacitor being charged exponentially through a suitable part of the curve, using a resistor in place of a constant current source. Power transistors are used in the scan coil current amplifiers. Owing to the heat generated, these amplifiers are built in separate units away from the timing circuits.

Both timebases should have automatic flyback to prevent burning of the screen. Controls for velocity and amplitude of each timebase are essential. The line timebase should have a very short flyback time, eg $\frac{1}{30}$ of the scan time, and be capable of very reliable synchronization or triggering by a train of suitably shaped pulses. The frame timebase must be designed to be reset to the start of a new frame at the throw of a switch.

The position of the picture on the screen can be adjusted by the shuffle plates or magnets which are usually part of the scan coil assembly, but electrical shift controls may be more desirable because the ion trap adjustment is only really correct for one position of the magnets. However, the APT picture need not fill the screen, and the camera position can be altered instead.

The large current requirement of the scan coils needs a massive power supply. It is disastrous if this introduces mains hum into the scan currents as the velocity ripple results in exposure variation, and diagonal lines appear on the print. The dc couplings which must be used at the slow scan rates introduce drift problems: an unstabilized supply may cause objectionable changes in the position of the picture as well as of scan amplitude. Laboratory NiFe batteries have been used with success, allowing a short time after switch-on to reach a stable voltage. It has not been possible so far to reduce the total consumption below 2.8A at 17V for the two timebases and scan amplifiers.

The frame timebase can be tested using a dummy load resistor in place of the scan coil, and a voltmeter with reversing switch connected across it. A graph is plotted of voltage against time, and adjustments made until good linearity is achieved with the scan time of 200s divided symmetrically between positive and negative voltage output. Then the line timebase can be built as a duplicate unit apart from the timing capacitor; about 40 μ A charging 1,000 μ F for the frame, and 1 μ F for the line scan may be a guide.

Alternatively, the line timebase can be built first and its output waveform investigated with an oscilloscope. The line velocity may be increased for testing to about 20Hz, but it is better to use the picture tube itself as an oscilloscope at the intended scan rate of 4Hz. About 12 cycles of the mains waveform may be displayed, connecting a heater voltage supply to the frame coils via a resistor; regular spacing of the cycles shows good linearity.

When the line timebase is synchronized correctly with the line sync pulses, ie "phased", the flyback will be blanked out by the video signal when negative polarity is used. With positive polarity the exposure time is too brief to record on the emulsion, and so even in this case the blanking facility

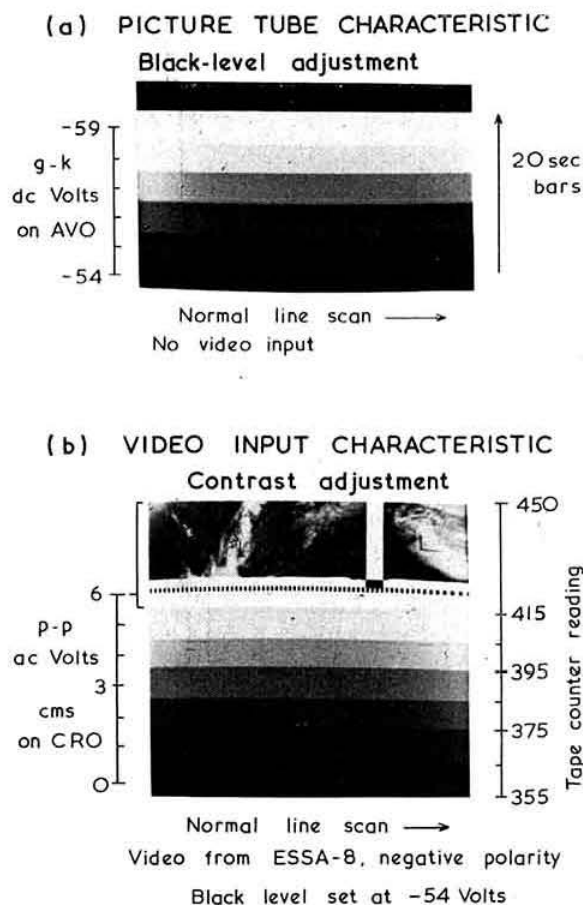


Fig 11. (a) An experiment to determine the brightness setting, ie the grid-cathode voltage of the picture tube, which prints a good black, and to correlate the grey scale with the g-k voltage. (b) An experiment to check the contrast adjustment by stepping up the steady white-level video input obtained from an ESSA-8 transmission between pictures

may be omitted. The frame flyback can be made to occur when the shutter is closed after the end of the picture; the flyback at "reset" occurs before the shutter is opened, so again no blanking is required.

Line synchronization arrangements

A reliable line sync or trigger signal at 4Hz is essential to the success of any scanning method. If it is derived from the 2,400Hz video carrier, the lock achieved will hold in spite of wow and flutter on the tape recorder, but the line length will vary a bit from line to line in a timebase scan system. The step-synchronized system requires a 4Hz trigger pulse to restart the staircase every 600th step. Two practical difficulties must be overcome: (i), the amplitude modulation of the carrier—black level is about 4 per cent or less of the peak white; and (ii), noise peaks and transients may interfere with accurate frequency division.

The first difficulty may be overcome by using two limiter stages in which the amplitude is clipped down to about one

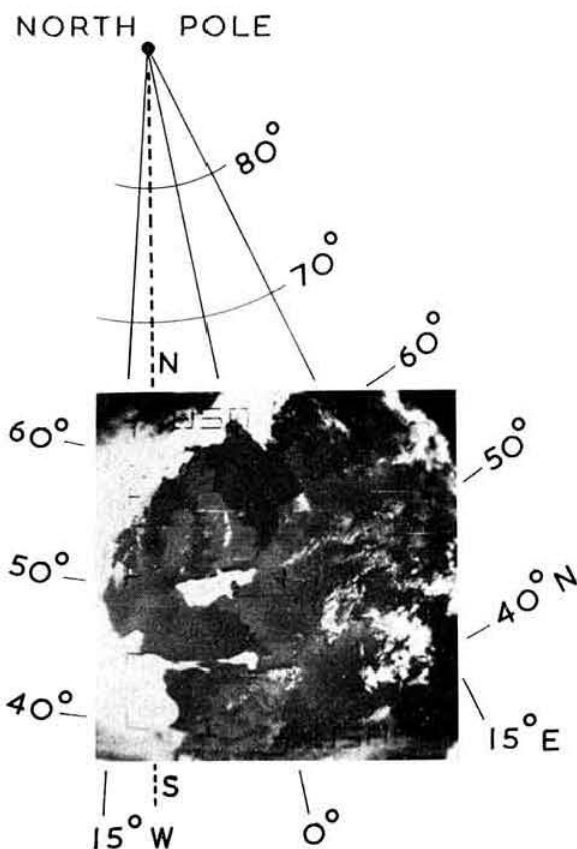


Fig 12. This picture was taken with a simple magnifying glass—a school laboratory type 10cm lens costing 25p, to show that inexpensive equipment can produce good results. The whole of the British Isles is clear of cloud, as is most of the northern coast of the Continent. The central + mark is at Paris. The line N-S is a line of longitude and so indicates the direction of the North Pole. This helps to orientate the picture correctly as it is in very nearly the same position on every picture

per cent of the peak-white level. The second difficulty is minimized by the inclusion of filtering at 2,400Hz in the two limiter stages. Tuned circuits employing pot-cores with a Q of 30 work well, but other circuits using RC active filters are equally effective.

The inclusion of a phase-locked oscillator in the system proved to be so successful and so simple (only an hour to build) that it should be regarded as an essential stage in the counting system. It is an RC (Wien bridge) oscillator into which the video carrier is injected after clipping. In the absence of injection the oscillator free-runs at the video carrier frequency—a fine control is needed to adjust this, and a monitor device to check it, eg CRO (as indicated on Fig 9), or magic eye, but headphones indicating the beat between video carrier and oscillator are entirely adequate. The optimum injection level must be found by trial, but once set correctly it should not need further adjustment. Further details are given in the appendix. Best results have been obtained when using maximum regeneration, although the



Fig 13. An orbit model for APT satellites in which a half globe can rotate about an axis inclined at about 12° to the vertical plane of the semi-circular strips which mark the limits of view at the sides of the APT picture. The strips are spaced about 30° of longitude measured at the equator. A wire frame is made to scale so that its squares correspond to the fiducial marks on the pictures; its position can be adjusted around the orbit guides. A summer-time sequence for ESSA-8 pictures is illustrated with the wire frame in the No 2 picture position

oscillator waveform is then far from sinusoidal. The output needs squaring before feeding in to the divider or counter stages.

Three methods of dividing have been tried with success: a chain of binary stages with feedback loops to obtain the $n:m$ ratio, a chain of four synchronized multivibrators, and a chain of four step-counters. The multivibrator method is simple to construct and adjust, reliable in operation, and it provides a very neat solution to the phasing problem. This requirement is illustrated in Fig 10. At the start of the picture a 5s period is provided in which to adjust the line sync position to the edge of the picture. The illustration shows this being done part way through the picture, and in slow motion for clarity. The multivibrator chain is disconnected from its drive by switch S2 (Fig 9) and so its first stage runs free. This must necessarily be at a slightly slower rate than when locked to a control frequency, so the timebase runs slower, and the position of the sync pulse advances systematically to the desired edge position. When it reaches there, switch S2 is closed again to reapply the control frequency and lock it there. If allowed to slip a little further than shown in Fig 10, part of the sync pulse would begin to appear at the other edge of the picture, and hence provide a white margin both sides. If the flyback time is appreciably shorter than the sync

pulse length there will be ample tolerance for setting S2 manually for the correct phased position without any loss of picture.

Using negative polarity, the phasing pulses appear as bright blips on the picture tube during the 5s phasing period and are easily observed. The free-running multivibrator is adjusted so that the position of the pulse slips its own width each successive line. At this rate it traverses the whole line during the 5s period if required, and this is not too fast for S2 to be operated at the correct moment.

The frame timebase also needs phasing to restart its scan at the beginning of the picture, so switch S1, Fig 9, is operated simultaneously with S2. A Post Office type key-switch is used for these functions and may be seen in the photograph of the apparatus, Fig. 8.

A CRO is the best instrument to check the division ratios of the counting chain, but the picture tube itself could be used, applying the outputs of successive stages to modulate the brightness (where a high impedance input would be available), and using the 4Hz timebase to display a row of dashes, each corresponding to a cycle of the counter waveform. It is advisable to provide buffers, eg emitter followers, for the output of each stage in the counter chain so that connection of the CRO does not disturb the adjustments. The counting must be reliable whether the first stage is driven or free-running, with a margin also to allow for temperature drifts. Zener stabilization of the power supply is essential, and it may be desirable to keep the power supply separate in the interests of temperature stability.

When step counters are used for the divider chain, switch S2 is re-positioned so as to interrupt the video injection to the phase-locked oscillator, and also slightly detune it (by about a semi-tone) to free-run a little slow, and so slip the phasing pulses to the edge of the picture.

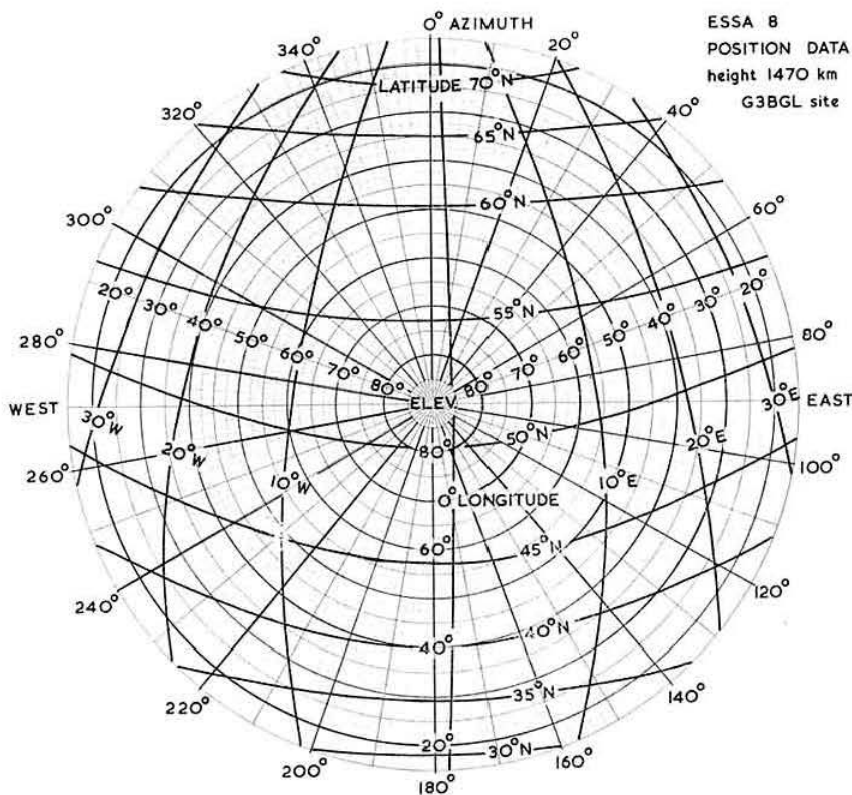
The output of the counter chain must be of suitable shape, amplitude and polarity to synchronize the timebase, and Fig 9 shows that it may also be used to lock the video waveform on the peak-white monitor. In many oscilloscopes an extra capacitor must be connected to the timebase to obtain a scan of 4Hz, and the value of capacitors in the external sync circuit may also be insufficient.

Photographic requirements

A simple home-made box camera is arranged on a stand in front of the picture tube. The lens used for all the APT illustrations in this article, except Fig 12, is a Ross Resolux, 9cm F/4 enlarger lens—a relatively expensive item. But Fig 12, which illustrates a point later on, was specially taken to show that very acceptable results can be obtained with a cheap lens if it is well stopped down. In this case a school laboratory type biconvex 10cm lens of 50mm diameter (only 25p!) was used with an aperture of F/16 ($\frac{1}{4}$ in hole in a piece of aluminium, taped over the front of the lens).

A reduction from 7in or 8in square on the picture tube to $3\frac{1}{2}$ in square or less gives a good size of print at an economic price. The length of the camera can be preset according to the reduction ratio chosen, and a box constructed to keep stray light from reaching the sensitized paper except via the lens. A simple plate can be rested against the front as a shutter—there is no need for anything elaborate for 200s exposure! A flange around the back enables the bromide paper to be held in position with spring back clips, and a metal plate is also clipped to keep stray light from the back of the paper. These details are visible in Fig 8. The laboratory lens may be

Fig 14. A data chart to obtain the latitude and longitude of ESSA-8 from given azimuth and elevation angles. The aerial direction is noted at the time the APT picture is taken (cf sequence, Fig 10), and the corresponding geographical co-ordinates are those of the central + mark on the picture. The chart is correct for central southern England



clamped between two pieces of hardboard in which central 1in holes have been made, this mounting being fixed to the flange at the front of the box. For a half-size image and 10cm lens: distance from lens to back of camera 15cm, from lens to picture tube 30cm. For a full-size image: 25cm lens, 50cm from back of camera, 50cm from picture tube.

Focusing is done accurately by clipping a piece of tracing paper to the back flanges; a brightly lit focusing card or piece of graph paper is placed in front of the camera, and the position of the camera adjusted for a clear image. The room should be dark for this adjustment. Then the camera is placed at this same distance from the picture tube allowing for the thickness of the glass and the curvature of the screen.

When the whole system is ready for operation, two experiments should be made to determine the exposure conditions. Fig 11 shows what may be expected. In making these experiments the exposed bromide paper should always be developed according to the recommended times and temperature: the processing must be standardized to obtain consistent results. In Fig 11(a) the black-level adjustment is determined by exposing successive strips of the raster at different grid-cathode voltages. The black level is that which prints black in the final picture, and so is -54V when the video is applied with negative polarity, or -59V when the video is applied positively (to make paper or plate negatives). It is the brightness level before video is applied. Although the -59V level prints white, the trace on the picture tube is still quite visible. Other types of sensitized materials or optical conditions will give different characteristics.

In Fig 11(b) the black-level is adjusted to the level determined by the first experiment, and video (steady tone) is then applied in increasing steps to obtain a grey scale from which the correct contrast can be selected. An af signal generator can, of course, be used in lieu of the tape, but ESSA-8 sends a steady peak-white level for over 2min, which is sufficient for the tests. In the figure, the tape has been allowed to run on into the start of a picture—the same picture as in Fig 10. It may be found in practice that the contrast sometimes needs to be increased beyond the level indicated by this test as the dynamic characteristics are influenced by the time constant of the video detector. Once the correct settings have been found, picture printing can begin in earnest.

Calibration of the pictures

The activities of the orbit prediction group should include the calibration of the pictures, ie marking lines of latitude and longitude, or drawing an overlay outline map to show what land lies under the clouds. Fig 12 shows a graticule based on a great-circle map centred on the North Pole applied to an ESSA-8 picture. One true line of longitude is parallel with the vertical edge of the picture and lies just within the left-hand fiducial marks. This position only varies slightly in successive pictures and is a help to correct orientation. If some coastline is visible its co-ordinates may be found from an atlas, and a construction used to find the position of the pole and the scale. A model helps to identify small portions of visible coastline and Fig 13 shows the

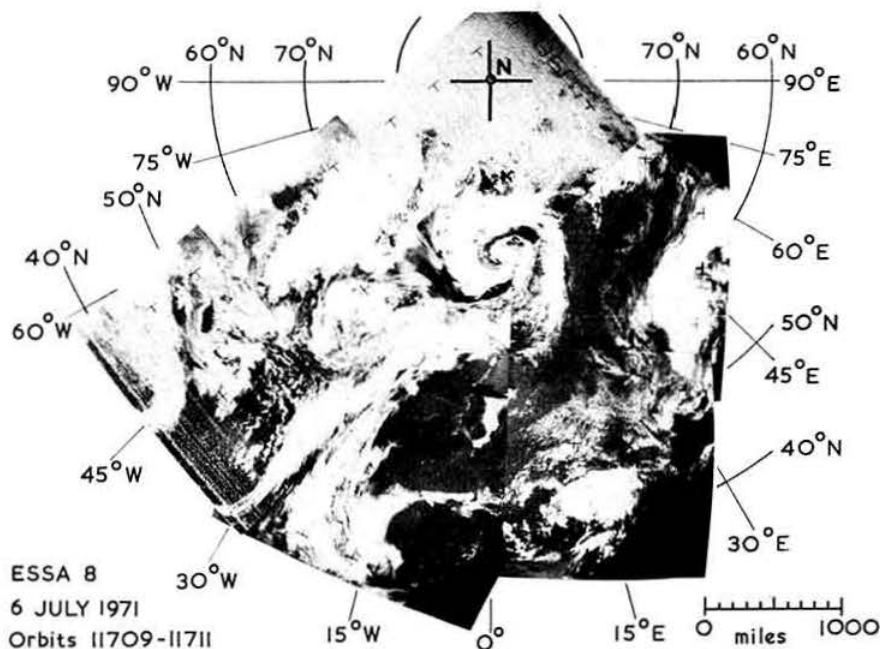


Fig 15. An end-product picture from ESSA-8 showing a big depression (large white spiral cloud formation) to the east of Greenland. Seven pictures from three passes form this mosaic. The geographical coordinates are drawn as for a great-circle map centred on the North Pole. This is reasonably accurate as far south as the Mediterranean which is at the bottom of the picture

detail of a model in which a wire grid frame can be adjusted along an orbit path to indicate what points are under the fiducial marks on the picture. The half globe is rotated under the orbit to adjust the model for each pass. Between passes it is rotated 28° . A diagram on the model shows a particular summertime sequence of three ESSA-8 pictures and their overlap areas.

The correct position of the globe in respect to the orbit can be obtained from the visible details of land in the picture, but it can also be predicted from the tracking data. Fig 14 is a data chart giving the latitude and longitude of ESSA-8 from the observed angles of azimuth and elevation. If these have been recorded at the start-of-picture signal (300Hz cue), then the central $+$ fiducial mark on the picture corresponds to that position, and the model can be correctly set up.

A final example of an end-product from ESSA-8 is given in Fig 15. The great-circle grid of latitude and longitude centred on the pole is sufficiently accurate for most purposes down to Mediterranean latitudes. The scale of distance corresponds to the radial scale of latitude. In assembling the mosaic, the pictures of one pass are first overlapped correctly, with a slight lateral displacement between pictures corresponding to the earth's rotation of 11° . The successive passes are then overlapped with an angle of 28° between them, aligning the cloud and coastline features as well as possible. The two-hour interval is sufficient for some change in detail to occur in the cloud formations, from which the trend in the weather movement may be seen, but this information is lost once the full picture is stuck together.

ESSA-8 sends one other "picture" not so far mentioned: a blank picture consisting of a grey background on which only the fiducial marks appear, printed black as usual. This picture is sent at the start of a sequence and is followed by only 17s of white before the first real picture. The blank

picture can be received only on the later passes in summertime, but on all passes in winter; it is sent immediately following an abrupt switch-on of the transmitter. The aerial must be ready in the right direction and the tape recorder running.

Conclusion

No project of this kind can get off the ground without a lot of help, and thanks are offered here on behalf of the Douai School Radio Society to the many kind people who have given ideas, information and equipment or "junk" to further the success of the project. It is hoped that this article will help many other project groups to tune in for a space-age look at the weather.

Appendix

The phase-locked oscillator circuit is basically that of the Wien bridge af signal generator, *Radio Communication Handbook*, page 19.29, Fig 19.40, V1 only, using a 12AU7, and $0.001\mu\text{F}$ with $66\text{k}\Omega$ in the bridge arms. Grid leak mixing is used to inject the video carrier; the output is taken from one of the cathodes, both cathodes having $1\text{k}\Omega$ resistors, with no lamp. A transistorized version of the circuit is equally satisfactory. Step counter stages and a description of their operation are included in the transistorized crystal calibrator: page 19.14, Fig 19.21; a valve multivibrator stage is included in Fig 19.19, page 19.13. The component values would have to be adjusted to suit the frequencies from 2,400Hz to 4Hz.

Editor's note

Readers' attention is drawn to the fact that reception of signals from earth satellites is not permitted by the amateur licence. See notice under QTC on page 818.

EQUIPMENT REVIEW

Burns Electronics solid-state fm detector module Type FMD-1

NARROW-BAND frequency modulation is rightly becoming a popular mode for amateur vhf and uhf communication and the Burns Electronics fm detector module Type FMD-1 may readily be added to most communications receivers to enable full advantage to be taken of nbm transmissions.

It is possible to resolve nbm signals by slope detection on an a.m. receiver, ie by tuning slightly off the signal frequency and utilizing the slope of the i.f. passband for demodulation, but this method is not to be recommended as it deliberately throws away two of the main advantages of the mode; the quietening effect on receiver background noise in the presence of a carrier and the rejection of a.m. interference when a correctly adjusted discriminator type of detector is employed.

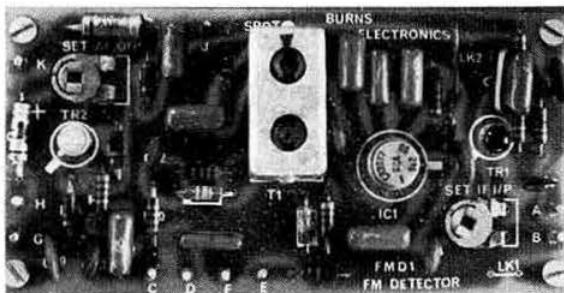
The FMD-1 is supplied either as a complete unit or as a kit of parts, and as the overall measurements of the unit are only 4in by 2in by 1½in it should be possible, in many cases, to accommodate it inside the existing communications receiver.

No difficulty was experienced in assembling the kit version of the unit with the aid of the explicit instructions in the handbook and the clearly marked position for each component on the fibre-glass printed circuit board.

The circuit comprises an emitter-follower stage to present a high impedance for coupling to the receiver i.f., an integrated circuit, type CA3011, providing an i.f. amplifier/limiter, a Foster-Seeley detector (discriminator) and an audio amplifying stage. A dc supply of between 6V and 9V at approximately 15mA is required and provision is made for this to have either the positive or the negative side earthed. As a matter of interest, the CA3011 includes within its 0.3in diameter casing three dc-coupled differential amplifier stages, with a total of eight transistors, plus a voltage regulating network itself comprising seven diodes and two transistors.

It is recommended that the FMD-1 be connected to the input of the i.f. amplifier preceding the detector in the communications receiver via screened cable (a length of which is supplied) unless the unit can be mounted close to the circuit concerned. When ordering either the complete

by W. H. ALLEN, MBE, G2UJ*



unit or the kit of parts it is necessary to specify the i.f. required, which may lie between 450kHz and 1MHz. The only other modification necessary to the main receiver is to disconnect the output of the af gain control from the input to the af amplifier and to connect these two points via screened cable to the three-way function switch provided. The three switch positions give (1) a.m./cw (status quo in the receiver), (2) fm with de-emphasis at 6dB per octave from 300Hz to 3kHz, or (3) fm with a flat audio response.

The FMD-1 was tested in conjunction with an R1475 receiver having an i.f. of 600kHz and, in consequence, a discriminator transformer of that frequency was employed.

Having retrimmed the i.f. transformer in the receiver to compensate for the added circuitry, a steady carrier was tuned in and with a milliammeter connected to the test points indicated in the instruction book, the two cores in the discriminator transformer were adjusted, one for maximum reading and the other for minimum. During reception of an nbm signal, a slight readjustment of one or both cores may be found necessary to obtain the best audio response but it would be advisable to check on several transmissions before finalizing this adjustment.

There are two pre-set potentiometers on the unit. The input control is set in conjunction with the receiver i.f. gain for maximum limiting on an a.m. signal, and the second, controlling af gain in the unit, is adjusted so that the audio output is similar on either a.m. or nbm signals. The specified i.f. input to the unit for limiting to commence is 300µV, and as the overall gain is considerable, no difficulty was experienced in securing adequate limiting and volume on even weak nbm signals on the two-metre band. The voltage of the dc supply to the FMD-1 was not found to be critical and between 7 and 8.5V proved satisfactory.

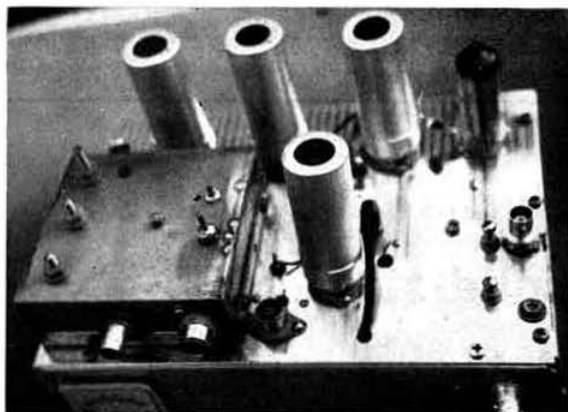
This equipment can be recommended for use in conjunction with an existing receiver or for incorporation in a new design.

The price of the kit is £6.70, and of the complete unit £8.20.

* "Cobbs", Challock Lees, Ashford, Kent.

The G3EEZ 9cm converter

by A. WAKEMAN, G3EEZ*



AFTER having some measure of success with narrow band transmission on this frequency, a narrow band converter became necessary. The initial arrangement of changing crystal frequency and using the transmitter to drive the mixer circuit was only partially successful due to having a multiplicity of circuits to adjust on changing from transmit to receive. It was decided, therefore, to develop a self-contained converter for use on this band for portable and fixed station use.

The first decision to be made was whether to use transistor or valve circuitry, and since it was necessary to purchase the transistors—particularly at the 381MHz stage—this did entail a considerable outlay. The power supply presented no problem since a narrow band 13cm converter using valves was already in use together with its inverter supply. Since the necessary valves were readily available, it seemed an obvious choice to develop a valved version. If it is desired to use transistors in the multiplier circuits, a possible source is the Mullard G8ARV transistor board [1] together with circuits to produce the 381MHz output. Requirements here are 1–2W of rf at this frequency.

Circuit description

A triode pentode valve, ECL80, is used as the first multiplier—the triode section in a conventional overtone oscillator arrangement using an overtone crystal of 42.333MHz. The supply to this stage is stabilized with an OB2 gas stabilizer. The output is coupled to the pentode section of the ECL80 which triples to 126.999MHz, series tuned from anode to ground with a small tubular trimmer capacitor.

The output of the ECL80 is link coupled to the cathode of the first A2521 with standing bias provided by the 470Ω resistor. This stage triples to 380.997MHz, the anode line tuned by a fabricated disc capacitor formed by two 1/2in diameter copper discs. The output here is again link coupled to the second A2521 [2] operated as a straight grounded grid amplifier at 380.997MHz, the anode line tuned with a fabricated disc capacitor.

The output is link coupled to an output socket to transfer the rf to the input circuit of a BAY66 varactor tripler. This unit is similar to a varactor unit described in the *ARRL VHF Manual* and the October 1967 issue of *RSGB Bulletin* [3] with modified strip lines.

The output from the varactor unit at 1,142.99MHz is coupled to a GEX66 multiplier diode in a trough line cavity, the reactance of the diode being largely cancelled by another fabricated capacitor adjacent to the trough cavity side. Output from the IN21 mixer diode in the trough cavity is coupled to a conventional head amplifier cascode, which is an ECC85, the output of which is link coupled to provide an input for the main i.f. receiver.

Construction

The converter is built on an 8in by 5 1/4in 18swg aluminium sheet, and the figures and photograph show the layout used.

The sides are made in two pieces and bent at 90° to form one long side and one short side of the chassis plate. It is necessary to bend up the two sides of these members 1/8in–1/16in to provide a fixing flange to the chassis plate, the other flange thus providing a flange for fixing a base plate to completely seal the bottom. This type of chassis make-up considerably eases wiring.

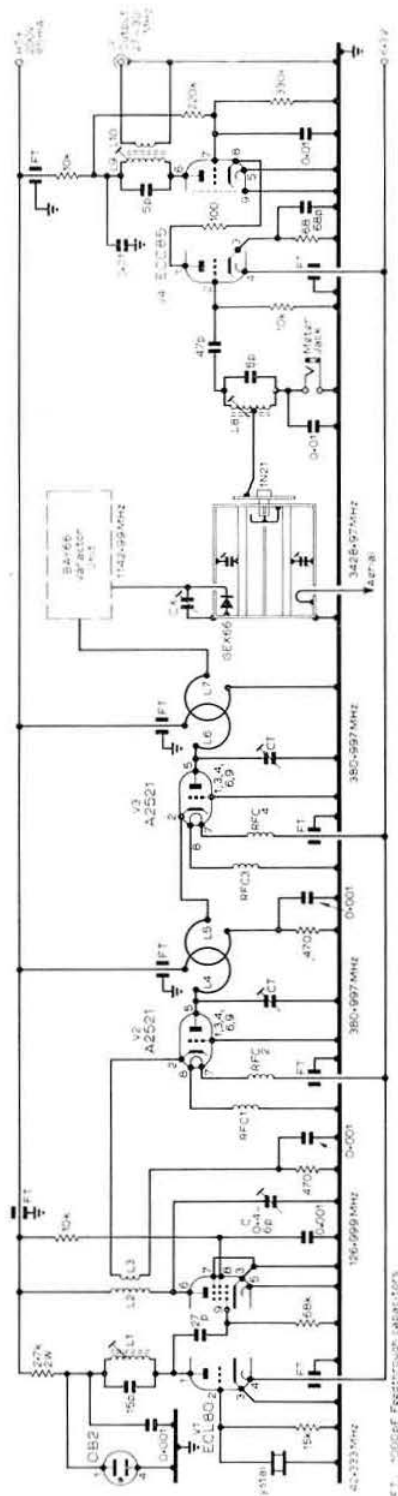
The mixer trough is made from a U piece of 18swg brass, 2 1/8in wide, 1 1/8in inside dimension with 1in flanges, the two side pieces well soldered on. It is an advantage to have a block of the correct size to support the sides while this is done—a blow torch also being necessary. The centre partition is then soldered in—again a block of the correct size being an advantage to support the centre partition while soldering.

The varactor unit is built in a brass box 3 1/4in square and 1in deep and the necessary articles for construction of this unit will be found in the references given.

The screen across the A2521 tripler valve was found necessary to fully stabilize the unit and for convenience in making earthing points.

The screens across the A2521s and ECC85 valves were made from thin tin plate to facilitate soldering and should

* 1 Kendal Close, Aldersley, Wolverhampton, Staffs.



be well bonded to chassis solder tags. All grid pins on the A2521 valveholders are bent and soldered to the centre spigot of the valveholders, these in turn being well soldered to the partition screens.

Alignment

Most of the coupling circuits are quite critical for best output, and in lining up it is as well to check that the stages are stable by detuning the crystal stage, when the output should fall to zero. The adjustments of the A2521 line tuning capacitors are made by varying the spacing between the discs to achieve resonance. Similarly, the capacitor between the multiplier diode and mixer trough side is adjusted thus for best crystal current and will be found to be quite critical.

A small bulb (6V 0-04A) will light as the output at 381MHz is brought to the maximum, and the coupling circuits at 127MHz and 381MHz can be adjusted. These are critical and require fairly loose coupling—in the author's case the spacing between L4 and L5 was approximately $\frac{1}{16}$ in and between L5 and L6 was $\frac{1}{8}$ in, but these spacings will depend on the valves used. Cement the coupling in place at 127MHz after adjustment—approximately half mesh with L2. The output coupling at 381MHz, together with the input to the varactor, should be adjusted for maximum output at 1,143-MHz to a wavemeter connected to the varactor output.

The mixer block follows the accepted pattern as on lower frequencies [4] apart from dimensions. The drawing shows the construction of this unit. A GEX66 multiplier diode is used although a 1N914 has been tried. However, the 1N914 seems less selective to spurious responses from the varactor than does the GEX66. The GEX66 line produces two peaks—one with the tuning screw quite close to the line, the other approximately $1\frac{1}{2}$ turns out. The second is the peak required and can be checked with a meter in series with the mixer diode. Tuning the aerial line should produce the customary dip in current and slacking off the screw about one turn should bring the line close to resonance at 3,456MHz. When all circuits are finally adjusted it should be possible to obtain 0.10–0.25mA of crystal current without difficulty. It is also worth selecting a mixer crystal which offers the best signal and rectification as at this frequency crystals seem to vary considerably.

The head amplifier valve (ECC85) shows no tendency to instability when the circuits are staggered to produce the 3MHz bandwidth (27–30MHz corresponding to 3,456–3,459MHz). The aerial input coupling is made as shown on the drawing and can thus be varied by turning through 90°.

Signal source

It has been found a decided advantage to have a small signal source available at this frequency to check aerials, feeds and the converter. This was achieved at the author's QTH by using an old 126MHz valved unit giving about 2W output. A harmonic at 3,458MHz was usable but required direct coupling to the aerial socket. A much improved signal was found available if the output was taken to a multiplier diode (a 1N914) in a single trough cavity similar to the one in the converter and tuned to the 27th harmonic. The signal could then be heard some considerable distance away using a dipole in the aerial socket.

Comments

A word of caution in using overtone crystals. If the capacitance existing across the crystal circuit (ie extraneous

capacitance, capacitance of crystal holder etc) is not identical to the capacitance used in checking the crystal on grinding, then some change of frequency can occur, which may be appreciable when multiplied 81 times. In the author's case a calculated i.f. of 27-30MHz proved to be 26.5-29.5MHz! The local oscillator unit could be used as a transmitter in its own right, providing 10-100mW of output. It is quite surprising what can be achieved with this sort of output and a high-gain dish aerial. The 13cm band for narrow band work has now been accepted as 2,304-2,306MHz. It will be noted that the frequency coverage of the 9cm converter bears direct harmonic relationship to the 13cm band, covering as it does 3,456-3,459MHz.

If the converter is required to operate from a 12V supply the two A2521 heaters may be connected in series. The ECL80 and ECC85 heaters may also be connected in series but a resistor is required across the ECL80 heater as the ECC85 takes 435mA and the ECL80 300mA (see circuit). An alternative would be to replace the ECC85 with an ECC88 taking 300mA. However, the voltage would then have to be reduced to this stage.

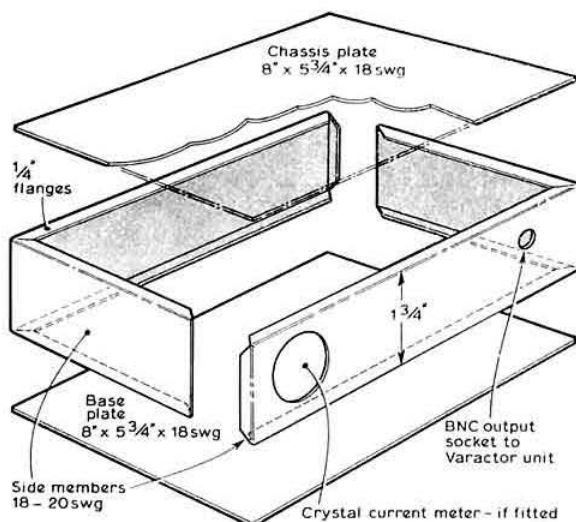


Fig 3. Chassis detail

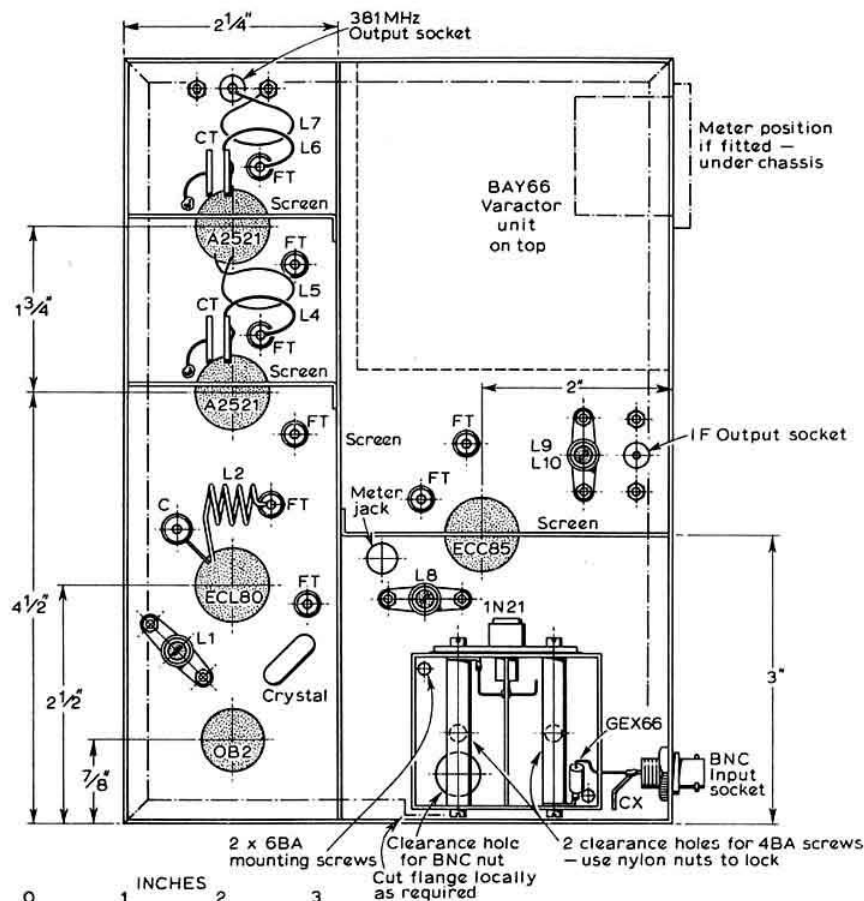


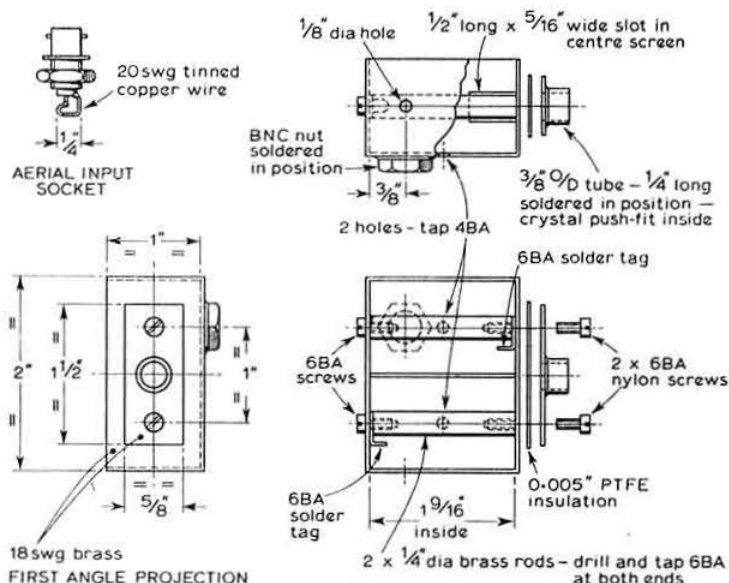
Fig 2. Chassis layout

Conclusion

Some improvement may be obtained by silver plating the mixer trough assembly but this has yet to be tried.

Results have been most encouraging, producing signals very similar in strength to 13cm signals given reasonable conditions.

The converter is reasonably stable, so much so that on one occasion while moving it on a portable expedition during the reception of a signal, the author inadvertently put his hand across the ht supply. The converter was dropped to the floor of the car, and although the signal momentarily disappeared, it reappeared in a 3kHz passband as soon as a stable state was approached! It will be realized that construction of a converter such as described will not be undertaken lightly and requires some vhf building experience, the necessary test equipment, and quite an amount of patience, but the effort can be most rewarding.



Current Table

Total current drawn, 85mA

V1 + 0B2	53mA
V2	14mA
V3	10mA
V4	8mA

Fig 4. Trough unit

Voltage Table. Input, 200V

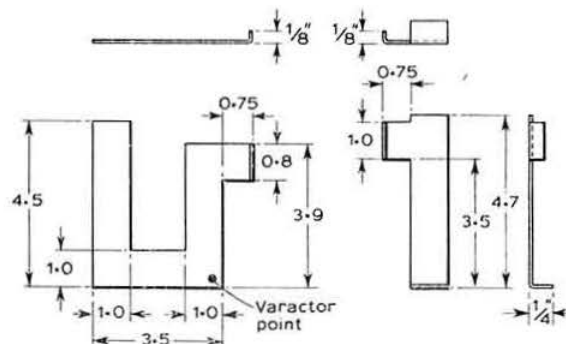
			Anode	Screen	Cathode
V1	ECL80	triode	105V	—	—
		pentode	200V	170V	—
V2	A2521		200V	—	8V
V3	A2521		200V	—	6V
V4	ECC85		120V	—	—

References

- [1] *Radio Communication* December 1969 (G8ARV).
- [2] GEC Application sheet A2521. "A 70cm transmitter".
- [3] ARRL *VHF Manual* (W1WID). *RSGB Bulletin* October 1967 (G8AMK—Four Metres and Down).
- [4] *QST* March 1961 (K6AXN).

Components list

- CT Capacitor formed of two 1/2 in diameter discs. One soldered to anode pin and one soldered to 1/2 in length of 20SWG t/c wire attached to solder tag at chassis. Forms variable capacitor by spacing between discs.
- CX 4BA solder tag attached to 1/2 in length of 20SWG t/c wire. Forms variable capacitor to side of mixer trough.
- L1 8 turns 24SWG enamelled closewound on 1/2 in former slug tuned.
- L2 4 turns 18SWG t/c wire 1/2 in inside diameter 1/2 in long.
- L3 2 turns insulated wire at cold end of L2.
- L4, L6 2 1/2 in long 18SWG t/c formed to approx 1/2 in inside diameter for 1/2 in turn.
- L5, L7 23SWG insulated wire formed to similar shape as L4, L6.
- L8 22 turns 30SWG enamelled closewound on 1/2 in slug tuned former. Tap at 6 turns from meter end.
- L9 As L8 without tap.
- L10 3 turns insulated wire at cold end of L9.
- RFC1,2,3,4 14 turns 1/4 in inside diameter 24SWG enamelled closewound.



Dimensions are in centimetres except where indicated
Material 0.015" copper strip

Fig 5. Modified lines for BAY66 varactor unit

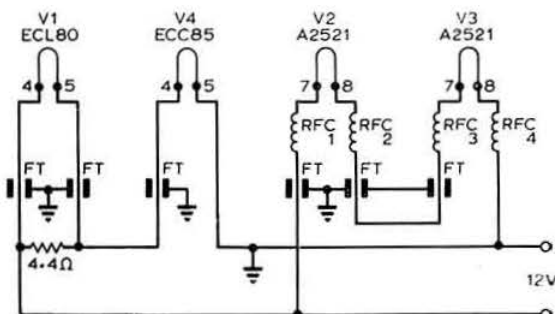


Fig 6. Arrangement of heaters using 12V supply. Note two extra feed-through capacitors required. The 4.4Ω resistor may be made up of five 1/2 W 22Ω resistors in parallel

Adding a switchable gain control to a KW201 receiver

by H. J. MANNING, MIMC, G3XOM*

FOR some time the author used an Airmec type 308 attenuator in the coaxial feed to the receiver, on the noisy 40 and 80m bands. The noticeable losses of this arrangement made the difference between copying weak dx signals or using such bad language which, converted into real energy, would have disrupted the aerial systems of the commercials.

As a result of this operating situation and several QSOs on the attributes of various valves for use in the rf stage, the opinion reached (although many may disagree) was that the EF183 used in the KW201 could not be bettered. However, the compromise arrived at by the designer on the agc circuit valves could never have taken into account the S9+ noise levels (on the other hand the designer of the Drake 2C has

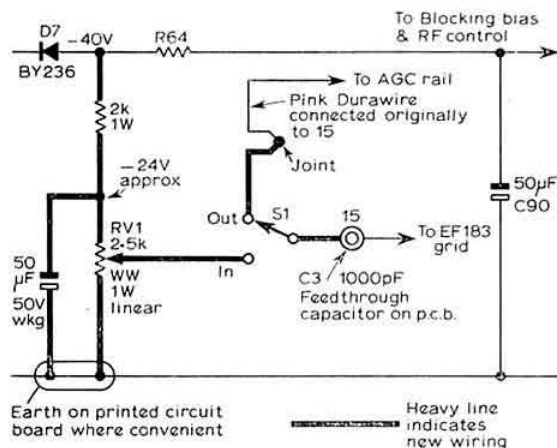


Fig 2. Connection diagram

gone to the other extreme and the author is about to modify the agc to the 12BZ6 to get more gain).

The modification to provide manual gain to the EF183 (V1) is simplicity itself and provides several advantages:

1. The agc is still operative on all other stages.
 2. The manual control can be switched in and out at will.
 3. The signal to the 1st mixer is always at an optimum.
- The manual rf control is adjusted to a point just below the 1st mixer going into cross modulation.
4. A little extra gain can be realized on the hf bands in manual with the gain control RV1 at maximum, since V1 will no longer be subject to the 1.5V standing agc voltage.

The hardest part of the modification is drilling the front panel, but if the following technique is used no great difficulty will be encountered. Do not use blunt drills. Use a power drill for the pilot hole (say No 30 or $\frac{1}{16}$ in), but use a sturdy drill brace for opening up to the required diameter. RV1 is a Radiospares wirewound potentiometer, drill $\frac{1}{8}$ in for bush. S1 is a no-name (Japanese) spst miniature switch from G. W. Smiths', drill $\frac{1}{16}$ in.

The author recommends that the S-meter be removed before any drilling operations are begun. Do not use a centre punch, automatic or otherwise; the sharp point of

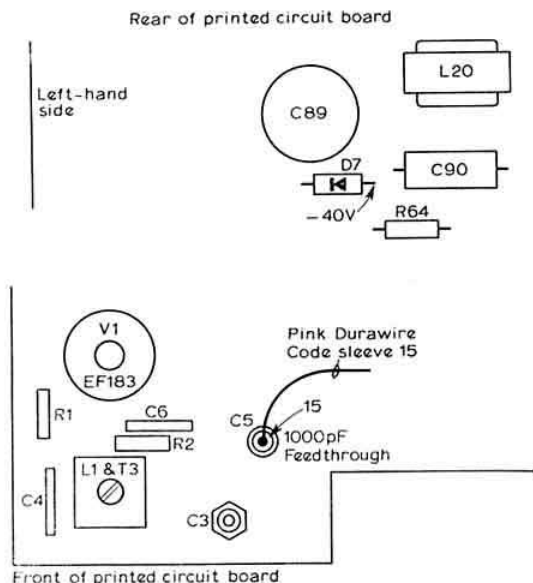


Fig 1. Location diagram of printed circuit board

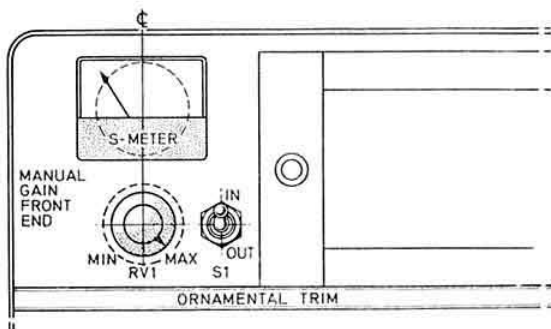


Fig 3. Layout

* 60 North Cray Road, Bexley, Kent.

scissors or something similar should be used as a centre mark to avoid the shock of impact which would result from conventional centre punching.

The control knob was obtained from KW Electronics. The skirt of the $\frac{1}{2}$ in size gives plenty of clearance between the S-meter and the decorative channel. The diameter of RV1 is 0.91in so that its clearance (with the solder tags pointing downwards) relative to the S-meter is ample. All wiring of components to RV1 and S1 should be done before fixing to the front panel. Viewed from the back of panel, with solder

tags downwards, the right-hand tag should connect to the 2k Ω resistor and the 50 μ F capacitor for correct gain rotation, eg clockwise—maximum, anti-clockwise—minimum.

The selected component values give a good span to RV1; the S-meter needle seems to follow the red mark on the skirt.

An external arrangement for this modification in the form of small box housing S1 and RV1 is quite possible. The age rail and the feed to V1 grid are fully decoupled, and the use of screened three-core cable would probably eliminate completely any instability problems.

EQUIPMENT REVIEW

by B. PRIESTLEY, BSc, G3JGO*

The Yaesu—Musen FF50DX low-pass filter

AN effective low-pass filter is essential for the reduction of tvf-causing harmonics. The availability of this Japanese design is therefore of considerable interest to amateurs who buy rather than build. Samples were kindly supplied for evaluation by Western Electronics (UK) Ltd, from whom it can be obtained at £6.20.

Specification

As this is written mainly in Japanese characters, it is not too obvious but it appears to be:

Cut-off frequency:	35MHz
Impedance:	52 Ω \pm 10 per cent
Power rating:	1.2kW p.e.p.
Stop-band loss above 45MHz:	60dB
Passband loss:	0.5dB

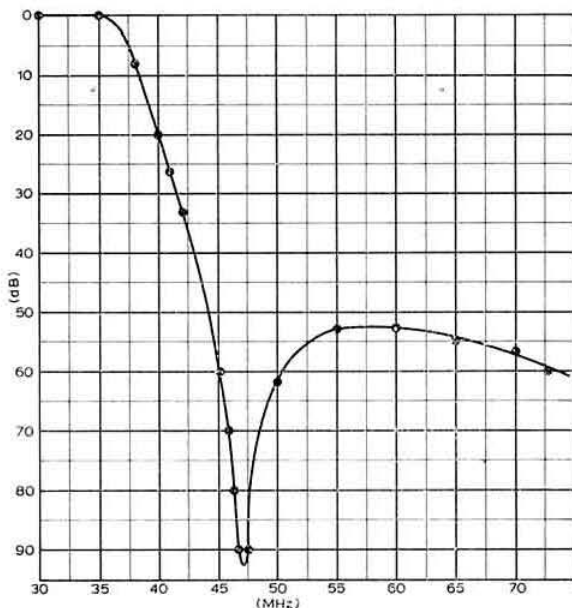
A note cautions against an swr over 1.5:1.

General description

The filter is built in a cylindrical case 40mm in diameter and 170mm long excluding connectors ($1\frac{1}{2}$ in by $6\frac{7}{8}$ in). Two fixing clips and two mating PL259 coaxial cable plugs are supplied. The case is completely sealed, and the impression is of a solid well-constructed piece of equipment.

Tests

Bench tests of the attenuation versus frequency gave the results shown below, with two units yielding almost identical results. The insertion loss at 28MHz was too low to measure accurately and gave no detectable rise in temperature with 100W passing through the filter (0.5dB dissipation loss would imply 10W dissipated in the filter). If the specification 0.5dB loss is interpreted as reflection loss only, this implies an swr of nearly 2:1 when the filter is correctly terminated. The actual swr introduced would prove tolerable in most amateur stations, particularly when the alternative is tvf.



Comments

The filter was obviously not designed for the UK market and so the beautifully deep notch falls just where it does no good at all. If only it were at 42.5MHz! As it is, the filter falls a few decibels short of its specification, but would nevertheless be adequate for most areas served by Channels 2 to 5. The electrical design of the filter is in fact very similar to the well-proven G5RV design.

* 43 Raymond Road, Slough, SL3 8LN

Ideas for noise limiters for a.m. receivers

by D. A. TONG, BSc, PhD, G8ENN*

IMPULSE noise limiters in a.m. receivers tend to be an area of receiver design in which information is conspicuous by its absence. The basic shunt and series diode noise limiter circuits have been around for many years and, while capable of excellent performance in older valve equipment, are not entirely suitable in their original forms for use with semiconductor circuitry. In this article several noise limiter designs are presented in an attempt to stimulate discussion on the subject. So far as the author is aware they are original and with one exception were developed during design work for the author's miniature 2m transceiver. The exception is the first one to be discussed, which was incorporated in the author's 4m transceiver. All the circuits are for use after the final detector.

As is well known, the basic problem in noise limiters is to have a device which will place a high attenuation in the signal path during noise impulses and which will do this at a certain percentage of modulation on the incoming signal despite wide variations in the strength of the signal at the noise limiter. The attenuator can be either a gate in series with the signal path or one which shunts the signal path. In the past, diodes appear to have been most popular as the active device and the first circuit to be discussed is a modification of the classic shunt diode noise limiter. The modification was first described by the author in [1] and involves compensating for the knee voltage of the shunting diode by introducing a similar diode in such a way as to back-off this knee voltage. The circuit is given in Fig 1.

D1 is the normal diode detector and R1 in series with R2 comprises the diode load resistance; C1 is the rf bypass capacitor. In order to discuss the operation of the circuit we assume a steady input voltage $V_a(0)$ at point A produced from a received signal. $V_a(0)$ will be as shown in Fig 2, full line, in the absence of modulation, and the same carrier with 100 per cent modulation would give the output shown by the dotted line. Any noise impulses would cause either line to go more positive for the duration of the pulse. The function of R3 and C2 in Fig 1 is to produce at the cathode of the shunt diode, D3, a steady voltage which is proportional to the average carrier level. From Fig 2 it will be seen that modulation on the carrier will not affect the voltage at point C (V_c) provided that the time constant R3 C2 is sufficiently large and that the modulation is symmetrical.

The condition that D3 shall conduct during an impulse is easily obtained since this will occur when the voltage (V_d) at point D goes more positive than V_c . If the impulse is short, V_c will remain at its initial level which is $V_a(0) - V_{D2}$ where V_{D2} is the voltage drop across D2. The voltage V_d is that at point A divided down by the voltage divider R1 and R2, thus

$$V_d = V_a \cdot (R_2 / (R_1 + R_2)).$$

Actually for D3 to conduct, its knee voltage, V_{D3} , must be exceeded, therefore the condition is that $V_d - V_{D3} > V_c$, ie, that

$$V_a(R_2 / (R_1 + R_2)) - V_{D3} > V_a(0) - V_{D2} \quad \dots (1)$$

If similar diodes are used for D2 and D3 then $V_{D3} = V_{D2}$ and the expression becomes merely

$$V_a > V_a(0) \cdot \frac{R_1 + R_2}{R_2} \quad \dots (2)$$

When R1 and R2 are equal, limiting occurs at 100 per cent modulation, whereas if R2 is much larger than R1 limiting occurs at nearly zero modulation percentage.

The current passed through D2 and D1 by R4 is beneficial to detection since the linearity at low signal levels is improved.

This circuit is very effective, particularly if high conductance diodes (eg germanium gold-bonded types) are used for D2 and D3. Car ignition noise is rendered almost inaudible in the absence of a carrier. For this reason an on/off switch is useful, if only in order to demonstrate its virtues to others, and one need merely disconnect one end of D3 or the earthy end of C2.

A problem which is common to the circuit of Fig 1 and its classical precursor (the same circuit with R4 and D2 omitted) is that every time D3 shunts a noise pulse, C2 gains an extra increment of charge. Thus, on sustained noise the limiting level slowly increases and full performance is not obtained. By using a transistor as the shunt element this problem is much alleviated and this gives rise to the second circuit which is given in Fig 3.

The condition that Q1 should conduct is exactly the same as expression (1) except that V_{D3} now represents the knee voltage of the base-emitter junction of TR1. If D2 and TR1 are either both silicon or both germanium, V_{D2} and V_{D3} will

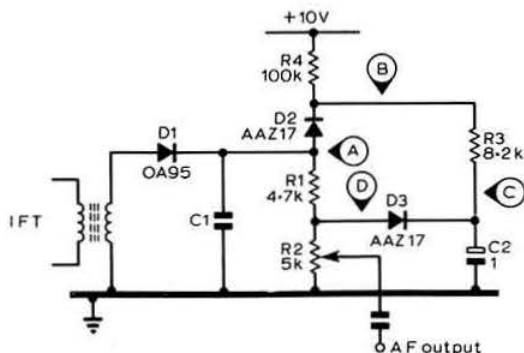


Fig 1. Modified shunt noise limiter in which the forward voltage drop across D2 compensates for the knee voltage of D3. These two diodes should preferably be the same type, and gold-bonded types such as AAZ17 or OA5 work well. High-conductance silicon types should also be satisfactory. D1 is the conventional detector diode

* 11 Moor Park Avenue, Leeds, LS6 4BT

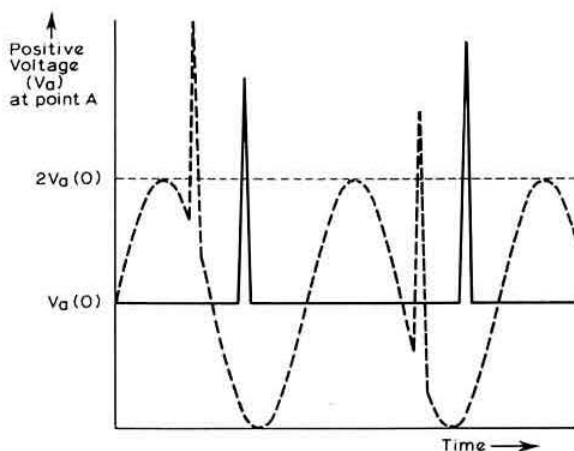


Fig 2. The full line represents the voltage at point A in Fig 1 produced by an unmodulated signal applied to the receiver. The "spikes" are intended to represent impulse interference superimposed on the received signal. In most cases, of course, their relative amplitude would be far greater than that shown. The dotted line represents the voltage at point A from the same carrier modulated 100 per cent by a sine wave. The output from an ideal shunt noise limiter would be the same waveforms except that the parts above the dotted line at $2V_a(0)$ would not be present.

again be nearly equal and equation (2) again applies. The advantage of using the transistor is, however, twofold. Firstly, when equation (2) is satisfied, the current that flows into the emitter of TR1 mainly flows out of the collector to ground. The current flowing out of the base, and hence available to charge up C2, will be reduced by a factor comparable with the gain of the transistor, and, therefore, C2 maintains a potential which is much more nearly equal to the average value of the varying voltage at D1 cathode. To put it another way, the charge and discharge time constants of C2 are made more nearly equal than in Fig 1, where the charge time constant is appreciably the shorter. Secondly, because of the gain of the transistor, the current available from a given noise impulse can cause a much lower impedance to ground through TR1 than it can through diode D3 in Fig 1.

It may be worth pointing out that the back-off diodes D2 are necessary only when V_{D1} is not negligible compared to V_a . Thus although D2 is essential when a low voltage i.f. strip is in use, it may not be necessary with an old-fashioned valved i.f. strip.

In receiver design it is more and more common to use lumped selectivity in the i.f. strip. This in turn means that there is no need to use i.f. transformers, and it then becomes more convenient to use a transistor detector instead of a diode. During tests by the author with part of the Mullard vhf receiver circuit [2], the i.f. strip for which was used by G8ARV in his receiver design [3], a very effective noise limiter circuit was developed which makes use of a fet as a nearly ideal series gate. In fact the system is really a type of noise silencer in that noise pulses are replaced by periods of silence. The circuit described below is the only one tried by the author which renders unobjectionable the audible effects of stroking a vhf whip aerial with a hand-held file. This is, of course, a very severe test and mere car ignition noise is well suppressed by the previous two circuits as well as this one.

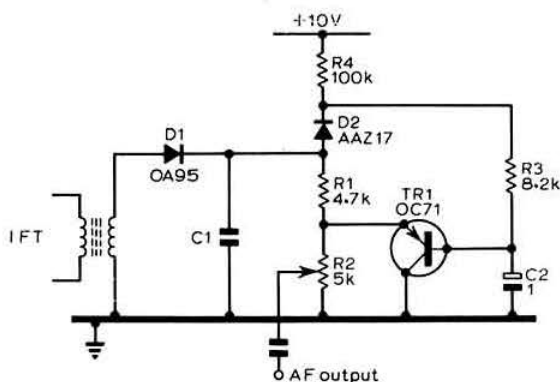


Fig 3. An improved shunt noise limiter in which the shunt element is a transistor instead of a diode. D2 should have a forward voltage drop which is equal to the turn-on voltage of the transistor. Thus if TR1 is a germanium transistor, D2 should be a germanium junction or gold-bonded diode. A silicon planar transistor, eg BCY70, would require a silicon planar diode which could either be the base-emitter junction of an identical transistor or a diode such as the 0A200 or 1N914.

The basic difficulty with adding a noise limiter to a transistor detector is that such detectors always have a standing voltage at their output even in the absence of a signal. It is, therefore, difficult to obtain voltages proportional to the mean carrier level and to half this level with modulation superimposed (ie voltages comparable to V_a and V_e in Fig 1).

The circuit used is given in Fig 4 which also includes the detector circuit used in the Mullard i.f. strip. TR1, the detector, gives an output voltage of about 6V with no input, and the presence of a signal causes this output to go less positive. In order that TR3 (a p-channel junction gate fet) should be switched off, and thereby interrupt the audio output, its gate must go positive with respect to its source. The gate voltage is the sum of two contributions. The first is the output at TR2 collector which goes more positive with increasing signal and tries to switch off the fet. If this were the only input to TR3 gate, the fet would tend to cut off as the input signal increased in amplitude. However, the second input to TR3 gate is from the collector of TR4 which goes less negative with increasing signal and thus counteracts the effect of the first input.

In order to make this system function as a self-following noise limiter, the overall ac gain and overall dc gain are made different. Thus the input to TR4 is smoothed by C2 so that its collector voltage follows the average level of the input signal. The collector of TR2 on the other hand contains amplified modulation and interference components, and by suitably controlling the circuit constants a self-following action can be achieved. The function of R7 is to set the quiescent voltage level at TR3 gate so that the fet is only just conducting. An adjustment is necessary because of the variation in fet parameters from batch to batch.

If a greater self-following action is desired, the ratio $R9/R8$ should be increased. Alternatively the ratio of $R10$ to $R11$ can be altered; the action can be visualized from the following. Point A has a nearly constant dc level whereas point B goes less positive with signal but contains no ac components. On the other hand point A follows modulation and noise voltage excursions. Thus with TR3 gate connected

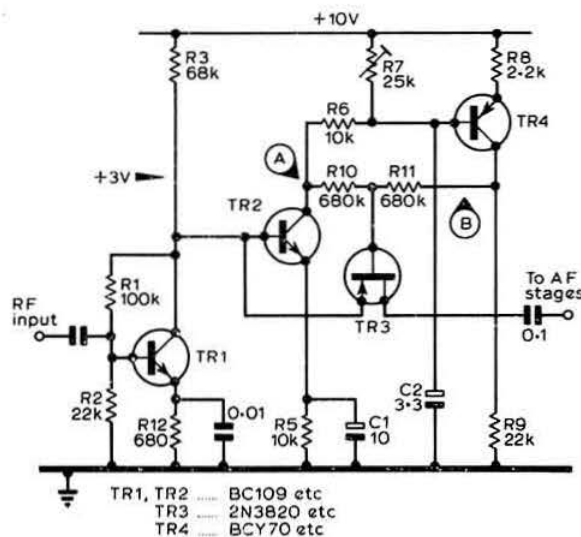


Fig 4. Noise "silencer" circuit for use with the transistor detector used in the Mullard receiver circuit (see [2] or [3]). The detector is TR1 and its associated components; the required rf input is of the order of 50mV (rms)

to point A, no self-following action will be obtained, but if connected to point B, no noise limiting action will occur. An optimum tapping point will clearly exist somewhere in between.

In practice the circuit values quoted give good performance. If it is desired to have an on/off switch R8 need merely be disconnected from the positive supply. When adjusted correctly the circuit gives very little distortion and such a switch is not really necessary.

A further feature of this design is that the same fet may be used as a click-free squelch gate. Thus, to disable the signal path a positive voltage must be applied to TR3 gate. This can be done as shown in Fig 5. The gating voltage would conveniently come from a Schmitt trigger circuit as described, for example, in [4].

Some transistor detectors produce an output which goes more positive with increasing signal, and an example of this is the detector in the Mullard integrated circuit TAD100 which is used by the author as the tuneable i.f. system in a 2m transceiver. It has proved rather difficult to add a really

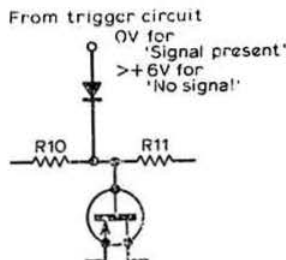


Fig 5. Modification to circuit of Fig 4 to allow utilization of the fet as squelch gate

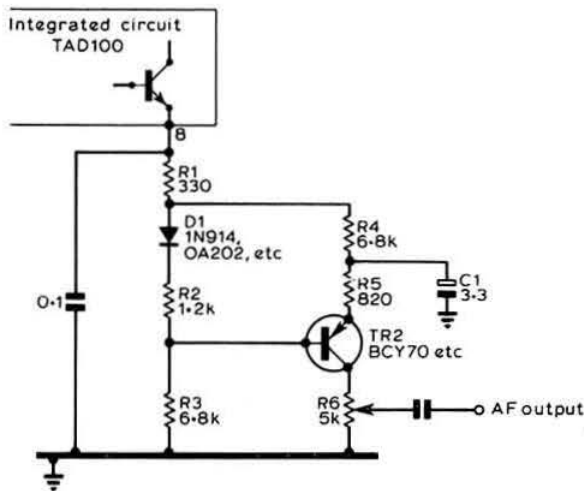


Fig 6.

effective automatic noise limiter to the TAD100, principally because the device seems to operate with relatively high af gain and a correspondingly low output from the detector. The circuit shown in Fig 6 is the best of the circuits tried with this ic and although useful is not as effective as the three circuits already discussed. If anyone has any other ideas on this subject the author would be very pleased to see them published.

The circuit uses a silicon planar transistor TR2 as a gated amplifier which operates as follows. TR2 will normally be biased on by the forward voltage drop across D1 (which performs the same function as D2 in Figs 1 and 2) and the voltage developed across R2 by the current taken by the detector output transistor, TR1, in the TAD100. As the signal level at the detector increases, the voltage at point A goes more positive and, therefore, because of the non-zero value of R2, TR2 is biased more and more into conduction. The function of C1 is first to ensure that the emitter of TR2 rests at an average input voltage and, second, to provide an audio frequency bypass so that TR2 can amplify the audio output from TR1. If now a pulse of interference is picked up, point A suddenly goes positive and TR2 tends to be cut off since its base rises faster than its emitter (because of C1).

Analysis of the circuit shows that true self-following action is possible only if the quiescent current through TR1 is zero, which is certainly not the case. However, the values shown provide useful clipping over a reasonable range of input levels, and of course the better the agc on the receiver the less important is accurate tracking.

References

- [1] "Extra diode improves noise limiter", by D. A. Tong, 1969, *Wireless World*, 75, 15.
- [2] "Mobile 166MHz a.m. communications receiver", by D. Singh, *Mullard Technical Communications* 1968, 10, (91) 14-29.
- [3] "The G8ARV two metre portable receiver", by D. J. Taylor, *Radio Communication* 1970, 46, 664-669.
- [4] "Squelch acts faster with fet gate", by D. A. Tong, *Electronics*, 1969, March 17, 42, 96.

The G3TVU/G8BDO 20MHz dfm

Some random comments

by J. A. SHARE, G3OKA*

THE G3TVU/G8BDO 20MHz digital frequency meter described in the July and August 1971 issues of *Radio Communication* will surely have an effect almost as profound as the G3PDM series; indeed, one may almost compare it to the G2DAF series of a few years ago. The whole concept is quite revolutionary in the field of amateur radio; DFMs have been a tool only in professional laboratories, and may well have remained so but for the introduction of the very economical Texas 7400 series of tti. In any project of such complexity no two designers will ever produce the same solution, and while in no way criticizing the circuit of the designers, a few ideas may be appropriate. As suggestions, therefore, the following comments have been compiled.

The time standard oscillator

This circuit is TR2 and TR3, with TR5 as the tti interface. The higher the master oscillator, the more accurate will be the overall figure for the instrument. Some quite elementary sums will show that a 10MHz clock will show 100 times the accuracy for the same drift and original setting error.

The circuit attributed to G4ANQ in "Technical Topics" for October 1971 will operate well at 10MHz by reducing the values of the 1,000 and 3,300pF capacitors, such an oscillator being successfully used by the writer in a number of projects. Two 7490 decade counters will be required to divide the 10MHz to 100kHz to feed into 3P12 pin 14.

Any ideas about using the mains frequency of 50Hz should be instantly ruled out.

Decode and display

The 7441 is now obsolete and has been replaced by the 74141, the connections are the same and the device performs the same function. In striking the Nixie tubes the surge of current forms a spike which is transferred to the supply rail; the new module has corrected this tendency.

The availability of KGM Minitrans and KGM 74 decoder/drivers requiring the 5V supply is an attractive alternative. The Minitron tube is a seven-segment display the same size as a module and will fit a 16 pin socket. The price for Nixie plus decoder and the Minitron plus decoder is about equal; however, the 250V supply is eliminated, but the increased power requirement on the 5V supply will offset a little of the advantage.

3P3

The selection of this module is a little non-professional. The limit of the 74N is quoted as 10MHz, and replacement of this module by a unit from the 74H series may be more

successful. Those who may wish to read their 2m frequency direct should read the Motorola MECL 111 specifications.

Construction

The circuit board looks a difficult item to produce, and this alone may well be off-putting to some constructors. (The authors of the article can supply pc boards and enquiries should be addressed to G3TVU accompanied by an sae—Ed).

An alternative exists in the use of 0.1in spacing Veroboard and the use of sockets from RS components. The sockets may be soldered into the board and then wired together with sleeve wire, when complete the modules being inserted as each part of the unit is tested. This will assist in fault finding by removing the modules as one used to go "bottle-swapping"; with soldered-in modules this is not possible.

Conclusion

G3TVU and G8BDO are to be thanked for their efforts and for giving the fraternity an excellent article in a very practical application of logic and of integrated circuits.

British satellite in orbit

Britain's satellite *Prospero* was launched on 28 October 1971 from the Woomera range, Australia. The Black Arrow launcher placed the satellite in an elliptical orbit of 350 miles by 850 miles. Data from the experiments aboard *Prospero* is being received by the ESRO stations in the Falklands Islands and Alaska and by the Royal Aircraft Establishment at Lasham, Hampshire.

Prospero weighs 145 pounds and contains the equivalent of 10,000 transistor circuits. The main purpose of the satellite is to test in space equipment and techniques which will be needed for future satellites. There are four experiments carried on the satellite: (a) the effect of extremes of temperature and radiation on new lightweight solar cells, (b) the behaviour of special paints in space conditions, (c) the reliability of new type hybrid electronic circuits and (d) an experiment devised by the University of Birmingham which will measure the incidence of micrometeoroids and assess the damage that they might do to spacecraft.

In its elliptical orbit *Prospero* will pass over the whole of the earth's surface twice every 24 hours. The frequency of the satellite's carrier is 137.56MHz.

BOOK REVIEW

The Mazda book of PAL receiver servicing. D. J. Seal. Published by Thorn Radio Valves and Tubes Ltd, 288 pages. £3.50 plus 25p postage.

An independent author was commissioned by Mazda to write this handbook, which is designed to provide a complete guide to the servicing of television receivers using the PAL system now operating in 22 countries. The approach is basically practical with little mathematics appearing in the text. More than 200 illustrations, most of them in colour, have been used to provide logical additions to the text. There are extensive sections dealing with fault-finding. Five appendices provide guidance for dealers, including a complete schedule of BBC and ITA colour television transmitting stations. The book is available from radio dealers or from Mazda Publicity Department, 7 Soho Square, London W1V 6DN.

* 219 Prenton Dell Road, Prenton, Birkenhead, Cheshire.

TECHNICAL TOPICS

A monthly feature by PAT HAWKER, G3VA

THIS month we again have a look at the current tvi situation as seen through the eyes of the MPT and Post Office inspectors, include a bridged-T filter that can help in some cases, and then turn our attention to a batch of aerial ideas culled from a wide variety of sources. Finally we describe several circuit ideas, including a bandpass cw filter, a note about new integrated circuits for communications applications, and some views and comments on digital phase shifting and the like.

But first, an important correction to last month's notes on ssb speech processing. The Comdel CSP-11 unit has a USA price of \$120 and not \$240 as, inadvertently stated: (thanks to G3BOB for pointing this out).

The current score in tvi

Both in 1969 and 1970 it fell to our lot to report on the MPT/Post Office statistics on radio interference complaints (*Radio Communication* October 1969, 1970), with special emphasis on those matters relating to amateur operation. The figures for 1970 have now become available (*MPT Technical Bulletin* No 5) and, on the whole, are significantly less depressing than those for 1969—though it is worth stressing that the MPT points out that “the number of households in which interference to radio and television reception is experienced is usually much greater than the number of complaints received.”

The trends in tvi show up fairly clearly by compiling a comparison table giving the number of cases of interference ascribed to amateur transmitters in the three years.

Table 1—Interference from amateur transmitters

Band	1970	1969	1968	Change 70 to 69	Change 70 to 68
LW/MW	28	48	55	-42%	-49%
Band I	630	821	725	-23%	-13%
Band II	40	44	34	-9%	+18%
Band III	394	492	319	-20%	+24%
Bands IV-V	65	26	12	+150%	+442%
Mobile	4	11	6	-64%	-33%
Total	1,161	1,442	1,151	-24%	+0.9%

(Band I is television channels 1-5; Band II is vhf/fm radio; Band III is television channels 6-13; Bands IV-V are uhf television channels 21-68; Mobile refers to interference to the various two-way vhf radio communication users).

The first point that is apparent is that the tvi incidence is now back to very nearly the 1968 figures (and one must hope that in retrospect 1969 will appear to have been a uniquely bad year for no special reason). But there has been a clear change in the distribution pattern: LW/MW radio is steadily becoming less and less of a problem; Band I interference has yo-yoed, but is tending to go down; Band III, though less than in 1970, is still bad, possibly reflecting the greater amateur use of vhf compared with hf; tvi to uhf

television is growing at a fast rate—due largely one suspects to the far greater use of uhf for colour viewing on all three channels, although possibly also because of the now recognized susceptibility of modern tv receivers to strong out-of-band local signals.

The total number of complaints, at 64,006, is down 7.7 per cent on 1969 and over 10 per cent down on 1968; the amateur contribution after the bad year of 1969 is back down to under two per cent of the total but slightly worse than the “just over 1.5 per cent” of 1968.

Interference from non-amateur UK transmitters (of which the bulk are probably mobile base stations) has risen steadily from 1,819 in 1968 to 1,876 in 1969 and 2,206 in 1970. Here again one suspects that tv receiver design trends have played some role. It is interesting to note that at least one recent report (not concerned directly with tvi) stressed the wide variation in tv receiver susceptibility to out-of-band signals with different current designs, and indicated that some makers are now providing modification kits when it is shown to be the fault of the receivers.

On the equally interesting subject of interference from electrical appliances, the report provides further evidence of the diminishing role of small electric motors (1970 5,498; 1961 14,982) during the past decade. This year there has been a small decrease in complaints attributed to contact devices but this source is still accounting for the largest numbers of identified sources. The MPT states that the thermostats of domestic heating systems are responsible for the bulk of these complaints, which often arise only after the thermostats have been in service for some time. A detailed analysis is being undertaken of representative thermostats, and the MPT is hoping to be able to provide manufacturers with information which will allow them to produce systems which will not prove so troublesome in operation.

Finally, it is worth recalling that in the mid-fifties the number of complaints each year was running at around 150,000 despite the far fewer tv sets and fewer domestic electrical appliances. But at that time the yearly number of cases attributed to amateur transmitters was only around 400 or so, or less than 0.3 per cent of the total. So we are now faced with the situation that as interference to tv reception becomes much less, the amateur share is growing.

We still feel that much more could be done by set-makers to improve the immunity of their sets!

Bridged-T band-stop filter

Some years ago, in connection with the prevalence of co-channel interference to Band I tv reception due to Sporadic-E propagation, the Post Office investigated and recommended the use of a single add-on bridged-T filter capable of providing high attenuation on its resonant frequency with relatively little loss on closely adjacent frequencies. In other words, the filter could insert a deep, symmetrical notch into the signals coming along the feeder

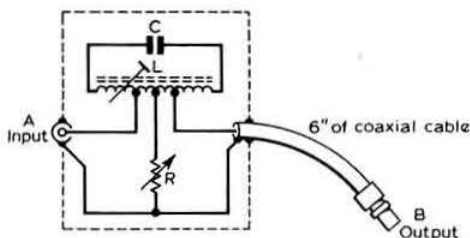


Fig 1. Post Office bridged-T filter originally designed for rejection of Sporadic-E interference on 49.75MHz but useful also as a bandstop filter in circumstances where a high-pass filter can be used to reduce tvi. In the original design: C, 27pF; L, 12 turns 20swg, 0.8in length, 0.4in outer diameter, tuned by brass slug. For optimum rejection R is equal to $Q/(4\omega C)$, or approximately 150Ω; A, coaxial socket; B, coaxial plug

cable with a minimum of disturbance to all other frequencies. About five years ago the Post Office released information on these filters, intended as a fixed frequency unit for 49.75MHz, although it could be made tunable simply by replacing the fixed capacitor by a variable type. A number of these filters were manufactured and marketed, although it would not appear that many were sold. A slightly different version of this type of filter, developed by the Army, was demonstrated at the 1967 Amateur Radio Exhibition and described on page 731 of the *RSGB Bulletin* (November 1967) including a recommended layout for a filter tunable over the range 25-60MHz.

The ability of this type of filter to null out a single strong signal has not in the past been of particular value for combating tvi, for which the high-pass filter has been far more widely used. However, the changing pattern of tvi with, for example, the problem of the local 144MHz or 432MHz signal causing a tv set to overload in cases where the set may be required to receive tv transmission on frequencies below that of the amateur station, must surely make this type of filter very attractive. Fig 1 provides information on the Post Office 49.75MHz fixed frequency unit, although this could readily be adapted to other frequencies; the information in the November 1967 issue will also be found useful. The PO unit is claimed to provide over 35dB attenuation at resonance yet has an insertion loss of less than 6dB at ± 1 MHz from resonance.

Long wires—and upstairs operation

The note in the October *TT* on the LA4LN arrangement for multiband operation of a 40m end-fed wire has reminded Dick Halls, G3E1W/ON8KM etc, of a useful tip on using long-wire aeralis. As one of those amateurs who have operated in a number of different parts of the world, he has often found himself needing an aerial in a block of flats; quite often the only practical aerial is a long-wire strung out to a tree or other conveniently high point. In Singapore, for example, as 9V1LK, he used a 500ft wire and found this highly effective, particularly on 28MHz. But a common problem in such circumstances is that the earth lead on the transmitter and/or matching unit will often have standing waves with a voltage point where "earth" should be. This can frequently lead to excessive rf coupling into the mains supply, or result in hot points on the transmitter cabinet or on the atu, rf burns on the fingers, and bci/tvi in nearby sets in the

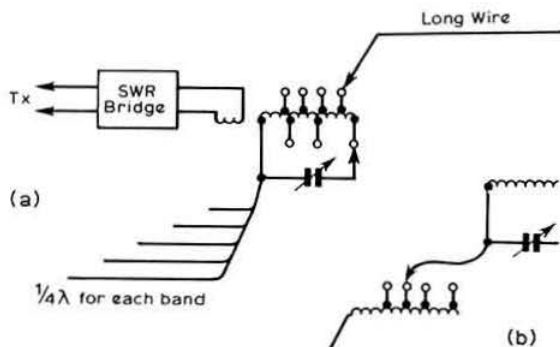


Fig 2. (a) $\frac{1}{4}\lambda$ lengths of wire used to produce artificial earth for a multi-band long wire aerial; (b) alternative technique used tapped inductor with single wire. As recommended by G3E1W/ON8KM

same building. Dick Halls points out that if instead of trying to connect an earth to the atu/transmitter, one connects instead a $\frac{1}{4}\lambda$ length of wire for the band in use, the rf hot point disappears, the other problems often vanish, and radiation and radiation patterns improve. For multiband operation a series of wires can be left permanently connected as in Fig 2(a); alternatively, instead of using several wires, it is possible to have a series-tapped or variable inductor which changes when the atu taps are changed: see Fig 2(b).

It so happened that a few days after receiving the note from Dick Halls we were using what was basically an LA4LN type of arrangement, with L-network matching, on 7MHz and the exact problem described by Dick Halls arose. Connecting a 33ft length of wire to the rotor spindle of the L-network capacitor completely cured the hot condition, even though this rotor was connected back to the transmitter earth through the feeder. So, this time, we can recommend this technique unreservedly!

All-band double dipole

Now for another approach to a simple multi-band aerial. Many years ago we included in *TT* a DJ2ZF dipole for

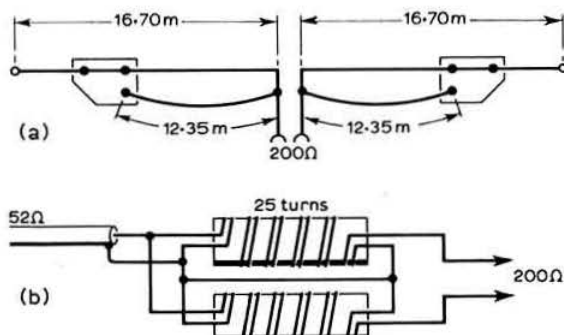


Fig 3. (a) The DJ4BQ five-band double dipole designed to provide 200Ω feed-point on all hf bands; (b) 4:1 balun transformer used with the double dipole to allow the use of 52Ω coaxial feeder

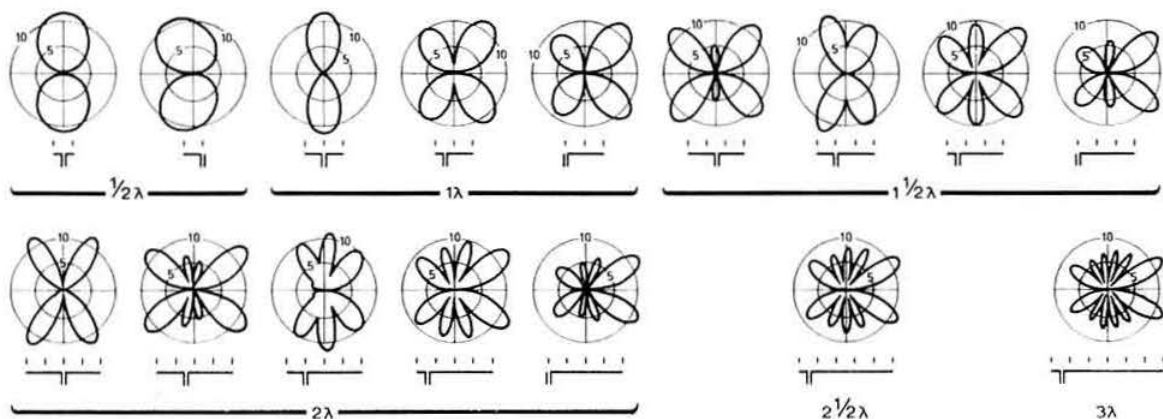


Fig 4. Horizontal radiation patterns of aeriels indicating the effect of feed point. Based on model aerial range measurements by D. C. Cleckner (*Electronics Manual for Radio Engineers*)

3.5, 7 and 14MHz having two 27m sections and fed with 300Ω line; this design appears in *ART* and has also been included in *Radio Communication Handbook*. However, neither this aerial, nor its half-scale version, made provision for 21MHz and neither was claimed as suitable for more than three bands. So we were interested to find in *DL-QTC* (No 10, 1971) a somewhat similar idea, but made suitable for all five hf bands by using a double dipole system having a shorter dipole suspended beneath the main wire, see Fig 3(a). The dimensions are such that the originator, Heinz Scheunemann, DJ4BQ, is able to show that the centre feedpoint impedance on all five hf bands (3.5, 7, 14, 21 and 28MHz) is approximately 200Ω; no traps or stubs are used. The aerial could be fed directly with 200Ω balanced line, but as this is not readily available, DJ4BQ shows how a 4:1 wideband balun transformer can be placed at the feed-point, so enabling the aerial to be fed from 52Ω coaxial cable (Fig 3(b)).

Aerial feed points and radiation patterns

In the early days of hf operation the average amateur often had very little idea indeed of the radiation patterns of different lengths of aerial wire. For this reason one of the articles which had a major impact on some of us was "DX to order" by Dud Charman, G6CJ, which appeared in the old *T & R Bulletin* back in January 1937. In that article he not only described the basic radiation patterns but also did so in relation to a great circle map. He succeeded in convincing at least one schoolboy reader that it really was possible to put signals out in the required directions! Of course that is now ancient history, and for many years radiation patterns have been such a standard feature of every amateur handbook that they are burned deeply into the consciousness of most hf operators.

But usually these patterns are shown as being symmetrical, and little or no indication is given that the position of the feedpoint can be used deliberately to distort the patterns and to put significantly more power into some of the lobes. Recently, John Brodzky, G3HQX, drew my attention to an idea by D. C. Cleckner in *Electronics Manual for Radio Engineers*, Zeluff & Markus, McGraw-Hill, 1949

(collected articles from *Electronics*). This article presented a number of patterns showing clearly the effect of changing the feed-point, and were based on work carried out on a scale-model, table-top aerial range. In practice, it must be pointed out, there may well be other distortions, and unless the aerial is well up and really in the clear it is usually over-optimistic to expect the pattern to be exactly according to the book.

It will be appreciated that there is a major difference in feeding an aerial at an internal voltage point rather than a current point in that this results in in-phase operation, but the diagrams show that, apart from this, there are quite significant differences as one moves out from the centre point towards the end of the aerial. Generally an end-fed arrangement tends to put more pronounced lobes towards the free-end direction than backwards from the fed end. Fig 4 shows 16 of these patterns covering most of the possible arrangements for $\frac{1}{2}\lambda$, 1λ , $1\frac{1}{2}\lambda$, 2λ aeriels, and examples of $2\frac{1}{2}\lambda$ and 3λ long wires.

One of the points which G3HQX noted, and which seems well worth emphasizing, was the very useful patterns of the little-used $1\frac{1}{2}\lambda$ aerial, which can be fed to produce either four or six main lobes in directions well suited to dx operation from the UK. And on this subject of $1\frac{1}{2}\lambda$ aeriels, we noted in the October *TT* that the 90ft aerial described for 3.5/7MHz operation appeared to offer possibilities as a voltage-fed arrangement for 14MHz where it is roughly $1\frac{1}{2}\lambda$. Unfortunately, as L. F. Ivin, G5IC, noticed, the description of using the series tuning capacitor of this current-fed dual-band aerial suggested in the text that the capacitor is used on the *lf* band, whereas the circuit diagram showed it switched out of circuit on this band but used on the hf band. G5IC expounded an interesting theory on how a handwriting error could have caused this confusion. While agreeing that my handwriting could indeed cause such an error, reference back to the original source (*The Radio Handbook*) shows that the error crept in a long time ago, for the same mix up appears there. Personally, I suspect that the diagram, rather than the text, is correct, and that the capacitor is adjusted to accurate resonance on the hf band where the aerial functions as a $\frac{3}{4}\lambda$ wire; however, would-be users should be warned that it may be the other way round.

Inverted-V W8JK

Two other aerials deserve brief mention this month. A note by Andrian Weiss, K8EEG/O in *CQ* (September 1971) indicates that a 70ft W8JK (Fig 5) aerial can form a potent bi-directional fixed beam when set up in "inverted-V" configuration. A roof top 10ft spacing boom mounted atop a short pole can readily provide about 40ft height at the centre, with the wires then sloping away to tree or other supports at about 20ft anchoring level. The array, it is claimed, still provides a useful 4-7dB gain on 7MHz and 6-2dB on 14MHz and can also form the basis of a top-loaded vertical for 1-8MHz (and presumably 3-5MHz). The W8JK configuration, of course, is well known, but I cannot recall having seen this type of mounting arrangement suggested before.

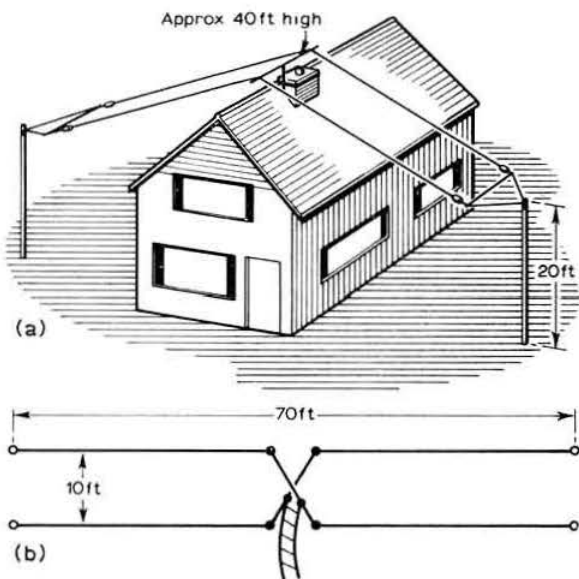
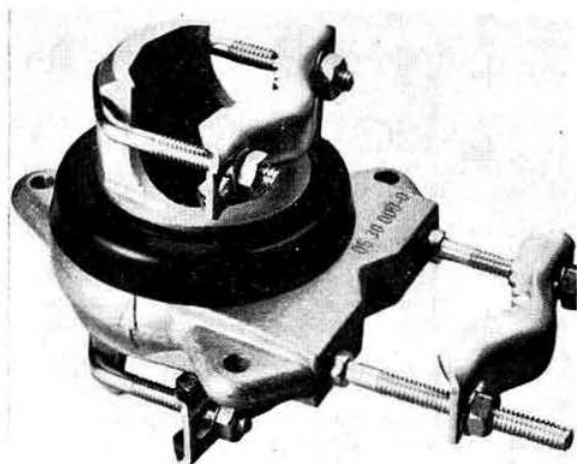


Fig 5. The K8EEG/O "optimum performance array for 1-8, 7 and 14MHz" aerial using the W8JK as an inverted-V fixed beam

Also in the same issue John Schultz, W2EY, explains in some detail the usefulness of a $\frac{1}{2}\lambda$ drr loop aerial which for 144MHz need be mounted only 1½in above a metal ground plane (thus making a very attractive mobile aerial). The configuration all seemed vaguely familiar until I remembered that the advantages of the half-wave form of drr appeared several years ago in *TT*, based on some work in Italy (see *Amateur Radio Techniques*, 3rd edition, page 184). Apparently a commercial model of this aerial has appeared in the USA. For 144MHz the loop is only about 11½in in diameter and is fed by coaxial cable between the grounded vertical radiator and a tap about $\frac{1}{2}$ to $\frac{2}{3}$ along the circumference. It is claimed that with this type of aerial one can achieve low swr across the complete range of any vhf band. We should perhaps make it clear that the drr loop is not going to out-perform a simple dipole aerial, but on at least some bands overcomes the dipole length and directivity problems—it should also be noted that, if working correctly, the aerial is vertically polarized, which may or may not be an advantage when working mobile on vhf.



VHF operators, in particular, will be interested in a new J-Beam alignment bearing fitted above rotators to allow an additional 9ft mast to be used

And as a final note on aerials, brief mention of a new hardware item recently introduced by J-Beam Engineering Ltd, (Rothersthorpe Crescent, Northampton). This is a new alignment bearing (Model RZ100) designed to enable a mast length of up to 9ft by 1½in diameter to be erected above J-Beam rotators, and also aerials with longer booms to be installed—see the accompanying photograph.

Transmission line transformers

In the October *TT* a suggestion was included on how to modify a piece of RG58U coaxial cable in order to make-up a $\frac{1}{4}\lambda$ transmission-line transformer to match 50Ω coaxial cable to 75Ω coaxial. This had prompted J. A. Carter, G3KYH, and L. J. Rottier to point out that there is another rather more elegant (and simpler) solution to this problem, by using a relatively little known approach which also has other potential applications.

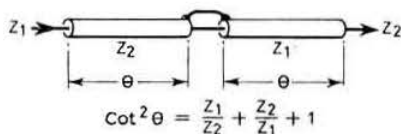


Fig 6. Transmission line transformer technique used to provide simple means of matching 50 to 75Ω coaxial cable

In an article "Wideband coaxial transformers using solid dielectric cables" (*Electronic Engineering* April 1962), two BBC engineers, A. B. Shone and W. Wharton, described a number of matching transformer techniques; one of these allows any two cables of different impedance to be matched together simply by using matching lengths made up of the two cables concerned: see Fig 6. The original article provided fairly elaborate formulae for the construction of coaxial cable transformers. G3KYH suggests that, in practice, for this type of transformer a simplification will provide

all the information that is necessary, viz

$$\cot^2 \theta = \frac{Z_1}{Z_2} + \frac{Z_2}{Z_1} + 1$$

For a 50/75Ω transformer this works out to an electrical length of 29.3° for each section of cable; the physical length must take into account the velocity factor of the cable (typically for coaxial cable around 0.66).

Additions to the Plessey SL600 range

The SL600 series of Plessey integrated circuits for communications applications by now needs no introduction to *Radio Communication* readers. So I am sure many will be interested to learn of two new additions to this range; the SL622C and the SL623C. While early units are carrying a high price tag (around £6 to £7), it is confidently expected by the firm that as production increases the price will drop to about the same level as for the other SL600 devices.

The SL622C is a combined af amplifier, vogad (voice-operated-gain-adjustment) and sidetone amplifier primarily for transmitter applications. It incorporates a series regulator to allow the device to be used on supply voltages between 6 and 12V (and this allows a stabilized output at 4.5V to be taken from the device). The unit accepts signals from a low-sensitivity microphone and provides an essentially constant output signal for a 60dB range of input; it also includes a constant gain amplifier which provides an amplitude-limited output for sidetone.

The SL623C combines the functions of low level a.m. detector and agc generator with an ssb demodulator; it is thus designed for use in combined ssb/a.m. receivers and is complementary to the SL621 ssb agc generator. On a.m. the agc voltage is generated directly from the carrier signal and is capable of maintaining output in an SL600 type receiver to within 4dB for a 90dB range of input signals. The ssb demodulator is of the single balanced form. It should be noted that the SL623 is described by Plessey as suitable for intermediate frequencies up to 2MHz, so that presumably it should not be used in receivers having the now popular 9MHz i.f.

Bandpass cw filter and more on the switchable filter

In *QST* (September 1971), D. C. Rife, WA2PCA, provides detailed information on the design of low-loss passive

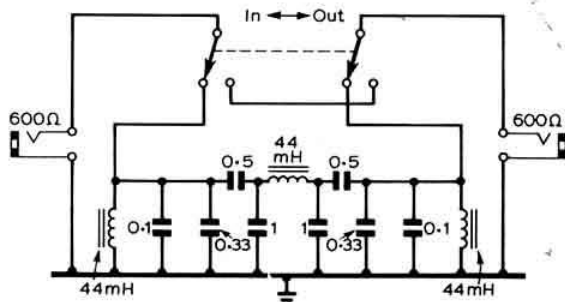


Fig 7. The WA2PCA low-loss passive bandpass cw filter using 44mH surplus inductors and mylar capacitors. Centre frequency about 875Hz and impedance about 600Ω

bandpass cw filters, arguing that some of the really narrow-band cw filters, such as some of the active filter designs, are suitable only for use with receivers having a very slow tuning rate. For many of the receivers where it is desirable to sharpen up the selectivity for cw operation, one is up against the problem that the tuning rate then makes it difficult to tune the required station accurately enough. Among a number of bandpass designs, WA2PCA includes one having a centre frequency of about 875Hz and providing a bandpass response of the order of 400Hz with an insertion loss of only about 1dB. This design, Fig 7, is based on the use of low-cost surplus 44mH toroidal coils in conjunction with standard value 100V mylar capacitors and it is stated that, in the USA, it can be built for less than \$5 (about £2).

Ron Wheatland, G3SZW, writes to point out that it should have been made clear that in the switchable audio filter based on the μ A741 integrated circuit (*TT* August 1971), the output must be capacitively coupled to the following stage, phones or what have you; several readers apparently tried to take the output straight from pin 6 without an isolating capacitor. Since describing the circuit he has come across Motorola Tech Note AN-403 which describes the single power supply operation of 709 integrated circuits; some readers, he believes, may not be aware that the 741 replaces the 709 and does away with the external lag components.

Digital phase shifting

Continuing the various *TT* comments on digital ssb generation, a further suggestion has come from Bev McEwen Smith. He writes with reference to Fig 11 of the September *TT* (page 615) as follows:

"I believe that I am correct in saying that 90° phase shift can be obtained using only two J-K flip flops: as shown in Fig 8. In addition to the obvious economy of one J-K flip flop, the phase error may be less than with the arrangement used by G3UEZ. In the circuit of Fig 8 the two flip flops are clocked by the same waveform; whereas the clocking waveforms of flip flops (2) and (3) of the G3UEZ circuit may be not exactly in antiphase.

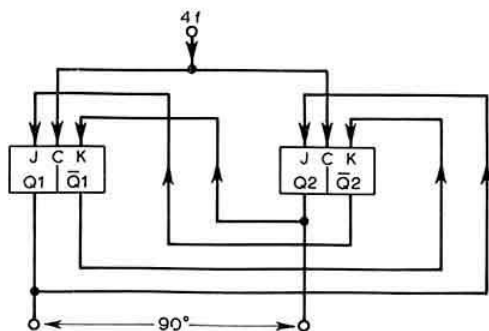


Fig 8. Use of two J-K flip flops to achieve 90° phase shift

A similar comment has come from Andrew Stephenson, G8BUD. Also on another recent *TT* subject he would be interested to know whether anyone using the NE561B type

at phase-lock loop demodulator has found that the voltage-controlled-oscillator tends to jump in frequency/phase. He has no personal experience of this but has heard that it can happen. Otherwise he is attracted to the idea of using one as a general-purpose cw, ssb, nbfm, pm demodulator, depending on the external R and C components switched into circuit.

Another viewpoint on ICs and Nixie tubes

A letter from T. R. Jackson, WIDMU, (Black Mountain Engineers, Box 1, Corinth, Vermont 05039, USA) draws attention to his recently issued Application Note No 1 on "Economy digital counting and display modules" containing information likely to be of interest to anyone building digital frequency counters or similar devices. He will be glad to supply readers with a copy in return for postage (5p cheapest rate, 10p first-class, 20p air, English stamps acceptable). One of his ideas is information on a relatively low cost ic terminal board to eliminate the need for relatively high cost ic sockets, but there is a good deal of other information on circuit modules and the like.

WIDMU is not happy with some of the suggestions we reprinted in the April 77 stemming from an article by ZL2BCP in *Break-in*. For instance he feels that item 4 ("Sine wave inputs to counters may have to be shaped") is understated. He considers that almost all ic counters require a specific fall time of the input pulse (or sometimes a specific rise time) and very few are rate insensitive enough to permit operation with raw sine waves except over a very limited range of frequencies.

But his main quarrel is with some of ZL2BGP's suggested precautions when using ic decoder/drivers in conjunction with Nixie tube indicators. Based on experience with the 7441A and RTL type 9760, he is prepared to state flatly that you can wire as few, or as many, or none of the 7441A outputs to a Nixie-type tube, just as required; you do not have to switch it and ht together (he has switched off 11 hundreds of times leaving 300V on the tube anode without destroying anything other than the fears that ZL2BGP's suggestions may have implanted). He would also like to see authors in *Radio Communication* including addresses of component firms where these may not be well-known overseas.

Output circuit for a parallel grounded-grid linear

Another approach to the problem of operation on 21 and 28MHz turns up in a note by Bob Baird, W7CSD, (*Ham Radio* August 1971). He considers that in high-power grounded-grid linear amplifiers based on multiple tetrodes or pentodes (where all the grids are strapped down to earth), the anode-to-earth capacitance of the valves becomes formidable, so that it can be difficult to obtain good efficiency at 21 and 28MHz. His solution is to connect the C1 of a conventional CLC pi-network in series rather than shunt with the inductor: see Fig 9. It is important with this modification to ensure that both sides of this capacitor are isolated from earth (and from the user) as both sides are "hot" to r.f. He reports that this modification has allowed him to increase his tank coil on 21MHz "from two very hot turns to six cool running turns".

The modified W7CSD linear also uses a string of 15 silicon diodes to provide a constant standing bias of 10V. He uses

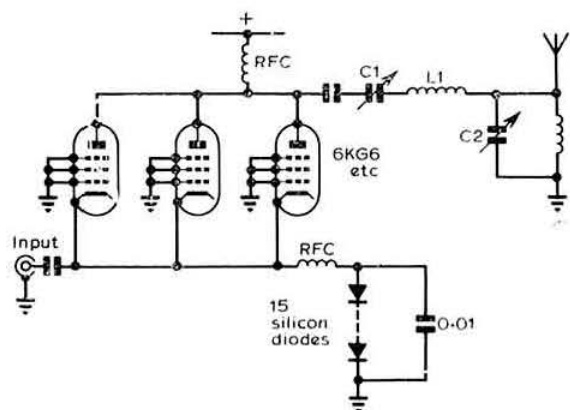


Fig 9. W7CSD's multiple-valve linear using series instead of shunt capacitor in the tank network. Note also use of diode string to provide fixed bias

low-cost surplus 100piv 1,500mA silicon diodes as an alternative to the higher cost of a high-power zener diode, which could equally be used in this application (but for his rig would call for a 10V 20W zener diode). W7CSD comments that the conventional cathode bias fixed resistor is a poor way of providing standing bias for a variable anode current amplifier.

Here and there

Apologies to several correspondents whose ideas have had to be held over this month: we will do our best to include several of them before long. But there is room for one brief hint from Peter Williams, G3UDW: "Drinking straws are now made of plastics and make excellent high insulation sleeving."

Catalogue received

Home Radio (Components) Ltd

The first edition of the *Home Radio Catalogue* was published in 1959 and it has little resemblance to the present reprinted sixth edition of 312 pages together with a separate price supplement.

The purchase of components, particularly those associated with professional equipment, is an ever-increasing problem. Manufacturers are unwilling to sell in small quantities where the overheads are said to be uneconomic. To try and overcome some of the problems, Home Radio has formed a buying group with other component dealers which enables purchases to be made at better prices and provide facilities to obtain components which would have otherwise not been available. The results are evident in the catalogue, which sets out a tremendous range of equipment, accessories and components. Home Radio offers the facilities of a credit account, details of which are given in the catalogue, which also contains vouchers worth 50p redeemable against orders in accordance with the details provided.

The catalogue, invaluable to any constructor of communication and electronic equipment, costs 70p (50p plus 20p postage) and is obtainable from Home Radio (Components) Ltd, 240 London Road, Mitcham, Surrey CR4 3HD.

FOUR METRES AND DOWN

A monthly account of vhf news compiled by JACK HUM, G5UM*

Annual table

Making its annual appearance, the table of Four Metres and Down Certificate winners, up-dated to the time this issue of *Radio Communication* went to press, discloses once again the developing pattern of metre-wave activity in the UK. Predictably, there is a big increase in the 144MHz Transmitting bracket amounting to some 20 per cent above 1970, the G8E-- men and the first of the Four plus Threes making their initial appearances. The newer licensees may well be expected to achieve equal success in the 432MHz Section before 1972 is far advanced.

All three Senior categories have gathered in new callsigns during 1971, one on 70MHz, five on 144MHz Transmitting and a further six in 432MHz Transmitting. No change occurs in the 1,296MHz Transmitting category, nor in respect of the top metre-wave award of all, The Supreme: Bill Hawthorne continues to sit in solitary state as No 1 in both.

Maybe the big increase in 1,296MHz activity which has occurred as the result of three major field day events will introduce a few verification cards into the pipeline so that more 23cm certificate claims may be made—unless it should be that the appeal of the QSL card diminishes in direct proportion to the frequency in use!

* * *

Members who have notched a place in the annual table will feel some sympathy for those who could not quite make it because the incoming QSL rate was insufficient. Whatever is done to stimulate the flow of cards, in the end luck seems to be the dominant factor, eg, "I send QSL cards and an sae for any new counties worked. Recently, after sending 10 cards with stamped envelopes I received two back. But by way of compensation I received back from a Nottingham station not only his QSL card but also my sae, and a suggestion I should use it for someone else."—G3WZT of Sussex.

But G3HCW, who has just earned Yorkshire's first Senior 144 Award and needed 60 county cards to do it, reports good returns: only one county failed to produce a QSL. Counties were 100 per cent—and here he proffers a special thank-you to "... the superb GM expedition for 10 rare counties plus a country, and to G3BA for his timely LX-pedition".

* * *

As for "Seniors", and particularly the 432, it does not do to imagine that site and power restrictions are insuperable obstacles to earning this award. Says Suffolk's G8BCA, upon achieving 70cm Senior No 12, "If anyone thinks he hasn't got a very good QTH try this one at 30ft asl and in the middle of a forest. The trees grow a lot faster than the beams." And his power? Never more than 5W out from a

3/20A tripler. The secret? Two 18-el Parabees and super low-loss coaxial "... to ensure most of it arrives at the top".

That this performance is readily repeated by others prepared to give 70cm a whirl is shown also by G3RZK, whose tripler is a 2/6 with 8W in. It quickly collected the three plus 20 from the Middlesex QTH to produce 70cm Award No 80 and put Errol Walling into the "certificates on all three bands" category. There would be a few more of these around if there were more easy-to-build 70cm transmitters on the band, like those of 'RZK and 'BCA.

* * *

For the first time the table includes a Microwave Section. The three stations listed contacted one another on 3cm in a couple of memorable expeditions last September, as has been reported here. And if there should be thoughts that this kind of work is too esoteric for the run of the mill vhf-er, take a look at what G3RPE has to say about 10GHz later.

Who's next for 10GHz?

The full story of the RPE-ZGO-APP triumph in opening up the 10GHz band to good solid communication beyond 150km, and thereby earning themselves the Society's first microwave awards, is to be told by the participants. All we need to say here at this moment is that 10GHz, which looks like a frighteningly high frequency (so did 2m, once), offers distinct attractions. It is not wholly enthusiasm that prompts G3RPE to tell *FMD* that 3cm may actually be regarded as a good beginner's band.

He emphasizes that the 150km contacts across the Bristol Channel were done using low-powered, simple equipment readily duplicated by almost any amateur. "It is literally true," he says, "that my transmitter and receiver have seen no test equipment other than an Avo and a 30MHz signal generator!"

The successes of 25 September, however, were obtained as the result of much effort put into the initial preparations, particularly in checking maps, testing the equipment under field conditions, and in ensuring that the dish aerials could be pointed reliably.

Dain Evans concludes: "If other people are prepared to take the same sort of trouble then their simple equipment ought to work as well."

From XO11A (part 2)

The year brought 406 contacts to G18AYZ/P in 27 sorties to the mountain top near Larn— and it brought Ian Kyle much experience in designing portable rigs for one-man operation, in propagation phenomena, and of the other man's operating habits. The first two of these were given some attention on this page last time. What, now, of the way we go about our business, as discerned from the other side of the water to the main areas of UK vhf activity?

* Houghton-on-the-Hill, Leicester LE79JJ

Says 'AYZ: "Operating manners and techniques seem to be improving, with many of the 8E-- setting an example to us all. I find it easy to talk to such a well-mannered bunch. Contests on the other hand produce, as well as the slick boys, some quite awful signals and terrible operators."

On the use and misuse of variable frequency oscillators, G18AYZ shares the views of several other remotely situated and much sought after stations who have deplored the excessive variability of the vfo. While recognizing its value for setting up spot frequency nets and for finding a clear channel, he offers the thought that it can actually *lose* QSOs to its user, simply because the man at the other end cannot be bothered to chase it all over the band.

Then there is the QSL problem, something which hits the "rare dx" man in a way unknown to most of the rest of us. Everybody who has worked G18AYZ/P knows that a QSL is never difficult to obtain. What does niggle Ian Kyle is a promise to QSL via the Bureau that is discounted when a card comes direct. He prefers to QSL via the Bureau: a statement which will cheer those who have conscientiously avoided sending direct, in the knowledge that the 'AYZ card will get there in the end.

So much for the G18AYZ year investigating the one way stretch. Over now in the same context to . . .

In the noise but readable

The regular schedule between G3HCW, not far from Leeds, and G4CG in hill-hemmed Barnstaple will be counted remarkable by operators who have not tried for themselves setting up long-haul links on 2m telegraphy.

The Knottingley-Barnstaple link is 230 miles long, its terminals only 120ft asl, and no take-off assistance from local terrain. The path is a diagonal traverse across the Pennines, the Brecon Beacons, the Quantocks and the North Devon moors. At G4CG are 100W and a 5-element, at G3HCW 70W and (unusually) a 2-2-2-2 aerial.

For students of vhf propagation the results obtained are fascinating, 75 per cent of the schedules yielding QSOs and exchange of reports (a QSO is not a QSO if full reports are not exchanged both ways and logged). Much evidence exists of one-way paths in both directions, of immunity from "lifts" (during the historical opening of 6 October the 'CG-HCW schedule almost failed!), and, equally curious, of the unreliability of GB3VHF as a guide to propagation over this particular path. Says G3HCW: "Nil results have occurred when GB3VHF is romping in here. Fair QSOs very often result when GB3VHF is almost inaudible, the barometer is low and wind and rain are sweeping the country."

By contrast the G3HCW-G3IUD (The Lizard) path behaves more predictably in accordance with conditions.

Thus 144MHz demonstrates that the dx is there if you dig for it and, even more important, if you know how.

Using German repeaters

Repeater talk-through beacons properly engineered and used can be an important adjunct to amateur metre-wave communication. Inadequately engineered they can be a menace, and members can be assured that no scheme will be put forward by the RSGB until it is as foolproof as the present beacon system—more so, maybe, for repeaters are more complex than the beacons we are all familiar with.

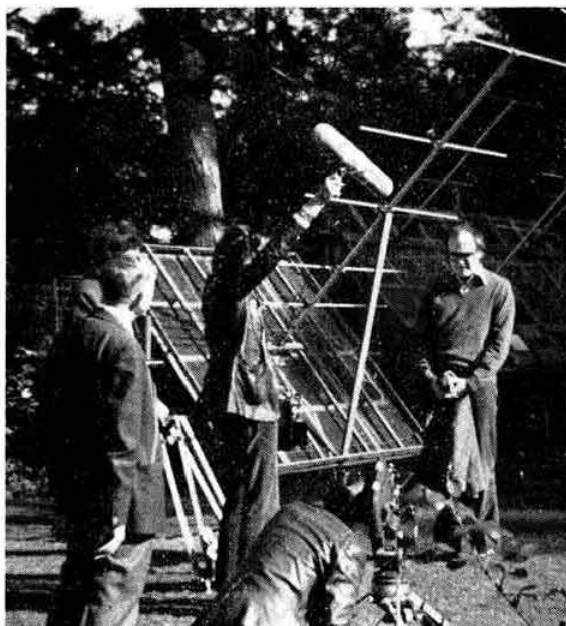
Meanwhile, we in the UK can profit by the experience of others who have commissioned repeater talk-through systems and made them work. Right now we have an on-the-spot report on the subject from Dave Pilley, G3HLW, ON8IE, and at present in West Germany as DJ0TU. He recommends any RSGB members planning to visit the country with mobile gear to be prepared to transmit on 144.15MHz (re-radiated on 145.75), 144.2 (re-radiated on 145.80) or 144.25 (re-radiated on 145.85MHz). He adds that a dx relay frequency of 144.30 re-radiating on 145.7 has been allocated, though to date he has heard nothing on it.

Each relay station has a callsign which is sent in tone cw imposed on the signals every five to ten minutes. And here in Dave Pilley's words is what happens: "Listening this evening I could hear stations at over 150 miles being worked from the repeater at Frankfurt on Channel 1. These relays are active all the time, and I seldom switch on the 2m mobile rig without hearing another /M on the frequency. The difference is he is probably 100 miles away!"

More from over the sea . . .

Living in a sub-tropical region would be many a 2m man's idea of bliss, temperature inversions permanently turned on, and super-dx available at the push of a talk-switch. Writing from Kingston, where he is with the Jamaican Broadcasting Corporation, Peter Blakeborough tells us that 2m is not quite like this but 6m tends to be: inter-island long haul communication in the Caribbean on vhf is done largely in the 50MHz band, using extended skip.

The 2m band yields much activity, further stimulated as the result of the Jamaican Amateur Radio Association's initiative in commissioning a beacon on 146.95MHz. And



The BBC Tomorrow's World team at work when they visited the radio telescope installation of BRS15744, Ron Ham of Storrington. Producer Brian Johnson, G3LOX, is at left, just behind the cameramen

on the dx front 6Y5PB (yes, Peter Blakeborough) has available to him a special site carrying high gain aerials on a nearby hill. From here, using his sideband rig, he will attempt to establish the first Jamaica to USA contact on 145MHz before he returns to the UK in February to resume operations as G3PYB/G6ACU/T.

A note for UK vhf men equipped to receive slow-scan television in the hf spectrum: look for 6Y5PB every Monday at 2000gmt when he beams on Europe in search of sstv contacts on 14.23MHz.

... and on it

Life has been rough for G3UGF/MM now that the winter voyaging season is here, and on the Inverness-Fawley-Milford Haven run, the mv *Esso Inverness* hits heavy seas.

Nevertheless the QSO rate on 2m while at sea has increased, as more people read in *FMD* about the voyages of G3UGF/MM. One rewarding evening brought half a dozen Home Counties contacts into the log all at 200-miles-plus QRB from a point in the Bristol Channel.

Since the reversion to gmt the operating times of G3UGF/MM are 0800-1000, 1200-1400, 1600-1800 and 2000-2200gmt.

"Countryless" at sea

Further to maritime mobile operation, G8BQX, who works MMs of many nationalities that beam from the English Channel to his south coast QTH, asks what their country status is.

The answer: None. The VHF Committee had a go at this point when it met in October, and decided that to obviate all anomalies this answer was the only possible and logical one to give.

On the dx front

The Germans now have a "Tuesday night is cw night". Evening telegraphists in other Region 1 countries are enjoined to look for the DJ/DL men at the low end of 2m.

The matter does not rest there: further to promote morse usage on vhf the DARC has instituted a VHF CW Award. All A1 contacts made since 1 January 1970 can be used as a basis to build up points: 50 points earn the initial award, and stickers are to be had for 100, 150 and up to 500 points. Working outside one's own QRA Locator field or across a national boundary boosts score accumulation. The fee for the award is DM5 or 10 IRCs. Stickers cost half a Deutschmark, or one IRC each. A copy of the rules may be had by sending an sae to G5UM.

All of which means that the German vhf operators will be looking for UK contacts as especially high points earners on "Telegraphy Tuesdays".

* * *

Ducting south to Spain, the 2m band has lately lifted EA1AB into several cw operators' logs. At times his signal is so strong as to suggest to him a QSY to 432MHz. Regrettably he does not have 70cm. He reports none nearer than Madrid.

Just over the EA-F border lives F8OB, once resident in northern France and then a regular contact on 70cm and 2m with G-land, who retired to SW France four years ago. We have it from G3COJ, who regularly works both the

EA and F8OB, that the latter, a keen RSGB member by the way, looks for many more UK contacts to fall to his key on 2m.

Contest commentary

Approval unqualified and qualified for a couple of 432MHz contests. Having two four-hour stretches for the October event, and plenty of time in between to sleep, found wide favour. We hope all who remarked over the air that they liked the arrangement said so when they sent Form 427 to the VHF Contests Committee.

But a week later, when the joint 144/432MHz CW Contest came up, complaints of "no bonus points on 70cm" were frequent. It was hardly worth quitting 2m to repeat a QSO on 70cm when you could have knocked off another couple in the time it took to set up on 432.

In the past, cw on 70cm was not worth while because most of the occupants were G8 men who do not use it. This is no longer true; and if telegraphy for long haul coverage on 432MHz is to develop as it has manifestly done on 144MHz, more encouragement to use it is required. Bonus points will help (they are given already on VHF NFD). As it is, several contestants admitted they had 70cm transmitters but no incentive to add keying facilities to them.

Telegraphists on 70cm hope that the VHF Contests Committee will look at this one when preparing the 1972 offerings.

* * *

The new 70MHz Cumulatives got off to a wet start for the first two-hour session in October, and keywork was necessary if the weak ones were to be winkled out (G3DOR had nine contacts that night, seven on A1). Activity built up as fairer weather favoured subsequent sessions. Reminder: last two legs this month are on 8 and 29 December.

* * *

As for the top contest of all, VHF NFD, the Mid-Essex VHF/UHF Contest Group are overall winners for the fourth year in succession, a truly remarkable feat which will earn them the congratulations of all their fellow contestants.

Sked corner (in bauds)

Located at BII2C not far from Paris, F6AOJ seeks rtty contacts on 145.3MHz with British stations using either 800 or 170Hz shift. And in conjunction with neighbours F6AOF and F8XV he regularly monitors 145.4 for sideband contacts. There is a home-built transverter and 150W out to a 9-el Yagi. The rtty machine is an Olivetti T2CN. Write to J. F. Le Foulser, 84 Voie Audran, 94 Vitry, France.

Also active on 144MHz rtty is GW8EYG, whose site at Bridgend behind the mountains may not look promising but gets him as far as G8ATV in Wiltshire on the keyboard. He asks rtty operators to look towards South Wales at weekends to latch on to his signal on 144.6 or 145.3MHz at 50bd speed and 850Hz shift, with plenty of punch from 150W and a 10-el at 38ft.

Procedure

While the 144/432MHz telegraphy contest exhibited cw usage at its superb best for most of the time, demonstrating that you can say as much via the key as via the microphone if you know how, it was surprising to observe lapses from contest procedure that simply wasted time and slowed the QSO rate.



Luxembourg is so rarely worked from the UK that the G3BHT/LX/P expedition there in September found itself in great demand during VHF NFD and for 36 hours afterwards, using speech and key on 2m. The picture shows Tom Douglas, G3BA, on night duty in LX-land

There was the case of the interminable CQ (we counted almost 20 in a row) pumped out by one veteran consistently throughout the contest. Air-time was wasted also by newer G4 men so unversed in cw abbreviations that they spelt words in full. And as for the misuse of QRZ?, a reminder comes from G6KD of Sussex that might well be heeded by all cw operators: "Why is it that so many operators these days seem to think that QRZ is an alternative form for a CQ call? I was taught that a morse operator should send QRZ?, meaning 'Who is calling me?', only when he had heard a station calling him but had not been able to copy the callsign of the station concerned. On 2m I never reply to an operator using QRZ because to me it means that he has already heard somebody calling him but has not been able to copy the callsign of the station concerned."

* * *

On procedure in general, G6KD found much to agree with in last month's piece "Cut the waffle". A great deal needs to be done, he thinks, and many would agree with him, to tighten up the way telephony is used on 2m.

He sums up a typical situation in the following terms: "Some time ago a station I was working concluded a transmission with 'And now this is G8ZZZ over, off and clear, and now standing by for your final'. I could hardly resist pointing out that he was no doubt 'over' but he didn't appear to be 'off', and as he was listening for my further transmission he was certainly not 'clear'."

Just as our veteran (above) was in error in sending garrulous CQs on the key, as if to attempt to catch at some time or another everybody who would be scanning 144.0 to 144.15, so do newercomers err by calling the wanted station so extensively that by the time they go over he is well into another QSO.

"Three by three"—his callsign thrice followed by yours—has served amateur radio well for half a century. It should continue to do so on vhf.

Tech Corner

From G2UJ (W. H. Allen of Ashford, Kent)

There is lively interest in nbm in this district, led by G2JF, who has been using this mode exclusively for some time

without in any way decreasing his considerable dx capabilities. I intend using nbm myself in due course.

Naturally, for reception it is absolutely necessary to have some form of discriminator: "skirt detection", or slope detection as it is also known, wastes nearly all of the advantages of the mode. I have been trying three different designs: that described by H. L. Gibson (*Radio Communication* February 1971), the Burns Electronics FMD1, and the pulse counter type described by B. Priestley (*Radio Communication* September 1971). Experiments with this latter device using available inexpensive transistors show considerable promise, utilizing proper screening to keep the i.f. signals out.

Quite by accident I found that, with its rf and af limiters, it was a potent aid to weak cw reception! There must be something wrong in this, and probably when I get it going satisfactorily for nbm it will fail to provide this cw aid, but a bit of switchery might be worth looking into.

As an example of the benefits of a discriminator for nbm reception, I was listening one evening to a PA0 near Leiden. He was using nbm—very good nbm—and on slope detection he was just readable, about RS44. With the Burns FMD1 his signal was RS59.

From G6RH (Bob Hall, of Bexley)

It would be interesting to have comments from members in high density areas on how they build adequate selectivity into their converters. Due to the high level of local signals in the writer's area, experiments with the converter have been in the direction of providing triple bandpass coupling between the 2N4416 rf stage and the mosfet mixer, in conjunction with a 116MHz crystal (fifth overtone) to give an i.f. of 28.30MHz.

The next step is to try tuned helix resonators between rf and mixer to determine what discrimination can be achieved across the band without affecting the signal-to-noise ratio, in the hope of further abating blocking and cross modulation.

From G8AKH (R. G. Harry, of Billericay, Essex)

By coincidence, a few days before reading G3JGO's comments on spectrum analysis of a 2m transmitter (October FMD), I had the opportunity of looking at the output of my own 2m transmitter (15W input) on a spectrum analyser. Sensitivity was limited to -50dB on the 144MHz carrier to avoid overloading the analyser. The fact that G3JGO's analysis shows no "parasitics" but only multiples of 8MHz suggests that he may have generated some of the products within the analyser.

That comment apart, with an absorption wavemeter in the input circuit of the analyser to check internal products, signals at 72, 96, 288 and 432MHz were identified as genuine signals produced by the transmitter. All were about -40dB relative to the carrier.

The most disturbing features revealed were two 8MHz "sidebands" about the 144MHz carrier, lower sideband -50dB, upper -38dB with reference to the carrier. These are similar to G3JGO's results of -28dB for 136MHz and -48dB for 152MHz.

At this point I should emphasize that no indications were observed that would suggest anything wrong with the transmitter. The measurements indicated multiples of the 8MHz crystal, not parasitic oscillations.

The transmitter uses capacitive coupling up to the 72/144MHz doubler, then inductive coupling to the QQVO3/10 pa. The pushpull output is inductively coupled to the

aerial: in other words similar to hundreds of other transmitters in use today.

The use of a bandpass filter would reduce most of the out-of-band products to an acceptable level (ie taking the PO specification of -66dB relative to 10W as a good yardstick). However, the ± 8 MHz products about the 144MHz signal fall on the skirts of most bandpass filters.

The strip-line filter in the *VHF-UHF Manual* appears to offer between -20 and -25dB at ± 8 MHz about 144MHz.

The answer seems to be that a bandpass filter should always follow the transmitter output and that a high crystal frequency (12 or 24MHz) be used to clear the skirts of the bandpass filter.

Here and there

Nylon nuts and bolts: readers continue to ply us with the names of sources where they can be bought. From BRS32906 comes a list of the addresses up and down the country of Davis & Timmins Ltd, who sell them. An sse to G5UM will bring you one.

* * *

Something else we would put in the sse if you are interested is a list of Region 1 metre-wave beacons which appeared in the August *IARU Region 1 News*. Our space ration prevents its printing here.

* * *

"During October the 15-hour daily meteor observation recorded some 152,000 pings from Gdansk in the 4m band" —BRS15744 (Ron Ham of Storrington).

* * *

To cater for the enormous metre-wave population of SE London and NW Kent there is a proposal to form a VHF/UHF Group in the area. Write declaring your interest to G8AXA, Mike Wallace, 44 Shuttle Close, Sidcup.

25 YEARS BACK

"History was made on Sunday, November 24th, 1946, when Denis Heighman, G6DH, of Clacton, Essex, received 50 Mc/s signals from station WIHQD located at West Hartford, Conn, USA, and operated by Edward Tilton, V.H.F. Editor of QST . . . at 1620 GMT G6DH, using a frequency around 28 Mc/s, established two-way contact with WIHQD . . . later in the afternoon both stations went over to telephony, WIHQD being logged at R5, S7/8 by G6DH" —*RSGB Bulletin*, December 1946.

Four Metres and Down Certificates

70MHz Transmitting Section

1 G3EHY; 2 G3PJK; 3 G2AII; 4 G3OHH; 5 G3KEU/P; 6 G3NUE; 7 G3IUD; 8 G6NB; 9 G8PD/A; 10 G5FK; 11 G3NDF; 12 G3IMV; 13 G3HXV/P; 14 G3SKR; 15 G3OUF; 16 G3BNL; 17 G3PMJ; 18 G3PHG; 19 G3OBBM; 20 G3TLA/P; 21 G3HXV; 22 G5UM; 23 G3OJE; 24 G3SEK; 25 G3RWM/P; 26 G3FDW/P; 27 G3PPG; 28 G3FIJ; 29 G3GGL; 30 G3RQD; 31 G3NJP/P; 32 G3RWM/P; 33 G3NUE/P; 34 G3AZI; 35 G3PDW; 36 G3HCG; 37 G3LAS; 38 G3HRH; 39 G3M2U; 40 G3PPG; 41 G3VPK; 42 G3RLE; 43 G3UFS; 44 G3VHF; 45 G3OUL; 46 G3UUT; 47 G5NU; 48 G3OZJ; 49 G3HCG/P; 50 G3PGG/P; 51 G3UBX; 52 G3VSA; 53 G3NKL; 54 G3THQ/P; 55 G3JHM/A; 56 G3VJS/P; 57 G3EKP; 58 G3JHM; 59 G3VOF; 60 G2B2O; 61 G3JHM/P; 62 G3NNO; 63 G3WQP; 64 G3OXD/A; 65 G3SWEL; 66 G3OHC; 67 G2WS/P; 68 G3JEQ; 69 G3RZK; 70 G8LY; 71 G3TDH; 72 G3GZJ; 73 G3XLH/P; 74 G3HBB; 75 G3VNO; 76 G3VPF/P; 77 G2WS; 78 G3VJR; 79 G3OXD/P; 80 G5UM/P; 81 G3M3UAG; 82 G3W3UCB/P; 83 G5UM (new QTH); 84 G3REP/M; 85 G3NKS/P; 86 E12VE/P; 87 G3VFD; 88 G3DOR.

70MHz Senior Transmitting Section

1 G3SKR; 2 G3RWM/P; 3 G3FDW; 4 G3TCT; 5 G5NU; 6 G6HD; 7 G3OHH; 8 G3VSA; 9 G3VFD/P.

70MHz Receiving Section

1 BRS15744; 2 BRS15822; 3 BRS32036; 4 BRS24450.

144MHz Transmitting Section

1 G3HBW; 2 G3BLP; 3 G3MTI; 4 G5YV; 5 G3BNL; 6 G3MCS; 7 G3LAR; 8 G3CO; 9 G3BA; 10 G3MFF; 11 G3DFL; 12 G3NAQ; 13 G3NNG; 14 G3OJY; 15 G3KPT; 16 G3JYP; 17 G3KMT; 18 G3OHD; 19 G3BR/A; 20 G3HRH; 21 G3SEGW; 22 G3OFT; 23 G3OBD/P; 24 G2HIF; 25 G3JDN; 26 G8VZ; 27 G2AXI; 28 G3JYT; 29 G5UM; 30 G3EJO; 31 G3PBV; 32 G3FDG; 33 G3OSA; 34 G3JLA; 35 G2CFZC; 36 G3BOC; 37 G3MTI/M; 38 G3OJY (new QTH); 39 G3JWQ; 40 G3NOH; 41 G3PSL; 42 G3LBA; 43 G3FUR; 44 G2BJY; 45 G3MRA; 46 G3AGN; 47 G3MDH/P; 48 G3GMY; 49 G3GGK; 50 G3MDH; 51 G3NLR; 52 G3MLDU; 53 G3CKQ; 54 G5HZ; 55 G3NNK; 56 G6GN; 57 G5ZT; 58 G2PL; 59 G3FZL; 60 G3SAR; 61 G3NUE; 62 G3AEB; 63 G3AHP; 64 G3PTM; 65 G3LAS; 66 G3RMJ; 67 G2CDX; 68 G3ORL; 69 G2DHP/P; 70 G3FIJ; 71 G3CXM; 72 G3HRH/P; 73 G3BDS; 74 G3FNM; 75 G3IMV; 76 G2BQ; 77 G3KHA; 78 G3OHC; 79 G3SHZ; 80 G3PKT; 81 G3UFA; 82 G3RST; 83 G5NU; 84 G2BHN; 85 G3OZP; 86 G3W3YKT; 87 G3ICO; 88 G3ETH; 89 G2WS; 90 G3NJP/P; 91 G3W3CBY; 92 G3TLA/P; 93 G3JFO; 94 G3TDR; 95 G5UM/P; 96 G3M2U; 97 G3UUT; 98 G3BNC; 99 G3SZX; 100 G3UKV; 101 G3COBM; 102 G3FVC; 103 G3BJD; 104 G3PWJ; 105 G2ATM; 106 G3ISX; 107 G3USF; 108 G3OUL; 109 G3UIK; 110 G3GZJ; 111 G3EJA; 112 G3JHM/A; 113 G3AAZ; 114 G3EHR; 115 G8ATK; 116 G3WV; 117 G8APZ; 118 G3TR; 119 G3WZT; 120 G2WS/P; 121 G3EHH; 122 G3WSN; 123 G3RZK; 124 G3ILO; 125 G3RQI; 126 G3OXD/P; 127 G3WQ; 128 G8APO/P; 129 G8BQX; 130 G8BJK; 131 G6LK; 132 G8AYN; 133 G5ALP; 134 G8BHI; 135 G8ATK (new QTH); 136 G3UQK; 137 G8BSH; 138 G8BWW; 139 G8AUN; 140 G8AEJ; 141 G3WDG; 142 G8BCP; 143 G8ABA; 144 G3WUW; 145 G3YUA; 146 G8VN; 147 G8BCA; 148 G3OHC/P; 149 G8BEO; 150 G3WUW/P; 151 G8BQX/P; 152 G8BPY; 153 G8CMB/P; 154 G5UM (new QTH); 155 G8AEL; 156 G8CKG; 157 G3HCW; 158 G8CJV; 159 G8CKV; 160 G8CEZ; 161 G3SFP/P; 162 G8CEA/P; 163 G8BEW; 164 G3OHC/M; 165 G8CXK/A; 166 G8CMU; 167 G3YRH; 168 G3YDY; 169 G8BKR; 170 G8CVK; 171 G3PKV; 172 G6FI; 173 G8CUO; 174 G3W3OXD/P; 175 G3W3OXD/A; 176 G8DBB; 177 G8CCE; 178 G3ENY; 179 G8BQH; 180 G8BUJ; 181 G8ADP/A; 182 G8CVS; 183 G8BXX; 184 G8BGE; 185 G8CUT; 186 G8DLZ; 187 G8DBA-G3ZNW; 188 G8DJF; 189 G8DLP; 190 G8BCE/P; 191 G3W3UCB/P; 192 G8APO; 193 G8DKV; 194 G8CBZ; 195 G8BXX; 196 G3DOR; 197 G8CBU; 198 G8BKK; 199 G8DMY; 200 G8DJM; 201 G8BCL; 202 G8CXV; 203 G3YED; 204 G8DJK; 205 G8CRN; 206 G8BRT; 207 G8BRT/P; 208 G3EFP/P; 209 G3YIZ; 210 G8BZX; 211 G8BYV; 212 G3WHK; 213 G8BBDX; 214 G8ANQ; 215 G8CXO; 216 G3VNO; 217 G8EAV; 218 G8CKX; 219 G8BKE; 220 G8CJO; 221 G8DML; 222 G8DAW; 223 G8DKF; 224 G8EGS; 225 G8CKV/P; 226 G3ISX/M; 227 G8EBI; 228 G8ENL; 229 G3SRX; 230 G8AZU/P; 231 G8CEX; 232 G8BRRM/P; 233 G8W4ABR/P; 234 G8EBV; 235 G8BDJ; 236 G8BXC/P; 237 G8BCO; 238 G8ERW; 239 G3XEB.

144MHz Senior Transmitting Section

1 G3CCH; 2 G3FAN; 3 G5MA; 4 G3BLP; 5 G3CO; 6 G3BA; 7 G6NB; 8 G3EDD; 9 G3HRH; 10 G8GP; 11 G3LAS; 12 G3IMV; 13 G3PTM; 14 G5NU; 15 G6GN; 16 G3KHA; 17 G3AOS; 18 G3MRA; 19 G3BHW; 20 G3W3MFP; 21 G3DAH; 22 G3JEQ; 23 G6RH; 24 G3MCS; 25 G3GIM; 26 G2PL; 27 G2NH; 28 G3USB; 29 G5TA; 30 G3GZJ; 31 G3COJ; 32 G3JYP; 33 G8BBB; 34 G3OZP; 35 G3HCW; 36 G3DY.

144MHz Receiving Section

1 BRS22550; 2 BRS22322; 3 BRS15822; 4 BRS15744; 5 NL687; 6 BRS20103; 7 A3470; 8 A4048; 9 BRS21667; 10 A4871; 11 BRS23140; 12 BRS7323; 13 A3942/P; 14 A3942; 15 BRS24550; 16 BRS30352; 17 A5032; 18 A6812; 19 BRS31172; 20 BRS31466.

144MHz Senior Receiving Section

1 BRS15744; 2 A5032.

432MHz Transmitting Section

1 G3NNG; 2 G3KPT; 3 G3LHA; 4 G3BNL; 5 G3MCS; 6 G8AAZ; 7 G8ABP; 8 G3AHP; 9 G5UM; 10 G8ACQ; 11 G8WACG; 12 G8WACG/P; 13 G8AHC; 14 G8AEJ; 15 G8AGG; 16 G8AGU/P; 17 G3PTM; 18 G8AAY/A; 19 G8AGQ/A; 20 G3HRH; 21 G8AJU; 22 G8ALZ; 23 G8ADP/P; 24 G8AUE; 25 G6GN; 26 G8AQ; 27 G8AWO; 28 G8AXP; 29 G8AHE/P; 30 G8AOD; 31 G8AWV; 32 G8AKT; 33 G8ANS; 34 G8ARD; 35 G8AIE; 36 G3PKT; 37 G8ATK; 38 G8ACP; 39 G8AQZ; 40 G8ARC; 41 G8AVL; 42 G8ART; 43 G5NU; 44 G3FIJ; 45 G3XEB; 46 G8WBAH; 47 G8AVX; 48 G8AKQ/P; 49 G8ABB; 50 G8ADC; 51 G8ADC/P; 52 G3ATL; 53 G3UBX; 54 G8AAZ; 55 G2WS; 56 G8ALM; 57 G8AYN; 58 G8BGO; 59 G8AWS; 60 G8AWS/P; 61 G8BYV; 62 G3UQK; 63 G8BAK; 64 G8BCA; 65 G8BIL; 66 G8APZ; 67 G8CKX; 68 G8AMU; 69 G3EHH; 70 G8DLP; 71 G3RZK; 72 G5UM (new QTH); 73 G3OBD/P; 74 G2CFZC; 75 G8BQH; 76 G3PBV (old QTH); 77 G8CKX/P; 78 G2WS/P; 79 G8AMU/P; 80 G3RZK; 81 G8BKR; 82 G8ERW.

432MHz Senior Transmitting Section

1 G3MCS; 2 G8AKE; G3KEQ; 4 G2XV; 5 G8AWS/P; 6 G8AUE; 7 G8ACQ; 8 G8ATS; 9 G8BBB; 10 G3COJ; 11 G8ARM; 12 G8BCA; 13 G3XE3

1 BRS15744; 2 A5032.

432MHz Receiving Section

1,296MHz Transmitting Section

1 G3MCS.

Supreme Award

1 G3MCS.

Microwave Section: 3cm

1 G8WRPE/P; 2 G3ZGO/P; 3 G8APP/P.

MICROWAVES—1,000MHz and up

by Dr D. S. EVANS, G3RPE*

Microwaves during 1971

Looking back over this column (which actually started in October 1970), we note we have developed a set of standards which, even if not adopted in entirety by all microwave enthusiasts, appears to have no major shortcomings. We have also managed to produce something of current interest for each of the bands. For 23cm, designs for a hybrid ring mixer and for a long Yagi have appeared, although 13cm had only a waveguide feed. The 3cm band, on the other hand, has done well, reflecting the high level of interest in it and the willingness of people to write about activities on it. We have had designs for a Gunn diode oscillator, a diode mixer assembly and a directional coupler, together with details on modifying two types of klystrons to operate in the amateur band. This is sufficient basic data for building one style of transmitter/receiver. Some ideas on the special operating problems associated with the use of high-gain aerials characteristic of this band have also been presented.

In addition to the column there have been full-length articles in *Radio Communication* on designing and making dishes, a survey of the diodes used on microwaves, and invaluable reports of the VHF Contests Committee. Microwave events of note were the VHF Convention, where this year there was a strong microwave interest, and the two UHF/SHF contests which are becoming increasingly competitive and less experimental in nature. Two important innovations introduced during the year are the Microwave Awards, and the J. Frazer Shepherd Prize for research into microwave applications to radio communication.

All the above are on the plus side. On the minus side, the biggest disappointment must surely have been the meagre allocation by the ITU Space Conference, and one notes with special regret the failure of the 3cm proposal despite valiant efforts by those concerned. Still, we do have a 24GHz allocation for which we must be thankful, although this is rather awkward in not being in simple harmonic relationship with our bands at lower frequencies, and in that it will involve modifying any equipment built to suit the present 21GHz allocation.

There have been obvious gaps in coverage, even allowing for the restrictions imposed by the space available. Little has been described concerning either the 9cm, 6cm or the 15mm bands, although an attempt has been made to describe waveguide equipment for 3cm in terms which enable the designs to be scaled for other frequencies.

The compiling of the column has been made much easier by the large number of letters received from readers, to date nearly 200. These are very important in giving a picture of what is happening, and what ought to happen. So do keep writing in. Most of the letters have been concerned with technicalities, and perhaps too few have dealt with operating news—please note. Very welcome have been letters received

from abroad, from PA, F, VK and W. Thanks to those who saved time by enclosing SAES, those who did not are excused, but not the one who headed his letter "QTHR" and wasted that much more time.

So, summing up, 1971 seems to have been a good year for microwaves in general, and for 3cm in particular where the effectiveness over optical paths of even the simplest equipment has been demonstrated time and time again. It is fair to say that this activity is based on a solid foundation, part of this strength being due to there being three widespread centres of activity each of which can act as a focus; the Bristol group, the G5FK group in the London Area, and G3BNL and G3EEZ in the South Midlands who form a hive of microwave activity in their own right.

Operating news

G3WDG (Bristol) has written in with details of his equipment. His 23cm converter uses a hybrid ring mixer as described in this column last February, but using 1N23E diodes instead of the original Schottky barrier diodes. The untuned output is fed into a 20MHz tuneable i.f. Tests have shown that it significantly out-performs his converter using the more conventional trough lines. On 13cm he uses a similar ring mixer, scaled from the 23cm design, a self-excited local oscillator (BFY90), and a two-stage head amplifier to a EC10. This converter sounds very similar to the one employed by G8AGM: both rely on the oscillator developed by G8DEK which, when demonstrated at the VHF Convention some years ago, surprised many by its stability. The aerial is a 28in dish with an "oil-can" feed. The corresponding transmitter consists of a 384MHz exciter developing 4W, followed by a varactor sextupler which gives about half a watt out on 2,304MHz. A DET22 pa can also be fitted.

For the higher frequencies he resorts to klystrons. On 9cm he is using a 726A in the polaplexer configuration feeding a 28in dish, into a 30MHz i.f. amplifier. His 3cm equipment, which was briefly described in the August issue, has since been improved so that G3BNL, using a 723A/B and a 10in dish, is 5/5 at 30 miles just using the open end of the waveguide as the aerial. He has now worked seven stations on 3cm, which must be something of a record.

G3WDG also reports that G8DEK is on 23, 13 and 3cm, G8ANZ on 13cm, and G8ADP, G8CKZ and G3UPF on 3cm. The latter station runs 1W output: by next season there could be at least six stations running at this sort of power level, which may be sufficient to start opening up long non-optical paths for the first time.

Waveguide No 16

The search for a source of waveguide 16 bits and pieces is now over. G3JHM can supply short lengths of the waveguide in brass, together with the associated flanges, at competitive prices.

* Upper Sales, Chaulden, Hemel Hempstead, Herts.

THE MONTH ON THE AIR

A monthly feature by John Allaway, G3FKM*

ONCE again your scribe finds himself writing the last *MOTA* of the year and faced with the happy task of wishing all readers the very best of good wishes for Christmas and the New Year. 1971 has been a very encouraging year due to the very excellent support received from a number of regular contributors at home and overseas without whose help it would not have been possible to compile the monthly offering. Most sincere thanks are extended to all these and also to the authors of the various news sheets and publications regularly listed at the end of the article. The RSGB would like to take this opportunity to express its appreciation of the work done by Dr G. Lange-Hesse, DJ2BC, of the Lindau Ionospheric Institute, in supplying the information used in drawing up *Propagation Predictions*.

Attention is drawn to the notice which appeared in October *Radio Communication* concerning envelopes franked with pre-decimal stamps currently in the possession of QSL Bureau sub-managers. These will be useless after February 1972 and readers are advised to request their return so that they can be used before they become invalid. A fresh supply of envelopes with decimal stamps should accompany the request of course!

PE2EVO

Have you heard or worked PE2EVO? This is a special call-sign for a permanent station in an exhibition in Eindhoven, Holland. The station is intended for experimental use on all amateur bands. It is part of and is located in the EVOLUON.

The EVOLUON was opened in 1966 on the occasion of the 75th anniversary of Philips Industries, and is a permanent exhibition—"Man and Progress—the evolution of man, science, and technology". The PE2EVO station provides interest for the hundreds of thousands of visitors who see the exhibition each year and awards honorary membership to amateurs from more than 20 miles away who contact it on at least five bands and who submit the relevant QSLs. Membership carries the privilege of having one's QSL attached to a "Roll of Honour" in the station, and the PE2EVO QSL grants free admission.

GB3MSA/GB3MNI

The Cornish Radio Amateur Club will be using this special call-sign to celebrate the 70th anniversary of the first transatlantic radio crossing. This will be during the period 11 to 16 December inclusive, the station will occupy some of the original Marconi station buildings and the aerials will be on the site of the those used in the transatlantic test. Much historical data has been collected and there will be displays of photographs and apparatus. GB3MSA will be on the air continuously and offers from amateurs who would like to participate will be welcomed. Schedules may be arranged via G3VWK (A. H. Hammett, Rosehill, Ladock, Truro, Cornwall). Special QSL cards are being printed.

The Ballymena Radio Club will also be activating a special station during the same period. The call-sign will be GB3MNI and the club hopes to operate on all bands 160 to 2m on cw, a.m. and ssb. Special QSL cards have been printed.

Top Band news

Richard Kay, HB9ANW (G3OQF), has pointed out in connection with the Transatlantic DX Tests that stations whose "effective night-time geographical radio range" embraces the coastal stations on 1,827kHz should not use the 1,827-1,830 kHz segment as the latter stations are on upper sideband which is 3kHz wide. In view of the fact that many UK stations are heard in Switzerland on cw at S9+ during the hours of darkness Richard feels that no UK amateur should use the following channels at night: 1,827-1,830, 1,834-1,837, 1,841-1,844, 1,848-1,851, 1,855-1,859 (4kHz as both 1,855 and 1,856 are coastal frequencies), 1,869-1,872 and 1,883-1,887 kHz. Both HB9AJU (G3OOH) and 4U1ITU, as well as HB9ANW himself, are active from Geneva on 160m.

News from overseas

Colin McRae, G3WRN, is returning to Malagasy at the end of December for a two-month stay and will be on the air from about 1 January as 5R8AB. Operating frequencies will be as follows: 7,004, 14,020, 14,040, 21,050, 21,100, 28,050 and 28,100kHz (cw), and 7,080, 14,180, 14,280, 21,180, 21,280, 28,550 and 28,600kHz on ssb. Operating on 40m is uncertain. He will be on the air most days and when conditions are favourable will be looking for UK stations. He will accept bookings for schedules but at least three alternative dates should be given and he must receive the information before 26 December. Colin may be reached at 9 Portal Close, Barnham, Thetford, Norfolk. 5R8AB QSLs should be sent to this address, or via the bureau via G3WRN.

More information concerning conditions on Jan Mayen Is has been received from Sandy, JX3DH. There are now five amateurs on the island, and four more operators under instruction will receive licences soon—this will increase the amateur population to 25 per cent of the total! Sandy has a Sommerkamp FT500 transceiver and FR500 receiver, and hopes to have a CL33 beam and 80m dipole in the air by now. Lower frequency band working is difficult due to the large number of transmitters on the island (several Loran, two radio stations and a long-wave radiobeacon among others) but JX3DH will be heard on the WAB frequency. He prefers rag chewing and is rather tired of the rubber stamp type QSO.

VS9MF has asked (via BRS20249) that readers' attention should be drawn to the fact that his QSLs are obtainable from G3VOA, c/o 75 Beechwood Rd, Fishponds, Bristol BS16 3TW, and not from G3VOA's address as given in the 1971 *Amateur Radio Call Book*.

Gene Sochor, K9KDI, has very kindly forwarded news received direct from AC5TY together with a photograph. Yonten says that he is active around 14,030kHz from about

* 10 Knightlow Road, Birmingham B17 8QB.



T. Yonten, AC5TY. (Photo by courtesy of Northern Illinois DX Association, K9KDI)

1300 until 1500 on some days. He is using a 400W Indian-made transmitter and a dipole orientated E—W. He also has a Hallicrafter SR150 transceiver (which is in a poor state of repair) and a Yagi beam but this is for commercial use. Yonten is 33 years old, very keen on radio, and is Director of Wireless Communications in Bhutan. The Northern Illinois DX Association is trying to help out with a new transceiver and better aerials, and may take over QSL handling. At the moment QSLs should go to: T. Yonten, AC5TY, Director, Wireless Communications, Dechhentsi, Thimpu, Kingdom of Bhutan.

Dr L. Moreno-Quintana, LU8BF, is now on the air as TI2MQ from San Jose, Costa Rica. He is specializing in working stations back in Argentina by trans-equatorial propagation on 50MHz and has had reasonable success between 1800 and 1900.

DXpedition of the Month *Bulletin* 3-73 says that in addition to taking over the QSL managerships for HP1IE, PJ7VL and VE1ASJ (who formerly used the services of W2CTN), DOTM is now handling QSLs for IP1s MOL, RB and RBJ. KF4SJ and VA2UN cards are now being sent out.

D. J. Hibbin, G4AOP (ex-MP4MBG/MP4BHB, founder chairman of club station MP4MBC 1967/68), is now in Cyprus and has been issued with the callsign ZC4DJ. He may be reached at the address in *QTH Corner*.

Keith Howard, VK2AKX (G3NDH), will be in the UK from 18 December to 27 January and hopes to be on the air from 32 High St, Whitechurch, Aylesbury, Bucks, if he can borrow a power supply for his Swan 350! At home in Newcastle, NSW, Keith runs a radio club with 170 young members.

Dx news

A letter issued by FCC in Washington on 5 October said that the Commission had received notice from the Khmer Republic licensing authorities that there would be no objection to communications between XU1AA, Phnompenh, and USA licensed stations. This means that contacts with XU1AA are valid for DXCC credit. XU1AA is a club station and it

seems likely that suitable equipment and a number of guest operators will result in its callsign becoming quite prominent in the near future. The DXCC status of the other XU callsign holders and VE7IR/XU is not known at the time of writing. A great deal of credit is due to the latter operator for persuading the XU authorities that amateur radio could be beneficial in their country.

Two stations have been on the air from the British Phoenix Is—VR1AB, who is also WB9IAO/KB6, and VR1AC who has also used the callsign WB6IK1/KB6. Both have their own equipment and should be on the islands for a year.

QSL cards for contacts with CR5SP since the end of 1970 should be sent to the address given in *QTH Corner*—W2GHK (of DOTM) has logs only until 31/12/70.

The schedule normally followed by HM King Hussein, JY1, has been supplied by G3RFG. JY1 is to be found on 14,195kHz at 1430 on Mondays, on 14,295kHz at 1900 on Saturdays, and on the same frequency at 0330 on Fridays. G3RFG also explains the significance of the other JY prefixes—JY2 is HRH Princess Muna, JY3—advanced Class A licensees, JY4—Class A, JY5—Class B, JY6—club stations, JY7—special stations, JY8—tourists, and JY9—visitors.

GM3RSI has now received his call in Saudi Arabia and is HZ1GM. He has been reported in the Commonwealth Net (on 21,355kHz) and will arrange skeds (write to I. McKera-cher, PO Box 1484, Riyadh, Saudi Arabia). QSLs go via G3LQP.

Unusual prefixes which have appeared during the past month include KY6PMR (Space Fair, Point Mugu, California), and 4C1QB and 6D1AA who were in Mexico. Stations in Angola were heard using XX6, and those in Mozambique XX7 during the CQ WWDX Contests. Zambian stations have been using 9I7 to celebrate their seventh independence anniversary. II4FGM has been on the air from the Marconi Commemoration Foundation.

Further news of CR5AJ is that he now has crystals for the following frequencies:—3,525, 3,540, 3,550, 3,635, 3,640, 7,013, 7,020, 7,023, 7,025 and 7,032kHz. His frequencies on 14, 21 and 28MHz will presumably be in harmonic relationship to these.

ZM7AG is due to leave the Tokelau Is on 10 December. According to *West Coast DX Bulletin* his replacement has not managed to obtain his licence yet so there may be no more activity for a while. VK3TL is expected to be on the air from Nauru with a C21 call early in 1972, and will be there for a couple of years. Another station is now on from Bougainville Is (New Guinea), this is VK9CH who is requesting QSLs via WA6MRG. VR1W should have been heard during the latter half of November from British Phoenix Is—this was W6BHY and ex-ZD8Z/9Y4AA—in the event of a delayed start this operation may still be on the air on all bands cw and ssb.

QSLs for contacts with all DJ6QT's recent African expedition callsigns (TZ2AC, XT2AC, DJ6QT/5U7 etc) should be sent to the address given under TZ2AC in *QTH Corner*. Please enclose sae and two IRCs.

ZD9GA (formerly ZD9BR) and ZD9GB are now on Gough Is and should be QSLd via ZS2RM. ZD9BM is back on Tristan da Cunha and will be there for two years. He looks for UK stations daily at 0700 and has been heard between 14,200 and 14,300kHz, QSLs for these contacts go to GB2SM.

The stations aboard the pirate radio ship in the North Sea are HP9s—not HB9s as mentioned in an earlier *MOTA*.

Contests

The ARRL 160 CW Contest

2200 10 December to 1600 12 December.

Rules have been changed this year so as to include entrants from countries outside the USA and Canada. However, contacts may only be between ARRL sections or between an ARRL section station and a dx station—contacts between non-USA/Canadian stations do not count. Exchanges consist of RST and in the case of stations in ARRL sections their section number. QSOs count five points and the multiplier is the number of ARRL sections worked. Certificates will be awarded to winners in each country. No log need be submitted—only an ARRL summary sheet and an alphabetical list of stations worked (the former is available from ARRL HQ). A copy of the log may be requested for verification. Entries must arrive before 10 January at ARRL HQ, 225 Main St. Newton, Conn. 06111, USA.

The URE Contest

Details of this contest were given in last month's *MOTA*. However, it was not pointed out that log sheets should only include 20 QSOs per page.

Results of the 1971 ARRL DX Competition have now been received and UK scores were as follows:

Phone Section			
G2QT	772,590 points	G5AOF	112,832 points
GM5AQR	708,822 ..	G3TJW	41,796 ..
G3SEM	707,294 ..	GM3HMU	21,552 ..
GW3NWW	580,492 ..	G2AJB	5,376 ..
G3YHB	450,180 ..	G3MWZ	4,760 ..
G6LK	293,544 ..	G3JKY	4,350 ..
GD3YBH	279,565 ..	G3JOC (Multi-op)	2,778,223 points
G3KMA	277,032 ..	G3SUX	856,464 ..
GC3YIZ	137,547 ..	G3FVA	668,861 ..
CW Section			
G3FXB	1,609,272 points	G2AJB	86,100 points
G2RO	1,371,510 ..	G3PVA	60,075 ..
G2QT	683,750 ..	G3JKY	23,554 ..
G2DC	645,636 ..	G3KSH	16,464 ..
GW3JI	529,704 ..	G3YHB	11,253 ..
G3KMA	250,236 ..	GC3ZIP	975 ..
GD5ATG	206,028 ..	G3SUX (Multi-op)	734,616 ..
G3ESF	158,166 ..	GW3ITZ	632,632 ..
G3APN	132,204 ..	G3NRR	582,417 ..

Log and summary sheets for the 1972 contest are available from G3FKM.

Results of the 1970 CQ WW DX Contests (phone and cw) have been received from WIWY. The phone (UK) scores are as follows:

Single operator, single transmitter			
G3LNS	1,667,385 points (All bands)	G2BOZ	251,086 points (28MHz)
G3KMA	312,309 ..	GC3YIZ	54,944 ..
G3YHB	300,752 ..	G3FXB	361,534 .. (14MHz)
G3YHB	205,313 ..	G4JZ	243,294 ..
GM3BCL	202,852 ..	G3KWK	165,977 ..
GW3NWW	167,240 ..	G3NSY	52,724 ..
G2AJB	69,768 ..	GM3VEY	23,214 ..
G3WOU	20,160 ..	GM3WOJ	1,560 points (7MHz)
G3RXV	300,580 .. (28MHz)	GM3VTB	9,460 .. (3-5MHz)
G3YBM	293,328 ..	GM3YCB	1,204 .. (1-8MHz)
G3WJN	266,112 ..		

Multi-operator, single transmitter			
G3WYX	2,150,685 points	G3YXR	532,656 points
G3SSO	1,976,469 ..	G3CXX	486,920 ..
G3KMI	612,864 ..	G3ZBI	117,040 ..
G3FVA	578,248 ..	GW3VBX	81,396 ..

Congratulations to certificate winners (listed in bold type). The detailed cw scores will be given in next month's issue.

The TOPS CW Club Contest.

The attention of readers is drawn to an unfortunate error given in the rules of this event as published in November *MOTA*—it is not an all-band affair but restricted to the 3,500—3,600kHz section of 3-5MHz in accordance with the European Band Plan.



Ed, 9J2ED, fortified himself before commencing the SARTG rty contest in which he scored over 96,000 points. This fine array of equipment will soon start to feed a new 40m beam

Awards

The Greater Vancouver Sea Festival Amateur Radio Award. This is awarded for contacting 10 stations located in the Greater Vancouver area since 1 February 1968. No QSLs are required, but a list showing time and date of contacts with callsigns and locations of stations worked should be sent to: Mr J. R. Rothwell, VE7TK, 6758 Bryant St, Burnaby 1, Vancouver, BC, Canada. There is no charge. Contacts with VE7VSF or VE7VMM count as the equivalent of working two stations; working both is the equivalent of working five others. The Greater Vancouver area includes Vancouver City, North and West Vancouver, Burnaby, New Westminster, Port Moody, Port Coquitlam, Pitt Meadows, Hammond, Hancy, Richmond, Delta, Lander, Surrey and Cloverdale. VE7JY, although not located in the area, counts for the award.

The Rhein-Ruhr DX Association Award

For contacts with members of the association since 1 January 1967. The first QSO with a member of the club counts one point, but members may be worked again for further credit and each further contest QSO counts two points. There are three classes—Class I for 100 points, Class II for 75 points, and Class III for 50 points. Mode endorsements are mixed, two-way cw, and two-way ssb. Listeners may apply. A list of contacts plus 10 ircs should be sent to: RRDAX Award Manager, DJ9NW, Bernd Jurgens, D-5604 Neviges, Schutzenstr. 11, W. Germany. A list of members may be obtained in return for an sae and irc.

Dxpeditons

Long Skip quotes a letter received by VE3GMT from OH2BH. In it Martii says that he is very hopeful that his intention to visit Mali Is will be carried out next summer. Contact has also been made with ZS6YQ, who is looking into the position with regard to transport to Bouvet Is (3Y0). An approach has

QTH Corner

AP2KS
CR5SP
EA7DJ/EA9
FG9GD/FS7

FL8MM
FR7ZQ/G
FY0GW
FY0KP
HR2GK
HQ2GK
WB6IKI/KB6
KB6DB
KC6WS
KC6YL
KY6PMR

TJ1AW
TJ1BA
TZ2AC

VP8JT

VRIAB
VRIAC
XUIAA
XV4BP
YB9UA
YJ8BL

YJ8RG
ZC4DJ
3D6AJ
5B4IS
5R8AS
5ZSKSA
7Q7CY
9S1SC

Mohd Khalid Shakur, PO. Box 1270, Lahore, W Pakistan.
Box 97, Sao Thome.
INDXA, Box 125, Simpsonville, Md, 21150, USA.
via W9IGW, Wayne Warden Jr, RFD 12, Bloomington, Ind, 47401, USA.
BP 574, Djibouti, TFAI.
FR7ZQ, BP 5, St Clotilde, Reunion Is.
via DJ5SM, Hans Greve, Schillerstr. 9, 7806 Waldkirch/Brsg, Germany
via DJ5AY, G. Schwarz, Prinz-Otto Str. 2, 8012 Ottobrunn, Germany.
via Rick Niswander, WA8VRB/I, PO Box 11331, Newington, Ct, 06111, USA.
(see VRIAC).
via INDXA (see EA7DJ/EA9).
via W3FDP, W Sedore, Box 950, Denton, Texas, 76201, USA.
via WA6WWC, 2406 Addison Circus, Thousand Oaks, Calif, 91360, USA.
now via K4MPE, 3208 Yanceyville St, Greensboro, NC, 27405, USA
via 4X4RH, Haim Israeli, 2 Iris St, Kiron, Israel.
via DJ6QT, Walter Skudlarek, An der Klostermauer 3, 6471 Hirzenhain, Germany.
via ZS6BBK, 14 Gerald Rd, Robertsham, Johannesburg, Tvl, Rep. of South Africa.
via INDXA (see EA7DJ/EA9).
Box 1248, APO San Francisco, Calif, 96401, USA.
PO Box 484, Phnom-Penh, Khmer Republic.
via STAR, PO Box 2008, Bangkok, Thailand.
Box 171, Djakarta, Indonesia.
via W6NJU, 7164 Rock Ridge Terrace, Canoga Park, Calif, 91304, USA.
Box 229, Villa, New Hebrides.
D. J. Hibbin, 103 MU, RAF Akrotiri, BFPO 53.
P. O. Box 541, Manzini, Swaziland.
OZ7IS, Aalekistevej 72, 2720 Vanlose, Denmark.
via G3WRN, 9 Portal Close, Barnham, Thetford, Norfolk.
via 5Z4MD, PO Box 30028, Nairobi, Kenya.
via K9BNF, 3646 S Logan Avenue, Milwaukee, Wisc, 53207, USA.
S. C. Ayivor, c/o University of Science & Technology, Kumasi, Ghana

R5GB QSL Bureau, G2MI, Bromley, Kent, BR2 7NE

been made to the authorities in Guinea (7G1) for a licence, and it is still hoped that something may come from continued correspondence with the Finnish Ambassador in Iraq. Readers may be interested to know that last autumn's trip to Annobon Is cost £2,000, £800 of which has been recovered from donations.

The expedition to Kure and Midway Is which was expected to take place at the end of October had to be cancelled as the helicopter which was to carry the operators crashed and no other transport was available.

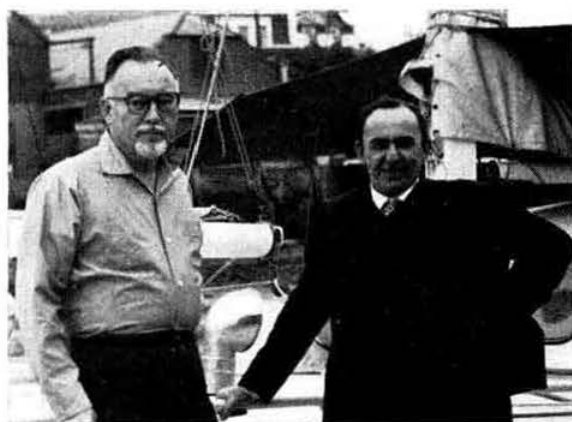
It now seems fairly certain that Aldo, ET3ZU, will be going to the Kamaran Is in early January. It is believed that his callsign will be ET3ZU/70 (70 is the prefix for South Yemen).

West Coast DX Bulletin says that there are at least two active dxers who have valid licences to operate from Clipperon Is. They are said to have suitable transport available and to have sufficient funds to make the trip as soon as they can obtain permission to land on the island. In view of the ending of French nuclear tests in the Pacific it may become possible for amateur operation to take place quite soon.

There is a rumour of a visit to Palmyra Is (KP6) to be undertaken by a group of KH6 operators in late November or early December.

Odds and ends

The yacht *Chamaru*, owned by Cdr and Mrs C. M. Sturkey Jr, was a recent visitor to the Thames (see picture). The ketch-rigged diesel auxiliary trimaran has a length overall of 50ft, beam width of 24ft and draft 3½ft. A "Trioform 50" class prototype of GRP construction, the vessel was built in Sasebo, Japan, during the late 'sixties. The Sturkeys are cruising around the world in the ship, which is fitted with many electronic navigation aids, and are keeping in



Cdr Sturkey, W7TNA, left, and Des Mills, G3LEI, on board *Chamaru* at Gravesend. (Photo: G3BPT.)

touch with their many friends throughout the world via amateur radio. They have an FTDX100 and FL2000 with them and use the callsigns W7TNA/MM and K7BGS/MM.

G3WEQ wishes readers to know that his former 9G1CO callsign is being pirated. Clive closed down from Ghana on 19 March 1971 and any contacts with 9G1CO since that date were not with the legal owner of the callsign.

GW8NP recently received a visit from VK4QW whose radio career dates back to 1912. Newton Wade was WRX in 1912; NWX in Jesselton, Borneo, in the period 1918-1923; 5PC in Portsmouth from 1923 to 1932; VS4A in Jesselton from 1946-1949; ZC5NW is Sandakan in 1950/1951; VK2AXW in Sydney from 1955-1958; and has been on the air ever since from Brisbane.

West Coast DX Bulletin reports that the ARRL DX Advisory Committee is considering issuing DXCC in one type only and dropping the separate phone and mixed categories. It is also thinking of eliminating all reefs etc not under the administration of any authority (eg Minerva Reef) from the DXCC list. Members of the committee include W4QCW, W1RAN, WA2FQG, W6RGG, W7LFA, W8BF, W9NN, W0ELA and VE3ACD.

Band reports

The recent spate of contest activity has resulted in increased interest on the bands and during the period under review interesting dx has been heard and worked on each one of them. Considerable activity on 28MHz has shown that this band is far from finished and the writer would like to remind readers that the occasional "CQ" call is a good idea on this band—just in case everyone is listening and not transmitting!

Many thanks to the following correspondents for submitting logs and information: G2BJY, G2HKU, GM3CFS, G3GVV, G3HB, G3KYF, G3UKH, G3UOL, G3UYM, G3VPS, G3YHB, G3ZEN, G5JL, G6GH, G8VG, BRS2098, BRS17567, BRS25429, BRS27880, BRS30231, BRS30694, BRS31239, BRS31301, BRS32457, A7056, A7082, A7120, A7531, A7555 and A7768.

1971 Countries Table

	1-8MHz	3-5MHz	7MHz	14MHz	21MHz	28MHz	Total
G3YHB	—	26	36	117	119	65	363
G8VG	1	17	40	45	62	34	199
G3YWX	—	14	19	86	26	—	145
BR527263	—	94	80	213	156	109	652
BR523429	—	124	108	175	145	97	649
A7460	9	61	41	125	92	51	379
A6220	11	53	57	141	88	20	370
BR527880	6	41	46	102	101	71	367
A7531	1	30	24	112	115	65	347
A7082	12	29	52	91	105	37	326
BR530684	5	11	17	83	72	35	223
A7681	5	28	14	67	45	—	159
A7511	3	38	15	35	32	3	126

Stations listed in italics were on cw, others on ssb.

1-8MHz. 0000 HB9CM, WIHGT, K2ANR, K2GNC, W8ANO, VE3EK, ZD8AY. 2300 OH1VR, OH5SM.

3-5MHz. 0000 FP8CT, MP4MPA, UO5BS, VO2AF, 0100 HRIKAS, 4M1A. 0200 VP7CQ (Box F2701, Freeport, Bahama Is). 0400 CT2BC, H18LC. 0500 CR4BC, OH0MA (Market Reef), PJ1AA, VP9BY, 8P6DR. 0600 KG4EQ, PZ1AX, ZF1WF, ZLs, ZP7PZS, 6D1AA (Mexico), 8R1G. 0700 HI3PC, VP2AAA, ZLs, 9Y4T. 1600 YA1OS. 1700 5U7AR. 1800 CN8HD. 2100 EA8HA, MP4MBC, MP4TDL, VE1ZZ. 2200 3V8AD. 2300 OD5BA, ZB2A.

7MHz. 0000 UF6CR, 9Y4MM. 0100 VP7CQ, 8P6DR, 9H1BP. 0500 OX5AS, TG9NJ (Box 115 Guatemala City—rapid QSL). 0600 PJ8AA (QSL to W2BBK), TG81A, ZP5AQ. 0700 KL7s HEE, HBK, W7s RM, SFA. 1000 WB4RJK/TF. 1900 EQ2BQ, JX2HK, VK6CT. 2000 HL9KH, JA9BA. 2100 EL2CB, 9G1DY. 2200 CP6FG, ZE8CP, 9V1PY. 2300 ZD8CW.

14MHz. 0700 TZ2AC, VK0JM, DJ6QT/5U7. 0800 CR8AG, KH6DT, VE8CD (from Essex and looking for UK contacts), 3A0GB (QSL to VE3MR). 0900 KL7UM, 1000 CT3AS. 1200 M1D (QSL to I4MKN). 1500 FB8XX, HSs. 1600 KH6BB. 1700 4S7SW. 1800 VK0MX (QSL to VK5TY), XT2AA. 1900 VP2VAD, VP8MM, ZD7SD. 2000 VP8JT (S. Georgia), VP8ME, 4C1QB, 6ZLNS/VP9. 2100 ET3ZU, KG4AL, TR8MC, ZD8AY (QSL via INDXA). 2200 VK6RU. 2300 W6MPE/KS4, TY1ABE, 5VZYH.

21MHz. 0700 JAs. 0800 KG6JAR, KR6AY. 0900 EA9EO, UA0YT (Zone 23), 9N1MM. 1000 JY6AMH, VK9s BA, HB, YA1CV. 1100 AP2KS, KS6DY, ST2SA, 9K2BQ, 9Y4VU. 1200 FM7AA, JY6AS (Box 2353, Amman), 1300 YB3AY. 1400 FR7AN, VU2HLU, YN0VMD. 1500 OX3ER, W6/W7s, YB0AAO, 4C1QB. 1600 TG9RJ, VQ9R, 9M2DQ. 1700 HC2GG/I, OX3VT, K7LDZ (Montana), TZ2AB, ZB2CE. 1800 K7POZ (Utah), 9L1RP. 1900 KY6-PMR, 5X5NF. 2000 KH6IJ, KY4CD, VE8AC.

28MHz. 0800 FR7AN, JY6FB, KR6MM. 0900 VK9XX, 5B4IS. 1000 DU1FH, FL8HM, JA3RQ, VK9XX, VS6CO, 5Z4MO. 1100 CR4BS, KH6HCM/KH6, K14CI, VK6s, VU2CK, 5B4ES, 917XZ. 1200 ST2SA, 7Q7CY. 1300 EL8I, 3B8CG 5Z4LW, 9K2AN. 1400 ET3DS, FL8MM, 9E3UA. 1500 G3MUL/CE3, FG7XT, VP8HZ, VS9MF ZS3KC (QSL to K4TXJ) 5VZYH. 1600 EA9AQ, TA3BJ, VP2AA, VQ9R, ZS3CCE (Expedition to Cape Cross). 1700 CT3AS, HPIWN, OB8V, T12WX (Box 30, San Jose), VP2AAA, W6s, 8R1G. 1800 CP6FG, FY7AE, Ws. 1900 CE3YF, HR2WTA.

Many thanks to the authors of the following for material reproduced: DX'press (PAOTO), DX News Sheet (Geoff Watts), the 29 DX Club Newsletter, (VK6PG), QUAX (G3DME), the DXers Magazine (W4BPD), NARS Newsletter (5N2ABG), Long Skip (Nick Sawchuk), CARS News-

letter (ZC4RS), the West Coast DX Bulletin (WA6AUD), and the Ex-G Radio Club Bulletin (W3HQO).

Deadlines for 1972 will be earlier than they were for 1971 and readers are reminded that the dates given here are absolute closing dates—nothing arriving later can be used. For February please send material to arrive by 8 January, and for March by 8 February.

Propagation Predictions

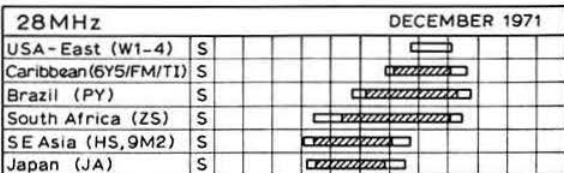
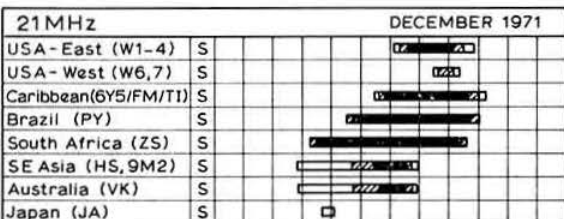
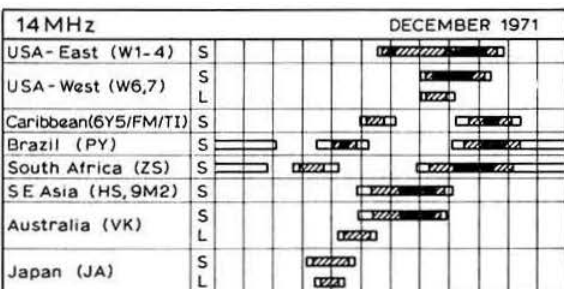
DX conditions, which reached their peak during October and November, will show a decrease in December and January. The F2 MUFs will be lower than in the previous two months, and seasonal changes mean shorter hours for dx on hf bands.

DX will probably not be possible at all on 28MHz. On 21MHz, all continents will be workable with certainty. The early sunset will close this band for dx traffic from about 1800gmt.

14MHz will probably remain open under normal conditions until 2030gmt for dx. The best chance of working all continents on this band will be between 0800 and 1300. The midwinter conditions will give opportunity to work dx by the long path. South America, East Asia and Australia should be workable in this way before noon, and western North America during late afternoon. Under exceptional conditions Central America, South-East Asia and eastern North America should be heard also via the long path.

On 7 and 3-5MHz, conditions will change little, but the distance covered on these bands will vary markedly from day to day. This is due to sporadic changes in the ionosphere, which are not related to solar activity.

The provisional sunspot number for October 1971 was 50.8 with solar activity evenly distributed throughout the month. The predicted smoothed sunspot numbers for February, March and April 1972 are 45, 43 and 42 respectively.



Time (GMT) 00 02 04 06 08 10 12 14 16 18 20 22 24

S Short path 1-5 days 6-20 days

L Long path

Openings on more than 20 days in the month

1971 Jamboree on the Air

We have received a few reports from participants in JOTA this year. Lack of space makes it impossible to include the reports in full but the following highlights from each one are noted.

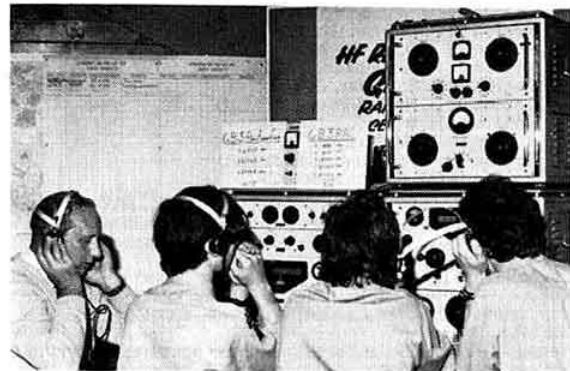
GB3CSM (Cornish Scout Movement) was set up in true Scout style under canvas, reports A. H. Hammett, G3VWK, Group Scout Leader. Two thirds of the 126 stations worked were Scout stations or stations directly connected with Scouting.

1st Hale Barnes Scout Group had the assistance of Geoff Barnes, G3AOS, and Peter Swann, G3WWX, in their successful participation. Approximately 300 contacts were made, including 70 Scout stations in the British Isles and 26 overseas, and 45 countries were worked.

3rd and 11th Keighley Scout Groups had the assistance of Northern Heights Amateur Radio Society, G2SU/A, for their operation from the 11th Group's HQ at Cullingworth. Operators were G3TFF and G8BML. More stations than last year were worked, mainly in Western Europe and eastern North America.

1st Scarborough Scout Group joined forces with the Scarborough ARS, G4BP, for their most successful weekend yet. Special QSL cards went to the 120 contacts in 36 countries which were made, 41 of them with other jamboree stations.

The 3rd Bracknell Scout Centre was the venue for Scouts from all over south-east Berkshire. The Racal ARC and Racal Communications Ltd loaned them an impressive array of equipment, and using the callsign GB3RAC, over 200 contacts were made.



Scouts and members of Racal ARC operating GB3RAC on 21MHz



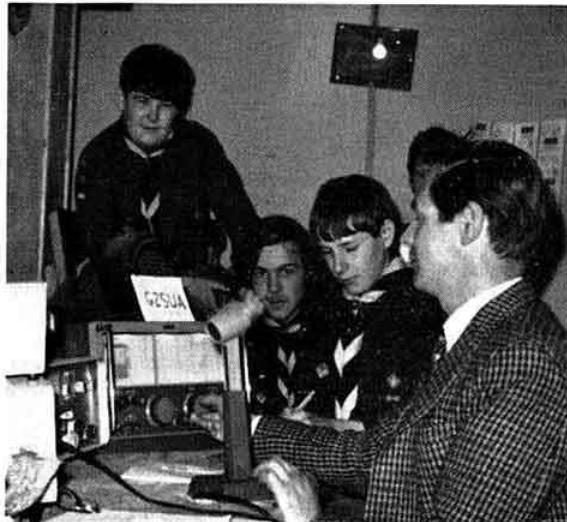
HB9AMY, located in Lugano, Switzerland, taking part in JOTA with Scouts of the San Gottardo Section



The Mayor of Scarborough, Councillor P. Jaconelli, surrounded by Scouts and cubs, watches G3JBR operating G4BP/A (Photo: Scarborough Evening News)



G8CDO operating GB3FES, overlooked by G3SJE, G3GC and a group of Scouts and cubs, when Edgware RS put the station on the air for the 1st Edgware Scout Group. (Photo: G3PSP)



G3TFF operating G2SU/A. (Photo: Keighley Scout Photos)

COUNCIL PROCEEDINGS

A brief report of the Council meeting held at Society HQ on 5 October 1971

Present: Mr F. C. Ward, G2CVV (President, in the Chair), Messrs B. D. A. Armstrong, R. J. Hughes, E. G. Ingram, G. R. Jessop, W. F. McGonigle, A. C. Morris, C. H. Parsons, W. A. Scarr, R. F. Stevens, G. M. C. Stone, E. W. Yeomanson (members of Council), and D. A. Findlay, general manager.

Mr J. O. Brown, director, Lambda Investment Co Ltd, attended the meeting by invitation to advise Council on financial matters.

Apologies for absence were received from Dr J. A. Saxton, Dr E. J. Allaway, Messrs J. Bazley, L. E. Newnham, J. R. Petty, A. W. Smith, and A. W. Hutchinson, editor.

Film Library

It was agreed that Mr W. F. McGonigle should check the copy of "Radio News of 1968" in Belfast and would arrange to check the second and third copies at headquarters. The fourth copy on loan to Crawley Group would be checked as soon as returned. Mr McGonigle agreed to report on the various copies of these films.

Honorary Treasurer

The President reported that he had received from Mr A. C. Morris a letter dated 5 October 1971 in which Mr Morris had confirmed his intention of resigning from the position of Honorary Treasurer. Mr Morris wished to terminate his appointment after the Annual General Meeting in December 1971.

Council accepted with regret Mr Morris' resignation and the President expressed appreciation of Mr Morris' services.

It was proposed that Mr J. O. Brown be appointed Honorary Treasurer to the Society, and on Mr Brown indicating that he was prepared to accept the appointment the proposition was carried unanimously.

Accounts

A first proof of the Accounts for the year to 30 June 1971 was considered, and Mr Morris explained various points concerning them.

It was agreed that the accounts as submitted in proof form were acceptable, subject to audit. It was pointed out that it would be necessary to submit a resolution at the AGM to approve the action of the Council in holding Lambda Investment Co Ltd Debenture Stock.

Membership and affiliation

It was resolved:

- to elect 127 corporate members and 27 associates;
- to waive the subscriptions of nine members on the grounds of blindness or other disability;
- to accept reduced subscriptions from four members;
- to grant life membership to four members;
- to grant affiliation to the Warrington & District Amateur Radio Society, St Lawrence's Amateur Radio Club, Bodmin, and the Wheatsheaf Amateur Radio Club, Grimsby.

Annual Report of Council

The draft report of Council for 12 months to 30 June 1971 was considered. After amendment, the draft was approved for publication in the November issue of *Radio Communication*.

Report on headquarters organization

Council considered a report dealing with accommodation and staffing at headquarters, submitted to the Finance and Staff Committee by the general manager.

It was agreed that the proposals for the use of the council room and for office reorganization should be implemented provided alternative accommodation was available for Council meetings.

Committee minutes

Council approved the minutes of the Scientific Studies Committee (23.8.71), TVI Committee (3.9.71), Education Committee (4.9.71), IARU Working Group (6.9.71), Membership & Representation Committee (7.9.71), VHF Contests Committee (8.9.71), Finance & Staff Committee (13.9.71), HF Contests Committee (16.9.71), Technical Committee (21.9.71).

Meeting with MPT

Mr R. F. Stevens reported that he had been asked to attend a meeting at Waterloo Bridge House on 14 October next when frequency allocations would be discussed.

Society publications

It was agreed that a stock of Society publications should be held by Mr C. H. Parsons, GW8NP, for sale to members in the South Wales Region.

Beacons

Mr W. F. McGonigle reported that it was probable that the Northern Ireland Beacon, GB3GI, would be operational again on the 2m band.

REPRESENTATION 1972-4

Regional Representatives

The following members have been nominated unopposed to serve as Regional Representatives for 1972-4:

Region 1: B. O'Brien, G2AMV

Region 4: T. Darn, G3FGY

Region 5: P. J. Simpson, G3GGK

Region 7: R. S. Hewes, G3TDR

Region 8: D. N. T. Williams, G3MDO

Region 9: H. W. Leonard, G4UZ

Region 10: D. M. Thomas, GW3RWX

Region 13: V. W. Stewart, GM3OWU

Region 16: D. F. Beattie, G3OZF

No nominations were received for Regions 6, 11, 14, and 15, and Council at its January 1972 meeting will invite qualified members of the Society to serve as Regional Representatives in these Regions.

A ballot will be necessary in the following Regions:

Region 2—North Eastern. (Durham, Northumberland, Yorkshire.) Nominated: J. E. Agar, G8AZA, W. Burton, G8ANQ, D. M. Pratt, G3KEP.

Region 3—West Midlands. (Birmingham postal area, Hereford, Shropshire, Staffordshire, Warwickshire, Worcestershire.) Nominated: R. W. Fisher, G3PWJ, B. Kennedy, G3ZUL.

Region 12—North Scotland. (Aberdeen, Angus, Banff, Caithness, Hebrides, Inverness, Kincardine, Moray, Nairn, Orkney, Perth, Ross & Cromarty, Shetland, Sutherland.) Nominated, G. Grant, GM3UKG, A. J. Oliphant, GM3SFH.

Region 17—Southern. (Berkshire (outside Region 7), Hampshire, Wiltshire, Channel Islands, Isle of Wight.) Nominated: L. Hawyard, G3ZKR, C. Sharpe, G2HIF.

Corporate members resident in the above Regions are invited to record their vote in favour of one of the above candidates in the appropriate Region on a postcard and to send the postcard to the General Manager, Radio Society of Great Britain, 35 Doughty Street, London WC1N 2AE, to arrive not later than 31 December 1971.

Form of Voting Card

Election of Regional Representatives, 1972-4

I,, being a fully paid up

Corporate member of RSGB resident in Region, wish to record my vote in favour of

Mr as Representative for Region

Signed

Callsign or BRS number

Address

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Area Representatives

The following nominations have been received.

Region 1: Wirral, J. K. Birch, G2FOS; St Annes, A. R. Uwins, G3VNX; Preston, C. Lancefield, G3DWQ.

Region 2: Barnsley, P. N. Ackley, G3LRP; Scarborough, P. B. Briscoe, G8KU.

Region 6: Gloucester, E. A. Perkins, G3MA.

Region 7: Chingford, D. Platt, G3JNJ; Gravesend, P. F. Jobson, G3HLF; Havering, O. S. Tillett, G3TPJ; Acton, Brentford & Chiswick, W. G. Dyer, G3GEH; Ilford, L. Currie, G3UKX.

Region 9: South-east Somerset, G. L. Parris, G3XFW; Cornwall (excluding Saltash), M. C. Locke, G3NKE; North Devon, H. G. Hughes, G4CG.

Region 10: Cardiff, T. J. Brooke, GW3GHC; Pontypool, J. S. Hammond, GW3JBH.

Region 12: Caithness & Sutherland, I. Mochrie, GM3VCM.

Region 14: Stirling & Clackmannan, A. M. Cameron, GM3OGJ.

Region 15: Stirling & District, H. Irvine, G13TLT; Belfast, J. T. Barnes, G13USS.

Region 17: North Berkshire, C. Desborough, G3NNG.

OBITUARIES

Mr S. C. F. Belcher, W2HWA

Sidney Belcher died on 13 November in New Jersey, USA. Originally a native of Exeter, Mr Belcher was a member of FOC Tops CW Club and WAB manager for USA as well as being an honorary member of Cannock Chase ARS.

Mr J. Chapman, G6AY

Jim Chapman of Falmouth, Cornwall, died on 29 October, aged 60. A well-known worker on the dx bands, Jim was the holder of the 45th DXCC certificate.

Mr L. M. Holyhead, G3PQL

Len Holyhead died on 6 October, aged 55 years. As well as being a keen mobile operator on top band, attending many mobile rallies, he was a meticulous constructor of all his own equipment.

We are also informed of the deaths of:

Mr J. Davie, G2XG, of Chingford.

Mr L. W. Airtan, G2HT, of St Anne's, Lytham St Anne's.

Contests calendar

8-9 January—AFS

9 January—144MHz SSB (Rules in this issue)

January-February—432MHz Cumulative Contest.

12-13 February—First 1.8MHz

4-5 March—144-432MHz Open Contest

11-12 March—BERU

25-27 March—BARTG Spring RTTY Contest (Rules in this issue)

9 April—80m LP

9 April—70MHz Contest

6-7 May—432MHz

21 May—144MHz

3-4 June—NFD

10-11 June—70MHz

24-25 June—Summer 1.8MHz

25 June—Microwave Contest

1-2 July—144MHz

8-9 July—HP Field Day

23 July—432MHz

13 August—70MHz

20 August—144MHz SSB

2-3 September—VHF NFD

2-3 September—IARU VHF

10 September—80m Field Day

7-8 October—21/28MHz

7-8 October—IARU UHF

21-22 October—7MHz CW

4-5 November—7MHz Phone

5 November—144/432MHz CW

11-12 November—Second 1.8MHz

November-December—70MHz Cumulative

Looking ahead

10 December—RSGB Dinner Club, Kingsley Hotel, London WC1 1972

7 January—Presidential Installation; Bonnington Hotel, Southampton Row, London WC1.

22 February—RSGB lecture at the IEE.

YOUR OPINION

The Editor

Radio Communication

Sir—I am saddened to think that Mr W. Farrar, G3ESP, has not paid a visit to the Worcester & District Amateur Radio Club Rally held in mid-July every year at Upton-on-Severn, for if he had, I am sure he would not have written in such a vein. (*Radio Communication* October 1971).

This rally is admittedly held in a school, but in a school in the heart of beautiful Worcestershire countryside with the majestic Malvern Hills as a backdrop. Here our visitors can park their cars round a 10-acre sports field on which we have various outdoor activities such as games and sports for the younger children, a fancy dress parade which has proved very popular, model aircraft displays, tugs-of-war and the like. Indoors we have the trade stands etc, laid out with plenty of room for the goodies to be inspected. We turn down more applications for trade stands than we accept. Across the road there is a farmer who specializes in bringing in a strawberry crop for rally day.

We aim to provide an amateur radio rally for the whole family, a day out to be looked forward to and remembered. Each year we have more cars, this year over 350 and more people attending. We look forward to welcoming Mr Farrar on 18 July next year when we will try to modify his viewpoint on this subject.

Yours faithfully,

R. G. Luckock, G3VDX

Chairman, Worcester & District Amateur Radio Club

The Editor

Radio Communication

Sir—The question of bandplanning has been given frequent publicity for many years now; all the IARU member societies support it, but it seems to me that the position is steadily getting worse, due to the selfishness and lack of consideration of a very small ill-mannered number of operators, many of them with old-established calls, who should and do know better.

I would suggest that all who are interested in making the best use of our congested, pirated bands strictly observe the bandplan, both on hf and vhf bands; not forgetting that sidebands do extend, ie, a station on 7,040kHz using lsb will spread down at least 3kHz, and many spread much more than that.

In addition to all the troubles of A3 on the A1 portion, we are now getting stations using A2, this is not necessary and in my opinion is pure selfishness. I habitually use 1.5W cw on 80, 40 and 20, and I am regularly blotted out by A3 stations who come on frequency, probably without listening, and call "on sked" or CQ as low as 3,550 and 7,025kHz.

I would suggest that stations using A1 should not congregate at the lower ends of the band, but make full use of the recommended portions; that stations using A1 on 7MHz use the frequencies occupied by illegal broadcasting stations to conduct all local QSOs—it is not difficult with a reasonable cw filter; turn off your bfo and use the broadcast carrier instead; and if you do hear an A3 station in the cw portion of the band, politely draw his attention to the bandplan (he is perfectly entitled to be there by the terms of his licence, at least in this country) and request his co-operation in getting the best possible use for all modes.

It is also requested that all operators who value the retention of the cw portions of the band for that mode, make use of the cw portion, and that a polite note to any offending station may help.

I may add I use A3J, A3 and A1; I can use A2 but see no point in this, reserving this mode for foreign jammers' use.

Yours faithfully,

John Douglas, ON4ZD/G2CAS

The Editor

Radio Communication

Sir—In September 1971 *Month on the Air*, G3FKM draws attention to the fact that the interest of British amateurs in contests is small and appears to be declining, and he asks why?

He appears to cloud the issue and make its explanation more difficult by coupling the "very little interest in contests" with "dx working and any other amateur radio activities of an international nature". The association of three different aspects of amateur radio confuses the issue. There are three different aspects of our hobby:

(1) Contest operating is an art in itself, involving great speed and an ability to judge when it is worth sacrificing extra contacts to gain an extra multiplier etc.

(2) DX working need involve no speed. Even in the competitive field most awards of importance involve no time limit. DXCC, WAZ, 5 band DXCC WPX etc can be achieved over any period of time, no need to rush, no need to consider complex multipliers etc.

(3) Activities of an international nature also involve no speed, no time limit, no complex rules. Additionally it need not be competitive.

International activity thrives on the absence of speed. One can only get to know the other man and his views on aerials, equipment, climatic conditions and even different countries' regulations if there is time for a discussion. Tests can only be made on aerials (especially regarding angles of radiation), different microphones, keys, filters etc if speed is NOT important.

From this it would appear that two characteristics of contest operating discourage British amateurs,

- (a), speed, or the "rat-race" atmosphere, and
- (b), the complicated rules which do not exist in other radio activities.

Above all, the British amateur appears to have tired of the "rat-race" atmosphere. It would not be the first time in history that British radio amateurs have led the way to better things!

Yours faithfully,

E. M. Wagner, G3BID

The Editor

Radio Communication

Sir—Having attended the major part of the recent WARC-ST as a member of my national delegation, I want to express my high appreciation of the immense work done by the IARU observer team, including G2BVN, who served on the UK delegation.

It has often been said that an international conference of this kind resembles an iceberg with only a minor part of its volume visible. This was particularly true for the WARC-ST. So the work of the IARU team had to be done mostly below the surface. If the results of the WARC-ST are not entirely satisfactory for the cm-amateur, there being no space allocation in the terrestrial amateur bands between 1 and 10GHz, it is certainly not the fault of the IARU observer team without whose relentless work we would have been much worse off.

I do not know how much it has cost IARU HQ and Region 1 to participate in the WARC-ST, but I do know that every penny spent will pay manifold dividends in the years to come.

Looking back on the WARC-ST and the technical preparatory special joint meeting of the study groups of the CCIR, where attendance of official amateur representatives would have been most welcome, because it was at that meeting early in the spring that some basic decisions had to be made how to treat amateur matters at the WARC-ST, I think that the following can be stated:

- (i). The amateur service has now internationally come of age, finally attaining the status of a fully acknowledged radio service with all its rights and duties.
- (ii). The future is open for amateurs to take part in the most modern communication medium, the space service.

Both conclusions place certain obligations on the world's amateur community:

- (a) Adequate participation in the ITU-work through its official representation, the IARU.
- (b) To make full use of the privileges attained by the amateur service, which are unique insofar as no restrictions have been imposed on their use for space activities in the exclusive worldwide allocations.

Since so far only the USA has launched amateur satellites, an appeal should be directed to the other great space nation, the USSR and to the European rocket organizations (ELDO/ESRO) requesting them to consider launchings of amateur satellites, too.

On the national amateur societies there will, on the one hand, fall the obligation to popularize the difficult material of the new techniques and help their members in their continual self-training which is stipulated in the definition of the amateur radio service in

the Radio Regulations; and on the other, to support IARU in its efforts to represent the amateur service adequately in the international organization on the decisions of which the future development and the existence of the amateur service will depend.

I do not hesitate to declare that the work done by RSGB in these respects over the years has set an example for other European societies.

Yours faithfully,

Alfred Schädlich, DL1XJ

RAYNET

by S. W. LAW, G3PAZ*

It has long been recognized by members and user services that the term "Raynet" is synonymous with the Radio Amateurs' Emergency Network. The term was originated in the first place when it was realized that the letter combination RAEN could not be transmitted by amateur stations as it constitutes a maritime call sign.

However, despite the insistence of the purists that the term should be spelled "raenet" in order to conform to the RAEN initials, the attractions of the more obvious spelling are so great as to outweigh the strict semantics. The Raynet Committee has therefore decided that the term shall be employed on all possible occasions to refer to the Radio Amateurs' Emergency Network.

Raynet Committee

At the meeting held on 30 October a welcome visitor was the controller for Liverpool and SW Lancs, Mr W. Fitzgerald, G3DCA. An unusual absentee was our hard-working hon secretary, Mr E. R. L. Bassett, who was unable to make the journey from Southampton owing to circumstances beyond his control. Fortunately the hon registrations secretary, Mrs Balestrini, was able to combine both functions and thanks were accorded her for the extra work involved.

A motion was taken on the formation of the committee for 1972 and it was found that all existing members were prepared to serve for the next period; a resolution to Council to this effect is to be put forward. A resolution as to the future use of the term "Raynet" was agreed upon. A point was raised in connection with the admission of young persons under the age of 16; it was agreed that the rules allowed this only with the written consent of the parent or guardian and the relevant prospective controller of the group concerned.

The present situation in Northern Ireland was highlighted by a letter from a Co Antrim group to the effect that morale was still at a high level on 70-2MHz although operation after dark was discouraged for mobiles owing to obvious dangers. It was reported that G3JUS is still carrying on the Bangor, Co Down, group despite the difficulties.

G3GJW reported that the London section of Kent went on to standby in the flood alert period and that their equipment and operational facilities were much admired by certain police operators who chanced upon one of the Raynet mobiles. He went on to report that regrettably few groups had as yet taken the offer reported some time ago of assistance with photographic records.

Concern was again expressed at the continued ill-health of Ted Bowden of the Cornwall area, and a mention was made of the extra responsibility which might fall on G3VJB of Newquay in an emergency.

It was confirmed that G3NGK has taken over as controller from G3FSN who has resigned in the Buckinghamshire area.

Southern controllers meeting

It was learned at the meeting on 7 November that G3MFB has had to vacate the controllership of Surrey for private reasons and that G3HVE will now be at the helm.

Honorary registrations secretary: Mrs Jane Balestrini, "Merrivale", Willow Walk, Culverstone, Gravesend, Kent.

Honorary secretary, RAEN Committee: Mr E. R. L. Bassett, 57 Upper St Helen's Road, Hedge End, Southampton, SO3 4LG. Tel Botley 4462

* 130 Alexandra Road, Croydon, Surrey CRO 6EW

CONTEST NEWS

Affiliated Societies' Contest 1972

The **General Rules** for RSGB HF Contests, as published in the January 1972 *Radio Communication*, will apply.

When. From 1800gmt to 2200gmt on Saturday 8 January 1972, and from 1800gmt to 2200gmt on Sunday 9 January 1972.

Eligible entrants. All fully paid-up affiliated societies.

- As the contest is to encourage club activity, it is not in the spirit of the contest that a competing station should be operated by only one operator for all, or nearly all, of the time. Entries which indicate this method of operation may be disallowed.
- All entries will be classed as multi-operator.
- Entries will only be accepted from stations operating within a 10-mile radius of the normal meeting place or HQ of the affiliated society.
- Callsigns which have been issued to affiliated societies must be used.
- More than one entry will be accepted from an affiliated society, providing that where a club callsign has been issued, that callsign is used by the "A" station.

Contacts. CW (A1) only in the 1-8-20MHz band.

Competing stations only (as defined in Rule 3) must send AFS to identify themselves after the report-serial number group, eg 579012 AFS. Repeat contacts may be made during the second session.

Scoring. 15 points for each contact with an AFS station, and one point for other stations.

Logs. Column (5) must be headed "Enter AFS if received". Entries must be addressed to: HF Contests Committee, c/o J. C. Graham, G3TR, The Willows, Church Road, Lowfield Heath, Crawley, Sussex RH11 0PQ.

Trophy. The Edgware Trophy will be awarded to the affiliated society submitting the highest checked score.

January 1972 144MHz SSB Contest

From 0900gmt to 1300gmt on Sunday 9 January 1972.

This contest has been extended in view of the increasing 144MHz ssb activity, and has thus been moved to a Sunday. This contest only will be run under the 1971 General Rules.

All entries and checklogs to: VHF Contests Committee, c/o G3XHU, 5 Birkdale Drive, Oakham Green, Tividale, Warley, Worcs.

The following **General Rules**, as published in the January 1971 issue of *Radio Communication*, will apply: 1, 2, 3, 4b, 5a, 6a, 7a, 8d, 9c, 10a, 11-24.

3rd BARTG VHF RTTY Contest

Band conditions seem to have been better for the European stations during the first leg, but British stations were able to enjoy reasonable conditions during the second stage. In general the split operating idea was very much appreciated as was also the timing in order to minimize the problem of tvi.

The activity in England was centred around the Home Counties with a considerable rise in activity in the Midlands as well as operation from a number of stations in the West Country. Some contacts of quite good distances were achieved and these results will no doubt encourage operators to use rty over longer distances. In this context the use of fsk seems to have a lot to commend it when longer distance contacts are contemplated.

An encouraging sign is the appearance of many more G stations now operating with rty on the vhf frequencies; all but two of the logs received came from the UK. A "first" was recorded this year with the entry on 70MHz from G3YKB, and another "first" was the 432MHz log from G8ATV.

Summing up, the results have been very encouraging and the event will be held again next year with possibly a change in the scoring system. It is proposed to drop the country bonus as this tends to favour the Continental stations, and consideration will be

given to a points per kilometre scoring system in order to spread the final scores a little and to encourage the making of contacts over longer distances.

Callsign	Points	QSOs	Countries	Best dx (km)
70MHz band G3YKB	202	2	1	45
144MHz band DJ8BTA	662	10	3	260
G8ATV	263	13	1	238
G3NTT	249	11	1	240
G3XSO	243	10	1	205
G8BNW	241	7	1	240
G8AEL	230	5	1	138
G8DJF	220	9	1	160
G3AJS	216	4	1	187
G3YKB	216	9	1	120
G3TWX/A	209	4	1	175
G8CUO	209	4	1	175
LX1JW	206	1	1	185
G3SBA	205	3	1	80
432MHz band G8ATV	2010	1	1	23

144MHz check log from G3FRV gratefully acknowledged.

The following stations were active during the contest and gave points to stations who submitted contest logs.

70MHz band G3FRV G3OLM

144MHz band G3EPP, G3FIJ, G3FRV, G3LOU, G3NUE, G3OLM, G3WRA, G3XOD, G4ALE/P, G6CW, G8AGT, G8BHD, G8BLG, G8BMR, G8CKF, G8CKT, DC9RY/P, DJ3GK, DJ4KI/P, DJ5BV, DL8CX, DL8PI, DL8UO, DL8OG and PA0OSI.

432MHz band G8BMR.

BARTG Spring RTTY Contest

When. 0200gmt Saturday 25 March to 0200gmt Monday 27 March 1972.

The total contest period is 48 hours but not more than 36 hours of operation is permitted. Times spent in listening periods count as operating time. The 12-hour non-operating period can be taken at any time during the contest, but off-periods may not be less than two hours at a time. Times on and off the air must be summarized on the log and score sheets. The contest is also open to swl rtyers.

Bands. 3-5, 7, 14, 21 and 28MHz.

Stations. Stations may not be contacted more than once on any one band, but additional contacts may be made with the same station if a different band is used.

Country status. ARRL Countries List, except KL7, KH6 and VO which are to be considered as separate countries.

Messages. Messages exchanged will consist of: (a) Time gmt and (b) Message number and RST.

Points. (a) All two-way rty contacts with stations within one's own country will earn **TWO** points.

(b) All two-way rty contacts with stations outside one's own country will earn **TEN** points.

(c) All stations will receive a bonus of **200** points per country worked including their own. **NOTE:** any one country may be counted again if worked on another band but continents are counted once only.

Scoring. (a) Two way exchange points times total countries worked. (b) Total country points times number of continents worked.

(c) Add (a) and (b) together to obtain your final score.

Logs and score sheets. Use one log for each band and indicate any rest periods. Logs to contain: band, time gmt, message and RST numbers sent and received and exchange points claimed. (All logs must be received by 31 May 1972 to qualify.)

Awards. Certificates will be awarded to the leading rty stations and SWLs.

The final positions in the results table will be valid for entry in the "World Champion of RTTY" Championship.

The judges' decision will be final and no correspondence can be entered into in respect of incorrect or late entries.

Unsportsmanlike operating will be deemed sufficient reason for possible disqualification.

NFD 1972

The HF Contests Committee wishes to thank the many affiliated societies and groups who replied to the recent NFD questionnaire. The committee will be giving careful consideration to the results of the questionnaire, but would like members to know that it is not proposed to make any substantial alteration to the rules for NFD 1972. Any major change in the rules for the 1973 event will receive adequate advance publicity.

VHF NFD 1971 Results

Winner: Mid-Essex VHF-UHF Contest Group

Runner-up: Surrey Radio Contact Club

Band leaders: 70MHz: G3FDW/P. 432MHz: G8AWS/P.
144MHz: GC3ZXR/P. 1,296MHz: G3FP/P.

VHF NFD continues to expand and to involve an ever-increasing proportion of the country's amateur population. This year most portable stations enjoyed mild, warm weather and the associated good propagation conditions. The Surrey Trophy remains in the hands of the Mid-Essex VHF-UHF Contest Group for the fourth successive year.

70MHz

Once again the leadership on 4m has fallen to stations in the north and west, with G3FDW/P in Westmorland almost 500 points clear of Cornwall's G3XFL/P and G3NUN/P in Lancashire, and it is necessary to look a long way down the table before one finds many stations in the Home Counties. Nevertheless, a good score on this band proved instrumental to the high final placings of many of the more southerly groups, who had to contend with the usual atrocious QRM. The N-S path did not really open until dawn on the Sunday, when the dx which one had struggled to work overnight on weak cw came up to 5 and 9. GM3RIK/P and G13LV/P appear as many people's best dx, and the longest distance covered was some 600km, between the former station and G3XFL/P. Aerials are becoming larger on 70MHz, with many stations managing to erect a 4/4 in an attempt to gain that small edge over the competition; this has in turn forced some to even greater things, which look as if they have strayed off the 144MHz cover sheet!

144MHz

The single-band entry of GC3ZXR/P tops this year's 144MHz list, followed by EI2VET/P, whose callsign disguises a group from Staffordshire. Third in the list, although not in the placings, comes G3BHT/LX/P, who provided many fixed and portable stations with a Luxembourg contact over the 24 hours. Sunday produced the best dx and many stations made European contacts, with EA1AB logged by G3EFX/P: no Scandinavian contacts were made.

432MHz

A solo effort by G8AWS of Chester RS, operating from Derbyshire, was rewarded by first place on 70cm for the third year running.



G3PKV/P, Mid-Herts ARS VHF NFD 2m station, at Therfield near Royston



Edgware RS 2m station G8ERS/P being operated on VHF NFD by G8CDO with G8DAC, club president, looking on (Photo: G3PSP)

GW3VXK, representing the North Liverpool RC, operated from the isolated Lleyen Peninsula. Mid-Essex, as G3LTF, recorded the best dx at 540km with DJ9DL—on the key. Most operators agreed that conditions were above average in most locations with an improvement on the N-S path on Sunday; a lift to DL was evident in the south during the last hour.

1,296MHz

Sussex seems to be the place to go if you have set your sights on the 23cm band leader's certificate, with the first three places going to stations in that county. The entry of 26 was two up on last year, and scores were much the same (allowing for the extra 10 point bonus), despite dire predictions about Rule 13c. Light winds gave little scope for the sport of dish wrestling this year, but the relative placings of Yagi users suggest that the potential advantages of the Yagi over a small paraboloid on this band remain to be realized.

Conclusions

With so many stations in the field, it seems inevitable that there will be considerable interference, on the two vhf bands in particular, but comments received show that operators are becoming less tolerant of unnecessary interference in the form of splatter and other spurious emissions. Many stations have escaped disqualification only because of the lack of corroboration of individual reports, especially on 144MHz and particularly on ssb; they may not be so fortunate next time. Comments have also been received about phone operation in the cw sub-bands, "band-edge" crystals which result in one sideband (or more) falling completely outside the band, harmonics of vhf stations in the uhf bands, and misuse of vfos.

Another question which is exercising the VHF Contests Committee is that of rival claims to the use of sites, and groups which intend to travel a long way would be well advised to contact amateurs local to the proposed site in order to avoid acrimony and disappointment. In this connection we are happy to record the thanks of the Harrow Club to the Mid-Sussex ARS, for tossing a coin for the use of the site (in Sussex) and cheerfully moving when Harrow won.

Our thanks to all the stations who sent along check logs, including the fixed-station entries for the IARU event; all IARU logs will be passed on to the NRRL. In view of the confusion over the correct address for logs, no entry which was first posted before the closing date has been rejected, although those logs which were not accompanied by some attempt at a summary sheet have been listed in the band tables only.

Finally, your sympathy is enlisted for the Cleveland Group, which had hum trouble—from bees; for G18AYZ, whose dog ate the logs on the way to the post; for the Horsham Club member who found out why series strings of rectifiers sometimes blow, and for his colleague who appeared with spare gear which just happened to contain brand new rectifiers; and for the unfortunate postmen of Wantage and Wimbledon.

OVERALL RESULTS

Posn	Group	Points	70MHz	144MHz	432MHz	1,296MHz	Posn	Group	Points	70MHz	144MHz	432MHz	1,296MHz
1	Mid-Essex VHF-UHF CG ..	9,285	G3VPK	G3SKT	G3LTF	G3LTF	63	South-East Kent ARC ..	1,937	G3YMD	G8CUB	G8DOH	
2	Surrey Radio Contact Club ..	8,339	G8TB	G3ODY	G3FP	G3FP	64	Norfolk ARC ..	1,824		G8AUN	G8AWZ	
3	AERE Harwell ARC ..	7,753	G3PIA	G3NNG	G2CXT	G2CXT	65	G18AYZ/P ..	1,806		G18AYZ	G18AYZ	
4	Bournemouth-Poole VHF Gp ..	7,251	G3YJC	G3PFM	G3OBD	G3OBD	66	Oatlands Scout ARG ..	1,798		GW8FBI	GW8DXO	
5	Radio Society of Harrow ..	6,983	G3TUX	G3EFX	G3HBR	G3HBR	67	Sutton Coldfield RS ..	1,772	G3CNV	G3RSC	G3WOI	
6	Crawley ARC ..	6,811	G3TR	G3WSC	G3FRV	G3FRV	68	Newbury & D ARS	1,761	G3KJC	G3WVX	GW3YKZ	
7	Albright & Wilson ARS ..	6,427	GW3UEY	GW3OXD	GW3VDM	GW3VDM	69	Pontypool ARC ..	1,728	GW3VXC			
8	Mid-Herts ARS ..	6,357	G3AAZ	G3PKV	G3WGC	G3WGC	70	Thames Valley ARS ..	1,702	G3TVS	G2NH		
9	Reigate ARS ..	6,297	G3REI	G3RIN	G8AMU	G8AMU	71	Magnus G.S. RS	1,699		G3TBK	G3SHY	
10	Dunstable Downs RC ..	5,863	G3ZFP	G8DDC	G3HEO	G3HEO	72	Reading ARC ..	1,672	G3LFM	G8APH	G4AGQ	
11	Taunton & District ARS with Pye Telecomms CG ..	5,726	G5PI	G3TWO	G3PYE		73	Barnsley & D ARC	1,670	G3LRP	G8BRK	G3TLK	
12	Stockport RS ..	5,689	G3VSA	G6UQ	G8BCG		74	G3TLK ..	1,575	G3TLK	G3UHF		
13	Chester RS ..	5,657		G8AYW	G8AWS		75	North-West VHF Gp ..	1,554				
14	March & D ARS ..	5,655	G3REH	G8BBB	G3PMH	G3PMH	76	Maidenhead & D ARC ..	1,518	G3ZPK	G3WKK	G3WXX	
15	Wulfrun CG ..	5,617	G3ONP	G8BHH	G8TA		77	G13LV/G18EUY ..	1,496	G13LV	G18EUY	G3BFX	
16	South Dorset RS	5,543	G3VPF	G3SDS	G3RZG	G3RZG	78	Rugby & D ARC ..	1,487	G3TOF			
17	Southdown ARS	5,351	G3XUS	G8BQX	G8CFZ		79	Doncaster College of Technology ..	1,481	G3KPU	G3UER	G3NEO	
18	Cornish VHF Gp ..	5,269	G3XFL	G3XC	G2BHW		80	Chapel Green C.C.	1,469		G3RIR	G8DLB	G8AWQ
19	Wessex ARG ..	5,003	G3ZTZ	G3RZV	G3NIL	G3NIL	81	Purley & D RC ..	1,462	G3ZRR	G5QK	G3YZS	G8AAY
20	Midland ARS ..	4,944		GW3MAR	GW3HAZ	GW3KPT	82	Southend & D RS	1,460	G3XSC			
21	Westmorland VHF Gp ..	4,941	G3FDW	G3SPL	G3JYP		83	G8AAY/P ..	1,448				
22	Southampton RSGB Gp ..	4,710	G3MRA	G8FAB	G3SOU	G3SOU	84	G3ZSS/G3YKR/G3YSG ..	1,435		GW3ZSS	GW3YKR	G8ADP
23	Southgate RC ..	4,659	G3ZXX	G3SFG	G3TTV	G3TTV	85	Swindon & D RC ..	1,405	G3ZVC	G3FFC	G8DMY	
24	Stourbridge & D ARS ..	4,479	GW3ZVK	GW6OI	GW8AWR		86	Manchester & D ARS ..	1,374	G2ALN	G3HOX		
25	Ealing & D ARS ..	4,291	G3SGT	G3WMO	G3THQ	G3THQ	87	Worthing & D ARC	1,302	G3WOR	G8ETL		
26	East Kent RS ..	4,250	G3LTY	G4AJC	G3MLO	G3MLO	88	Preston ARS ..	1,233	G2AXH	G3KUE		
27	Bexley VHF-UHF Gp ..	4,100	GW3TYB	GW8CXJ	GW8AZM	GW8AZM	89	Horsham ARC ..	1,159	G3TNO	G6SX		
28	Verulam ARS ..	4,098	G3LXP	G3RPA	G3RPA	G3RPA	90	Heath RC VHF CG	1,154		G3JFH		
29	Southampton University VHF CG	3,904		GC3ZXR			91	G8ADP/P ..	1,145			G8ADP	G8ADP
30	Crystal Palace & D RC ..	3,884	G3IIR	G3VCP	G3FZL		92	G2WS/P ..	1,116	G2WS	G2WS		
31	North Liverpool RC ..	3,684					93	G3FIA/G8ELO ..	1,083	G3FIA	G8ELO		
32	Echellord ARS ..	3,594	G3TDR	G3UES	GW3VXK	G2HDJ	94	Burnham Beeches RC ..	1,011		G3WIR		
33	Wirral ARS ..	3,577	GW2FOS	GW3NWR	GW3VQT	G2HDJ	95	Woodmansterne Gp ..	1,004	G3KTA	G8CCK		
34	Guildford & D RS	3,521	G3VIR	G3HTP	G3TLM	G3TLM	96	Ysbyty Ystwyth CG ..	1,002	GW3VFD			
35	Cheltenham ARS	3,520	G3REP	G5BK	G3LDA		97	Hull & D ARS ..	936		G3AMW		
36	Yeovil ARC ..	3,406		G3CMH	G8AFA	G8AFA	98	Cannock Chase ARS ..	922		G3VCC		
37	E12VET/P ..	3,376		E12VET			99	Seascale VHF Gp	913		G8DLL		
38	Cambridge & D ARS ..	3,364	G3VCV	G3USB	G8CKU		100	Grimsby ARS VHF Gp	904	G3LMT	G3XOY		
39	Pennine VHF Gp ..	3,269	GM3RIK	GM3PUO	GM3XAC	GM3XAC	101	G3TAL/P ..	846	G3TAL			
40	Addiscombe ARC	3,258	G3SJK	G4ALE	G3WRR		102	Ex-Birmingham CG ..	842	G3ZLQ	G8CLY	G3WYT	
41	North Riding ARS	3,053	G3PEJ	G3GJY	G3WTX		103	G3KSU/P ..	800	G3KSU	GW4ADJ	GW8DBW	
42	South Coast VHF Gp ..	3,039	G3ZCI	G3JHM	G3JVL	G3JVL	104	Paul, Ron et al. ..	789				
43	Clifton ARS VHF Gp ..	3,018	G3JKY	G3GHN	G8CZZ	G8CZZ	105	Cleveland ARS ..	764		G3XAG		
44	Leicester RS & Leics. VHF Gp ..	3,013	G3SUM	G3LRS	G5UM		106	Mid-Warwickshire ARS ..	740	G3EHA	G3UDN		
45	Bristol RSGB Gp	2,958	G3TKF	G6YB	G3TWT		107	Skegness & D RG	711	G3THX	G3MMS		
46	Ainsdale RC ..	2,798	G2CUZ	G2DQX	G3VNO	G3VNO	108	Basingtoke ARC	697	G3TCR	G8CKN		
47	Kidderminster & D VHF-UHF Gp ..	2,784	G3MWQ	G4ACS	G4AFY		109	Cardiff RSGB Gp	674		GW3GHC		
48	Caesaromagnus VHF/UHF CG ..	2,775	G3SLJ	G8AWM	G8BIT	G8ATD	110	Spalding & D ARS	642	G3VPR	G3XBS		
49	Luton VHF Gp ..	2,707	G3TDH	G8COL	G8ATD	G8PX	111	NE London VHF Gp ..	607		G8BXC		
50	Oxford & D ARS ..	2,632	G3UJO	G3UJO	G8PX		112	GW3CBY/P ..	580		GW3CBY		
51	Yorvik VHF Gp ..	2,612	G3OZE	G8DXQ			113	G3OTK/P ..	542		G3OTK		
52	Cray Valley RS ..	2,511	G3TAA	G3YGR	G3RCV		114	Lincoln SWC ..	508		G3IXH		
53	Colchester Gp ..	2,493	G3CO	G3SJO	G3FIJ		115	Hartlepool ARC	482		G3IDV		
54	Mid-Sussex ARS	2,435	G3RXJ	G3ZMS	G3WPO		116	Havering & D ARC	481		G8CED		
55	G8AYN/P ..	2,238			G8AYN		117	Border ARS ..	467		GM8BDX	GM8CVN	
56	Bury & Rossendale RS ..	2,222	G3BRS	G8ETT	G8AKT		118	Loughlan & D RS	466	G8AB	G8AB		
57	Sheffield & D ARS	2,177	G3XTQ	G3FJE			119	Edgware RS ..	450		G8ERS		
58	Glasgow University ARC & friends	2,128	GM3WOJ	GM3OFT			120	GM3OXX/P ..	374		GM3OXX		
59	Adur CG ..	2,107	G3YHM	G4ACG			121	Nailsworth & D ARC ..	371		G4AAN	G8BEL	
60	Blackpool & Fylde ARS ..	2,090	G3JUN	G3XEP			122	Rugby ARS ..	326		G3LJB		
61	White Rose RS ..	2,011	G3ZKH				123	Southwell/Newark	277		G8CXX		
62	Nunfield House ARG ..	1,955	G3EEO	G3ZBI	G3EEO		124	Liverpool & D ARS	261		GW3AHD		
							125	Tyneside ARS ..	258	G3YRH	G3ZQM	G3YRH	
							126	South Shields & D ARC ..	254		G3DDI		
							127	Chippenham ARC	203		G3VRE		
							128	Oakham ATC RC	186	G3PLL	G8ESX		
							129	Carlisle & D ARS	181		GM8DVD		

Late entry: Derby & D ARS

70MHz BAND RESULTS

Posn	Callsign (/P)	Points	QSOs	County	Best dx	Km	Aerial
1	G3FDW	2,564	120	WD	G3XFL/P	536	6
2	G3XFL	2,090	78	CL	GM3RIK/P	590	4/4
3	G3NUN	2,038	121	LE	G3XUS/P	425	10
4	GW3UEY	1,978	129	RN	GM3RIK/P	360	4
5	GM3RIK	1,928	71	PB	G3XFL/P	605	4/4
6	G3PI	1,894	122	ST	GM3RIK/P	475	4
7	G3VPF	1,876	115	DT	G3ILV/P	470	4/4
8	GW2FOS	1,768	123	DB	G3LTY/P	365	4/4
9	G3ONP	1,694	111	HD	GM3RIK/P	386	4/4
10	G3MRA	1,686	143	HE	GM3RIK/P	505	4
11	G3REH	1,662	119	CE	G3ILV/P	490	4/4
12	G3TUX	1,648	137	SX	G3ILV/P	586	4/4
13	G3OZE	1,538	87	YS	G3XFL/P	520	4
14	G3REP	1,486	119	GR	GM3UAG/P	552	6
15	GM3WOJ	1,482	74	WG	G3REI/P	545	4
16	G3YJC	1,480	104	HD	GM3RIK/P	400	4/4
17	G3VPK	1,442	129	SX	GM3RIK/P	530	10
18	G2CUZ	1,426	85	WD	G3XFL/P	475	4/4
19	G3JKY	1,382	85	KT	G3ILV/P	560	4
20	G3VSA	1,376	105	SD	G3ILV/P	323	4
21	G3VCV	1,372	106	HN	G3ILV/P	470	6
22	G3TR	1,368	117	SX	GM3RIK/P	558	4
23	G8TB	1,328	117	SX	GM3RIK/P	450	4
24	G3TDH	1,324	124	BD	GM3RIK/P	570	4
25	G3REI	1,320	109	SX	GM3RIK/P	440	4/4
26	G3PIA	1,298	103	BE	G3ILV/P	450	4
27	G3ZFP	1,284	117	BD	GM3RIK/P	422	4
28	G3AAZ	1,246	105	HF	GM3WOJ/P	340	5
29	GW3VXC	1,238	88	MH	G3FDW/P	460	4/4
30	G3TAA	1,228	132	KT	GM3WOJ/P	505	4/4
31	G3VIR	1,212	121	SY	GM3RIK/P	460	4
32	G3SIX	1,210	61	DN	G3FDW/P	350	7
33	G3TLK	1,170	95	SX	EI9ONE/P	512	4/4
34	G3TKF	1,158	74	DB	G3REI/P	218	4
35	G3XUS	1,148	88	DT	G3FDW/P	415	4/4
36	GW3ZVK	1,142	112	YS	G3XFL/P	445	4/4
37	G3ZTZ	1,112	115	LE	G3ILV/P	564	4/3
38	G3VRS	1,100	55	YS	G3VPF/P	417	4
39	G3IR	1,098	92	LR	G3XFL/P	400	4
40	G3PEJ	1,082	108	SX	G3FDW/P	425	10/10
41	G5UM	1,064	106	OX	GM3RIK/P	470	6
42	G3YHM	1,060	70	KT	GM3RIK/P	585	4
43	G3SGT	1,042					
44	G3LTY	1,026					

Disqualified (Rule 12b): G3YRH/P

432MHz BAND RESULTS

Posn	Callsign (/P)	Points	QSOs	County	Best dx (Km)	Aerial
1	G8AWS	4,254	125	DY	380	46
2	GW3VXK	3,684	59	CV	407	2 x 14
3	G3LTF	3,300	93	SX	540	2 x 18
4	G8BCG	3,180	99	SD	320	2 x 46
5	G3PYE	3,024	70	ST	450	18
6	G3OBD	2,844	84	HD	300	46
7	G3HBR	2,796	84	SX	436	4 x 46
8	G8TA	2,748	73	HD	298	18
9	G8AMU	2,730	74	SX	408	2 x 18
10	G2CXT	2,706	93	BE	434	32 slack
11	GW3HAZ	2,610	77	MG	310	2 x 14
12	G8CFZ	2,400	71	SX	410	46
13	G3UQH	2,336	77	SE	340	46
14	G8AYN	2,238	87	SY	360	2 x 18
15	G3WGC	2,232	79	HF	317	14
16	G3FRV	2,076	75	SX	334	46
17	GW3VDM	2,064	64	RN	285	46
18	G3PMH	2,028	60	CE	330	18
19	G3TTV	1,974	83	BS	287	46
20	GW8AWR	1,959	55	DB	330	18
21	G3FP	1,932	64	SX	434	46
22	G2BHW	1,812	27	CL	522	2 x 8/8
23	G8AFA	1,806	67	WE	265	2 x 46
24	G3RZG	1,752	45	DT	—	—
25	G3LDA	1,716	65	GR	286	18
26	G3FZL	1,674	69	SY	381	46
27	GW8AZM	1,662	41	GN	390	46
28	G3HEO	1,614	66	BD	297	18
29	G4AFY	1,608	62	SE	—	—
30	G3NIL	1,578	48	DT	272	46
31	G3TLM	1,554	66	SY	348	46
32	G8PX	1,548	65	OX	—	—
33	G3THQ	1,506	62	OX	266	18
34	G2HDJ	1,494	63	HE	308	2 x 28
35	G3MLO	1,458	38	KT	414	18
36	G8AYY	1,448	47	SD	324	18
37	G3JVL	1,414	68	HE	320	46

Posn	Callsign (/P)	Points	QSOs	County	Best dx (Km)	Aerial
38	G8AKT	1,410	50	BD	307	24
39	G8AYZ	1,326	18	AM	464	18
40	G5UM	1,284	50	LR	219	18
41	G3SHY	1,242	40	LN	275	15
42	G3RPA	1,194	58	HR	206	46
43	G3FIJ	1,182	38	EX	385	24
44	G3WRR	1,170	50	SY	352	2 x 46
45	G8CKU	1,158	38	HN	310	8/8
46	GW8DXO	1,146	37	RN	305	18
47	G3JYP	1,122	24	WD	536	46
48	G8CZZ	1,062	47	KT	255	8/8
49	G3WTX	1,050	26	YS	377	46
50	G3SOU	940	41	HE	295	8/8
51	G8ATD	936	38	BD	220	46
52	G3TWT	888	36	ST	240	18
53	GW3YQT	882	33	DB	280	46
54	G2WS	840	19	DN	402	11/11
55	G3EEO	762	35	DY	210	46
56	G3WPO	756	36	SX	360	18
57	G8BHZ	744	31	YS	312	46
58	G8AWZ	702	19	NK	195	46
59	G8ADP	642	32	GR	222	9
60	G3YZS	606	34	EX	255	18
61	G3RCV	600	33	KT	233	16 coll.
62	G8DMY	558	27	WE	160	46
63	G3VCT	552	32	BE	207	18
64	G3NEO	546	21	YS	435	4/4
65	G4AGQ	516	23	YS	245	18
66	G3VNO	510	15	WD	257	14
67	GM3XAC	486	11	PB	—	—
68	G8AWQ	474	36	KT	260	8/8
69	G8BIM	468	25	HE	145	—
70	GW8DBW	264	12	BK	169	17
71	G8DOH	126	4	KT	330	12
72	G3WYT	120	10	HE	82	11
73	GW3YKR	102	7	DB	80	8/8
74	GM8CVN	78	3	BW	126	18
75	GW3CBY	48	2	GN	134	14
76	G3YRH	36	2	ND	64	8/8
	G8BEL	36	2	GR	88	6/6

144MHz BAND RESULTS

Posn	Callsign (/P)	Points	Best dx	Km	QSOs	County	Posn	Callsign (/P)	Points	Best dx	Km	QSOs	County
1	GC3ZXR	3,904	DK2EL	732	350	AD	67	G2NH	684	F6ADZ	630	123	SY
2	EI2VET	3,376	F9FT/A	875	257	—	68	G3YGR	683	HB9RO/P	600+	146	KT
3	G3BHT/LX/P	3,182	GW6OI/P	683	355	—	69	G4ALE	678	EI2VET/P	460	142	SY
3	G3ODY	2,303	DL8NP/P	712	229	SX	70	GW3GHC	674	G18AYZ/P	386	143	MH
4	G3SKT	2,065	DL2AU/P	862	219	SX	71	G6SX	673	DLOWU	530	115	SX
5	G3SRT	1,815	HB9AOF/P	900	207	SE	72	G3LRS	665	F9TL/P	542	153	LR
6	GW3OXD	1,799	HB9AOF/P	1,028	202	RN	73	GW8FBI	652	F6BHI/P	300+	102	RN
7	G8BQX	1,797	HB9RO/P	655	212	SX	74	GM3OFT	646	F9TL/P	780	82	WG
8	G8AWM	1,785	F1MJ/P	620	208	HE	75	G3BXF	645	PA0HVA/P	430	143	VK
9	GW3MAR	1,680	HB9AOF/P	940	228	MG	76	G8BXC	607	GM3PUO/P	493	109	EX
10	G3NNG	1,590	HB9ADJ	803	233	BE	77	G3XDY	604	GC3ZXR/P	490	117	LN
11	G3UHF	1,554	DL8GA/P	732	202	DY	78	G3LTN	603	PA0FHV	450	132	NR
12	G3RIN	1,492	HB9RO/P	620	186	SX	79	G8ELO	577	EI2VET/P	345	122	NR
13	G8CUB	1,491	DK5SD/P	640	155	KT	80	G3WMO	574	EI9ONE/P	375	116	OX
14	G3RIR	1,469	F1RM	555	220	WE	81	G3UJO	572	—	400+	165	OX
14	G3WSC	1,469	F5JQ/P	767	187	SX	82	G8FBJ	571	G3XC/P	425	107	YS
16	G8BBB	1,420	HB9AOF/P	770	198	CE	83	G5QK	564	F9FT/A	410	141	EX
17	G4AJC	1,407	OE2OML	942	137	KT	84	G18EUY	552	F9TL/P	685	50	AR
18	G8AYW	1,403	F9TL/P	550	212	DY	85	G3OTK	542	G8DLL/P	388	90	ST
19	G8DDC	1,382	DL2QV/P	1,005	190	BD	86	GW3CBBY	532	GM3PUO/P	434	90	GN
20	G3SDS	1,376	F2LQ/P	715	173	DT	87	GW4ADJ	525	F9TL/P	411	86	BR
21	GW6OI	1,372	G3BHT/LX/P	679	218	DB	88	G8FAB	517	EI9ONE/P	410	101	HE
22	G3XC	1,367	DK2EL/P	926	105	CL	89	G3GHN	513	F92G/P	300	128	KT
23	G3PRC	1,367	PA0HVA/P	620	141	DN	90	G3IXH	508	G3XC/P	464	91	LN
24	GW3ZSS	1,333	PA0HVA/P	400+	208	DB	91	G3EAB	502	G18EUY/P	444	82	ST
25	G3VER	1,297	HB9AOF/P	748	199	HR	92	GW3YKZ	490	F9TL/P	373	86	MH
26	G3SPL	1,255	—	500+	142	WD	93	G3KUE	487	G3XC/P	440	97	LE
27	G8BHH	1,175	ON5OT/P	540	165	HO	94	G3IDV	482	GC3ZXR/P	650	58	DM
28	G3IFH	1,154	GM3UKG/P	500+	212	—	95	G8CED	481	F1RM	520	121	EX
29	G6UQ	1,133	—	400+	184	SD	96	G18AYZ	480	G3XC/P	521	56	AM
29	G8ETT	1,122	—	400+	172	LE	97	G3ZBI	459	G3TLK/P	304	106	DY
30	G8AUN	1,122	DL8GA/P	530	134	NK	98	G3TBK	457	PA0CML	300+	80	LN
32	G3VCP	1,112	HB9AOF/P	690	141	SY	99	G8ERS	450	F9FT/A	455	110	HF
33	G8DXQ	1,074	ON5EW/A	575	150	YS	100	G8CDL	447	EI9ONE/P	425	97	BD
34	G3OHM	1,067	DL8GA/P	600+	200	WR	101	G8CLY	440	HB9AOF/P	725	81	HE
35	G4ACG	1,047	HB9RO/P	640	145	SX	102	G8ETL	436	G3XCI/P	350	80	SX
36	G3XEP	1,033	GC2FZC	400+	110	YS	103	G3TLK	405	PA0HVA/P	640	44	DN
37	G3SFG	1,013	GM3UKG/P	575	186	BS	104	GM8BDX	389	G3IFH/P	447	63	BW
38	G3WIR	1,011	G18EUY/P	455	191	OX	105	GM3OXX	374	G3PRC/P	550+	70	BU
39	G3RZV	988	GD2HDZ	402	155	DT	106	G3DLB	366	EI2VET/P	509	81	SY
40	G3PKV	971	GM3UKG/P	554	167	HF	107	G4AAN	355	G3SDLP	325	80	GR
41	G3WOI	959	PA0CML	400+	180	BE	108	G3XBS	334	EI2VET/P	362	79	RD
42	G8DUO	947	G3XAG/P	294	175	HD	109	G8CCK	330	G8DXQ/P	310	99	SY
43	G3AMW	936	F9TL/P	577	130	YS	110	G3LJB	326	G3TDV	270	84	NM
44	GW3NWR	927	GC2FZC	416	150	—	111	G5BK	318	EI9ONE/P	315	84	GR
45	G3ZMS	923	F6AKQ	590	123	SX	112	G3WXX	314	F1AVG	257	94	BE
46	G3VCC	922	F9TL/P	755	176	SD	113	G3CMH	302	F9TL/P	385	78	WE
47	G3GJY	921	GC3ZXR/P	520	127	YS	114	G8CCK	277	GC3ZXR/P	365	55	LN
48	G8DLL	913	F1ASH	617	97	CO	115	G3UDN	270	GC2FZC	310	61	VK
49	G6YB	912	G18AYZ/P	400+	146	—	116	G8CKN	265	—	66	HE	
50	G3RSC	876	F9FT/P	560	170	WK	117	GW3AHD	261	GM3PUO/P	252	74	DB
51	G2DQX	862	F9TL/P	660	98	WD	118	G3DDI	254	EI4AL	420	48	NO
52	G3PFM	861	GM3PUO/P	401	152	HD	119	G8BRK	232	G3SDS/P	319	44	YS
53	GM3PUO	855	G8AWM/P	500+	100	PB	120	G3ZQM	222	G3FDH/P	390	35	NE
54	G3USB	834	DL8GA/P	583	126	HN	121	G3VRE	203	GC3ZXR/P	212	59	WE
55	G8APH	824	PA0CML	420	130	HE	122	G3FJE	201	—	200+	52	BD
56	G3TWO	808	G18EUY	420	136	ST	123	G2WS	196	G18AYZ/P	430	24	DN
57	G3UER	803	GC2FZC	462	140	YS	124	G8EEM	190	G6UQ/P	246	38	YS
58	GW8CXJ	791	ON5EW/A	660	116	GN	125	GM8DVD	181	G3IFH/P	370	33	DE
59	G3HOX	782	F1ASH	540	124	LE	126	G3KSU	134	G8AUN/P	290	30	HE
60	G3UES	776	DK5PD/P	624	140	HE	127	G8AB	112	GW3NUE/P	250	44	EX
61	G3FEC	771	HB9ADJ	825	118	WE	128	G8ESX	53	G3CSU/P	164	21	RD
62	G3XAG	764	GC2FZC	570	94	YS	129	G3MMS	41	G6YB/P	260	15	LN
63	G3JHM	735	DC8RAA/P	760	97	HE	130	G8ERQ	22	G3XIH/P	120	15	YS
64	G4ACS	724	F9FTY/P	600+	135	SE							
65	G3SJO	695	F1BBQ	610	88	EX							
66	G3HTP	685	EI2VET/P	430	120	SY							

*Station located outside British Isles.

Disqualified: G4AJX/P, Rule (12b); G3EFX/P, Rule 16.

*Station located outside British Isles.

Disqualified: G4AJX/P, Rule (12b); G3EFX/P, Rule 16.

1,296MHz BAND RESULTS

Posn	Callsign (/P)	Points	QSOs	County	Best dx	Km	Aerial	Posn	Callsign (/P)	Points	QSOs	County	Best dx	Km	Aerial
1	G3FP	2,776	23	SX	F8WN	167	3ft dish	15	G8AMU	755	7	SX	G3FP/P	135	3ft dish
2	G3HBR	2,539	21	SX	F8WN	169	4ft dish	16	GW8AZM	681	5	GN	G2CXT/P	139	34-el
3	G3LTF	2,458	21	SX	F8WN	167	4ft dish	17	GW3KPT	654	5	MG	G2CXT/P	158	dish
4	G2CXT	2,159	19	BE	GW8AZM/P	139	3ft dish	18	GW3VDM	586	5	RD	G2DJ/P	138	4ft dish
5	G3OBD	2,066	15	HD	G3WGC/P	206	4ft dish	19	G3PMH	545	5	CE	G3THQ/P	102	8/8
6	G3WGC	1,908	16	—	G3OBD/P	206	4ft dish	20	G3RZG	539	4	DT	G3LTF/P	142	3ft dish
7	G3FRV	1,898	16	SX	F8WN	184	14-el	21	G8ADP	503	6	—	GW3VDM/P	78	3ft dish
8	G3HEO	1,583	15	BD	G3OBD/P	166	3ft dish	22	G2HJD	470	6	HE	G3HEO/P	76	20-el
9	G3SOU	1,567	14	HE	FIBQ/P	128	6ft dish	23	G3MLO	359	3	KT	G3HBR/P	98	48-el
10	G8AFA	1,298	12	WE	G3FP/P	128	6ft dish	24	G3JVL	343	5	—	G3RPA/P	77	6 x 18-el
11	G3NIL	1,295	10	DT	G3FP/P	154	4ft dish	25	G8PX	114	2	OX	G2CXT/P	32	
12	G3RPA	1,219	13	HF	G3HBR/P	105	4ft dish	26	G3TLM	70	1	SY	G5FK	40	8/8
13	G3THQ	1,169	12	OX	G3OBD/P	135	1ft dish	27	G8CZ	61	1	KT	G8ARM	31	18-el
14	G3TTV	796	9	BS	G3HBR/P	122	3ft dish								

RSGB SLOW MORSE PRACTICE TRANSMISSIONS

These slow morse practice transmissions are sponsored by the RSGB. Alterations and additions to this list should be sent to the honorary organizer, Mr M. A. C. MacBrayne, G3KGU, 25 Purlieu Way, Theydon Bois, Essex.

Clock time	Call sign	MHz	Town
Sundays			
1000	G3WNR	1-920	South Shields, Co Durham
0930	G3HZL	1-940	Isleworth, Middlesex
0945	G3VRO	1-850	Fareham, Hants
0945	G3USK	1-975	Mablethorpe, Lincs
1000	G2FXA	437-000	Stockton-on-Tees
		to north	
1015	G3CGD	1-875	Cheltenham
1030	G2FXA	437-000	Stockton-on-Tees
		to south	
1030	G3NPB	1-875	St Ives, Cornwall
1030	G3ZNV	144-520	West Molesey, Surrey
		to east	
1100	G2FXA	1-900	Stockton-on-Tees
1100	GW3UMB	1-880	Colwyn Bay
1130	GW3VPL	1-918	Porthcawl, Glam
1200	G3HVI	1-890	Stoke-on-Trent
1200	G3GNS	1-910	Weston-super-Mare
1330	G3FWW	1-880	Burnham-on-Sea, Soms
1330	G3XDV	1-190	Canterbury, Kent
1330	G3WDS	1-975	Carlisle
1400	G3XWQ	1-975	Canterbury, Kent
1400	G3XGJ	1-830	Huddersfield, Yorks
1930	G3YFO	144-19	Burnham, Bucks
		to south	
† Alternately			
Mondays			
1800	G3SWR	1-980	Birmingham
1830	G3NCZ	1-920	Blackburn, Lancs
1830	G3RXH	1-910	Skipton, Yorks
1900	G3WGU	1-880	Bispham, Lancs
1900	GC2FMV	3-600	Jersey, CI
1900	G3YJA	1-920	Coventry, Warks
1900	G3WYF	1-850	Thornton Cleveleys
	G3YEI		Fleetwood, Lancs
1900	G3YEO	145-640	Leeds, Yorks
	G3YEE		Bradford, Yorks
1930	G2ABC	144-050	Woodford, Essex
		1-930	omni-directional
1930	G3TLF	1-930	Hull, Yorks
2000	G3XWZ	1-910	Mansfield, Notts
2000	G3KAN	1-990	Northampton
2000	G3IBJ	1-910	Southampton, Hants
2015	G3BIA	1-910	Teddington, Middlesex
2030	G3YEB	1-915	Harlow, Essex
2030	G3PRN		
	G3JHM	70-050	Worthing, Sussex
† Alternately			
Tuesdays			
1100	G3EBU	1-852	South Woodham, Essex
1800	G3XDV	1-910	Canterbury, Kent
1900	G3UFO	1-980	Wirral, Cheshire
	G3XAM		
1900	G3XWQ	1-975	Canterbury, Kent
1930	G3SWP	1-850	Doncaster, Yorks
1930	G3WGU	433-500	Bispham, Lancs
		to south-east	
1930	G3XUD	1-910	Leeds, Yorks
	G3YEE		Bradford, Yorks
1930	G3XGY	144-240	Weston-super-Mare
		144-144	omni-directional
1930	G3ZUM		Iver Heath, Bucks
		to south	
2000	G3TUW	145-200	Banbury, Oxon
		to south-east	
2000	G3UPA	1-850	Meriden, Warks
2000	G3TIK	1-980	Stevenage, Herts
	G3KSS		
2000	G3OVT		
2000	G3FWW	1-880	Burnham-on-Sea, Soms
2000	G3WGD	1-860	Leicester
2000	G3PIP	3-590	Mintlaw, Aberdeen
2030	G3HZL	1-845	Isleworth, Middlesex
2030	G3ROE	1-915	Harlow, Essex
2030	G3RBE	1-975	Whitley Bay, Nth'land
2045	G3CRY	3-590	St. Andrews, Fife
2100	G4RS	1-865	Blandford, Dorset
2200	G3HZM	1-925	Manchester
† Alternately			

Clock time	Call sign	MHz	Town
Wednesdays			
1830	G2FXA	1-900	Stockton-on-Tees
1900	G3YPZ	28-700	Harlow, Essex
1930	G3WGU	433-500	Bispham, Lancs
		to south-east	
1930	G3YFO	144-19	Burnham, Bucks
		to north	
1930	G3UJD	1-825	Farnborough, Hants
	G3AJX		Winchester, Hants
2000	G3TWP	1-925	
	G3YSK		
2000	G8QU	1-970	London, N22
2000	G3JHM	70-050	Worthing, Sussex
2000	G3VCV	145-020	Wyton, Hants.
		to north-east	
2030	G3KGU	1-915	Theydon Bois, Essex
2100	G3HVI	1-890	Stoke-on-Trent
† Alternately			
Thursdays			
1800	G3SWR	1-980	Birmingham
1830	GW3VBP	3-590	Barry, Glam
1830	GW3UMB	1-880	Colwyn Bay
1830	G3NC	1-968	Swindon, Wilts
	G3WYF	1-850	Thornton Cleveleys
1900	G3YEI		Fleetwood, Lancs
1900	G3WGU	1-880	Bispham, Lancs
1930	G3GNS	1-910	Weston-super-Mare
1930	G2ABC	145-500	Woodford, Essex
		omni-directional	
1930	G3ZNV	144-520	West Molesey, Surrey
		to north	
2030	G3SJE	1-875	Harrow, Middlesex
	G3GC		
2030	G3YMJ	1-915	Harlow, Essex
2100	G4RS	1-865	Blandford, Dorset
2100	GW3XNI	1-930	Crosskeys, Mon
† Alternately			
Fridays			
1800	G3XDV	1-910	Canterbury, Kent
1830	G3NCZ	1-920	Blackburn, Lancs
1900	G3NPB	1-875	St Ives, Cornwall
1930	G3PQF	1-825	Farnborough, Hants
1930	G3ZUM	144-144	Iver Heath, Bucks
		to south	
2000	G3EEL	1-980	Peterborough
2000	G3WGD	1-860	Leicester
2000	G3KEP	1-910	Bingley, Yorks
2000	G3WTF		Bradford, Yorks
2015	G3SAZ	1-845	Ashford, Middlesex
2030	G3JHM	70-050	Worthing, Sussex
† Alternately			
Saturdays			
0930	G3YZZ	3-590	Maldenhead, Berks
1000	G3PLE	1-820	Stourbridge, Worcs
1100	G3ZQO	28-350	Leyland, Lancs
	G3ZRE		
1300	G2FXA	1-900	Stockton-on-Tees
1400	GC2FMV	3-600	Jersey, CI
1730	G3TNP	1-980	Gateshead
1930	G3ZEN	1-915	Milham, Surrey
	G3ZRR		Thornton Heath, Surrey
2000	G3KPO	1-980	Peterborough
† Alternately			

G3BZU morse proficiency transmissions at 20, 25, 30, 35 and 40wpm are made at 1900 gmt on the first Tuesday of each month on a frequency of 3-520MHz. For 100 per cent copy at 20wpm a certificate is awarded, and endorsement stickers are available for 100 per cent copy at the higher speeds. A charge of 10p or two IRCs is made for the basic certificate, and 2½p or one IRC for each endorsement sticker claimed. All claims should be sent to—The QRQ Manager, RNARS, HMS Mercury, Leydene, Petersfield, Hants.

CLUB NEWS

Items for inclusion in this section should be sent to regional representatives on the first of each month for inclusion in the following month's issue. They should not be sent direct to the editor.

The date of publication of the following month's issue, first

Tuesday in the month, should be borne in mind so that events are not, in fact, history when the details are published. While regional representatives are pleased to receive clubs' events calendars for several months ahead, they still require monthly events lists so that entries can be confirmed or amended.

REGION 1

RR B. O'Brien, G2AMV

Merseyside Luncheon Club—First Monday in each month, 1230 for 1245, HMS Landfall. Please advise G3VQT or G2AMV if you wish to attend.

Ainsdale (ARC)—Members should contact N. Horrocks, G2CUZ, QTHR, for details of the changed meeting arrangements.

Allerton (Liverpool) Scout Amateur Radio Society—North West Region—Thursdays, 8pm, 1st Allerton Group Headquarters, Aigburth Vale, Liverpool 17. All Scouts interested in amateur radio are welcome.

Blackburn (East Lancs ARC)—First Thursday in each month, 7.30pm, Edinburgh House, Shearbank Road, Blackburn. Further details from G4JS.

Blackpool (B & FARS)—Mondays, 8pm, Pontins Holiday Camp, Squires Gate. Morse tuition, 7.30pm.

Bolton (B & DARS)—First and third Wednesdays in each month, Bolton Recreation Club, Kensington Place. Full details from G3ZQS. G3ZPL gave a talk recently on the mysteries of TV with emphasis on the differences experienced in using "slow-scan". Neil, although not yet 17 years of age, showed that he was well able to put his subject across. In the recent Jamboree on the Air the society managed to work W1QCO, formerly a Bolton resident, on Rhode Island.

Bury (B & RRS)—14 December (AGM), 11 January (Construction contest), The "George Hotel", Market Street, Bury. The club has a regular net on 145.80MHz after the GB2RS News Bulletin on 2m. Tickets are going well for the dinner and dance to be held on 19 January. Full details from G3RSM. Secretary, G3VVQ, 411 Holcombe Road, Greenmount, Bury.

Carlisle (C & DARS)—Mondays, 7.30pm, Currock House, Lediard Avenue, Currock. Secretary, G3FZG, QTHR.

Cheshire (Mid Cheshire ARC)—Wednesdays, 7pm, Technical Activities Centre, Winsford Verdin Comprehensive School, Grange Lane, Winsford. Morse practice from 1900 to 2000 hours and on the air working, 160 and 2m, extending later to 80m. Net night on 160m starting on Monday at 1900 hours, Tuesday on 2m at 1900 hours. There is a club project being discussed—2m tx—full details from G3JWK.

Chester (C & DARS)—Tuesdays, except for the first Tuesday in each month which is net night, 8pm, YMCA, Chester. Further details from G8AYW, QTHR.

Crewe—Local members continue to meet at the QTH of R. Owen, 10 Circle Avenue, Willaston, Nantwich, from whom further details may be obtained.

Douglas (IoM) (D & DARS)—Every Monday and Thursday, 7.30pm, rear of Douglas Holiday Centre, Victoria Road, Douglas. Club callsign, is G3ZCM. Secretary, J. Parnell, Cronkban, Quines Hill, Port Soderick, IoM.

Eccles (E & DRC)—Tuesdays, 8pm, Bridgewater School, Worsley, Lancs. Thursdays, club Top Band net, 2030gmt.

Leyland Hundred Amateur Radio Group—Net nights: Thursdays at 2000gmt on 1.915kHz. Saturdays at 1900gmt on 145.8MHz.

Liverpool (L & DARS)—Tuesdays, 8pm, Conservative Association Rooms, Church Road, Wavertree. Secretary, K. Wood, G3WCS, 90 Childwall Valley Road, Liverpool 16.

Liverpool (NLRC)—17, 31 December, 8pm, Labour Party Headquarters, 13 Crosby Road South, Liverpool 22. Secretary, M. Graham, G3XMG, 14 Albert Road, Waterloo, Liverpool 22.

Manchester (M & DARS)—Wednesdays, 7.30pm, 203 Droylesden Road, Newton Heath, Manchester 10. Secretary, G3JOA, QTHR.

Manchester (SMRC)—The club meets on Fridays, 8pm, Sale Moor Community Centre, Norris Road, Sale, Cheshire. 10 December (Tape/slide lecture "Radio aurora"), 17 December (Christmas party—bring your own beer), 24, 31 December (Club closed). The vhf/uhf activity night is Mondays, with operation of G3UHF on 2m and 70cm from the club shack "Greeba", Shady Lane, Manchester 23, at 8pm. Visitors are welcome on both Mondays and Fridays. Secretary, G3WFT.

Manchester University (ARS)—The society operates hf and vhf stations and is organizing a programme of lectures and visits. Tuition for the RAE and Morse test is also available. Those interested should contact either G8BVF, G3ZNS or GM3YOK at the University Union in Oxford Road.

Preston (PARS)—9, 23 December, 6 January, 7.30pm, Windsor Castle (private room), St Paul's Square. Secretary, G. Windsor, 26 St Gregory's Road, Preston.

Salford (Dial House RS)—A society of PO Engineers which meets on Wednesdays, 6pm, 8th floor (river end) Dial House, Chapel Street, Salford 3. Further details from the secretary at same address.

Stockport (SRS)—Second Wednesday in each month (Discussion night), fourth Wednesday (Lecture night), 8pm, Blossoms Hotel, Buxton Road, Stockport. Secretary, G8BCG.

Thornton Cleveleys (TCARS)—First and third Wednesdays in each month, 8pm, St John Ambulance Brigade Hall, Fleetwood Road North, Thornton, Blackpool. Secretary, G3YWH, ASR, G3ZBO.

Warrington (Culcheth) (CARS)—Fridays, 7.30pm, Chat Moss Hotel, Glazebury. All visitors are welcome. Secretary, K. Bulgess, 32 Hendon Street, Leigh, Lancs.

Westmorland (WRS)—First Monday in each month at the New Allen Technical College, Room 377 (top floor), Milnthorpe Road, Kendal. All visitors welcome. Secretary is E. P. Goonan Jnr, "Longridge", Storth, Nr Milnthorpe, Westmorland.

Windscale (Cumberland WAR & ES)—Fridays, 7pm, c/o Falcon Club, Falcon Field, Egremont. Further details from N. Ramsden, G3RHE.

Wirral (WARS)—First and third Wednesdays in each month 7.45pm, Sport and Indoor Recreation Centre (Old Drill Hall), Grange Road West, Cloughton, Birkenhead. Secretary, G3WSD, 34 Glenmore Road, Oxtown, Birkenhead.

Wirral (Wirral DX Association)—Last Thursday in each month at members' homes. Visitors are welcome but the secretary should be advised beforehand. December meeting will be at the QTH of G3VVA, also the Annual Dinner, the date of which is to be announced. Secretary, G3OKA, 219 Prenton Dell Road, Prenton, Birkenhead.

REGION 2

RR K. Sketheway, BRS20185

Barnsley (B & DARC)—10 December ("Ritzy", by R. Smith, G3DHU), 24 December (No meeting), 7.30pm, King George Hotel, Peel Street, Barnsley. G3LRP.

Bradford (BRS)—21 December (Another favourite disc), 4 January ("Electronic organs", by P. F. Allen, G3USH), 7.30pm, 10 Southbrook Terrace, Great Horton Road, Bradford 7.

Fulford (York) (FARS)—Tuesdays, 7.30pm, Scout HQ, 31 George Street, York. G5KC.

Halifax (NHARS)—8 December (Annual dinner), 22 December (Ragchew), 29 December (Members' slides), 5 January ("Lightning and its effects", by K. Walton, G3IKS), 7.45pm, Peat Pitts Inn, Ogden.

Hull (H & DARS)—10 December ("Unidentified flying objects," by Mr C. Watson), 17 December (Construction competition), 24 December (No meeting), 31 December (Social evening), 7.30pm, 592 Hessle Road, Hull. The Annual Dinner will be held on 7 January at the Beverley Arms Hotel. Tickets are available from M. Longson, 4 Chester Road, off Wold Road, Hull, or the chairman, Mr L. D. Colley, G3AGX, "Micassa", Ferry Road, Wawne. They will be limited in number so it is advisable to apply early. The open night and junk sale held on 22 October attracted about 150 amateurs and SWLs. M. Longson.

North Riding (NRAR)—Meets at the Railway Hotel, Seamer Road, Scarborough. Details from the secretary, J. E. Ager, G8AZA, 88 Rothbury Street, Scarborough, Yorks.

Northumberland (NRC)—Meets weekly at the clubroom, 3 Wheat-sheaf Yard, Morpeth, excepting the first meeting in every month which is held in the Sun Inn, Bedlington. G3XAI.

Scarborough (SARS)—Thursdays, 7.30pm, c/o RAF Association, 3 Westover Road, Scarborough. Club callsign is G4BP. Hon secretary, J. Cutter, G3VAN. G8KU.

South Shields (SS & DARC)—Fridays, 8pm, Trinity House Social Centre, Laygate, South Shields.

Spenn Valley (SVARS)—6 January ("Amateur tv", by R. Harrison, G6AAS/T/G8AYI), 7.30pm, The Grammar School, High Street, Heckmondwike.

Sunderland (SARS)—Meetings on the first and third Tuesday in each month, 7pm, Sunderland Polytechnic. G3XID.

Wakefield (W & DRS)—Alternative Tuesdays, 7.30pm, Wakefield Youth Centre, Ings Road School, Ings Road, Wakefield. Further information from the hon secretary, G3XVU, 13 Kingsdale Avenue, Drighlington, Bradford, BD11 1EY. G3XVU.

REGION 3

RR R. W. Fisher, G3PWJ

Birmingham (MARS)—21 December (Judging of home-brew equipment), 8pm, The Birmingham & Midland Institute, Margaret Street, Birmingham 2. G8BHE.

(Slade)—17 December (Film show), 8pm, Church House, High Street, Erdington, Birmingham 23. G8EYL.

(South)—8pm, Hampstead House, Fairfax Road, West Heath. G8BHE.

Coventry (CARS)—10 December (Night on the air), 17 December (Annual club Christmas dinner), 24 December (No meeting), 31 December (New Year's social), 8pm, Coventry Scout Headquarters, 121 St Nicholas Street, Coventry.

Dudley (DARC)—7, 21 December, 8pm, Central Library, St James' Road, G3PWJ.

Leamington Spa (MWAE & RS)—Every Monday, 8pm, 28 Hamilton Terrace, Leamington.

Solihull (SARS)—7 December (Informal, Malt Shovel, High Street, 9pm), 21 December (Formal meeting), 7.30pm, Manor House, High Street. G3XPY.

Stourbridge (STARS)—7 December (No meeting), 14 December (Informal outing with buffet at the Sun), 4 January, 8pm, Longlands School, Stourbridge.

Sutton Coldfield (SCRS)—13, 27 December, 8pm, Club House, Sutton Town FC, Coles Lane, Sutton Coldfield. G8CZM.

Telford (WARS)—15 December (Club dinner), 22 December (Natternite), 8pm, Kettle Youth Club, Main Road, Kettle Bank, Telford.

Worcester (W & DARC)—11 December, Crown Hotel, Broad Street, Worcester. G8ASO.

REGION 4

RR T. Darn, G3FGV

Derby (DADARS)—8 December (Film show), 11/12 December (Marconi commemoration station GB3ERD operating from Derby Market Place), 15 December (Constructors Contest—for the Founder Members Trophy), 16 December (Vhf/uhf night), 22 December (Christmas party), 29 December (The year in retrospect). All meetings are held at 7.30pm in the clubroom, 119 Green Lane, Derby. Everyone welcome. The 1930 Net is operating on Saturday evenings at 1930gmt on 1,930kHz, a.m. only. For all club members.

Grimsby (GARS)—9 December (Visit—technical college?). New clubroom situated at the Red Cross Rooms, Rowston Street, Cleethorpes. Information from G8EDS, 13 Rudham Avenue, Grimsby, Lincs.

Melton Mowbray (MMARS)—17 December (RSGB lecture or film), 7.30pm, St John Ambulance Hall, Ashfordby Hill, Melton Mowbray. R. Winters.

Nottingham (ARCON)—9 December ("Aerials", a talk by one of the experts), 16 December (On the air), 23 December (Natter night), 30 December (On the air). The new shack is almost finished and the moving-in completed. The cw net on 80m is going strong and has now been joined by G4ANS. Slow morse classes are being held after the main item on the programme on Thursday nights. G4AFJ.

Spalding (SDARS)—The annual Christmas social and surplus sale will be held at the "Ship Albion", 37 Albion Street, Spalding, commencing at 7.30pm 17 December. Admission is 15p, which includes refreshments and a ticket in the raffle. Please bring along and price any surplus equipment and components for sale. Everyone is welcome and there is ample car parking space. Further details from Roy Harrison, G3VPR, 38 Park Avenue, Spalding, Lincs.



Bob Thornton, G3WKW, operating G3PYE/P for Pye Telecomms Contest Group on the Quantock Hills on VHF NFD

REGION 7

RR P. A. Thorogood, G4KD

Best wishes for Christmas and the New Year and thanks for your newsletters.

Acton, Brentford & Chiswick (ABCRC)—7.30pm, Chiswick Trades & Social Club, 66 High Road, Chiswick.

Addiscombe (AARC)—Second and fourth Tuesdays, 7.30pm, Prince George Hotel, High Street, Thornton Heath.

Ashford (Echelford ARS)—Second Monday and last Thursday in each month, 7.30pm, St Martin's Court, Kingston Crescent, Ashford, Middlesex.

Barking (BR & ES)—Thursdays, 27 January (AGM), 7.30pm, Gascoigne Recreation Centre, Gascoigne School, Morley Road, Barking. Mr M. R. Collingwood, G3WKV, was recently co-opted to serve on the committee.

Bexleyheath (NKRS)—Second and fourth Thursdays, 10 December (Natternite and club station), 7.30pm, Congregational Church Hall, Chapel Road, Bexleyheath. The Christmas EGM—hoped to be held opposite Brook Street, in the Hostelry.

Cheshunt (CDRC)—First Friday in each month, 7.30pm, Methodist Church Hall, opp. Theobalds Station, Cheshunt.

Chingford (RSGB Group)—Fridays, telephone 01-524 0308.

Chingford (SRC)—Fridays, 7.30pm, Friday Hill House, Simmons Lane, Chingford, E4.

Croydon (SRCC)—Third Tuesday in each month, 7.30pm, Swan & Sugarloaf, South Croydon.

Crystal Palace (CP & DRC)—19 December (Junk sale and Christmas party), 8pm, Emmanuel Church Hall, Barry Road, SE22. There has been a marked increase in club membership, and in transmitting licenses held by members—mostly "B".

Dorking (DR & DRS)—Second and fourth Tuesdays in each month, 7.30pm, Dorking.

Ealing (E & DARS)—Tuesdays, 7.30pm, Northfields Community Centre, Northcroft Road, W13.

East London—Sundays, 19 December (AGM—also "Anthology of radio waves", by A. O. Milne, G2MI), 16 January ("Mobile operating", by G. Wakefield, G5WG), 3pm, Wanstead House, The Green, Wanstead.

Edgware & Hendon (E & DRS)—Second and fourth Mondays in each month, 8pm, St Georges Hall, 51 Flower Lane, Mill Hill, NW7. **Farnham, Bucks (Burnham Beeches RC)**—Fortnightly on Mondays, 7.30pm, Buffaloes Hall, Victoria Public House, Victoria Road, Farnham Common.

Gravesend (GRS)—Wednesdays, 8pm, Northfleet Recreation Centre, Springhill Road, Northfleet, Kent.

Greenford (GARS)—Alternate Fridays, Greenford Community Centre, Oldfield Lane, 10 December, 24 December (No meeting). Contact G3OHX, telephone Uxbridge 33861.

Guildford (G & DRS)—Second and fourth Fridays in each month, 8pm, Guildford Engineering Society, Stoke Park.

Hampton Court (TVARTS)—First Wednesday in each month, 7.30pm, The Three Pigeons, Portsmouth Road, Long Ditton.

Harlow (DRS)—Tuesdays (General and cw practice); Fridays (Junior), 7.30pm, Mark Hall Barn, First Avenue.

Harrow (RSH)—Every Friday, 10 December (Junk sale), 17 December (Christmas party), 24 December (No meeting), 31 December (No meeting), 7 January (G4GB giving a talk on radio of his own choice), 8pm, Harrow County School for Boys, Sheepcote Road, Harrow.

Haverling (H & DARC)—Fortnightly, 8pm, British Legion House, Western Road, Romford.

Hemel Hempstead (HH & DARS)—First and third Fridays in each month, 7.30pm, "Addmult" Sports Club, Hemel Hempstead.

Holloway (GRS)—Mondays (RAE), 7pm; Wednesdays (Morse), 7.30pm; Fridays (Club), 7.30pm, 10 December (Junk sale). Club meets at Archway School Annex, Whitlington School, Highgate Hill, N19. The following officers were elected at the AGM held on 15 October: President, A. Wennell, G2CJN; chairman, A. Bristow; hon secretary, T. Coleman, G8EEI; hon treasurer, A. Baker. All vice-presidents were re-elected. A new committee was formed consisting of: B. Bond, G3ZKE; J. Bland, G8BLN; J. Hitchings and T. Ritchie. A new cup for vhf/uhf contest was presented by G2CJN.

Hounslow (BEAARS)—Last Wednesday in each month, 7pm, BEA Training Centre, Southall Lane, Heston, Hounslow. (This club is open to non-BEA employees by invitation—contact David Evans, G3OUF, telephone Amersham 3257 for details).

Ilford—Every Thursday, 8pm, 50 Mortlake Road (off Ilford Lane), Ilford.

Kingston (K & DARS)—Second Wednesday, 8pm, Penguin Lounge, 37 Brighton Road, Surbiton.

Loughton—Fortnightly on Fridays, Loughton Hall, Rectory Lane, (nr Deben station).

New Cross (CARS)—Wednesday and Fridays, 8pm, 225 New Cross Road, SE14.

Paddington (P & DRS)—Wednesdays, 8pm, Beauchamp Lodge, 2 Warwick Crescent, W2.

Purley (P & DRS)—First and third Fridays, 8pm, Railwaymen's Hall, Side Entrance, 58 Whytecliffe Road, Purley.

Reigate (RATS)—First Wednesday in each month, 7.45pm, George and Dragon, Cromwell Road, Redhill.

Romford (R & DRS)—Tuesdays, 8.15pm, RAFTA House, 18 Carlton Road.

Scouts (ARS)—Third Thursday in each month, 16 December (Junk sale, construction contest and Christmas social), 7.30pm, Baden Powell House, Queensgate, Kensington, SW7.

Sidcup (CVRS)—16 December (Natternight), 6 January ("Integrated circuits and their application," by Ken Ide), Congregational Church Hall, Court Road, Eltham, SE9.

Southgate (SRC)—Second Thursday in each month, 9 December (AGM), 7.30pm, Civil Defence Hut, Bowes Road, N11.

St Albans (Verulam ARC)—22 December (AGM followed by film show), 7.30pm, Town Hall, St Peter's Street, St Albans.

Sutton & Cheam (SCRS)—Third Tuesday in each month, 8pm, The Harrow Inn, High Street, Cheam.

Welwyn (Mid-Herts ARS)—Second Thursday in each month, 9 December (Club project night—design to be discussed for 2m df rx, the front-end to be useful as 2m converter), 8pm, Welwyn Civic Centre, Welwyn.

Wimbledon (W & DRS)—Second and last Fridays, 8pm, St John Hall, 124 Kingston Road, South Wimbledon, SW19.

Wembley (GECARS)—Thursdays, 7pm, c/o GEC Hirst Research Centre, Wembley. (This club is open to non-GEC employees by invitation. Telephone Dain Evans G3RPE, at 904 1262, for further details).

Woolwich—Contact G3ZOJ—re-forming this society.

REGION 8

RR D. N. T. Williams, G3MDO

Brighton (BTCARC)—Details of future meetings from the hon secretary, G2CMH, QTHR.

Canterbury (EKRS)—16 December (Constructional contest). Further details of meetings from G3MDO, QTHR.

Dover (SEKYMCAARC)—Meetings held every Thursday at YMCA, Leylands Road, Dover.

Eastbourne (SARS)—Meetings held on the first Monday in each month, Victoria Hotel, Latimer Road, Eastbourne.

Horsham (HARC)—1 December (AGM at the "Swan", West Street).

Maidstone (MYMCAARS)—Meetings held every Friday, 10 December ("Adjustment and operation of transceivers and transmitters, cw/a.m./ssb", by G3ORP), 17 December ("Radio fun", by G3XUN), 31 December (A/ or /P meeting at the "Swan", Loose), 7-10.30pm.

Mid-Sussex (MSARS)—Meetings held at Marle Place, Leylands Road, Burgess Hill.

Thanet (TRS)—Meetings held every Friday, Hilderstone House, Broadstairs.

Worthing (W & DARC)—Meetings held every Tuesday, Rose Wilmot Youth Centre, Littlehampton Road, Worthing.

REGION 9

RR J. Thorn, G3PQE

Bristol (City & County RSGB Group)—13 December ("Propagation", by Ted Halliday, G3JMY), January meeting (AGM), 7.30pm, Becket Hall, St Thomas Street, Bristol 1. G3ULJ.

(University)—Meets every Saturday from 2.30pm, Royal Fort, Dept of Physics, Tyndall Park Road, Bristol 1. G8ADP.

Burnham-on-Sea (BoSRC)—Contact J. Robertson, G3ZOR, telephone 2333.

Cornish (CRAC)—First Thursday in each month, 7.30pm, SW Electricity Board Social Centre, Pool, Camborne. G3UCQ.

(Newquay)—15, 29 December, 7.30pm, Treviglas School, Newquay. The club is celebrating the 70th Anniversary of Marconi's first signals across the Atlantic by erecting and manning a station at Poldue Hotel from 11-16 December inclusive over 24 hours. This will be in conjunction with stations at Signal Hill, Nova Scotia, and Italy. Callsign will be GB3MSA on all hf bands plus 2 and 4m. Club PRO G3NKE, telephone Camborne 2419. G3THT.

Exeter (EARS)—14 December, Club HQ, Community Centre, St David's Hill, Exeter.

North Devon (NDRC)—8 December, 12 January (Talks). Club meets at "Grinnis", High Wall, Sticklepath, Barnstaple. G4CG.

Plymouth (PRC)—7, 21 December, Club HQ, Virginia House, Batter Street, Bretonside, Plymouth.

Salisbury (S & DARC)—17 December, Burraton Toc H Hall. G3XWA.

Taunton (T & DARC)—Fridays, 7.30pm, Club Room, Jelalabad Barracks, The Mount, Taunton.

Torbay (TARS)—Meets every Tuesday and Friday, 18 December (Christmas party and "Quiz KUP"), Club HQ, Bath Lane, rear of 94 Belgrave Road, Torquay. G3NQD.

Weston-super-Mare (WsMRS)—10 December, 14 January (Technical talks), Lecture Theatre, Room 2, WsM Technical College. G3GNS.

Yeovil (YARS)—Meetings every Thursday, 6 January ("Electronic tubes", tape lecture), 7.30pm, Youth Centre, Park Lodge, The Park, Yeovil. G3NOF.

REGION 10

RR D. Thomas, GW3RWX

Blackwood (ARC)—Fridays, 7.30pm, Oakdale Community Centre, Oakdale, Mon. GW3TUG.

Barry College of Further Education (ARS)—Thursdays, 7pm, College of Further Education, Colcot Road, Barry, Glam. Much work is being done on the Marconi 75th anniversary project, and the full programme will be announced as soon as possible. GW3VKL.

Cardiff RSGB Group—13 December (Annual Christmas Social at the BBC Club, Llandaff, nr Cardiff), 7.30pm. Due to the use of external catering it is essential that invited clubs and visitors must inform GW3GHC by 6 December. GW3GHC.

Glamorgan Raynet Group—Details of meetings, exercises, etc, available from GW3ZFG, telephone Cardiff 62411.

Haverfordwest (ARS)—Tuesdays, 7.30pm, HQ Rosemary Lane, Haverfordwest, Pems. Club callsign GW3XZT. Secretary GW3YBB.

Hoover (ARC)—Mondays, 7.30pm, Hoover Social Club, Hoover Works, Pentrebach, nr Merthyr, Glamorgan. Secretary Mr F. E. Tribe.

Port Talbot (ARC)—Second Tuesday in each month, 7.30pm, Trefelin Club & Institute, Trefelin, Port Talbot, Glamorgan. **GW5VX**.
Pontypool (ARC)—Tuesdays, 7pm, Educational Settlement, Rockhill Road, Pontypool, Monmouth. **GW3JBH**.
Pembroke (ARC)—Last Friday in each month, 7.30pm, Defensible Barracks, Pembroke Dock, **GW3LXI**.
Sully & District Shortwave Club—Tuesdays, 7pm, The Annexe, Sully Bowls & Social Club, 59 South Road, Sully, Glamorgan. Club callsign **GW3ZIT**. Secretary Mr Glyn Maggs, 3 Thornley Close, Cyncoed, Cardiff.
Rhondda (ARS)—Meets at Rhondda Transport Employees Club & Institute, Porth, Rhondda, Glamorgan. Details of meetings from **GW3PHH**.
Swansea Telephone Area (ARS)—Tuesdays, 7.30pm, Telephone Engineering Centre, Gors Road, Swansea. Secretary Mr D. E. Connor, 7 Glenmon Road, Sketty, Swansea, Glamorgan.
University College, Cardiff (ARS)—At time of publication this society is not active, but it is hoped that sufficient interest will be aroused to re-start activities in the near future. Details from the secretary, Students Union, Dumfries Place, Cardiff.
University College of Wales, Aberystwyth Radio & Electronics Society—This is an active society with a programme extending well into the New Year. Details from the secretary Miss Ruth Bury, c/o Students Union, University College of Wales, Aberystwyth, Cardiganshire.

REGION 11

RR P. Hudson, GW3IEQ

Bangor (B & DRS)—Alternate Thursdays. The Drill Hall, Bangor.
Bangor (UCNWAR)—Anyone interested in radio, attending the University, is invited to contact the secretary.
Conway Valley (CVARS)—Second Thursday in each month, Parade Hotel, Llandudno.
Rhyl (R & DARS)—Second Tuesday in each month, 14 December ("Integrated circuits and ssb", by Frank Wiseman, GW3GRY), Mona Hotel, Rhyl. Forthcoming visits include the Wales Gas Board Telemetry Station and the Telephone Exchange.

REGION 12

RR G. M. Grant, GM3UKG

Aberdeen (AARS)—Fridays, 7.30pm, 6 Blenheim Lane, Aberdeen. **GM3HGA**, telephone Aberdeen 33838.
Inverness (IRS)—No formal meetings as yet but the clubroom is open on Thursdays. Clubroom, 4 Falcon Square (nr railway station), Inverness. Miss A. Vieth, telephone Drumnadrochit 266.
Lerwick (LRS)—Tuesdays and Thursdays, 8pm Abbsbrae House, Lerwick. **GM3XPO**, telephone Bixter 249.
Lhanbryde (MFARS)—Wednesdays, 7.45pm, St Andrew's School, Nr Lhanbryde, Morayshire. **GM3UKG**, telephone Clochan 225.
Thurso (CARS)—Second Tuesday in each month, 7.30pm, details of QTH from **GM3JUD**.

REGION 13

RR V. W. Stewart, GM3OWU

Berwick (BARS)—First Sunday in each month, 3pm Tweed View Hotel. Further details from C. H. Crook, G3YOG, 19 Hatters Lane, Berwick on Tweed or from the AR, G. Shankie, GM3WIG, 8 Ettrick Terrace, Hawick, Roxburghshire.
Dunfermline (DRS)—Second Wednesday in each month, 7.30pm, Abbot House, Dunfermline. Further details from G. Martin, **GM3NVQ**, 42 Rose Street, Dunfermline.
Edinburgh (LRS)—Second and fourth Thursdays, 7.30pm, 66 Hanover Street, Edinburgh. Further details from R. Manners, **GM3ZVB**, 165 Mayfield Road, Edinburgh.
Glenrothes (GDARC)—First Sunday in each month, 7.30pm, Old Nursery Buildings, Leslie, Fife. Further details from K. Home, **GM3YBQ**, 14 Liss Way, Kirkcaldy.
Lothians Radio Society—9 December, 7.30pm, 66 Hanover Street, Edinburgh.

REGION 14

RR N. G. Cox, GM3MUY

Ayrshire (AARG)—19 December, 7.30pm, YMCA, Howard Street, Kilmarnock.
Ayrshire (Ardeer Recreation Club)—9, 14, 16, 21, 23, 28, 30 December, 7.30pm, Ardeer Recreation Club, Amateur Radio Section, Stevenston. Details from J. F. McCreight, **GM3DJS**, 10 Auchenhavie Road, Stevenston.
Falkirk & District RSGB Group—10 December, 7.30pm, Temperance Cafe, Lint Riggs, Falkirk.
Glasgow University (GURC)—10 December (Annual junk sale), 17 December, 7.30pm, George Service House, University Garden, Glasgow, W2.
Greenock & District (G & DARC)—10, 17, 24 December, 7.30pm, James Watt Library, Union Street, Greenock.
Mid-Lanark RSGB Group—17 December, 7.30pm, YMCA, Brandon Street, Motherwell.
West Scotland (ARS)—10 December (Annual dinner), 17, 24 December, 7.30pm, 81 Virginia Street, Glasgow.

REGION 15

RR J. Thompson, GI3ILV

Belfast (B & DRG)—Club meets on the third Wednesday in each month, 8pm, 90 Belmont Road, Belfast 4.

REGION 16

RR W. J. Green, G3FBA

Colchester (CARC)—Wednesdays, 7.30pm, North East Technical College, Sheepen Road, Colchester. Club Chairman, B. M. Morrissey, G5YK; secretary, E. T. Jacobs, 26 Pondfield Road, Colchester. The club proposes to hold an inter-club 2m and up contest on 25-26 March. It is hoped to include details in *FMD* in due course and further details may be obtained from the secretary. The club station will be active on 2m, 4m and hf bands.



Part of the large gathering which sat down to dinner after the Region 12 ORM at the Beach Hotel, Aberdeen, in October

Norwich (NARC)—Wednesdays, with the third Wednesday in each month as the main meeting. 15 December (NFD 1972), 7.30pm. Club now meets at the Crome Community Centre. Arrangements to hold morse classes are in hand. Secretary, John Lockwood, G3XXL, G3XXL.

REGION 17

RR C. Sharpe, G2HIF

Basingstoke (BARC)—Meetings on the first and third Saturday in each month, 7pm, Chineham House, Shakespeare Road, Basingstoke, Hants. G3CBU.

Harwell (AERE ARC)—Meetings on the third Tuesday in each month. Also informal gatherings and junk sales every Friday lunchtime. 21 December (AGM), 7.30pm, Social Club, AERE, Harwell, Berks. G3NNG.

Maidenhead (MDARC)—21 December (Home construction competition), 7.30pm, Victory Hall, Cox Green, Maidenhead, Berks. G3VMR.

Reading (RDARC)—Meetings are held on alternate Tuesdays at the club's new address at Ashmead School, Northumberland Avenue, Reading. 7 December (AGM), 7.30pm. G3NBU.

Swindon (SDARC)—8 December (Informal), 22 December (Club Christmas party and social evening, 7.30pm, Penhill Junior School, Penhill, Swindon, Wilts. G3JAP.



Exhibition station GB3PCA run by Fareham & D ARC for Porchester Community Centre Open Week in September. Standing: club president G2QK; Councillor G. H. Robinson, ex G2AIX and chairman of Fareham UDC, and Mrs Robinson. Seated: G3VFI, SWL David and G3XUF

A new RSGB publication RADIO AMATEUR'S EXAMINATION REVISION NOTES

by G. L. Benbow, G3HB

A pocket-size book containing facts and figures covering the examination syllabus. Invaluable for reference and revision.

Available **only** from RSGB Publications, 35 Doughty Street, London, WC1N 2AE, price (by post) 30p.

In order to keep the cost of this book as low as possible it will be available only from RSGB.



"The other interest here is politics"



A PUBLICATION FOR THE RADIO AMATEUR
ESPECIALLY COVERING VHF, UHF AND MICROWAVES

The magazine especially for the VHF-UHF amateur. VHF COMMUNICATIONS is more than just a magazine, since it offers features not provided by any other magazine in the world.

- Purely technical articles in the VHF and UHF spheres, no editorial columns.
- Provides all special components required for building up the described equipment that are not readily available to the amateur. Items such as: Epoxy and Teflon (PTFE) PC-boards, collimators, trimmer capacitors, semiconductors (including ICs), as well as kits of parts.

- Absolute state-of-the-art in VHF technology, because the authors of VHF COMMUNICATIONS are not only leading VHF amateurs but mostly professional engineers employed in industrial research and development departments.

VHF COMMUNICATIONS is a quarterly publication in February, May, August and November. The subscription rate is £1.50; individual copies are available for 48p.

Please write to your representative for full details, including list of contents, material price lists, etc. All back copies are still available.

Editors:

Terry D. Bittan, G3JVQ/DJ0BQ
Robert E. Lentz, DL3WR

Publisher:

UKW-BERICHT, H. J. Dohls, DJ3QC
D-8520 ERLANGEN, Gleiwitzerstr. 45
Federal Republic of Germany

UK Representative:

MICROWAVE MODULES
4 Newling Way, WORTHING, Sussex
Tel: 0903 64301 (Worthing)

MEMBERS' ADS

These advertisements are accepted free of charge as a service to members of RSGB. They must be submitted on the Members' Ads order form printed on the penultimate page of each issue of *Radio Communication*, or on a postcard similarly laid out. Each must be accompanied by a recent *Radio Communication* wrapper addressed to the advertiser, as proof of membership.

The closing date for each issue is the 4th of the preceding month, but no guarantee of inclusion in a specific issue can be given. Valid advertisements not published in the issue following receipt will be held over until the next issue and should not be resubmitted.

Trade or business advertisements, even from members, will not be accepted for Members' Ads but should be submitted as classified or display advertisements in the usual way. The RSGB reserves the right to refuse advertisements, and accepts no responsibility for errors or omissions or for the quality of goods offered for sale. Members are advised to enclose a stamped addressed envelope when replying to advertisements.

No correspondence concerning this free service can be entered into.

See the current order form for further details.

FOR SALE

Hi-gain TH6DXX super Thunderbird with mtchng balun in new unused cond, elements assembled in low phone postn but can be altered to suit user's requirements, comp with manual, £50 ono. G3ZDI, 21 Alwyne Drive, Shipton Road, York.

70cm tx, strips with provision for nbfm, brand new and boxed with circ, uses E90F, 6AK5, E810F, 2XQCE02-5, £4 ea + 30p p + p. Some with valves, some without. G8AKA, 2 Orchard Road, Mortimer, Berks. Tel Mortimer 332582.

Unused xtal fltr, Salford Instrument Co, 10.7MHz 15kHz bndwidth, £2.50. G3YPS, QTHR.

Heathkit rf sig gntr RF-1U, unused, £15. Homebrew superhet with 898 dial, Electroniques coils, S meter, vgc, £15. 8 track stereo car tape player with elac twin cone spkr + tapes, £25. Price, "Grosvenor", Wanswell, Berkeley, Glos.

FR500 rx with 2m cnvtr, vgc, £100. 25ft steel tower, £8. Aluminium stub mast 15ft 2in diam, £2. Allen, "Rossman", Dimmocks Lane, Sarraat, Rickmansworth, Herts.

Panda cub, gd mech and electrical cond, comp with circs and some spares, £20. Heathkit gdo with all coils and hndbk, £8.50. Large collection of valves, 30 for £1, state preference. G3NXX, QTHR. Tel Tiptree 6265.

R209, £7.50. Top band Command rx with 12V psu, £3.50. 1970 *Radio Communications*, £1, carr extra. G13NZZ, Cromlech Park, Kilkeel, Co Down.

4m transistor cnvtr, new, £5.50. Top band Command rx, new, £6. Koyo transistor comm rx, 8 wavebands inc lw mw traxler band, fm vhf aircraft public services etc, new, cost £54, sell £35. 60 *Bulletins*, 65 *SWMs*. G3XBE, 39 Oakdale Drive, Wrose, Shipley, Yorkshire. Tel Shipley 57490.

Hudson AM112, 25W highband/M, transistor modulator, audio & psu, £14. Wideband transistor amp, 5kHz-15MHz, 7in by 2in pcb, unused, £1.25. Wanted: transistor 405/625 tv video i.f. strip. G3YLQ, QTHR. Tel Luton 25595.

Class D wavemeter, mains powered, £5. Wanted: cheap rx, must be fb cond, also gd tape recorder. All letters answered. G3WXT, QTHR.

G2DAF Mk 2 tx less 4 xtals, with psu. Also G2DAF rx, gd wkng order £45. G3WACF, QTHR. Tel Briton Ferry 2475.

Eddystone EB35 12V rx, new cond, with manual, £40 ono. Sissons, 25 Southlands Grove, Bromley, Kent. Tel 01-464 3646.

Mint LM7 with spare valves, £20. HW12A (new), £45. Collins MP1 /M psu, £75. Weller solder gun (new), £5. Olivetti /P typewriter, £15. Wanted: Pye Vanguard for 4m. G13CDF, QTHR.

GEC BRT402E, £50 ono. G3VLY, 74 Highlands Road, Fareham, Tel Titchfield 2357.

Rtty Creed 7B with cover, £10. Cathode ray monitor for rtty, can be used as normal oscilloscope, £12, together with instrcn manual. G3VWR, "Brumles", Howgate Lane, Bembridge, IOW.

Variable psu, outputs 0-250V 60mA, 0-25V 60mA, overload trip + 2X6-3V at 2A, metal case, output terms on front panel, unused, £5.50. G3YNA, 169 Ashburnham Road, Hastings, Sussex. Tel 29794.

Heathkit amateur band rx HR-10B, 10-80m, brand new, little used, immac cond, £50. Pref buyer insp and coll or carr extra. Wayland, 443 Hincley Road, Leicester, LE3 0WD.

NbPm/am 70cm txs, brand new with cct and output valves, £4 ea. NbPm 2m txs, used, £1.75. 70cm tx/rxs comp with hndbk, exc cond, £15. TW 2m communicator, ac psu, hndbk, £40 ono. G8ATK, QTHR. Tel Farnham 5765.

Racal 5 digit counter freq meter SA43B/10, wkng order but valve model. Wanted: 70cm varactor tripler, /P digital voltmeter. G3VMR, QTHR. Tel Maidenhead 24929.

R107T, S meter, hndbk, £10. R110, 10-60MHz, £3. Psu stab ht to 500 mA, many lts, bias, £5. 52 Sender psu + modulator, Class B, inc modulator trnsfmr, £5. Buyer coll or del up to 30 miles. G3VAX, QTHR.

DX100U, £40. KT320 rx, £15. Hartley 13A scope, £22. Japanese bug key, £3. Taylor 45A valve tester, £5. Jason kit wobulator, £7. Q fiver, £3. Avo all wave osc, £5. Buyer coll. G3MMQ, QTHR.

KW2000B with ac psu, little used, hndbk + circ diag, £165. 2 ETM elec keyers, as new £16 ea or both for £175. Pref buyer coll. G3YGU, QTHR.

h/b 160m df rx, £8. G3COI, 58 Springhill Park, Penn, Wolverhampton. Tel Wombourne 2288.

Eddystone EA12, gd cond, £120. Heathkit Q mult, 455kHz lf, £5. G13SUM, 13 Maralin Avenue, Bangor, Co Down. Tel 2674.

Heathkit GR-78, £65. Marconi TF144, £10. TF340, £3. Avo Mk 8, £20. Megger, £10. Philips gdo, £7.50. Hallicrafters S-27, £15. 11 channel marine vhf tx/rx, £15. HRO, 1 coil tatty, £4. Write only. Rivett, c/o 6 Pollards Hill North, London SW16.

Pair Fantavox walkie-talkies metal cased superhets in exc order, £16. 6BE6, 6BA7, 6CH6, 25p. GEC 100kHz xtal, 60p. CV415/TT15, £1. 4242A/242, £1.50. Wanted: 813, 144MHz cnvtr. G2ACT, 14 Station Road, Poppleton, York. Tel Poppleton 4366.

Hallicrafter SX110 rx, gd cond, 0.538-34MHz with bndsprd 80-10m, £30. G3TVX, 32 Huntingdon Road, Cleveleys, Lancs. Tel Cleveleys 4758.

Solartron psu AS754. Stblzd 200mA, 6.3 6A ct. 6.3 2A, £5, with manual. Buyer coll. Baldwinson, 33 Cherry Close, Tulse Hill Estate, SW2.

KW low pass fltr 75Ω channel 1, Belling Lee sockets, £2.50. GC3YIZ, QTHR. Tel Guernsey 57868.

Sommerkamp FTDX500, absolutely perf cond, hndbk, £190 ono. Pref buyer coll or del up to 80 miles. G4AMF, 4 Hall Street, Hoyland, Barnsley, Yorks. Tel Barnsley 743414.

40m tx, 30W, £10. 500-0-500V trnsfmr, £2.50. 500V psu, £5. 8W modulator + psu, £10. Woden UM1 trnsfmr, £2.50. Philips cassette tape deck (new), £5. 75/50Ω swr bridge, £4. 75/50Ω dummy load, 50W, £2.50. Blessed, 60 St Peter's Avenue, Cleethorpes, Lincs. Tel 63862.

Mohican 2m cnvtr, built-in external preamp, £30 ono. 2m tx, 25W rf, built in modulator ac psu, £10 ono. 8/8 slot, £4. Miniscope + wobulator with spare tube, £10 ono. QVO8-100s, brand new, £3 ea. 6K7Gs, 6K8Gs, 6B8Gs, 807s, 10p ea, 2m cnvtr, 28-30 i.f., transisORIZED, £5. G18AYZ, QTHR.

Eddystone hf/mf comm rx, Model 830/7, vry little used, mtchng spkrs, head set, manual, £230 ono. Heyman, Wongas House, S Holmwood, Surrey. Tel Dorking 6314.

Valve tester, £3. Cossor 3313 oscillograph, £2. 6-12V dc transistor cnvtr psu, £4. Command tx with mod 160m, £5. Wavemeter 1191, £2. Wavemeter 1310, £5. Cossor scope telecheck/matter gntr, £12. Other gear. G3SIK, QTHR. Tel 01-883 1136.

HA350 rx in mint cond, no mods, comp with hndbk and calib xtal. USA version supplied with auto trnsfmr, £50. G30SW, QTHR. Tel Wylam 2434.

2 Vols *Radio Communication* 1969, 1970, 50p per vol + post. 2 valves UU8, 2 valves UUS, 40p ea + post. G8WP, 31 Lascelles Hall, Kirkheaton, Huddersfield, HD5 OBE.

School lab eqpmnt, Negretti + Zambra quick reading potentiometer, £9. Tinsley Wheatstone bridge, £8. Sae full list. AVO 7, 50A + 100A shunts, 50p ea. Cossor 1035 scope, £15. TF144G sig gntr, £12. G8AYN, 32 Ironmill Lane, Crayford, Kent. DA1 4RR. Tel Crayford 24625.

70cm pa 4CX250B with blower + psu, meters, leads etc, £16. 70cm pa QV06940A + psu, £8. Pye fm 2m tx, new £10. G8CKH, QTHR. Tel 01-644 2687 (after 6.30pm).

RCA rty tu mtchng the AR88, £30. 19in rack cab, 10in high 13in deep, £2. J Beam 1in by 20ft/P mast with rigging, £4.50. Other odds and ends, dets on request. Boyd, 18 Meadows Road, Lower Willingdon, Eastbourne, Sussex. Tel Eastbourne 52721.

Constant voltage stab, 190-260V output 235V 150V, £5. Garex Mk 2 2m cnvtr with xtal, new with box, £10. Top band KW Mk 2 tx, mint cond, £17. All above + carr or coll. Wanted: VF1U. G3FK, QTHR. Tel Broadstone 2631.

Xtal set, homebrew 1920s, Basket coils, xtals + holder, £2. Columbia 352 Model 0-V-1 radio comp with valves, £3. G3AKD, 52 High Street, Bottisham, Cambs. Tel Bottisham 404.

Heathkit HW100, mic GH12A, swr bridge /M spkr HS-24, dummy load HN-31, low-pass fltr, home made psu, mint, £90, the lot. Buyer must coll. Owner going abroad. GM3GHF, QTHR. Tel 041-638 5367 (6pm).

Codar AT5 with control box. G3JAS, QTHR. Tel Weaverham 2575.

Labgear LG50 60W cw, 40W a.m., exc cond, £25 ono. Del rsnbld distance or cp. Valves 813, £1.10, TT10 (same as 813, bigger), 80p. Pair KT88, £1. U19, 50p. All post paid. GM2HCZ, QTHR. Tel Monlave 345.

11 Vols *Basic Electricity and Electronics*, £5. *Dictionary of Electronics* £1. Cossor scopes 1035, £12.50, 1049 Mk 4, £17.50. Buyer insp and coll. Regret w/ends only and please phone before calling if poss. G8DJR, QTHR. Tel Slough 26099.

2m transistor tx (G8ARV) with mic and 2 xtals, in biscuit tin, £10. 2m transistor super-regen rx (Johnson's CV2), £2. G3VPH, 37 Tagwell Road, Droitwich, Worcs. Tel Droitwich 3089.

HW12A, absolutely mint, £50. Solid state psu, atu and swr meter in mtchng cab, prof finish, mint cond, £30 ono. Wanted: SX100, SX96, SX99, Eddystone 750 or sim, must be mint. G3SIH, QTHR. Tel Melksham 3443.

KW2000B mains psu, Q mult, £120 inc carr. All enquiries answered. G3LKT, QTHR.

HBW Mosfet 2m cnvtr, i.f. 27-29MHz, ideal ssb trnsvtr, boxed, £7.50. AF239 commercial 2m cnvtr, boxed, 24-26MHz i.f., £6. Transistor, tunable, i.f. 24-26MHz in, 1.5MHz out, cased, £6. 30W ex-comm 2m a.m. boot tx, £6. Shirville, G3VZV, 2 Bradford Way, Toddington, Beds. Tel Toddington 2470 (05255).

Heathkit HW17A, 12 mths old, £45. G8EKX, 30 Hazelbank Close, Liphook, Hants. Tel Liphook 2546.

HRO + gen cov coilpacks, psu, 19in mounting S meter vernier, N limiter, £25. Heathkit Mohican, £20. Swap either for Pye base high or low band. G8CNP, QTHR. Tel 0273 503980.

Gntr from 1,500V megger, set valves for HRO. Siemens high speed relays. Moving coil mic, AVO electronic testmeter, comp with hndbk, 10 small NiFe cells, all cheap for quick sale. G8DFS, QTHR. Tel 021-354 7769.

EMI WM16 30MHz scope comp with 3 plug-in wide band high gain and differential amps, in gd wkg order and with hndbks, buyer to coll. Kingston upon Thames area, £55. G8DFT, QTHR. Tel 01-942 1230.

Four ele ws 10m T beam, fantastic gain, £10. Hygain 12AVQ cw radial, guys and feeder, £16. Also 30ft 2in hg all mast in 2 scns, £2.50 or £28 the lot. Buyer must coll. G3MLP, QTHR. Tel 09334 2469.

Hallcrafters S76 rx, 550kHz-30MHz, gc bs double superhet, manual, mint, £35. AT5 tx 240V psu and T28 rx, £30. G3ZMT, 34 Pelham Road, Birmingham 8.

Marconi sig gntr TF144G with box spares, £20. Two rotary cnvtrs 11-5V in 250V 125mA 490V 65mA out, 50p ea. Cossor 339 scope, £15. Sae further det. Buyers coll. Hickinbottom, 76 Heathfield Avenue, Ilkeston, Derbyshire, DE7 5EL Tel 2526.

JR500SE rx, £45. PM2 preselector, £4. Dowkey valve t/r switch, £5. E-zee match, £10. LG300 tx spares, 813s WBM unit, pi-choke pi-coil circ, £20. Companion mod/psu, modulation not wkg, circ, cables, £10. Stone, 39 Purrett Road, Plumstead, London SE18 1JR. Tel 01-854 6646.

Ten-Tec PM2 cw tx/rx, 80-40m, 12V supply, £18. G3YEP, QTHR. Tel Portishead 2312.

Brand new speech compressors (3), plugs into mic lead, fully shielded, req only PP3 batt, £2 ea or £5 the lot. G2PU, QTHR. Tel Cambridge 870454.

NCX5 Mk 2, mint cond, one owner and little used, £160. Morris, 3 Astley Road, Bradshaw, Nr Bolton, Lancs. Tel Bolton 52384.

Microwaves. 10ft lengths WG14 1 1/2 by 1 1/2ins rigid waveguide flanged each end, £2 ea. 22ft semi-flexible elliptical waveguide with WG14 adaptors each end, £4. Pair loose WG14 flanges, £1, used but clean. £8 the lot. Buyer coll. G3HRH, QTHR. Tel Codicote 607.

Radio Constructor "sure fire" 2m tx £12.50. 25W another homebrew 2m tx, compact, about 20W, unused since bought, £12.50. Copper sheet 18in by 18in 20 gauge, bought trade, £2. Seymour, 25 Ryde Buildings, Webb Street, London SE1 4RX.

Very old all brass ship's key, mounted on 3in thick slate base 8in by 3 1/2in, horn ldspr adjustable metal diaphragm mounted on 4 legs, resistance 2,000Ω, bakelite construction less horn, £5. G3JGJ, Rose Cottage, Moreton on Hampstead, Devon.

Fm wireless mic, Midland model 13-500 hiband cov, batt powered by one PP3, all in one unit 7.5in by 1.5in by .75in + trimming tool, cost £12.50, accept £5. Pse telephone after wkg hours. Steve, Ilford. Tel 01-590 0324.

Marconi rf sig gntr type TF390F, £10. R1392 vhf rx with mod dets for 2m, £6. R1132 vhf rx, £3. Psu P234, £4. Carr extra on all items. G8EBM, 31 Ellesmere Road, West Bridgford, Notts. NG2 7DE. Tel N'ttm 231933.

BC348Q rx, wkg order with psu, spkr, £15 ono. Buyer insp and coll or will del rsnbld dist. Judge, 14 Hayley Bell Gardens, Bishops Stortford, Herts.

Marconi W5517 tx, am/cw/mcw, 80W, comp with modulator less psu, £5. Carbon load resistors, 75Ω 50Ω, 50p ea. G3SDK, 27 Norton Crescent, Towcester, Northants.

Labgear LG50 tx, 60W cw 40W phone, fb cond, £15 ono. G3ZHM, 6 York Road, Torpoint, Cornwall. Tel Torpoint 496.

Eddystone S640, mint, £15. Ekco tx/rx /M CE12/A, £15 the pair. Ekco base station CE93/A + CE94/A, mint cond. Buyer coll. G3-MVU, 27 Clifton Road, Ashingdon, Essex. Tel Southend 77129 (day), Southend 546627 (evening).

Pair, as new, 4CX250B cw bases and chimneys, offers? RSGB *Bull/Radio Communication* 1960 to 1968, few copies missing, also few copies 1952 and 1959, offers? Buyer coll. G3SVD, QTHR.

Turn counting dial unit 00-00 to 99-99 turns, £2. GW3PJT, QTHR. Tel Ruabon 2577.

APR4 rx, £42. RDO rx, £16. Rf units for APR4/RDO 38-95MHz, 95-300MHz, 300-1,000MHz, 1,000-2,000MHz, £6 ea. Panadaptors, match APR4/RDO, £16. Teletype 19 page printer, tape tx, table, power unit, £25. Barry-Peters, Blue Coat School, Wavertree, Liverpool L15 9EE. Tel 051-733 1407/8 or 7221 4446 (evngs).

Heath HW32A tx/rx with psu, mic and ldspr, exc cond. Buyer coll, £60. G3YJH. 317 Old Walsall Road, Great Barr, Birmingham 22A.

Hammarlund HQ170A, mint cond, £85 ono. G2HFI, 18 Newlands, Langton Green, Tunbridge Wells Kent. Tel Langton 2647.

Minimitter Mercury 150W tx, 80-10m am nbfm, cw needs slight attention, £30. G6FI, QTHR. Staines 52785.

Heathkit Mohican, clean cond, wkg order, £18 ono. G8FAK, 46 Windsor Street, Wolverton, Bucks.

KW160 a.m./cw top band tx. Heathkit RF-1U sig gntr, both fb cond, best offer. Buyer coll. Wanted: RSGB blazer badge. G3WXT, QTHR.

Trio TS-510 tx/rx cw fltr remote vfo, mint cond, vry little use, £170. Del rsnbld dist. G3JBU, QTHR. Tel 0604 43020.

G3HTA rx am/cw/ssb QP166, Eddystone dial, engineer built, new metal cab, just comp req alignment calibration, wkng perf, £45 ono. Lafayette stereo tape-deck 4 track 2 speed, £25 ono. Williams, 135 Welbeck Road, West Harrow, Middlesex. Tel 01-422 6097.

JXX 2m cnvtr i.f. 1.8-3.8, 18 countries and 73 counties worked, £9 post free. G5NU, QTHR. Tel Reading 81200.

Pye base stn, 2m, exc cond, £20. G8BCA, QTHR.

70cm tripler amp, 30W rf output /M psu, few watts, 2m drive, £25. G3RUI, 1 Danethorpe Road, Wembley, Middlesex. Tel 01-902 6535.

Heathkit 0-12u scope, £18. Scope CRT type 1324C, new, £2. All carr extra, just brand new Radiospares comps at give away prices, send for list with large sae. GM3VXR, 70 Leven Street, Motherwell, Lanarks, Scotland. Tel Motherwell 66597.

Class D wavemeter, new, £4. Codar self powered preselector, £4. Radiovision Hambander, £3. Mosley V3JR trap vert, £5. Heathkit HP13 /M psu, £18. Pair new QE05/40F valves, 12V version of 6146, £2. Davies, 71 Charlack Way, Holywell Estate, Watford, Herts.

CR100 rx re-aligned, serviced, £12. Marconi No 13 sig gntr, a.m./fm, 20-80MHz film scale, xtal check, £15. RCA audio freq meter, £10. Pye lab freq standard 500kHz + 1MHz in oven, £9. Homer, 32 Iron Mill Lane, Crayford, Kent DA1 4RR. Tel Crayford 24625.

2 ele mini beam for 21MHz. Same size as CH1 tv aerial, pref buyer coll, £8. GM3POK, QTHR.

Radio Communication and Bull, 8 Vols, 6 comp, £5 ono. SWM 10 Vols, 7 comp, £6 ono. Channel Master rotator and control unit, £8 ono. Electronic organ, cost £123, will accept £80 ono. Numerous other books, mags, send for list—sae please. G8CIJ, 31 Westthorp, Greatworth, Nr Banbury, Oxon.

Eddystone 840C gen cov rx, exc cond, with manual, £35 ono. Wanted: Katsumi EK-9X el bug. Robertson, 31 Greenways, Bow Brickhill, Blechley, Bucks. Tel Blechley 2463.

Honda 1kW gntr, one contest one /P operation, £85. KW77 rx, £70 ono. Eddystone 640 rx, £20 ono. Electroniques QP166 coil pack and i.f. mains tx/rx chassis and case. Offers? G8FIS, 25 Campbell Avenue, Acomb Road, York. Tel York 59861 extn 294 (daytime).

KW201 rx with xtal calib, mint, £80. KW Ezee match, £8. Lp fltr, £3. G3VLX, 17 The Weald, Chislehurst, Kent. Tel 01-467 8093.

2m cnvtr field effect transistor/bipolar, gd cond, £6. G8EEJ, 51 Ruskin Crescent, Crown Hill, Plymouth, Devon.

Hammarlund SP600JX comp with spare valves and manual, immac cond, £80. AR88, exc cond, spare valves and manual, S meter aligned by KWE, Dartford, £35. Tomlinson, Marsh Farm, Clifton, Preston, Lancs. Freckleton 632248.

82in diam 150-300V dc relay meter, £2. Vintage Galvanometer, £1. 5 Dekatron unit less Dekatrons, 50p. 4 digit counter, 25p. Stamp pse for list of other comps. Meek, 39 Horsebrook Lane, Brewood, Stafford. Tel Brewood 850760.

Pye Rangers transistor type ready cnvtd for 2m, almost mint cond, with diag, £10 + carr. GW3GDO, QTHR. Tel Cardiff 755224.

Mosley Mustang 3 ele 3-band yagi, 18 mths old, weather-proofed, as new, £20. Buyer coll. G8WS, QTHR. Tel Maidenhead 23239.

2m Pye Vanguard 25W tx/rx, fb cond, with remote controls + cables, offers. G3VYP, QTHR. Tel Cambridge 55341.

Lorenz T36LO printer, immac, £25. Redifon fsk adaptor 455kHz i.f., as new, £15. Hf bands pa, spare 813, £9. Kit form 2kV 1A psu, £8. Buyer coll if poss. G3PGN, Steeple View, Peartree Lane, Doddinghurst, Brentwood, Essex. Tel Blackmore (Essex) 822891.

CR100, cw, manual, noise limiter, S meter, fb cond, £15. BC221, cw, charts, psu, £16. Taylor valve tester, £4. Sae for lists, all + carr. G3LLX, QTHR.

75W dc ip 70cm 2m phone tx, self-contained in table top cab, may be used by arrangement, £50. AR88D overhauled, case resprayed, £20. Carr extra by arrangement. G6AET/T, QTHR. Tel 07415 2609.

Set 8 HRO gc coils, £15. 1,000V 600mA psu, £3. 813, £1. Base, £1. Wanted: linear. HD rotator, post extra. G3XUR, QTHR.

Star SR600 rx, gd cond, £45. Also Yaesu Musen FL100B tx, £45, both with manual. G3HRY, QTHR.

Heathkit HW17 modded to HW17A standard, improvements inc bfo fitted, £40 ono. GW8BQN, 22 Plasturton Gardens, Cardiff CF1 9HH. Tel Cardiff 29424.

Desk top projector, 3m model 88, ideal for club lectures, £22. 10W transistor modulator, £2.50. Fm tuner, £2.50. 75W audio amp, 50p. Solon 25W soldering iron, 60p. Post extra. G8AWV, QTHR. Tel 01-794 9934.

Eddystone S504 rx, gd cond, £20. Wanted: Radiovision "Commander" rx or Hammarlund HQ170 or HQ145, state price and cond. G5NH, c/o Ariel Radio Group, BBC Club, Daventry, Northants. Tel Daventry 2152.

Grey/green louvred 16swg steel cab, 26in tall, 15in deep, 14in wide, with mounting plinth, suit linear, £3. 2 grey 18swg steel cabs 21in long, 13in tall, 10in wide, suit scope, £1 ea, or £4 the lot + carr. Lepper, 128 Sheephouse Hill, Fauldhouse, West Lothian, Scotland. Tel Fauldhouse 433.

Codar CR70A with preselector and mtchng ldsprk, gd wkng order, the lot for £18 ono. Will del 100 miles, ring or write. G3YNO, QTHR. Tel 0482 667252.

KW swr meter, £4. Fil trnsfmr, 7½ 3A, £1. 5.500kHz xtal, new unused, with base, £1. post paid. G2GM, QTHR. Tel Freshwater 2709.

KW2000B with ac psu and KW1000 linear amp, exc cond, will cons offers. Also Hartley 13A scope. G3WXD, QTHR.

Solartron CT316 dc -6MHz, gd cond. Heathkit Q mult, 1.6MHz i.f., offers. Wanted: Heathkit spkr for RA1. Ellis, Pierrepont School, Frensham, Farnham, Surrey.

Viceroy 111A extra fltr 6146Bs, £90. KW77 rx, £70. KW500 linear, £45. Will cons del. Pallant, "Wheatley" Martins End Lane, Great Missenden, Bucks. Tel 2642.

KW2000A + both ac and dc psus, £175 cash. Del 100 miles. Trio 9R59DE, £27.50. Del within 100 miles or £25 collected. TA33JR, £10 ono. Del extra. Wanted: Pye base station unmodded. G3LQB, 12 Oakfield Drive, Kempsey, Worcs. Tel 0905-63 577.

Solartron 711S scope, 7MHz bandwidth, offers pse. 10ft sailing dinghy, £45. G8AWO, 14 Maryland, Hatfield, Herts. Tel 68010.

Hallcrafters SX117 comm rx, xtal calib, triple cnvrsn, vgc, no mods, £70 ono. BRS 3227, 132 Limsfield Rd, Sanderstead, Surrey. Tel 637 0430.

KW2000 with 6146B, ac psu, £120. HT40 75W a.m./cw xtal cond, £10. 3 speed tape rec, Collaro studio deck, £10. G3ZNV, QTHR. Tel 01-432 2343 (office).

EK9X keyer, £5.25 post paid. G3FNV, QTHR.

KW Vespa Mk 2/KW201, 1st class cond, offers, G3WBL, QTHR.

Drake 2B with 2AC 2BQ, extra xtals inc 160, set spare valves, £100. Heath QPM-1, £5. Set valves for KW2000A, £7.50. 4m gear xtals, ex-AJH units, J-Beam 4 ele, oddments, sae list. G5RPF, QTHR. Tel East Hendred 384.

Integrated uhf/vhf tv tuner, tuner type AE01530, req 12V dc 38MHz i.f., 2 AF186, 2 AF178 transistors with circ diag, 50p + postage 20p. Bartlett, 4 Kelsall Close, Kidbrooke, SE3 0JJ.

Self erecting 10ft 6in whip aerial, collapses to 8 17in scns which erect by internal spring and wire, suit /M, £2. Mann, 45 Old School Lane, Milton, Cambridge. Tel 0223 824150.

SB300, cw, all fltrs, mint cond, £130. SB400, mint cond, 2 spare 6146s, £110. Pref buyer coll. G3JNX, QTHR. Brixham 3142.

70MHz cnvtr, commercial DL6SW type, 28MHz i.f., £7 + pp. 70MHz base tx, QVO3-20A pa, 2 xtals, £5, buyer coll. 70MHz Reporter, xtals 70-320, £3, buyer coll. G2BVN, QTHR.

BC221 with charts and spare valves, £14. Admiralty P38, psu 110-260V input 250V dc 6-3V ac output, £3. G30SE, QTHR. (new Call-book). Tel Nuneaton 67992.

KW2000B and ac psu (2 trnsfmrs), fitted 6146Bs, in orig packing with mic and lpf, £180 ono. G3VFO, QTHR. Tel (B'ton) 684659.

TW2 2m tx, fixed or /M-/P, comp with 12V transistor psu for /M, £25 ono. 70cm cnvtr AF279 rf af 279 mixer i.f. 28-30MHz, £10 ono. G3ZYC, Farm Close, Pentrich, Derbys. DES 3RR. Tel Ripley (0773) 3883.

1C2F 2m tx/rx with 145MHz xtals, mint, £80 ono. Shure 201 mic, £2.50. BM3 mic with stand, £2, AU + carr. G3PRD, 44 Watson Road, Worksop, Notts.

KW Vanguard tx, 160-10m, £20. Eddystone 888A rx, £50. HRO-MX, 9 coils + psu, £15. G3VFI, QTHR. Tel Fareham 3120.

20W am/cw 2m tx inc psu, £12. Very gd 2m nuvistor cnvtr, £6. 6ft mesh dish, £10. Unfinished Cornishman, inc psu, £10. All ono. Sae list of other uhf gear. G3ZDN, QTHR.

Panda Cub tx, 160-10m a.m./cw, gd cond. G3VEH, 71 De Freville Avenue, Cambridge, Cambs. Tel Cambridge 58068.

Evershed and Vignoles 500V megger, £15 ono. Also Advance type E2 sig gntr, 100kHz-100MHz, £20 ono. G3VLH, 4 Benhams Close, Horley, Surrey, Tel Horley 6732.

Hallicrafters S-27 vhf rx, 28-143MHz, £14 ono. Collaro studio tape deck, solenoid operated, 3-heads, £3.50. AVO rf sig gntr, £5. 3in scope tube and 19in chassis, 75p. G8EII, 76 Wilshire Crescent, Hitchin, Herts.

Heathkit DX60A, 6146B pa with 4 a.m. xtals and h/brew vfo free, will del 25 miles, vgc, £31. G3YVF, 123 Knights Road, Hoo, Rochester, Kent. Tel St Werburgh 2219.

G2DAF Mk 2 tx with xtal fltr, built with extreme care, just comptd but needs dial, 6146s and 3 xtals only, vfo and fltr only tested, £25. G3LKW, 71 Ferndale, Waterloo, Wiltshire. Tel Waterloo 4146.

Practical Wireless, Radio Constructor and Radio Communication back-copies, 5p ea. List of dates available. Forsbey, 123 Harestone Hills, Caterham, Surrey CR3 6DL. Tel Caterham 43498.

Pot cores. 1N4001, 3p ea. ICs from 2p ea. All brand new, encapsulated Memol reed relays. Sae for list. G8DLT, 17 Cadnam Close, Strood, Rochester, Kent. Tel Medway 77405.

Property of late G3JWR: BC221, sig gntr, valve tester, CR100, BC342 B2 tx + rx, Avelly transistor psu, 1-8 /M tx and other gear. Sae for list. G2ZZ, QTHR. Tel 01-472 2153.

Selling cheap: base for 813. Wideband 23MHz i.f. strip, suit microwave rx. Wavemeter type W1646, 18-27MHz. Wanted: coaxial c/o switch, new 4CX250B. G3KH, 133 Station Road, Cropston, Leicester LE7 7HH.

Xtals: 10X type 2MHz, small 4-3MHz, miniature 10XZDS, 22000, 24000, 26000, 28000, 30000, 32000, 36000, 38000, 40000, 41000, 1363-7kHz, 50p ea. Wanted: free or very cheap surplus rx or tx eqpmnt for school club. G4ANM, 1 Wilmington Avenue, Orpington, Kent. BR6 9BJ.

GEC fm vhf 180MHz ship/shore tx and mtchng rx, mains, rack ... + circ diag, offers. Gresham trans 625-0-625 CT 250mA, 2.6-3.3A 3-15-0-3-15 CT 4A, £4. Gresham trans, 400-0-400 200mA 6-3 2A, 6.3 3A, 3-15-0-3-15 CT 3A, £3. G3USZ, QTHR. Tel Upminster 23699.

CR100 rx with manual, £12. Geloso 4/102 vfo will drive two 6146s never used, £6. RF26 unit, £2. G3XLB, QTHR. Tel Formby 71968 (Lancs).

WANTED

From Norman Gladstone, 11 yrs' old schoolboy/swl. "I have no rx, but I do have £6 for Christmas. Please, would anyone with an old rx to spare sell it to me. I will collect it myself if it is within walking/bussing distance." 18 Limerick Close, Bracknell, Berks RG12 1YA.

Xtals FT243. 8106-7kHz, Channel 72, several req. G6TS, QTHR. Tel. Bournemouth 35886.

ETM-2 or ETM-3 el-bug or similar. Heath metal locator GD-48, would cons one not wkng. G3UAA, 28 Loxley Road, Glenfield, Leicester. Tel Leicester 875241.

For loan or hire psu (ac) for Swan 350, second half Dec and all Jan while on leave in Britain. Pref with plug to suit 350. Reply after Dec 18. VK2AKX/G3NDH, c/o Willis, 32 High Street, Whitechurch, Aylesbury, Bucks.

TDO3/10 or DET22 valves. G3FRV, QTHR. Tel Crawley 23359.

Vintage radio books: *Outline of Wireless*, by Ralph Stranger; *Chambers Encyclopaedia of Radio* etc. Besford, 49 Blake Road, Gt Yarmouth, Norfolk. Tel 2677.

Thorn 3,000 frame time base unit. G3TDZ, QTHR. Tel Pudsey 5478 (daytime only).

Fltrs on centre freq of 1.6MHz-10-7MHz bandwidth, 3-5kHz to 12kHz for group project, buy or exch for 455kHz, 8kHz and 10kHz mech fltrs. G3YJC, QTHR.

Modern record player in gd cond, pref wkng, please state price. Dalgleish, 5 Craiglockhart Park, Edinburgh EH14 1ER. Tel 031-443 3381.

Model dynamo, either permanent magnet or electro-magnet, cond immaterial, trembler parts etc for induction coils for my private collection. G2FXA, QTHR.

Any info on W1191A wavemeter, will buy or borrow. 2m, 8 or 10 ele beam. G3ZTV, 15 Lindsay Road, Sprowston, Norwich, Norfolk NOR 92P. Tel Norwich 44602.

Front panel for Pye base tx or scrap PTC3302 tx with front panel intact. G8CBE, QTHR.

University radio society req comp 2m tx with mod and mains psu, 3-10, 3-20 pa or why? Must be in full wkng order, pref view first. G3UCL, QTHR.

70cm tx, must be of clean neat construction + gd wkng order and have mod + psu comp. G3WPX, QTHR. Tel High Wycombe 34143.

Warlike utility radio mains or batt, also xtal sets or parts for same. Williams, 204 Dysart Road, Grantham, Lincs.

Radio Communication Sept 1970, 50p inc post. Notify first by airmail postcard. 7Q7LZ, PO Box 59, Mzuzu, Malawi.

Early copies of *T & R Bulls*, *Amateur Wireless* and *Wireless Worlds* to 1935. Cash only. Brown, c/o 203 Middle Park Way, Leigh Park, Havant, Hants PO9 4NQ.

18AVQ, 10-80m vertical aerial (hy-gain) 40ft telomast with rigging kit. G3JMO, QTHR.

SSB tx for top band only. G3NJP, Shandon, Willesley Pound, Cranbrook, Kent.

Info on Dumont CRT type 3ADP1. Whitworth, 83 Southbrooks Avenue, Hartlepool, Co Durham, TS25 5JB. Tel Hartlepool 3833.

Trap dipole, G3UOV, QTHR.

4CX250B valve bases, suitable vhf/uhf use + chimneys and anode clips, HRO coils particularly 28-30MHz bndsprd. QQVO6-40A, QRO c/o coaxial relay low loss for vhf use (reasonable prices please). G8CXN, 4 Keyes Gardens, N Jesmond, Newcastle on Tyne, 2.

Ham Radio Vols 1, 2 and 3, *Radio Communication* Vols 1968, 1969 and 1970, *QST* Jan 1970 to date, *SWM* 1967 May, June, Jan 1966, Feb to Dec 1965, Feb to May, Sept, Nov. G8EVG, 53 Larkhill Lane, Liverpool L13 9BL. Tel 051-226 3488.

2m /M tx/rx, pref cnvtd, Cheap comm rx with am bands for school ARC. G5AOZ, QTHR. Tel Bournemouth 66458 (after 5pm).

Newly wed swl requires cheap rx for 160/80m, preferably cw only or all bands. Tel Newark 21755 after 7pm except Tuesdays.

Can anybody help 16yr old schoolboy with cheap reliable eqpmnt to generate 240V ac for use in a ham shack. May, 80 Green Lane, Great Barr, Birmingham B43 5LE. Tel 021-357 8692.

An original RCA AR88D cab in rsnlble cond or a scrap AR88 rx. G3JTI, QTHR. Tel Plymouth 75301.

JR60 rx, KW E-ZEE match, 15-20 beam. G3YFI, QTHR. Tel Leeds 664823.

Hartley Turner or Voight spkr, antique wireless rxs, spkrs, books, mags, catalogues, or comps. Collection arranged. G3KPO, "Alverstone", Luccombe Road, Shanklin, IOW. Tel Shanklin 2586.

HW17A or homebrew 2m tx, input not less than 10W. 2m cnvtr, i.f. 28-30MHz, at rsnlble cost. Must be gd cond. G4ANH, 56 Oakmount Road, Chandlersford, Hants.

Circ for Ministry of Defence tester, performance type 9170, part of 740 test set. 28V operation, 100-150MHz. All replies answd. G8CXS, QTHR. Tel Sheffield 396774.

10V 10A ct mains trnsfmr. G13XLK, QTHR. Tel Belfast 650652.

KW Q mult for 201 rx comp with plug etc and in gd wkng order. G3ZDD, QTHR.

Heathkit HW12 or HW12A tx/rx. G3TEP, 3 East Cawledge Park, Alnwick, Northumberland.

Electroniques stabcoil, 1-8Hz and 1-8bp. G3VEB, QTHR.

Two R220 rxs with 12V filament trnsfmrs, frequ 70-00-70-375MHz if poss. Xtal either B7G base, FT243 or HC6U, 10,900, 10,890, 10,856-7 kHz, Urgent. G13RNY, 13 Avonmore, Antrim Road, Ballymena, Co Antrim, N Ireland. Tel B'mena 41468.

Psu for Hammarlund superpro rx (wartime model). Woollons, 12 Meadow Way, Letchworth, Herts. Tel Letchworth 5535.

Buy or borrow: (a) circ or hndbk for EMI WM1 scope, (b) cnstrctn dets for Brenell soundmaster tapedeck kit. G3XZK, 1 Miserden Road, Cheltenham, Glos.

Urgent: tx/rxs A40/6Z5/A41 or sim for cadet use, must be cheap. Prince, Field House, 25 Chiltern Road, Burnham, Bucks, SL1 7NF. Any free or vry cheap surplus eqpmnt for newly formed school club. Any unwanted rx or tx greatly appreciated. Will refund carr. G4ANM, 1 Wilmington Avenue, Orpington, Kent BR6 9BJ.

Manual for R107 rx. Creed 7B page printer motor psu, terminal unit. Gardner, 47 Wilson Street, Grangemouth, Scotland. Tel Grangemouth 3702.

Wavemeter for 2m, prei range up to 2nd harmonic, eg Eagle RF40. State dets. Also req info on Ranger 2007 conversion for 2m. GW4AQR, 85 Garth Road, Bangor, Caerns.

70cm cnvtr in gd wkng cond 28-30MHz i.f., state price. GW4AMV, 11 Broadacres, Leckwith, Cardiff, S Wales. Tel Cardiff 387076 (evenings).

Heathkit RA1 a.m. bands rx in gd cond. Riley, 150 Bedworth Road, Bulkington, Nr Nuneaton, Warks. Tel 0203 314946.

Hndbk or circ diag for wavemeter Class D No 2. G3JON, 30 Alms Hill Road, Sheffield S11 9RS. Tel 0742 367774.

Case front, graticule, hood and probe for Hartley 13A scope. Also ATU No 12 for R210 rx. Jackson, 38 Haslemere Road, Thornton Heath, Surrey. Tel 01-689 2727.

Loan or purchase circuit and info of Varney's Elizabethan. G3YYM, QTHR.

Drake 2B or R4B, KW77 or sim rx, will exch 444T as new for Shure 444. G2UZ, 2 Cliff Road Gardens, Leeds LS6 2EY.

Gd bndpass fltr for 2m. Harris, 6 Chestnut Avenue, Lutterworth, Rugby, Warks. Tel Lutterworth 2284.

Buy or borrow circ and/or hndbk on BRT402E. G3DBU, QTHR.

Instrctn book for SX28, fair price. G3EBG, "Redroofs", Oak Hill, Stapleford Abbots, Essex. Tel Romford 45041.

Student amateur req DX40 and VF1U or LG50 tx. G3ZZD, 10 Chestnut Avenue, Southborough, Kent.

Complete *Practical Television* mag for this year. Hillside, Hoe Lane, Lambourne End, Essex. Tel 01-500 5151.

FL1000 linear, any cond, G3OH, QTHR. Tel Parkstone (Dorset) 4694. Mains + /M psus for Eddystone EC10. Hndbk for Creed 7B teleprinter. Laycock, Hall Place, Fen Ditton, Cambridge.

Newnes Radio & TV servicing 1961-64, 6F7 and 6B8M valves. G13N22, Cromlech Park, Kilkeel, Co Down.

Gen on dc scope made by Testgear (Acton) Ltd, has 3in crt (unknown number) with 12 pin base. Also a VR65A or SP41 valves wanted for it. Hewitt, 3 St David's Drive, Quinton, Birmingham 32.

Joystick antenna only (not Joymatch). G3ZAR, QTHR. Tel Hull 0482 658984.

Heathkit dc psu HP13A. G3KEF, 86 Halford Lane, Coventry CV6 2GW.

Source or manfctr of IFT8 in G3OQD tx/rx in *Radio Communication Handbook*. G3RNV, QTHR.

B4OC or CR100 rx, must be in gd wkng cond. Fatherley, 34 Chatsworth Avenue, Winnersh, Wokingham, Berks.

KW2000A or B, state cond and price. G4ALB, 1 John's Close Burbage, Hinckley, Leics.

Heathkit Mohican circ or hndbk. G3WMM, 24 St Cyrus Road, Colchester, Essex. Tel Colchester 42453.

Manual for type W1191/A wavemeter, any info appreciated. G3ZTV 15 Lindsay Road, Sprowston, Norwich, Norfolk NOR 92P. Tel Norwich 44602.

Gd quality gen cov rx RA17, RCA 8516L etc, gd bandsread and accuracy more important than size. G8BCL, QTHR. Tel Halifax 21885.

Buy or borrow circ diags of Minimitter 5 band double superhet rx, 9n 3 units. Psu, cnvtr, Q mult. Pilkington, 37 Spinning Wheel Mead, Harlow, Essex.

Back issues of *Radio Communication* for college club library, your donations appreciated, surface post refunded. W4DQD, Box 2067, States bo, Georgia 30458, USA.

ham radio

magazine

**A state-of-the-art magazine written specially
for the radio amateur**

North America's leading technical publication in the amateur radio field, it is published monthly by: Communications Technology Inc (Com-Tec), Greenville, New Hampshire, USA.



The subscription rate for ham radio magazine mailed to the UK is £2.50 per year. UK subscription applications should be sent to RSGB, 35 Doughty St, London WC1N 2AE.

SOLID STATE MODULES

63 Woodhead Road, Solid, Lockwood, Huddersfield, HD4 6ER. Telephone 23991

THE SENTINEL DUAL GATE MOSFET 2 METRE CONVERTER

- ★ Low noise figure 2dB.
- ★ Gain 30dB.
- ★ Dual gate MOSFETs in the R.F. amplifier and mixer for excellent overload and cross modulation characteristics.
- ★ Size only 2½" × 3" × 1½" aluminium case—silver hammer finish with black trim.
- ★ IFs always in stock: 4-6MHz, 9-11MHz, 14-16MHz, 18-20MHz, 23-25MHz, 24-26MHz, 28-30MHz.
- ★ A new IF for those receivers that don't tune up to 30MHz—27.7-29.7MHz.
- ★ Price £13.75.

THE SENTINEL DUAL GATE MOSFET 4 METRE CONVERTER

- ★ Same specification as the 2 metre converters.
- ★ Ex stock IFs: 25-25.7MHz, 28-28.7MHz.
- ★ Price £13.75.

THE SENTINEL LOW NOISE FET 2 METRE PRE AMPLIFIER

- ★ Low noise figure 1dB.
- ★ Gain 18dB.
- ★ Not only do they improve the N.F. of most converters but help if you have an I.F. breakthrough problem, and increase front end selectivity.
- ★ Size—matching our Sentinel Converters. Price £6.50.

SM70 70cms FET CONVERTER

- ★ Low noise figure 4.5dB.
- ★ I.F. output 144-146MHz for connection into a 2 metre converter. This arrangement means that we can produce a high performance 70cms unit for only £13.75.

NEW. SM71 70cms LOW NOISE FET PRE AMPLIFIER

- ★ Low noise figure 3.5dB.
- ★ Gain 10dB. Price £6.50.

THE SPITFIRE 2 METRE A.M. TRANSMITTER

- ★ 5 watts input. At least 2 watts output.
- ★ 12 volts operation.
- ★ Modulation wave shaping gives good, clean 100% audio.

- ★ Size 4½" × 2½" × 5½" deep.
- ★ Audio monitoring point for headphones. Price £22.00.

THE SPITFIRE MODULATOR

Same size and appearance as the transmitter. Price £10.00.

SOLID STATE 9MHz SSB GENERATOR

- ★ Selectable USB, LSB, and CW.
- ★ 0.2 volts into 80 Ohms output.
- ★ Sideband suppression 45dB. Carrier suppression 50dB.
- ★ A sound basis for your SSB transmitter.
- ★ Price £11.00 less filter and carrier crystals.

We can also supply from stock the range of KVG 9MHz crystal filters

XF9A	SSB	2.5KHz	£11.00
XF9B	SSB	2.4KHz	£16.00
XF9C	AM	3.7KHz	£15.00
XF9D	AM	5 KHz	£15.00
XF9M	CW	0.5KHz	£11.50
Carrier crystals			£1.50 each.

We can supply the modules for a 2 metre output V.F.O. for £15.00.

I'll just mention that we have lots of stock components many of which are difficult to obtain. These we will supply, often at below trade prices. Some examples are:

Erie 1000pF discoidal feed throughs 6p each, 55p per dozen.
 Erie 100pF discs 5p each, 50p per dozen.
 Tubular ceramic trimmers 6pF. 12p each, 120p per doz. 18pF 17.5p ea. 15p per doz. Plessey SL600 I.C.s SL610, 11, 12. £1.85. SL620, 21, £2.55. SL630 £1.75. SL640 41, £3.40.
 National LM373. £3.20.

Our callers seem to have found difficulty in finding our new place. We are on the A616, about one mile from Huddersfield centre. All this gear should be ex-stock but you can always ring for confirmation.

No time to get on the air much these days, so have for disposal a complete Inoue transceiver IC-700T and PSU. Price £140. Come and try it.

What's On in London

THE LIGHTS IN REGENT STREET

ENTERTAINMENT AT THE ALBERT HALL

ENTERTAINMENT AT THE FESTIVAL HALL

THE HEATHKIT EXHIBITION

TRAVEL BY INTER-CITY RAIL

To The Heathkit Centre, 233 Tottenham Court Road,
 on 13th—24th December inclusive. 9 a.m. to 6 p.m. Daily.

Hi-Fi, Test Instruments and other products.

A Fully Operational Radio Amateur Station available for your
 use and operation.

★ A 10% Discount on all Amateur Radio Kits Purchased ★

LOWE ELECTRONICS

119 Cavendish Road, Matlock, Derbyshire

Tel. Matlock 2817 or 2430 9 a.m.—9 p.m.

Bill G3UBO

Alan G3MME

*Service and Sales
(evenings & weekends only)*

John 16 Harvard Road, Ringmer, Lewes, Sussex.
G3JYG Ringmer 8071

Sim 19 Ellismuir Road, Baillieston, Nr Glasgow.
GM3SAN 041-771 0364



Just a short ad, to wish you all the very best for Christmas and to remind you that we are **AUTHORISED YAESU MUSEN DISTRIBUTORS FOR THE U.K.**, have been selling this gear for some six years now, have been servicing it for the same period and reckon to know a bit about it. We don't wish to blow our own trumpet, but when talking of stock, spares, facilities and so on, we'd rather you came to Matlock and let us prove a point or two.

Service (evenings & weekends):

Dave Dryden, G3BKQ 205 Main Street, Thornton, Leics.

Alan Bartlett, GW3YSA 35 Pen-Y-Waun, Efail Isaf, Nr Pontypridd, Glam.

Peter Ward, G3XWX 47 Radstock Avenue, Ward End, Birmingham, B36 8HD

Please drop us a line enclosing s.a.e. and we'll send you all our guff.

We also offer H.P. facilities—minimum 10 per cent deposit.

Hours: Tuesday to Saturday 9-5.30 (closed for lunch 1-2 and all day Monday).

Please note we will be closed Christmas week.

73 de Alan and Bill

The Briefcase 'Scope.

The IOI has many features found only in large, high price Oscilloscopes. Its built-in extras are



small size, low weight and low cost.

DC-8 MHz bandwidth at 50mV/DIV: solid state throughout: 5 cm x 4 cm screen:—unique circuitry to lock sweep: 100nS-10mS calibrated sweep: high impedance input: 1M Ω /15pF: X amp facility: Z modulation facility.

A general purpose oscilloscope, for the laboratory,

workshop or field servicing where low weight, ruggedness and small size are desirable. Set-up time is short and simple for unskilled personnel or students.

Contact FieldTech now to find out how Meteronic combine rugged sophistication with low cost in the IOI.

FieldTech



FieldTech Limited, London Airport (Heathrow), Hounslow, Middx. Telephone: 01-759 2811

AMATEUR ELECTRONICS

BIRMINGHAM 021-327 1497 021 327 6313

Below we show our current stock position of quality used equipment, all items of which are in stock at the time of going to press. Our stock changes daily, however, and it is very much a question of first come first served, but a telephone call will secure any item, pending receipt of a written order.

We are now able to offer all items of new Collins equipment and as we have a continual turnover in used Collins gear would be happy to accept this in part exchange against brand new equipment or for that matter would be interested in the outright purchase of anything with the Collins name on it.



RACAL RA-17 RECEIVER. Magnificent mint condition	£200.00	KW 201 AMATEUR BAND RECEIVER. Excellent clean condition ..	£80.00
NATIONAL NCX-5 TRANSCEIVER, Mark II. Good all round condition	£195.00	HALLICRAFTERS S108 RECEIVER. Fairly good condition externally	£40.00
COLLINS KWM-2 TRANSCEIVER. Very good condition	£395.00	LAFAYETTE HA230 RECEIVER. Excellent condition	£28.50
COLLINS 75A-2 RECEIVER with mechanical filter	£135.00	LABGEAR 160 TWIN TRANSMITTER. With matching AC and DC PSU's	£29.00
HEATHKIT SB-300 RECEIVER fitted 3 filters, excellent	£95.00	KW VANGUARD TRANSMITTER. Used condition. Callers only ..	£25.00
HEATHKIT SB-300 RECEIVER with SB610 Monitor scope, fitted 2 filters	£135.00	PANDA 'CUB' TRANSMITTER. As above	£24.00
HEATHKIT SB-301 RECEIVER with SB600 Speaker unit, fitted 2 filters	£120.00	KW VESPA MARK II TRANSMITTER, with PSU. Immaculate ..	£95.00
HEATHKIT HW-12 80 METRE TRANSCEIVER, with matching PSU, mint	£68.50	CODAR PRESELECTORS AND 'Q' MULTIPLIERS. From	£5.50
HEATHKIT HW-32 20 METRE TRANSCEIVER, as above	£68.50	EDDYSTONE 740 RECEIVER. Excellent electrically but poor external condition	£22.00
HAMMARLUND HQ100 RECEIVER, with matching speaker ..	£56.50	TRIO JR-500 RECEIVER. As new 3 months guarantee	£58.00
YAESU MUSEN FL-1000 LINEAR. In excellent condition ..	£75.00	AR88D Wave Change Switches, complete ceramic switch assembly as previously advertised	£1.25
SOMMERKAMP FR-100 RECEIVER. Fitted 160 metres also ..	£70.00	GUY WIRES. Brand new and boxed 32' 6" total length, high quality stranded wire, interposed with 6 egg insulators	0.95
HEATHKIT MOHICAN RECEIVER. Factory built with AC PSU ..	£40.00	MEDCO Filters. The supply position of these has now eased and prices and types as per August issue	
HEATHKIT MOHICAN RECEIVER. Kit built, excellent	£35.00	KW ACCESSORIES. All items available from stock, including the new KW107 Antenna Tuning System	
CODAR CR70A RECEIVER. Absolutely as new	£17.50	HAMGEAR EQUIPMENT. Available from stock	
STAR SR165 GENERAL COVERAGE RECEIVER	£30.00	G-WHIP ANTENNAE. Full range from stock	
TRIO 9R59DS RECEIVER. Slight marks at case rear	£40.00	An S.A.E. will bring a prompt reply to your enquiries.	
TRIO 9R59DE RECEIVER. Excellent condition	£38.00	All types of equipment urgently required—please state price when writing.	
TRIO 9R59DE RECEIVER. Absolutely as new	£39.50	Full demonstration facilities and excellent parking for the caller.	
TRIO 9R59 RECEIVER. In absolutely mint condition	£35.00		
EDDYSTONE 840C RECEIVER. In exceptional condition ..	£46.50		
EDDYSTONE 840C RECEIVER. Very good condition	£45.50		
EDDYSTONE EC10, Mark I, with AC PSU	£50.00		
EDDYSTONE EC10, Mark II. Brand new with guarantee	£75.00		

ELECTRON HOUSE, 518-520 ALUM ROCK ROAD, BIRMINGHAM 8

FOR 2

- PYE RANGER 15 2202** ready modified for 2m AM, 12volt + or — earth, boot mounting with cables, control unit, mic and crystals for one channel (our choice). Carr. £1.50 £28
- PYE RANGER 2107**, 5 watt output, ready modified for 2m, AM, 12 volt + or — earth, boot mounting with cables, control unit, mic and crystals for one channel (our choice). Carr. £1. £28
- PYE BASE STATION TRANSMITTERS** ready modified for 2m, 19 inch mounting, mains power supply, QQV03-20A PA, 30-40 watts input, aerial change over relay incorporated, crystal (our choice) included, requires crystal mic and mains lead to operate. Carr. £2. £45
- Type **QDA TX/RX**, 1 watt AM 116-132MHz, will convert to 2m. p & p 75p..... £15
- HUDSON AM108** mobile, will convert for 2, dash mount, + or — earth, transistor psu 5 watts AM with circuit. p & p 50p. £15
- 100W MODULATORS** PP Parallel min 807's 5 x 5 x 9. Circuit P. & p. 50p £10
- MURPHY MR806** Tx/Rx 2M conversion data, 15 watts, QQV03-20A PA. p. & p. £1 £10
- COSSOR 103BE** FM Tx/Rx, QQV03-20A PA 15 watts for 2m Mobile Conversion. 5 x 10 x 18 p. & p. £1 .. £15
- CRYSTALS** 8002, 8081-25, 6001, 6009, 6016, 6024, 6031, 6046 6054, 6076, 11764, 8820, 8837, 7816, 7833, 7850, 7002, 7005, 7010, 7017, 7032, 7047, 7054, 7077, 7092, 7099, 7172, 7129, 7270, 8007-4, 8007-69, 8090-7, 6010, 6021, 7060, 7080, 7090 each £1

BAGINTON ELECTRONICS

(G3TFC)

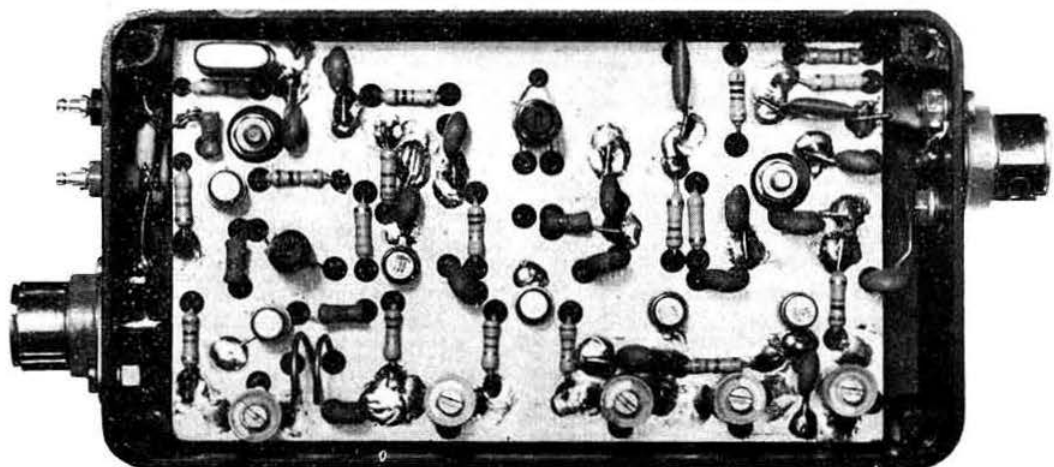
MARKET CORNER, BAGINTON, WARCS. CV8 3AP

Phone Coventry (0203) 302668

MICROWAVE MODULES LIMITED

RADIO CONSULTANTS and MANUFACTURERS

432 MHz MOSFET CONVERTER



ALL R.F. CIRCUITS IN MICROSTRIP. TYPICAL NOISE FIGURE: 3.8 dBs TYPICAL OVERALL GAIN: 30 dBs I.F.s: 14 - 16 MHz, 28 - 30 MHz. Other I.F.s available to order. SUPPLIES: 9 - 15 volts at 20 mA Positive or Negative Earth. R.F. Connectors: Standard Belling-Lee. BNC 50/75 ohm may be supplied for 50p extra. PRICE £18.50

ALL EQUIPMENT GUARANTEED FOR 12 MONTHS, POST and PACKING FREE, PLEASE SEND S.A.E FOR FURTHER INFORMATION.

MICROWAVE MODULES LIMITED

4 Newling Way, Worthing, Sussex, England

Telephone 0903 64301

THE SENATOR CRYSTAL BANK

G3UGY

CRYSTALS FROM STOCK AT KEEN PRICES

Phone 01-769 1639

Laps, Cutters, Coaters, Counters, Test-sets, Optical-checkers, Ion-bombardment equipment, temperature-control chambers, polishers, vacuum dryers, humidity controllers, plus the essential know-how, make SENATOR CRYSTALS what it is today: the first place to contact when you need good crystals quickly.

55,000 BRAND NEW, modern crystals under our control and actually in our own stockrooms, is sufficient reason for our customers who range from amateurs to the post office, government departments, universities and leading electronics manufacturers, to order from SENATOR time and time again, particularly when they need crystals in a hurry.

Here are just a few of the popular frequencies actually in STOCK now:

kHz		MHz	
100 in HC13/U	£2.50	30 000 in HC6/U	£1.60
455 in HC6/U	*** £1.75	32 500 in HC18/U *	£1.60
500 in HC6/U	*** £1.75	34 000 in HC18/U *	£1.60
		34 500 in HC18/U *	£1.60
1 000 in HC6/U	£1.75	35 000 in HC18/U *	£1.75
2 000 in HC6/U	£1.60	35 500 in HC18/U *	£1.75
3 500 in HC6/U	£1.75	38 666 in HC18/U *	£1.35
5 000 in HC25/U *	£1.60	40 000 in HC18/U *	£1.60
7 000 in HC6/U	£1.50	42 000 in HC18/U *	£1.60
9 000 in HC6/U	£1.50	70 000 in HC18/U *	£2.00
10 000 in HC6/U	£1.50	71 000 in HC18/U *	£2.00
11 000 in HC6/U	£1.50	72 050 in HC18/U *	£1.75
19 500 in HC6/U	£1.60	72 425 in HC18/U *	£1.75
24 500 in HC18/U *	£1.60	72 500 in HC25/U *	£1.75
25 000 in HC6/U	£1.60	72 525 in HC18/U *	£1.75
26 500 in HC18/U *	£1.60		

* = Also in HC6/U *** = New frequency.

TWO more stock frequencies: 454 kHz and 456 kHz in HC6/U, useful for side-band filters etc. at £1.75 each.

And here's our STOCK range of BRAND NEW HC6/U 8 MHz for 2M: 8-007 8-012 8-018 8-021 8-032 8-041 8-043 8-047 8-048 8-055 8-058 8-061 8-070 8-081 8-092 8-100 8-104 8-107

All at £1.25 each, post free. These crystals pull well when VXO'd. Here are some popular frequencies for VHF, home station, mobile channels and R.A.E.N. ALL IN STOCK:

8 0555 MHz in HC6/U for TX × 18	= 145 000 MHz 2M Mobile	£1.25
44 7666 MHz in HC6/U for RX × 3	+ 10.7 MHz	
	= 145 000 MHz 2M Mobile	£1.80
8 100 MHz in HC6/U for TX × 18	= 145 800 MHz for RAEN	£1.25
45 0333 MHz in HC6/U for RX × 3	+ 10.7 MHz	
	= 145 800 MHz for RAEN	£1.80
12 975 MHz in HC6/U for RX × 12	= 10.7 MHz	
	= 145 000 MHz 2M Mobile	£1.60
11 1916 MHz in HC6/U for RX × 12	+ 10.7 MHz	
	= 145 000 MHz 2M Mobile	£1.60
12 0833 MHz in HC6/U for TX × 12	= 145 000 MHz 2M Mobile	£1.60
8 7825 MHz in HC6/U for TX × 8	= 70 260 MHz 4M Mobile	£1.60
29 780 MHz in HC6/U for RX × 2	+ 10.7 MHz	
	= 70 260 MHz 4M Mobile	£1.65
6 74666 MHz in HC6/U for RX × 12	= 10.7 MHz	
	= 70 260 MHz 4M Mobile	£1.60
11 710 MHz in HC6/U for TX × 6	= 70 260 MHz 4M Mobile	£1.60

Mail Order SENATOR CRYSTALS Dept. Q.C., 36 Valleyfield Road, SW16 2HR

You'll find the above frequencies may be suitable for your PYE Cambridge, Ranger, Vanguard and other makes of ex-commercial R/T gear for the well-used mobile call channels. Check up with crystal multiplication data and crystal spec. in equipment manuals for suitability.

For 10M walkie-talkies with I.F. of 455 kHz to transceive on 28-500 MHz we have in STOCK in HC25/U 28 500 MHz (TX) and 28 045 MHz (RX), at £1.60 each.

AVAILABLE SOON:

44 666 MHz for 2M converter.

116 000 MHz for 2M converter; GIVING I.F. 28-30 MHz, THUS DISPENSING WITH NEED FOR OSC: MULTIPLICATION CHAIN.

72 875 MHz for 2M TX.

CLUB and other GROUP projects: If your club or group is contemplating a constructional project requiring crystals, we can offer real keen prices for quantity orders.

Most crystals for G2DAF and other designs, and crystals for every amateur band, always in stock. There are so many 1,000's more useful frequencies in the bank that to list them all would take too long.

Why not telephone or write your enquiry to us? Experience proves that we are sure to have something very close to—if not spot-on—the frequency you require from 50kHz thru 132 MHz in stock. Should you require crystals made to order—no problem. We can supply as follows: (PLEASE NOTE however, our crystals can only be as accurate as your specification).

3rd, 5th and 7th OVERTONE to an adjustment tolerance of ± .005% (will hold 50 ppm from -20 to + 70°C). Available in HC6/U, 18/U and 25/U;

175 MHz to 200.0 MHz	£12.00	60 MHz to 109.9 MHz	£3.25
140 MHz to 174.9 MHz	£8.75	17 MHz to 59.9 MHz	£2.50
110 MHz to 139.9 MHz	£7.00		

FUNDAMENTAL MODE to an adjustment tolerance of ± .005% available in HC6/U, HC18/U and 25/U;

4 MHz to 20.0 MHz	£2.50		
The following in HC6/U only, ± .005% tolerance:			
1.4 MHz to 3.9 MHz	£3.00	1.0 MHz to 1.39 MHz	£3.20

The following to ± .01% tolerance:			
500 kHz to 999 kHz in HC1/U ...	£4.50	150 kHz to 449 kHz in HC6/U ...	£3.85

450 kHz to 500 kHz in HC/U ...	£3.50	50 kHz to 149 kHz in HC13/U ...	£4.60
--------------------------------	-------	---------------------------------	-------

Below 50 kHz and to closer tolerances, by quote.

Types available: Flexural Mode; NT Elements; J Plate; Duplex Elements. SENATOR can supply crystal units to British and U.S.A. Defence specs. SENATOR know-how and 55,000 units actually in stock, practically assures your satisfaction.

BLANK CHASSIS

FOUR-SIDED 16 S.W.G. ALUMINIUM

Size	Price	Base	Size	Price	Base
6 × 4 × 2"	34p	17p	10 × 8 × 2 1/2"	66p	30p
7 × 4 × 1 1/2"	33p	18p	12 × 7 × 2 1/2"	66p	33p
7 × 5 × 2"	40p	19p	12 × 9 × 2 1/2"	76p	38p
8 × 4 × 2"	38p	19p	13 × 8 × 2 1/2"	76p	38p
8 × 5 1/2 × 2"	44p	21p	14 × 7 × 3"	80p	36p
9 × 7 × 2"	50p	26p	14 × 10 × 2 1/2"	88p	47p
10 × 4 × 2 1/2"	50p	21p	15 × 10 × 2 1/2"	92p	50p
12 × 4 × 2 1/2"	55p	22p	17 × 10 × 3"	£1.10	55p
12 × 5 × 3"	66p	26p			

Plus post and packing.

PANELS Any size up to 3ft. at 36 p.sq. ft. 16 s.w.g. (18 s.w.g. 32p).

Plus post and packing.

H. L. SMITH & CO. LTD.

287-289 EDGWARE ROAD LONDON W.2. Telephone: 01-723 5891

TOO MUCH STOCK !!

— to list on one advertisement

Yes, LST would need most of this magazine to show their full range.

But 5p for postage will bring you our FREE components catalogue. 44 pages of semiconductors, integrated circuits, passive components, tools, kits, etc., etc.

write to:

LST ELECTRONIC COMPONENTS LTD
MAIL ORDER DEPT RCM
7 COPTFOLD ROAD
BRENTWOOD, ESSEX

OUR RETAIL COUNTER (same address) IS OPEN MON-SATURDAY (THURS EARLY CLOSING) UNDER THE AUSPICES OF G3RLR (DICK) WHO WILL BE PLEASED TO SEE YOU.



HONDA GENERATORS

All the generator types listed have been severely tested under such conditions as NFD, VHF/NFD, and can be recommended for any amateur service. Continuous ratings, at 220V 50Hz, shown.

E 300E 250 watts plus 12V DC £74.

E 800E 800 watts plus 12V DC £96.

E 1500E 1.25 KW plus 12/24V DC £135.

Price shown is collected. Full Honda six month guarantee.

HIRE SERVICE E 800s. In 1971 our generators powered expeditions from a local NFD to the Shetlands all without a misfire.

Rates are £7.00 a week, £12.50 a fortnight. Charge includes tools, spares, mains lead, U.K. insurance and even a pint of oil!

"MERRY XMAS" DE G3FDW, MIKE GIBBINGS

14 Howbeck Lane, Clabrough, Retford, Notts. DN22 8LW.

R.T. & I. offer the finest selection of first-class new and fully overhauled second-hand communications and electronics equipment in the U.K.

- Constantly changing stocks of a vast range of equipment.
 - Cash or Hire Purchase terms easily arranged.
 - Part exchanges welcomed.
 - We are 'spotcash' buyers for almost all electronic equipment.
- Send S.A.E. for our latest list of over 50 receivers and many other interesting items.

R.T. & I. ELECTRONICS LTD.

Ashville Old Hall, Ashville Road, London E.11 Tel: 01-539 4986

G3LRB STEPHENS-JAMES LTD. G3MCM

70 Priory Road, Anfield, Liverpool L4 2RZ. Tel 051-263 7829

YAESU

FT560/747 Transceiver	£195-00
FT401 Transceiver	£215/£225-00
FT101 Transceiver	£220-00
FT200 Transceiver	£168-00
FT2F 2m Transceiver	£80-00
External VFOs	£35-00
FR500 Receiver	£120/£160
FL500 Transmitter	£140-00

TRIO

9R59DS Receiver	£47-50
JR310 Receiver	£77-05
JR599 Receiver	£185-00
SP5D Loudspeaker	£4-38
HS4 Headphones	£6-00

KW Electronics

KW 202 Receiver	£140-00
KW 204 Transmitter	£142-00
KW Atlanta Transceiver	£200-00
KW 2000B Transceiver	£240-00
KW 105 Matching unit	£37-00
KW107 Matching unit	£40-00
KW101 SWR meter	£9-50
KW103 SWR/Power meter	£12-50
KW 3 way antenna switch	£3-50
KW E-Z Match	£13-50
KW Trapped Dipoles from	£12-50
KW Dummy Loads	£7-00
KW Baluns	£1-75

EDDYSTONE

EC10 Mk2 Receiver	£79-00
AC PSU	£7-75
898 SM Dials	£8-92
EB37 Receiver	£98-00

LAFAYETTE

Lafayette HA600A Receiver	£45-00
---------------------------	--------

J Beam

Most J. Beam antennas from stock	
----------------------------------	--

R.S.G.B.

All RSGB publications stocked at current prices.	
--	--

HY-GAIN Antenna Range

12AVQ Vertical	£13-50
14AVQ/WB Vertical	£18-00
18AVQ/WB Vertical	£35-50
TH3MK3 Tribander Beam	£67-50

G-WHIP Antenna Range

Full range in stock with the new 5/8th 2metre vertical whip

Codas

PR30X Preselector	£8-50
AT5MK2 Transmitter	£22-50
PR40 Preselector	

Test Equipment

TE16A Transistor Sig. Gen.	£7-95
Tech 15 GDO	£12-50
TTC3005 SWR/Power Meter	£7-25
TTC SWR Bridge	£4-25
Osker Power meter	£18-00
Omega Noise Antenna Bridge	£13-75
Semi Auto Bug Keys	£4-50
Antenna Rotators	£18-£25-£40-£70
Vibroplex Keys	£15-00
Sentinel 2m and 4m Converters	£13-75

Shure 201 microphones	£5-75
Shure 444 Microphones	£14-00
TTC PTT microphones	£3-75
Copal 24 Hour Clocks	£8-75
Copal 24 Hour Calendar Clock	£17-50
Battery 24 Hour Clock Wall Mounting	£22-00
Dipole "T" Pieces 13p: Egg insulators	
3p PL259 Plugs 30p Sockets 28p Cable reducers 10p. 300ohm Ribbon feeder 5p yd. 75ohm twin feeder 5p yd. 50ohm co-ax 12p yd. Panel Meter, Cabinets, Chassis, Panels, Paxolin panels, Diecast boxes, Plugs sockets, Valves.	

Secondhand Equipment

Swan 350 Transceiver	£145-00
Trio TS500 with remote VFO	£135-00
National NCX5 MK2	£185-00
Lafayette HA500 Receiver	£38-00
Minimitter MR44 Receiver/spkr	£22-00
FL200 Tx	£90-00
Ten Tech PM3A	£30-00
FR100B Receiver	£80-00
KW200B	£200-00
Lafayette HA350	£55-00
KW204TX	£120-00

S.A.E. with all enquiries please. All items in stock despatched same day. Large S.A.E. will bring all information on equipment stocked. Equipment bought for cash. After sales service and all items carry normal guarantee. Part exchanges welcome and HP terms arranged on all orders over £35.

Halfday Wednesday. No parking except Saturday afternoon as we are close to the Liverpool and Everton football grounds.

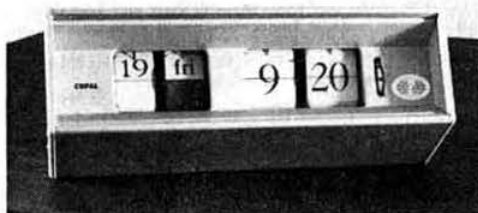
Wishing you all the compliments of the Season.

COPAL CLOCKS FOR CHRISTMAS

(FROM YOUR SPECIALISTS, OF COURSE)

These clocks are made by the world's largest manufacturers of Digital Clocks, are mains powered (negligible consumption) with slow running motors giving long life, incredibly accurate time keeping, and absolute reliability.

THEY ARE FULLY GUARANTEED FOR 12 MONTHS



THE '601' (ILLUSTRATED) A superb clock with day, date, hour, minute and twelfth of a minute. Every day is shown with a different colour. Diffused lighting built-in. 12 or 24 hour versions available. The beautiful case is satinised aluminium. You used to be asked £20 or £18.50 for these.

Our price only £16.50

THE '602' Exactly the same mechanism as the 601 but in an ultra modern case of simulated teak.

Also only £16.50

THE '222' (Illustrated last month.) Beautiful and compact with built-in diffused lighting in five colours (Charcoal, White, Flame, Purple and Lime). Ideal for your station or anywhere in the home or office. What a lovely present for someone special!

24 hr. Only £8.25

PLEASE NOTE—ALL OUR CLOCKS:

- Are dispatched by return.
 - Have been carefully checked and tested.
 - Are sent free of any charge for post, packing and insurance.
 - Have a full refund guarantee if after 14 days you are not satisfied.
- We have very large stocks, but would still strongly advise you NOT to leave your Christmas order until the last minute.

May we take the opportunity to wish all readers

A VERY HAPPY CHRISTMAS

AERO & GENERAL SUPPLIES, Dept. S.D.,

NANAIMO HOUSE, 2 RINGWOOD AVENUE, LEEDS LS14 1AJ.

Telephone: 658568.

CLASSIFIED ADVERTISEMENTS

RATES: Display: £3 single column inch.
Private advertisements 5p per word, minimum charge £1.
Trade advertisements 10p per word, minimum charge £1.
Please write clearly. No responsibility can be accepted for errors.

Post to SAWELL & SONS LTD., 4 LUDGATE CIRCUS LONDON EC4

FOR SALE

BARGAIN complete high power CW station LG300, PSU, B40 receiver key phones mains filter and all circuits buyer collect £35. G3RFG QTHR.

QSL CARDS. GPO approved log books, prompt delivery. Samples SAE Atkinson Bros., Printers, Looe, Cornwall, PL13-ILA.

QSL CARDS: 1,000 from £2-98. SAE samples, Ara Press, 46 Moat Avenue, Coventry.

**SWOP YOUR CAMERA OR HI-FI
FOR A TRIO OR EDDYSTONE?**



JR.599. JR59DS TS510 EC10MkII JR310 on dem:
BORROW A TS510 MANUAL for 7 days deposit £2 refunded when returned.

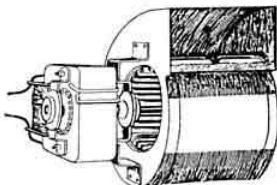
SPECIAL OFFER JR.310 with top band and Cal. unit £84.50. Mechanical filter £14.67 extra.

29.5-30.1 MHz (for 2 metre converters) £3.00 extra Large S.A.E. details and copy of "Radio Communication" containing test report.

HOLDINGS Photo Audio Centre,

39/41 Mincing Lane, Blackburn, BB2 2AF. Closed Thursdays.
Tel: 59595/6.

BLOWERS. 240 volt AC shaded pole "Mycalex" motor, continuous rated very silent. Double air intake, single output of about 45 C.F.M. overall size 4½" x 4½" x 5½". Ideal for cooling equipment, etc. Brand new. Our price owing to large purchase, £2.25, post 25p, 2 for £4.25, post, 35p.



CRYSTALS FT243. 5750-6900, 7150-7900, 8150-8625 in 25kHz steps. All @ 25p each. 5 for £1.00, post 7p.

40 ASSORTED CRYSTALS including FT243 and 241A types, £1.00, post and packing, 25p.

R.F. METERS. 2" round, in following range 250-350, 500 MA and 1 amp, 62p each, post 10p. 4 Meters for £2.20, post and packing, 27p.

OSCILLATOR UNIT No 704 for R1933A receiver. 3 valves EF91. 7 miniature wire ended crystals, 2 ceramic yxley switches, microswitch, variable condenser about 17PF, with slow motion dial, 2½" centre zero meter, 50 micro amps. cons res. plugs, sockets. In Aluminium case. Brand new with circuit diagram, £1.50, post, 35p.

CATALOGUE No 18, 23p post free.

ARTHUR SALLIS LTD,
28 Gardner Street, Brighton, Sussex

UNIMIXER battery/mains mixing unit with professional specifications, £45. Reviews, specifications, s.a.e. Soundex Ltd., 18, Blenheim Rd., London, W.4. 1ES.

INTERNATIONAL TRANSISTOR DATA MANUAL now available from the publishers. See advertisement on page 886.

G3JFY

*For all Ordnance Survey Maps.
Our speciality PVC laminated.*

Send SAE for sample and lists.

RALLYMAPS of WEST WELLOW,
14 Kingston Park, West Wellow, Romsey, Hampshire

**R.S.W. ELECTRONICS
U.H.F.-V.H.F. METALWORK**

2 METRE LINES

PARALLEL LINE ANODE CIRCUIT FOR QOV06/40 ETC. 8" x 4" dia LINES WITH DISC TUNING, ANODE CONNECTORS AND CERAMIC INSULATORS. SILVER PLATED £4.50

2 METRE HIGH Q BREAK

ALL COPPER CYLINDRICAL TYPE 12" x 1½" dia. BELLING & LEE T.V. TYPE INPUT AND OUTPUT SOCKETS SUITABLE FOR HIGH POWER £5.25

23cm TRIPLER

METALWORK FOR HANDBOOK 23cm TRIPLER (PLATE LINE VERSION) IN DIECAST BOX, LESS CATHODE TUNED CIRCUIT £8.50

METALWORK SERVICE

We can quote for supplying all Metalwork requirements for VHF/UHF equipment, either from published designs or to your own design.

S.A.E. Enquiries to:

57 Jacey Road, Shirley, Solihull

**BASIC PRINCIPLES OF
ELECTRONICS**

by Jenkins & Jarvis (GM8APX)

Vol II covers semiconductors, including practicals using ICs. Pergamon Press, any bookseller.

This announcement paid for by authors.

QSL CARDS: for TX, G8, SWL. One to four colour designs. Large. SAE. For samples. Good selection. Red Rose Publicity, (Pennington) 34 Aqueduct Street, Preston, Lancs. Tel 59570.

PYE VANGUARD AM25B transmitter-receivers with circuit diagram. £21 carriage paid. G8AJB QTHR.

GAREX ELECTRONICS

NEW MOBILE HEAVY DUTY PSU FOR HW17

12Vdc input. 375v at 150ma output. Bridge rectifier. Choke smoothing. Built into a diecast box 8.5 x 5.5 x 2". No external parts. Easy service design. Neg. earth. Baked on blue/grey finish. Including relay & octal plug & socket. 11 pin socket not supplied Post 27p. **£14.65**
Garex FM Continental TX/RX De Luxe model. Large directly calibrated dial, fully tuned 144-146MHz RX. 3 channel TX. No standby current. Squelch operates up to 5my YL1080 P.A. **£115.30** ex works.

TWOMETRE RECEIVER AM

Fully transistorized covering 144 to 146MHz. Sensitivity 1.0 microvolt emf in. for 500mw audio out. S/noise ratio 10dB or greater for 1 microvolt input. Audio output stage to drive external speaker. Double superhet 2 RF amplifiers. FET first mixer. 1st IF 10.7MHz. 2nd IF 455kHz. Crystal controlled second FET mixer stage. 6kHz bandwidth. 29 Transistors plus 6 diodes. Neg. or pos. earth. Directly calibrated dial. size 6 x 4 1/2 x 8" deep **£47.75**

2 METRE RECEIVER AM FM & SSB. Noise limiter. S. Meter. B.F.O. Neg. or pos. earth 6 x 4.5 x 8" deep 34 transistors plus 8 diodes. **£75**

TWOMOBILE AM/FM Tx-Rx.

Tx. Transistor crystal osc & multipliers. YL1080 driver YL1080 P.A. No standby current. FM or AM at a flick of a switch. 3 position crystal selection. 1 crystal supplied.

RX Performance similar to above receiver size 12 x 4 1/2 x 8" deep. **£105.45**

TWOMETRE TRANSMITTER RECEIVER AM

Complete with 12vdc mobile power supply unit built into one case 12" w x 4 1/2" h x 8" deep.

Rx Fully transistorized covering the full 2 metre band. Built in noise limiter. Bandwidth 6kHz.

Tx 6MHz 6BH6-QQV03-10-QQV03-10. Fully Transistorized modulator with compression.

Complete with P.T.T. mike, 28 Transistors. 10 diodes 4 valves. **£88**
Four Meter Model **£88**

GAREX 70CM CONVERTER

2N709-2N708-2N3478-GM0290. GM0290 or equiv. Post 20p **£14.87**
Size 4 1/2 x 3 1/2 x 2". diecast box IF 28-30 MHz.

FOR SALE (contd.)

XTALS

HC18U 35-2895; 35-27708; 35-2854; 35-3437; 36-0104; 36-0729, MHz, Etc. FT243 METAL 4-500; 9-100; 9-770; 10-000; 10-600; 10-700; 11-150; 11-400 MHz, Etc.

60p. each inc. post. Postal orders to:

A. P. Teale, G3SGT

11 Burns Avenue, Southall, Middlesex.

2 Metre and 4 Metre FET CONVERTERS

Professional low noise design using latest FETs. Reverse polarity protection. Two tone case. One year guarantee. State I.F. required **£11.90**

D. S. ELECTRONICS, 71 ECTON AVENUE, MACCLESFIELD, CHESHIRE: MAC 21138.

MAMMOUTH CLEAROUT G8APS has decided that he must clear-out a vast amount of gear. He will be AT-HOME during the week-end of December 18-19. All callers will be welcome, and prices rock bottom or even free. It seems a pity to give it to the dustman! Meters—valves, new and vintage—components—tools—cables—paints—photographics—etc—WD, etc. (no lists available). Go down Little Sutton Lane, nearby the A38-A453 junction, go under the railway bridge and first left. B.C.N.U., 73, Don Wilson, G8APS, 177 Dower Road, Four Oaks Sutton Coldfield.

New—The 4MH 70cm TRANSISTOR CONVERTER

IF 14-16MHz, Battery supplied. Fantastic Value at **£7.80** including post. Money back guarantee.

From THE AMATEUR RADIO SHOP G4MH.

13 CHAPEL HILL, HUDDERSFIELD.

Telephone 20774

FOR SALE Two each new QY4-250 with bases £7.00 each, 6146—£1.50 each, 811A—£2.00 each, slightly used 5B254M—60p each. Mechanical filters Collins—500kHz carrier 2.7kHz bandwidth, upper or lower side band—state preference—used £6.00 each. 2502-31 (symmetrical) 3-1kHz bandwidth with 248-35kHz crystal used. £12.00. New F455Y21 (symmetrical) 2-1kHz bandwidth with matching crystals £20.00. Used Collins 70K-2 P.T.O. (KVM2A) 2.5 to 2.7MHz Two Turn ultra linear/stable £8.50. Used Collins P.T.O. 2455 to 3455kHz—10 turn £10.00 Used Hi-Mould BK100 bug key excellent £3.50. Transformer suitable linear, windings—two 500 volt at 500mA and six 6.3 volt 4 amp, 'C' core fully shrouded £3.50. Noise generator (71 ohm) Marconi, TF897/good condition less manual £12.50. Valve voltmeter Marconi TF428B with probe/manual £7.00. Quad parts, Boom-end cross arms—8 top quality Burmese poles, Tri-band £8.00. Carriage/postage extra please. J. B. Smith (G3HSR), 11 The Crescent, Milton, Weston-super-Mare. Tel: 21071.

GET THROUGH BETTER WITH AN EMUPRESSOR

- * Battery powered, placed between mic and tx.
- * Virtually constant output for a wide input range enables mod. to be kept at an optimum level over a wide range of speech levels.
- * Accepts input signals from 1mV to 1V.
- * Suitable for AM, FM or SSB.
- * Money back guarantee.

£7.80 including postage

I. N. Cline, G3EMU, 21 Woodvale Avenue, Whitstable, Kent

FIRST for carpets Dodson Bull

**UP TO 30% DISCOUNT
on BRANDED CARPETS**

Wilton • Axminster • Oriental • Tufted

• All makes available with full Manufacturers' Guarantees

• NO IMPERFECT GOODS SOLD • Free delivery in U.K.

• Expert fitting service available most areas.

£200,000 carpets on display

In our extensive London and provincial showrooms

Write stating requirements or for introduction to carpet showrooms in most main cities. Free brochure on request to Dept. RC

DODSON BULL CARPET CO. LTD.

LONDON: 5 & 6, Old Bailey, EC4M 7JD. Tel: 01-248 7971.

BIRMINGHAM: 164, Edmund St., B3 2HB. Tel: (021) 236 5862.

BOURNEMOUTH: 268, Old Christchurch Rd., BH1 1PH.

Tel: 21248. BRISTOL: 2-3, Royal London House, Queen

Charlotte St., BS1 4EX. Tel: 28857. LEEDS: 12, Great George

St., LS1 3DW. Tel: 41451. MANCHESTER: 55-61, Lever St.,

M1 1DE. Tel: (061) 236 3687/8/9. NEWCASTLE-upon-TYNE:

90-92, Pilgrim St., NE1 6SG. Tel: 20321/21428. WESTCLIFF-

on-SEA: 495, London Rd., SS0 9LG. Tel: Southend 46569.

Open: 9.00-5.30 Mon.-Fri. Sat. 9.00-12.00 (Manchester 9.00-4.00)

FOR SALE (contd.)

YOUR CALL SIGN ENGRAVED white letters black plate. 6 x 1 1/2 inch, 28p 2 x 1/2 inch, Badge pin, 21p-post free-C.W.O. Workshops for the Disabled, Northern Road, Cosham, Portsmouth PO6 3EP.

RUN FULL LICENSED POWER ON RTTY, CW, AM! Clean Heathkit DX-100U transmitter, covers 160m-10m, factory-modified for RTTY, also for SSB with SB-10U unit (not provided). 850 or 170Hz shift on RTTY, manual, £52. **ATM FSK-2** Frequency Shift Keying Unit & PSU, generates stable FSK for RTTY transmitter (crystals & tuned circuit in oven), crystal or VFO operation, meter reads shift 0-1000Hz, £15. G2FUD, 184 Hale Road, Hale, Cheshire. 061-928 1321.

WANTED

URGENTLY WANTED Manual for LM14 frequency meter. Pragnell, 9 Broad Walk, Heston, Middlesex. Phone: 01-570 9909.

SITUATIONS VACANT

CITY OF BIRMINGHAM

Police Department

WIRELESS TECHNICIAN

Salary: £1,059-£1,416 per annum (Technical Grades 2/3) according to ability, experience and qualifications.

Wireless Technicians required for the repair and maintenance of mobile and personal radio sets by Birmingham Police, Fire and Ambulance and other Departments.

Applicants should be familiar with principals of transmitter and receiver design and experienced in fault-finding techniques. Interesting and worthwhile work with a 3 1/2 hour week.

Applications should be received within 14 days addressed to: **STAFF APPOINTMENTS, P.O. BOX 29, Council House, Birmingham, B1 1BB.**

PLEASE STATE REFERENCE NUMBER 43/WT/1/11 ON LETTER AND ENVELOPE.

(V 9536)

Television engineer required 5 day week, permanent position. REM Radio, Ashford, Middlesex, write or phone G3XRP, QTHR.

EDUCATIONAL

LEARN Practical Electronics the easy way! In just 3 months you'll read circuits—build your own radio with the kit supplied. Send for illustrated book—FREE: BIET, (Dept. H.19), Aldermaston Court, Reading, RG7 4PF.

OPPORTUNITIES UNLIMITED

Get the right C & G Certificate and be ready to move up into a higher paid job. ICS provide expert coaching for Telecoms Technicians' Certs; Radio and TV Servicing; Electronic Servicing; Radio Operator Certs; and Radio Amateurs'. Also available Colour TV Servicing, and many other courses accredited by the C.A.C.C.

Details from ICS, Dept. 563 Intertext House, London S.W.8.

EXCHANGE

TRIO STOCKISTS - York Photo Audio Centre, Fossgate, York. Tel. 56176 - Equipment exchange for Cameras/Projectors.

CAPACITY AVAILABLE

PROTOTYPE or short run turning/milling etc., and sheet metal work capacity available.—C. G. James Electronics (G3VVB), Staines Road, Feltham, Middx. 01-570 3127.

GAREX WHOLESALE LTD.

RADIOTELEPHONES. Mobile all solid state, robust construction. 6-7 watts output, up to 4 channels. Easy service design, original manufacturers maintenance agreement can be arranged. Low band 71.5 to 88MHz. 12.5kHz channel spacing. Type approved.

New ex works. Price £70. ex Chinnor, less crystals, mike & speaker. Original list price around £150.

Export only

New. Low band 71.5 to 88MHz Packset. 25kHz channel spacing. 3 channel. Muting facility. F.M.

Nickel cadmium cells. 1.25v at 1.6 ah. Ull size 1" dia. by 1.75". New. Small quantity price 70p each inc. carriage UK. 1000 plus prices on application.

CAR RADIOS BRITISH MADE

Push Button model. Push Pull output, fully transistorized. Neg or pos earth. £14.50

Manual model. Fully transistorized meg or pos earth, slightly soiled. £8.50 Both models fully tuned long and medium wavebands. Prices include carriage UK. 3 months guarantee.

London area enquiries (Car Radios only) GAREX UK, BELSTAR WORKS, STEPHENSON ST., LONDON E16. Tel 01-476 5944.

Postal enquiries and orders to Chinnor please.

CHINNOR, OXON OX9 4BT

Telephone Kingston Blount 51476 (0844)

P. & P. DEVELOPMENTS

DRAKE T-4X and MS-4 PSU. This complete AM/SSB/CW Transmitter in perfect working order and condition only £175 Carriage paid.

COLLINS 75-A4 Receiver

Amateur bands only covering 160m-10m including WWV for calibration checks. Specifications: Mode AM/CW/SSB/MCW. Sensitivity 1uV for 6dB signal to noise ratio at 3kHz bandwidth: Selectivity 0-8kHz, 3-1kHz, 5kHz. AVC audio rise less than 3dB for input of 5/200,000 uV. AVC time constant release time 0-1 secs to 1 second. IF and image rej. Greater than 50dB. Drift less than 100HPS Collins KSW-1TX runs up to 1kW. 80-10 metres including citizens band. AM/CW/SSB. Collins aerial changeover relay, 10" L/S in matching case. Delivered with all connections, leads and headphones. Tested and guaranteed in good working order. £450 or will separate stations by arrangement.

B44 Mk III Really clean condition ideal for conversion to 4 metres. £ plus 75p carriage.

HEATHKIT RA1 Immaculate condition £30 carriage paid.

PYE VHF/FM Base station and remote control unit. QQV06-40A final. High Band. Immaculate condition and in working order. £45 carriage £1.

PYE MARINE TRANSMITTERS Runs 2 x 5B254M's in final AM/CW/MCW XTAL Control on 8 frequencies or VFO in 1-5MHz-16MHz continuous coverage. Required 500v/300v/6-3v. In good condition complete only. £10 carriage £1.50.

RC 600 GEC mobile VHF/FM transmitters uses QQV03-10 and QQV03-20A, transistor frequency multiplier chain, osc. and mic amp boards transistor inverter supply 12 volt or a few units still available but less QQV03-20A at bargain price of £10 carriage paid.

EDDYSTONE EC10 Mk II New £79 carriage paid.

Viewing of equipment can be arranged by appointment.

MULLARD Ceramic trimmers type CODEA/6E 0-6pF as used in most converters for 2 metres 13p each.

Unmarked ceramic trimmers 0-10pF 5p each.

Terms of business Mail Order only CWO Min order 25p.

Havant 72657

Cosham 74695

P. & P. DEVELOPMENTS

19 LONE VALLEY, WIDLEY, PORTSMOUTH, HANTS.

BURNS ELECTRONICS

CRYSTAL CALIBRATOR CC-10—Battery operated solid state using low power integrated circuits to generate 1MHz, 500KHz, 100KHz, 50KHz, 10KHz and 5KHz and harmonics to above 500MHz. Stability better than ± 10 Ppm. Heterodyne wavemeter and Mod monitor functions.

Price: £25.60

WAVEMETER TC-101—Absorption wavemeter covering 0.8–480MHz in six overlapping ranges with sensitive meter and detector circuit. Insulated probe. Matching style to calibrator.

Price: £18.30

FREQUENCY STANDARD SD-11—Provides separate outputs of 1MHz and 10MHz phase locked to Droitwich 200KHz transmission. Battery operated solid state with self contained aerial.

Price: £78.00

LOW PASS FILTER FL2/FL4—Reduce BCI/TVI, available 50 or 75 ohms. Passband loss less than $\frac{1}{2}$ dB, stopband loss 50 dB minimum.

Price: £6.20

FET CONVERTER FC2/FC4—New design using protected dual gate MOSFET's for low noise and high gain. 4–6MHz and 28–30MHz standard IF's but any in range 2–30MHz to order. Operates from 9 volt DC supply and has reverse polarity protection.

Price: £16.20

TEST OSCILLATOR TO-701—Crystal controlled oscillator in small hand-held case for IF alignment, calibration, etc. Any single frequency 100KHz to 100MHz. Battery operated.

Quantity 1–4 Price: £10.00
Quantity 5+ Price: £8.90

FM DETECTOR FMD-1—Add on unit using high gain integrated circuit and low distortion discriminator. Any IF in the range 450KHz to 1MHz. Supplied in kit form or made and tested.

Kit Price: £6.70
Made and Tested Price: £2.20

Our new catalogue now includes supplies of most components, e.g. Resistors, capacitors, semi detectors, plug sockets, etc. for all forms of constructional work.

Large S.A.E. for details or cash with order to:

BURNS ELECTRONICS
THE COTTAGE, 35 BEULAH HILL, LONDON, S.E.19

MISCELLANEOUS

PATENTS and TRADE MARKS—Booklet on request. Kings Patent Agency Ltd (B. T. King, Mem RSGB, Reg Pat Agent). —146A Queen Victoria Street, London, EC4. Tel 01-248 6161. 60 years' refs.

SCA 63962, 65996 DERWENT RADIO S.A.E. ENQUIRIES

GOOD STOCKS OF TRIO, KW, YAESU, CODAR, ETC.

Wightraps, pair £2.50	Pye Vanguard hiband £25.00
RCA Hobby ccts manual £1.05	Pack silver mica caps 20p
RCA IC manual £1.30	Pack ceramic caps 20p
Chokes 50m/a 10H 15p	Pack 100 resistors 50p
RCA valve (RX), manual £1.25	J Beam 2m halo £1.30
Egg Insulators 3p	RCA valve (TX), manual £1.00

Latest: Plastic strip pockets to take 10 QSL cards for vertical wall display. One strip 3p, 10 strips 25p. CARRIAGE EXTRA. We have in stock a large quantity of back numbers of "HAM RADIO" magazine, 15p each or ten different for £1.25 post extra.

28 HILLCREST AVENUE SCARBOROUGH YORKSHIRE
SHOWROOM: 5 COLUMBUS RAVINE, SCARBOROUGH

VHF Rx 67907

Compact double conversion Rx 20 min valves AM/FM 10 Ch. approx 250MHz. Noise Lim 500uA check/tuning meter etc v suitable for conversion to 2m. Excellent condx £4.50 carr £1 Some for callers at £4.

Transistor 70cm Rx Unit

Complete converter with 3XAF186, OC170, AF102 49-8MHz xtal etc. Tunes 70cm with 14MHz if plus 10-7MHz if strip, relay unit, power supply etc. In attractive case. New or as new £2.50 p & p 50p.

STC Communication Rxs

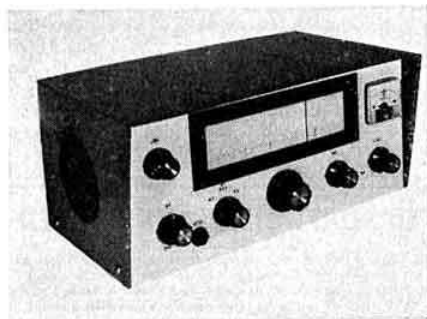
Still available as previous advert.

Blowers

Small, powerful 24V (ok on 12V) 37ip. p & p 20p
Parmeko Chokes 3H 120MA, 3H, 70MA 30p please add p & p.
RICHARD SELLERS G3VDE Eastington, Goole, Yorkshire.

TELFORD COMMUNICATIONS

78b High Street, Bridgnorth,
Shropshire. Tel: 074 62 3865/3403.



TUNABLE I.F. MODEL TC7. £35.

To tune any 2MHz in range 20-30MHz.
S.A.E. for full technical specification.

METALWORK FACILITIES

Chassis Boxes, Panels in 16, 18, 20 SWG Aluminium.
Send sketch and S.A.E. for competitive quotation.

hamstrung?

No need to be strung up with guys!
our telescopic, tilt-over towers are unguyed.
Post and wall mounted models,
in heights of 25, 40, 60 and 85 feet.
Enquiries to
Western Electronics (U.K.) Ltd.
Osborne Road, Totton, Southampton

STRUMECH
VERSATOWER
SYSTEM

Strumech Engineering Co. Ltd.
Coppice Side, Brownhills, Walsall, Staffs.

MARK EQUIPMENT

V.H.F. U.H.F. ELECTRONICS

0803 55488

G8ABP

ABP 2 metre FET converter with dual gate mosfet mixer N.F. 2DB. IFs. Ex-stock. 28/30. 14/16. 4/6 MHz. £14.50 Details on request.

Valves: 4CX250B @ £4.50p, 2C39A £3, first class. Guaranteed 3 months. Brand New: 7360 £1.50. DET 24 £2. DET 23 £2. E180F, 75p. A2599 £1.50. BC221-M very good condition with xtal & charts. £22. p.p. £1.

M.E. 70 8 watt 70 cms Tripler Amplifier, complete with 2 x QQVO2/6 £14.

Transistors: 2N5245 (Formerly TIS88), 50p. 40600 75p. 2N3819 45p. 2N708 30p. 2N3826 25p. 2N706 12p. TIS48 25p. 2N2369 30p. IN914 11p. BC109 30p.

Post 3p. Send S.A.E. for list and enquiries.

35 Lifford Tor Avenue, Roseland Park, Paignton, Devon.

Listen to the world with Eddystone



When you own an Eddystone communications receiver, you have the broadcasting world at your finger tips - wherever you happen to be - on land or at sea. The reputation these sets have attained is proof of their excellence and reliability and at Imhofs, there is a special Eddystone department where you can see, hear and compare the models listed here and some of the Eddystone professional receivers.

Same day despatch to any part of the world; free delivery in the U.K.; plus after sales service for which Imhofs and Eddystone are world famous.

EDDYSTONE EC10 Mark II transistorised communications receiver. A de-luxe version of this famous design now incorporating carrier level meter and limited fine tuner, £79.00.

EDDYSTONE 830/7 wide range communications receiver. A high grade HF/MF receiver covering 300kHz-30MHz in 9 ranges with crystal control facilities. Many satisfied users acclaim it as "the best ever", £372.75.

New from Eddystone

EDDYSTONE EB/37 transistorised broadcast receiver. Long, medium and shortwave coverage. Flywheel-loaded gear driven tuning. Self-contained battery pack for portable use. Accessory units available for 12/24 v DC and standard AC supplies. £98.00 (incl. £18.00 P.T.).

IMHOFS

MAIN EDDYSTONE DISTRIBUTORS



Dept.: 12-12

112-116 New Oxford Street, London, WC1A 1HJ Tel: 01-636 7878 R36H

GM2FHH

L. HARDIE

GM3BCL

542 George Street

Tel. Aberdeen 20113.

Eddystone EC10 Mk2	£79.00	De luxe logbooks post paid ..	£1.30
Eddystone Teles Aer.	£2.50	TTC C3042 SWRB	£4.25
Eddystone 924 PSU	£7.75	TTC C3041 FS meter	£3.00
Eddystone 945 12/24V PSU ..	£7.75	Drake SW4A	£140.00
Eddystone LP3242 phones ..	£5.68	Drake AL4 loop ant	£5.00
Trio 9R59DS	£47.50	Used Equipment	
Trio JR310	£77.50	Eddystone EA12 as new ..	£150.00
Trio HS4 phones	£5.98	Drake R4A mint cndx ..	£195.00
Trio SP5 speaker	£4.38	Tiger T100 good order ..	£30.00

Stockist for Eagle, Jackson, Joysticks, KW, Shure, RSGB publications, etc. SAE all enquiries please.

SONTRONICS introduce the BANDSCANNER, a 7 transistor Rx. covering a wider frequency range than any other Rx on the amateur market. Comprises a high sensitivity, untuned, wide band cascade RF amplifier, covering the entire RF spectrum from 100kHz to greater than 450MHz. Uses UHF silicon planar transistors. Pocket sized and self contained in a strong moulded, white plastic case measuring 4 1/2" x 3" x 1 1/2"; complete with miniature loud speaker. Hear local transmissions on all bands up to 70cm. Check modulation. Hear local radio-telephones, taxis, helicopters etc. Remember the strongest signal predominates; the telescopic aerial acts as an RF gain control. A must for D.F. events and Rallies. Use as an I.F. strip when servicing. Locate unwanted transmissions, i.e. spark interference. Detects powerful radar beams at over 2 miles. Sensitivity preset to receive a 5 watt Tx, whether on Top band or Two, at between 100 and 200yd. Special introductory low price of £8.50 each, p and p and insurance 20p. PP3 battery 14p extra.

Terms of business: Mail order only, cash with order.

SONTRONICS, 30 ASTBURY AVENUE, POOLE, DORSET BH12 5DT. Telephone: BOURNEMOUTH 58211.

SPECIAL OFFER

To Readers of "Radio Communication" only

HONDA E300E...

PORTABLE PETROL ELECTRIC GENERATORS

LIST PRICE £89

OUR PRICE **£75**

Also in stock: E800, EC1500, E1500E's etc.

C.W.O. for IMMEDIATE DESPATCH. All equipment is new and GUARANTEED and CARRIAGE PAID U.K.

Write, call or phone, Guildford 65639

ASHLEY DUKES

226 London Road, Burpham, Guildford, Surrey.

THE RADIO CONSTRUCTOR

DECEMBER ISSUE

FEATURES

"VIBRATOR" VIBRATO UNIT

MEDIUM AND SHORT WAVE REFLEX RECEIVER

TRANSISTOR STABILIZED POWER UNIT

PLUS

SHORT WAVE NEWS MORE CONSTRUCTIONAL PROJECTS

ON SALE DECEMBER 1st

PRICE 20p

Copies may also be obtained direct from the Publishers, 24p including postage. Published by Data Publications Ltd. 57 Maida Vale, London, W9.

AN OPPORTUNITY YOU MUST NOT MISS!
THE

INTERNATIONAL TRANSISTOR DATA MANUAL

This remarkable volume provides comprehensive technical characteristic data on the whole of the transistor family of semiconductors. Supplied to all the major engineering and industrial organisations, universities and reference libraries in the U.K. and overseas.

The manual contains 18 classified sections, including a comprehensive cross index of type numbers and manufacturers, CV numbers, outline drawings and terminations. There are 356 pages containing about 20,000 entries.

SPECIAL DISCOUNT OF 10% TO MEMBERS OF RSGB

(Published price, £5.25: You pay £4.72 post paid)

SEND FOR DESCRIPTIVE BROCHURE

(No stamp necessary)

COMPILED & PUBLISHED BY

FUNCTIONAL PUBLICATION SERVICES LTD.,
FREEPOST, WOKINGHAM, Berks. RG11 2AY

G. W. M. RADIO LTD.

PORTABLE AERIAL MASTS. Fine quality 48ft. masts by Coubro & Scrutton. 2" dia. aluminium sections, complete with 16 guys, pickets and all fittings. Unused and in "as new" condition in green canvas carrying bag, £20, carriage paid. Also available Erection Derrick kit containing 3 additional mast sections, ropes and pulleys, etc. to enable mast to be erected by fewer personnel, £5, carriage paid.

EDDYSTONE PANADAPTORS MODEL EP17R. Complete with handbook in original makers boxes. £60 carriage £2. New components. R. F. Chokes 1010, 1-25mH 250ma, 2 for 20p post paid. Knobs 591 2" for 640, 750 etc. 1/2" spindle, 25p or 6 for £1 post paid.

AERIAL VARIOMETER tuners, new and boxed, £1.30 post paid. Mk 111 19 Set.

UNUSED MAINS TRANSFORMERS. Woden 100-240 a.c. to 0-5-250-260-270-280v 2-5a 6-5v 4a four times "C" core. 7" x 6" x 5 1/2" £3.50 delivered.

GARDNERS 200-250v to 250-0-250v 250ma, 0-4-5v 3-5a, 0-4-6-3v 4a, 0-4-6-3v 4a. £2.50 post paid.

"RADIOSPARES" Heavy duty 205-245v to 350-0-350v 150ma, 6-3v 2-5a, 6-3v 3a, 6-3v 2a (tapped at 5v 3-5a, £2 post paid. "Midget output" 50p post paid. Paper capacitors, 8uf 400v, 30p post paid or 6 for £1.05 post paid.

REED RELAY inserts as previously advertised, 63p dozen, £3.75 for 100 post paid.

CONTAMINATION METERS No. 1. 0-10 Millirontgens/Hour. Will detect radiation from average luminous watch easily. Battery powered, needs 2 x 150V at a few milliamps, £5 carriage 50p.

S. G. Brown. headphones, type "F", £1.45 post paid. Motor Cycle Ammeters, 7-0-7 amps, 50p post paid.

All receivers and Test Equipment are in working order at time of despatch. Carriage charges are for England and Wales only.

Telephone 34897

Terms: Cash with order.

Early closing Wednesday

G. W. M. RADIO LTD.

40-42 PORTLAND ROAD, WORTHING, SUSSEX

Radio Shack Ltd



London's Amateur Radio
Stockist

Just around the corner from West Hampstead Underground Station

**R. L. DRAKE'S
MAGNIFICENT
R-4B RECEIVER**
£240.00



**FULL RANGE OF
MATCHING
TRANSMITTERS,
LINEARS AND
ANCILLARY
ACCESSORIES
IN STOCK.**

Send S.A.E. for details

**DRAKE SPARES & SERVICE
RADIO SHACK LTD.**

182 BROADHURST GARDENS, LONDON, N.W.6.
Telephone: 01-624 7174. Cables: Radio Shack, London N.W.6.
Giro Account No.: 588 7151

Buy it with your

BARCLAYCARD

CLASSIFIED ADVERTISEMENT ORDER FORM

Advertisements should be prepaid. Private rate 5p per word, minimum £1. Box no. 15p extra, which includes forwarding replies.

Words comprising name and address or callsign should be counted for advertisements not requiring a box number.

Trade advertisements should be submitted by letter.

Remittance £.....

Classification (for sale etc)

Please insert this advertisement in Radio Communication.

(BLOCK CAPITALS PLEASE)

[illegible]

£1 (min)

£1.20

£1.40

£1.60

NAME

ADDRESS

DATE..... SIGNED.....

POST TO SAWELL & SONS LTD., 4 LUDGATE CIRCUS, LONDON, EC4

Box No. Yes/No

MEMBERS' ADS

ORDER FORM

Please type or print in block letters

Tick classification

For Sale ☐Wanted ☐[illegible]

Date..... Signed..... Callsign, BRS or A No.....

The number of words in each advertisement must not exceed 32 not including name and address or call sign and QTHR or telephone number. Four pages of each issue are allocated to Members' Ads at present, and in order to include as many advertisements as possible licensed members are requested to give their call sign and QTHR instead of their name and address. (QTHR means: "My address in the current call book is correct"). Also to conserve space, please keep advertisements as brief as possible. They will be edited to conform to a set style of abbreviations, so it is unnecessary to submit them in abbreviated form.

Conditions under which Members' Ads are accepted are published on the first Members' Ads page of each issue. Do not forget to enclose a wrapper as proof of membership.

POST TO MEMBERS' ADS, RADIO COMMUNICATION, 35 DOUGHTY STREET, LONDON WC1N 2AE

INDEX TO ADVERTISERS

Aero & General Supplies	880	Jackson Bros (London) Ltd	813
AJH Electronics	cover 14	KW Electronics Ltd	cover 14
Amateur Electronics	887	Low Electronics	876
Amateur Radio Shop	888	LST Components	879
Baginton Electronics	878	Mark Equipment	885
J. Birkett	813	Microwave Modules Ltd	878
Burns Electronics	884	Mosley Electronics Ltd	813
Data Publications	885	P. & P. Developments	883
Derwent Radio	884	I. S. Partridge	888
Dodson-Bull Carpet Co Ltd	882	Radio Shack Ltd	886
Ashley Dukes	885	R.T. & I. Electronics	880
XB-Electro (Electronic Design)	814	Senator Crystals	879
EMSAC	888	J. R. Sellers	884
FieldTech Ltd	877	Shure Electronics Ltd	816
Functional Publication Services	886	H. L. Smith & Co Ltd	879
Garex Electronics	882	Solid State Modules	875
Garex Wholesale Ltd	883	Sonitronics	885
Mike Gibbins	880	Spacemark Ltd	814
GWM Radio	886	Stephens-James Ltd	880
L. Hardie	885	Strumach Engineering Co Ltd	884
Heath (Gloucester) Ltd	810, 811 & 875	Telford Communications	884
Imhof-Bedco Ltd	885	J. & A. Tweedy Ltd	888
IPC Magazines	812	Western Electronics	818

THE AMATEUR RADIO SHOP G4MH 13 CHAPEL HILL HUDDERSFIELD TEL 20774

We are approved dealers for the following:

Eddystone, KW, Trio, J. Beam, Codar, Strumech Towers, Jan Crystals, Solid State Modules Convertors, Tavasu, etc.

Full range of accessories in stock: S.W.R. and ATUs, MICs

2 Mtrs: The 4 MH Tx price now £11.50 inc post. (over 250 sold).

SSM Convertors' £13.75.

J Beams: Halos, 4EL, 6EL, 8EL, 10EL

Jan Crystals 8002 to 8109 75p inc post.

Publications: RSGB Handbook £3.15, UHF/VHF Handbook £1.60, 1972 call book 50p.

Morse practise oscillator inc battery 85p.

Second-hand: Guaranteed

Trio TS 510	£150	Vespa II	£90
National HXL 1. Lin	£75	Summerkamp FT200	£75
Eddystone 750	£50	SR 550	£35
Eddystone 940	£95	Atlanta VFO	£25
Eddystone EC10 Mk1	£40	Codar PL30X	£5
KW 201 Cal & Qmulty	£80	CR100	£20
Drake 2C	£80	Heath GR65	£25
AR88	£40		

This equipment is in stock at the time the advert was submitted.

Carriage paid on all s/hand gear and other items unless stated.

SAE for further details. Closed Tuesday all day. Late opening Thursday 8pm. Large car park rear of shop. Free.

EMSAC



★
TX2

2 metre AM-FM-CW transmitter. 20w. input TX2 £30.40. Power supply PS2 £18.20. 4 metre version TX4 £28.85. Demonstrations arranged. Send SAE for equipment details and crystal lists. G3IAR. p. & p. 50p.

Electronic & Mechanical Sub-Assembly Co. Ltd.,
Highfield House, West Kingsdown,
Nr. Sevenoaks, Kent.
Tel: West Kingsdown 2344.

DECADE COUNTER KITS!

Comprise:

- Plug-in etched and drilled fibreglass PC board printed with component layout (70p).
- Neon Numeral Indicator Tube (£1.30).
- Decade Counter IC, type 7490 (75p).
- Decoder/Driver IC, type 7441 (95p).
- Fully descriptive application leaflet (3p in stamps).

All items sold separately
—see prices in brackets

Also available:

TTL ICs—type 7400, 20p ea.
type 7473, 40p ea.

**ALL ABOVE ITEMS SUITABLE FOR USE IN
RECENTLY PUBLISHED FREQUENCY COUNTER
DESIGNS**

Toggle Switches; Bulgin S/P on/off, high quality 15p.
Mains Transformers; 20v at approx. 2A (few only) 60p.
FETs—type 2N3823e—brand new with data sheet 28p.
New Range—Carbon film resistors 1/2 watt E12 series—
values 10Ω to 1MΩ; 1p ea.; 10p doz.; 80p
per 100.
Tubular ceramic capacitors (500v) 22pF; 1000pF; 4700pF
1p ea.

P & P 15p per order unless otherwise noted

★ PLEASE NOTE OUR CHANGE OF ADDRESS ★

IAN S. PARTRIDGE, G3PRR
71 ESKDALE AVENUE, CHESHAM, BUCKINGHAMSHIRE

KIT PRICE
£3.50 (20p p & p)
(4 or more post free)

G2CTV

G3ZY

J. & A. TWEEDY (Electronic Supplies) Ltd.

SPECIALISING IN AMATEUR RADIO EQUIPMENT

Full range of KW equipment and accessories in stock.

KW 2000B with A.C. p.s.u.	£240.00	Matching VFO 4A	£32.00
KW Atlanta with A.C. p.s.u.	£200.00	KW EZEE Match	£13.50
KW Linear 1000	£135.00	KW 103 SWR/Power Indicator	£12.50
KW 101 SWR Indicators	£9.25	KW Traps and Insulator	£4.00
KW Dummy Loads	£7.00	KW Trap Dipole	£12.75
KW Baluns	£1.75	KW 107	£40.00
Matching VFO 4B	£35.00		
Trio 9R59DS Receiver	£47.50	Trio JR599 Receiver	£185.50
Trio TS510 with A.C. p.s.u.	£180.00	Trio Accessories	
Trio JR310 Receiver	£77.00		

YAESU/Sommerkamp:

FT101 Mobile/Fixed	£230.00	FT200 and p.s.u.	£167.00
FT560 560w. p.e.p.	£195.00	FRDX400	£160.00
FL2000B Linear	£130.00	FLDX400	£130.00

MOSLEY AERIALS:

TA31JR	£13.25	Atlas Vertical	£19.00
TA32JR	£22.00	TA33JR	£31.50
		Ribbed Insulators ML5	5p

J BEAM AERIALS:

20 Halo	£1.20	70/14Y 14 el. 70 cm	£6.45
2HM Halo	£1.50	2/8Y 8 el. Yagi	£3.80
2/10Y 10 el. Yagi	£2.20	2/14P 14 el. Parabeam	£13.00
2/12 double six	£6.15	70/16 double 8 70 cm	£5.10
carriage on aerials etc at nett cost.		70/18P 18 el. Parabeam	£6.50

Rotators 2010

£24.50	CDR22	£25.00
--------	-------	--------

TAVASU MOBILE AERIALS AS PREVIOUSLY ADVERTISED

Hallcrafters HT44	£70.00	KW Viceroy	£65.00
Sommerkamp FLDX400	£119.00	Yaesu FTD400	£165.00

"Solid State Modules" Dual Gate Mosfet converters and pre-amps.

ALSO OPEN IN THE EVENINGS BY APPOINTMENT AT "STONELEIGH,"
WADSWORTH, CHESTERFIELD (4 miles from town on the A619).

Several items of used equipment in stock too numerous to list.

OPEN TUESDAY TO SATURDAY, 9 a.m. to 5.30 p.m.

H.P. Terms available

Part exchanges

64 Lordsmill Street, Chesterfield, Derbyshire
Tel. Chesterfield 4982 or 68005 Evenings

RSGB PUBLICATIONS

RSGB

Amateur Radio Circuits Book	70p
Amateur Radio Techniques	£1.13
Guide to Amateur Radio	47p
Morse Code for the Radio Amateur	14p
RSGB Countries List	9p
RSGB Amateur Radio Call Book, 1972	57p
Radio Amateurs' Examination Manual	41p
Radio Communication Handbook (4th ed.)	£3.15
	postage 35p extra
Radio Data Reference Book (out of print)	
SSB Equipment	19p
Service Valve and Semiconductor Equivalents	29p
VHF/UHF Manual (2nd ed.)	£1.80
World at their Fingertips (Paperback)	76p
(De-Luxe)	£2.53

MORSE

RSGB Morse Instruction Tape (900ft)	£1.84
RSGB Morse Practice Tape (450ft)	71p
G3HSC Rhythm Method of Morse Tuition— Complete Course (two 3-speed LP records and one EP record plus books)	£4.50
Beginner's Course (one 3-speed LP record and one EP record plus books)	£3.30
Beginner's LP (0-15 wpm) plus book	£2.75
Advance LP (9-42 wpm) plus book	£2.75
Three-speed simulated GPO test 7in ds ep record	85p

ARRL

Antenna Book	£1.38
Course in Radio Fundamentals	61p
Hints and Kinks	62p
Mobile Manual	£1.38
Radio Amateur's Handbook	£2.75
Radio Amateur's Operating Manual	83p
Single Sideband for the Radio Amateur	£1.60
Understanding Amateur Radio	£1.37
VHF Manual	£1.38

CQ

Amateur Radio DX Handbook	£2.26
Antenna Handbook Vol. 1	£1.80
Antenna Roundup Vol. 1	£1.46
Antenna Roundup Vol. 2	£1.84
Mobile Handbook	£1.41
Sideband Handbook (out of print)	
RTTY A-Z	£2.21
RTTY Handbook	£1.64
Shop and Shack Shortcuts	£1.87

USA MAGAZINE SUBSCRIPTIONS (pa)

QST (including ARRL membership)	£2.93
QST (Societies and organizations)	£3.28
CQ	£2.50
73	£2.95
Ham Radio	£2.50
Braille Technical Press	£3

RADIO PUBLICATIONS INC

Beam Antenna Handbook (3rd ed)	£2.08
Better Short Wave Reception (2nd ed)	£1.78
Cubical Quad Antennas	£1.75
S-9 Signals	85p

MISCELLANEOUS

Basic Electricity	£1.67
Dictionary of Electronics	56p
Foundations of Wireless (case bound)	£3.25
(paperback)	£2.04
Guide to Broadcasting Stations	59
How to Listen to the World	£1.43
Improve your Short Wave Reception	£1.19
Mullard Data Book	33p
Radio Amateur Operator's Handbook	50p
Simple Shortwave Receivers	89p
Transistor Audio and Radio Circuits (Mullard)	£1.61
Transistors in Practice	£1.85
Wireless World Radio Valve Data (9th ed)	88p
World Radio TV Handbook	£2.25

LOG BOOKS

RSGB Standard Log	56p
RSGB Receiving Station Log	43p
Mobile Mini-Log	21p
RSGB De-Luxe Log	£1.41

73

Care and feeding of a Ham Club	47p
Simplified Maths for the Ham Shack	25p
VHF Antenna Handbook	£1.31

MAPS

Admiralty Great Circle Map (in tube)	57p
Counties	35p
QRA Locator Map (Western Europe) (in tube)	47p
QRA Locator Map (Western Europe) (on card)	10p
VHF/UHF band plans (on card)	10p
Amateur Radio Prefixes (World)	14p

MEMBERS ONLY

Lapel Badge (RSGB or RAEN emblem, pin fitting)	15p
Callsign lapel badge (RSGB or RAEN pin or stud fitting) *	50p
Car badge (RSGB or RAEN)	70p
Callsign car badge (RSGB) *	£1.25
Callsign car badge, de-luxe (RSGB or RAEN) *	£2.19
Ties (Maroon or Blue)	£1
Tie bar (RSGB emblem)	28p
Radio Communication Easi-binders	£1
Car window sticker (RSGB or RAEN). (No adhesive required)	9p
Members' headed notepaper (50 sheets) quarto	33p
octavo	20p

*delivery 4 to 6 weeks.

Prices include postage and packing except where stated.
Stamps and book tokens cannot be accepted.

**35 DOUGHTY ST.,
LONDON WC1N 2AE**

A. J. H. ELECTRONICS (G8AQN)

Proprietor: A. J. HIBBERD

Tel: RUGBY 71066

Terms of Business Cash with order, Mail order only, or Callers by appointment. S.A.E. with all enquiries.

NOTE: Inverters, Modulators, P.C. Boards, etc., are ex-equipment and are offered with full money back guarantee if returned unused.

TRANSISTOR MODULATOR KIT ready assembled P.C. board, with mod. transformer sec. to match QQVO3/10 will match most Tx 10 watts input, also provision to use as Rx audio to 3 ohm speaker, modulator output 7 watts, now less microphone, hardware, & chassis, microphone required 2500 ohm impedance, £3.50 with circuit.

TRANSISTOR INVERTER 12v D.C. input pos or neg earth, 400v @ 150m/a output, sub-standard ie. needs slight att. to wiring, with circuit £3.00

TOROIDAL TRANSISTOR INVERTER TRANSFORMER 6v and 12v D.C. input, 260v @ 150m/a output potted with metal cover 2" x 1 1/2" x 2 1/2" high, with circuit £1.00 each

TOROIDAL TRANSISTOR INVERTER TRANSFORMER as above but not potted, all leads terminated to a tag board, plenty of space for extra windings ie. for bias, heaters etc. for 6 or 12v D.C. input 260v 150m/c output, with circuits 62p each.

MAINS TRANSFORMER tapped input primary to 240v A.C. output 465 @ 350 m/a 50v @ 50m/a, 6.6v @ 6A, WT 13 lb **BRAND NEW** drop through half shrouded type only £3.50 post paid.

SPLIT STATOR TRIMMERS 5+5 pf o.k. for PA tuning 17p each. 20 + 20pf 20p each.

8MHz. xtals 8006-67, 8007-69, 8008, 8029-41, 8035-71, 8036-25, 8044, 8046, all unused 10XJ type 1/2" pin spacing 62p each state second choice if possible. 12.7 MHz HC6/U XTALS ex-equipment. 15p.

VHF T.V. TURRET TUNERS valve type (less valves) with coils including VHF radio as used in RBM models no circuits 30p each, postage 13p if not ordered with other items.

3 GANG VHF TUNING CAPACITOR 17 + 17 + 20pf 1/2" x 1/2" x 1/2" 3-1 reduction drive 25p.

MICROPHONES 200 ohm dynamic transistor tape recorder type with remote control switch famous manufacturer £1.50.

VHF R.F. CHOKES 17.5 microhenry (about the size of 1/2 watt resistor) 1 1/2p or 25 for 25p.

CERAMIC AIR SPACED TRIMMERS 1—14 pf miniature type 8p each.

TUBULAR CERAMICS mixed bag containing five of each value, approx 30 different values from 1/2 pf to 2000 pf this pack mainly consists of types below 100 pf which are all valuable for use in converters limited supply £1.00 per bag.

470 KHZ I.F. TRANSFORMERS set of 3, 1st. I.F. double tuned, 2nd. & 3rd. single tuned, detector diode & decoupling capacitor in 3rd. I.F. can to suit AF117 type transistors approx 1/2" square cans, with circuit 50p per set. I have a quantity of 1st. & 2nd. I.F.s spare as used in the above set, one of your choice will be supplied with the set if required while they last, at no extra charge.

TX MODULATOR MIC PRE-AMPS on P.C. board approx. 6 1/2" x 2 1/2" 5 transistors, speech compressor & limiter 300—3500cs. new & unused no circuits 80p each.

CIRCUITS for AM25B Vanguard, & AM10B Cambridge, 15p each.

ELECTROLYTICS 16 MFD 450v 10p, 5000 MFD 35v electrolytic 37p, 10,000mf 25v, 37p, 32mf 450v can type, 20p each.

75 ohm "N" type plug suit UR1 etc. 37p.

75 ohm "N" type socket (cable mounting with chassis flange) 40p. 1N648 silicon diodes 500 piv. at 400 m/a, 2 for 15p.

CG61H detector diodes 2p each 20p doz, GT45B 5p each, 2N3866 37p, 2N5109 £1.00.

DISC CERAMIC TRIMMERS 7-35pf 1/2" dia. but have side contacts 2 1/2p each 25p doz. sorry sold out of 4-20pf type.

DISC CERAMIC CAPACITORS 3.3pf, 5.6pf, 6.8pf, 10pf, 15pf, 68pf, 470pf, 1000pf, 1 1/2p each for 15p doz. all 50 volt wkg. .01mf 25v 17p doz. .047mf 30v P.C. type 15p doz.

P. C. BOARDS pack of 7 boards ideal for components minimum of 30 transistors miniature 1/2" & 1/2" watt resistors, electrolytic & paper capacitors, small skeleton pots, diodes, transistor types 2N3702, 2N3708, 2N3711, 2N4062, 2S302, BFY51, all components are modern miniature types, these are not computer panels but are of recent manufacture & designed for fuel injection systems 70p per pack or £1.30p for two packs, money back if not satisfied.

470 KHZ 1. F. AMPLIFIERS single tuned transformers as used in domestic transistor radios with M/LW osc. coil BF194 mixer osc., two BF195 1. F. amps. diode detector P. C. board size 4" x 1 1/2" no circuit only 60p each

HEAT SINK CLIPS to hold two OC81s etc. 2 1/2p each (quotations for large quantities)

EDGEWISE METERS 200 microamps 1200 ohms, panel cutout size 1 1/2" x 9/16" horizontal or vertical mounting, scale 10 equal graduations not numbered ideal as S meter etc. clear plastic case brand new 75p each, two for £1.37p four for £2.50.

AM25B VANGUARD radiotelephones 17-20 watts output from QQVO3/20A, transistor modulator and inverter, valve front end Rx. transistor 2nd IF and audio, xtal controlled. Rx and Tx simple to retune to 144MHz or 70MHz (state which required) these are boot mounting units and are less control box, cable, speaker and microphone, with circuits used condition. £20.00, p/p 75p.

MINIATURE MAINS TRANSFORMERS 240 volt A.C. input, nominally 12 volts A.C. output @ approx. 75m/a for bridge rectifier ideal for mains PSU for converter, transistor radio etc. (these transformers produced on test using bridge rectifier and 1000 Mfd for smoothing 9 volts D.C. @ 150m/a) size overall 1 1/2" x 1 1/2" x 1" only 40p each.

MINI POWER UHF TRANSMITTERS as advert last month but less the 10KHz audio modulator these are mounted in black crackle case with wrap over cover size 3 1/2" x 2 1/2" x 7 1/2" long with rubber feet, with circuit of last month's Tx. £1.75.

LAGBEAR MAINS PSU 19" rack mounting 3 1/2" high 8 1/2" deep, HT voltage fully stabilized and variable between 200 to 300 volts @ 40m/a (conservatively rated) EHT variable 350 to 750 volts @ 50 micro-amps (this was designed for Geiger-Muller tubes), 6.3 volts @ 3 amps, 100 volts @ 5m/a negative bias supply, calibrated voltage controls on smart polished black front panel with HT and bias test sockets and chrome handles, OK for receiver PSU etc. in makers original packing boxes with mains lead and manual £7.50 p/p 50p. Hurry there is only six.

MODEL CONTROL Tx and Rx single channel type made by McGregor, receiver in metal case 4 1/2" x 3 1/2" x 1 1/2" (superhet), Tx plastic case internal aerial 2 1/2" x 3 1/2" x 1 1/2" with crystals and sold only as pairs Tx have been used for test purposes only but Rx's unused less relay, type number unknown, 27MHz (7 only so hurry) £7.00 pair.

LAGBEAR TRANSISTOR TESTERS type E5121 for testing NPN/PNP Gain to 150, leakage current to 5m/a, with probe for testing RF and audio circuits, built in mains PSU or can be run from external 9 volt supply, unit also has sockets to run set under test from the internal stabilized 9 volt supply, die cast case size 7 1/2" x 4 1/2" x 2" deep brand new and unused in boxes @ half manufacturers price bargain @ £9.00 each, S.A.E. for full descriptive leaflet (limited supply).

ALLADIN COIL FORMERS 1/2" dia. 2" long with core 4p each or 30p doz.

PLEASE NOTE due to postage increases we now have to make a handling charge on all orders of 12p. sorry!!

59 Waverley Road, The Kent, Rugby, Warwickshire.

IF UNDELIVERED

Return to:—
RSGB, 35 DOUGHTY ST,
LONDON WC1N 2AE

IF UNDELIVERED

Return to:—
RSGB, 35 DOUGHTY ST,
LONDON WC1N 2AE