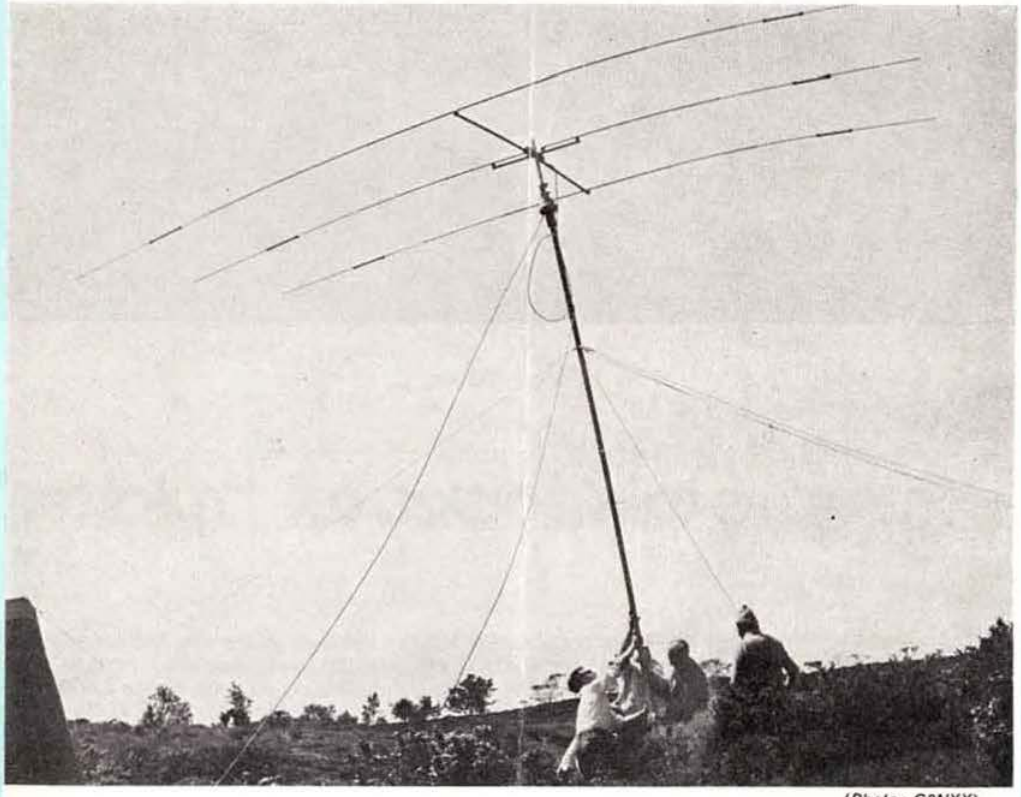
radio communication

September 1974

NATIONAL FIELD DAY 1974

Results in this issue



(*Photo: G3NYY*)

Members of the Greenock & D ARC erecting their aerial at Mid Glen Farm, Kilmacolm, Renfrewshire.

journal of the Radio Society of Great Britain

radio communication

Volume 50 No 9 **September 1974** Price 40p

CONTENTS

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ABC
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Advertising, other than Members' Ads, should be sent to the above address marked for the attention of Mr C. C. Lindsay. Tel 01-837 8688 (or 01-686 5839, advertising only).

BURNS

ELECTRONICS

CRYSTAL CALIBRATOR CC-10

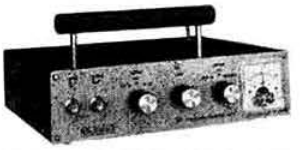
Price **£30.80**

High stability crystal oscillator and dividers generate 1MHz-500-100-50-10-5kHz and harmonics to above 600MHz. Heterodyne wavemeter and modulation monitor (AM) facilities. Battery operated.

WAVEMETER TC-101 Price **£24.50**

Absorption wavemeter covering 0·8-480MHz in six ranges with meter indication and insulated probe.

Due to extended delivery of this instrument orders will only be accepted on a pro-forma basis.



FREQUENCY STANDARD SD-11

Basic **£114.00**

Battery operated, phase locked to Droitwich on 200kHz, with O/Ps of 1MHz and 10MHz. Optional low signal inhibit facility. Internal or external aerial.

FET CONVERTERS

FS2/4 **£18.50**

MOSFET RF stage + Schottky diode ring mixer for low noise and strong signal handling. 9 volt supply. Any IF from 2-30-MHz.

FC70 **£19.00**

Bipolar RF stages + MOSFET mixer for low noise and reasonable gain. 9 volt supply. Any IF from 2-30MHz.

MULTIVERTER MC-3 Basic frame **£11.50** Mains PSU **£4.40** 1-3 converters may be fitted. Separate RF I/Ps with common IF O/P and "thro" position. External DC supply socket. Only supplied with minimum of one of our converters.

COMMUNICATION MODULES—KITS or MADE AND TESTED

—NEW—

SPEECH PROCESSOR SP-1
Kit £6.30. M & T £7.70.

AF I/P 0·5mV (min.) O/P 1 volt RMS at low Z. Contains preamp, limiter, amplifier and active L.P. filter. Suitable for AM, FM, SSB, AFSK etc. May be used with PM-1.

PHASE MODULATOR PM-1
Kit £5.50. M & T £6.80.

Generates NBFM by audio corrected phase modulation. Use on 70MHz and above. Contains crystal oscillator, phase modulator and AF filter. Insert between existing TX crystal and oscillator. State crystal frequency.

NBFM Generator FMT-1 = SP-1 plus PM-1. (add prices).

POWER SUPPLY MODULE PSM-1
Kit **£3.70** M & T **£4.50**

Regulated PSU for driving modules and converters etc. Fixed O/P in steps from 5.0v to 14.3v, at up to 100mA basic or 500mA with an extra power transistor. Contains rectifier (half or full wave, bridge or doubler), smoothing, zener and current amplifier. Short circuit protection. State o/pV.

FM DETECTOR FMD-1
Kit **£7.40** M & T **£9.00**

IC limiter, discriminator and AF amplifier provide 100mV O/P RMS at 3kHz deviation for an I/P of 300μV min. State frequency in range 350kHz to 1MHz (1·6MHz to special order). 6-9 volt supply.

TONE BURST GENERATOR TBG-1
Kit **£5.20** M & T **£6.20**

Generates access tone for UK/European repeater systems. Range of frequencies. Easily fitted to mobile or home station. 8-12 volt supply.

AGENTS:

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Tel. 01-653 6306

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10 Tudor Crescent, High Cross, Rogerstone, Newport, Monmouth NP1 9BS

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01-550 8798

J. H. JONES, GW3TMP
TMP Electronic Supplies,
3 Bryn Clyd, Leeswood, Mold, Clwyd CH7 4RU
035-287 846

COMPONENTS

Some examples of components from our issue 4 catalogue are as follows:

Resistors ¼ & ½W 10ohms to 1Meg (E12) **1½p** ea, Polystyrene capacitors 10pF to 4700pF from **3½p**, Disc ceramics 1pF to 10,000pF **2½p**, Polyester capacitors 0·01μF to 2·2μF from **3p**, Miniature electrolytics from **7p**.

3 gang 17pF variable capacitor **£1.15**, special VFO capacitor with built in reduction drive **£3.22.**

BC108 **11p**, BFR90 (ft 5GHz typ) **£3.48**, 2N3819 **37p**, 2N5245 **46p**, 2N3866 **87p**, 2N4427 **92p**, BLY33 **£1.49**, HP3080 **£1.59**, 1N4148 **5p**, 1N4001 **7p**.

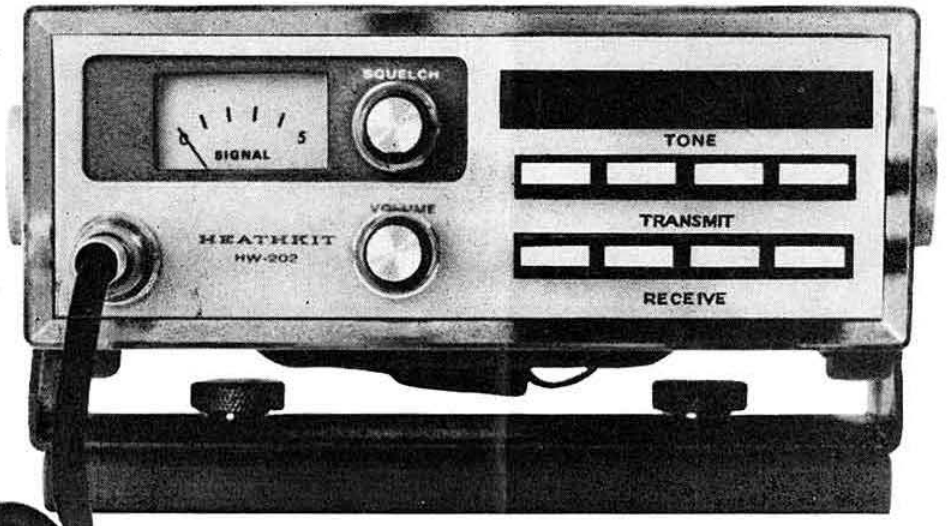
Send cash with order or **20p** for catalogues detailing these and other products. Export and trade enquiries welcomed.

VAT Reg. No. 218 4215 82. Please add 8% VAT on all orders including post and packing charges

Equipment and kit prices include carriage. Minimum component order 50p. P&P 15p, free over £5 excl VAT

43a CHIPSTEAD VALLEY ROAD, COULSDON, SURREY, CR3 2RB **Tel: 01-668 7766**

Heathkit amateur radio is what you make it.



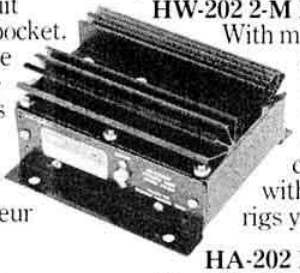
In the Heathkit range of amateur radio kits, there are models to suit virtually any requirement, any pocket.

Every one of which will give you versatility and performance second to none. Backed by years of Heathkit know-how.

And new techniques, new ideas are being incorporated all the time to make Heathkit amateur radio even more exciting.

Just take a look at these models.

HW-202 2-M FM Transceiver



With multi-channel capability, all solid-state design, PTT mike and an optional tone burst encoder, the HW-202 compares very favourably with the best wired 2M/FM rigs you can buy. Kit: £97.20.

HA-202 FM Amplifier

For added power, try the HA-202. It'll deliver 40 watts (nominal) out for just 10 watts in. And all it requires is a 12V DC supply. So you can use it easily in car or boat. Kit: £41.05.

HWA-202-1 AC Power Supply

Coupled up to the HW-202 for home use, our AC Power Supply produces 13.6V DC at 2.2 amps—with regulation better than 1%. Kit: £19.45.

HEATH
Schlumberger

Prices inclusive of V.A.T. at 8%.

SB-102 80-10M Transceiver
Giving full coverage of 10 metres, the SB-102 has an all solid-state linear master oscillator, permitting fast warm up time with excellent stability. Power input 180 PEP. Kit: £280.80.

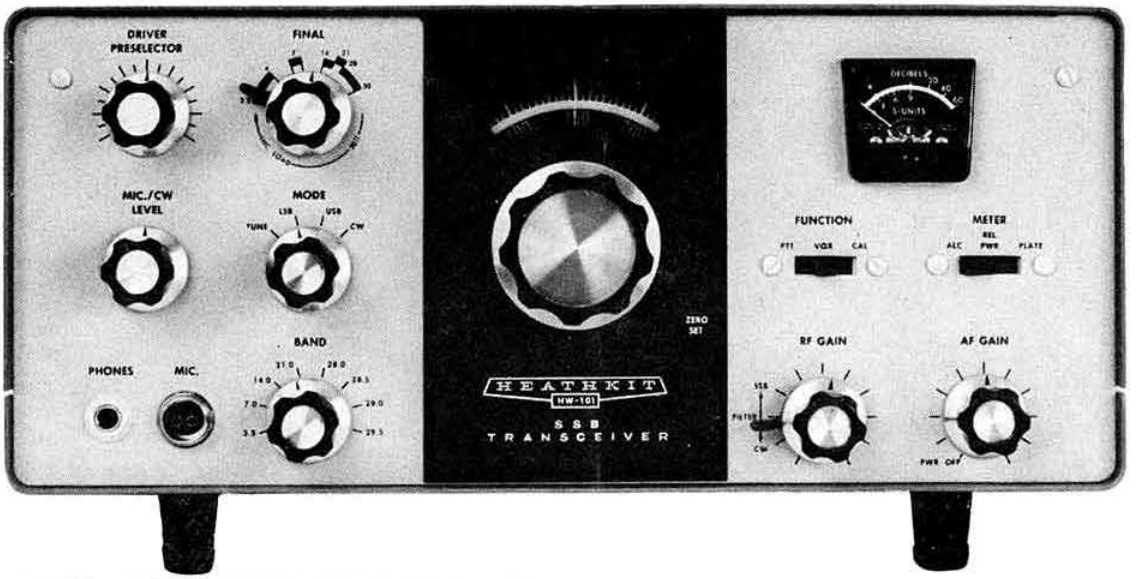
HD-10 Electronic Keyer
15-60 wpm with 10-20 slow-speed option, self completing dashes and variable dot-space ratio. Kit: £27.00.

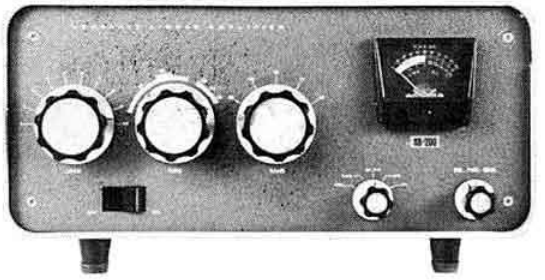
HDP-21 Desk Mike
A high impedance dynamic mike for SB-series equipment. Kit: £24.85.

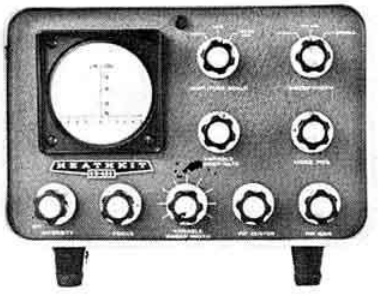
SB-600 Station Speaker
Matching Heathkit SB and HW gear, the SB-600 has an audio response from 300 to 3000 Hz. Kit: £10.80.

SB-220 2kW Linear Amplifier
Requiring only 100 watts drive, the SB-220 uses a pair of conservatively rated Eimac 3-500Z's to provide up to 2000 watts PEP SSB input. Kit: £243.00.

HEATH
Schlumberger







HW-101 5-Band SSB Transceiver

Representing superb value for money, the HW-101 is a direct descendant of our widely acclaimed HW-100. And gives you even greater performance, with improved receiver circuitry and dial drive, and new front panel SSB/CW filter selection. Kit: £185.75.

SB-200 1kW Linear Amplifier

With built-in solid state power supply, circuit breaker protection, metering for SWR, grid current, plate current, relative power, plate voltage and has ALC output, the SB-200 provides 1200W PEP SSB input. Kit: £176.00.

SB-620 Spectrum Analyzer

Gives 10 and 50kHz sweep widths for single signal analysis and band spectrum sweep. Kit: £97.20.

SB-610 Signal Monitor

Gives accurate display of transmitted AM, CW, SSB and RTTY signals—showing signal envelope, AF and RF trapezoid patterns. Kit: £75.60.

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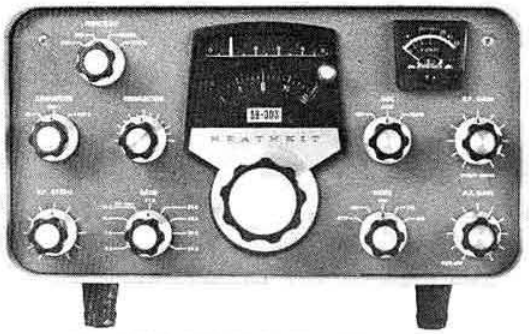
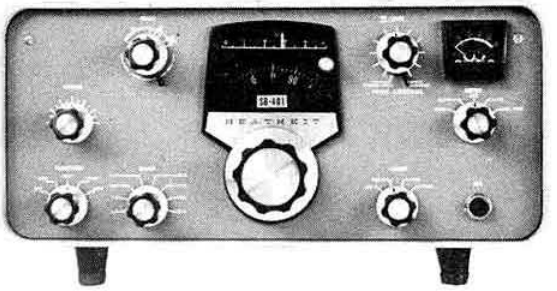
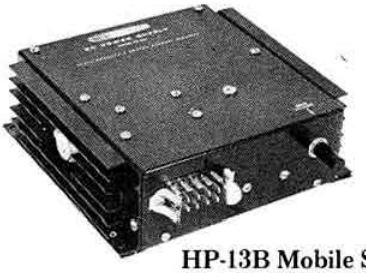


SB-303 Solid-State Receiver
Receives USB, LSB, AM, CW and RTTY, 80-10 metres. 15MHz WWV reception. Kit: £235.50.



SB-401 SSB Transmitter
Covers 80-10; USB, LSB & CW. Operates from 110 or 220V AC. Kit: £216.00

HP-23B Fixed Station Supply
AC mains 110 or 220V power supply. Designed for accommodation within model SB-600. Kit: £29.20.



HP-13B Mobile Supply
Gives improved starting and power transistor protection and now has fixed bias voltage. Kit: £47.55.

HN-31 'Cantenna' Transmitter Dummy Load. Gives 50 ohm non-inductive load with SWR less than 1.5:1 for frequencies of 1.5 to 300 MHz. Kit: £8.10.

SB-650 Digital Frequency Display
Counts the three different frequencies produced in the receiver or transceiver and then computes and displays the operational frequency to within 100 Hz accuracy. Kit: £95.05.

For more details of these and all the other models in the Heathkit range, just write for your free catalogue today, or for a free full specification sheet for any model. Besides the enjoyment and satisfaction you'll get from using Heathkit equipment, you'll also have an equally enjoyable and satisfying time assembling it. Especially as the easy-to-understand instruction manual you get with ever kit makes light work of assembly.

And the Heath Monthly Budget Plan will make it surprisingly easy on your pocket too. For instance, for just £10 a month you could have £200 worth of equipment immediately. You'll find full details and an application form in your catalogue when you receive it.

HEATH
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Amateur Radio Division, Heath (Gloucester) Ltd., Gloucester, GL2 6EE. Tel: (0452) 29451.

NEW LOW PRICES

AMATEUR RADIO BULK BUYING GROUP

ALL PRICES INCLUDE VAT

Write for our new August Price List. In addition to VAT bringing prices down by nearly 2% there are also several other substantial price decreases, making some of our components even cheaper! Save even more by buying our Minikits at special prices.

COMPONENTS FOR RADCOM DESIGNS

G3TDZ 2M TX/RX

Design for this portable 2m transceiver as Jan '73 RadCom with correction as April '73 edition. **Reprint** (included free in MiniKit Rx 1)—20p plus large SAE. **Special Prices for complete kits** (less crystals) are as follows: Rx, £12.60; Tx, £5.55; Modulator, £2.95. (Modulator kits do not include PCB or transformer as many constructors prefer to use an i.c. amplifier.) **All parts available separately as follows:**

P.C.Boards—Rx, 90p; Tx, 60p.
Drive Drum—24p.
Cord Drive Spindle—23p.
4mm Coil Formers—4p ea or 36p/10.
FX1115 Ferrite Beads—1p ea or 35p/50.
CFT455C Filter—48p.
3 gang × 17pF—£1.23 (incl. fixing screws and washers).
Cord Tension Spring—5p.
VHF Cores—1½p ea or 12p/10.
Trimmers: 10pF, 15p; 35pF, 45p.
Philips 2½in Loudspeaker—£1.35.

Special Prices for MiniKits:

MiniKit 1 (which contains the above)—Rx, £5.75; Tx, £1.65.
MiniKit 2 —Rx (1 i.c., 9 transistors/& 4 diodes)—£4.65;
— Tx (4 transistors & 3 diodes)—£3.45
— Modulator (7 transistors and 2 diodes)—£1.80
all semi-conductors available separately
Minikit 3 (resistors and fixed capacitors)—Rx, £2.35; Tx, 50p; Mod. £1.20.
Set of 10 NiCad Batteries—£24.00. (Each—£2.65 6 for £15.00).

G3XGP—MINI D.F.M.

Design as June 73 RadCom. **Reprint** (free in MiniKit 1)—20p plus large SAE. Two versions of the clock board are available: the original with 100kHz oscillator, and our modification to take the more readily available (and cheaper!) 1MHz Xtal oscillator using a 7400 i.c. and an extra 7490 divider.

P.C. Boards: Input Amplifier—80p; Display—£1.00; Clock—100kHz—90p or 1MHz—£1.00; (modification detail included).

Minitron—£1.35. LED—20p ea or £1.75 for 10. Transformer—£1.55. Timebase Switch—49p. Pointer Knob—12p. Round Knob—25p.

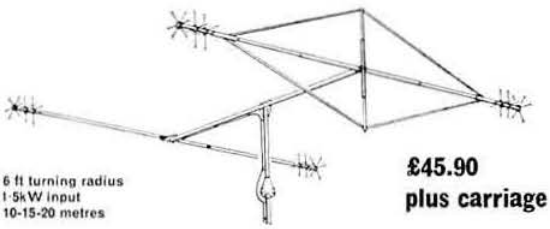
MiniKit 1 (which contains the above) —100kHz (without Xtal), £10.90.
—1MHz (including Xtal), £13.85.

Also available—**10 turn Potentiometer 1KΩ—£3.45.**

MiniKit 2 —100kHz (18 i.cs., 8 transistors & 9 diodes), £15.85
—1MHz (19 i.cs., 8 transistors & 9 diodes), £16.40
Add 50p if 30MHz i.cs. required (DM7490 & 74HOO)
all semiconductors available separately.

MINI BEAM AERIALS

HQ 1



6 ft turning radius
1·5kW input
10-15-20 metres

£45.90 plus carriage

Model **C4**, coaxial vertical for 10-15-20 metres. Overall height is 11½ft—£20.45 (plus carriage).

These aerials are 50 ohm impedance—a full specification sheet is available on request (SAE please).

Carriage is £1.00 for any number of aerials to one address in G.B.

Coax Cable: 50Ω—16p per yard. 75Ω—13p per yard.

SURPLUS COMPONENT SECTION G8AAE G8BYL

VARACTORS VSC65D, 5W in at 2GHz for 2·5W out at 4GHz at £1.00.

OXLEY TRIMMERS 10pF and 15pF at 5p.

Transistors, Disc ceramics, Polystyrene, Polyester, Polycarbonate and Electrolytic Capacitors are still available. For full details see July advert (p. 486).

Cheques etc. payable to D. G. Phillips, P&P 10p.

D. G. PHILLIPS, G8AAE, 16 Back Lane, Stock, Ingatestone, Essex CM4 9DG

SEMICONDUCTORS

DIGITAL I.Cs.

7400 22p.	74HOO 40p.	7447 £1.10.
7473 40p.	7490 75p.	DM7490 £1.05.
74196 £1.60.		

LINEAR I.Cs.

LM380 £1.08.	MVR5/LOOT1 £1.75.	TAA570 £1.81.
TAD100 £1.50.	μL914 41p.	

SL600 SERIES

SL610 £1.75.	SL611 £1.75.	SL612 £1.75.
SL620 £2.65.	SL621 £2.65.	SL622 £6.65.
SL623 £5.25.	SL630 £1.65.	SL640 £3.25.
SL641 £3.25.		

TRANSISTORS

AC187 25p.	AC188 22p.	BC108 13p.
BC109 17p.	BC178 16p.	BC301 34p.
BD131 43p.	BD132 53p.	BF115 19p.
BF167 24p.	BF173 28p.	BF220 Use BF115.
BLY33 £1.25.	BSX20 14p.	ZTX300 14p.
ZTX500 14p.	2N706 11p.	2N708 12p.
2N918/MPS918 42p.	2N3553 £1.25.	2N3819 29p.
40290 £1.25.	40673/MEM616 53p.	

DIODES

BA102 28p.	BAW62 6p.	BZY88/3V3 14p.
BZY88/6V8 14p.	MLED500 20p.	NKT279 equiv. 17p.
OA200 8p.	1N914 6p.	1N4001 5p.
1N4003 9p.	1N4148 5p.	

NEW FROM CATRONICS LTD

The first of a new range of modules from Catronics Ltd are now available, all having these features:

- ★ All units readybuilt and aligned
- ★ Only top grade components used
- ★ Each unit individually tested before despatch
- ★ Full instructions and connection diagram included
- ★ Available only from A.R.B.B.G.
- ★ Delivery from stock (at time of publication)

Repeater Access Tone Generator with repeat tone facility, floating polarity supply and reverse polarity protection diode. Output is presettable for frequency and amplitude. 9-15 volt supply. **Only £4.40 inc. VAT.**

Crystal Calibrator giving outputs on 1MHz, 200kHz, 100kHz, 50kHz and 25kHz at the flick of a switch, with harmonics audible up to 2m band, 6 volt supply. **Only £7.15. inc. VAT.**

MICROWAVE MODULES LTD.

The full range of units is now available as follows:

RECEIVER CONVERTERS using dual gate MOSFETS in the R.F. Amplifier (in 4m & 2m) and mixer stages (in all versions). 30dB gain. All with 28-30MHz or 4-6MHz I.F. output (State which required).

70 & 144MHz — £16.42.
144MHz with 116MHz oscillator output for TX — £17.60.
432MHz — £19.55 (also 144-146MHz I.F. version available).

144MHz PREAMPLIFIER, 18dB gain, 2·8dB noise figure—£9.72.

144MHZ 5 WATT AM TRANSMITTER, 6 channel crystal controlled (144·5MHz supplied)—£35.10.

VARACTOR TRIPLERS

20W I/P to give 12W O/P on 432MHz—£18.90.
24W I/P to give 14W O/P on 1296MHz — £27.00.

Detailed information sheets available for any of the above on request—SAE please!
All above prices include postage.

"VHF COMMUNICATIONS"

Magazines and kits for "VHF COMMUNICATIONS" may now be ordered through us. Current magazine subscription is £2.50 (including postage). A new kit price list is in course of preparation.

All prices shown include VAT at 8%. Please note that our UK post & packing charge, except where indicated, in 10p. **EXPORT** orders are welcome—deduct one fourteenth (1/14) from the cost of goods and then add 45p. for post and packing—this will normally cover cost for air mail postage. **CHEQUES & P.Os** should be crossed and made payable to 'Amateur Radio Bulk Buying Group' or **pay by GIRO** —our Account no. is: 31 523 4003. **CALLERS** are welcome—but please telephone first. **ORDERS** should be sent to our mail order address as follows:

20 THORNTON CRESCENT, OLD COULSDON, SURREY, CR3 1LH
(Telephone: Downland 51413—10 am to 8 p.m. Monday to Saturday only)

Western

YAESU, YOUR ASSURANCE OF QUALITY, INTRODUCE The Superbly engineered YO-100 MONITOR SCOPE

FOR THE SERIOUS OPERATOR

THE YO-100 ALLOWS YOU TO

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- ★ **TUNE FOR MAXIMUM P.E.P.**
- ★ **MONITOR RECEIVED SIGNALS**
- ★ **ADJUST CARRIER SUPPRESSION**
- ★ **PROVIDE 2-TONE TEST SIGNAL**
  (Delivery is Ex-stock. SAE for details).

★ ★ ★ ★ ★

"ALL RECEIVERS 'FALL OFF' AT 30MHz!"

THIS HAS BEEN THE GENERAL OPINION OF RECEIVER SENSITIVITY PERFORMANCE FOR YEARS AND STILL APPLIES TO SOME MODERN EQUIPMENT! HOWEVER,

IT DOES NOT APPLY TO YAESU EQUIPMENT! "YOU DON'T BELIEVE US? THEN HERE ARE THE FACTS!"

TAKE YOUR PICK! EITHER REFER TO THE R.S.G.B. REVIEW APRIL 1973 OR OUR TEST ON AN OFF-THE-SHELF

YD-844 SP-400 FT-401 FV-401

SENSITIVITY

Input Freq. MHz	S + N:N for 0·50μ emf dB	S + S:N for 1·0μV emf dB
3·6	16	22
7·1	19	25
14·2	19	25
21·2	19	25
28·7	20	26
29·7	20	26

RECEIVER MEASURED PERFORMANCE

In order to compare receiver performance figures one must determine the following:

1. 'Voltage': is it emf or pd across, say 50 ohm input? There is a 6dB difference!
2. The signal + noise to noise ratio (S + N:N) in dB's.
3. The frequency at which the measurements have been made.
4. The bandwidth used.

Just in the same way as one can't compare apples with oranges, nor can one compare sensitivity figures unless the same standards are used. To use a narrower bandwidth would seem to give a recieiver a better noise performance. Equipment used for tests: Marconi signal generator TF2002AS, Digital Synchroniser (Marconi) TF2170AF, Power Meter TF2500.

Electronics (UK) ltd

SPECIAL OFFER! YOUR LAST CHANCE TO BUY SP-101, £9.90, FP-75 or DC-75 FOR YOUR FT-75, £16.50 EACH (including VAT)

YAESU PRICES (free delivery by Securicor or postage on small items) EXCLUDING VAT

HF TRANSCEIVERS'/PSU's

FT-75, Few only	£115
FP-75 AC PSU for FT-75	£15
DC-75 DC PSU for FT-75	£15
FT-101B	£330
FT-200	£170
FP-200 AC PSU for FT-200	£45
DC-200 DC PSU for FT-200	£51
FT-401	£310
FT-501	£375
FP-501 AC PSU for FT-501	£53

HF TRANSMITTERS

FL50 + VOX	£83
FL400	£193

HF RECEIVERS

FR50B + CAL	£67
FR-101S	£245
FR-101D	£330
FR-400DX	£155
FR-400SDX	£210

VHF TRANSCEIVERS/PSU'S

FT-2FB 12 ch.	£115
FP-2AC AC PSU/SPKR for FB	£38
FP-2AC/B AC PSU/SPKR + Batts	£71
SIG 200 200 ch.	£180
FT-2 AUTO AC/DC	£157

TEST EQUIPMENT

YC-35535MHz AC PSU	£99
YC-355 WE 35MHz. AC/DC PSU	£120
YC-355D 220MHz. AC/DC PSU	£127
YO-100 Monitor Scope	£93

REMOTE VFO

FV50B VFO for FL50	£28
FV50C VFO for FT75	£28
FV-101 VFO for FT-101	£42
FV-101B VFO for FT-101B	£48
FV-200 VFO for FT-200	£42
FV-401 VFO for FT-401	£42

SPEAKERS

SP-101	£9
SP-101B	£13
SP-400/401	£11
SP-101PB Phone Patch	£29

LINEAR AMPLIFIERS

FL-200B	£195
FL-2100B	£195
FL-2500	£150

ACCESSORIES

YD-844 Table MIC.	£14.75
YD-846 Hand MIC.	£5.75
CW Filter FT-101	£16.00
FF50DX L.P. Filter	£12.25
Yaesu Log Book	£00.55

★ ★ ★ ★ ★

NEW? FM DEVIATION METER, ECM.5A. (Ex-stock)

- ★ OPERATES 30-500MHz
- ★ CRYSTAL CONTROLLED EASY OPERATION
- ★ READS PEAK DEVIATION IN kHz
- ★ CALIBRATED 0-15kHz
- ★ BATTERY POWERED FOR PORTABLE USE

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(Illustrated right)

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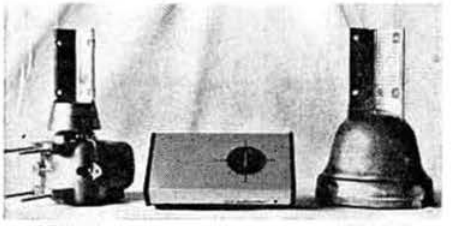

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Last month we told you about the excellent IC210. Please do not hesitate to contact us if you would like further details about this rig.

By the time this advert lands on your doormat we will have a fairly large stock of the IC22 which we believe to be the best buy at the present in mobile rigs—that is of course if you want a good, solid, well-built machine as opposed to some others we could mention which are cheaper but somewhat fragile in construction and for which you will have difficulty in obtaining crystals.

The IC-22 can accommodate up to 22 channels, and if bought from us has repeater access tone built in. We supply crystals for 145·00 and two other channels to your choice. The range of crystals available covers 144·24 to 145·92MHz in 40kHz steps plus the following: — 145·5, 145·55, 145·65 and repeater channels. We do not keep all channels in stock but can obtain them within a reasonable period of time. The IC-22 costs £118 including VAT at 8% and we will deliver by Securicor. Spare crystals cost £3.50 per set, write to us for a spec. sheet if you would like further details.

Don't forget the IC-225, Phase-lock synthesised mobile rig. This covers 80 channels at 25kHz spacing without having to buy extra crystals. An automatic Tx. Shift of 600kHz can be brought in for repeater working and of course we put a bleep-tone in the ones bought direct from us. We are very impressed by its performance, we only sell good equipment. Here is our price list.

PRICE LIST

September 1974

LINER-2

2m SSB Transceiver 144·1–144·35 ..	**£142.56**

INOUE

IC-210 2m FM Transceiver—fully tunable 144-146 with built-in phase-locked VFO 240V AC and 12V DC	**£280.80**
IC-22 22 Channel mobile transceiver (3 channels supplied)	**£118.00**
IC-20 Mobile Crystal Controlled transceiver (crystals for 145·00MHz supplied)	**£113.00**
Extra channels for above	**£3.50**
IC-225 80 channel mobile transceiver ..	**£210.60**

MICROWAVE MODULE PRODUCTS

2m. Converters IF2 2-4, 4-6, 28-30 ..	**£16.72**
2m Converter 28-30 IF with 116MHz LO output for transverter use	**£17.93**
70cm Converters IFs 28-30, 144-146 ..	**£19.91**
2m Low noise preamp with 2 isolated outputs	**£9.90**
70cm Triplers 2m in 70cm out. Max input = 20W giving 12W out	**£19.25**

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Converters 2m IFs 2-4, 4-6, 28-30 ..	**£16.20**
70cm IF 144-146	**£16.20**
Europa Transverter complete	**£76.67**
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PA3 miniature 2m preamp for building into existing equipment	**£5.40**

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744 150MHz Counter (Delivery 6-8 weeks)	**£99.00**

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Full Range of Accessories—Matching Speaker, Noise Blanker, Loop Antenna, etc.

SPECIFICATIONS

Frequency Coverage	Can be programmed with accessory crystals for 23 ranges (each tuning a 500kHz band) from 0·5 to 30MHz plus 150 to 500kHz. Crystals supplied with the receiver allow coverage on these ranges: 150-500kHz, 0·5-1·0MHz, 1·0-1·6MHz*, 6·0-6·5MHz, 7·0-7·5MHz, 9·5-10MHz, 11·5-12 MHz, 15-15·5MHz, 17·5-18MHz, 21·5-22MHz.
Modes of Operation	AM, CW, LSB, USB, (RTTY with RY-4 accessory installed)
Selectivity	AM: 4·8kHz @ -6dB, 10kHz @ -60dB SSB: 2·4kHz @ -6dB, 7·2kHz @ -60dB CW: 0·4kHz @ -6dB, 2·7kHz @ -60dB
Intermediate Frequencies	1st IF 5645kHz four pole crystal lattice filter, 2nd IF 50kHz four pole Hi-Q Ferrite LC filter.
Frequency Stability	At room temperature, drift for all causes (including ± 10% change in supply voltage) is less than ± 100Hz.
* Generous overtravel gives additional 50kHz or more off each end of range.	
Sensitivity	SSB and CW: 0·25microvolt for 10dB $\frac{S+N}{N}$, AM: 0·5microvolt with 30% modulation for 10dB $\frac{S+N}{N}$
Calibration	Dial is accurate to better than ± 1kHz when calibrated at nearest 100kHz calibration point.
Hum and Noise	More than 60dB below rated output.
Size and Weight	5¼" H × 10⅔" W × 12¼" D 140mm H × 274mm W × 324mm D). 18 lbs (8·2 kg).

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144MHz Mosfet Converters

UPDATED SPECIFICATION

The overwhelming response to the introduction of our 144MHz SSB receiver converter has indicated the requirement for a tightly specified converter for use with modern highly accurate 28-30MHz receivers. To this end we have now standardised the design of our 28-30MHz converter using a zener-stabilised 116MHz crystal oscillator, giving a typical read-out error of better than 1kHz. The converter is now available in the two versions, with and without the local oscillator output facility.

MMC144/28 Price **£16.42** inc VAT
MMC144/28 LO (with 116 MHz output) Price **£17.60** inc VAT

SPECIFICATION

Noise figure: 2·8dB max. Gain: 27dB typ.
Image rejection: 65dB typ.
Crystal oscillator: 116MHz (zenered)
Frequency error at 144MHz: 3kHz max.
Power supply: 35mA at 12 volts.
116MHz o/p power: 5mW min (LO o/p version)

We have extended our popular range of single conversion converters to include the following I.F.s:
9–11, 12–14, 14–16, 18–20, 24–26, 27·7–29·7, 28–30MHz
Price **£16.42** inc. VAT

144MHz DOUBLE CONVERSION MOSFET CONVERTER

I.F.s available ex-stock: 2-4, 4-6MHz. Price inc VAT **£16.72**
This unit was developed to meet the heavy demand for a converter suitable for use with receivers having better performance at lower frequencies. It uses two dual-gate mosfet mixers, both fed from the output of a 70 or 71MHz crystal oscillator. Selectivity is obtained at the first IF in the 74MHz range, thereby overcoming the usual problems associated with low-I.F. single conversion converters.

70MHz MOSFET CONVERTER

I.F.s available: 4–4·7, 14–14·7, 18–18·7, 28–28·7MHz.
Price **£16.42** inc VAT

136MHz SATELLITE BAND CONVERTER

I.F.s available: 28–30MHz and others. Price **£16.42** inc VAT

COMPLETE CONVERTER CAPABILITY

We can supply converters in the range 50–1300MHz. Please enquire if you have any specific requirements.

144MHz DUAL OUTPUT PREAMPLIFIER

Gain 18dB, N.F. 2·8dB. Ex-stock. Price inc. VAT **£9.72**

432MHz MOSFET CONVERTER

I.F.s available ex-stock: 14-16, 18-20, 24-26, 28-30, 144-146MHz.
Price inc VAT **£19.55**

This unit uses a dual-gate mosfet mixer for excellent strong-signal performance preceded by two BFY90 transistor RF stages for high sensitivity. All UHF tuned circuits are printed using Microstrip technology, and a crystal in the 100MHz region is used in the oscillator chain to overcome unwanted beats in the tuning range.

1296MHz CONVERTER

This converter has been developed using an extension of the microstrip techniques that have been well proven in our 70cm converter design. Two versions of the design are available using either a 96MHz or 105·666MHz crystal to produce I.F.'s of 144-146MHz or 28-30MHz respectively, corresponding to the 1296-1298MHz band. We are using crystals of a very tight tolerance to minimize the offset that would otherwise be very noticeable when using a high performance 28-30MHz tunable receiver. The multiplier chain uses three BFY 90 transistors and the mixer is fabricated using a pair of MA 4882 Schottky diodes in a balanced hybrid ring configuration. The I.F. head amplifier uses a selected low noise dual-gate mosfet to give an overall noise figure which is typically better than 8·5dB, and a gain of 25dB. Microstrip UHF circuitry ensures repeatability of this high performance design. The unit is housed in the same small die-cast box as the rest of our range of converters and is fitted with 50 ohm BNC connectors for optimum UHF performance. The converter operates from a nominal 12V supply and is available in negative earth version only. Price inc VAT **£25.92**

VARACTOR TRIPLERS

We manufacture varacter triplers for 432 and 1296MHz. Both are highly stable, with low level harmonic output, and capable of AM operation at the 50% power level. These units are aligned using swept-frequency and swept-power drive sources, the output of each unit being monitored on one of our spectrum analysers. Great attention is paid to harmonic suppression and linearity. All harmonics are greater than 40dB down on the wanted output.

432MHz VARACTOR TRIPLER

Maximum input power at 144MHz: 20 watts. Typical output power (at maximum input): 14 watts. Price inc VAT **£18.90**

1296MHz VARACTOR TRIPLER

Maximum input power at 432MHz: 24 watts. Typical output power (at maximum input): 14 watts. Price inc VAT **£27.00**

144MHz 5 WATT AM TRANSMITTER

5 watts input, six channel crystal controlled.
See April Radcom advert for full details.
Price inc VAT **£35.10**

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INCORPORATED 1926

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INTERNATIONAL AMATEUR RADIO UNION

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Membership rates: UK—£5.50, VAT included (Unlicensed members under 18 years of age—£2). Overseas—£5 (USA $12). Members are asked to notify changes of address without delay.

QTC AMATEUR RADIO NEWS

Regional and Area Representatives

The revision of county boundaries in England and Wales necessitates a revision of RSGB regional boundaries, but before doing so Council wishes to have the opinion of members. A map showing the proposed new regions will be included in the October issue of *Radio Communication*, and comments from members are invited. When these have been considered, arrangements will be made for nomination and election of Regional and Area Representatives.

In the meantime the present representatives, whose terms of office were due to end on 31 December 1974, will remain in office until the results of the election are confirmed.

Opinions please

Under the present arrangements and licence conditions, when G4AAA operates from Scotland he must use the call GM4AAA, together with the suffix /M, /P or /A, as appropriate. The use of GM4AAA does not immediately make it clear that it is in fact G4AAA visiting Scotland and initially QSL cards would be routed through the GM bureau. There have been suggestions that it would be more convenient and logical if a visitor to a UK country used that country identification as a suffix, eg G4AAA/GM. This would provide a clear indication of the status of the station. However, this still leaves the suffixes (/A or /M) as additional characters to be sent by cw or telephony, eg G4AAA/GM/M. If the country suffix system were to be used it might be possible to obtain a change in licensing conditions obviating the use of /A or /P but this is not likely in so far as /M is concerned.

Having pointed out the essentials of both systems the RSGB would like to hear from members with decided views on one or the other. Do you prefer the present system or would you favour a change as indicated above? Opinions (on postcards only, please) to the general manager at RSGB HQ. Please mark your postcard "Callsign changes".

Radio Amateurs Examination

The next RAE will be held on Monday 2 December 1974 and the RSGB will again organize an examination centre at London University. Those wishing to sit the examination at this centre should apply to the Society for an application form which must be returned, duly completed, together with appropriate fee, to arrive not later than 31 October. The examination fee is £2.50 for RSGB members and £3 for non-members.

"VHF Communications"

We understand that the management of *VHF Communications* have retained Messrs Blacket Gill & Langhams, 9 Staple Inn, London WC1, to represent them in connection with the affairs of *VHF Communications*/Echelford Communications. Any member who has an outstanding transaction with Echelford Communications may wish to get in touch with Messrs Blacket Gill & Langhams at the above address.

Reciprocal licensing

The Home Office advises that two further classes of amateur (sound) licence are now being issued. These are the amateur sound licences "G" (fixed) and "H" (mobile). These licences are issued to visiting members who hold licences in their own country equivalent to the UK Class B licence. The new Class G and Class H licences are being issued in the G5MAA—G5MZZ series.

Applications for reciprocal licences should be sent to the Home Office, Radio Regulatory Division, Waterloo Bridge House, Waterloo Road, London SE1 8UA. Visitors proposing to bring into the UK equipment capable of transmissions between 26·1 and 29·7MHz should first obtain written authority. This should be obtained from the Secretary of State, Home Department.

Intruders

There have been several instances of radio cars connected with broadcasting organizations being heard in the amateur 70 and 144MHz bands. Any such incidents should be reported to the RSGB Intruder Watch organizer, G3PSM, QTHR, giving full details of time, frequency and traffic heard.

Lecture at the IEE

A lecture dealing with interference suppression and investigation will be given at the IEE on the evening of Monday 25 November. The subject will be divided into two sections, the first of which will be a talk by Mr R. J. Harry of the Directorate of Radio Technology of the Home Office, who will discuss the methods of investigation and suppression applied in the UK. This will be followed by a presentation by Messrs Holloway and Jackson of the RSGB Interference Committee who will discuss problems confronting the radio amateur. It is hoped that there will be a capacity attendance to hear discussions on subjects affecting every licensed radio amateur.

Facts and figures

The Home Office advises that the following numbers of amateur licences were in force at 30 June 1974:

Class A 15,101	Class B/M 1,320
Class B 4,519	Television 266
Class A/M 3,243	

The Callsign Record received from the Home Office, dated 27 July, gives the latest callsigns issued in the G4 and G8 series as G4DGG and G8IVN respectively.

At the end of July RSGB membership totalled 17,877, made up of 15,051 UK corporate, 1,105 UK associate members and 1,721 overseas members.

New publications list

Recent changes in postal charges, increased cost of packing materials, and some changes in cover price have necessitated a revision of our publications list. The new list incorporating these changes appears on the inside back cover of this issue.

Certain books, including *Radio Communication Handbook* and *VHF/UHF Manual*, which are out of print have been omitted. New editions are in course of preparation and will be advertised when published, but in the meantime no orders for them can be accepted.

If in doubt concerning price or availability please enquire before ordering. When orders cannot be filled in whole or in part a refund will be made. Will members at present holding credit notes for items not available please return them to RSGB HQ with a request for a refund.

"QST"

Members subscribing to this magazine are receiving reminder cards carrying a notice which is incorrect due to changes in postage and exchange rates. The current subscription charge is shown on the revised publications list on the inside back cover of this issue.

AA "Drive" Magazine

An article on mobile operation, published in the summer issue of this magazine, has resulted in over 200 letters to RSGB HQ. All will be answered but it is regretted that some delay in doing so will be inevitable.

"Radio Amateur Operator's Handbook"

The latest (13th) edition of this popular book is now available. It comprises 88 pages of information invaluable to the practising radio amateur, including such items as prefix lists, zone lists, table of bearings, details of the band plans and a selection of maps. The information has been revised and was current at the time of going to press. The presentation is clear and a durable binding should ensure satisfactory life on the operating desk. Size 8½in by 5½in.

Published by Data Publications Ltd and obtainable from RSGB Publications Section price 70p plus 10p post and packing.

G2YL QSLs

Constance Hall, G8LY, QTHR, will be handling the late Nell Corry's (G2YL) QSLs, during the next six months. Cards already sent via the bureau will be honoured, but from now on please send to G8LY direct with sae.

Stolen equipment

The following equipment was stolen from G3CVF on 3 August: a Heathkit HW100 with built-in speaker, and a Prinzmatic 500W auto-slide projector. Any information to Don Pidgeon, 6A Verlands Road, Preston, Weymouth, Dorset.

Independent Order of Oddfellows Ham Club

This club has members in G, HB9, LA, OZ, OH, SM, VE and 11 W call areas, and is looking for more. Schedules are: 1200gmt Sundays, 14,273kHz; 2015gmt Tuesdays, 14,273 kHz; 2015gmt Wednesdays, 14,073kHz; 0730gmt Sundays, 3,720-3,725kHz, Scandinavian Net. Further information from G3YJS, QTHR.

Can you help ?

The RAF Amateur Radio Society recently received a letter from blinded, ex-RAF Warrant Officer E. P. Williams and is anxious to contact him. Unfortunately he neglected to give his address, but he did mention that he had been loaned an Eddystone 640 receiver. Would any reader who loaned an Eddystone 640 to Mr E. P. Williams advise Sqn Ldr V. J. Ludlow, RAF ARS, RAF, Locking, Weston-super-Mare, Avon BS24 7AA.

Southampton RSGB Group Convention and Region 17 ORM

Southampton College of Art

East Park Terrace

1400-2000

Saturday 21 September 1974

PROGRAMME

1415-1550	Official Regional Meeting
	Lectures
1600-1650	(A) Aerial Circus—*F. J. Charman, MBE, G6CJ*
	(B) RTTY today—*D. E. Beattie, G3OZF*
1700-1750	(A) Mystery lecture—A. N. Other
	(B) Meteor Scatter—J. Ludlow, GW3ZTH
1800-1850	(A) VHF Topics—M. Dormer, G3DAH
	(B) Solid state '74—P. Tunbridge, G8DEK
1900-1950	(A) The RSGB today—D. A. Findlay, G3BZG
	(B) New frontiers on 23cm—M. Walters, G3JVL

Trade stands. Bar and refreshments.

Talk-in stations: G3SOU/A, 70·26; G8FAB/A, 144·25 ssb; 145 a.m./fm, 145·5 fm.

Admission by programme—50p

Nominations for election to the 1975 RSGB Council

The Articles of Association (as amended at 1 January 1972) require that not later than 10 September in each year the Council will send to each member entitled to vote a list of those Council members who retire by rotation or for any other reason on the succeeding 31 December. The list must indicate those members who are willing to accept nomination for re-election and the list must also indicate whether the vacancies are to be filled by election of an ordinary member or on a zonal basis.

The following members retire at the end of this year:

Ordinary member

Mr G. M. C. Stone, G3FZL, (by rotation) who will accept nomination for re-election.

Zonal members

Mr J. R. Petty, G4JW, Zone A, (by rotation) who will accept nomination for re-election.

Mr C. H. Parsons, GW8NP, having been appointed President for 1975, is required to relinquish his office as Council member for Zone E.

Not later than 10 October next any 10 corporate members may nominate any qualified member, by delivering in one closed envelope to the secretary of RSGB, their respective nominations in writing together with the written consent of such member to accept office if elected, but each such nominator shall be entitled to nominate only one member for election at the subsequent Annual General Meeting.

In the event of insufficient nominations being received to fill all vacancies arising, Council has power to fill any remaining vacancies and all nominations properly made shall thereafter be declared elected unopposed.

Members nominated for election to the Council on a zonal basis must be resident within the zone for which they are nominated and the nominators must be Corporate Members resident in that zone.

A self-contained high-power linear amplifier for the hf bands

by R. SCHOFIELD, G3RJQ* and G. MORRIS, G3YDR

WARNING

In view of the high voltage (1·5 to 2kV) required by this amplifier, it is suggested that construction of a project of this type should only be undertaken by an experienced constructor.

DESIGN CONSIDERATIONS

The specification for this amplifier was evolved as a result of consideration of the following requirements:

1. The amplifier must be a self-contained unit of a size consistent with modern practice.
2. Cost should not be greater than £30 if all components are to be bought.
3. Maximum permitted output to be obtained on all bands, 80 to 10m.
4. Valves must not be expensive.
5. Metalwork to be within the range of hand tools and to utilize, if possible, ready-made chassis.
6. Drive-power requirements to be within the range of currently-used transceivers.
7. One, or certainly not more than two, valves to be used. This would avoid involved matching and unusual LC tank components.
8. The valves to be operated well within their ratings.
9. The amplifier must be stable and, if possible, neutralization requirements to be avoided.

Initially a number of valves were considered, eg 813, 6HF5, and 572B. These were discounted for a number of reasons, some of which are:

813. This valve requires excessive eht and unorthodox filament supplies. Further, the efficiency is questionable above 21MHz.

6HF5. Colour-line timebase valves tend to require high levels of ht smoothing and a specialized transformer. The valves quite often have to be overrun, especially when legal output is required.

572B. These triodes used in grounded-grid configuration in commercial amplifiers were found to cost about £20 per pair!

The 4X150A/4CX250B type was considered and found to satisfy the criteria listed above. The use of such valves on the "dc bands" may be considered by some as wasteful; nevertheless the total lack of instability and high efficiency when used in passive grid AB1 negates such criticism.

A self-contained amplifier giving 400W output may be constructed on a chassis 16in by 10in by 2½in, the front panel being 10in high. Using particular care in the choice of components, this may be reduced to 12in by 9in by 2½in and 8in high: such a size would be consistent with modern practice. The use of a surplus eht transformer causes the unit to be rather heavy, but somewhat light on the cheque book!

An amplifier made by one of the authors cost less than the maximum of £30. In this costing was included the cost of both unused valves and bases, eht transformer, psu capacitor bank and rectifier, metalwork inclusive of chassis, cabinet and pi tank capacitors. Clearly the cost will vary with the availability of surplus components. Currently surplus unused 4CX250Bs are slightly more expensive than 6146s.

With regard to the output of the amplifier, using two valves in parallel passive grid AB1 and an eht of 1,600V, an output into a dummy load of 70Ω of 473W was obtained on 15m. The input drive was 21W.

In considering the metalwork, standard chassis were used and a form of construction using the front and side panels to form the case was adopted. The construction is, therefore, within the range of commonly available hand tools.

With reference to the rating of the valves, it has been noticed that when using an Air Flow Developments Blower type 26BTM it is not advisable to produce maximum output continuously for longer than is necessary to effect tuning of the pi-tank. With a blower of higher output this limitation does not apply.

However, it should be noted that the advantages to be gained by using these uhf tetrodes are gained at the expense of perhaps three important disadvantages:

(a) The valves require forced-air cooling even when the heater voltage is applied.

(b) An eht of between 1·5 and 2kV is necessary.

(c) A special valve base system is required.

The use of the eht cannot be avoided and the inherent danger from such a power source must not be underestimated. Considering (c), the bases are frequently advertised for sale but it should be noted that the authors do not have any surplus bases or valves.

CIRCUITRY AND CONSTRUCTIONAL DETAILS

It is intended in this section of the article to provide generalized information. The utilization of the data is then left to the individual constructor.

The circuit

This may be divided into two sections, the amplifier and power supply. It will be noticed that the circuit follows standard practice, but a number of factors will be considered. The stabilized 300V screen grid supply is not obtained from the eht but from a separate supply which is

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arranged to operate when the eht transformer is energized. This arrangement avoids the expense of, and heat generated by, a resistor dissipating in the order of 45W. It must be stressed here that both screen and anode volts appear at the same instant, or the screen supply later than the anode.

If the maximum values of the parameters associated with the 4X150A/4CX250B valves are examined, it will be noticed that the maximum anode voltage is 2kV, and each valve has an anode dissipation of 250W. It has been found that 2,200V may be applied with no ill effect. The anode dissipation in this amplifier will be of the order of 150 to 210W. This is well within the ratings of the valves.

1·5 to 2kV is the suggested range of eht which will permit optimum operation of the amplifier consistent with maximum permitted output. The supply may be reduced to 1,000V for a lower output, but this was not tried. Rather surprisingly, no significant difference in output was obtained when either the 4X150A, 4X250B or 4CX250B valves were used on the hf bands.

The rf energy on the required amateur band is coupled via 75Ω coaxial cable from the exciter pa to the input of the linear. If it is decided not to use the amplifier, this energy is coupled through to the aerial by relay RL1. This arrangement is standard commercial practice and is particularly convenient.

When the amplifier is to be used the system functions as follows: S1, S2 and S3 are operated sequentially so that the heaters of the valves cannot be operated unless the blower is working. Thus when S1 is closed the blower operates; S2 provides heater volts, bias and relay function, and S3 causes the eht, 300V line and relay supply to be applied to the pa. RF drive is applied to the 66Ω 18W resistor (R1–R18) which shunts the input to the amplifier. This resistor(s) is placed within the grid input module so that it is cooled. The voltage developed across this resistor provides the excitation to drive the amplifier to the required output. Such damping of the grid circuit does much to maintain the stable characteristics of the amplifier.

Regarding metering, since the cost of meters is not excessive, it is advisable to use separate meters to measure grid current (or lack of it), screen grid and anode current, but only the last two are really essential.

Construction

Consideration of the layout of the chassis will enable identification of the major components and the determination of their relative positions. In general the layout of the amplifier is not critical, but power supply safety considerations dictate the arrangement of components. It is useful to note that the reservoir capacitor for the eht is made up as a sub-unit and placed in the coolest area of the chassis.

Since standard chassis have been used for both the grid input module and the amplifier/power supply, the metalwork has been simplified. The case is formed from the front panel and sides. The sides have a ½in right-angle formed at each end, thus permitting them to be bolted to the front panel and a back to be fitted. Open mesh can be used for the top, and a perforated 16swg aluminium sheet used for the base. The under-chassis area must be ventilated.

Should excessive vibration be produced by the blower this can be minimized by mounting the blower on part of a plastic-foam sponge. Rubber-based sponge was found to be too resilient.

Components list

R1 to R18	1·2kΩ 1W carbon	**R46**	select for 40mA through V3 and V4
R19, R20	100Ω ½W carbon	**R47**	470kΩ ½W carbon
R21, R22	10Ω 1W carbon	**R48**	470kΩ 1W carbon
R23, R24	10Ω 5W ww	**R49**	2kΩ 5W ww
R25 to R32	47kΩ 2W carbon	**R50**	47Ω ½W carbon
R33 to R44	470kΩ ½W carbon	**RV1**	10kΩ linear ww pot
R45	1kΩ 10W ww		
C1, C2	0·01μF ceramic 400V	**C18**	32μF electrolytic 450V
C3, C4	0·01μF see text	**C21**	100μF electrolytic 50V
C5	500pF mica (not silvered mica)	**VC1**	250μF transmitting type ¼in min plate spacing
C6, C7, C8	0·001μF feed-through 400V	**VC2**	500pF+500pF broadcast type
C9 to C16	100+60μF electrolytic 350V		
C17, C19, C20	16μF electrolytic 450V		

MR1—12	1,000V piv at 1A.
MR13, MR14	800V piv at 400mA
MR15—18	400V piv at 400mA
MR19	100V piv at 500mA
T1	mains primary—1·5kV to 2kV secondary, also 6·3V if possible for LP3
T2	mains primary—300-0-300V 60mA, 6·3V 0·5A
T3	mains primary—80V to 150V 20mA secondary
T4	mains primary—6·3V 6A secondary
T5	mains primary—12V 0·5A see text
RFC1	see text
RFC2	2·5mH pi-wound receiver type
APC1, APC2	4 turns 18swg copper wire on 47 1W resistor
L1, L2	see text
M1	0–50mA moving coil meter
M2	0–500mA moving coil meter
RL1	double-pole change-over heavy duty type
RL2	single-pole change-over heavy-duty type
V1, V2	4X150A, 4X250B, 4CX250B with suitable bases and chimneys
V3, V4	OA2
FS1, FS3	0·5A cartridge
FS2	10A cartridge
S1 to S3	dpst mains toggle

Blower motor—see text.

The grid module was constructed on a 6in by 4in by 2½in chassis with a baseplate in which a hole was cut for the passage of the air input. All anti-parasitic resistors in the control-grid and screen-grid circuits were mounted as close to the valve base pins as possible. This follows standard constructional practice. The input resistor R1–R18 is formed from 18 1·2kΩ 1W carbon resistors arranged in parallel. This gives a nominal value of 66·72Ω and a power rating of 18W. These resistors are mounted within the grid module and are forced-air cooled. This allows them to operate satisfactorily with an input power of between 21 and 27W across the resistor.

All supplies except eht are applied via 1,000pF feed-through capacitors. This proved to be the most simple and effective means of connecting the various supplies, as the terminals of the capacitors extended through the main chassis and so formed convenient anchorage terminals for the voltage from the power supply. It is perhaps unnecessary to use feed-through capacitors at this relatively low frequency especially as the amplifier should be inherently stable when operated in passive grid AB1.

When the anti-parasitic chokes in the anode circuit were made, six turns were used. These were found to resonate with their self-capacitance at 22MHz, and this caused the

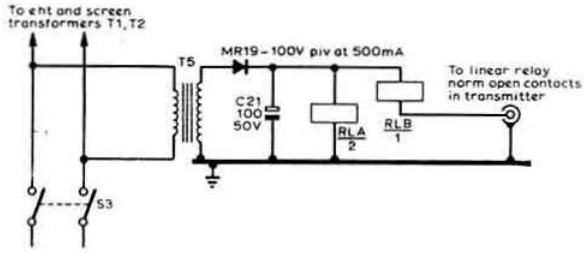


Fig 1. Control circuitry and relay supply

immediate destruction of the parallel-connected 47Ω resistors. Two turns were removed from each choke, raising the resonant frequency to 40MHz, and no further trouble was experienced.

The anode rf choke (RFC1) consists of a 4½in winding of 30swg enamelled copper wire on a ⅜in diameter paxolin former. This was merely tried as an experiment, but it was found to function perfectly on all bands and was noted to have a self-resonant frequency of about 35MHz. A lower self-capacitance could be achieved by winding the choke in unequal sections, thus raising the resonant frequency, but this was not tried. The multi-section pi-wound rf chokes are not suitable for high power pi-tank service. Connection to the anodes was made by the use of 1¾in diameter electrolytic capacitor clips.

Coils L1 and L2 were made as follows: L1 requires five turns of 8swg copper wire or tube, each turn spaced by the thickness of the wire. The diameter being 1¾in. A tap is made at three turns for 10m. L2 consists of 25 turns of 16swg 2in diameter tapped 4 turns for 20m, and 11 turns for 40m. Both coils are arranged in series for 80m.

C3 and C4 were surplus items having a rating of 2·5kV working and 5kV test. It is suggested that if non-surplus components are used, then because of the high dc and rf voltages involved, the ratings of these capacitors be at least twice the applied eht. Either mica or ceramic types may be used.

The design and construction of the relay supply is left to the individual constructor since the required voltage will depend upon the type of relay used. However, a suggested circuit is shown for the control circuitry as a whole, see Fig 1.

The eht rectifier is connected as shown in Fig 2. Paxolin tag board was initially used for mounting the rectifier components. Insufficient tag spacing could possibly cause breakdown of the board. Perspex sheets ¼in thick was considered and used in one of the amplifiers.

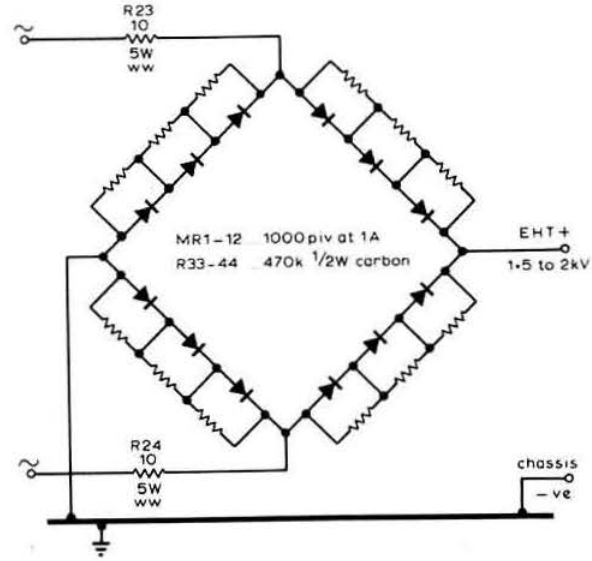


Fig 2. EHT rectifier

ALIGNMENT

Before applying mains voltage it is advisable to check the completed unit against the circuit diagram as a whole. It is also useful at this stage to measure the dc resistance of the various outputs provided by the power supply with reference to chassis to check for possible short circuits.

If electrolytic capacitors of seasoned vintage have been used in the reservoir capacitor for the eht supply, then before the eht can be applied these capacitors must be re-formed. This may be carried out by applying a reduced dc potential of the order of 50 to 100V across each capacitor forming the reservoir. The process is complete when equal voltage is dropped across each capacitor in the network. The dc for the process could be obtained from the screen supply. A suggested circuit for the re-forming process is shown in Fig 3.

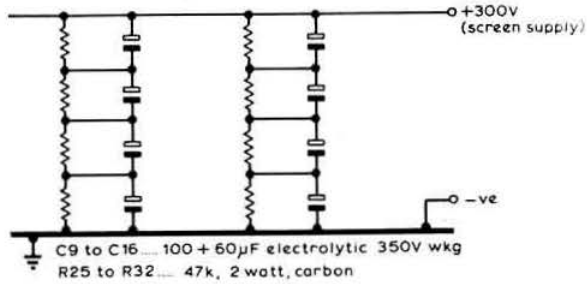


Fig 3. Temporary suggested circuit for re-forming old electrolytic capacitors

S1 is now depressed. The blower motor should function, and a careful check for air leaks from the grid module should be made. If the blower is arranged symmetrically between the bases of the two valves then each will receive an equal volume of air.

S2 may now be depressed. The heater voltage at the feed-through capacitor to the grid input module should be quickly checked and must not exceed 6·0V otherwise valve life will be greatly shortened. Adjustment of this voltage may be accomplished by selecting a suitable mains tapping on the transformer T4.

The bias supply is particularly important. A failure of the bias supply could cause the amplifier valves to be destroyed. RV1 is adjusted so that a voltage in excess of 50V (80V) is applied to the grids of the valves, measurement again being made at the appropriate feed-through capacitor.

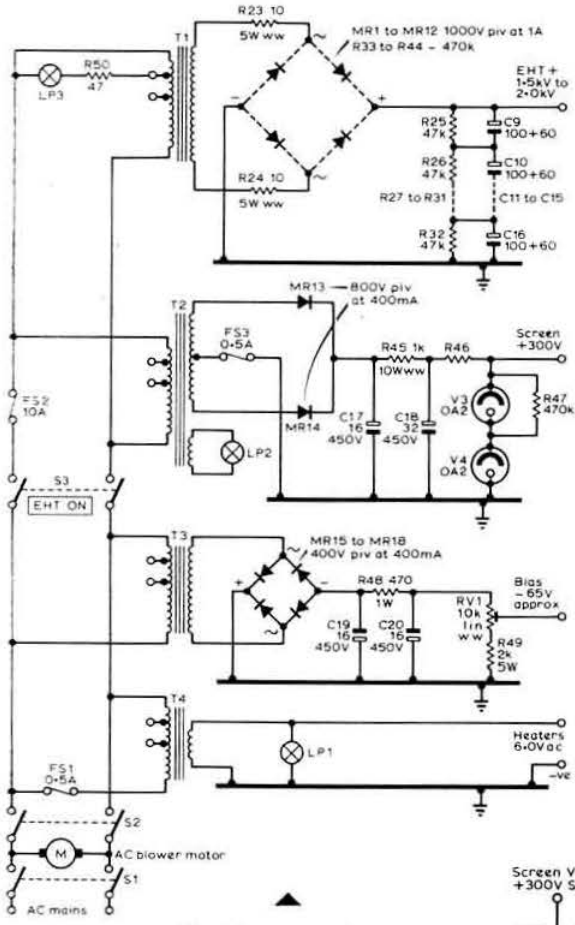


Fig 5. Power supply

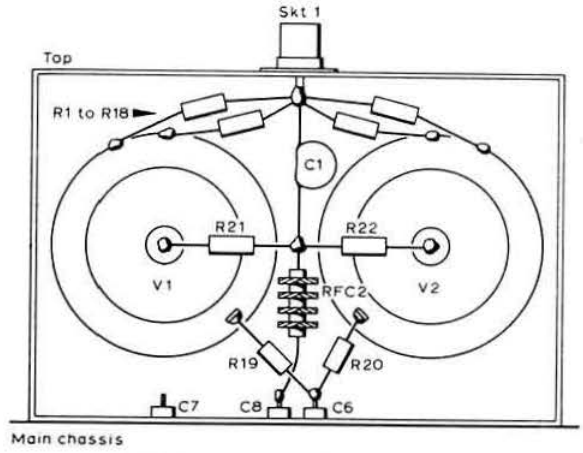


Fig 6. Inner view of grid input module

Although at this stage the amplifier output need not be loaded, it is advisable to anticipate this requirement and to connect a 50 or 72Ω dummy load to the pi-tank coaxial output socket of the amplifier. The input to the amplifier is connected to the exciter but no drive is, as yet, applied.

S3 is operated. The stabilizer valves V3 and V4 should light and an anode current of less than 100mA should be developed. It may be useful to measure the eht at this stage. If a much lower eht is developed than that expected, then S3 should be switched off, the eht line grounded after a suitable pause, and the capacitor bank and rectifiers checked for signs of stress.

Assuming that the eht supply is satisfactory then the

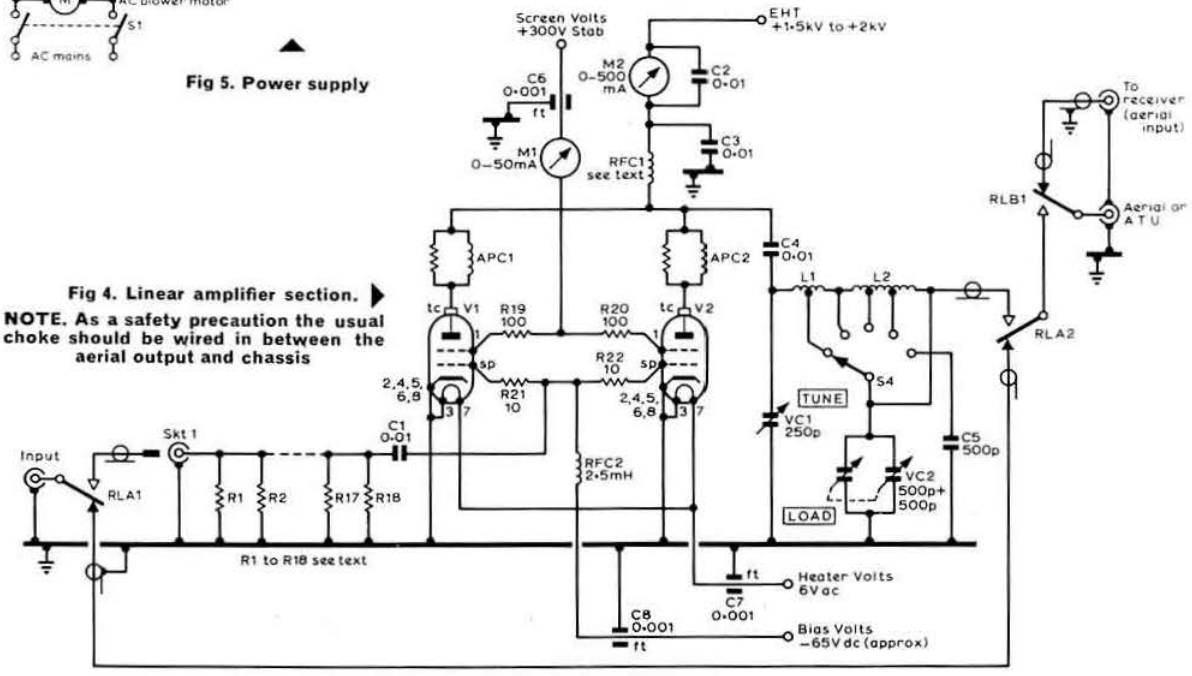


Fig 4. Linear amplifier section.

NOTE. As a safety precaution the usual choke should be wired in between the aerial output and chassis

Table 1. Input/output performance.

Band	Drive volts	Drive power	Va	Ia	RF o/p (70Ω)
80m	110V p-p	22W	2,040	320mA	400W
40m	110V p-p	22W	2,000	400mA	400W
20m	105V p-p	21W	2,000	400mA	400W
15m	105V p-p	21W	2.000	400mA	400W
10m	105V p-p	21W	2,000	400mA	400W

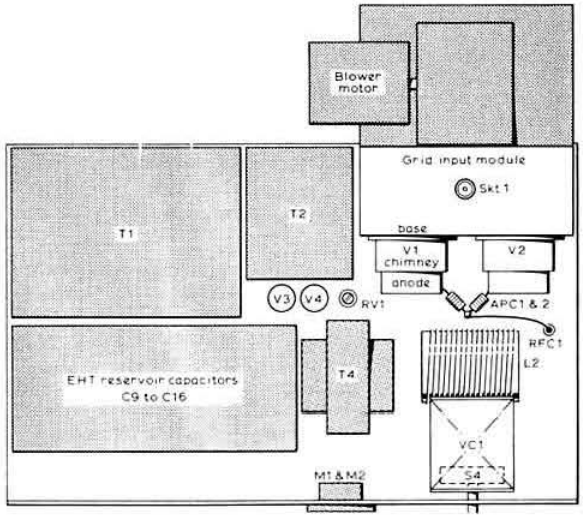


Fig 7. Above-chassis layout of principal components

potentiometer RV1 should be carefully adjusted for an anode current reading of 200mA total standing current. It should be appreciated that the finned metal-work associated with these valves will be at eht potential and clearly under no circumstances should ANY adjustment be attempted to the components involved with the anode circuitry while eht is applied.

With no drive applied, switch on eht/screen supplies (S3) and rotate VC1, VC2 simultaneously and observe the effect on anode and screen current meters. No variation in readings should be obtained at all settings of VC1 and VC2 and all positions of the bandswitch, indicating absence of parasitics and self-oscillation. No indication should be obtained on a power meter connected with the dummy load. A similar procedure may be carried out with the dummy load out of circuit, with similar results being obtained as in the tests above.

The performance of the amplifier is shown in Table 1. To achieve these levels of output it is necessary to adjust the plate tuning VC1 for resonance, indicated by a screen current peak and an anode dip. As the loading is increased (VC2 capacitance decreased) the dip in anode current will become less pronounced as expected. The screen current will still sharply peak but at a lower value with the drive level remaining constant. Maximum output occurs at a screen current peak of 35mA. Since the peak in screen current is more pronounced, this is the best indication of resonance and optimum loading.

Table 2. Taken at 14MHz.

Condition	Bias —Vg	Screen Volts	Anode Volts	Anode Current	Screen Current	RF Input Volts p-p	RF Output power
No signal	—55	320V	2,160	200mA (Both valves)	0 or negative slightly	0	0
Max signal	55	300	2,000	400	35mA	105	400

Since an alc facility has not been incorporated it is suggested that provision be made to monitor the output rf waveform.

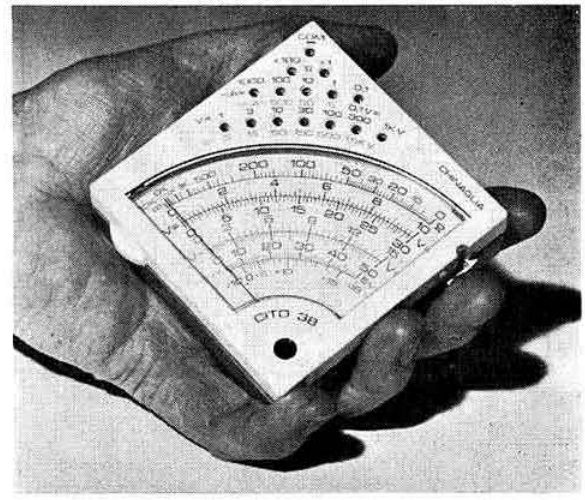
CONCLUSION

The amplifier on which this article was based has worked satisfactorily and has made contacts possible under adverse band conditions. In retrospect it is considered that the performance has certainly justified the time and money involved, and it is hoped that other constructors will find this unit a useful addition to their station equipment.

NEW PRODUCT

A hand-held multimeter

The Chinaglia Cito multimeter is a small instrument designed to facilitate portable measurement at low cost, with an accuracy of 2·5 per cent on dc and 3·5 per cent on ac. The basic movement is the 80μA Chinaglia moving coil unit, and range selection by test lead sockets avoids switch contact resistance problems. The six coloured scales are as big as the instrument itself. Ranges are: dc to 1·0kV; ac to 1·5kV; dc current to 1·0A; ac current to 0·5A; ohms to 1·0M and decibels between −10 and +65. These limits are covered by some 30 individual ranges. Sensitivity on dc is 10k and 2k on ac. Further information can be obtained from Chinaglia UK Ltd, 19 Mulberry Walk, London SW3 6DZ.



Building blocks for the novice

by SVEN WEBER, G8ACC*

Diodes, diodes and diodes — and some experiments with them

(Part 6)

Constant Voltage Devices—2

In Part 5, zener diodes were introduced as voltage stabilizing devices and, with a few experiments, their characteristics and ac resistance or output impedance were investigated.

Is it possible to define a measure of "goodness" for a zener diode? One could make an arbitrary definition of goodness of a zener by dividing the static diode resistance by the impedance (R_{dc}/R_{zc}) at a fixed value of current or voltage. This would mean that a perfect zener diode has a goodness factor of ∞, and an ordinary resistor of 1. This factor, perhaps, is not so esoteric a quantity as it at first sight appears. A graph can be drawn of goodness factor against zener voltage with similar types of diode at various constant currents (Fig 34), and each of these curves has its own maximum with a diode of a particular voltage rating. So sometimes it is better to use several zener diodes in series rather than one high voltage one, for two similar diodes in series have the same goodness factor as a single diode. Incidentally, these diodes must not be used in parallel to try to reduce their total impedance because one will take most of the current: it is impossible, practically, for any pair of diodes to be absolutely identical. This raises the question, why buy zener diodes that have goodness factors substantially less than the maximum practicable? The answer probably lies in a matter of convenience and because most zener diodes only have to do a rough job of stabilization with a constant current load.

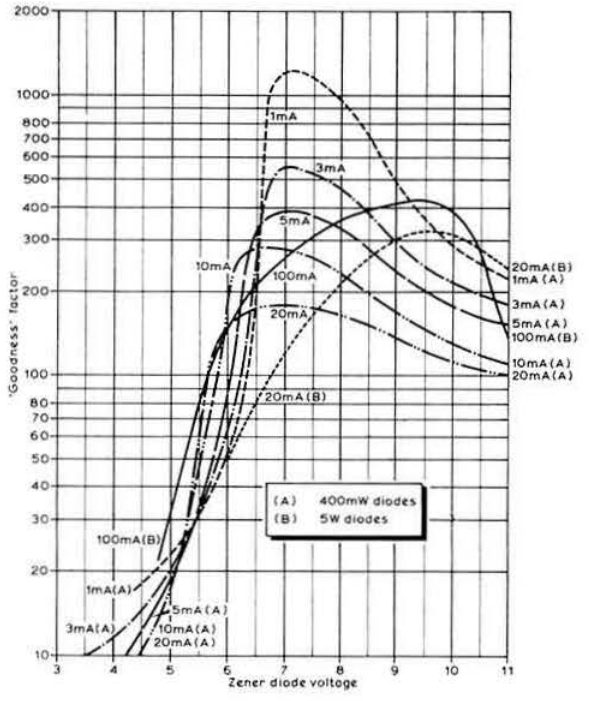


Fig 34. "Goodness factor" of zener diodes plotted against diode voltage for various currents with similar types of diode

Temperature also has its effect. Up to about 5·5V, with increasing temperature (depending on current to some extent) the voltage goes down, and above that voltage it goes up. Not substantially, except in the higher voltage diodes, but enough to put things out if a precision voltage reference is wanted. So again, if high voltages are wanted, a string of 5·6V diodes might be better than, say, a 28V version at a diode current of 15mA (Fig 35; note the almost zero temperature coefficients with some diodes at a particular current), or else having some ordinary forward-biased diodes, which have a negative temperature coefficient in series with a zener of slightly less than the voltage required. But it should be said that it is impossible to fabricate a single diode with a zero-temperature coefficient over all ranges of current and temperature, even in the range in which we are interested.

It is with unstable sources, or sources only a few per cent above the diode voltage, that trouble can be serious, especially if a constant current source is not used in place of R_s. Assume that the source varies from 15V down to 12V as a result of other external loads (Fig 31); at 15V with R_s = 120Ω, 85mA can be employed. But if the source goes down to 12V, the pd across R_s would be 7·3V and the available current would be reduced to 61mA, and if 85mA is still required, the voltage across the load would drop to 1·7V. Returning to the original current figure and normal zener voltage would entail changing R_s to 86Ω—which would mean that if the source returned to 15V again, the diode would have to cope with $\frac{15 - 4{\cdot}7}{86} \times 4{\cdot}7$W or 560mW, 40 per cent above maximum, which would not do it much good in the long run. This kind of calculation and effect would be made much more severe if the source voltage were nearer the diode turn-over voltage. So it seems that the thing to do is to calculate for the worst possible case and perhaps also assume that the load across the zener could go open circuit.

This brings to mind the stability factor, S, ie the ratio of change between a percentage change in the input and output voltages. It seems obvious that if a stable output voltage were

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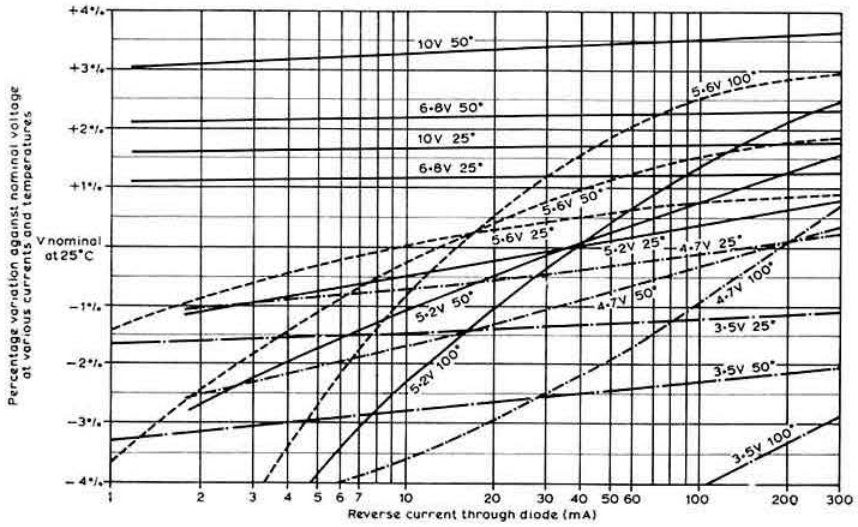


Fig 35. Temperature curves for zener diodes

wanted, the bigger the input to output voltage ratio the better and also the smaller the load current variation, and the lower the load current the better. The complete expression for S is rather complex, but as a rough-and-ready guide for a 5W 6·8V diode with a diode current of 20mA and load current the same, a ratio of 10 : 1 for input to output voltage gives a figure for S of about 40, a 5 : 1 ratio gives S = 30; and a 1·25 : 1 ratio about 10.

As was mentioned earlier, it is impossible with a single diode to stabilize completely against changes in temperature. Also, it is one of those unfortunate facts that a diode with the minimum temperature coefficient has not got the lowest output impedance; in fact, far from it. So there is a choice, either of having a low output impedance and the output dependent on temperature, or of stabilizing against temperature and having a constant (or more or less) load.

Taking the first choice of obtaining a stable voltage with a varying load, one has to have a large zener diode that can cope with the dissipation of a large standing current and also use a large V_{in}/V_{out} ratio, or else amplify the reference voltage across a smaller diode by a valve or transistor using negative feedback. That is, in both cases, trying to get the output impedance to its minimum value. Both systems have their advantages. But a point to watch is that some loads can provide voltage spikes back to their supply rails, which zener diodes can absorb and transistor PSUs often cannot. For example, ttl integrated circuits.

The second choice can also be satisfied in two ways, either by having a constant current source in place of R_s or having two or more diodes in cascade. In both cases, the best stability is obtained by having the highest input voltage possible. Fig 36 shows an example of a stabilizer where the output will stay constant to within 0·1 per cent (perhaps even an order better) over the range of −50 to +100°C and for source voltage variations of from 45 to 80V. S would be about 600 to 700, and Z_{out} of the order of 10Ω. However, the load current would have to be constant to under 1mA (up to a 5mA total) without going over the limit of stability. Of course, this degree of voltage reference could well be made the basis of a more complicated power unit. But this would be going to extremes unless this order of stability were really needed. A circuit using cascaded diodes could possibly be designed for a low impedance output (which would be around 8·2V pd) by having a string of low voltage zener diodes which have negative temperature coefficients for the first stage to compensate for temperature changes, but S would have to be rather carefully calculated. With all of these circuits, the more stable a voltage is wanted, the more inefficient the circuit becomes (W_{in}/W_{out}), particularly with regard to the last one.

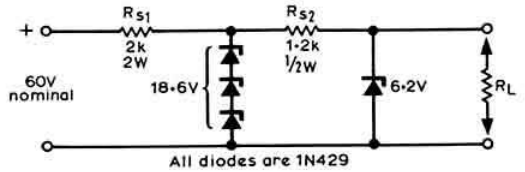


Fig 36. Cascade stabilizer

Another use for zener diodes would be for clipping ac waveforms. Although their self-capacity is rather high for rf work (because of this, they can be used as varactors, but more about this in a later article), for af work in medium to low impedance circuits they are ideally suited. A pair of diodes, back-to-back (some units are made this way like the Lucas CD5- series) would clip the peaks off any waveform where those peaks were above the combined turn-over and forward voltages. This can easily be shown using an af signal generator and oscilloscope. If the source impedance is not too low, the peaks would not cut off too sharply (Fig 37). This suggests that level switching would be possible very simply, giving a load current when a superimposed ac waveform

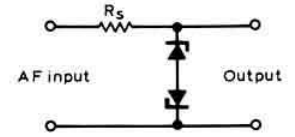


Fig 37. AF clipper

on a dc base went over a pre-determined peak voltage (Fig 38). In this circuit, the output voltage would go down from +15V to +5V immediately any output was greater than +5V.

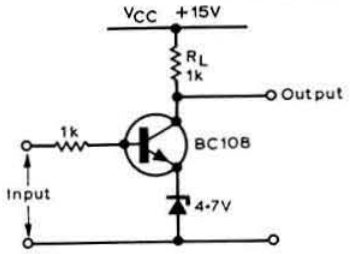


Fig 38. Level switch

The low value of ac resistance at any substantial dc current suggests that the diodes could also be used for decoupling and this, in fact, is the case. A small 6·2V or 6·8V diode at 10mA dc current has a typical value of impedance of 2Ω. It would need quite a large capacity to have similar decoupling characteristics at If to the right-hand part of Fig 36, and as zener diodes also have a fair value of self-capacity, decoupling of this sort would be effective up to quite a high frequency.

Part 7 will deal with constant current devices.

RAE COURSES, 1974-5

A list of other RAE courses was given on Page 52 of the August issue.

Aldridge, Walsall. Tynings Lane Evening Institute. Fridays 7.30-9.30pm, commencing 20 September. Enrolment: 7.30-9pm 13 September. Instructors: G3XFN and G4DDF.

Bangor, Co Down. Bangor Technical College. Two evenings a week, commencing mid-September, for details contact GI3WSS, QTHR, tel Holywood 4277.

Barry. College of Further Education, Colcot Road, Barry. Tuesdays 7pm, commencing 24 September (theory), 26 September (morse and practical). Enrolment: to 8pm, 16-18 September. Fee: £5.25 (over 18). Late enrolment penalty: £1 extra.

Battersea, London SW11. The Battersea Adult Education Institute, Latchmere Road, Lavender Hill, London SW11. Thursdays 7-10pm. Enrolment: week commencing 16 September. For details contact G3YNP, QTHR.

Bedford. Stratton School, Biggleswade, Bedfordshire. Commencing in September. For details contact G3OWQ, QTHR.

Borehamwood. Borehamwood College of Further Education, Elstree Way, Borehamwood, Herts. Wednesdays 7-9.15pm, commencing 18 September. Enrolment: 4-8pm, 4-5 September. Lecturer: G3HB.

Bradford. Bradford Technical College, Great Horton Road, Bradford, 1, Yorks. Monday evenings. Tutor G3YEE. Further details from the college or G3YEE, tel Bradford 664220.

Brentford. Brentford Girls' School, Clifden Road, Brentford, Middlesex. Enrolment: 12, 16 and 17 September.

Bridgend. Bridgend Technical College, Bridgend, Glamorgan. Wednesdays 6-9pm, commencing in September. For details contact GW3WRE.

Burgess Hill. Adult Education Burgess Hill and Hassocks, Mark Place, Leylands Road, Burgess Hill, Sussex RH15 8JD. Thursdays 7.30pm, commencing 26 September. Fee: £6.60.

Burslem. Northern College of Further Education, Moorland Road, Burslem, Stoke-on-Trent. Thursdays 7-9pm (theory) Mondays (morse). Enrolment: first week in September.

Canterbury. Canterbury College of Technology. Tutor G3LCK.

Dudley. Dudley Technical College, Dudley DY1 4AS. Enrolment from 2 September.

Dundee. Kingsway Technical College, Old Glamis Road, Dundee. Thursdays 6.30-9pm, commencing 5 September. Enrol at class or call at college. Further details from GM3YVX, QTHR, tel Dundee 75054.

Farnborough, Hampshire. Cove County Secondary School, St John's Road, Farnborough. Thursdays 7.30pm (theory), commencing 3 October; Mondays 7.30pm (morse) at Oak Farm School, Farnborough.

Glasgow. Glasgow College of Nautical Studies, 21 Thistle Street, Glasgow G5. Tuesdays and Thursdays 7-9.30pm, commencing 10 September. Enrolment: 7pm, 10 September. Fee: £3 (over 18).

Gosforth. Gosforth Secondary School, Gosforth, Northumberland. Tuesdays and Wednesdays 7-9pm, commencing September. For details contact the principal.

Grantham. St Hugh's CE Secondary School, The Avenue, Dysart Road, Grantham, Lincs. Mondays 6.45pm, commencing 16 September. Enrolment: at the class. Instructor: G3PJR.

Jordanstown. The Northern Ireland Polytechnic, School of Maritime Studies, Jordanstown, Newtownabbey, Co Antrim. Two evenings per week, commencing mid-September. For details contact the College Registry Office or GI4ANX, QTHR.

Leeds. Airedale & Wharfedale College of Further Education, Calverley Lane, Horsforth, Leeds. Wednesday evenings (RAE), Tuesday evenings (morse). An advanced and practical amateur radio course designed to assist those who wish to gain experience in design, construction and operation of equipment, with the facilities of a fully equipped station and workshop, will also be run on Thursday evenings. Details of all courses from the college or tutors G3YEE (Tel Bradford 664220) and G3FCW.

Loughborough. Loughborough Technical College, Radmoor, Loughborough, Leics. Tuesdays 6-7pm (morse), 7-9pm (theory and practical) commencing 17 September. Enrolment: 6-8pm, 9-11 September. Fee: £3.55. Instructor: G3FLS, QTHR.

Newport, Gwent. Newport College of Further Education, Nash Road, Newport, Gwent. Wednesdays 6.30-9.30pm (theory); details from GW3YTJ, QTHR. Mondays 6.30-9.30pm (practical constructional course); tutor GW4COJ.

Openshaw. Openshaw Technical College, Whitworth Street, Openshaw, Manchester. Enrolment: 9-11 September. For further details contact G3IOA, QTHR.

Perth. Perth Technical College, Perth. Mondays 7-9.30pm, commencing 23 September. Enrolment: 6.30-8.30pm, 2-6 September. Instructor: GM3YEW.

Portsmouth. Further Education Centre, Drayton Road, North End, Portsmouth. Tuesdays and Thursdays, commencing 24 September. For details contact the principal or G6NZ, QTHR.

Princes Risborough. Princes Risborough Adult Education Centre, Merton Road, Princes Risborough, Bucks. Mondays 7-9pm (theory), Thursdays 7-9pm (morse), commencing 23 September. Enrolment: 7-9pm, 11 and 12 September.

Rolleston-on-Dove. Rolleston Evening Institute, The Forest of Needwood High School, Rolleston-on-Dove, Burton-on-Trent. Tuesdays 7.30-9.30pm, commencing 10 September. Fee: £3.10. Full details from J. T. Smith, tel 0283-812333.

Sheffield. King Edward VIII School, Darwin Lane, Sheffield 10. Commencing 2 October. Further details from G3JON, QTHR, tel 367774 (home) or 732333 (office).

Southend-on-Sea. Southend-on-Sea College of Technology, Engineering Department, London Road, Southend-on-Sea, Essex. Enrolment: Tuesday and Wednesday, 10 and 11 September.

Stevenage. Stevenage College of Further Education, Stevenage, Herts. Fridays 7-9.30pm, commencing 27 September. Enrolment: 6.30-8.30pm, 10-12 September. For further details contact the college.

Swinton, Manchester. Moorside High School, East Lancashire Road, Swinton. Thursdays, commencing 26 September. Details from G8BFP, QTHR, tel 061-794 3706.

Welwyn Garden City. Mid-Herts College of Further Education, Welwyn Garden City. Enrolment: 16 September. Details from Mr S. Jurek, Head of Engineering Department.

Wembley. Wembley Evening Institute, Copland School, Cecil Avenue, Wembley, Middlesex. Mondays 7-8pm (morse), 8-10pm (theory), commencing 16 September. Enrolment: 7-9pm, 9-11 September. For details contact G8CZQ, QTHR.

Wigan. Wigan Adult Centre, Mesues High School, Parsons Walk, Wigan, Lancs. Mondays 7pm, commencing 23 September. Enrolment: 7-9pm 16 September, 6.30-8.30pm, 17-18 September.

Wolverhampton. Wombourne Evening Institute, Ounsdale School, Wombourne, nr Wolverhampton. Mondays 7pm, commencing 16 September. Enrolment: 9-10 September. Instructor: G3NOW.

An SL600 series ssb transceiver

by B. D. COMER, G3ZVC, Plessey Semiconductors

THIS article describes the i.f. and af signal circuitry of a single-sideband transceiver designed by the applications department of Plessey Semiconductors using their SL600 series integrated circuits. The unit consists of a single printed-circuit board which requires only the addition of a local oscillator, preselector, linear amplifier, volume control, microphone and loudspeaker to make a complete transceiver. The transceiver may be used at any frequency from a few kilohertz to 500MHz.

Receiver

The receiver consists of a single-conversion superhet with a 9MHz i.f. In order to optimize its intermodulation performance there is no rf amplifier, and the incoming signal is fed directly to a hot-carrier diode ring mixer and then to the crystal filter. The i.f. sensitivity is such that at frequencies of 30MHz or less no rf amplification is required if a reasonable aerial is used (as it would be with a transceiver) but if the receiver is used at frequencies of over 30MHz, or with a less than ideal aerial, some rf gain may be necessary to obtain the necessary noise figure. The rf amplifier used should have the lowest gain consistent with the frequency and aerial to be employed and must have good large signal-handling capability if the receiver performance is not to be degraded.

The mixer is an Anzac MD108 hot-carrier diode ring. This was chosen for its conveniently small size, high performance and low cost, but doubtless similar devices from other manufacturers could be used. All the ports of this ring are 50Ω, and two have a frequency range of 5MHz to 500MHz while the third has a frequency range of dc to 500MHz. The input from the aerial is applied to this dc to 500MHz port via a preselector, and the local oscillator at a level of +7dBm (500mV rms)—is applied at pin 8. The mixer output from the last port passes a ferrite toroidal transformer to match it to the 500Ω input impedance of the filter. If other filters are used the impedance-matching transformer may need to be altered.

Once the signal has passed the crystal filter, a 2·4kHz bandwidth 9MHz filter with 90dB stopband suppression (the SEI QC1246AX), there is little further risk of cross-modulation or intermodulation. The i.f. strip consists of three cascaded SL612C i.f. amplifier circuits followed by an SL640C product detector. Without agc applied, each SL612C has 34dB gain and 15MHz bandwidth. A broadband i.f. strip

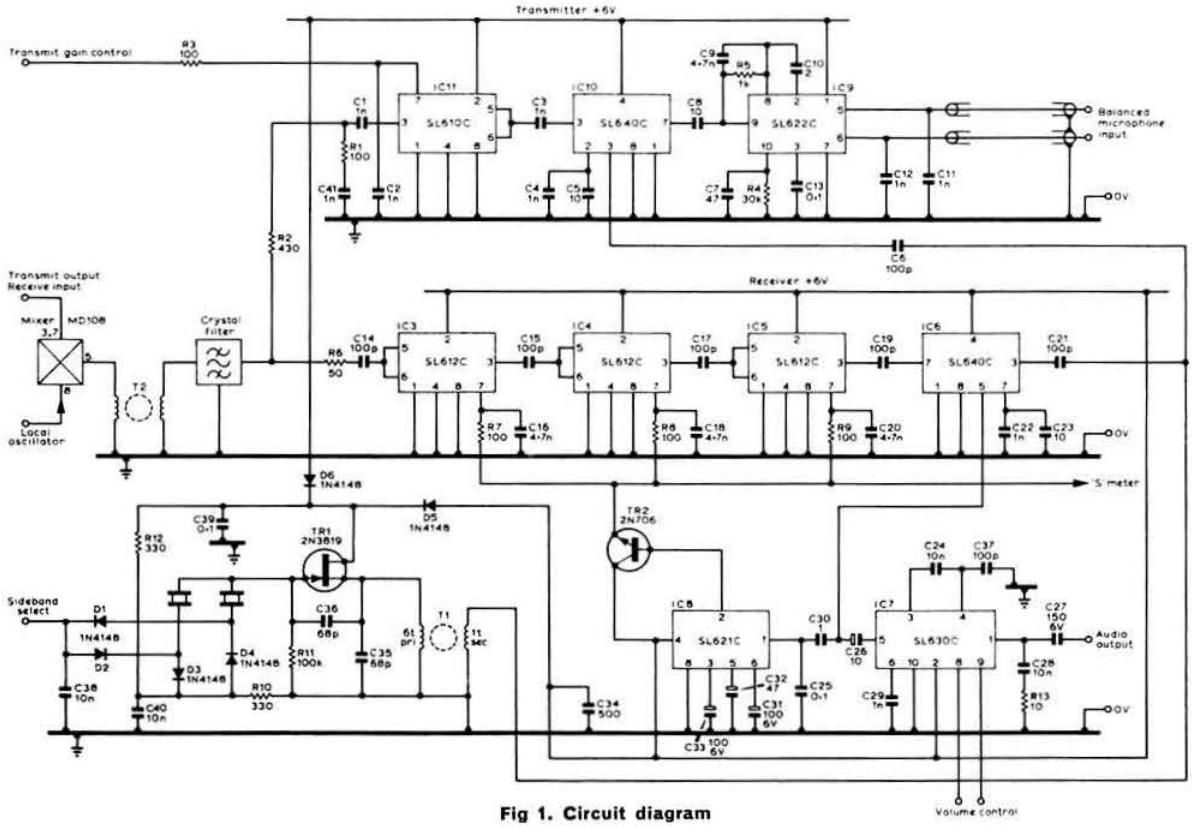


Fig 1. Circuit diagram

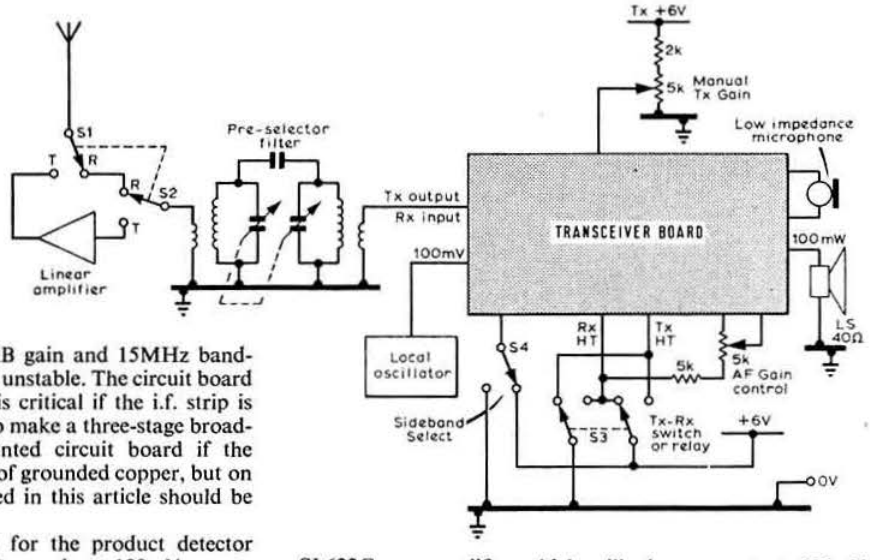


Fig 2. Block diagram of transceiver

of three SL612Cs has over 100dB gain and 15MHz bandwidth and can very easily become unstable. The circuit board layout used for this transceiver is critical if the i.f. strip is to be stable. It is relatively easy to make a three-stage broadband strip on double-sided printed circuit board if the component side is left as a plane of grounded copper, but on single-sided board the layout used in this article should be rigidly adhered to.

The beat frequency oscillator for the product detector is a fet crystal oscillator. It delivers about 100mV rms to the SL640C product detector and also supplies the carrier for the transmitter modulator. One of two crystals for upper or lower sideband is selected by diode switches.

The detected audio from the product detector drives an SL630C output stage, which is capable of providing about 65mW to headphones or a small loudspeaker and also drives an SL621C agc system. The SL630C has voltage-controlled gain so the volume control consists of a potentiometer providing a control voltage to the SL630C. If 65mW is insufficient output (it is worth listening to it before deciding as it is usually adequate for domestic listening), an external higher power audio amplifier may be driven either from the SL630C output or directly from the product detector.

The agc is provided by an SL621C audio-derived agc system. Its output is buffered by a transistor TR2 to enable an S-meter to be connected if required. Since TR2 reduces the available agc voltage swing, agc is applied to all three i.f. stages to ensure that the agc can cope with the receiver's 114dB dynamic range. If R7 is replaced by a germanium diode there will be a delay to the first stage agc which may improve the receiver noise figure very slightly on small signals—this is barely worthwhile. The capacitors C16, C18 and C20 are kept down to 4,700pF in order to retain the ignition suppression characteristics of the system.

Transmitter

The transmitter is also single conversion. It generates single-sideband at 9MHz by the filter method, using the same crystal filter as the receiver. The 9MHz ssb is then converted to the final frequency by the MD108 ring mixer with the unwanted product being removed by the preselector. This system entails no signal switching between the aerial side of the preselector and the transmitter/receiver side of the crystal filter on the change-over from receive to transmit. All the transmit/receive switching on the board is achieved by turning on the appropriate power line (transmit or receive) and grounding the unused line. The grounding of the unused line is most important and instability can result if it is not done.

The audio input from the microphone is amplified by an SL622C agc amplifier which will give a constant 100mV rms output for a 60dB range of input. If a single-ended input is used rather than a balanced input this dynamic range is reduced to about 46dB. In most systems 60dB input dynamic range is too large, 40dB being sufficient, so R5 has been included in the circuit. If 60dB is required R5 should be omitted and C9 reduced to 4,700pF.

The audio output from the SL622C goes to the SL640C double-balanced modulator. The carrier input to this modulator is fed by the bfo (which works on both transmit and receive since its power may be derived from either line via diodes D5 and D6). The output of the SL640C consists of double-sideband with low carrier leak (usually −40dB on signal) which is amplified by an SL610C which may have its gain controlled either by an alc signal derived from the transmitter linear amplifier or manually by a dc gain control. This amplified dsb is applied to the filter to yield ssb. Resistors R1 and R2 ensure a correct match to the filter both on transmit and receive.

The ssb output from the filter passes to the diode ring via the impedance-matching transformer and is mixed with the local oscillator to give the final transmitter frequency (and an image which is removed by the preselector). This is amplified by the linear amplifier and transmitted. The output from the preselector is about 70mV rms.

Construction

The system is built on a single-sided printed circuit board with two wire links—one in the receive supply, the other in the transmit supply. If only a receiver is required the components R1 and R5 inclusive, C1 to C13 inclusive, C40, and the semiconductors IC9, IC10, IC11, D5 and D6 must be omitted, a wire link connected where D5 was, and a 500Ω resistor connected from the filter end of R6 to earth.

The layout of the board is critical and changes of printed circuit design will almost certainly lead to instability unless double-sided board is used. The design shown may be built on double-sided board quite safely.

The components used in the original are given in the list below. Bead tantalum capacitors are used where possible

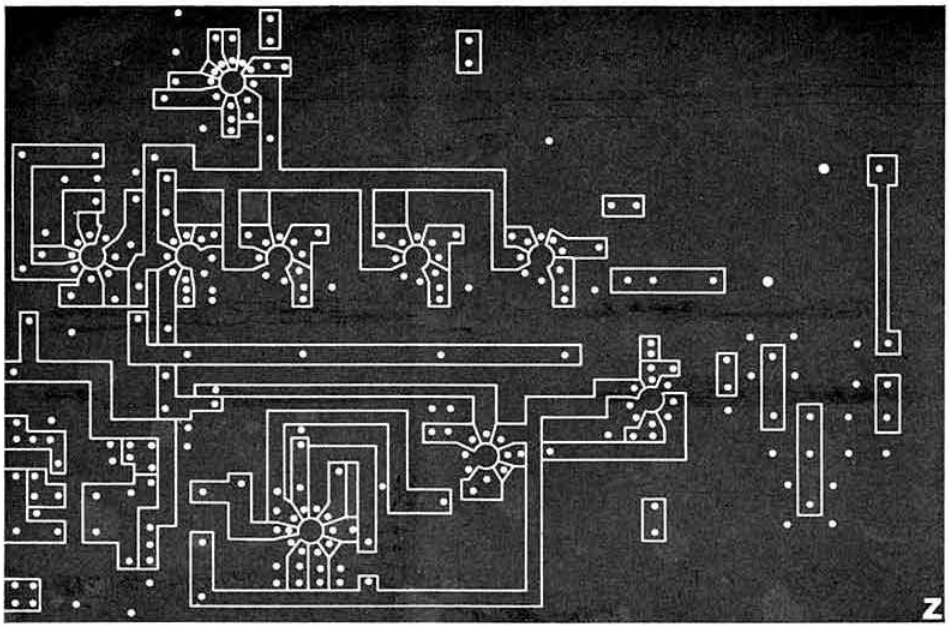


Fig 3. PCB layout, actual size

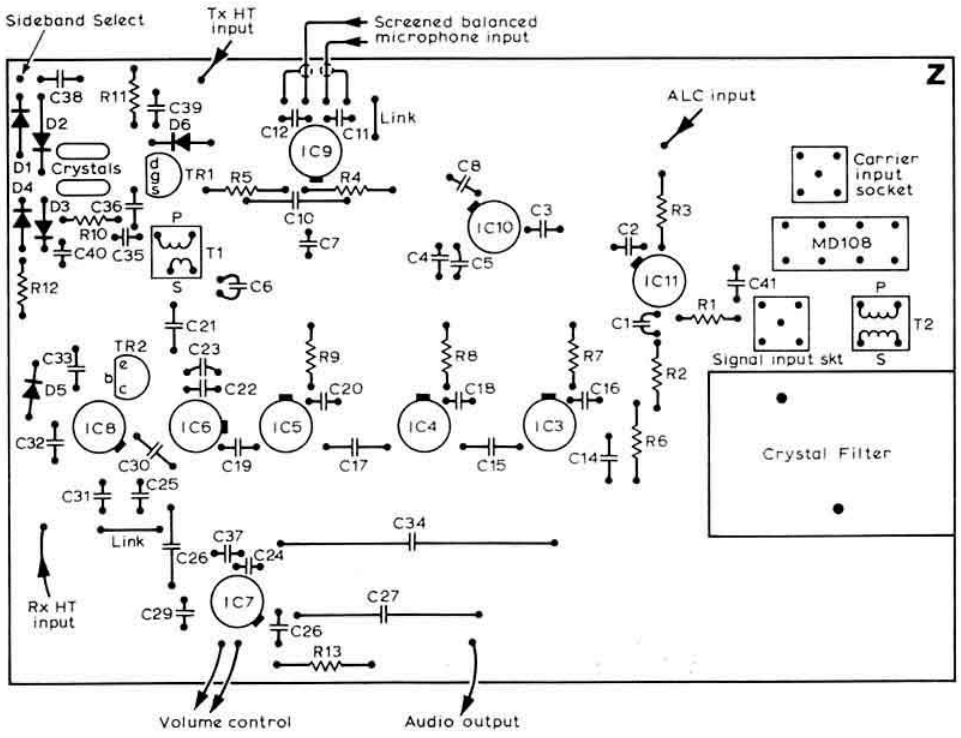


Fig 4. Component positions, actual size

Component list

IC3, IC4, IC5	SL612C
IC7	SL630C
IC9	SL622C
IC6, IC10	SL640C
IC8	SL621C
IC11	SL610C
R1, R3, R7-9	100Ω ¼W hi-stab carbon film
R2	430Ω ¼W hi-stab carbon film
R4	30kΩ ¼W hi-stab carbon film
R5	1kΩ ¼W hi-stab carbon film
R6	50Ω ¼W hi-stab carbon film
R10, R12	330Ω ¼W hi-stab carbon film
R11	100kΩ ¼W hi-stab carbon film
R13	10Ω ¼W hi-stab carbon film
C1,C2,C3,C4,C11, C12,C22,C29,C41	1nF Wee Con
C5,C8,C23,C26	10μF 6·3V tantalum bead
C6,C14,C15,C17, C19,C21,C37	100pF ceramic
C7,C32	47μF 6·3V tantalum bead
C9, C16, C18,C20	4·7nF Wee Con
C10	2μF 16V tantalum bead
C13,C25,C39	0·1μF Wee Con
C27	150μF 6V A1 electrolytic
C31,C33	100μF 6·3V tantalum bead
C24,C28, C38, C40	10nF Wee Con
C30	1μF 35V tantalum bead
C34	500μF 16V electrolytic
C35,C36	68pF ceramic
D1-D6	1N4148 or similar low capacitance switching diode
TR1	2N3819 or similar N channel jfet
TR2	2N706 or similar low-cost silicon npn transistor
Filter	SE1 QC1246AX with sideband crystals (or KVG XF-9B)
Mixer	Anzac MD108 hot carrier diode ring mixer

for their small size but since they are hard to obtain in high capacitances at high voltages aluminium electrolytics have been specified in three places. The WeeCon capacitors specified may be replaced with other miniature high-K ceramic capacitors but the values of any components should not be altered without very good reason. The resistors are all ¼W 10 per cent types.

Transformer T2 is made on an ITT CR 071-8A ferrite core. In fact any small ferrite or iron dust toroid with cross-section greater than 3mm² and diameter between 7 and 12mm, capable of working at 9MHz, may be used. Square-loop materials, however, are not suitable. Four 5cm lengths of 26swg wire are twisted together and two turns are wound on the core with the twisted wire. The ends are then opened and three windings are connected in series for the filter winding and the fourth is used as the winding connected to the diode ring. Transformer T1 is wound on a core of the same type and has a six-turn primary and a single-turn secondary.

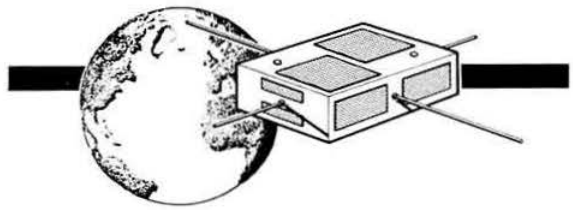
Conclusion

The circuit diagram of the system is shown in Fig 1 and a block diagram of its use in a single band transceiver in Fig 2. Obviously it may be used in many different transceivers, the one in Fig 2 being the simplest. Fig 3 is the printed circuit master and Fig 4 shows the component placing.

This transceiver is probably the simplest which may be made using the SL600 Series but its performance is not compromised. It has a sensitivity of better than 0·5μV for 10dB s/n, it can handle signals of over 200mV rms at the diode ring with minimal intermodulation, and the board uses less than 500mW on transmit or receive. It has been designed so that anyone with basic technical competence but without previous experience in ssb transceiver design can build a successful ssb transceiver.

Editor's note

We are advised by the Amateur Radio Bulk Buying Group, 20 Thornton Crescent, Old Coulsdon, Surrey CR3 1LH, that they can supply **pcbs** and all components required for this project.



Oscar operating schedule

The present schedule of "on" orbits is the north-south passes on the evenings of Saturdays, Mondays and Thursdays with the ascending node passes on Sunday mornings. With control being exercised by CN8BO, the reliability of on orbits has become much greater.

It is possible that Oscar may emerge "live" from areas beyond the CN8BO area and at times different from the above. Members are especially asked not to access it then: they may negate its needed battery charge sequence if they do. And when it *is* accessed, please ensure that the minimum possible erp is used.

Sample equatorial crossing times and longitudes for September are:

14 September: orbit 8,755, 20·06ut, 349°
15 September: orbit 8,762, 09·31ut, 191°
16 September: orbit 8,780, 20·01ut, 348°
19 September: orbit 8,817, 18·56ut, 332°

The orbit period is 115min and the longitude increment 28·74°/orbit. Orbits repeat on a 263 orbit cycle every 21 days but 3·6min later and 0·9° further west.

The count-down to the launch of Oscar 7 continues and windows suitable for the launch are October 3, 10, 14 and 16. Latest news will be carried in the GB2RS news bulletins and also on the UK Oscar net which can be found on Sundays at 1015am around 3,780kHz under the direction of G3IOR.

Oscar News is a regular publication carrying news on Oscar satellites. Details can be obtained from Tony Bailey, G3WPO, 5 Erin Way, Burgess Hill, RH15 9PN.

AMSAT subscription

Arrangements have been made with the Radio Amateur Satellite Corporation for subscriptions to be accepted in the UK, thus avoiding the necessity for individual membership applications to be accompanied by a dollar remittance. AMSAT subscriptions become renewable on 31 December annually and the amounts payable are: October 1974 to December 1975, £2.45; annually from December, £2.15. Membership includes the quarterly *AMSAT Newsletter* and application forms are obtainable from G2BVN QTHR.

AMSAT is a non-profit making organization founded five years ago. It is a membership organization open to all radio amateurs and interested non-amateurs.

MICROWAVES—1,000MHz and up....

by DAIN EVANS, G3RPE*

Super super-refraction on 10GHz

On 18 July GW3PPF and GW4AMV conducted a test over a 95km sea path from Freshwater East Beach to Nash Point over the Bristol Channel. The stations were 20 and 100ft asl, and the "height" of the sea between them was about 400ft. GW4AMV's transmitter was a 12mW Gunn oscillator to a 25dB horn, and the receiver employed a GEM2 mixer to a 40673 preamplifier with a 106MHz standard fm broadcast receiver as the i.f., the aerial being a dish 30in. in diameter.

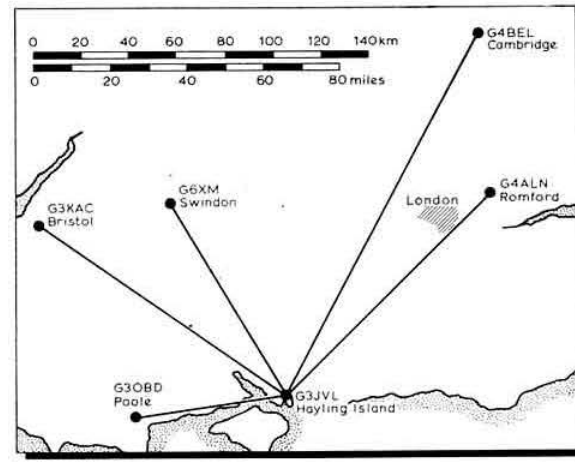
Very strong signals were received immediately over this nominally non-optical path. Generally the signal strength was 40dB above noise but two periods of fading consisting of three or four separate 10dB fades each lasting about 2min, together with a single fade, were observed during a 45min period. The strength of the signal is good evidence of super-refraction occurring within a humidity duct formed over the sea, the weather conditions for which appeared to be ideal: little or no wind, a hot sun, no clouds and presumably a calm sea. A remarkable observation made by GW3PPF was that while the 30in diameter receiver dish displayed its normal sensitivity to beaming direction in the horizontal plane, that is $\pm 2°$, it could be tilted by $\pm 15°$ in the vertical plane before the signal strength appeared to fall. This seems to imply that the receiver was positioned well within the duct itself rather than firing into it from above, and therefore that the duct was significantly greater than 20ft in thickness.

The sums on the contact are quite striking. The path loss capability of the equipment estimated from the parameters given above is about 171dB. The free-space loss over the distance, which assumes no obstructions whatsoever, is 152dB. So even if the latter conditions prevailed then the signal strength would have been only 19dB above noise compared with the 40dB observed; that is, the path loss was 21dB *lower* than free space. However, if it is assumed that a perfect duct was formed, then the path loss expected would be only 132dB, so the signal would be 39dB above noise. The excellent agreement with the observed value must be regarded as somewhat fortuitous.

On the three previous occasions during which this mode of propagation was explored, the maximum signal strengths were in one case just greater than the free space value, and in the other cases 5 or 10dB lower than this value. This most recent contact therefore opens up still further the possibilities of low-powered wide-band equipment for working dx.

Some regular contacts on 1,296MHz

The figure shows five paths which are regularly covered by G3JVL from his Hayling Island site which is a mere 6ft asl. His transmitter produces 40W of rf, and the receiver has a noise factor of 4dB. The aerial consists of four 25-element quad-Yagis which together are equivalent in gain to a dish about 8ft in diameter. This is, one supposes, the standard that one should expect for "second-generation" equipment.



Paths covered regularly on 1,296MHz by G3JVL from his Hayling Island site

The contacts are as follows:

Station	Location	Distance	Schedule	Minimum signal
G3KAC	Bristol	134km	every week night 8pm	S5
G6XM	Swindon	101km	every night 10pm	S5
G3OBD	Poole	72km	every night	S7
G4ALN	Romford	116km	twice weekly	S4
G4BEL	Cambridge	172km	every Monday	S4

Pointing high-gain aerials

With high-gain aerials increasingly being used on the higher microwave bands, there are bound to be some difficulties on arriving on a site in the middle of nowhere and pointing them within a degree or two of a particular direction. When visibility is good, then a simple sighting tube which has previously been aligned with the electrical axis of the aerial usually does the trick: the rotator is calibrated simply by sighting onto one or two landmarks identifiable on a 1in map and setting the scale to the appropriate bearing. In the absence of a sighting tube, viewing across the face of the dish or horn and lining up the near and far edges on a landmark is a satisfactory alternative provided the aerial has limited squint.

The problems multiply when visibility is poor. In the February column readers were asked for suggestions on how to cope. One reader, who prefers to stay anonymous, recommends leaving behind a more self-sacrificing member of the team on a suitable spot to act as a beacon. G3JVL suggests not overlooking the pole star which is sometimes visible at night when little else is.

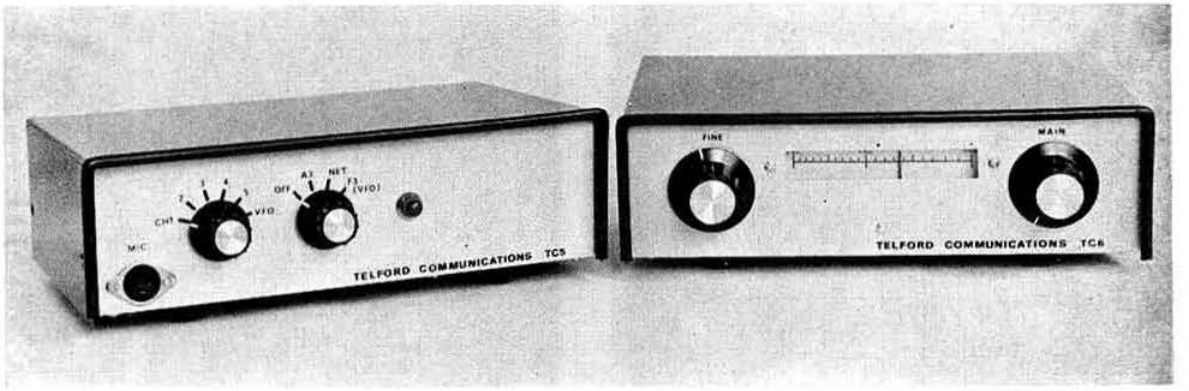
Continued on page 597

* 4 Upper Sales, Chaulden, Hemel Hempstead, Herts.

EQUIPMENT REVIEW

by K. A. M. FISHER, G3WSN*
and
P. L. SELWOOD, G3YDY

The Telford 2m transmitter TC5 and vfo TC6



THE TC5 transmitter and TC6 vfo are manufactured and supplied by Telford Communications, 78b High Street, Bridgnorth, Shropshire WV16 4DS. They are designed to operate from 12V negative earth supplies. The transmitter is capable of providing an rf output in the order of 1·5–2W over the whole of the 2m band with A3 modulation. Using the TC6 vfo with the TC5 provides vfo coverage over the entire band with A3 modulation, or with F3 if required. Facilities for netting are also provided. The units are housed in matching hammer finish cases and while being designed for use together they could easily be used as part of a more complex system separately.

Technical description

The transmitter uses an oscillator circuit operating at 48MHz with provision for up to five crystal channels using HC25U crystals or an external 48MHz vfo input. Where the vfo input is selected, the oscillator stage becomes a buffer amplifier stage. This stage is followed by a multiplier stage and an amplifier which in turn is followed by the driver and pa stages. The amplitude modulation is fed to the driver (2N3866) and pa (40290) stages via the modulation transformer from the complimentary output pair (AD161, AD162) in the modulator. Modulation depth and clipping levels are adjustable by pre-set controls within the unit. The overall modulation response (af) is also adjustable, by selecting suitable coupling capacitors, if a different microphone is used.

The synthesizer vfo is a companion unit to the transmitter. The circuit is of the more conventional mixer type and the word synthesizer tends to suggest a more complex circuit. A 53·9MHz crystal oscillator is fed into a wide-band double balanced mixer together with the vfo signal of 5·9 to 5·233 MHz to provide 48 to 48·667MHz as required for the TC5. The wide-band mixer is followed by a two-stage 48MHz band-pass amplifier using two dual-gate MOSFETS to reduce unwanted mixer products. The vfo uses a fet oscillator and the output is taken via an emitter follower to reduce loading effects on the oscillator. Fine tune is obtained with a varicap diode (BA102) and the F3 modulation is produced by this diode, when required, via the interconnecting leads from the transmitter. The vfo provides a nominal output of 1V in 75Ω.

The main tuning dial is flywheel assisted and has a useful scale length of 3in. The scale is calibrated at 100kHz intervals over the range 144·05 to 145·95MHz to give a degree of safety against inadvertent out-of-band operation. The fm deviation is adjustable by means of a pre-set control located inside the TC6 from 0 to 5kHz. The transmitter incorporates a mode switch: OFF/AM/NET/FM (VFO ONLY); and a channel switch: CRYSTAL 1–5/VFO. Diode gates are used for the various switching functions, including the selection of crystal channels. When NET (with vfo) is selected the vfo can be tuned to the required frequency and will be audible in the 2m receiver. Selection of either A3 or F3 from the NET position results in a change of loading to the vfo oscillator. This is obtained by adjusting the base bias of the vfo buffer emitter follower and causes an If shift of the 2m signal to allow co-channel working. During transmission the vfo reverts to the frequency set during the netting process. Power consumption of the vfo is in the order of 160mA at 12V, with 100mA being taken by the scale lamp. The latter may be removed if required for lower consumption with no effect on performance of the vfo

* 88 Longmead Avenne, Great Baddow, Chelmsford, Essex.

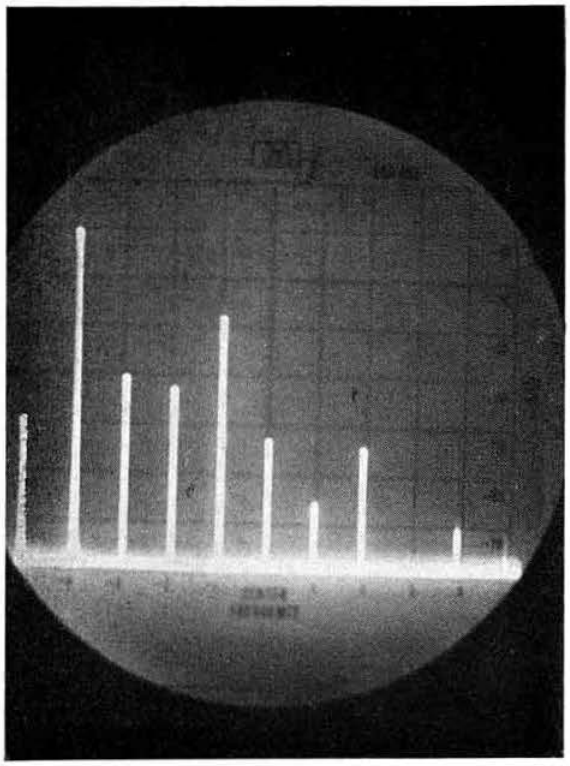


Fig 1. RF spectrum of TC5 transmitter, crystal controlled 145MHz

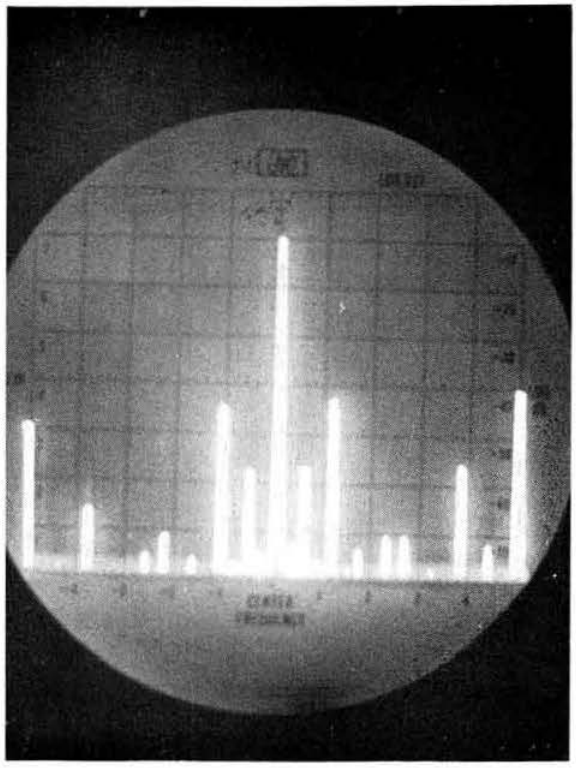


Fig 2. RF spectrum of TC5 with TC6 vfo drive 145MHz

Tests

Initially the TC5 was tested using the 145MHz crystal supplied and then the vfo was added for further tests.

RF Output

Using the 145MHz crystal with 13·8V supply, the output in 75Ω was 1·9W unmodulated. Current consumption was 500mA. Using the vfo, the output over the whole band was found to be within 0·25dB of 1·9W.

Fig 1 shows the rf spectrum of the TC5 using the crystal. The 145MHz signal is the second from the left. Scan width was 50MHz/division and vertical display 10dB/division. Taking the 145MHz signal (at −10dB) as reference, the output at 193MHz (145 + 48) is 30dB down and at 241MHz (145 + 96) is 33dB down. At 289MHz (second harmonic) the output is 18dB down. The 432MHz signal is 45dB down.

With the TC6 fed into the TC5 the output spectrum as shown in Fig 2 was obtained. The 145MHz signal is shown centrally with a scan width of 10MHz/division. Vertical amplitude was 10dB/division. This shows the vfo frequency of 5·9MHz and of vfo × 2 on either side of the wanted output at 145MHz.

Frequency

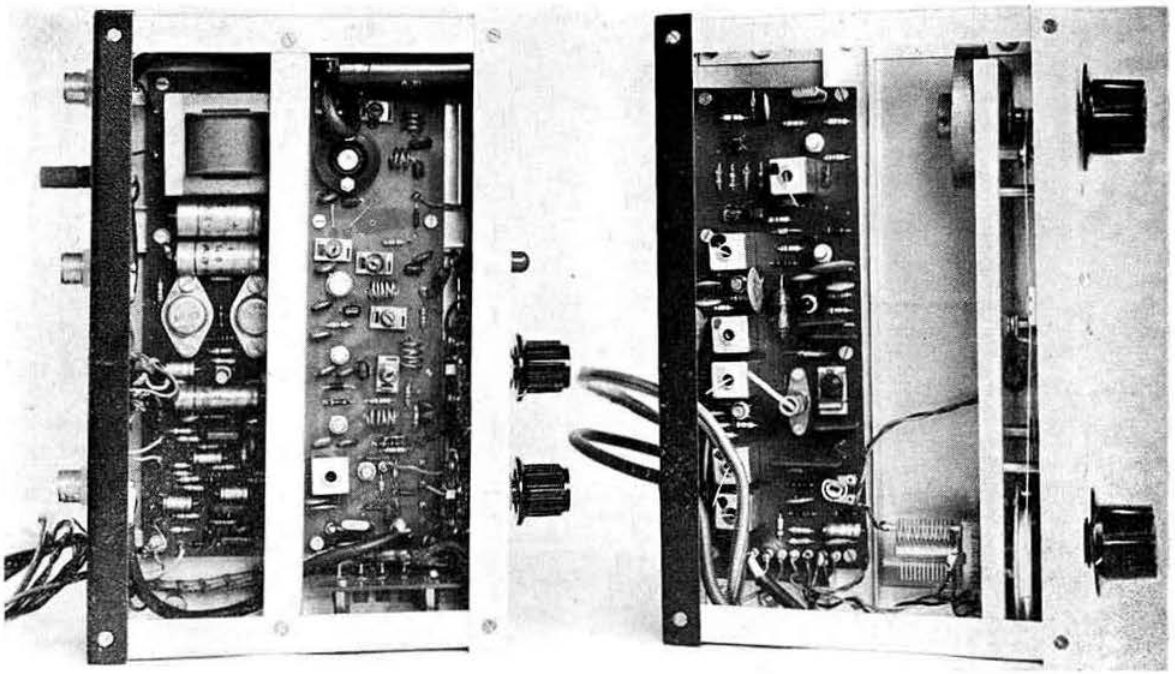
Using the 145MHz crystal supplied, the output frequency was 144·984MHz. After a 15min warm-up the vfo was set to 145MHz output frequency. After a further 10min run, on transmit, the output frequency was measured as 144·9997 MHz. The vfo dial was then calibrated.

Frequency on dial	Actual output frequency
LF end	144·01
144·2	144·145
144·4	144·370
144·6	144·570
144·8	144·760
145·0	144·950
145·2	145·150
145·4	145·330
145·6	145·510
145·8	145·680
HF end	145·830

The vfo fine tune was found to have a range of 13kHz with the main dial set at 145MHz. The specification for this is typically ± 2kHz from central position.

Modulation

With the TC5 on crystal, the a.m. was checked using a sine wave input at 800Hz. With modulation depth set for 50 per cent peak modulation, the trough modulation was measured as 60 percent as shown in Fig 3. The upper trace is the modulating signal and the lower the modulated envelope. Fig 4 shows the modulation input on the upper trace and the recovered modulation on the lower following the modulation process and detection.



Internal layout of the transmitter (left) and the vfo

With the TC6 set for 145MHz fm an 800Hz sine wave was applied and the amplitude adjusted to produce 2kHz deviation. Fig 5 shows the af input on the upper trace and the recovered audio on the lower after detection.

The a.m. af response referenced to 1kHz with peak 28 per cent, trough 30 per cent, was −3dB at 1·3kHz and −6dB at 1·75kHz. At 650Hz the level was +3dB. The response of the af amplifier was plotted as shown in Fig 6.

Conclusions

The TC5 transmitter and TC6 vfo were subjected to thorough tests, the results of which are presented here. The units were "air tested" and despite the rather poor fm audio waveform the signal sounded acceptable. The a.m. signal was clean and had a good sound. The af response of the modulator is adjustable to suit various microphone responses. Apart from slight frequency errors on crystal and vfo (the latter being easily corrected) the units performed quite satisfactorily. It is felt, with one reservation, that these units provide a good basis for a station for mobile, portable or fixed use. The inclusion of an output filter is considered essential if the unit were to be used to drive a linear amplifier. It would be a wise addition regardless of intended use (Refer to Fig 1). Two other points became evident while undertaking this review. There is no provision for adjustment of the crystal frequencies on any channel; a minor omission which would nevertheless add to the performance of the transmitter. The pin numbers on the DIN lead for the vfo supply do not

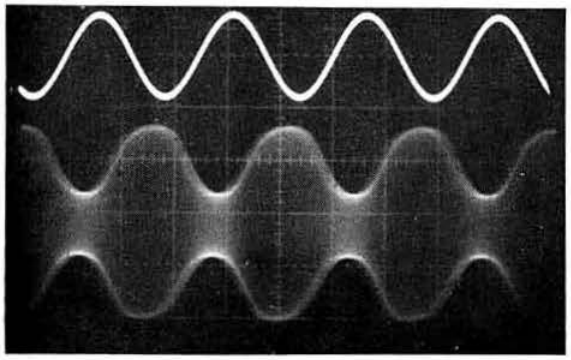


Fig 3. A.M. envelope TC5

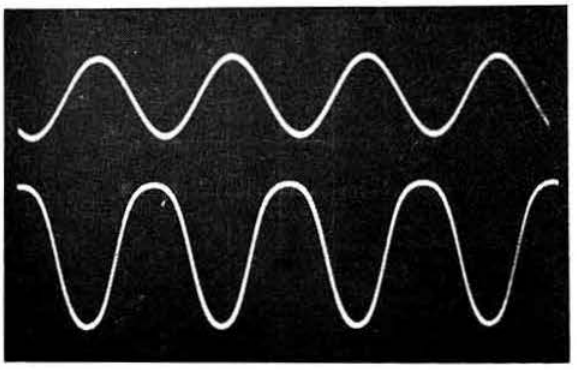


Fig 4. A.M. input and recovered audio TC5

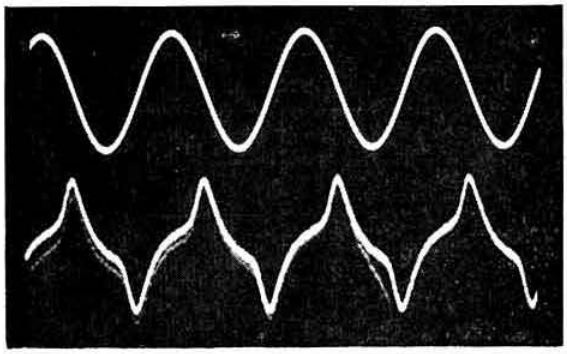


Fig 5. FM input and recovered audio TC5/TC6

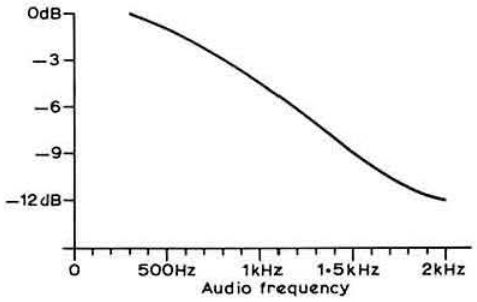


Fig 6. AF response of modulator

correspond to the identities given on the circuit diagram, a point which could give rise to confusion.

The transmitter is supplied complete with a microphone (with ptt switch) and a well-drawn circuit diagram. The price of the TC5 transmitter is £35 + VAT and delivery is ex stock. The TC6 vfo is £30 + VAT and delivery was quoted as 2–3 weeks. Additional crystals for the TC5 can be supplied at 8–10 weeks delivery. A 145MHz crystal is supplied installed as Channel 1. An aerial change-over relay and converter muting are incorporated in the TC5.

A three-stage pre-amplifier for the 1,296MHz band

by JACK HUM, G5UM, from notes supplied by HENRI VAN GASTEL, ON4HN

This is a three-stage pre-amplifier for the 23cm band which can be made up without any "factory work", and is probably capable of a noise figure of 5dB with a gain of around 20dB. It will make a substantial improvement to any 23cm set-up which does not have a really professional mixer with a high quality diode (very few diode mixers built at home achieve a noise figure better than 10dB and many are nearer 20dB).

As may be seen, Fig 1, the pre-amplifier uses three BFR90 devices in the grounded emitter configuration and four identical inductors made from copper wire 3in long tapped $\frac{1}{2}$in from each end. It may be questioned whether it is really necessary to use three stages of amplification in view of the fact that the BFR90 is moderately expensive and in any case gives about 7 to 8dB of gain at 1,296MHz. The constructor who prefers to make a two-stage unit need merely connect the output, via C11, to the point on L3 where C9 is

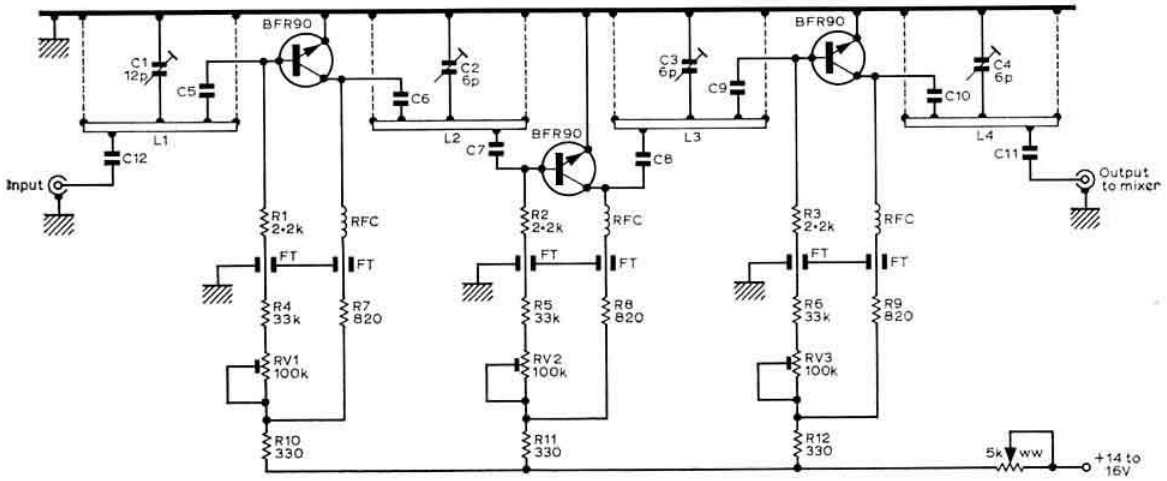


Fig 1. Circuit diagram

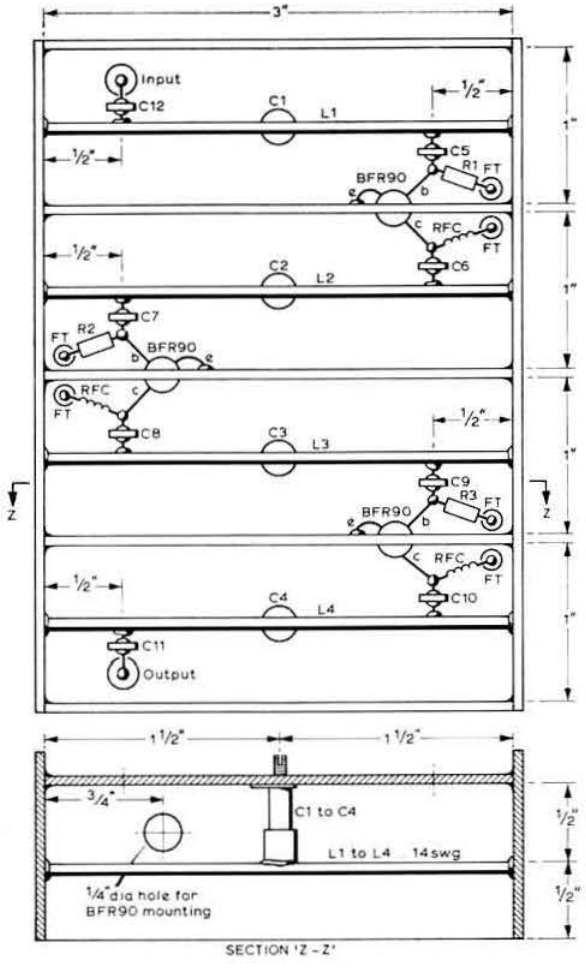


Fig 2. Layout and end view

attached. Assuming that a mixer noise figure of 10dB is obtainable, then the *overall* noise factor will be degraded by only 0·5dB using two stages rather than three.

Some users recommend a BFR91 as the first stage, limiting its collector voltage to 5V by means of a zener diode connected between the junction of R10 and R7 and ground. This should give a better noise figure than the BFR90, and if it is followed by a single stage using a BRF90, a most effective pre-amplifier unit should be the result.

To obviate a problem commonly encountered at these frequencies, ie parasitic resonances in rf chokes, it is strongly recommended that a miniature 56Ω 0·1W carbon resistor be fitted in series with each of the RFCs shown in the diagram.

For constructors who prefer to go ahead with the three-transistor configuration, Fig 2 shows the mechanical layout and the end view of the 4in by 3in box which contains the complete pre-amplifier. The horizontal panels shown in this view will be of bakelite, copper on both sides for printed circuitry, but on one side only otherwise.

Component List

RFC	¼ λ 0·5mm wire wound into four turns.
C1	12pF tubular trimmer.
C2, 3, 4	6pF tubular trimmer.
C5-12	470pF axial lead type or 100pF Erie miniature tubular ceramic, style A.
R1, 2, 3	2,200Ω miniature resistor.
R4, 5, 6	33,000Ω miniature resistor.
R7, 8, 9	820Ω miniature resistor.
R10, 11, 12	330Ω ¼W.
RV1, 2, 3	100kΩ trim potentiometers.
FT	400 to 1,000pF feed-through.
L1-L4	2mm copper wire 3in long, tapped ¼in from each end.
Transistors	Mullard BFR90 or BFR91 (see text).

Adjustments are as follows:

1. Set the variable resistors RV1, 2 and 3 to about the half-way position;
2. Connect the aerial (a load is necessary on the front end);
3. Using a local signal source such as the station 1,296MHz transmitter, or the third harmonic of a 70cm one, adjust the capacitors C1 to C4 for maximum signal strength: the level may be increased further by careful adjustment of the variable resistors RV1, 2 and 3;
4. Using a signal from another 1,296MHz station, reset capacitors C1 to C4 and resistors RV1, 2 and 3 for the best signal to noise ratio. Note that the screw threads of the presets may usefully be lubricated with contact lubricator.

Because there was a lack of 23cm activity in the vicinity of ON4HN, the alignment of this front end was accomplished using a signal from G8ACN at 250km distance, audible at great strength during good conditions in the summer of 1973. A few days later G4BYV was logged at S9, followed by G3SXK (then at Cambridge) at RS54 when he was using only a 3W transmitter. Needless to say, G2FNW and G8AKE have been heard many times; they use 23cm receivers with similar pre-amplifiers to this one.

Microwaves—1,000MHz and up

Continued from page 592

An interesting suggestion came from G3KSU. The technique relies on the sharp null that is observed when a dipole is directed end-on to a station. One method for aligning the dipole is to peak the main aerial on a local station and then rotate it through 90°. The dipole operating on the talk-back frequency is mounted with the main aerial so that it nulls, and then is clamped firmly in place. For subsequent contacts it is necessary only to null the dipole and then to rotate the aerials through the correct 90° when the main aerial should be on target. With this technique the dipole can be used for talk-back but a calibrated rotator is essential.

A second method is to align the dipole so that it nulls when the main dish is peaked on the other station. This approach does not require a calibrated rotator, but a second aerial for talk-back will probably be necessary.

Both methods seem well worth trying, and it would be of interest to hear of people's experiences. If the dipole has to be removed for transporting, some method for replacing it in exactly the right position will have to be developed. A simple way of doing this would also be of interest.

Modifications to a trap dipole

by J. K. TODD, G2KV*

AFTER a long period of QRT the author became active again in November 1971 planning to work on all licensed frequencies below 30MHz. A survey of his garden and its trees showed that wires totalling only 113ft (and this with a dog's leg in them) were the maximum that could be accommodated, so it was decided to purchase a trap dipole complete with balun and the 97ft of coaxial cable recommended to ensure performance on 14, 21 and 28MHz. The aerial was supported by three trees and reached a height of about 30ft. The rest of the station consists of an FT101, an swr meter with sensitivity control and a one-pole three-position switch which connects the above to either the trap dipole, another aerial or a screened high power 50Ω load.

Over a period of 18 months a watch was kept on the performance of the trap dipole in both dx performance and swr aspects. The 3·5MHz performance was good for Eu but bad for dx; the 7MHz performance was satisfactory for both Eu and dx; 14MHz was satisfactory, but 21 and 28 were not good. The method of assessing performance was based on the straight interchange of RST reports and notes taken of other contacts by the other station and the reports exchanged. Allowances were made for erp if possible and further information was obtained by listening to the reports exchanged by local stations with dx and assuming reciprocity.

The swr performance of the original aerial is shown in Table 1. A problem arose in that the swr figures recorded for earlier measurements would not repeat themselves. This was tracked down to the sensitivity control on the swr meter. The meter was operated by adjusting the forward power reading just to reach full scale, then the reverse power was read and a further scale showed the alleged swr. Depending on the output of the transmitter and other things the position of the sensitivity control varied. So for a given frequency one could operate the swr meter using either:

(*a*) full transmitter output and reduced sensitivity of the meter;

or (*b*) full sensitivity of the meter and reduced transmitter output.

These two methods gave widely different answers, perhaps because the dc load in the diodes' circuits varied with the sensitivity control and so therefore did their linearity. So a rule was made always to run the swr meter at maximum sensitivity and to reduce the transmitter power to get full scale reading. After this, swr readings could be repeated and it was also found that less QRM was caused. Whether Table 1 gives the accurate swr is not certain, but as the rest of this article is about how to reduce the swr of a trap dipole, the absolute values are not so important for cw/ssb.

The change of swr with frequency on 3·5 and 7MHz followed the expected pattern, but the greater constancy on 14, 21 and 28MHz was puzzling. Many amateurs claim that their aerial is a good one because it has a fairly constant swr,

Table 1

SWR compared with frequency of original trap dipole with 97ft feeder

MHz	SWR	MHz	SWR	MHz	SWR
3·5	6·0	14·0	3·2	21·0	3·2
3·6	3·5	14·1	3·1	21·1	3·1
3·7	1·5	14·2	2·9	21·2	2·9
3·74	1·1	14·3	2·8	21·3	2·8
3·8	1·9			21·4	2·8
7·0	2·1			28·0	4·0
7·05	1·8			28·5	4·5
7·1	1·4			29·0	4·8
				29·5	5·5

but so has a resistive load or a long lossy feeder! It is not right for a single-wire dipole to have a too constant swr (as measured by percentage change) over a band. Various ways of improving the swr on 14, 21 and 28MHz were mulled over, and it was finally decided to try some parallel dipoles mechanically and electrically attached to the main trap dipole for these bands. This principle is mentioned in both RSGB and ARRL handbooks.

The aerial rigging was slightly rearranged so that the balun and coaxial cable could be lowered easily to the ground and hauled up again. Two lengths of about 16½ft of tinned hard copper 14swg wire were hung on the trap dipole by six pieces of string and about 4in spacing was used. The inner ends were soldered to the balun connection. The aerial was hauled up and the swr figures over the 14MHz band were measured and are shown in Table 2 and Fig 1.

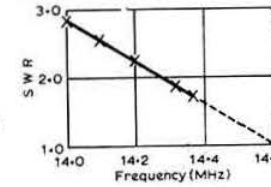


Fig 1. Figures of Table 2 plotted as rough graph and extended to swr of 1·0

The minimum appeared to be at about 14·6MHz (if indeed there was one) but it should have been about 14·1 for cw, an approximate 3½ per cent decrease from 14·6. Therefore the dipoles should have been about 3½ per cent of 16½ft (or 7in) longer. Pieces of tinned 14swg wire 10in long were squeezed onto the 14MHz dipole about 2½in from the ends and proved to correct the swr to about the desired frequency and so were soldered on. SWR results obtained by trimming this odd piece which was sticking out almost at right angles are given in Table 3 which also shows those obtained for the 3·5 and 7MHz performance—compare Table 1. It is important to note that the frequency of minimum swr on the lower frequencies has not changed, but that the rate of change with frequency has reduced considerably. This is partly because the effective diameter of the aerial wire has increased, giving it a performance approaching specially designed wide-band aerials like sausage and conical dipoles.

Table 2

SWR compared with frequency in 14MHz band when 20m dipole added

MHz	SWR
14·0	2·8
14·1	2·5
14·2	2·2
14·3	1·9
14·35	1·7

* Wych Elm, Eve's Corner, Danbury, Essex.

Table 3

SWR compared with frequency in 3·5, 7 and 14MHz bands when correctors added

MHz	SWR	MHz	SWR	MHz	SWR
3·5	4·3	7·0	1·8	14·0	1·2
3·6	3·0	7·1	1·3	14·1	1·05
3·7	1·2			14·2	1·2
3·74	1·01			14·3	1·3
3·8	1·5			14·35	1·5

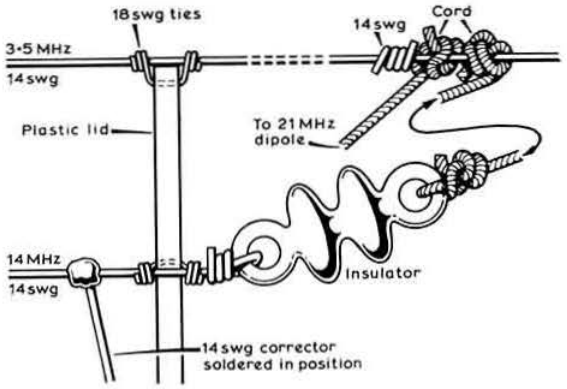


Fig 2. Assorted mechanical details around the outer plastic spacer

This method of reducing swr seemed successful so the aerial was mechanically tidied up with spacers and strainers as described later, and the same procedure was carried out on the 21 and 28MHz dipoles. The bandwidth of the 28MHz dipole is obviously too narrow but can probably be widened by adding another dipole.

Mechanically the system has been partially tidied up. Plastic food-tin lids about 4in in diameter had holes punched near their perimeter and 90° apart (there were plans for only three extra dipoles but it seems that the 28MHz may need at least two of its own) and the various dipole wires were laid over the rims and retained there by winding 18swg wire tightly over the dipole, passing through the hole and then round the dipole wire again. This method also prevented the wires (and correctors) twisting relative to the aerial. The slight end strain of each dipole was taken by an insulator and polypropylene string to the main 3·5MHz dipole wire. The plastic spacing discs were fixed about 1, 6, 11 and 16ft from the balun on each side. Care was taken that the dipole wires were reasonably straight and did not short one to another. The coaxial feeder was cut from 90ft to the minimum of about 30ft.

The figures of Table 4 were obtained after the above modifications were completed. Fig 2 shows examples of some of the mechanical details, Fig 3 a sort of general arrangement

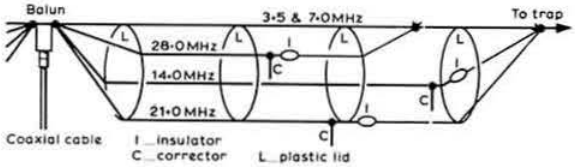


Fig 3. General idea of mounting the multiple dipoles to main dipole: one side only

Table 4

SWR compared with frequency in 3·5 to 28MHz bands when all dipoles and correctors added and feeder reduced to 30ft

MHz	SWR	MHz	SWR	MHz	SWR	MHz	SWR
3·5	4·0	14·0	1·1	21·0	1·6	28·0	3·5
3·6	2·8	14·1	1·1	21·1	1·1	28·5	1·3
3·7	1·1	14·2	1·2	21·2	1·1		
3·8	1·4	14·3	1·3	21·3	1·3	29·0	2·2
7·0	1·6	14·35	1·4	21·4	1·4	29·5	3·5
7·1	1·1			21·45	1·6		

of part of the aerial system, and Fig 4 an impression of the whole aerial.

The whole exercise worked in accordance with simple theory (aided by the feedback of measuring and retrimming). No attempt was made to cut wires to accurate lengths; something near to the expected length was rigged up, measured, a calculation made for the correctors and it worked. In the context of swr this aerial works and looks useful. Whether it works well for dx will require more operating time to find out; it should do because more power will get to and from the aerial; certain other pointers (such as comparison with another aerial on particular azimuths before and after the modification) look optimistic.

Note that no atu is used between 3·5 and 30MHz. All that an atu does (other than act as a low pass filter) is to change the resistance and reactance at a certain point of the feeder system to something that the transmitter can cope with. It does *not* change the swr between the atu and the aerial (ie the major part of the feeder system). ATUs cost money, take up space and have more knobs to turn when changing bands.

Theory shows that the power in the aerial at 28MHz should increase by 3·3dB. This was calculated as follows: one end of the 60ft of feeder that was cut off was shorted and the swr at the other end was measured at 28MHz. It was 5, and the 1972 ARRL *Handbook*, p569, shows that this looks like 1·9dB for the 60ft; so the original 90ft had 2·85dB losses. The swr of 4·0 (Table 1) gives an additional loss of 1·5dB (*Radio Communication Handbook*, pp13–19), so the total feeder loss was originally 4·35dB.

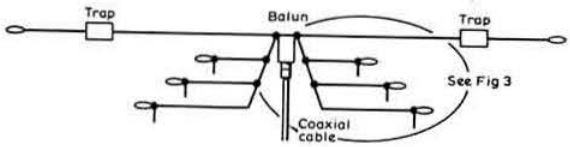


Fig 4. General impression of the whole modified trap dipole

The "final" aerial has a feeder of 30ft so the loss is 0·95dB; and with an swr of under 1·5 (which ought to be attainable when it is broad banded) the additional loss is under 0·1dB. So the new total loss is about 1·05dB, a saving of 3·3dB, which is useful.

This has not been a description of a new type of aerial but of a method of setting up an aerial system using well-known principles and simple test gear in a way which allows the final dimensions to arrive at the correct figure for a particular station. Once the principles have been established, a new dipole can be erected and trimmed in under half an hour. Including the problems obtained from developing the mechanical ideas and pruning the trees, the whole exercise was completed in under six hours.

TECHNICAL TOPICS

by PAT HAWKER, G3VA

THIS month we take a rather wary look at the latest official figures on radio and television interference complaints—down but still worrying—plus quite a varied selection of aerial topics, propagation oddities and a clutch of circuits; some entirely new topics but others arising out of recent items.

Radio and television interference

The Home Office Radio Regulatory Department has recently put out the annual report on radio and television interference complaints investigated by the Post Office during 1973. This time it seems to me that the figures are more than ever liable to be misinterpreted and the wrong conclusions drawn. For example, the number of new complaints is well down on past years, actually less than 50,000 for the first time for many, many years (compared for instance with 57,536 in 1972 and 72,842 in 1968 and up to about 150,000 in the mid-'fifties). So the unwary might think that we are really getting on top of the problem of electrical interference and that there is now very much less pollution of the radio spectrum than for 20 years.

Frankly I think such a conclusion would be false; and that there has been little if any improvement over the last five years or so. One notes that complaints of interference to mf and Band 2 *radio* are both up, Band 2 by no less than 29·1 per cent. The steady decrease in complaints throughout the 'sixties followed legislation on the fitting of suppressors to domestic appliances and in particular small motors, and this did represent a real improvement. But the present numerical decline clearly stems from the much greater use by viewers of uhf rather than vhf television, and such reception is clearly much less susceptible to conventional electrical interference. And meanwhile the thermostats of domestic central heating systems have enormously increased in numbers and have for some years been the single most important polluter of the urban and suburban air-ways; there is still a long way to go before anyone can claim to have overcome this menace. (I write with some bitterness, having suffered from this problem recently to the extent that for several weeks there was no pleasure in switching on my receiver!)

But to come to the question of tvi and what is happening on this front. Here again there is plenty of evidence that uhf television has brought far less relief to the amateur scene than we had all expected; and this is due largely to tv receiver design with susceptibility to pick-up on the outer braid of the aerial and extremely limited dynamic range. When we used to forecast the improvement that uhf would bring we little suspected that transistor tuners and the lack of front end filtering would cancel this out.

Recently I had a chance to chat with Ed Oxner of Siliconix, a number of whose mixer and other circuits have found their way into *TT* in the past. He was on a lightning tour of Europe to see if European firms were interested in using mosfet rather than bipolar devices in tv tuners. A number of American tv manufacturers are now using MOSFETS both for vhf and uhf channels, but we both agreed that it is unlikely that this practice will be widely followed in the UK since with the co-sited uhf stations there is no strong user demand for sets with greater dynamic range.

TABLE 1

BCI and tvi ascribed to amateur stations

Band	1968	1969	1970	1971	1972	1973
LW/MW (radio)	55	48	28	38	56	61
Band 1 (tv)	725	821	630	467	462	329
Band 2 (radio)	34	44	40	44	55	58
Band 3 (tv)	319	492	394	300	306	221
Bands 4–5 (tv)	12	26	65	173	348	488
Mobile service	6	11	4	5	15	12
Yearly totals	1,151	1,442	1,161	1,027	1,242	1,169

Table 1 shows bci and tvi ascribed to amateur stations over the past six years. With the exception of 1969 the totals have remained remarkably similar (indeed so similar that any self-respecting mathematician is bound to wonder what strange influence is at work to confound theories of statistical distribution!). The curious balancing act of fate (if fate it be) seems to have determined that whatsoever is taken from Bands 1 and 3 shall verily be added to Bands 4 and 5. I suppose one could argue that since the total number of amateurs is now a good deal greater than in 1968 the position has improved to that extent (but are we really sure that the number of amateurs and the total amount of amateur activity are strictly proportional?).

TABLE 2

BCI and tvi ascribed to UK transmitters other than amateur

Band	1968	1969	1970	1971	1972	1973
LW/MW	86	91	95	101	164	160
Band 1	765	790	805	654	703	452
Band 2	137	140	201	167	201	264
Band 3	635	637	728	517	582	347
Bands 4–5	55	84	210	317	631	872
Mobile	141	134	167	127	170	472
Yearly totals	1,819	1,876	2,206	1,883	2,451	2,567

Table 2 indicates that interference ascribed to "Radio transmitters in the UK other than amateur" has greatly increased. But here again the figures are rather ambiguous. Some of this interference represents tvi from mobile base stations and so is analogous to amateur tvi, but a lot of it probably relates to co-channel interference from distant stations and reflects the greater utilization of the uhf channels with the steadily increasing number of local tv relay transmitters.

My feeling that general noise levels are not getting any better is supported by looking at the number of complaints of interference to mf reception due to radiation from tv line time-bases: 1973, 202; 1972, 165; 1971, 49; 1970, 45. This increase may be partly due to more people listening to local radio stations, but I suspect it also reflects the very vicious time-base radiation from many colour tv receivers. This

injects into the mains and gets carried over quite long distances, producing harmonics every 15·625kHz.

So personally, despite the 10·82 per cent reduction in the number of complaints, I find very little comfort in the 1973 figures. But one item of good news is that interference from overhead powerlines went down 45 per cent compared with 1972 and is now little more than a quarter of the figure of 5-6 years ago.

More on the VK2ABQ triband beam

January *TT* included a description of a triband hf beam which featured "no traps or coils, a turning radius of only 12ft, no special 'blobs of electronics' and mechanically simple". This design had emerged from a good deal of effort on the part of Fred Caton, VK2ABQ/G3ONC, although it was made clear in January that the dimensions suggested both on the diagram and in the text would almost certainly need a degree of cut and try and depended on such factors as the amount of metalwork used in its construction and at the top of the supporting mast or tower. In fact I was perhaps rather too cautious in adding that I had some slight qualms about the design and this may have put some readers off: this would be a pity since there are very few triband designs that can be claimed to be both suitable for home construction, easy on the pocket and offer the promise that once put up they have a good chance of staying up.

Fortunately at least one reader was not put off from trying out the idea. This was Phil Horwood, G3FRB, and his comments may well encourage others. He writes: "Results on the three bands have been very encouraging, particularly on 14MHz, where you have to be a big signal to work in the American phone section. Although folded it is full-size on each band. 14MHz results are better than with a G4ZU Minibeam and comparable to the full-size 3-element Yagi previously used but which had to be taken down after neighbours had complained of a 4ft incursion into their airspace."

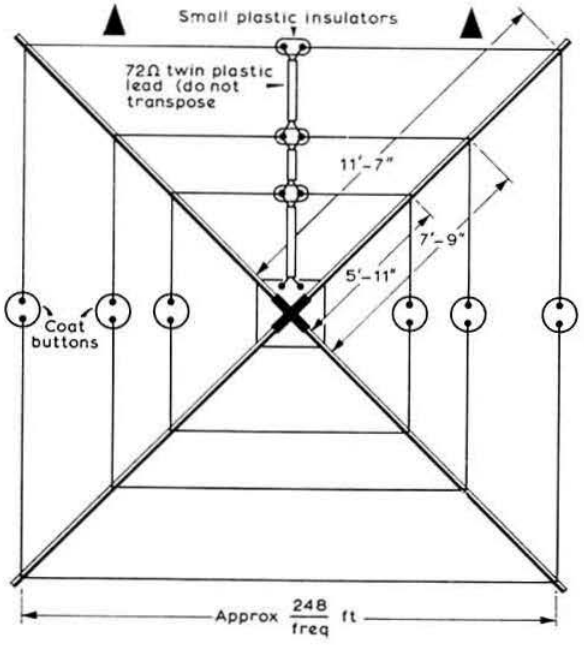


Fig 1. The VK2ABQ triband beam for 14/21/28MHz (seen looking down on the aerial) as published in the January issue but showing the final dimensions of G3FRB

He adds: "On all bands front-to-back ratio is noticeably good, though not yet measured. At 55ft high I have regularly worked into VK and ZL at 2300 local time on 14MHz and during some recent unusual conditions worked W and VE east coast on 28MHz also at 2300. Even with my Versatower at minimum height, with the array just clearing the roof, I have had 59-plus reports from W and VE on 14MHz. I think this design deserves attention from amateurs who might otherwise spend £50-plus on a commercial trap beam. The cost of construction is minimal. I cut up my old Minibeam (the victim of metal fatigue) to make the centre section, so it only cost me four 8ft bamboos and about 150ft of wire. It is very light and offers little wind resistance, and does not develop sympathetic mechanical resonances in a stiff breeze."

In fact it would seem that the only real snag is that of getting the dimensions correctly adjusted and this could be difficult without a fold-over tower or some easy way of putting the beam up and down; G3FRB found neither the dimensions given on the diagram nor those in the text were suitable in his case; 21 and 28MHz in particular varying considerably with the amount of metalwork inside the loops, and it was also difficult to predict the change in frequency when adjusting 6ft off the ground and when finally at operating height; there was almost a 500kHz change on 14MHz in his case.

He adds to the comments of VK2ABQ on using a gdo to adjust the wires, saying: "When tuning with gdo coupled to the feed point and with the full loop uncut, gripping the voltage maxima will load the gdo and reduce the depth of dip. After the radiator is insulated from the reflector, gripping the end of the radiator increases the loading on the gdo, while gripping the end of the reflector *reduces* the load (presumably, he suggests, because this detunes the reflector and it absorbs less power from the radiator). It is useful to measure the gdo frequency on the shack receiver; he finds his gdo radiates well from the aerial over 100ft to receiver with 2ft of wire for aerial; the signal can be identified because of frequency modulation of the gdo at "wind" frequency. He feeds with 50Ω coaxial via a 1 : 1 balun at the boom, thence as suggested by VK2ABQ by flat twin, all radiators in parallel.

The final outcome of his adjustments (Fig 1) was resonance at the centre of each band, obtained with dimensions along the "booms" of 11ft 7in (14MHz), 7ft 9in (21MHz) and 5ft 11in (28MHz), but remember that these dimensions will not necessarily apply with a different amount of metalwork. Because the array is basically widespaced the bandwidth is sufficient to maintain a vswr of less than 1·5 : 1 over 14 and 21MHz and, if centred on 28·5MHz, $\leqslant$1·5 : 1 on 28–29MHz.

G3FRB also points out, to anyone still worried about my remark in January about expecting the reflector to be longer than the radiator, that at $\frac{1}{2}\lambda$ spacing a reflector is resonate at signal frequency (and similarly at $\frac{1}{10}\lambda$ the same length would be a director).

So there we are: confirmation that for the amateur prepared to do some cut and try the VK2ABQ really does represent a practical and useful approach to a triband beam.

A modified VK2ABQ tribander

Following up the original beam, as discussed above, another note from Fred Caton, VK2ABQ/G3ONC, provides two further ideas: one is a modification to the tribander, the second is a bow-tie monoband beam using rather similar mechanical concepts and which has also appeared in *Electronics Australia* (April 1974).

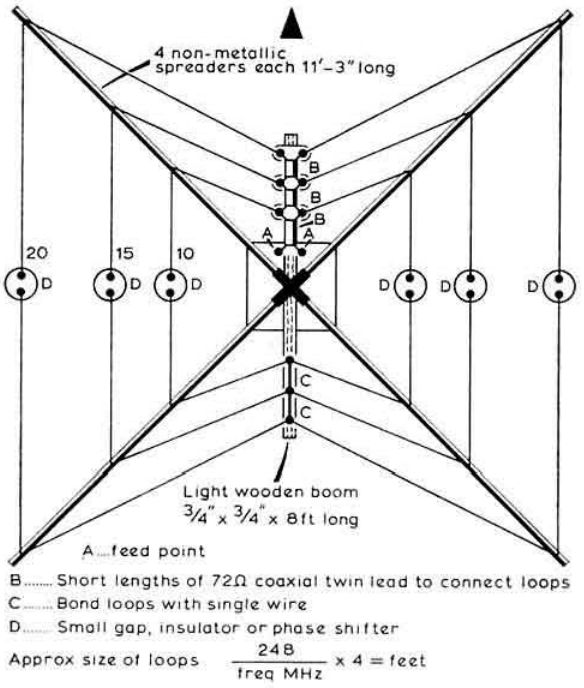


Fig 2. The modified form of VK2ABQ which by reducing the element spacing at the points of maximum current tends to produce an improved back to front ratio

His modification to the triband array is basically by decreasing element spacing at the current maxima, resulting in greater front to back ratio and decreasing the turning radius to about 11ft 3in. As shown in Fig 2 he reduces spacing by means of a light wood boom (8ft by ¾in by ¾in) to which he bonds the loops with single wire. He also notes that the lengths of twin feeder between the loops does cause some capacitive loading on 28MHz and rather less so on 21MHz; these effects can be nullified by adjusting the total length of wire in the loops. Despite the change in shape, VK2ABQ finds the total length of wire in each loop remains roughly the same (but again he emphasizes the need to adjust using a gdo or swr bridge). He also clears up a point that caused some confusion in January: the suggested 248/f (MHz) represents the approximate side length of the loop in feet; that is to say the total length of wire in each initially uncut loop is about 4 by 248/f feet.

One can see both advantages and disadvantages in the modification, depending on the relative importance to the builder of front to back ratio or broader band operation and whether or not you want to avoid the extra wooden "boom".

The mono-band bow-tie

Fig 3 shows a design for a 14MHz bow-tie wire array with a turning radius of about 12ft which VK2ABQ suggests can provide a front to back ratio of the order of 20dB with forward gain of up to 6dB. It is built entirely with light timber, wire and nails. Without insulators (buttons) inserted at the extremities it will provide substantially bi-directional radiation; with the insulators it is uni-directional with up to 20–24dB front to back ratio.

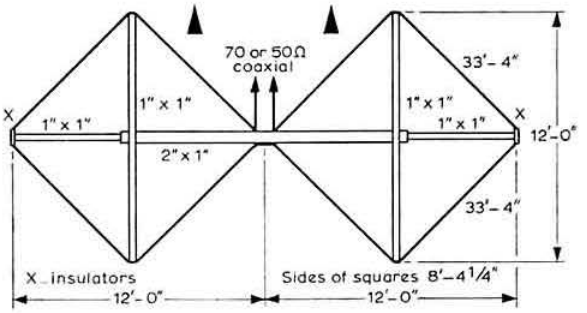


Fig 3. The VK2ABQ monoband bow-tie aerial showing dimensions for 14MHz

The timber frame consists of one 12ft length of 2in by 1in timber, two 12ft lengths of 1in by 1in, and two 7ft lengths of 1in by 1in. Six feet in from each end of the main boom (24ft long) a 12ft cross-piece of 1in by 1in timber is fitted. Two lengths of insulated wire, each about 33ft 5in long are fitted with small close-spaced insulators at each end and with the driven element also broken in the centre with an insulator. The array can be fed with either 70 or 50Ω coaxial cable (a 1 : 1 balun would seem to be indicated but not essential).

I must admit to a feeling that if I made a framework to this specification it would turn out to be rather unstable and less manageable than for the triband arrangement, but VK2ABQ states that a full scale unit has been built and fully tested at the home of a friend and that a model for reception on 144MHz has also been made. So here again is an idea for a rather out-of-the-ordinary aerial.

Dielectric loaded aerials

I remember reading an article some years ago in one of the amateur journals which pointed out that if we all submerged our aerials in water it would be possible to reduce dimensions to an extent where 1·8MHz three-element beams would be all the rage. But fascinating though this seemed I was too dim-witted to see how the idea might have any real application to amateur radio. Fortunately this same concept has of late been attracting attention at the Royal Military College of Science and what is emerging (eg British Provisional Patent Application 27097 of 1973) is in a form where one can begin to see some very practical applications indeed, particularly for aerials where a degree of power loss can be tolerated in order to achieve dimensional reductions which may even be of the order of *10* times. Imagine a true $\frac{1}{4}\lambda$ vertical for 1·8MHz only 13ft high instead of 130ft! Though I hasten to add that I have no idea of the cost of the special ceramic material that would be needed to do this, or its power-handling capabilities.

This current work is based on the idea that if an aerial radiates into a dielectric-filled atmosphere the wavelength can be scaled down by a factor depending on the dielectric. If the relative permittivity is ϵ_r then the scaling down factor is $(\epsilon_r)^{\frac{1}{2}}$. The new twist is to question how much dielectric needs to surround the aerial elements. And the answer, apparently, is very little. In other words, if we have a suitable dielectric coating around the array we can achieve the reduced dimensions without affecting the radiation pattern as the waves diverge from the subsequent dielectric-air boundary.

Originally the Military College team used bulky coatings of powdered dielectric material, but more recently thinner coatings using a fired ceramic material of ϵ_r about 3,000 have been developed, allowing the overall diameter of the miniaturized element to be only a fraction of its reduced height.

Some notes on recent progress of this work appear in *Electronics Letters*, 27 June 1974, in a letter from J. R. James, A. J. Schuler and R. F. Bingham. One technique which has been tried is a 3-element monopole Yagi at 1000MHz using barium-titanate powder dielectric packed between the elements; this permits their physical dimensions to be reduced by a factor of three. Tests have also been carried out using dielectric-loaded slot aerials suitable for aircraft applications: in this case the dielectric loading consisted of titanium-dioxide powder ($\epsilon_r \simeq 35$) held in position by a thin plastics skin: in this case slot lengths were reduced by about 20 per cent, the percentage bandwidth from 18 per cent to 10 per cent but the radiation resistance increased by 50 per cent. This experiment was repeated at 100MHz with ferrite loading with similar results and again with an increase in radiation resistance.

Ceramic coated monopoles at 100MHz can have a height reduction of the order of 10 times for a power loss in the material of about 2dB (but no indication is given of the maximum power that could be used).

So it is really beginning to look as though dielectric loading could prove an effective approach to miniaturized aerials, without having to put them in the sea!

Simple muting switch

My first, dictionary-aided, attempt to tackle an article "Einfache Rauschsperre" by Wolfgang Hamer, DL1FN (*Old Man*, No 2, 1973) came up with the rather surprising translation of "Plain open-wide intoxication" but since the circuit diagram (Fig 4) did not seem to include any "bottles" I soon decided that "simple muting switch" is perhaps rather nearer the "mark".

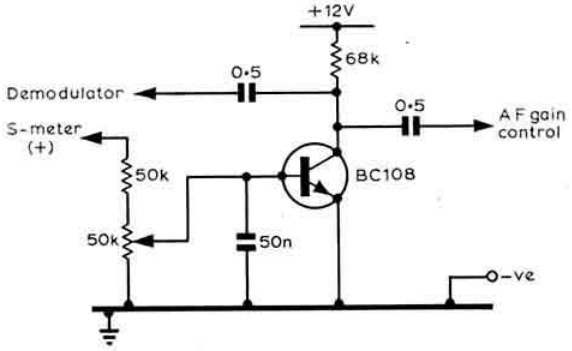


Fig 4. Simple muting arrangement used by DL1FN

In fact DL1FN suggests that a switch of this type, triggered by a carrier, is a useful aid to anyone wishing quietly to monitor a vhf channel. The transistor forms an electronic switch which short-circuits the bulk of the af signal until the arrival of the carrier removes the short-circuit from the audio; the system can be adjusted to trigger on carriers of a wide spread of signal strengths. DL1FN adds the warning that the 12V supply for the BC108 needs to be completely ripple free since any hum will be amplified by the receiver af stages.

Balanced modulator gone wrong

In the July *TT* in all innocence we abstracted from *Mercury* an idea for using symmetrical transistors to form balanced modulators. It *seemed* a good idea but we should have stopped to think about those diodes. Certainly a symmetrical transistor can be regarded as two similar diodes (Fig 5) but unfortunately as GI3VCI, G3BY and G3DYH

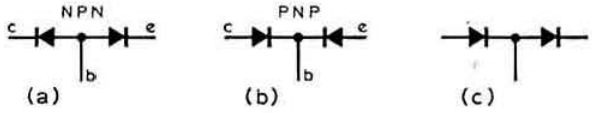


Fig 5. (a) and (b) show the "diodes" provided by npn and pnp transistors; (c) shows what is needed for balanced modulators

(who tried the idea and found results very poor) have pointed out, the diodes are in "series opposition" rather than the "series aiding" arrangement required for a balanced modulator. So it looks as though this one is a non-starter and I am duly blushing (and hoping that the Royal Signals have not converted all the military equipment yet). However, G3BY, on the grounds that it is an ill-wind, feels that some symmetrical transistors might offer possibilities as the "varicap" control of a "huff and puff stabilizer" as in the July issue (Fig 5). But this is a thought untried.

Mismatched diode demodulators

Last month brief reference was made to the paper by Maurice Hately, GM3HAT, at *Communications 74* entitled "Mismatched diode modulator-demodulator". This describes a new approach to a family of linear ssb/nbfm/a.m. demodulators which form the subject of British Patent 1,339,608 of December 1973 (though of course this does not prevent anyone from using the ideas in home-constructed equipment).

The original paper runs to some three and a half pages and 18 diagrams so it is possible here only very briefly to digest a few of the main points.

Basically GM3HAT suggests that nearly all presently used demodulators involve diodes working from a low impedance source into a high impedance load, presumably a legacy from power rectification practice where efficiency is the primary objective. But it means that: (1) the diode operates near its bend for most of the conduction interval; (2) the conduction interval is a very short part of the cycle; and (3) diode peak current is very large and carrier storage phenomena becomes significant. These factors mean that the behaviour is analytically intractable and nearly unimprovable.

By re-appraising the situation; for example by having two current sources feeding through a diode junction into a

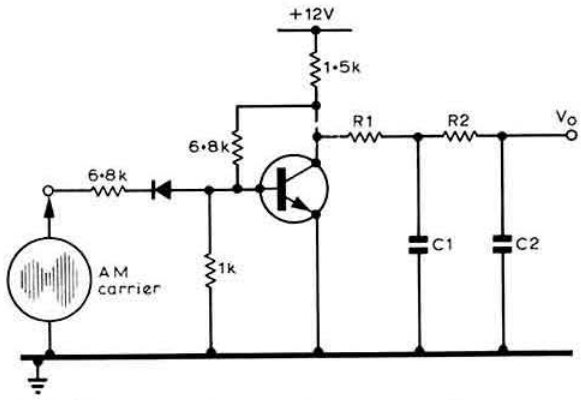


Fig 6. Mismatched diode circuit for demodulation of a.m. signals capable of linear demodulation right down to the trough of 100 per cent modulated carrier waves

current sink, he believes the result is far less efficiency (of little consequence in an era of cheap gain) but it becomes possible to achieve good linearity, repeatability and reliability in the form of several circuit configurations that do not depend upon transformers and yet can be of single or balanced form.

In effect voltage sources can be changed to a close approximation of a current source by connecting a high impedance in series; current sinks can consist of a shunt fed back common emitter transistor or a common base circuit. For minimum distortion square-wave carrier input is required, involving fast switch-off diode performance, with Schottky barrier or gold-bonded germanium diodes necessary when the carrier frequency is in the hf region.

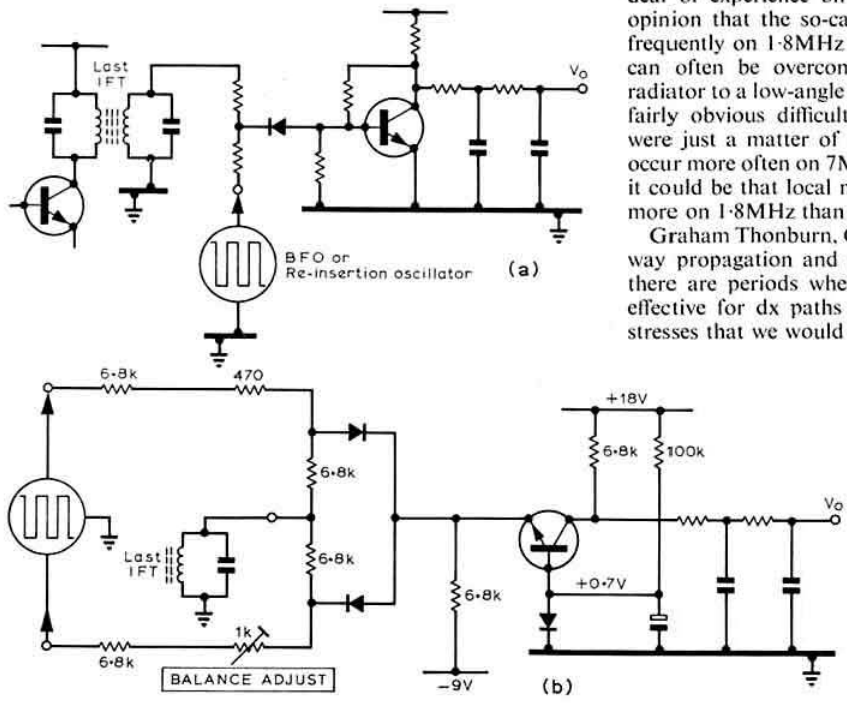


Fig 7. Two mismatched diode demodulator circuits for ssb reception. (a) unbalanced form, (b) balanced

Fig 6 shows an elementary mismatched diode circuit which is stated to provide an ideal demodulator of a.m. signals where the forward bias for the silicon diode is obtained from the junction voltage of the npn silicon transistor to ensure linear demodulation right down the trough of 100 per cent modulated waves.

Fig 7(*a*) shows an unbalanced ssb demodulator while Fig 7(*b*) is a single-balanced form of demodulator for ssb or phase-modulated signals, corresponding to the usual product detector. Balance is determined principally by resistor value and is almost independent of diode characteristic and remains good over wide frequency range, thus suggesting possible improvement to the design of mixers for receiver front ends.

GM3HAT suggests that results he has obtained (for example at 900kHz) have borne out the expectations of this approach, with the values for intermodulation products so small that they become concealed by the shortcomings of the measuring equipment. The genuine dc coupling for the signal baseband eliminates the need for transformers.

This then is a very brief introduction to this new family of modulator-demodulator circuits; it will be interesting to see if they influence future design.

Propagation oddities again

Quite a lot more comments have come in on the subject of "one-way propagation" and the question of signals arriving from paths other than the true great circle route (*TT* May, July).

Phil Ashton, G3XAP, has a theory that one-way propagation effects are normally closely linked with the now well-recognized phenomenon of layer tilting which can mean that the reflecting layer may be significantly nearer one end of the path than the other. But curiously in the course of a good deal of experience on 7 and 1·8MHz he has formed the opinion that the so-called one-way effect occurs far more frequently on 1·8MHz than on 7MHz. On 7MHz the effect can often be overcome by switching from a high-angle radiator to a low-angle one or *vice versa* but there are usually fairly obvious difficulties in doing this on 1·8MHz. If it were just a matter of tilting he would expect the effect to occur more often on 7MHz than 1·8MHz. On the other hand it could be that local noise and hence signal-to-noise varies more on 1·8MHz than on 7MHz.

Graham Thonburn, G3WBT, is also a firm believer in one-way propagation and agrees with G6CJ and G3XAP that there are periods when high-angle radiation can be more effective for dx paths than low-angle radiation. Again he stresses that we would all be less surprised at this if it were

not that we have been conditioned by the over-simplification of hf propagation in most text-books, with all those diagrams showing a nicely round earth surrounded by neat concentric circles marked D, E and F layers, when there are in reality many ways in which propagation can be affected by the sun, the moon, solar winds and the seasons. He recalls incidentally that in 1922–3 he used to hear Australian broadcast stations in Scotland at noon using a single-valve superregen; he also points out that the temperature and thermal currents over Africa tend to make South Africa contacts less consistent than, for example, the paths to Australia and New Zealand.

In *TT* (January 1973) I mentioned the "twilight girdle" as a path of particular interest and this point has long interested Ted Cook, ZS6BT. He is convinced that the most uniform level of ionization can be expected along this "shadow line", particularly on 14MHz which he describes as neither a "night frequency" such as 3·5 and 7MHz nor a "day frequency" such as 21 and 28MHz. He feels that "superior dx" paths on 14MHz can be expected to lie along this shadow line and paths reasonably parallel to it, whereas a seasonal blackout develops when a path from A to B is at too obtuse an angle to the shadow line. He believes that using this approach one can predict likely dx in terms of "shadow line probability" as accurately as by any of the more usual prediction methods. I feel that there is a good deal of evidence to support this suggestion.

Great circle deviations

In the July *TT* we reported on a Rohde & Schwarz article which drew upon the observations of H. A. Whale (not Whate) of New Zealand to support a contention that a rotary log periodic could provide better signal to noise ratios than a higher gain rhombic over periods of directional fluctuations. This paper failed to mention the opposite conclusions of Dr E. N. Bramley of the Appleton Laboratory who in 1971 suggested that there are relatively few occasions over normal commercial medium-distance paths when this will really be the case.

In correspondence Dr Bramley suggests that the German firm have rather taken the New Zealand results out of context He confirms that, as I suggested, Whale's observations were based on the reception of signals from the UK (specifically GVY on 11·955MHz, 1800–2300gmt, thus covering the New Zealand dawn period, during 1954–5). He feels that these near-antipodal paths are rather special and might be expected to show large bearing changes, but knows of no published data obtained on more normal paths which conflict with the conclusions of his paper (*Proc IEE*, Vol 118, No 2, 1971).

This same point is also made by W. E. (Rusty) Russell, G5WP. He writes: "My experience, and that of other G-dx buffs, confirm that H. A. Whale's findings of ZL/G path deviations are absolutely correct. The effect appears only in connection with antipodal paths and, as Whale's diagram shows, follows a seasonal pattern.

"The actual nature of an occurrence is that ZL3 and ZL4 are putting in high level signals on more or less true great circle paths (ie long path on 14MHz); ZL1 and 2 are not audible, or only just above the noise. Turn the beam to about 310° and there is North Island booming in. These signals are *not* coming the true short path as a rapid check to the north-east will prove.

"I would say on average it happens a dozen times a year and only regret that I have not kept a record; I have never noticed the effect on signals from VK or anywhere else than ZL1 and ZL2, never on ZL3 or ZL4 signals.

"I do not think the foregoing conflicts with the investigations carried out by Dr Bramley on shorter non-antipodal paths."

But G5WP also takes up another point: "What has always interested me is an approximate 90° deviation and the other common example, but probably with quite different causes, which is found on 21 and 28MHz. Usually in BERU, annually in March, the addicts depending on the sunspot cycle will find the path closed to VE1–3 from G, yet at times when the band is likely to be open from Eastern Canada to 9JE, ZE etc it is possible to lurk until you hear the southern Africans reeling off the VEs, and then you listen on a bearing of about 240° and there are the VE signals and quite workable, but nil on the correct bearing; this condition never lasts for more than a few minutes. It seems to be a question of capturing a smallish area of highly-ionized layer. The signals are always degraded with high speed fading although not to the extent of an auroral effect. I have wondered if the "reflector" could be of sporadic-E nature located over the southern Caribbean."

Lithium batteries

GTE Laboratories Inc have recently released some details of a new type of battery they are currently developing: the inorganic lithium battery.

It is claimed that the experimental units produce eight times more power than conventional Leclanché cells, with double the shelf life. An inorganic liquid serves as the electrolyte, with the electrodes made of carbon and lithium metal. Output voltage per cell is roughly 3·7V, and the battery produces 250Wh/lb of battery in comparison with about 30Wh/lb of the conventional dry cell.

Commercial introduction is said to be based on progress of current testing and design work: no indication has been given of how prices are likely to compare with rival forms of battery.

Here and there

L. F. Ivin, G5IC, is puzzled at the value of 64μH given by PA0RCH. (*TT* May 1974) He calculates, from the details given, that the loading inductance of this short vertical aerial must be nearer 165μH. Incidentally, G5IC gets good results on 1·8MHz with a short T-aerial of which the vertical section consists of some 220 turns on 1½in tubing.

Several more letters have come in on one-way propagation and it is hoped to return to this subject shortly.

INTERFERENCE PROBLEMS

Members accused of causing interference or who suffer interference from external sources are invited to seek the assistance of the Interference Committee in solving their problems.

Enquiries should be addressed to: The Chairman, Interference Committee, RSGB, 35 Doughty Street, London WC1N 2AE.

FOUR METRES AND DOWN

by JACK HUM, G5UM*

Spin-off from 9 July

Sending your conductor a tape cassette full of the sound of UK stations working him on 2m in the phenomenal Es opening of 9 July, OE1WEB gives 1024–1152gmt as the peak period (he worked 44 British stations, 43 of them ssb, six mobile). On the lower broadcast vhfs the opening extended from 0500 to 1715gmt, "... the largest, super-reflecting and most stable Es-thing we ever had since my observations began in 1962". Could the Es clouds travelling west at 300km/h have reached the USA? Attempts to alert the Americans failed: the Es itself had blacked out the inter-continental hf bands! Walter Ertelt was impressed by the discipline and good manners of British stations, whom he was able to work "... in contest manner ... a pleasant difference from my first 2m Es event of May 1971, when the tendency during Es contacts was to describe precisely length and colour of microphone cord, or similar to that."

Strong BBC emissions in Band 2 alerted the two operators at HG5AIR that something was afoot. From 0935gmt they worked on 2m a total of 68 British (all on ssb, all S9 including a mobile in London), plus one F and one SM (on A1).

Note SM: although the reports flooding into *FMD* showed that everybody who was on at the time worked the same half-dozen middle European countries, Grimsby's G3XDY notched two SMs as late as 4pm. The opening lasted a bare 2min; when SM0ASA was lost at 'XDY he appeared with G3ZSS at Lichfield, indicating that the effect was due to a fast moving patch of ionization. At that same time, GW8BXQ worked three Swedes in quick succession on A3J.

In a three-page typescript he sent to RSGB Scientific Studies Committee and to F8SH, who investigates sporadic-E for IARU Region 1, G3USF attempts to link the events of 9 July with solar phenomena. Professor Harrison writes that the small scale auroral opening of 6 July could have been associated with the exceptionally large solar flare of 5 July, but he believes that the sporadic-E on the following Tuesday was probably related more to the rather large group of spots which passed across the sun in early July, adding "... it is chancy to speculate without having the full geo-physical data".

The enormous strength of the central Europeans on 9 July is commented on by all contributors. Ripon's G8IBB thought a local was having him on when a station signing YU2RHV replied at S9+ to a CQ call; its genuineness was confirmed when YU2CDP followed. "Like winning the pools ... could barely believe it was happening to me after only nine months licensed," as Dennis Boniface puts it. Across at GW3NNF "... the first I knew about the sporadic-E opening was when HG5AIR QRMd a local contact I was having on 2m!" Alan Mills taped the next 90min of Es dx communication and would be pleased to duplicate the recording for any members who care to send him a cassette tape and return postage.

Believed-firsts which spun off from 9 July are GD to HG and OK (GD8EXI); first GD to YU seems to have been established in that previous historic sporadic-E opening of July 1965, when GD2CZM/P worked YU2HB and the British distance record on 2m was hoisted by GI5AJ also with a contact into YU.

County status

The VHF Certificates Manager received an unusual claim for a 144MHz Standard Award which happens to answer a number of questions that members have put on the subject of county status.

During VHF NFD of 1968, Graham Badger of Sutton Coldfield put GW3OHC/P on the 2m air from Radnorshire, and worked more than enough stations to qualify him for the five-plus-30 needed to claim the certificate. As the years passed the QSLs trickled in, and a recent check disclosed that the required number had percolated through. Now Certificate No 392 has gone to Sutton Coldfield.

Middlesex, Monmouth, Flint and many other counties which have now disappeared were worked by GW3OHC/P that day. The claim would remain valid if it had not been made until, say, 1980: the point is that the contacts had been made and the verifications received, all before 31 December 1974, which is the closing date for contacts made with old counties.

Mode and code

"The metre-wave man's code" recommended that the radio amateur equip himself to use as many modes as possible. A couple of years back the advice was needed (heeded?) by fm users, who appeared never to have heard of any other mode. Now it seems that it needs to be directed at some of the A3J-only operators.

"I've worked more stations in the last two months on ssb than during the last year using fm," says G8DML, "but I hope the swing to ssb will not be at the expense of other modes. I must admit to neglecting the rest of the band ... no doubt when the novelty wears off I'll be tuning high to low again."

And G8CXV, while sharing everybody's view of the enormous superiority of ssb over other phone modes as a distance getter, urges the case for establishing a calling channel for a.m. phone. Both ssb and fm score by having calling channels allocated to them and contacts are therefore easy to set up. "Let's put a.m., which has served us very well, back on an equal footing with the other modes. Nine decibels, or 1½ S-points, cannot account for all the dx worked on ssb ... most of this dx is a result of a calling channel and co-channel working".

Relevant comment by G8IBB: "All my dx worked in the great opening of 9 July was on ssb. Thinking back, if I'd tuned the whole 2m band I'd have worked many more. I'll know next time, if there is one!"

* Houghton-on-the-Hill, Leicester LE7 9JJ

And by YU3ZV: "We prefer the cw mode because there are only a few ssb stations in YU-land." That, too, is worth bearing in mind for "next time, if there is one!"

Another from G3DAO (attempting to get his 144MHz Senior on cw only): "It seems a little ironical that I can work cw into LZ, SP and the like, but trying to find a cw station in GD, GC (Jersey) and the counties of DH and ND is like trying to find gold at the bottom of the garden!"

A final stir: in the audio world where the hi-fi boom shows people's desire to listen to enhanced sound, we in amateur radio seem quite content with debasing the timbre of what we listen to; but perhaps when it is only the human voice we are concerned with, it matters little. Or does it? Can *you* put a good quality speaker on to your 2m receiver and say to yourself when you hear a friend on the local net: "Now, that *really* sounds like the man I know"?

Parchment piece

Intensive microwave operations in Scotland have enabled three members to put in claims for three-plus-20 in a category that does not exist—10GHz! So the VHF Certificates Manager, with the approval of the VHF Committee, invented one, the 3cm one. Now certificates Nos 1, 2 and 3 in this category have been mailed to GM3OXX/P, GM3DXJ/P and GM8BKE/P in recognition of 3cm contacts made between GM, GD, GW and G, involving a lot of motoring and a lot of hill climbing to set up dishes on strategic high-spots. As Tom Holbert, GM3DXJ, observes: "The distance per QSO for cards submitted for this claim is 29·55km, but the distance travelled per QSO is around 70km. It must have cost a small fortune in petrol. Perhaps there should be some such recognition as a windscreen sticker or petrol coupons! Anyway, it was very enjoyable, as 3cm portable operation always is."

Almost as rare as the above is the claim by BRS15822 of East London for a 432MHz Listener's Award; his certificate is No 4. Here is a fruitful field for other listeners to till, especially during the present 432MHz Cumulative contest period, and not forgetting the importance of having bfo facilities on receivers to cope with today's big increase in ssb on 70cm. Still in a 70 centimetric context, full marks go to G3NHE and G3EHM who have just obtained their "Seniors" for the band (Nos 19 and 20).

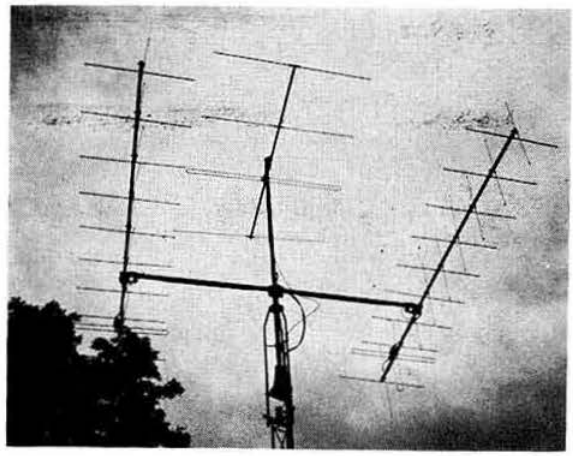
On 4m, Certificate No 111 sent to G3RWM was endorsed "All by ssb"; No 112 goes to G3NHE. And the Senior 144MHz Transmitting to G3XBY was for all-ssb (No 56) preceded by GD2HDZ whose No 55 embraced most modes.

On 2m, 390 to G8GXA, 391 to GD8DMA, 392 GW3OHC/P (above), 393 to G8EBM, 394 to G4CIK.

Expeditionary

A quick sae to A. J. Wade, Fodol Farm, Bangor, Gwynedd LL57 1UT, will fix a schedule for the GM3UCB/P expedition on 14—21 September, when several rarely activated Scottish counties will be put on to 70cm. Look for the team from 8.30 to 11pm each evening on 432·2 and 432·16. The preceding 30 min will be spent on 2m to arrange or finalize sked details, and after 8.30pm a continuous watch will be maintained on 2m. Look for GM3UCB/P also from 6.45 to 8.15am. Sites will be in eight Border counties.

A VHF NFD rarity will be GM3ITZ/8ITZ on the Mull of Kintyre 800ft asl on 70cm, following a recce by GW8AAP and GW8DEZ during the July 70cm event . . . contacts well down into the Midlands were made then.



The multi-purpose complex installed by G3OUF of Amersham. At the top of the mast a 4-element Yagi for 70MHz, beneath it two 10-element crossed Yagis for 144MHz stacked horizontally. Two separate feeders go into the radio room for the 144MHz system, one from both horizontal aerials and the other from the two vertical Yagis. Circular polarization has been used for contacts through Oscar 6, during the first four usable orbits of which 12 countries were worked, including W and VE. When used alone the vertically polarized beams substantially improve signals from mobiles using $\frac{1}{4}\lambda$ whip aerials on vehicles

Talk-out stations

Latest repeater news reported at the August meeting of the VHF Committee was that GB3PI had been reinstalled back at the 600ft Barkway site (as is evident to listeners as far off as 100 miles QRB); GB3BC going strong in the Bristol Channel area, and GB3LO temporarily at Epsom, soon to be resited at Crystal Palace. This month a formal opening is planned for GB3SN in Hampshire. All these on 2m.

Action to establish the first 70cm repeater proceeds at DDRC, who plan to use 431·35 in, 433·35 out.

A new one in Switzerland is HB9F at 10,000ft up. Access is by 1,750Hz tone on 145·1, down channel 600kHz higher in accordance with agreed European standards. It was accessed from G within a few days of commissioning.

Cheer day for (literally) thousands of patiently waiting 2m men was 6 August when GB3VHF appeared on the new spot at 144·15MHz, as the result of devoted single-handed work by G3COJ, who had recovered the device from Wrotham, taken it home to Wycombe for renovating and soak testing, and reinstalled it back in Kent.

Signals in wrong places

Two queries raised in *FMD* last month have brought quick replies:

TVI to BRC1500 from the 4m band (raised by G3LVP): Fred Robins, G3GVM, section leader in the Engineering Liaison Laboratory at Thorn Consumer Electronics at Gosport (himself a very active 4m man for many years), tells *FMD* that the company is fully aware of this problem and can provide all the information to cure it, adding that

the Thorn Group has established a means of dealing with interference complaints if they are channelled to the proper departments. "The RSGB Interference Committee knows who to contact in the Thorn organization and we can deal promptly with authenticated interference cases," he says.

Mystery foreign language broadcast on 78MHz (raised by G3TMG): this could be a harmonic of the BBC sw station at Crowborough, suggests Norman Guy, G2DN, who at Purley has also heard it and checked it with the fundamental emission. And apropos more distant sources of QRM on 4m, sporadic-E induced, 'DN has a list of 45 E European fm stations between 69 and 71MHz, over half of which radiate between 70 and 71MHz.

Misuse and abuse

Back on 2m is G8GBW, inactive since last Christmas, but circumstantial report had it that the callsign was being bootlegged . . . always difficult to substantiate when reporters are either inexperienced or tend to confuse phonetics. However, G8BNO of Uckfield received a QSL for a contact allegedly made in April when he was off-air. He would welcome log-extracts from any one who believed they worked G8BNO that month: write to Bob Street, Brockwells Cottage, Little Horsted, Uckfield, Sussex.

Here and there

The big signal from Carnforth should remain big in spite of a move of QTH; G8GQY asks friends to note he is now at 131 North Road, Carnforth (still on top of a hill).

Harold Thornton's progress: 1923 first fixed and portable wireless experimental receiving licence, 1963 retired, 1970 RAE at first attempt and became G8ECT. 1974 morse test at first attempt (at age 71). Now look for G4DHM on 2m from Coulsdon.

Any fixed stations in GM seeking skeds on 70cm ssb? If so write to G3EHM at Stoke-on-Trent (Ken Parkes can also offer 150W on 23cm).

Purchasing point: J-Beam are back in production with the 4-element beam for 70MHz after redevelopment of the insulator section. Price is £6·20 including fitted balun.

Tech corner

From G3PGN (Howard Buckenham, Brentwood)

During the course of re-equipping the station for 4m ssb one used the rf section of a Pye "Vanguard" with ssb injection at 12·025 to 12·7MHz. Basically, any of the Pye series rf chains can be used as a transverter, including the "Cambridge".

On the receive side a home-built receiver has a pin-diode attenuator in front of a TIS34. I have recently added a reciprocating detector as *Technical Topics* June 1972. This has allowed me to copy some stations which just could not be heard on a conventional GMO290 and R1475. This detector does a really good job at vhf by cutting out some of the ignition noise as well as being hissless.

From G3NHE (Martin Dann, Sheffield)

I hope the "Simple starter for 70cm" item, *FMD* July, does something to stir the "I'm thinking about it" brigade. I would query some of the line lengths suggested. I have found that a half-wave line with end capacitance needs to be about 5⅜in long, and a quarter-wave line 2⅞in, shorted at the remote end and tuned near the valve pins (the nearer the valve the smaller the C needed and the better for a high Q circuit).

A complete portable station in the palms of two hands (those of G8ILI, son of G3FDW). The equipment, top to bottom, is a Europa 4 transverter, a vfo for 70MHz, FT75 ssb source, and its psu. GM3FDW/P will activate Border counties on 4m from 1 to 7 September. *(Photo by G3FDW.)*

What they say

"Mannerisms? If they do not break the MPT regulations they are probably not very important. I must admit I'm strongly irritated by 'Aitch Eye'. What *does* it mean?"—G8DML.

"Correct code for 'Listening on my own frequency' is QSU. Better than QMF or something else incorrect."—G3LVP.

"Repeaters are retrograde. Do we have to follow others like sheep? And the allocation for repeaters in the UK is absurd. It we must have them let's have something decent, eg linear repeaters capable of accepting any mode, and preferably on 70cm"—G8CXV.

25 YEARS BACK

"Television Licences: In Great Britain and Northern Ireland at the end of July 1949, 155,150 television licences were current—an increase of 7,250 over the previous month".

"TVI. Have you cured it? If not read 'Transmitter Interference' price 1/6 post free".

RSBG Bulletin, September 1949

SWL NEWS

by BOB TREACHER, BRS32525*

Summer doldrums

The summer seems to have taken its toll this year. Conditions on the hf bands have been poor for as long as one can remember and only sheer persistence has provided a notable dx catch. Apart from poor conditions, holidays have intervened in many instances and, in some, blame has been credited to the World Cup finals held in West Germany during May and June which could be seen on both tv channels. All in all it seems as though amateur radio is taking a back seat at many QTHs up and down the country. A number of listeners have deserted the hf bands for 2m. Chris Henderson is an example. He was very high in the Countries Table last year and now he is collecting counties on 2m using a converter into his B40 receiver. His aerial system is only modest—a ground plane at 30ft—but it reaps rewards and Chris is now highly knowledgeable on 2m propagation.

A set listening period for 10m was mentioned in the last *SWL News*. This is the brainchild of Dave Whittaker, BRS 25429; the idea being to log every station heard between 1200 and 1800 on 6 October and send the reports to Dave who will analyse them and, in due course, publicize his findings in this column. Tell your friends about this event and also spread the news around any amateurs you may know, as without their help the event will not get off the ground. Dave's address for those with any further questions about the slp is: "Hillcourt", 57 Green Lane, Harrogate, Yorkshire.

Mailbag

Your scribe's plea for comments seems to be registering. We have a large mailbag this time, which is very comforting.

Brian Smith, A8554, is a first-timer and from his letter has been able to winkle out some fine 20m dx in the shape of KP6PA and ZK1DX. Brian says he has a crude aerial system which consists of 132ft of cable wound around the attic several times; an idea gleaned from one of last year's periodicals. Brian is off to technical college at Barnstaple in September so unfortunately will not be able to listen as much as he would like.

Our current leader in the Countries Table, Keith Kerr, must be at his receiver all day, every day, judging by his table entry. Under such poor conditions his score is extremely good but I am sure there is someone somewhere who will try and catch him before 31 December. Keith mainly comments on activity above 7·1MHz where stations in the USA, Canada and the Caribbean spend much of their time. It will pay members to look around this segment of 40m late at night and early in the morning.

Nigel Taylor, A8431, is studying for the RAE and, with the help of G3WMA, trying to improve his morse. Nigel comments on the good signals from South America on 40m which he heard during late July, especially YN8JES who apparently was a consistent 59 signal on a number of evenings. FP0YY is located on St Pierre & Miquelon (FP8)—the FP0 prefix simply donates that he is a visitor to the islands.

A. C. Roberts, A8428, from Leicestershire has a 9R59DS which performs adequately on 20m, which is his favourite band. With only three months' listening behind him, he has started off on the right foot.

Paul Kelly is A8113 and writes from Liverpool. He has a Trio JR500S and the aerials are a 30ft end-fed long wire, an indoor loop, and a telescopic, which are all switchable to the receiver via an atu. Paul reports that conditions have been fair with some useful dx heard on the lf bands as well as on 20m. TJ1EZ was heard on 40m, while 20m produced VE6JL/SU, A9XO and VS5MC. 10m seemed to produce signals from PY1ZAE and no one else. (Your scribe says he is the new 10m South American beacon!)

Correspondence is also acknowledged from A8187, 8203 and 8358, and BRS33558.

Contests

It is to be hoped that conditions improve to enable much activity on the bands to coincide with the many contests which occur during the autumn months. These usually produce hoards of exotic callsigns and very full bands, especially 20m, and it is known that listeners enjoy reaping the benefits of a contest which occurs during good band conditions.

On the subject of contests, the Cray Valley Listeners Contest is on 21-22 September and not 15-16 September as was stated in this column in July. The rules appeared in the August *Radio Communication* and log sheets are available from Chris Henderson at the address quoted in both July and August issues. The long-awaited results of last year's contest appear in "Contest News". The delay was due to several reasons, the main one being the sub-standard logs submitted by several entrants. Your scribe understands that they were to be disqualified but a last-minute change of heart gave them a reprieve. This goes to show that if logs are neat, well written and easy to understand, it makes the adjudicator's job much easier and as a consequence the results are available much quicker.

News, comments, photographs and up-dated scores for inclusion in the November *SWL News* should reach the writer by 2 October.

1974 HF COUNTRIES TABLE

Station	10	15	20	40	80	160	Total	
A8482	87	170	215	122	144	0	738	SSB
A8312	53	137	171	85	90	21	557	SSB/CW
BRS33211	60	112	182	82	107	9	552	SSB
BRS25429	48	107	152	89	115	9	520	SSB
A8313	39	116	135	71	84	24	469	SSB/CW
BRS25901	10	83	161	71	85	5	415	SSB
A8606	13	101	155	49	82	2	402	SSB
A8320	0	56	122	59	70	6	313	SSB
A7460	25	73	79	78	41	14	310	CW
A8431	22	48	101	43	88	3	305	SSB
A7317	9	67	114	24	57	5	276	SSB
BRS34658	17	48	90	32	39	5	231	SSB
A8187	18	48	107	9	40	1	223	SSB
A8358	2	32	141	10	16	8	209	SSB
A8203	13	23	60	12	41	3	152	SSB
A8428	0	17	52	8	36	1	114	SSB

* 392 Rochester Way, Eltham, London SE9 6LH.

THE MONTH ON THE AIR

by JOHN ALLAWAY, G3FKM*

ALMOST every month *MOTA* has occasion to mention stations using special and different-from-normal prefixes issued by various licensing authorities for a multitude of reasons, some of national importance and others of a less serious nature. The writer feels that the presence of these unusual callsigns creates added interest and wonders why it should be that Britain continues to be almost the only major nation where permission to use novel prefixes (other than GB2 and GB3) is denied?

DX news

A group of operators from the University of Wisconsin, which includes WA4RXS, K9KGA, WB9EGZ and WB9FRG, will be in Senegal until October. They will be using their own callsigns/6W8 and will most likely be active in the 1700–1900 and 2130–0100 periods. Their equipment consists of two stations and includes a Swan 500, an SB102 and an HW101. LF band operation is intended especially between 0630 and 0800, and they will normally be found in the low 30kHz of each appropriate band segment (cw and phone).

FR7ZL/T left Tromelin Is in mid-July and will possibly be FR7ZL/J during November and December.

Polish stations will have been heard using the SQ prefix since 22 July; this is to celebrate the 30th anniversary of the People's Republic and will continue until 9 May 1975. Special Russian stations were on the air on 4 August using the single prefix letter "R" followed by the appropriate district number and a single letter prefix. These were to mark the 50th anniversary of amateur radio. "Long Skip" says that the Festival International de la Jeunesse would be celebrated in Quebec in August and early September and that Quebec stations would be allowed to use the CY2 prefix during the period.

Bill, VK6SW, will be on Cocos-Keeling as VK9YV until mid-September. He has been heard around 14,220kHz between 0700 and 1000. He has an FTDX401 and asks for QSLs to his home address. Tuatai, ex-ZK1MA, has been heard using his ZK1CY call from Rarotonga on 14MHz cw. ZK1CD has now left the Cook Is, but a new station, ZK1CL, has been worked on 14MHz ssb.

VE2CK is in Nepal and has been given permission to operate using the callsign 9N1CK. There is no further news of Father Moran, 9N1MM.

OK30SNP will be active from 1 August to 30 November and marks the 30th anniversary of the outbreak of the Slovak revolt against the Nazis. During November OK30SNP will transmit from central Slovakia, during September from west Slovakia, and during October from east Slovakia. The station will operate for a few days from each of the 38 Slovakian districts, thus offering those interested an opportunity to obtain the necessary contacts for the Slovensko Diploma. There will also be a special certificate to European stations who obtain 30 points (others need 10) by contacting stations in Slovakia (ie OK3, OL8, OL9, OL0) during the special activity period. Each contact counts one point, and OK30SNP counts as five. Log extracts should be sent before 31 December to CRC, PO Box 69, 113 27 Praha 1, Czechoslovakia. Listeners may also apply.

SSTV enthusiasts in the UK meet daily on 3,640kHz at 1900 and on Sundays at 0800. G3IAD has already contacted 67 countries this year and G3WW 55.

News from overseas

G4AFJ says that John Wright, formerly VP8KF, is back in the UK and should be on the air by now using his G3VPW call. John visited many amateurs in S America on his return journey.

Colman Jones, G4DGZ, expects to be back home in Ontario by now and to be using his VE3HHN call. He will be found mostly at the low end of 7MHz using cw between 0300 and 0500. Colman offers his services to any station who requires a QSL manager (see *QTH Corner*).

VP8NS can now be found after 1800 around 14,041kHz on cw, and is now in a position to QSY on request to rtty. His first contact on that mode was with G3PUU in early August, and this could well be the first rtty contact made from Antarctica. Transmissions use 50 bauds which is convenient for UK amateurs, but difficult for others who use the 45 bauds standard.

Dxpeditions

WB6CZB should reach W Samoa in mid-August and he then hopes to catch a boat to the Tokelau Is (ZM7). These normally only operate every three months but there may be an extra service available this autumn, which would reduce his stay to two months.

W4AIF, in the *DX'ers Magazine*, is quoted as saying that the RCA and LU2AFH, plus a "west coast dx club", are planning a joint expedition to the South Sandwich Is. This would take place during November 1974 or January 1975 and would be on the air for four days.

The expedition to Desroches Is should begin operations on 3 September; the group will consist of VQ9D, VQ9BP and VQ9M. They hope to continue until about 15 September.

A beam has been sent by the N California DX Foundation to CR9AK and there is a possibility that K6AHV and W6MAV may operate from that station for a week or so this autumn.

Contests

The VK/ZL/Oceania DX Contest

1000 5 October to 1000 6 October (phone).
1000 12 October to 1000 13 October (cw).

Two points are scored per QSO on each band with VK/ZL and one per QSO with Oceania. Final score is derived by multiplying total QSO points by the sum of VK/ZL call areas worked on each band added together. Entrants should exchange RS/T and serial QSO number (from 001). Logs must show date, time, callsign or station worked, band,

* 10 Knightlow Road, Birmingham B17 8QB

serial numbers sent and received, and each new VK/ZL call area contacted. Use separate log for each band and enclose summary sheet showing callsign, name and address (in block letters), details of equipment used, and for each band QSO points and multiplier claimed. A signed declaration that all rules and regulations have been observed must also be enclosed. Entries may be single- or multi-band, and listeners may also take part—they should only log VK/ZL stations and record date, time, callsign of station being worked, RS/T of, and serial number being sent by the VK/ZL, band and points. Scoring is the same as for the transmitting section. Attractive coloured certificates will be awarded to each country, with second and third places, if participation warrants this. Send logs to reach NZART Contest Manager, 152 Lytton Road, Gisborne, New Zealand, before 25 January 1975.

In the 1973 event **G3KSH** is to be congratulated on being the only UK entrant—he scored 160 points in the cw section.

The Scandinavian Activity Contest

1500 14 September to 1800 15 September (cw)
1500 21 September to 1800 22 September (phone)
All bands 3·5 to 28MHz. Non-Scandinavians work Scandinavians—LA/LJ/LG, JW, JX, OH, OH0, OY, OX, OZ, SK/SL/SM. Single-operator and multi-operator single-transmitter and multi-op multi-transmitter sections. Exchanges consist of RS/T and QSO number (from 001). One point for each complete contact and the multiplier is the sum total of SAC countries (maximum 10) worked on each band. Enclose summary sheet and signed declaration with logs, which should be sent to: EDR Contest Committee, PO Box 335, 9100 Aalborg, Denmark, to arrive before 15 October. Certificates will be given to top scorer in each section in each country.

In the **4th Worldwide SSTV Contest** held in February **G3IAD** came 11th 1,617 points, and in the **6th Giant RTTY Contest G3RDG** was in 38th place with 35,424 points. Two listeners—BRS25676 and BRS27239—took part and came seventh and tenth respectively with 639,000 and 134,464 points.

The Radio Society of Bermuda has announced the winners of the **1974 Bermuda Contest**. These are W1BGD, G3LNS and VP9GE in the phone section, and G3HCT, K1RQE and VP9GO in the cw. The non-Bermudan winners will each receive a free week's holiday in Bermuda.

In the **1974 WAB Contests** G3WQK was the only entrant in the HF Phone section and G8KU in the CW section. G3ZAY (306,600), SM6DHU (148,920), ON8IW (132,750), G3WQK (117,600), GM3CFS (90,720), GW4CMW (44,200), F6AJA (33,150), DA2SN (16,165), LA5QK (7,525) and OZ6GH (45) won certificates in the LF Phone section, and GW6GW (284,000), G3VLX (267,650) led in the multi-op section. In the LF CW G3JUL (27,335), G3ABG (14,560), G3VDW (14,040), G8KU (12,960), DJ6SI (1,700), G3WP (780) and OZ4HW (405) are listed. (Provisional dates for 1975 are: HF Phone 9 March, HF CW 6 April, LF Phone 27 April, LF CW 18 May, and VHF 22 June).

Awards

Diplome des Nations Francophones (DNF)

For confirmed contacts with countries in which French is the official or main language. QSOs count from 1 January 1960, and the DNF-1 is for having contacted 30 countries, DNF-2 for 45 or more countries in at least six continents (French Austral and Antarctic Territories count as a seventh continent). DNF countries are: C3, CN, DL5/DA2, F, FB8W, FB8X, FB8Y, FB8Z, FC, FG, FG(FS), FH, FK (New Caledonia & Ile des Pins), FK (Iles Loyaute, Fuon, Chesterfield), FL, FM, FO—Clipperton, FO—Marquesas, FO—Rapa, FO—Society Is, FO—Tuamoto Is & Gambier, FO—Tubuai Is, FP, FR, FR/E, FR/G, FR/J, FR/T, FU, FW, FY, HB, HH, LX, OD, ON, TJ, TL, TN, TR, TT, TU, TT, TU, TY, TZ, VE2, VQ8, XT, XU, XW, 3A, 3V, 4U1ITU (if operator from a DNF country), 5R, 5R (Nossi Be), 5R (St Marie), 5T, 5U, 5V, 6W, 7X, 7X—Sahara, 9Q, 9U, and 9X. Applicants should send certified list of QSLs, plus 12 IRCs, to F8UM, Rene Monteil, Quartier de Beyne, 19 Egletons, France. Listeners may also apply. The list should indicate the country, continent, and full details of each QSO.

The Rheinland Pfalz Award

For contacts with stations in the Rheinland-Pfalz district since 1 January 1970. Each DOK from K01 to K24, and DOKs Z11 and Z22 count as one point on each band. German stations may only use 7 and 3·5MHz but other applicants may use any band. European stations need 30 points and others 20, and listeners may apply. Send QSLs and 10 IRCs to: DARC Distrikt Rheinland Pfalz, DX Referat, Gunter Heinzen, 6550 Bad Kreuznach, Kuhberg, Germany.

The Pennine Award

Issued by the East Lancs ARC to stimulate activity on 1·8 and 144MHz. It is in four grades and available also to listeners. Full particulars from award manager Barry Smith, G8IAT, 58 Blackburn Rd, Rishton, Lancs, in exchange for an sae.

QTH Corner

C21NP	PO Box 225, Nauru, Central Pacific
C31DV	via G3ZXK, D. R. Powell, 54 Colburn Av, Hatch End, Pinner, Middlesex.
DK6NN/VP7	H. Henning, PO Box 40, D-8621 Frohnlach, Germany.
F0HX	via G3ZXK (see C31DV).
FP0XX	Vern Dameron, K1DRN, 265 Davis Rd, Bedford, Mass, 01730, USA.
FP9YY	J.McNutt, 10432 Lawnhaven Circle, Indianapolis, Ind, 46229, USA.
FR7ZU/J	BP 4, Ste Clotilde, Reunion Is, Indian Ocean.
GB2BRC	J. Harvey, 22 Elm Grove, Bromsgrove, Worcs, B61 0EH.
HB0AYT	via HB9AYT.
HB0XJJ	via DL7HZ, Glambeckerweg 15-A, 1000 Berlin 28, Germany.
KL2ARW	via WA2UWA, 8 Cooper Lane, Box 1158, East Hampton, NY, 11937, USA.
ON6UK	R. C. G. May, Th Gauterstraat 18, B-2050 Antwerp, Belgium.
TA2QR	via DJ0JO, Schellingstr 58, 8000 München 13, Germany.
VE3HHN	C. M. Jones, 7 Jackes Av, Apt 108, Toronto, Ont, M4T 1ES, Canada.
VE6JL/SU	VE6JL, 171 Maranda Close NE, Calgary, Al, T2A 3E7, Canada.
VK9YV	via VK6SW, 4 Beaman St, Dianella, W Australia, 6062, Australia.
VK0MX	via VK5TY, 16 Fairmont St, Black Forest, S Australia, 5035, Australia.
VP2SV	via K3GYD, 317 Harvey Av, Erie, Pa, 16511, USA.
VR1AM	J. McKenzie, PO Box 419, Betio, Tarawa, Gilbert Is.
WF6OCF	via K6VDP, 1106 Highland Drive, Newport Beach, Cal, 92660, USA.
YJ8KM	via VK3EW, 4 The Grove, South Camberwell, Vic, 3124, Australia.
ZD3G	PO Box 165, Banjul, Gambia.
ZD3O	OZ1OO, Faarevejle Hojskole, 4540 Faarevejile St, Denmark.
5T5CJ	(wef 1 Sept) via W4BAA, Box 1, Captiva Is, Fla, 33924, USA.
5V7AR	BP 123, Lome, Togo.
5Z4PD	PO Box 14829, Nairobi, Kenya.
5W1AL	via W5UBW, 1518 Lincoln Av, Alamogordo, NM, 88310, USA.
5W1AR	via WA7LFD, 20025 Meridian Pl N, Seattle, Wash, 98133, USA.
9X5KE	via WB2EOO, 3 Lincoln Av, Port Chester, NY, 10573, USA.

RSGB QSL Bureau, G2MI, Bromley, Kent, BR2 7NH.

Odds and Ends

W3HQO, who acts as QSL manager for 9G1GD, has lost touch with the latter, who is believed to be in the UK at present. Would anyone knowing his present whereabouts please contact G3FKM?

A letter from the Radio Society of East Africa draws attention to the fact that "5Z4LR" is a pirate and thought to be operating from a ship. Any information would be much appreciated and should be sent to 5Z4RS, PO Box 45681, Nairobi, Kenya.

GC8HT points out that UK stations should send *loose* stamps with addressed envelopes when applying for QSLs; British stamps are not valid for postal use in Guernsey.

Band reports

Many readers comment on the generally poor state of the hf bands for long-distance contacts, but closer study of logs received shows that there have been occasions when some very interesting dx has been workable. From memory it seems to your scribe that more dx is being worked now on the hf bands than during the last sunspot minimum years, no doubt reflecting the very considerable improvement in equipment since that time. Comments of a critical nature are received concerning the accuracy of *Propagation Predictions*, but it must be remembered that these forecasts cannot possibly make allowance for periods of electrical disturbance, and in any case one of the joys of long distance communication is the amount of listening which has to be done in order to develop the sixth sense acquired by regular band users.

Thanks are due to the following for the information listed below: G2HKU, G4RZ, G5JL, G6GH, G3GVV, G3NKQ, G4AFJ, G4CLN, BRSs 17567, 17991, and 34775, ORS 31026, and As 7056, 8298, 8312, 8428 and 8431.

Stations listed in italics were using cw, the rest ssb.

1·8MHz. 0100 *PT9DM, W1BB, W2DEO.*

3·5MHz. 0000 EP2VJ, FP8DH, PY7BPW. **0100** PY2FUS, VP8HA. **2100** C31FO, LX1KN. **2200** ZSs 1MH, 3PT, 5LB, 9L1JT. **2300** CE6EZ, CN8BF, CR3WB, KP4AN, KV4FZ, UA9ADU.

7MHz. 0000 CE3ED, LU9CAM, PYs, YN8JES, 9H1BX. **0500** *WB8ABW/HC1, HI, LU, OA, PY.* **0600** VK, ZL, *ZP5WS.* **0800** *KC6CC.* **2200** FY7AN. **2300** CE, *HK*, PY.

14MHZ. 0000 CX3AE, 9M2DQ, 9Y4. **0100** DL3ZM/YV5. **0700** FO8DO, KH6, KL7, KS6CC, *UA0YAE, UPOL22*, 5W1AU. **0800** JW8IL (Bear Is), KS6EZ, VR1AA, 5W1s AL, AN, AR. **0900** SK9WL (Morokulien). **1100** K4KMA/KM6, TA2SC. **1200** PY. **1400** FP8CZ, VS5MC, XV5AA, YB1KW. **1500** VK9YV (Cocos Keeling). **1600** 9M8VLC. **1700** *FH8CY*, JA, *VS6DD, ZD7IH, 5H3JR*, 8Q6AC. **1800** VK9XX (Christmas Is), W6, YB0BY, 4S7PB. **1900** A9XT, HR6SWA (Swan Is), LG5LG (Morokulien), VE6JL/SU, VQ9BP. **2000** CF3DTG, CR3AX, FP0YY, TA2QR, VP8LP, ZD7SD, WA4RXS/6W8. **2100** *FC9VN*, FP0XX, HK0BKX, *KH6CF*, TR8SS, *ZD8DH*, VP2KMH, ZP. **2200** VK, W7, ZL4BX. **2300** HC, 5J4CJR, 9K2DB.

21MHz. 0800 ZE, 9JS. **0900** ZS. **1000** 5N2ESH. **1100** JA. **1300** CR3ON, VQ9HCS, VS6CO. **1400** VS5MC, ZD9GG. **1500** FL8BX, JA. **1600** 7X2AN, G4ACU/P/4X4. **1700** VP8s FL, LP. **1900** CE2PC, CR3KD, HK, KV4, *TR8CQ*, 9L1JM, 9X5KE. **2000** LU, PY, VP2MKH, *ZD7PS, ZD8TM*, ZP. **2100** CE3PY, HC2YL, 6Y5HM.

28MHz. 1800 PY1ZAE. **1900** PY4AEX, 9L1JT. **2000** LU8FT. **2100** PY2DUK.

Many thanks to all correspondents and also to the authors of the following for items obtained from their publications: **Long Skip** (*Nick Sawchuk*), the **West Coast DX Bulletin** (*WA6AUD*), **DX'press** (*PA0INA/PA0TO*), the **Ex-G Radio Club Bulletin** (*W3HQO*), **DX News Sheet** (*Geoff Watts*), the **29 DX Club Newsletter** (*George Allen*), **World Radio News**, and the **DX'ers Magazine** (*W4BPD*).

Please send all items for **October** issue to reach G3FKM no later than **5 September**, and for **November** issue no later than **9 October.** Receipt of letters before these dates would be appreciated and readers are reminded that second-class mail now seems to take several days in transit.

Propagation Predictions

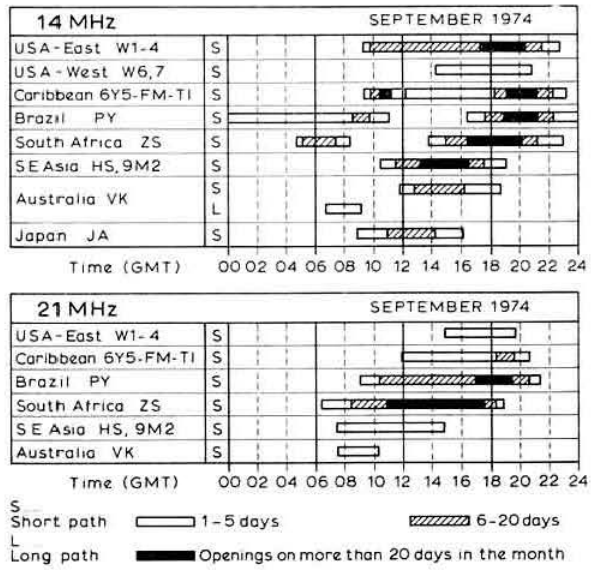
Only a slow improvement of conditions on hf bands will occur during September and continue into October and November. In years of maximum sunspot activity the seasonal change is very marked, but during the present low activity the seasonal change will make little difference on 28 and 21MHz.

In exceptional circumstances dx traffic with Africa (0900-1830gmt) and South America (1400-1830gmt) will be possible on **28MHz.** Short skip conditions on 28 and 21MHz will cease during the course of the month. Only traffic with Africa and South America will be certain on **21MHz**. Eastern North America will only be heard under exceptional conditions and Japan most likely not at all.

14MHz will remain the main dx band, but it will be less useful in making contacts via the indirect path during the phase of the autumn equinox, with the possible exception of Australia. Chances of dx during the latter half of the night on 14MHz will lessen with the longer nights, and this will make **7MHz** the more important carrier of dx during those hours. Basically traffic will be possible on this band and **3·5MHz** when the greater part of the path lies in darkness. The longer autumn nights and the decline in static level will improve dx conditions on 7 and 3·5MHz. Local traffic will be interrupted by the dead zone at various times on 3·5MHz.

The provisional sunspot number for July 1974 was 61·5 with solar activity peaking during the first 10 days of the month. The predicted smoothed sunspot numbers for November, December and January 1975 are 29, 28 and 27, according to the forecast from the Swiss Federal Observatory.

The unusually high daily numbers noted at the beginning of July could account for good conditions experienced on the hf bands and which were not in accordance with the forecasts. It should be noted that the propagation predictions can give only a general picture of expected conditions and cannot give advance warning of conditions such as an opening of two or three hours to the east coast of North America on 28MHz. There is always the possibility of short openings on this band, and to a lesser extent on 21MHz, which do not follow the pattern to be expected at the trough of the current sunspot cycle. The various beacons operating at the low end of the 28MHz band will provide an actual check on conditions.



YOUR OPINION

The letter from Mr D. A. Shepherd, G3LCS, in the July issue resulted in 13 letters to the editor in reply which were fairly evenly divided in support of and against his opinions. It is regretted that because of space considerations only a representative cross-section can be published below.

The Editor
Radio Communication
Sir—Re Mr Shepherd's remarks in the July issue, I agree with the points he makes but note that little or no constructive comment was put forward to aid the 8 + 3 fraternity—a feature which I must add runs true of all this type of criticism.

The blame for the licensing imbalance must, in part, rest upon the shoulders of the Class A fraternity who do not make use of cw as a communication mode on vhf. Instead of lying back thinking up criticisms they would be better employed inserting key jacks in their vhf transmitters.

I realized from a short period of listening on 2m that there was an alarming lack of cw, and that some use their phone facility as a private radiotelephone service and would cause less QRM if they took out a commercial radiotelephone licence as they seem disinterested in working anyone else anyway. If cw were used during contests, Class A-A contacts could be made without time-wasting "QRZ QRZ" and "please repeats".

If I had heard more cw on 2m I would perhaps have passed my morse test before now instead of searching for a reasonable-speed commercial on the hf bands. Maybe I am biassed because I do not hear much cw activity in GM-land, so why not make it the "in mode" on 2m and maybe the 8 + 3s will become curious, ogle at the dx they can hear without expensive ssb equipment and reset the A-B licence imbalance.

A last word for the 8 + 3s—resist the temptation and switch off your transmitter and listen—seriously. It is hard work because I spent 10 years from my RAE until now and the only answer is to practice cw, learn cw, think cw and, if you want, eat it too!

W. D. Stirling, GM4DGT (ex GM8IEW)

The Editor
Radio Communication
Sir—Although I am still only a "B" licence holder, I aspire to hold an "A" licence but it has taken me four years to learn the code to the required speed. Maybe I am either a slow learner, or I have not had good instruction, but I feel that two years is too short for those who can only spare a certain amount of time. There is also the derth of morse classes; it took me two years to find one, and then it only taught me the code to 9wpm. But I was lucky enough to find an ex-Merchant Navy operator who brought my speed up to the 12wpm so that I could take the test in my summer holidays.

I think that either five or ten years would be a realistic time to put an embargo on a "B" licence holder, although I agree with the general suggestion.

D. T. Busby, G8ELB

The Editor
Radio Communication
Sir—So the cw war has started raging again. Firstly I disagree with a compulsory morse test after two years on vhf. The choice is there so let each of us decide for ourselves. However, tying cw in with loss of sw bands is very serious. For how much longer will the morse test be necessary? The Royal Navy seems to have forgotten cw as a form of communication. Is this the beginning of a mass move to ssb and facsimile?

Having stirred the boiling cauldron a little, I go QRT with a reminder that when I sit the cw test I shall have to travel 30 miles to the nearest centre, and pay an extortionate fee for 15 minutes tapping! The newcomer to amateur radio probably is not old enough to drive and is also not earning a wage. Every penny goes on the rig with the aim of getting that first QSO. The cheapest way out is vhf. I would much rather go to an approved amateur examiner who may even allow me to sit the test outside my working hours, and pay a sensible fee to the RSGB.

M. J. Cooper, BRS33780

The Editor
Radio Communication
Sir—I sympathize with Mr D. Shepherd and can appreciate his alarm and despondency as outlined in his letter. There is no doubt about it that the present day "microphone-mania" and the all too prevalent apathy towards the cw mode, lies with the originators of the Class B licence.

Under the old Class A licensing system, a sensible, successful and rational balance of activity was achieved, supplying ALL modes to ALL the amateur bands.

Today, we are "lumbered" with a system of licensing which is bordering on the ridiculous. We now have a system which is building up tremendous activity on vhf/uhf and at the same time annihilating the activity on lf/hf. A system which does much to promote the use of some modes and precious little to encourage the use of other modes. A system which allows the meagre flow of Class B to Class A to decrease alarmingly and to such an extent that it must be reasonable to suppose that it will only be a matter of time before the lf/hf bands become so thinly populated that we will be deprived of them totally. A system which, to all intents and purposes, is rapidly turning us into a nation of technical orators. A system which provides the farcical situation where a phone-only station is required to take a morse test—to enable them to continue using phone-only!

Surely, the time has now come when we should endeavour to instil a modicum of sanity. I am sure that it is not the wish of the majority of the membership to sit back and watch 50 years of pioneering on the lf/hf bands slowly going down the drain. Mr Shepherd has asked for genuine suggestions; mine is simply—bring back the old system of licensing, it should never have been abolished in the first place.

P. Cutler, G3DAO

The Editor
Radio Communication
Sir—With reference to the letter from Mr Shepherd and his comments about "joining the men or give up", might I suggest that the outmoded method of communication called cw should be dropped and forgotten as a licensing condition. Why not drop the morse test altogether and just issue one class of licence?

Mr Shepherd is concerned about the ratio of Class B to Class A licences issued during the past five years. My suggestion would solve this problem!

To learn cw just to pass the test and then not use it and forget it is merely a waste of time—yet I am sure there are many who have done that.

On the other hand there are many Class B licensees like myself who have no interest whatever in getting on to the hf bands; yet we are keenly interested in vhf and uhf working. Also I know quite a few Class A licensees who have developed a keen interest in 2m and 70cm and have virtually given up working the hf bands. They enjoy life among the G8s.

However, I do not think the statistical position as regards the ratio of new Class B to Class A licences is as bad as it seems because: (a) quite a number of Class B licensees do become G4 in due course, and (b) a large number who hold Class B licences are schoolboys to whom amateur radio is merely a passing fad. I know of several who have had their fling on 2m for a few months or perhaps a year and then disappeared off the air. I doubt if they will take it up again.

E. S. Silvester, G8FHB

The Editor
Radio Communication
Sir—I feel I must take issue with G3LCS over the statement in his letter that Class B licensees should "after two years either take the morse test and join the men or give up". I thought the idea that doing something one does not want to do is good for one went out with the Victorians.

G3LCS argues that because more people are obtaining Class B licences than Class A licences we will become a nation of vhf/uhf operators. Does proficiency in morse code at 12w/min make one an hf operator?

If G3LCS listened to what is said on the 2m band he will realize that there are two types of Class B operator, those who are studying their morse to become G4s, and those, like myself, who have no interest in hf band communication at all. The steady increase in G8 callsigns is in any case misleading since many of the earlier G8s are now defunct, the operators now holding G4 calls.

If there is still a serious discrepancy between the numbers of hf and vhf-only licences then the reason must be that the hf bands just

do not have much appeal to the new radio amateur of today. "Bedlam" and "rat-race" are just two words I have seen in print to describe some of the hf bands. Neither could ever be said to apply to any vhf/uhf band, even 2m. If a beginner put out a bad signal on 2m he would in all likelihood be offered constructive help. On 80m there is a fair chance he would be sworn at. (Yes, I have listened to what goes on on 80m.) In other words, 2m is a far easier band for the newcomer to commence his process of "self-training in communication by wireless telegraphy" on. If, having tried vhf, the operator is perfectly content, let him stay there.

Come now, Mr Shepherd, is it really fair to criticize the Class B operators, whose enthusiasm and interest in amateur radio is going to play as important a part as that of the Class A men when the review of amateur band allocations takes place in 1979?

J. V. Moss, G8ILO

The Editor
Radio Communication

Sir—I would like to comment on the letters from Mr D. A. Shepherd and Mr G. B. Packer published in the July issue.

In a situation where the hf bands are grossly overcrowded on a world scale and the vhf/uhf bands under occupied, it seems quite extraordinary to require or even encourage Class B licence holders to qualify to use the hf bands if their interest does not make this essential. The suggestion that the Class B licence is in any way inferior to the Class A is quite unjustified; those who require to operate on the hf bands must necessarily satisfy the international regulations by demonstrating a knowledge of morse, but it would be absurd to require others to spend time learning something which they do not intend to use. It is difficult enough to find time to keep up-to-date with advancing techniques without spending time learning an irrelevant skill. The suggestion that one may forget the code having passed the test seems quite indefensible. Surely hf operators have an implied obligation to maintain their skill in the use of morse.

If it is considered useful to encourage the use of the code, it would be worthwhile to consider if there is any justification in precluding the use of morse on the vhf/uhf bands by Class B licence holders. Many people might be prepared to learn morse in order to use it under marginal conditions and not a few Class B operators already have the skill to do so. I can see no reason why they should be required to take a morse test and qualify to use the hf bands just to permit them the occasional use of morse on the vhf bands.

Turning to the question of the so-called "mode-war", it seems to me that the writers of regular columns have a duty to encourage a climate of opinion as to what is good and considerate operating practice. To my mind, this includes an ability to work cross-mode. Obviously, individuals must be free to use any restricted mode which suits their needs but I would hope that opinion generally would regard inability to work any receivable signal as somewhat anti-social. Activity is often so slight that it is frustrating to be unable to work what may be the only signal on the band due to equipment limitations at the other end. This deplorable situation seems to have come about largely as a result of the use of commercial equipment of extremely limited scope seldom reflected in similarly limited cost. Let us see more stations at least equipped to receive all modes competently.

The aim at this station is to hold useful conversations with others of like interests. For this purpose, nbfm is normally transmitted as having the lowest chance of causing interference but a.m. can be produced. SSB will be available as soon as a satisfactory transmitter has been developed with facilities for both transceive and separate channel operation. All modes can be received, without compromise. However, no facilities are planned to operate through repeaters, as I cannot imagine a useful conversation limited to one minute.

H. L. Gibson, G8CGA

The Editor
Radio Communication

Sir—It seems to me that our society is languishing in the doldrums; there does not appear to be a go-ahead spirit in the executive as a whole, and certainly little sense of unity with the affiliated societies.

To strengthen the Society and increase our membership I propose the following changes. Firstly, only our members or members of other IARU societies should be able to enter Society contests and obtain Society certificates. Second, only our members should have their names in our callbook, our aim being eventually to get at least every amateur into the Society. Last, and most important of all, the organization of our Society needs to be restructured into a forward-looking purposeful network of closely-linked affiliated societies centred around the national Society.

A difficult and complicated task but it is about time Auntie RSGB retired and about time other amateurs and SWLs were prevented from riding free on the backs of those prepared to contribute through the RSGB to the expansion and continuance of our hobby.

Kenneth Thompson, G3YNV

The Editor
Radio Communication

NFD 1974—Lusaka entry, 9J2CL/P

Sir—This letter is written on NFD + 1 and such were our impressions that it was felt desirable to write as soon as the contest ended.

We in Zambia take NFD very seriously indeed and this year went to considerable lengths regarding aerials. A rhombic was constructed with 4λ on 20m (leg lengths) at 60ft above ground. This plus a full-sized 3-el Yagi for 15m were our main aerials.

We would greatly appreciate reports from G stations on our signal strengths on all bands; they will all be acknowledged. While asking for reports, I am fully aware of the reactions of some G NFD teams: "Those deaf 9J2s", must be an axiom common to all UK stations—all except two that is; for their signals were ear shattering in Lusaka, and 10W on 20m will not do that in this sunspot trough.

Without wishing to add to the NFD power controversy, members might be interested to know that we in Lusaka worked fewer G portables than ever before—and twice as many DLs! I think you will all know just what that means and it has little to do with propagation. I now wish we had brought along an AR88 or shunted the gate of a popular dual-gate mosfet front end receiver section: the signals from Germany were that strong!

Let me sincerely apologize to all fellow members of the RSGB who think NFD is extra mural activity for the mentally deranged (there are even one or two 9J2s who feel like that), but when one eats, sleeps and dreams NFD for 364 days a year....

Finally: the height of insensitivity; a non-portable G calling an overseas portable during NFD. From Europe we expect it but from UK never. However, one *should* apologize to numerous W, VE, VK, KH6 and other good friends who were deliberately ignored. We do not sit up in the freezing cold to chat with someone drinking coffee in his silk pyjamas ... NFD is /P and if you are not under canvas, Bwana ... forget it!

B. Clark, 9J2CL, 5B4CL, ZC4CL, G3VCL

Special event stations

Tiptree Carnival, 13-15 September
The Tiptree ARS will be operating a special event station during this carnival weekend. Operation will be on bands from 1·8 to 144MHz, a.m., fm, cw, ssb; and live rtty on 80, 20 and 2m. QSL requests via G3ZWW direct to 18 Oak Road, Tiptree, Essex, or via bureau.

North-West Amateur Radio Convention, 13-15 September
Station GB2NW will be operational during the convention on 80 to 10m and on 2m. Talk-in on 80 and 2m. Special QSL cards will confirm all contacts.

Basingstoke Show, 21-22 September
Basingstoke ARC will operate GB3BS during this show at Stratton Park, Kempshott, Basingstoke. Operation will be on 3·5, 14 and 21MHz ssb, and 144MHz fm, including talk-in facilities. QSLs via bureau or direct on receipt of sae by G3CBU, QTHR. The show will be open from 10am to 7pm with a wide range of attractions.

Birmingham University, 28 September
Birmingham University RS will have a display in the Students Union during the societies afternoon of the Birmingham University Freshers' Conference. G3IUB will operate on bands below 10m, with G8IUB on 2m (mainly A3J). All students, staff, and local amateurs will be welcome.

Mobile rally news

Longleat Rally report
This event, held by the City of Bristol RSGB Group on 7 July, was blessed with good weather and had an estimated crowd of 2,000. Visitors came from all parts of the British Isles, including the Guernsey R & ES which chartered a plane from Guernsey to Southampton for the first part of their journey. Overseas visitors included ZC4MM, ZL1AH, WA6NKM and VE3HHN. Features included displays by the RAF and the Post Office, and the Bristol Channel Repeater Group explained the workings of GB3BC. All tickets for the raffle were sold and all 118 prizes were claimed.

The raffle stand at the Longleat Rally

Mobile rallies calendar

22 September—Harlow MR. (Details in August issue).
29 September—Peterborough MR, Walton School. Talk-in on 160m and 2m. Details from G8GNV, QTHR.

NOTE: The date of the Peterborough rally has been changed to 29 September.

OBITUARIES

The Society records with regret the deaths of the following radio amateurs:

Mr W. G. Anderson, GM3BZY
Gordon Anderson died on 5 August, aged 57. Although not active in the bands in recent years he was well known by most of the older generation of amateurs in Edinburgh.

Mr W. M. Clarke, G3VUC
Wesley ("Nobby") Clarke died in his early seventies, on 8 August. He was often heard on 80m, especially as a founder member of the Early Birds Net. His work for the disabled has been considerable, and he masterminded the provision of many radio receivers and cash donations to the Cheshire Homes.

Mr E. R. Homer, BRS34908
"Rich" Homer, an ardent listener to the Cheltenham and District 2m Sunday evening net, died on 26 July. His main interest was in vhf.

Mr H. Hoyle, BRS34444
Harry Hoyle died on 5 August. Despite blindness he was always interested in short wave listening and was one of the earliest 2m listeners in the 'forties.

Mr C. Lingard, G3IR
Cuthbert Lingard died in July at the age of 66. A keen amateur since boyhood, he had been a member of the RSGB since the 'thirties. He was active on all bands and was a first-class cw operator. He will be missed by many friends on 80 and 40m.

Mr H. C. Page, G6PA
Cecil Page died on 9 July. Licensed in 1927 and a keen RSGB member, he took over the running of "Contact Bureau" in 1931 from G5VL. In the later 'thirties he was actively experimenting in the use of wavelengths below 10m. He was comparatively inactive in the amateur bands in recent years.

Mr W. V. Shepard, G8ALF
Vic Shepard died on 1 July, aged 55. He was for many years secretary of the Bournville Radio Society and a member of the South Birmingham Radio Society. He will be remembered by many RAE students whom he tutored at local evening institutes.

Mr C. C. Stevens, G6XH
C. C. Stevens died on 13 July aged 67. Licensed in 1927, he had always been a keen experimenter and constructor, and was active on all bands from 2 to 160m up to his death.

Mr G. Sykes, G2JC
Gilbert Sykes, aged 81 years, died on 4 August. Although he had not been active in recent years he could still occasionally be heard on the 2m band.

Mr K. Wooff, G3TCC
Ken Wooff died on 6 July. He became hon treasurer of Cray Valley RS in 1967 and chairman in 1968. He worked on all bands, 160–2m.

We have also been advised of the death of:
Mr C. C. Redshaw, G2YT, in February 1974.

HF BEACON STATIONS

Callsign	Frequency (MHz)	Location	Reports to
DL0AR	29·000	Hiddesen	DL6TC, Paul Nipkow Weg 5, 4930 Detmold, FR of Germany
DL0IGI	28·195	Mt Predigtstuhl near Salzburg	DJ5DT, Kollwitzweg 1, D 6100 Darmstadt, FR of Germany
GB3SX	28·185	Crowborough, Sussex	G3DME
VE3TEN	28·175	Ottawa, Canada	VE3QB, 59 Westfield Crescent, Ottawa 5, Ontario, Canada K2G 0T6
VP9BA	28·165	St Catherines	VP9BY, PO Box 73, Devonshire, Bermuda
5B4CY	28·180	Limassol	5B4AP Box 1267, Limassol, Cyprus
3B8MS	28·190	Signal Mount, Mauritius	3B8DG, PO Box 44, Port Louis, Mauritius

Reports for any of the above may be sent to RSGB HQ (Attn IBP). At present only DL0IGI switches to 28·200 at 00-05 and 30-35min past each hour.

NFD 1974 RESULTS

THE weather is traditionally poor over the NFD weekend—only to be expected really as it often falls during one of Buchan's "cold spells"—but this year the elements surpassed themselves. Torrential rain, thunder, lightning, "static rain", and gale force winds plagued most groups. Several clubs found that severe QRN obliterated the bands for some minutes; others suffered repeated flash-overs in their ATUs caused by static build-up on the aerials. Some groups abandoned their stations at times in fear of a direct lightning strike. A wise precaution as Worksop recorded that one of their poles was hit, but fortunately no-one appears to have been injured.

As if in compensation for the appalling weather, the powers-that-be (alas, not the HF Contests Committee) produced some pretty good propagation conditions considering the near sunspot cycle minimum. 20m was open for dx much longer than expected, and the skip on 40m was shorter than usual enabling many inter-G QSOs to take place in addition to the seemingly endless number of contacts with European portables.

Overall, the total number of entries received was up on 1973—single-station entries increased from 70 to 76, but the double-station section dropped from 19 to 17.

The relaxation in the power rule which allowed groups to run as much power as they wished to a valve with an anode dissipation not exceeding 13·5W, brought forth little adverse comment. Judging by other comments received, a few groups were not aware of the change in the power rule although attention was drawn to the change and the reasons for it outlined in *Radio Communication* November 1973.

Double-station section

The NFD Trophy goes, this year, to the Ariel Radio Group (BBC) with a splendid total of 2,805 points. This follows their success last year in the single-station section when they took the Bristol Trophy for the leading group. Well done indeed. Their "A" station, G3BBC/P, consisted of an HW101 with a 10W transverter for 160m and a 2E26 pa running at 30W for 40 and 15m. Dipoles were used on 160m and 40m, with a 2-el quad for 15m. Operators were G3KKQ and G3COJ aided by G3MDC and G3VRW. The "B" station, G3GDT/P, had a KW2000 with a 2E26 running at 25W feeding a dipole on 80m and quads on 20m and 10m. Operators were G3COJ and G3POI.

Last year's winner, the Surrey Radio Contact Club/Croydon, were this year's runner-up with a score of 2,611 points. The "A" station, G3BFP/P, employed an FT401 with an outboard 2E26 pa unit run at 10W on 160m into end-fed $\frac{1}{2}\lambda$ or $\frac{1}{4}\lambda$ wires, and at 30W on 40m into a delta loop or an inverted-V, and on 15m into a 2-el quad. Operators were G3BFP, G3DCV and G3SVW. The "B" station, G6LX/P, had an FT101 with a 30W 2E26 pa and was operated by G3IAS, G3JLB and G6LX. Aerials were a full-wave for 80m, a 2-el beam and an 8-el fixed array for 20m, with a 3-el beam for 10m. They will receive the Gravesend Trophy.

Single-station section

The East Barnet Amateur Radio Contest Club, last year's runner-up, lead the single-station class and will thus receive the Bristol Trophy. G5FA/P scored 1,803 points from 561 QSOs using a KW2000 with a 2E26 pa run at 10W on 160m into a dipole, and at 30W on the other bands into dipoles on 80m and 40m, quads on 20m and 15m, and a vertical on 10m. The station was operated by G3KTZ, G3RPB, G3UGK and G3YDX.

The Guildford & D ARS have also moved up one place since last year to become the 1974 runner-up with a score of 1,517 points. G6GS/P was operated by G3KMO, G3PJX, G3SYM and G3ZDD, and used a homebrew receiver and a Vespa transmitter modified for full break-in working.

Scottish NFD Trophy

The Scottish groups have always supported NFD consistently, and this year is no exception. The Scottish NFD Trophy has been won by the West of Scotland ARS with a score of 2,379 points, which also puts them in third position in the double-station section. GM4AGG/P used a KW2000 with a 2E26 pa on 160m, 40m and 15m feeding what must surely be the largest NFD aerial ever—a V-beam with 1,200ft legs. The station was operated by GM3YCB and GM4DAE. GM3VIU/P also used a KW2000 with a 2E26 running at 40W on 80m and 20m into a 260ft V-beam and an inverted-V. Operators were GM3UA, GM3SSB and GM5BER.

The runner-up for the Scottish NFD Trophy, and 4th overall in the double-station section, was the Glenrothes & D ARC (GM3YOR/P and GM3OLK/P) who scored 2,331 points.

NFD Trophy	
Ariel Radio Group (BBC)	2,805 points
Gravesend Trophy	
Surrey Radio Contact Club/Croydon	2,611 points
Bristol Trophy	
East Barnet Amateur Radio Contest Club	1,803 points
Scottish NFD Trophy	
West of Scotland ARS	2,379 points
Frank Hoosen (G3YF) Memorial Trophy	
Gay Gordons Group	928 points
Leading scores on individual bands	
1·8MHz Edgware & D ARS	550 points
3·5MHz Edgware & D ARS	708 points
7MHz West of Scotland ARS	926 points
14MHz Gay Gordons Group	928 points
21MHz West of Scotland ARS	353 points
28MHz Addiscombe ARC	104 points
Overseas station giving most points to NFD entrants	
Lusaka Group of the Radio Society of Zambia (9J2CL/P)	588 points

1·8MHz

Top Band ran to usual, fairly predictable, form with a mad rush lasting about four hours and very little else. The band winner, Edgware & D ARS "A" station (G3ASR/P), scored 550 points and, being one half of a two-band double-station entry must have found life somewhat tedious after 0300, for during the remainder of the contest their contact rate averaged just over three per hour! The runners-up, Kingston 160 (G3KIN/P) and the Mansfield ARS (G3GQC/P) with 528 and 518 points respectively, seemed to find the same situation.

Several stations commented on hearing a VP8 during the night, although there was some discrepancy in the callsign which was quoted as either VP8BG or VP8NP (perhaps they were both on?) but no contacts were noted. A few QSOs with W/K were logged, particularly by GM4AGG/P with their 1,200ft legged-V beam.

Some groups appear to be confused about the scoring on this band, and they are reminded that the rules state that the **total** score for the band should be doubled. Several groups claimed double points for each contact, while a few others did not apply the multiplier at all. One enterprising group claimed double points for each contact, and then doubled the resulting total! (Good try—but sorry, we noticed!)

3·5MHz

The 80m band has always been one on which good scores can be made (one has to go back to 1962 to find a leading 80m score of less than 500 points), and this year was no exception even though the dx bands were in quite reasonable shape.

The single-band entry of the Edgware & D ARS "B" station (G3GC/P) complemented the success of their "A" station by topping the 84 logs for 80m with 283 contacts producing 708 points—a score which appears to be an all time band record. G3GC/P used a Drake R4B receiver transceiving with a homebrew transmitter running 10W to a 2E26 pa. Aerials were a half-wave dipole, and a quarter-wave Marconi. The station was ably keyed by G4AEM, G3GC, G4BMK, G3SJE and G3PSP. Last year's band leader, the Veteran Operators Club for Telegraphists (G3VOC/P) took second place with 675 points made using a Heathkit SB303 receiver, a home-built transmitter running 15W to a TT11 pa, and a dipole—all the equipment was powered solely by batteries. Close behind, in third place, with 670 points was the Maidenhead & D ARC who ran 40W to a 6BW6 pa.

SINGLE-STATION SECTION

Posn	Club or group	Callsign	1·8MHz	3·5MHz	7MHz	14MHz	21MHz	28MHz	Total
1	East Barnet ARCC	G5FA/P	340	525	473	276	158	31	1,803
2	Guildford & D RS	G6GS/P	286	517	480	142	77	15	1,517
3	Maidstone (YMCA) ARS	G3TRF/P	328	83	346	550	66	—	1,373
4	Gay Gordons Group	GM3GAY/P	170	105	108	928	3	—	1,314
5	Swansea RC	GW5ZL/P	—	122	280	873	2	—	1,277
6	East Notts CC	G3TBK/P	290	418	565	—	—	—	1,273
7	Stockport RS	G6UQ/P	284	285	293	236	155	2	1,255
8	Leyland Hundred ARG	G3GGS/P	332	325	257	272	33	1	1,220
9	Racal ARG	G3RAC/P	186	445	398	153	30	—	1,212
10	Channel CG	G4DAA/P	172	300	336	292	66	12	1,178
11	Torbay ARS	G3NJA/P	266	286	383	174	35	—	1,144
12	Bristol CG	G6YB/P	264	314	326	204	11	—	1,119
13	East Kent RS and University of Kent RS	G3LTY/P	436	270	293	104	—	—	1,103
14	Chiltern ARC	G3CAR/P	444	248	231	82	54	35	1,094
15	Blackpool & Fylde ARS	G8GG/P	326	265	122	309	27	—	1,048
16	Worcester & D ARC	G3GJL/P	272	230	230	84	228	3	1,047
17	Sunderland ARS	G3RDI/P	170	243	349	269	—	—	1,031
18	Greenock & D ARC	GM3ZRC/P	—	228	124	363	303	—	1,018
19	Chippenham & D ARC	G3VRE/P	142	306	450	99	6	2	1,005
20	Chelmsford ARS	G3KRZ/P	262	315	360	54	—	—	991
21	Southgate RC	G3SFG/P	86	411	313	129	27	23	989
22	Cornish RAC	G4CRC/P	72	233	291	374	12	—	982
23	Baden Powell House ARG	G3ZHZ/P	300	354	259	61	—	—	974
24	Cheltenham	G3CGD/P	—	358	490	107	17	—	972
25	Scarborough ARS	G4BP/P	24	300	460	156	—	—	940
26	Horsham ARC	G3TNO/P	218	233	101	355	3	18	928
27	KW RC	G4AUU/P	—	344	278	208	90	—	920
28	Standard RC	G3NIS/P	312	230	254	67	49	—	912
29	Edgware RSGB Group	G3VW/P	—	294	565	43	—	—	902
30	Crystal Palace & D ARC	G2LW/P	166	163	100	300	140	25	894
31	Hull & D ARS	G3AMW/P	—	305	363	207	9	—	884
32	Colchester Radio Amateurs	G4CRA/P	230	343	264	31	—	—	878
33	Liverpool & D ARS	G3AHD/P	334	337	115	90	—	—	876
34	Ilford RSGB Group	G3XRT/P	266	476	118	3	—	—	863
35	West Kent ARS	G3WKS/P	—	528	232	95	—	—	855
36	Harlow & D ARS	G6UT/P	—	421	264	124	21	2	832
37	Bury & Rossendale RS	G3BRS/P	2	257	196	359	10	—	831
38	Purley & D RC	G3XMW/P	274	253	127	152	—	—	806
39	Mid-Lanark ARS	GM3PXK/P	154	263	315	68	—	—	800
40	Aberdeen ARS	GM3BSQ/P	—	127	302	358	12	—	799
41	Gloucester ARS	G3MA/P	—	257	342	170	14	—	783
42	Dundee Group	GM4HR/P	190	80	195	238	79	—	782
43	Salisbury R & ES	G3FKF/P	—	—	781	—	—	—	781
44	Conway Valley ARC	GW6TM/P	294	227	165	79	—	—	765
45	RC of Worksop	G3RCW/P	24	489	233	16	—	—	762
46	Kingsway Tech Coll ARC	GM4AAF/P	238	62	98	344	2	—	744
47	City of Leicester Poly ARS	G3SDC/P	338	209	101	36	—	—	684
48	RAF Wyton AR & EC	G3MMH/P	—	—	683	—	—	—	683
49	Veteran Operators Club	G3VOC/P	—	675	—	—	—	—	675
50	Maidenhead & D ARC	G3WKX/P	—	670	—	—	—	—	670
51	Shefford & D ARS	G3FJE/P	278	270	107	—	—	—	655
52	Bromsgrove & D ARC	G3VGG/P	104	285	100	152	5	2	648
53	Havering & D ARC	G3TTB/P	270	320	54	—	—	—	644
54	City of Belfast (YMCA) RC	GI6YM/P	—	—	637	—	—	—	637
55	Southdown ARS	G3WQK/P	—	215	8	412	—	—	635
56	Garendon School	G3MKX/P	258	300	33	39	—	—	630
57	Newbury & D ARS	G3WOI/P	214	289	73	47	—	—	623
58	Leicester RS	G3LRS/P	32	229	211	116	—	—	588
59	South Dorset RS	G3SDS/P	242	211	91	10	—	—	554
60	Woodmansterne Group	G3KTA/P	268	240	28	15	—	—	551
61	Bracknell ARC	G4BRA/P	204	209	4	63	34	33	547
62	Echelford ARS	G3UES/P	78	202	141	114	3	—	538
63	Farnborough & D ARC	G3XCH/P	—	528	—	—	—	—	528
	Aquila RC	G3BRK/P	—	528	—	—	—	—	528
	Kingston 160	G3KIN/P	528	—	—	—	—	—	528
66	Mansfield ARS	G3GQC/P	518	—	—	—	—	—	518
67	Eccles & D RC	G3GXI/P	—	—	510	—	—	—	510
68	Kingston HF	G2LP/P	—	283	122	33	27	—	465
69	Telford & D ARS	G3ZME/P	—	—	—	417	—	—	417
70	Solway RC	G4BBX/P	—	372	—	—	—	—	372
71	Gloucester Junior Group	G4AYM/P	356	—	—	—	—	—	356
72	Echelford CG	G3YCQ/P	—	102	133	83	20	—	338
73	Sutton & Cheam RS "Group B"	G2DMR/P	178	88	33	30	—	—	329
74	Caithness ARS	GM3SFH/P	—	—	155	157	14	—	326
75	Preston ARS	G3KUE/P	—	225	22	6	—	—	253
76	Gt Yarmouth & D RC	G3YRC/P	34	150	—	—	—	—	184

7MHz

An outstanding performance by the West of Scotland ARS "A" station (GM4AGG/P), who took the band award with a record score of 926 points—well over the previous best of 758 points made by Salisbury in 1973. Their splendid achievement was no doubt due in part to the fine aerial—a V-beam with 1,200ft legs beaming due south—and to the prevailing skip conditions which enabled them to work into Europe and around the British Isles with comparative ease. DX worked included A9, VK7, VX1, W1-4, YV5 and 9J2, and the equipment, a KW2000 running 40W to a 2E26, was well operated by GM3YCB and GM4DAE—they made 45 contacts during the first hour of the contest on 40m.

The single-band entry of the Salisbury R & ES (G3FKF/P) was the runner-up with 781 points from 256 QSOs. They had a G2DAF tx/rx combination with a 2E26 run at 10W input, and a pair of inverted-V dipoles at right angles.

In third position was the Oxford & D ARS (G3JLE/P) with 721 points, and they used a 2-el quad array tuned to fire either to EU or States-side.

14MHz

Conditions this year were fairly good, particularly towards North America, and the band provided a fair selection of dx.

The leading station, GM3GAY/P—Gay Gordons Group, although

DOUBLE-STATION SECTION

Posn	Club or group	"A" Station	"B" Station	1·8MHz	3·5MHz	7MHz	14MHz	21MHz	28MHz	Total
1	Ariel RG (BBC)	G3BBC/P	G3GDT/P	398*	607	703*	824	223*	50	2,805
2	Surrey Radio Contact Club/Croydon	G3BFP/P	G6LX/P	368*	473	705*	842	130*	93	2,611
3	West of Scotland ARS	GM4AGG/P	GM3VIU/P	433*	273	926*	394	353*	—	2,379
4	Glenrothes & D ARC	GM3YOR/P	GM3OLK/P	410*	389	444*	716	297*	75	2,331
5	Oxford & D ARS	G3JLE/P	G8IB/P	376*	384	721*	615	163*	—	2,259
6	Crawley ARC	G2DP/P	G3TR/P	372*	408	525*	668	171*	19	2,163
7	Reigate ATS	G3REI/P	G3NKS/P	340*	511	417*	545	124*	9	1,946
8	RS of Harrow	G3EFX/P	G3HBR/P	270*	311	530*	258	136*	39	1,544
9	Thames Valley ARTS	G3TVS/P	G8SM/P	428*	441*	192	188	191*	39	1,479
10	Sutton & Cheam RS "Group A"	G3LCH/P	G2XP/P	338*	479	403*	181	35	26*	1,462
11	Addiscombe ARC	G3SJX/P	G4ALE/P	274*	394	294*	241	118*	104	1,425
12	Edgware & D ARS	G3ASR/P	G3GC/P	550*	708	—	—	—	—	1,258
13	Wirral ARS	G3NWR/P	G2AMV/P	318*	372	426*	26	24*	—	1,166
14	Ayrshire ARG	GM3ZEA/P	GM3WIL/P	260*	167	315*	244	114*	—	1,100
15	Weston-super-Mare ARS	G6LQ/P	G8FC/P	188*	338	266*	278	—	—	1,070
16	Clifton ARS	G3GHN/P	G3JKY/P	236*	499	268*	—	26*	—	1,029
17	Grimsby ARS	G3RSD/P	G3CNX/P	318*	296	—	—	—	—	614

* "A" Station score

Overseas check logs

Posn	Callsign	Points to G stations
1	9J2CL/P	588
2	HB9R/P	488
3	EI5WW/P	224
4	OK2KLF/P	216
5	OL6AQV/P	184
6	OK3CCP	168
7	HA5JK/P	120
8	OL8CDQ	76
9	OK1ATZ	74
10	OK1KUQ	64
11	OK3TPV	62
	OK2PAW	62
13	OL6ARH	56
	YO6EX	56
15	OL6AQP	40
16	VK6II	36
17	DL8CCR	32
	OK1KZ	32
	OK1AGN/P	32
20	OK3KFO	30
21	OK2BEC	28
22	OK1IAS	24
23	OK1KIX	22
	OK3EE	22
25	OK2PFP	20
26	OK2BSA	18
	OK1AEH	18
	OK3YCW	18
29	OK1DAV	16
	HB9QA/P	16
	OK2SWD	16
	OK1MLA	16
33	OK2PGF	14
34	OK2SOD	10
35	OK1KIR	8
	OK1KSD	8
37	OK2KPS	6
38	OK1IBL	4
	OK1AWF	4
	EI5F	4
41	OK1MAA	2
	OK2BMZ	2

British Isles check logs

Received with thanks from G3IDV/P, G3LCS, G3YGB, G4QK, G8JM/P.

Entries disallowed

It is regretted that the following entries had to be disqualified for non-compliance with the rules indicated:
Cheltenham ARS (G5BK/P) . . . NFD Rules 2 and 13(a);
Verulam ARC (G3VER/P and G2AIA/P) . . NFD Rule 10.

Left to right: SWL Martin Barson; Max Hounsell, G3WDJ; Harry Willis, G3ZPK; and Julian Baldwin, G3UHK, manning G3WKX/P, the station of Maidenhead & D ARC. (*photo: Maidenhead Advertiser*)

not working as many N American stations as those in the south, had very favourable skip conditions to Europe. Their 313 QSOs included 105 with W/VE and 87 with G/EU portables, and produced 928 points winning them the Frank Hoosen (G3YF) Memorial Trophy. The aerial was a TA33 trap beam at 30ft, and the rig was an FT101 with an outboard pa unit running at 10W.

Swansea RC (GW5ZL/P), in second place on this band, made 171 N American contacts and 42 G/EU to score 873 points using a 3-el beam at 30ft.

There were 19 quads, 13 trap beams, five full-size three-element beams in use, together with the usual selection of dipoles, delta loops, verticals and V-beams. Croydon (G6LX/P) used an 8-el driven array fixed on the USA, in addition to a 2-el rotary beam, to gain third place on this band and to make a significant contribution to their overall position in the double-station section.

21MHz

Scotland 1st, 2nd and 3rd!

It seems that with conditions as they were, it was better to be as far away as possible from Europe so as to obtain maximum advantage from the skip conditions.

The band leader was the West of Scotland ARS "A" station (GM4AGG/P)—augmenting their success on 7MHz—with a score of 353 points. The gear used was a KW2000 (40W to a 2E26) and that mammoth V-beam described earlier, whose legs at 21MHz were in excess of 25 wavelengths (we attempted to estimate the gain of the aerial on 15m but were unable to do so as the author of the *ARRL Antenna Book* was apparently not as ambitious as the West of Scotland ARS, for his graphs stopped well short at 10 wavelengths!). Most of their score comes from EU portables, but dx worked included VR1AA and VS5MC.

In second place was the Greenock & D ARC (GM3ZRC/P) with a score of 303 points—they also used a KW2000 with a 2E26, but had a TA33 and a 14AVQ vertical. Again, lots of EUs were worked, but also some LUs and JAs.

To complete the Scottish triumph, the Glenrothes & D ARC "A" station (GM3YOR/P) came third with yet another KW2000/2E26 combination, but used a 2-el quad aerial. They scored 297 points.

A really first-rate effort was made by these three Scottish groups, who were wise enough to take full advantage of the favourable conditions. The benefit they, and other Scottish clubs, derived on 15m and 20m from short skip working into Europe would seem to nullify any advantage which the southern groups had on 160m.

Generally most of the contacts were with Europeans, but there were quite a lot of W and VE QSOs, the odd VK and VS, and a fair sprinkling of S Americans. From Africa the two stalwarts, 9J2CL/P and 9J2FC/P, seemed to have worked almost everyone.

28MHz

Congratulations to the Addiscombe ARC (G4ALE/P) on taking the band leader's certificate, and on having broken SRCC/Croydon's monopoly of this award for many years. G4ALE/P, operated by G3SJX, G3UFY and G3XJO, made 42 QSOs worth 104 points using an FT277 with a 2E26 pa running at 40W, and a 3-el quad plus a sloping dipole. Their log included F0AHY/FC, 9J2CL/P, 9J2FC/P and CR7IZ.

Surrey Radio Contact Club/Croydon (G6LX/P) take second place with 93 points from 34 contacts, while the Glenrothes & D ARC (GM3OLK/P) are in third place with 75 points.

Bracknell (G4BRA/P) commented that this was a good band to use since the local model aircraft club were flying their 27MHz radio-

Neil Henderson, GM3LYI, left, and Neal McAnerney, GM3XNJ, operating the Greenock & D ARC station. (*Photo: G3NYY*)

controlled planes in the same field. We assume that the planes performed acrobatics to the rhythm of "CQ NFD"!

Inspections

Once again the HF Contests Committee is indebted to those members who kindly undertook inspections on the committee's behalf, and once again we are pleased to note that they were invariably welcomed and given every assistance.

This year an attempt was made to limit the distance each inspector had to travel to 20-30 miles (ie, a gallon of petrol). This was achieved in some instances by requesting neighbouring groups to inspect each other—an innovation which brought forth a number of favourable comments.

Nearly half of the groups who took part were inspected, and therefore if your station was not visited this year, it is odds on that your pa valve will be subject to official scrutiny in 1975.

Comments from competitors

"Several thunderstorms—tent leaked badly—operated all night in raincoats"—*Ariel.*

"We appreciate the need for some sort of power limitation, but the limitation on the anode dissipation is, to be quite blunt, stupid"—*Southgate.*

Roger Weston, G3SXW, on early morning shift at the Torbay ARS station G3NJA/P.

"Monster V-beam was almost long enough to reach G-land!"—*West of Scotland.*

"Much less QSLing this year—"R" must now be found to be shorter to send"—*Oxford.*

"Must remember that it gets dark at night and have some lights in the tent next year"—*Sutton and Cheam.*

"Weather marvellous"—*Weston-super-Mare.*

"Question often asked by our newer members on their first NFD is 'Why use QRP on the hf band?'—we can't give a sensible answer to this"—*Maidstone YMCA.*

"Colour tv and all mod cons"—*Gay Gordons.*

"Our worst ever NFD weather"—*East Notts CG.*

"Please make it possible for us to use unmodified equipment next year"—*Verulam.*

"Please arrange for the contest to run mid-day to mid-day"—*Baden Powell House Scouts ARS.*

"The Contest Committee has now signed the death warrant for NFD as far as real sportsmen are concerned by allowing greater powers to be used"—*Cheltenham (G3CGD).*

"Lightning was jumping all around the gear—G3TNO/P was recorded at 300 plus wpm!"—*Horsham.*

"One pole struck by lightning"—*Worksop.*

"Weather forced us to retire early"—*Caithness.*

"Is one operator for 23 hours and 300 QSOs an NFD record?"—*KW Radio Club.*

Overseas check logs

The Lusaka Group of the Radio Society of Zambia, 9J2CL/P, again provided most points to NFD entrants with a score of 588 points. They used an FT101 feeding a full-size 3-el beam on 15m, and a rhombic designed for 20m with 4 wavelength legs on the other bands. Operators were 9J2BO, 9J2CL, 9J2EP and 9J2GE.

Runner-up was HB9R/P, operated by HB9QA and HB9ABD, who ran 200W to an FT277 and gave away 488 points.

Thanks to the many other stations who submitted useful check logs.

Final

Many groups noted their appreciation of the endeavours of the HF Contest Committee in organizing and checking NFD—when burning the midnight oil cross-checking contact after contact and wearing out red pen after red pen, it is nice to come across a word or two of gratitude. Many thanks!

As usual, most clubs and groups thoroughly enjoyed the contest and are looking forward to the next NFD.

Contests calendar

7-8 September	—VHF NFD & SWL (Rules in March issue)
7-8 September	—IARU Region 1 VHF (Rules in August issue)
14-15 September	—WAE DX(phone)
14-15 September	—SAC (cw)
14-15 September	—International ATV (Rules in August issue)
14-22 September	—6th BARTG VHF RTTY (Rules in July issue)
15 September	—80m Field Day
15,22,29 September	—1,296MHz Cumulative (Rules in July issue)
21-22 September	—SAC (phone)
22 September	—DF Final—Coventry and Rugby
22-23 September	—Cray Valley RS SWL (Rules in August issue)
5-6 October	—UHF NFD & SWL (Rules in April issue)
5-6 October	—VK/ZL/Oceania (phone)
12-13 October	—VK/ZL/Oceania (CW)
12-13 October	—21/28MHz Telephony (Rules in May and July issues)
October	—Start of 70MHz Cumulative (Rules in September issue)
October	—Start of 432MHz Cumulative (Rules in September issue)
19-20 October	—7MHz CW (Rules in June issue)
20 October	—432MHz SSB (Rules in September issue)
26 October	—High Wycombe Practice Triple DF (Rules in August issue)
26-27 October	—CQ WW DX (phone)
2-3 November	—7MHz Phone (Rules in June issue)
2-3 November	—144MHz CW
9-10 November	—Second 1·8MHz (Rules in September issue)
23-24 November	—CQ WW DX (CW)
24 November	—Verulam ARC 144MHz
1 December	—Verulam ARC 1·8MHz
8 December	—144MHz Fixed

CONTEST NEWS

1974 June Microwave Contest results

There was a very significant increase in entries for this contest from 21 in 1973 to 30 in 1974. Of particular note was the entry of three GM and one GW portables and the appearance of ON4HN, PA0SSB and PA0VV on 23cm. Clearly the growth in interest may suggest the need to separate the contest into two events, one for the coaxial technique bands and the other for waveguide bands (a suggestion from G3WDG and several others). Conditions were variable, being in the main poor except between 2100 on Saturday to 0900 on Sunday (G3WDG/P); excellent to east Saturday night and good to north on Sunday morning (G3JVL). These remarks apply to 23cm. On 3cm conditions were generally described as poor and as yet no one seems to be making use of over-sea ducting which promises much greater distances than purely optical.

The overall winner, G3WDG/P, used a ZC39A pa with 10W p.e.p. ssb to a 18-el Parabeam, with a BFR90 rf amplifier in the receiver feeding a pair of IN23WE diodes in a ring mixer. A 2K25 klystron was used on 3cm with an output of 40mW to a 15in dish, and the receiver mixer had an SIM2 diode. G3JVL had 40W output from a 8533 (2C39 type) on 23cm with a 4 × 27-el loop quad of his own design. The receiver rf stage was a 2SC987 with a 4dB noise factor to a AAY39 diode mixer. On 3cm he used an X13 klystron with 200mW output to an 18in dish and the receiver mixer was a MA4901D diode with a 7dB noise figure. However, there is little uniformity of equipment in general and obviously much ingenuity is used in developing and constructing amateur microwave equipment, the Gunn diode in particular now appearing frequently.

The contest did bring to light the present lack of standardization and even common agreement as to the vhf/uhf talk-back bands to be used. In the main there are two distinct schools of thought, one favouring 2m and the other 70cm. 4m was also used and many stations therefore had to take out more talk-back equipment than was needed for the contest itself. The RSGB has been asked to specify talk-back bands for future microwave contests and clearly the VHF Contests Committee and VHF Committee will need to give very careful consideration to this problem before deciding upon standards for the purpose. Further views are invited—to G3FZL or G3RPE please.

In all, this was by far the most successful microwave contest yet held. Interest in microwaves is obviously growing very rapidly. Thanks are recorded to all contestants and to G3DAH and G8ATD for their check logs. The overall winner and band leaders will receive certificates. *G. M. C. S.*

Posn	Callsign	Total score	23cm	13cm	9cm	6cm	3cm	Cnty	Feet asl
1	G3WDG/P	5,396	4,258	—	—	—	1,138	WE	874
2	G3JVL*	5,325	5,170*	—	—	—	155	HE	6
3	G3ZEZ/P	3,465	3,387	78	—	—	—	HF	470
4	G6XM	2,780	2,780	—	—	—	—	WE	420
5	G4ALN	2,739	2,739	—	—	—	—	EX	60
6	G4BYV	2,696	2,696	—	—	—	—	NK	155
7	G3JXN	2,587	2,587	—	—	—	—	LD	200
8	G3KSU/P*	2,345	—	—	—	—	2,345*	HE	773
9	G4DDC/P	2,310	2,226	84	—	—	—	BD	800
10	G3BNL/P*	2,182	751	216*	360	360*	695	GR	1,080
11	G8FEV	1,797	1,797	—	—	—	—	BE	290
12	GW4BRS/P	1,765	—	—	—	—	1,765	BR	2,624
13	G3COJ	1,696	1,696	—	—	—	—	BS	360
14	G3EEZ/P*	1,440	144	216*	360	360*	360	SE	1,530
15	G3THQ/A	1,425	1,260	—	—	—	165	OX	600
16	G3VPF/P	1,080	—	—	—	—	1,080	DT	777/820
17	GM3OXX/P	1,052	—	—	—	—	1,052	BW	1,755
18	G5DF	996	996	—	—	—	—	BE	350
19	G3JHM & /P	730	—	—	—	—	730	HE	700/889
20	G8DIC & /P	630	392	—	—	—	238	HE	150
21	GM3DXJ/P	615	—	—	—	—	615	SG	1,100
	GM8BKE/P	615	—	—	—	—	615	RW/SG	1,034/1,084
23	G8FMK	606	606	—	—	—	—	OX	230
24	G8ECR/A	603	603	—	—	—	—	SX	500
25	G3EEV/P	515	—	—	—	—	515	DJ	776/500
26	G3WJG/A	490	—	—	—	—	490	GR	854
27	G8AGN/P*	485	—	—	425*	—	60	YS	1,150
	G8DMW/P*	485	—	—	425*	—	60	YS	470
29	G3HCW/P	230	230	—	—	—	—	YS	1,360
30	G8GCP/P	178	178	—	—	—	—	SY	780

* Band leaders

May 144MHz Open and Listeners' Contest results

This year the May contest was run under Open status. A large entry was received and this indicates the level of activity which now exists on the band. The leaders averaged almost one QSO every 3 min.

The University College of North Wales team, GW3UCB/P, took the honours from a Denbigh hilltop with G8FUF in hot pursuit from his fixed QTH in Essex. The advantage gained by operating from the Welsh hills was matched by exploitation of a good sea path to the Continent. Runners up were Lichfield ARS and the Surrey Hills CG.

Many groups are using high power and large aerial systems and it is apparent that a number of receivers being used on the band have inadequate dynamic range and this often results in complaints. As a result the VHF Contests Committee has found it necessary to monitor the band during 2m contests, so operators should be careful to ensure that clean signals are transmitted at all times. Entrants should note that QTH and QRA locator are used for cross-checking by adjudicators. QTH should be transmitted in full for non-Continental contacts.

The Listeners' Contest was again won by Joe Skidmore, BRS26431, and the runner-up was David Barber, A8016. Certificates go to both. *W. J. M.*

FIXED

Posn	Callsign	Score	QSOs	Cnty	Best dx	Km
1	G8FUF	2,979	335	EX	GM8FFX/P	615
2	G4CXL	1,943	353	SY	DK1QC/P	725
3	G3XDY	1,258	154	LN	ON5EW/A	530
4	G3NHE	1,181	193	YS	DC9DZA	560
5	G4BPO	1,004	130	SF	GM8FFX/P	576
6	G8GSX	920	152	EX	F6KAW/P	487
7	G4CWW	912	208	SD	PA0BWL/A	474
8	G4CBZ	905	168	BD	F6KAW/P	565
9	GD2HDZ	891	101	IM	G3VCP/P	430
10	G4AGE	873	163	DY	DC9DZA	600
11	G8FCD	775	143	SX	DJ6JJ/P	535
12	G4ANS	741	132	NM	DC9DZA	520
13	G3UOE	672	110	EX	DJ6JJ/P	472
14	G8GGP	667	139	KT	DC9DZA	575
15	G8CXH	663	120	GR	GM8EUG/P	383
16	G8HOH/A	603	139	EX	PA0JOU/P	402
17	G3WHK	591	161	SY	PA0DHV/P	377
18	G4AEZ	578	130	MX	GM8DMZ/P	458
19	G3ZKE	539	163	LD	DC9DZA	430
20	G8ERW	510	140	HF	GM8DMZ/P	440
21	G5UM	509	111	LR	GM8FFX/P	480
22	G4CZP	467	78	LE	G3JEQ/P	365
23	G4AJE	454	80	NR	PA0VV	375
24	G8CTT	428	138	KT	PA0CKV/P	350+
25	G3LCH	380	136	LD	ON5UI	275
26	G8ECO	369	101	SY	ON5UI	350
27	G8GJV	346	80	WK	GM8CNK/P	330
28	G3SZS	342	78	GR	—	—
29	G3VWI	341	97	WK	G8FWV	211
30	G4CQG	320	77	YS	PA0VV	520
31	G8EYC	303	149	LD	G2AMV	290
32	G6YB/A	282	60	GR	G3WIN/P	330
33	G3ZMU	273	57	NM	PA0FWS	—
34	G4ART	257	57	WK	—	—
35	GM3PXK	225	47	LK	GW8BKY/P	300+
36	GC3YIZ	223	31	GY	G3ZBY/P	445
37	G8HYH	188	80	KT	GW3VCB/P	290
38	G4CSB	156	52	LD	PA0FWS	350
39	G8DPP/A	151	92	LD	GW3VCB/P	280
40	G3FPK	146	76	SY	GW3WRA/P	221
41	G3KMI	118	30	HE	G3NHE	269
42	G8BBP	110	31	WR	GM8CNK/P	310
43	G8GBN	77	53	LD	GW3WRA/P	225
44	G4CCA	63	51	LD	G8BQX/P	92
45	G8IOC	57	26	WR	GW8BKY/P	128
46	G4BKY	40	18	GR	GW4ABR/P	120
47	G4CRC/A	37	17	CL	GW3WRA/P	245
48	G8IEL	33	11	CH	GM8DMZ/P	230
49	G4AUR	29	15	LE	G4CWW	111

PORTABLE

Posn	Callsign	Score	QSOs	Cnty	Best dx	Km
1	GW3UCB	3,380	448	DB	F1ANH/P	958
2	GW3WAS	2,621	405	DB	ON5EW/A	675
3	GW4ABR	2,241	339	RN	F6KAW/P	710
4	GW3OXD	2,120	320	RN	DC9DZA	640
5	GW8BHH	2,117	291	RN	F6CVN/A	670
6	GW3FEC	2,050	319	BR	DB1KG	649
7	GW3WRA	2,042	316	BR	PA0IHD	480
8	G8FAB	1,883	295	WE	GM8FFX/P	628
9	GM8DMZ	1,809	170	WG	PA0JOU/P	770
10	G8GGH	1,603	201	BE	GM8FFX/P	610
11	G3ZBY	1,476	231	LE	GC8EZA/P	477
12	GW8BKY	1,462	202	MR	PA0ZAZ/P	700+
13	GM8FFX	1,422	114	KE	G8HQJ	670

Posn	Callsign	Score	QSOs	Cnty	Best dx	Km
14	G4APJ	1,417	225	EX	GM8FFX/P	595
15	G4CAR	1,397	241	SD	GC8EZA/P	413
16	G3BRS	1,229	248	SD	ON4PB/P	500
17	G8ELO	1,132	252	NR	GM8FFX/P	520
18	G8GCC	1,111	214	SD	DC9DZA	573
19	G8AUN	1,109	140	NK	GM8FFX/P	490
20	G4BSP	1,046	206	YS	PA0BWL/A	455
21	G3UES	1.026	248	HE	GM8DMZ/P	480
22	GW3OUL	968	193	DB	GM8FFX/P	465
23	G3WDH	927	185	LE	GM8FFX/P	370
24	G8BQX	891	159	SX	DJ6JJ/P	505
25	G3VCP	848	201	SY	GD2HDZ	440
26	G3WIR	836	164	OX	GM8DMZ/P	470
27	G3XTT	783	193	NK	GM8FFX/P	500
28	G8FWV	747	121	SX	DC9DZA	380
29	G8CUB	746	106	KT	DK0BN/P	470
30	G4CMG	733	197	KT	—	—
31	G3WIN	727	117	CD	G3SDS/P	400
32	G3OUR	725	155	GR	DC9DZA	553
33	G8DUQ	700	161	GR	GD2HDZ	330
34	G8HVY	689	133	DT	GM8DMZ/P	450
35	G3JEQ	648	140	SY	GC8FLM/P	425
36	G3SDS	628	118	DT	G3WIN/P	416
37	G8INJ	607	123	SE	ON4PB/P	—
38	GM8CNK	606	66	WG	G4CXL	460
39	G3SAD	598	162	HF	G8GON/P	266
40	G4DAA	561	117	SX	DC9DZA	435
41	G3JFO	530	84	YS	PA0JOU/P	485
42	G4COA	524	153	OX	G3UTS/P	295
43	G3KIN	490	157	SY	G3ZBY/P	298
44	G4BRA	473	144	OX	PA0CIS	306
45	G3OHM	453	147	WK	GD2HDZ	255
46	GI4AQF	452	52	AM	G3XDY	425
47	G3XJQ	451	111	WR	F5VA	375
48	G8IBB	354	60	YS	GM8FFX/P	345
49	G4BVE	300	105	SX	G3NHE	310
50	G8FDL	188	66	LR	G3UTS/P	220
51	G8BXF	187	53	DH	GM8BRM/P	320
52	GM6NX	119	54	CN	—	—
53	G8HWQ	59	18	YS	GW3AHD/P	240

LISTENERS

Posn	Callsign	Score	QSOs	Cnty	Best dx
1	BRS26431	621	123	DV	ON4PB/P
2	A8016	456	86	EX	DJ6JJ/P
3	BRS34348	373	64	KT	DC9DZA
4	BRS15822	334	94	LD	GM8DMZ/P
5	BRS33794	294	50	HE	—
6	A8094	190	42	SX	GW3UCB/P
7	BRS33823	151	43	BS	G3ZBY/P
8	A8605	143	—	—	—
9	A8284	120	—	SD	EI9Q
10	A8163	96	48	EX	ON4PB/P
11	BRS28005	82	42	SX	F9FT
12	A8552	40	14	LN	G3WDH/P

Check logs received from G3TGR, GW4BLE/P, G8HNI, G8HVV and OK1-15835.

Stratford on Avon DF Qualifying Round results

Nineteen teams gathered on the escarpment at Edge Hill overlooking the site of the Civil War battle in 1642. Had they known where to look, the sites of both hidden transmitters were also visible from just beyond a thin belt of trees. The fine weather which lasted all day may have encouraged the largest-ever turnout for a Stratford df, with 11 clubs represented. A welcome visitor at the start was Mr D. Findlay, general manager of RSGB and no stranger to df events.

Station B, G3ORI/P, was by far the stronger signal at the start, and 11 teams chose to hunt this station first. Only five miles away, the transmitter was in a small but dense wood, with an aerial about 100yd long. The best way into the wood was not apparent from the road, and few competitors found it. The majority spent some time beating about in the thick undergrowth, and tended to arrive at the transmitter in bunches, to the dismay of the operators who were frequently showered with entry forms.

Transmitter A, G3RPJ/P, was nearly 12 miles away to the north-west, in a steeply sloping wood on the bank of the River Avon just down-stream from Stratford. The main problem here was deciding where to leave the car; in fact a walk of nearly a mile was unavoidable, and the sight of competitors in full cry was an additional treat for the many tourists. Early arrivals were distracted by a rather conspicuous half-wave aerial which dipped in the middle to a thick thorn bush; this had been prepared the previous day as a transmitter site, but was then rejected in favour of a more comfortable one a few yards away, and a new aerial was erected, the other being put to good use as a decoy.

The organizers would like to thank transmitter assistant G8GJI and starter G3OOQ.

Posn	Competitor	Club	Time of Arrival Station A	Station B
1	P. Tyler	Oxford	1525	1431
2	D. Holland	South Manchester	1527	1431½
3	M. Hawkins	Chelmsford	1451	1529½
4	P. Lisle	Oxford	1533	1432
5	G. Whenham	Coventry	1453	1547½
6	M. Gee	Oxford	1552	1431
7	W. J. North	Chiltern	1454½	1553
8	C. McEwen	Crawley	1504	1553½
9	D. Newman	Rugby	1454	1600
10	J. McBurney	South Manchester	1608	1438
11	A. Hitchcock	Derby	1608½	1445½
12	I. R. Butson	Chelmsford	1525½	1610
13	A. Butcher	Chelmsford	1522	1612
14	M. Easterbrook	Dartford	—	1452
15	G. J. Reason	Banbury	—	1455½
16	G. Foster	Stratford on Avon	—	1530½
17	G. T. Peck	High Wycombe	—	1546½
18	M. Sheridan	Stratford on Avon	—	1610½

One competitor failed to find either transmitter.
Messrs Holland and Hawkins having already qualified for the National Final, subject to confirmation P. Tyler and P. Lisle qualify in this round.

Derby DF Qualifying Round results

Twenty teams entered for this event, which started from the Rolls Royce car park in Victory Road, Derby. More than 50 per cent of the competitors found that they could not receive station A too well, so in accordance with rule 4 an approximate bearing was given and, when permission to start was signalled, the organizers were nearly mown down in the rush. One car started off with its bonnet still up.

Station A was located in tall heather on a hilltop near Belper and station B was hidden in the depths of a large holly bush near Marchington, just over the Staffordshire border. The operators had pulled extra holly in after them and several competitors were seen circling the bush before plucking up courage to dive into the prickly depths.

Thanks go to Rolls Royce for the use of their car park for the start.

Posn	Name	Club	Time of arrival Station A	Station B
1	D. C. Holland	South Manchester	1427	1538
2	M. P. Hawkins	Chelmsford	1502	1548
3	W. L. Pechey	Chelmsford	1550	1443
4	G. A. Whenham	Coventry	1550	1454
5	J. R. Vickers	Stratford	1421	1610
6	J. McBurney	South Manchester	1424	1610½
7	I. R. Butson	Chelmsford	1615	1505
8	A. W. Butcher	Chelmsford	1616	1454
9	G. J. Reason	Banbury	1622	1507
10	R. Smith	South Manchester	1426	1626
11	P. Woollett	Dartford	1451	1626½
12	D. E. Newman	Rugby	1431	1628½
13	W. North	Chiltern	1430	1628½
14	M. Easterbrook	Dartford	1440	1629½
15	T. C. Gage	Oxford	1420	1630
16	B. Goodall	Derby	1512	—
17	B. Mahoney	Rugby	1544	—

Three competitors failed to find either transmitter.
Subject to confirmation, D. C. Holland and W. L. Pechey qualify for the Final.

1974 Second 1.8MHz Contest rules

1. Rules. The General Rules for RSGB HF Contests, published in the January 1974 issue of *Radio Communication*, will apply.

2. When. From 2100gmt Saturday 9 November 1974 to 0200gmt Sunday 10 November 1974.

3. Contacts. CW (A1) only, in the 1·8–2MHz band. County code letters, as published in the January 1974 issue of *Radio Communication*, must be sent after the report/serial number group; eg for a contact from Fife, 569001 FE.

4. Scoring. Six points for each of the first six contacts with stations in any one British Isles county, three points for the seventh and subsequent contacts with stations in that county; six points for each contact with a station outside the British Isles.

5. Logs. Column (5) should be headed "Code Rcvd". Entries should be addressed to: HF Contests Committee, c/o A. V. H. Davis, G3MGL, 41 Gainsborough Road, Crawley, Sussex RH10 5LD.

6. Awards. The Victor Desmond Trophy will be awarded to the winning station. The Maitland Trophy will be awarded to the Scottish member with the highest aggregate number of points in this contest, combined with the First 1·8MHz Contest 1975. A Certificate of Merit will be awarded to the second and third placed entrants.

7. Under 18 Section. An additional Certificate of Merit will be

awarded to the highest placed entrant whose 18th birthday falls on or after 11 November 1974. Entrants wishing to compete for this award should clearly enter on the TOP of the cover sheet **"UNDER 18"** and their date of birth. Entries will only be eligible for this award where operation has taken place under the entrant's own callsign, and from the "main address" as shown on the station licence.

70MHz Cumulative Contest rules

Dates: 13, 27 Oct; 10, 17, 24 Nov; 1, 8 Dec.
Times: 1000–1230 local time.
All entries and checklogs to: VHF Contests Committee, c/o G3SEK, 11 Rington Avenue, Poulton-le-Fylde, Blackpool FY6 7NR.

The following General Rules, published in the January 1974 issue of *Radio Communication*, will apply: 1, 2, 3, 4b, 5a, 6a, 7a, 8b, 9a, 10b, 11–26.

432MHz SSB Contest rules

Date: 20 October.
Times: 1000–1400gmt.
All entries and checklogs to: VHF Contests Committee, c/o G5HD, 100 Shirley High Street, Southampton.

The following General Rules, published in the January 1974 issue of *Radio Communication*, will apply: 1, 2, 3, 4b, 5a, 6a, 7a, 8b, 9c, 10a, 11–26.

432MHz Autumn Cumulative Contest rules

Dates: 31 Oct; 8, 16, 24 Nov; 2, 10, 18 Dec.
Times: 2000–2230gmt.
All entries and checklogs to: VHF Contests Committee, c/o G2HIF, 20 Harcourt Road, Wantage, OX12 7DQ.

The following General Rules, published in the January 1974 issue of *Radio Communication*, will apply: 1, 2, 3, 4b, 5a, 6a, 7a, 8b, 9a, 10b, 11–26.

Cray Valley RS 5th SWL Contest results

SINGLE OPERATOR

Posn	Name	Station	Score	Bonus points	Total
1	A. West*	A7790	136,000	40	136,040
2	S. C. H. Green*	G13863	109,388	100	109,488
3	D. S. Kendall	BRS24643	90,037	100	90,137
4	K. Muller*	3D6-14085	75,856	90	75,946
5	D. A. Johnson	A7511	41,040	55	41,095
6	S. J. Schmidt*	LA-M3705	36,512	100	36,612
7	P. C. Jane	BRS34494	33,110	55	33,165
8	M. Peters	—	30,804	60	30,864
9	P. Herber	A8198	25,728	45	25,773
10	M. Whitfield	A8458	24,494	65	24,559
11	D. R. Falkner	A8049	19,513	40	19,553
12	M. J. N. Sibley	A8075	18,584	75	18,659
13	M. H. Curtis	BRS30137	18,564	70	18,634
14	H. Ohnuki*	JA1-11166	12,450	75	12,525
15	S. Rathbone	A8298	11,868	40	11,908
16	J. P. Johnston*	A8423	10,971	85	11,056
17	M. Zarattini	G14094	10,465	40	10,505
18	S. Fletcher	A8303	8,640	85	8,725
19	T. Stanley	A8083	7,104	40	7,144
20	P. W. Carter	—	6,812	80	6,892
21	T. McGrath*	WIA-L60121	5,880	85	5,965
22	S. S. Ebato	JA1-10848	5,332	95	5,427
23	M. Schluter	A7951	4,410	40	4,450
24	B. S. Head	—	4,361	85	4,446
25	M. W. Lowson	A8248	3,745	65	3,810
26	G. W. G. Hall	GI14327	1,665	45	1,710
27	M. Loach	A8057	1,595	50	1,645
28	D. Thorpe	A8163	504	60	564

MULTI-OPERATOR

Posn	Name/Group	Station	Score	Bonus points	Total
1	A. Miller* D. Whittaker	G5218 BRS25429	137,837	80	137,917
3	North Staffs ARC*	—	30,476	75	30,551
4	A. Leach — C. Baker	A8338 A7661 BRS33875	24,978	50	25,028
6	D. Barber R. Kearns	A8016 —	10,287	90	10,377

* Certificate winner

RSGB Region 1 VHF Contest results

Section 1, Multi-operator. The winners were the Ainsdale Radio Club who win the G2CIP Shield, also having the highest score on 4m and 2m. Runners-up were Chester with a fantastic score of 946 points on 70cm.
Section 2, Single-operator. The winner was GD2HDZ who takes the new G3SMM Shield with the highest score on 4m and 70cm. Runner-up was G8BHQ, top scorer on 2m.
Outside section. The winner, G4BWG, operated on 2m only.

A record number of stations took part, in very good weather, and some fair dx was worked, including ZB2VHF by two entrants on 4m. At least 54 Region 1 stations were active on 2m, 25 on 4m and 16 on 70cm.

Chiltern ARC 2m Contest results

The contest was held on 30 June from 0900–1200gmt. There was some clash with the WAB Contest also in progress but there seems to have been little confusion. Activity was good from non-member stations but, as can be seen from the results table, the number of club-members active was rather low.

TRANSMITTING

Posn	Callsign	Cnty	Score Claimed	Score Checked
1	G3MOT	Oxon	3,288	3,248
2	GD8EXI	I of M.	584	3,212
3	G4CZP	Lancs.	2,024	2,024
4	G4BWW	Lancs.	1,800	1,890
5	G8FXG/P	Oxon	1,617	1,617
6	G8IKO/P	Oxon	812	774
7	G4DFI/P	Kent	624	585
8	G8GHZ	Northants.	1,680	552
9	G8FMG	Beds.	390	403
10	G3UCS/P	Worcs.	110	198
11	G8GCS/P	Devon	150	150

SWL

Posn	Station	Cnty	Score Claimed	Score Checked
1	A8398	Beds	65	960
2	BRS34348	Kent	750	750
3	BRS33823†	Bucks	105	77
4	A8065	Sussex	16	12

† CARC member.

Certificates awarded to G3MOT, A8398 and BRS33823.

GB3FM in VHF NFD

The UK FM Group (Northern) will be participating in the 1974 VHF NFD, under the call GB3FM. The location of the station will be very close to the site of the proposed Northern FM repeater (GB3NA) near Barnsley, and will use comparable power. It is hoped, therefore, that some indication may be given regarding the possible reception area of the proposed repeater.

The NFD station will normally operate only on fm, but will be able to receive all modes on all 2m frequencies. Contacts from any amateurs capable of receiving fm on 2m (the only band to be used) will be welcome, and will be confirmed by a special QSL.

Looking Ahead

14-15 September—North-West Amateur Radio Convention, University of Lancaster, Bailrigg, Lancaster.
21 September—Southampton RSGB Group Convention and Region 17 ORM, Southampton College of Art.
22 September—GW6GW, Welsh Amateur Radio Convention, Community College, Oakdale, Nr. Blackwood, Gwent.
28 September—Scottish VHF Convention, Region 12 ORM and Zone G Conference, Dundee.
31 October-2 November—Midland National Amateur Radio Exhibition, Leicester.
25 November—RSGB lecture at the IEE.
6 December—RSGB AGM, Royal Society of Arts, John Adam Street, Adelphi, London WC2.
17 January 1975—RSGB Presidential Installation, Cardiff.

CLUB NEWS

RSGB Affiliated Societies and Clubs, and RSGB Groups, are invited to submit items for inclusion in this section to their Regional Representatives (not direct to the editor), whose addresses appear on page 429 of this issue, for inclusion in the appropriate regional section.

Items of news and dates of forthcoming events should reach RRs by the following dates: 1 October, 20 November.

REGION 1 **RR B. O'Brien, G2AMV**

Ainsdale (ARC)—Thursdays fortnightly, 8.15pm. 12, 26 Sept; 10, 24 Oct; 7 Nov. Ainsdale Scout Headquarters. Further details from N. Horrocks, G2CUZ QTHR.

Blackburn (ELARC)—First Thursday in each month, 7.30pm. YMCA, Shearbank Road, Blackburn. Visitors always welcome. 7 Nov (Slide and film show—members' shacks and radio film.) The club took part in the Region 1 VHF Contest and hope to compete in the National VHF Contest. Sec W. E. Baxendale, G8FDG, "Juverna", Westland Ave, Darwen, Lancs.

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

Bolton (B & DARS)—3rd Wednesday in each month, 8pm. Clarence Hotel, Bradshawgate. Sec S. Macdonald, G4AQB, 8 Archer Avenue, Bolton.

Bury (B & RRS)—Second Tuesday in each month; informal meetings other Tuesdays. Morse classes in progress. RAE class starts in September. Mosses Community Centre, Cecil Street, Bury. An EGM was held on 9 July to bring the constitution of the club up to date. This was successfully accomplished and a good attendance was again in evidence in spite of local holidays. A QSL manager has been appointed; also a club licence holder.

Carlisle (C & DARS)—Mondays, 7.30pm. Currock House, Lediard Avenue, Currock, Carlisle. A very full programme of lectures and demonstrations has been arranged for the coming months. Full details from sec G8DVD QTHR.

Cheshire (Mid-Cheshire ARC)—Wednesdays, 7pm. Technical Activities Centre, Winsford Verdin Comprehensive School, Grange Lane, Winsford. Nets on 160m, 7pm Mondays; on 2m, 7pm Tuesdays; on 10m, 7.30pm Thursdays. On Tuesdays RAE classes and slow morse transmissions are available. Please see sec G3SIQ for details. Chairman is G3JWK.

Chester (C & DARS)—Tuesdays, 8pm. YMCA, Chester. Except first Tuesday in each month, which is a net night on 145·08MHz and 433·15MHz. Further details from G8AYW, G6AHC/T QTHR.

Douglas IoM (D & DARS)—Sec GD3YUM will be pleased to hear from any member who intends to visit the island.

Eccles (E & DARC)—Tuesdays, 8pm. Bridgwater School, Worsley, Manchester. Club 2m net, 11am Sundays on 145·66MHz. All visitors and prospective members welcome. Sec G4AEQ QTHR.

Lancaster University (UoLARS)—Wednedsays, 7pm. Furness College. RAE and morse classes. The society is active on the hf bands and 2m using G3ZBY and G8DOU. Skeds and visits welcomed; enquiries please to Colin Pegrum, Department of Physics.

Leyland Hundred (ARG)—2nd Monday in each month, 7.30pm. Rose & Crown, Ulnes Walton, Leyland. Net night Saturdays 2000-gmt on 145·8MHz. Details from F. Harrison, G3XII, 78 Lancaster Lane, Leyland, Lancs.

Liverpool (L & DARS)—Tuesdays, 8pm. Conservative Association Rooms, Church Road, Wavertree. Sec G3WCS.

Liverpool (NLRC)—Tuesdays 8.30pm. Informal meetings, "Nags Head", Thornton, Crosby, Liverpool 23. Visitors welcome. Sec R. B. Porter, 11 Cranmore Avenue, Crosby, Liverpool L23 0QD.

Liverpool University (UoLARS)—No meetings until 14 October. Details, if required, from sec G8IAV.

Manchester (M & DARS)—Wednesdays, 7.30pm. All meetings include morse classes. 203 Droylesden Road, Newton Heath, Manchester 10. Sec G3IOA.

Manchester (SMRC)—Fridays, 8pm. Sale Moor Community Centre, Norris Road, Sale, Cheshire. VHF and df lads meet on Mondays, 8pm at the club shack, "Greeba", Shady Lane, Manchester 23. The club is running a number of df practice events; anyone interested contact hon sec G3WFT. Visitors welcome either night. 6 Sept (Mini lecture contest and final preparations for VHF NFD), 13 Sept (Surplus equipment sale. Non-members are welcome to attend and bring "goodies" for sale if they wish), 20 Sept (Demonstration of Leak Wharfedale hi-fi products by Messrs A. Pickess, N. Woosey and D. Humble), 27 Sept ("Chemical energy" by M. J. Ware, G4BJT), 4 Oct (Night on the air), 11 Oct ("IC transceiver" by P. G. Torry, G3SMT), 18 Oct ("Hydrogen and hot air" by M. J. Ware, G4BJT), 25 Oct (Description and discussion on the club project (An ic receiver for df (160m) or 1·6MHz tunable i.f.), 1 Nov (Club dinner, Woodcourt Hotel, Brooklands Road, Manchester 23).

Manchester University (ARS)—G3VUM is active on all bands 160–10m and 2m. The programme of lectures, visits, RAE and morse tuition continues as previously. Details from sec G. T. Phelan, G3EPS, University Union, Oxford Road, Manchester M13 0PL, or G3AOS QTHR.

University of Manchester—Institute of Science & Technology (ARS)—G3CXX is active on all hf bands and G8FOT on 2m and perhaps 2cm. Items for club magazine/newsletter or letters from intending members gratefully received by G8GOS, 66 Howard Road, Kings Heath, Birmingham B14 7PQ.

Preston (PARS)—7.30pm. Windsor Castle (private room), St Paul's Square, Preston. Morse practice 7.30pm, main feature 8pm. 12, 26 Sept, 10, 24 Oct, 7 Nov.

Salford (DHRS)—Wednesdays 5pm. Dial House, Chapel Street, Salford. Members assemble in canteen and proceed to club room on roof. Sec G3WFW QTHR.

Stockport (SRS)—2nd and 4th Wednesdays in each month, 8pm. Blossoms Hotel, Buxton Road, Stockport. Sec G. R. Phillips, G3FYE, 6 Ross Avenue, Davenport, Stockport.

Thornton Cleveleys (ARS)—1st and 3rd Wednesdays, 8pm. St John Ambulance Brigade HQ, off Fleetwood Road North (behind police station), Thornton, Lancs. Project Group, Fridays 7.15–9pm, Project Laboratory, Rossall School, Fleetwood. Work in hand includes 160 and 2m transmitters/receivers. Please note acting sec is J. Duddington, G4BFH, The Grove, Thornton Cleveleys, Blackpool.

Warrington (W & DARS)—Tuesdays, 8pm. Thames Board Mills Social Club, Alford Hall, Manchester Road, Warrington. Sec G. H. Read, 2 Princess Avenue, Great Sankey.

Wirral (WARS)—1st and 3rd Wednesdays, 7.45pm. Sports and Recreation Centre, Grange Road West, Claughton, Birkenhead. Sec G3YGL QTHR.

Wirral (Wirral DX Association)—Last Tuesday in each month at members' homes. Visitors are welcome. Please inform sec G3XJZ QTHR beforehand.

Merseyside members meet for lunch on 1st Monday of every month. It is essential to book beforehand and obtain details of the venue from either G3VQT or G2AMV.

REGION 2 **RR J. E. Agar, G8AZA**

Hartlepool (HARC)—2 Sept (CW practice), 9 Sept ("Product detectors" by G8DKU),16 Sept (CW practice), 23 Sept ("Amplifiers" by G3NWU), 30 Sept (CW practice). Hon sec G3NWU/G6ACI/T, QTHR.

Hull (H & D ARC)—Fridays, 7.30pm. 592 Hessel Road, Hull. 6 Sept (Preparation for NFD), 13 Sept (Model railway electronics. RAE classes start), 20 Sept ("Tape recording for the amateur"), 27 Sept ("Getting ready for the morse test"), 4 Oct (Visit to Laser Dept, Hull University), 11 Oct ("Amateur tv"). *G3PQY*.

Sunderland (SARS)—Tuesdays fortnightly, 7pm. Sunderland Polytechnic. Officers: president, Dr J. R. Kirkman, G3RDI; chairman, G. E. Mason, G3YJE; secretary, P. Barker, BRS34898; treasurer, F. W. Erskine, G3WTE. Committee: J. E. Ayton, swl; H. Pickering, swl; Dr J. R. Kirkman, G3RDI; G. Lindsay, G4CDB. 3 Sept (80m Field Day preparations), 17 Sept (Talk by G2BS)—Meet at RAF Club, Murton St, for these two meetings. 1 Oct ("SWL aerials" by G3YJG) —at Polytechnic. Visitors and old members welcome. Hon sec P. Barker, BRS34898, 15 Buttermere St, Grangetown, Sunderland SR2 9NJ.

York (YARS)—Thursdays, 7.30pm. 61 Micklegate. The society mounted a special event station at Tollerton Show on 17 August using the callsign GB2TS. Several visits are lined up for the future. Annual dinner on 25 October. Hon sec K. R. Cass, G3WVO, 4 Heworth Village, York.

REGION 3 **RR B. Kennedy, G3ZU1**

Birmingham (MARS)—17 Sept, 15 Oct (AGM). Birmingham and Midland Institute, Margaret Street, *G8GOC*.

(Slade) 7 Sept (Junk sale), 21 Sept. The Committee Room, Church House, Erdington. Alternate Fridays, 8pm. *G4BRT*.

(South) Hampstead House, Fairfax Rd, West Heath, Birmingham 31. *G8GDZ.*

Bromsgrove (BDARC)—8pm. Avoncroft Art Centre, Stoke Rd, Bromsgrove. 11 Sept ("Oscars" by G3HAZ), 11 Oct (Surplus sale by auction). *Mr J. Harvey, 22 Elm Grove, Bromsgrove.*

Coventry (CARS)—Fridays, 8pm. Baden Powell House, St Nicholas Street, Radford Road, Coventry. 6 Sept (University Chalence type quiz), 13 Sept (Night on the air), 20 Sept (Hi-fi demonstration), 27 Sept (Night on the air), 4 Oct (Wine and cheese party), 11 Oct (Night on the air), 18 Oct (Scout Jamboree on the Air), 25 Oct (RTTY demonstration). *G3TFA.*

Dudley (DARC)—3 Sept (Talk by G3RLY), 17 Sept (Informal), 1 Oct (AGM), 15, 29 Oct. 7.45pm Central Library, Dudley. Visitors most welcome. *G8HHK.*

Hereford (HARS)—First and third Fridays in each month. Civil Defence HQ, Gaol Street, Hereford. *G4CNY.*

Lichfield (LARS)—First Monday and third Tuesday in each month. The Swan Hotel, Bird Street, Lichfield. *G3NLY.*

Mid-Warwickshire (MWARS)—Mondays, 8pm. 28 Hamilton Terrace, Leamington Spa. *G8GDY.*

Solihull (SARS)—The Manor House, High Street, Solihull. *G4AEJ.*

Stourbridge (STARS)—Third Monday in each month. Longlands School, Brook Street, Stourbridge. Informals at Shrubbery Cottage, Heath Lane, Stourbridge. 3 Sept (Informal), 16 Sept ("Transistors made easy" by D. Pearson, G3ZOM). 1 Oct (Informal), 21 Oct (Lecture by G. Edwards, G4BBB). *G3ZVK.*

Sutton Coldfield (SCRS)—Alternate Mondays, 7.30 for 8pm. Central Youth HQ, Clifton Road, Sutton Coldfield. 9 Sept (Films by courtesy of the GPO), 23 Sept (Visit by B. Kennedy, Regional Representative), 14 Oct ("Maps and locators for the radio amateur" by G3UBX), 28 Oct (Judging of home-built equipment by members). *G8ALO.*

Telford (TDARS)—Wednesdays. Ketley Bank Youth Centre, Nr Oakengates, except first Wednesday in end month when at Walker Technical College, Nr Wellington. 4 Sept (Learners evening, morse class at Ketley Bank). 11 Sept (Provisional start to the next club project), 18 Sept ("A solid state device" by G8FSV). *G4ANZ.*

Willenhall (W & DARS)—Alternate Wednesdays. The Three Crowns, Stafford Street, Willenhall. Morse classes at end of each meeting. *G4CFR.*

Wolverhampton (WARS)—Neachells Cottage, Stockwell End, Tettenhall, Wolverhampton. *G3UBX.*

Worcester (W & DARC)—The Old Pheasant Inn, New Street, Worcester. *G8ASO.* Tel Worcester 29208.

REGION 4 **RR T. Darn, G3FGY**

Derby (D & DARS)—Wednesdays, 7.30pm. 119 Green Lane, Derby. 4 Sept (Surplus sale), 7-8 Sept (VHF NFD at Drum Hill), 7 Sept (Exhibition Show at Turnditch), 11 Sept (Demonstration and talk on low definition tv), 18 Sept (DF practice night No 6), 26 Sept (Film show), 2 Oct (Surplus sale), 5, 6 Oct (Exhibition at Needwood School, Rolleston), 9 Oct (Cheese and wine party), 16 Oct (Talk on ssb by G3VGW), 23 Oct (Film show), 30 Oct (Preparation for Leicester Exhibition). Visitors are always welcome. *G2CVV.*

Derby (NHCAARG)—7.30pm. Nunsfield House, Boulton Lane, Alvaston, Derby. 6 Sept (Preparation for VHF NFD), 7-8 Sept (VHF NFD at The Weaver Hills, Nr Ashbourne), 13 Sept (Home-brew equipment evening), 20 Sept (Technical film show), 21-22 Sept (Local club contest 160 and 2m), 27 Sept (Night on the Air), 4 Oct ("Digital telemetry and control" by G3TVU), 6, 9 Oct (DF event), 11 Oct (Television transmission, the club's new project), 18 Oct ("Model aircraft" by Mr P. Wolvin), 25 Oct (Talk on wine making, bring your homemade wine), 1 Nov (AGM). *G4CTZ.*

Grimsby (GARS)—7.30pm. Grimsby Community Centre, Duncombe Street, Grimsby. 12 Sept (DF hunt), 26 Sept ("Meteor scatter" by G3CCH), 9 Oct (AGM), 23 Oct (Junk sale). *G8HAE.*

Nottingham (ARCON)—Thursdays. Community Centre, Mansfield Road, Sherwood, Nottingham. Visitors are always welcome. *G4AFJ.*

REGION 5 **RR P. J. Simpson, G3GGK**

Bedford (B & DARC)—Thursdays, 7.30pm. United Services Club, The Broadway, Bedford. 5 Sept ("Home-brew 80m mobile" by G3LWJ). Sat-Sun 7-8 Sept (VHF NFD), 12 Sept (Shack-scope use), Sat 14 Sept (Barbecue at G3ZKB), 19 Sept (SSTV), Sun 22 Sept (Humber Radio visit at Mablethorpe), 26 Sept (Junk sale). Hon sec G. E. Parker, 12 Dawlish Drive, Bedford.

Cambridge (C & DARC)—Fridays, 7.30pm. 6 Sept ("Ship to shore" film and talk). Hon sec John Fellows, G3YRZ, 8 North Street, Burwell, Cambridge.

Cambridge University (CUWS)—Tuesdays, alternate formal and informal meetings. Following reorganization, G6UW is active on the hf bands, with 160m and 2m to follow. 8-9 Oct (Newcomers please meet the club at the Societies Fair in Cambridge). Chairman, Dave Holburn, G3XZP; sec, John Robinson, G4AZX (QTHR or Christ's College during term).

Dunstable Downs (DDRC)—Fridays, 8pm. Chews House, 77 High Street South, Dunstable, Beds.

Peterborough (PE & RS)—20 Sept and 18 Oct, 7.30pm. The Scout Hut, Occupation Road, New England. 29 Sept (Peterborough Mobile Rally, Walton School, Mountsteven Road, Walton). ASR Peter Chilcott, G4BBA, 258 Coneygree Road, Stanground, Peterborough.

Shefford (S & DRS)—Thursdays, 8pm. Church Hall, Ampthill Road, Shefford. 5 Sept (Printed circuit boards and rtty), 7-8 Sept (VHF NFD), 12 Sept (VHF NFD post-mortem). Hon sec Bob Squire, 10 Brittains Rise, Lower Stondon, Henlow, Beds.

REGION 6 **RR L. W. Lewis, G3TDR**

Cheltenham RSGB Group—First Thursday in each month, 8pm. Royal Crescent Hotel, Clarence Street, Cheltenham. 5 Sept (Part 2 of series on colour tv servicing by Dick Sutton). *G3KII.*

Cheltenham (CARS)—Wednesdays, 8pm. St Marks and Hesters Way, Community Centre, Brooklyn Road, Cheltenham. *G8DVA.*

Milton Keynes (MK & DRS)—New meeting place is Lovat Hall, Silver Street, Newport Pagnell, Bucks. 9 Sept (AGM, 8pm), 14 Oct ("Getting going on 23cm"). *G8CHK.*

Oxford University (OURS)—G3OUR is operational on hf bands and 2m. There are also talks and informal meetings. On 11 Oct society will have a stand at the Freshmens Fair (Examination Schools), everybody welcome. Further details from D. Price (G4BIX), Colehill House, Winchester Road, Bishops Waltham,. Southampton (during vacation) or St Edmund Hall, Oxford (term). *G4BIX.*

REGION 7 **RR R. S. Hewes, G3TDR**

Acton, Brentford & Chiswick (ABCRC)—17 Sept (Members holiday radio reports), 15 Oct ("Experiments with random aerials" by G4DLK). 7.30pm. Chiswick Trades and Social Club, 66 High Road, Chiswick W4. Hon. sec W. G. Dyer, G3GEH, QTHR.

Addiscombe (AARC)—Tuesdays, 9pm. "Prince George", High Street, Thornton Heath. Hon sec S. F. Knowles, G3UFY, QTHR.

Ashford, Middlesex (Echelford ARS)—9, 26 Sept, 14, 31 Oct. 7.30 for 8pm. St Martin's Court, Kingston Crescent, Ashford, Middlesex. Visitors very welcome. Further details from hon sec Alan Wenham, G3ZXA QTHR. Tel Sunbury-on-Thames 86440.

Barking (BR & ES)—Thursday meetings. 5 Sept (First meeting of new session), 12 Sept (Technical film show), 3 Oct (Lecture on aerials, Part 1, by R. S. Roberts, G6NR), 17 Oct (Lecture on aerials, Part 2). Regular meetings, 7.30pm: Mondays, (Constructional); Tuesdays; (Morse classes); alternate Thursdays (Informal) and main meetings. Visitors very welcome. Further details from hon sec R. Clark, G4DDP, QTHR.

Burnham Beeches (BBARC)—First Monday in each month, 8pm. Hedgerley Scout Hut, Hedgerley, Near Slough, Berks. Hon sec E. Brown, 20 Balmoral Close, Cippenham, Slough.

Cheshunt (CDRC)—First Friday in each month, 8pm. Methodist Church Hall, opposite Theobalds Station. Hon sec Richard Cudwell, G3ZZQ, QTHR.

Chingford (Silverthorn RC)—Fridays, 7.30pm. Friday Hill House, Simmonds Lane, Chingford E4. Visitors very welcome. Hon sec C. J. Hoare, G4AJA, QTHR. Tel 01-529 2282.

Cray Valley (CVRS)—First and third Thursday in each month, 8pm. Eltham United Reformed Church Hall, 1 Court Road, SE9. Hon sec Peter Vella, G3WVP, QTHR.

Croydon (Surrey Radio Contact Club)—Third Tuesday in each month, 8pm. "The Ship", 47 High Street, Croydon. Further details from hon sec Sid Morley, G3FWR, QTHR. Tel 657 3258.

Crystal Palace (CP & DRC)—21 Sept ("Batteries" by Graham Cluer, G4AVV), 19 Oct (To be announced). 8pm. Emmanuel Church Hall, Barry Road, SE22. Hon sec Geoff Stone, G3FZL, QTHR. Tel 699 6940.

Dartford Heath (DF Club)—1 Sept (RSGB DF Qualifying Event, Dartford Heath), 6 Sept (Club night Broomhill Road, Dartford, 8pm), 22 Sept (RSGB DF National Final, Coventry and Rugby). October events to be announced. Hon sec Maureen Worby, G3XVC, QTHR.

Esher (Thames Valley ARTS)—First Wednesday in each month, 8pm. King George's Hall (next door to fire station), Esher, Surrey. PRO Rob Muir, G3ZHN, QTHR.

East London RSGB Group—Third Sunday in each month, 3pm. Wanstead House, The Green, Wanstead E11. (Buses 10, 20, 66, 101, 167. Underground Wanstead Station, Central Line). All transmitting amateurs and friends very welcome.

Edgware (E & DRS)—Second and fourth Thursdays in each month, 8pm. Watling Community Association, 145 Orange Hill Road, Edgware. Hon sec Alan Masson, G3PSP, QTHR. Tel 01-950 6827.

Farnborough (Bromley RC)—Third Monday in each month. Rear of Farnborough (Kent) Village Hall, (opposite "The Woodman" public house). Details from Derek Morgan, 59 Bassetts Way, Farnborough, Kent.

Gravesend RSGB Group—Mondays, 7.30pm. "Windmill Tavern", Shrubbery Road, Gravesend, Kent. Area representative P. F. Jobson, G3HLF, QTHR.

Guildford (G & DRS)—Second and fourth Fridays in each month, 8pm. Model Engineering HQ Stoke Park, Guildford, Surrey. Hon sec Dave Coltart, G3SYM, QTHR.

Harlow (DRS)—Tuesdays, 8pm. Mark Hall Barn, First Avenue, Harlow, Essex. Hon sec Vic Heard, 106 Vicarage Wood, Harlow, Essex.

Harrow (RSH)—Fridays, 8pm. Harrow Sea Scouts HQ, Woodlands Road, Harrow, Middlesex. Refreshments available during evening. Hon sec Les Light, G3KDL, QTHR.

Havering (H & DARC)—Second and fourth Wednesdays in each month (main meetings). Alternate Wednesdays are informal natter nights, 8pm. British Legion House, Western Road, Romford. Hon sec K. S. Hutchinson, G4ALN, QTHR.

Holloway (Grafton ARS)—Fridays, 7.30pm. Archway School Annexe, Whittington School, Highgate Hill, N19. Hon sec H. D. Ashcroft, G8AYU, QTHR.

Ilford RSGB Group—Thursdays, 8pm. Mortlake Road, (off Ilford Lane), Ilford, Essex. Hon sec Derek Sapsworth, G3YMW, QTHR.

Kingston (K & DARS)—11 Sept, 9 Oct (to be arranged), 8pm. Tolworth Scout HQ, Stirling Walk, Raeburn Avenue, Surbiton, Surrey. Acting hon sec Norman Smith, G3HFO, 7 The Byways, Surbiton.

London (UK FM Group)—10 Sept (Grand tombola evening), 8 Oct (to be announced), 8pm. Abbey Hotel, North Circular Road, (on NW side of NSR between Western Avenue and Abbey Dale Road). PRO Kris Partridge, G8AUU, Apartment 10, 74 Woodside, Wimbledon SW19. Tel 01-946 7843.

Loughton (L & DRS)—Second and fourth Fridays in each month, 8pm. Loughton Hall, near Debden Station. Hon sec P. J. Lawler, G4CMD, QTHR.

New Cross (Clifton ARS)—Every Friday, 8pm. New Cross Road, London SE14. Details from hon sec R. A. Hinton, 48 Camilla Road, Bermondsey SE16.

Northolt (British Airways, European Division ARS)—First Thursday in each month. Trident Club, Western Avenue, Northolt, Middlesex. This club is open to non-BA employees by invitation. Contact David Evans, G3OUF. Tel Amersham 21573 for details.

Purley (P & DRS)—First and third Fridays in each month, 8pm. Lansdowne Hall, Lansdowne Road, Purley, Surrey. Hon sec N. A. Marshall, 122 Goodenough Way, Old Coulsdon, Surrey. New committee elected at AGM; chairman Tim Puckey, G8DLB; treasurer R. Clavidge, G8GYM; ordinary members, M. Brown, A. Frost, E. Honeywood and M. Roach.

Reigate (RATS)—3 Sept, 1 Oct. (natter nights) new venue (to be announced later), 17 Sept ("RTTY" by G3VKQ), 15 Oct ("Aerials" by G6LX). 8pm. St Marks Church Hall, Alma Road, Reigate. Coach being organized to the Leicester Exhibition on 2 Nov, all welcome. Details from G3NKS. Hon sec F. H. Mundy, G3XSZ. Tel Reigate 43130.

St Albans (Veralum ARC)—18 Sept (Demonstration of latest amateur radio equipment by Lowe Electronics), 16 Oct (Talk on engineering and organization of vhf repeaters). 7.30 to 8pm. Market Hall, St Albans. Visitors very welcome. Hon sec Hugh Young, G3YHY, QTHR. Tel Watford 25633.

Southgate (SRC)—Second Thursday in each month, 8pm. The Green, Winchmore Hill, N21. Hon sec Brian Oughton, G4AEZ, QTHR.

South Kensington (Baden Powell House Scout ARG)—Third Tuesday in each month, 8pm. Baden Powell House, Queensgate, S. Kensington, SW7. Hon sec Alf Watts, G3FXC, QTHR.

Sutton & Cheam (SCRS)—17 Sept ("How power stations work"—Part 2 of the popular talk by Roy Scott, G2CZH), 15 Oct ("The use of repeaters" by G3CDK). 7.30pm. The Library, Cheam. Hon sec Alan Keech, G4BOX, QTHR.

Welwyn (Mid-Herts ARS)—12 Sept (sstv), 10 Oct (AGM). Second Thursday in each month, 8pm. Welwyn Civic Centre, Prospect Place, Old Welwyn, PRO Maurice A. Pyle, G2BCA, QTHR. Tel Welwyn 4685.

Wimbledon (W & DRS)—Second and last Fridays in each month, 8pm. St John Ambulance HQ, 124 Kingston Road, Wimbledon SW19. Hon sec F. W. Hill, G3WDO, QTHR.

Note. The Paddington Club has temporarily ceased activity.

REGION 9 — **RR H. W. Leonard, G4UZ**

Bath (B & DRG)—Mondays, 8.30pm. Church of the Ascension, Claude Avenue, Oldfield Park, Bath. Further information from John Noden, G8IOK, Flat 4, 30 Paragon, Bath BA1 5LY.

Bristol RSGB Group—7pm. Becket Hall, St Thomas Street, Bristol 1. *G3ULJ*. 30 Sept (Home constructed equipment), 14 Oct (Film night), 28 Oct (Potted lectures).

Bristol (BARC)—Tuesdays, 7.45pm. 24 Bright Street, Barton Hill, Bristol 5. *G4BZZ*.

Bristol (Shirehampton ARC)—Fridays, 7.30pm. Twyford House, Shirehampton. Prospective new members very welcome. *G4BOL*.

Bristol (University ARS)—Most Saturdays during term time, 2.30pm. Dept of Physics, Royal Fort, Tyndall Avenue, Bristol 8. Full details from G3WDG.

Cornish (CRAC)—Meetings normally at SWEB Clubroom, Pool, Camborne, but for Oct at Cornwall Tech College, 7.30pm. First Thursday in each month. 5 Sept ("Basic radar" by G4CUH), 3 Oct ("QRA Locator—what and how used" by G3XFL).

West Cornwall (CRAC)—Alternate Wednesdays, 7.30pm. The Guildhall, Penzance. Full details of Cornish and West Cornwall clubs from G3NKE, QTHR. Tel Camborne 2419.

Exeter (EARS)—Second Monday in each month, 7.45pm. ATC Hut, Colleton Hill, The Quay, Exeter. Full details from Jack Bawden, 232 Exwick Road, Exeter EX4 2BA.

Newquay (N & DARS)—Alternate Wednesdays, 7.30pm. 41 Crantock Street, Newquay. Full details from G3THT, QTHR.

Members of Torbay ARS who enjoyed a visit to the Longleat Mobile Rally

North Devon (NDRC)—Second and fourth Wednesdays, 7.30pm. "Crinnis", High Wall, Barnstaple EX31 2DP. RAE course at North Devon College, Barnstaple—enrolment 10-11 Sept 5.30 to 8pm. Course starts week beginning 16 Sept. *G4CG*.
Plymouth (PRC)—First and third Tuesdays, 7.30pm. Virginia House, Bretonside, Plymouth. Hon sec S. E. Croft, 2 Crozier Way, Mutley, Plymouth. Visitors always welcome.
Saltash (S & DARS)—First and third Fridays, 7.30pm. Burraton Toc H Hall, Saltash. *G3XWA*.
South Dorset (SDRS)—First Tuesday each month, 7.30pm. Lecture Hall, South Dorset Tech College, Newstead Road, Weymouth. *G3WAO*.
Taunton (T & DARS)—Fridays, 7.30pm. Jelalabad Barracks, The Mount, Taunton. Hon sec G. Swetman, "Little Copse", Monkton Heathfield, Taunton. Tel West Monkton 298.
Torbay (TARS)—Tuesdays, with special meeting on last Saturday in each month, 7.30pm. Rear of 94 Belgrave Road, Torquay. 28 Sept (Slide & Tape Lecture), 26 Oct ("Production of *Tars Talk*" by editor G3VTQ). RAE classes start on 1 Oct—enrolment night Tuesday 10 Sept. Visitors always welcome. *G3UIQ*.
West Dorset AR Group (Note new title)—New Chairman G5UF. First Friday in each month, 8pm. Dorset Assn of Youth Clubs, York Road, Dorchester. Hon sec Mrs Val March, 27 Great Western Road, Dorchester.
Weston-super-Mare (WsMRS)—Second Friday in each month, 7.30pm. Room Lewis M2, Worle School, New Bristol Road, Worle. *G3PQE*.
Yeovil (YARS)—Thursdays, 7.30pm. The Youth Centre, 31 The Park, Yeovil. *G3NOF*.

REGION 10 **RR D. M. Thomas, GW3RWX**
Details for inclusion should be sent to Deputy RR GW8HEZ QTHR

Barry (BCoFE ARS)—Thursdays, 8pm. Barry Rugby Club, Reservoir Road. Details from sec GW3VPB.
Blackwood (BARS)—Fridays, 7pm. Oakdale Community Centre, Blackwood. Details from sec GW3KYA.
Cardiff RSGB Group—Second Monday in the month, 7.30pm. 9 Sept (Social evening, cabaret "chicken in the basket" at the Roath Conservative Club, Cardiff. 25p entrance fee). 14 Oct (AGM and constructors contest at the BBC Social Club, Newport Road, Cardiff). Details from GW3GHC.
Glamorgan VHF/UHF Group—Third Tuesday in each month. NCB Social Club, Tonddu, Nr Bridgend. 17 Sept (AGM), 15 Oct (VHF/UHF questions and answers). Details from sec GW3ZTH.
Merthyr (HARC)—Mondays 7pm. Hoover Social Club, Pentrebach, Merthyr. Details from sec GW3RNC.
Monmouth (MARS)—Details of meetings from GW8GPX.
Pembroke RSGB Group—Last Friday in each month at Defensible Barracks, Pembroke Dock. Details from sec GW3AKO.
Pontypool RSGB Group—Tuesdays, 7pm. Educational Settlement, Park Hill Road, Pontypool. Details from sec GW3JBH.
Port Talbot (PTARC)—Second Thursday of each month. Rail and Transport Club, Station Road, Port Talbot. Details from sec G. Watson, 19 Kelvin Road, Clydach, Swansea.
Rhondda (RARS)—Every other Thursday, 7.30pm. Transport Employers Club, Porth. Details from sec GW3PHH.
Sully (S&DSWC)—Every Tuesday, 7pm. The Sully Bowls and Social Club, 59 South Road, Sully. Details from sec A. Dixon, 37 Bellevue Crescent, Cardiff.
Swansea (SARC)—7.30pm. 10 Sept (AGM). 24 Sept, 8, 22 Oct. The Commercial Inn, Killay, Swansea. Details from sec GW4BIQ.

REGION 12 **RR A. J. OLIPHANT, GM3SFH**
The RR has received no news from clubs for inclusion in this issue.
Scottish VHF Convention and Region 12 ORM. There will be a conducted tour for XYLs, commencing at 2.30pm,of the new Dundee Ninewells Hospital. See page 511 of the August issue for full details of this event.
Perth get-together. Over the past five years it has been the practice in central Scotland to have an annual nattering and elbow-bending session for all interested in amateur radio. A feature of this get-together is a FREE RAFFLE, an event unique in the history of the Scottish nation and an excellent chance to clean out the shack. This year the event was held in Perth on 28 May when about 60 people attended. The RSGB was represented by Sandy Smith, GM3AEL, and the Area Representative, Frank Hall, GM8BZX. During the course of the evening the opportunity was taken by GM3AEL to congratulate GM3OXX, GM3DXJ and GM8HEY, who along with members of Barry Radio Society set up a new British record for 3cm over a path of 243km.

Left to right: GM3AEL, GM8BZX, GM3OXX, GM3DXJ and GM8HEY seen at the Perth get-together

REGION 13 **RR V. W. Stewart, GM3OWU**
Berwick (BARS)—Last Sunday in each month, 3pm. Tweed View Hotel. Further details from G. Shankie, GM3WIG, 8 Ettrick Terrace, Hawick, Roxburghshire.
Dunfermline (DRS)—Second Wednesday in each month, 7pm, Queen Anne High School (TV studios). Further details from D. G. L. Anderson, GM8HEY, 10 Cairneyhill Road, Crossford.
Edinburgh (LRS)—Second and fourth Thursdays, 7.30pm. Adult Education Centre, Riddles Court, High Street. New sec Mr J. McVicar, GM8GEC, 3 Lochend Road, Worth, Musselburgh.
Glenrothes (G & DARC)—First Sunday in each month, 7.30pm. Old Nursery Buildings, Leslie, Fife. Special meeting for project groups every Wednesday. Further details from GM3YOR, QTHR.
St Andrews (UStAARS)—Details from R. Marchant, GM3ZCQ, Dept of Physics, North Haugh, St Andrews.

REGION 14 **RR M. A. Comrie, GM3YRK**
Ardeer (ARCARS)—Thursdays, 7.30pm. Ardeer Recreation Club, Stevenston, Ayrshire.
Ayrshire (ARG)—First meeting 25 August and thereafter every second Sunday. YMCA, Howard Street, Kilmarnock. Further details from hon sec R. D. Harkness, GM3THI, 55 Woodend Road, Alloway, Ayrshire.
Falkirk & D RSGB Group—Temperance Cafe, Lint Riggs, Falkirk. Further details from J. Ramsay, GM3OQI, 78 Wheatlands Avenue, Bonnybridge, Stirlingshire.
Greenock (G & DARC)—GM3ZRC Tuesdays and Fridays, 7.30pm. Watt Library, Union Street, Greenock. Enquiries to hon sec N. C. Henderson, GM3LYI, QTHR.
Glasgow (GURC)—George Service House, University Gardens, Glasgow. Details from hon sec, c/o Dept of Engineering.
Mid-Lanark RSGB Group—First meeting 30 August and thereafter every Friday, 7.30pm, with alternate meetings informal. Wrangholm Hall Community Centre, Motherwell. Details from GM3KMG, tel Hamilton 28759. RAE classes 7pm every Wednesday from 11 Sept. Details from GM8DRQ, tel Hamilton 26446.
West of Scotland (ARS)—Wednesdays and Fridays. 81 Virginia Street, Glasgow. Chairman Tommy Hughes, GM3EDZ. Enquiries to Mike Parks, GM8HBU, QTHR.

REGION 15 **Deputy RR H. J. Campbell, GI8FOK**
Bangor (B & DARS)—First Friday in each month, 8pm. Redcliff Hotel, Seacliff Road, Bangor. 6 Sept (AGM). Hon sec N. S. Newell, GI3YMY, QTHR.
Belfast RSGB Group—Third Wednesday in each month, 8pm, 90 Belmont Road, Belfast. New members and visitors made most welcome. 18 Sept (AGM). Further information from H. J. Campbell, GI8FOK, QTHR.
Belfast (CoB YMCARC)—Saturday afternoons, 2.30pm. New QTH Brunswick House, 7 Brunswick Street, Belfast. Hon sec GI8EWM, QTHR.
Belfast (QUoBRC)—Tuesdays 8pm. 37 Fitzwilliam Street, Belfast. Everyone welcome.
Mid-Ulster RSGB Group—First Sunday in each month, 3pm. GI4BAC, QTHR. All welcome. Hon sec R. F. S. Sinton, GI3ONF, QTHR.

REGIONAL EVENT

North Ulster Amateur Radio Rally
Castle Grounds, Antrim (Randalstown Road entrance).
From noon, Sunday 22 September.
Under cover if wet. Usual attractions, and demonstrations for XYLs and junior ops.
Talk-in on 2 and 4m, GI3FFF and GI8AYZ.

North-Ulster RSGB Group—Newly formed. Next meeting 8pm 30 Sept. Brown Trout Inn, Aghadowey, Co Derry.

REGION 16 **RR E. T. Jacobs, BRS32513**

Chelmsford (CARS)—First Tuesday in each month, 7.30pm, Marconi College, Arbour Lane, Chelmsford. Details from W. L. Pechey, "Berkeley", Tye Green, Good Easter, Chelmsford.
Colchester (CRA)—Most Wednesdays, 7.30pm. Stanway School, Stanway, Colchester. Details from E. T. Jacobs, 26 Pondfield Road, Colchester.
Colchester (UoEARS)—Details from hon sec J. Masterton, G8FUL, Eddington 6.
Great Yarmouth (GYRS)—Last Thursday in each month. 67 Southdown Road, Great Yarmouth. Details from hon sec A. D. Besford, G3NHU.
Ipswich (IRC)—Handford House, Ranelagh Road, Ipswich. Details from hon sec P. Hubert, G3YWM.
Lowestoft (L & DARC)—Twice weekly, 7.30pm. YMCA, Park Road, Lowestoft. Details from hon sec R. P. Finch, G4AJO.
Martlesham (MRS)—Details from G. Murchie, G8AXU, Post Office Research Centre, Martlesham.
Norwich (Norfolk ARS)—7.45pm. Crome Community Centre, Telegraph Lane East, Norwich, Norfolk NOR 36T. Details from J. M. Draper, G8BLD, Framingham Earl 2271.
Norwich (UoEAR & EC)—Meeting room 029 UEA Village. Details from hon sec P. Gowen, G3IOR.
Stowmarket (S & DARS)—Details from hon sec K. J. Bertrard, 35 Curwen Road, Stowmarket.
Vange (VARS)—Every Thursday, 8pm. Youth hall, Barstable Community Centre, South Riding, Basildon. Details from Mrs D. Thompson, 10 Feering Row, Basildon.

REGION 17 **RR L. Hawkyard, G5HD**

Basingstoke (BARC)—First and third Saturdays in each month. Chineham House, Popley, Basingstoke. 7-8 Sept (VHF NFD, Farleigh Hill), 14 Sept (AGM—extra meeting), 21-22 Sept (Operating GB3BS at Basingstoke Show, Stratton Park), 5 Oct (Surplus equipment sale), 19 Oct (Constructors Competition). Sec R. H. Oakley, G8FKT.
Bournemouth (Wessex ARG)—First Friday in each month and the Monday 17 days later, 8pm. Cricketer's Arms, Windham Road, G8BBN.
Bracknell (BARC)—Mondays, 7.30pm. Cooper's Hill Community Centre. *G3YMC.*
Fareham (F & DARC)—Wednesdays, 7.30pm. Porchester Community Centre, Room 9, Details G8FFI, QTHR.
Farnborough (F & DRS)—Second and fourth Wednesdays in each month, 7.30pm. 8th Air Scout's Hut, Rectory Road, Farnborough. Sec G8ECO, or PRO G8ATK, both QTHR.
Harwell (AERERC)—Third Tuesday in each month, 7.30pm, also informal meetings every Friday lunchtime. Social Club. AERE, Harwell. **G3NNG.**
Maidenhead (M & DARC)—5 Sept (Any Questions?), 8-9 Sept (VHF NFD), 17 Sept (Visit to Soil Mechanics Lab), 3 Oct ("SSTV" by G3VXZ), 15 Oct ("Interference—Prevention or Cure?" by G3VUQ & G3OHX).
Portsmouth (P & DRC)—Wednesdays, 7.30pm. Portsmouth Community Centre, Malins Road, Buckland, Portsmouth. *G3CNO, QTHR.*
Reading (RARC)—Alternate Tuesdays, 8pm, "White Horse", Emmer Green. G4BLT.
Southampton RSGB Group—21 Sept (ORM at the College of Art, 2pm to 8pm. Six lectures, trade stands etc), 14 Sept and 12 Oct (Group meetings 7.30pm, Lanchester Building, Southampton University). *G4AEU.*
Southampton (SUARC)—Tuesday evenings, also informal meetings every lunchtime during term in the clubroom, Old Union Building, Hon sec I. Mercer, G3ZER.
Swindon (SDARC)—Wednesdays, 7.30pm. Penhill Junior School, Swindon. *G3YKC, QTHR.*

RAYNET

by S. W. LAW, G3PAZ*

The Woburn Rally this year was by no means a washout, despite the determined efforts of the non-stop rain. At the Raynet stand the usual voluntary staff benefitted from the crush of visitors, which taxed the capacity of even the two enormous marquees. The Raynet visitors book was well filled and the usual Raynet raffle was as popular as ever. First prize, a Pye Vanguard AM25B, was taken by a long-distance entrant Mr Albon of Bristol with ticket No 745. Third was a dual 12V stabilized power supply on ticket No 787 by Denis Vincent, G3OKY. Up to the time of closing, the second prize of a BCC fm portable on ticket No 676 remained unclaimed. It is unfortunate that the holder left no name or address on the check list provided for the convenience of early leavers; we therefore ask the holder of No 676 to please let G3BPT (QTHR) or the RSGB have the ticket and claim with name and address as soon as possible so that delivery can be arranged.

We are pleased to note that Raynet is being featured in a number of exhibitions held around the country during this 21st year of Raynet. The committee will naturally always be prepared to loan whatever material is available for show purposes, but we would remind any controllers of local groups that information, press cuttings and photos together with offers of assistance at such functions would be greatly appreciated by the organizers and would help enormously to enhance our image with the user services and the public.

Also pleasing is the proliferation of groups running social functions to celebrate the 21st year of Raynet operation. As we have mentioned previously, the Raynet committee is in the process of arranging a London function with the object of paying tribute to the pioneers of Raynet, some of whom are unfortunately no longer with us. Since it is obviously impracticable to make this a country-wide affair, it is all the more heartening to see the efforts being made by individual groups to mark our "majority".

The North-west

May we draw the attention of members in the North-west to the amateur radio convention to be held at Lancaster University over the weekend of 14-15 September where a Raynet stand will be a part of the very comprehensive programme.

Raynet Committee

The meeting held on 27 July was well attended, in view of the holiday period, and had much to discuss. Thanks are extended to the many groups whose newsletters are perused with interest and whose points are noted. Copies of these are circulated among committee members for comment at leisure. Pressure of space renders detailed mention impractical, but controllers may rest assured that the group effort does not go un-noted. Anent which, the committee after some discussion has decided to award the Raynet Trophy to the Cumbria group in view of the persistent and unfailing effort made to maintain and build up this area under the difficulties encountered in administration.

The committee would like it to be known that they are keeping certain developments well under observation and have every intention of carefully observing official ruling, especially in view of the knowledge that the radio branch of the Home Office is not unaware of some current activities.

Members are reminded that there is no fee for registration, but it is an individual responsibility to ensure that cards are kept up to date. New registrations since May number 41 together with 145 re-registrations.

Hon Registrations Secretary; Mrs L. A. Crane, "Greta Woods", Bromley Road, Ardleigh, Colchester, Essex.

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* 130 Alexandra Road, Croydon, Surrey CR0 6EW

MEMBERS' ADS

These subsidized flat-rate advertisements are accepted as a service to members of RSGB. They must be submitted on the Members' Ads order form printed in 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, and a remittance by postal order or cheque for 40p (stamps not accepted). They will not be acknowledged. Those not clearly worded or punctuated will be returned. No correspondence concerning this service can be entered into.

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.

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. Advertisements may be edited or abbreviated as necessary.

Members are advised to enclose a stamped addressed envelope when replying to advertisements.

Post to: MEMBERS' ADS. "RADIO COMMUNICATION", 35 DOUGHTY STREET, LONDON WC1N 2AE

FOR SALE

Comp QRO 2m station Eddystone 940 Burns FS2 Storno base unit vxo 6-40 pa comp mic xtals, £150. Telford TC-7 Sentinel band-searcher, £48. Liner-2 Burns preamp mains unit, £125. Hp available. QRO power supplies, ex-govt, inc 630V at 575mA. 6·3V at 4A and 6A. 7·5mH choke plus valve holders, fuses, capacitors, diodes, ww pots, rack mounting, good cond, few only at £10 ea. G3ST QTHR. Tel 01-674 6947.

H-brew linear, self-cont with power, 813 output, £40. Pye AM10D Cambridge wkg on 2 rx tunable, good clean cond, £26. Pye base, "tx" only wkg on 2, £14. G3YSY QTHR. Tel Chesterfield 75944.

HRO with spare valves, £10 ono. Transformer 1kV 0·3A, £5 ono. Five Nixies ZM1020 with bases, £5 ono. G4BNQ QTHR. Tel Leeds 665831.

Liner 2 + ac psu + pre-amp, £125. Garex 2m tx/rx, £85. $\frac{5}{8}\lambda$ whip, £5. Lpf 75Ω 144MHz, £3. G8ESK QTHR. Tel Bradford 45611.

Heathkit SB-line, £180 ono. SB301 cw filter SB401 with pair 6146Bs, buyer collects. Tel Gravesend 4694.

Four-bed detached house only 18 months old in south Beds village, one hour London, superb vhf/uhf site with planning permission for Versatower, around £21,000 being asked. Full details from G3VZV QTHR. Tel Toddington (05255) 2470.

KW2000A, comp, mint cond £160. Honda E300, new, £95. B&W 5100B a.m./cw tx perfect, £25. G-Whip mobile aerial, £10. Master Mobile, £15. Hallicrafters SX101A and matching spkr with auto trans, £65. G6XY QTHR. Tel 52679.

Potted regulator for 6-24V, 0-2A current limit, set by external resistors, £2. Weston standard cell 1·01860V, £2. 4-gang 10kΩ potentiometer, £1. 100rpm 7LBIN 24V dc motor, £3. All new, data, post free. M. Mann, 45 Old School Lane, Milton, Cambridge.

Trio 9R-59DS communications rx gen coverage 10-160m voltage stabilizer, xtal calibrator, good cond, £40. Trap vertical antenna Hustler 4BTV 10-80m good cond, £15. H. Houghton, 12 Upper Park Street, Worcester. Tel Worcs 27495.

Collectors item Spy tx/rx comp with all accessories exc wkg order, covers 80 and 40, handbook. Offers. A. E. Glass, 152 Churchway, Plymouth, Devon PL5 1AJ.

Codar CR70A Mk2 communication rx 560kHz to 30MHz, 6 months old, £16. PR40 preselector, £5. Buyer collects. D.Guile, 29 Lymington Close, London SW16 4QL.

DX60B immaculate, VFIU, fb cw, £30. Marconi Electra rx 250-520kHz, 1·5-25MHz, mech amateur bandspread, 10m converter, psu, handbook, £25. Elbug, ICs, internal paddle, mains, diecast box, £10 ono. Buyer must collect. 01-648 5895.

Teleprinter 7B 24V wkg order, £10. Valves TY2-125 ex equipment, tested ok at 300W, £4 each. New QY4-400 and base, £15. G8DNK QTHR. Tel 097330 3580.

Partly-built a.m./cw tx GPO rack type probably suit club, including mains, bias, audio amp, co/pa, atu, units. Components alone worth price, £15. Buyer collects. G4AGR QTHR. Tel 0279 724041.

KW Vespa Mk2 with mains psu, £60. Hammarlund HQ170, £50. Both may require a little attention. David Kennedy, 66 The Oval, Dunscroft, Nr Doncaster.

Hy-Gain TH3 Mk3 triband beam, good wkg order, dismantled, buyer collects, £39. Mike Rowlands, 13 Watery Lane, London SW20. Tel 01-735 8111, Ext 407, (business hours).

72MHz vfo large output, drives Microwave Modules tx, nbfm facility, ten-turn pot tuning, £10. G8FCH QTHR. Tel Broadway 2344.

KW1000 linear in exc little used cond, one year old, in original packing, £110 ono. Shure 520SL desk mic fitted with new 444 insert, £10. G4BUY QTHR. Tel Nottingham 260715.

Heathkit HW-100, HP23, AC psu, exc cond. Recently brought up to specification by manufacturer, £135 ono. G30IX QTHR. Tel Cleckheaton (09762) 6499, home, 09762 5302, work.

Mobile antenna, Mosley TM5, 10-80m, £12 ono. Automatic antenna switch Johnson 250-39, 10-80m 4000W, £15 ono. Mullard colour tv tube type A56/120 × 22in unused in original pckg, £50 ono. HZP beam balun £3. G3IFB QTHR. Tel Churchdown 713792.

KW Viceroy Mk3 tx, extra filter, handbook immac cond, £55. EMI Mk6 tv camera vgc, handbook, £35. Choice of two BC221s built-in stab, PSUs and charts, £15 ea. G4CCI QTHR. Tel Trowbridge 5953.

FT501 digital readout tx/rx exc cond comp with FP501 power supply/spkr, £325. Liner 2 low band comp with ac power supply, £135. Prefer buyer collects. G3DPR QTHR. Tel Hawkhurst (Kent) 2063.

Heath HW-32A single bander, £50. HP-13B dc pu, £25. TW 2m Communicator, £35. G3LVO QTHR. Tel, day Hatfield 62906, evening Cuffley 3083.

KW2000 + ac/dc PSUs, £95 ono. 2m transverter QQV06-40 pa, internal PSUs 28MHz input, £35. Unused original packing RC601 lowband fm 25W output less xtals, £30. *Wanted:* modulation meter TF2303 or similar. G3NPZ QTHR. Tel Titchfield 43894.

Heathkit RA1 rx 160m-10m, recent professional overhaul, £20, or exchange for RG1 or similar or vtvm. G3RFT QTHR. Leyland 21904.

CDE AR22R rotator inc 60ft four-core cable, £22. G8BCA QTHR. Tel Mildenhall (Suffolk) 714051.

Trio JR310, top band, cal, filter, mint, £65 ono. Sentinel mosfet conv, 144MHz 28-30MHz, £10. H. Butler, 34 Cannonside, Fetcham, Surrey. Tel Leatherhead 73906.

Property of late G2BAT. FTDX401 tx/rx in mint cond with mic, £200. Variac 8A on 19in panel with voltmeter, £7.50. Ex-RAF telescopic mast 28ft solid brass, £10. Buyers collect only. G6XM QTHR. Tel Highworth 762540.

Yaesu FRDX400 rx 160-2m mint cond in orig carton, £160 ono. Trio JR500SE 10-80m spkr exc cond little used, £45. Eddystone 840C gen cov rx good cond, £45. C. K. Allerstage, Roundhead Cottage, 5 Milkingpen Lane, Old Basing, Basingstoke, Hants RO2 4ODD. Tel Basingstoke 65165.

"RSGB Bulletins" vols 48/47/46 comp, £1 + 20p post ea. 24 mixed *Bulletins,* 50p + 25p post. Two VT104 valves, £1.50p ea include post. 200 ex valves, £3 + 30p post. Philip Allott, 8 Park Place, Knaresborough.

Xtals 11,666 13,333 12,0208 12,0375 12,0458 12,060 12,120 12,1742 16,0345 16,050 16,070 16,090, all £1.50 ea. Lots of others 9 to 17MHz. Top band base/mobile tx/rx, £15. ono. G3DXI QTHR.

EMI Mk6 cctv camera control unit (625-line spg), £10, buyer collects. *Wanted:* circuit diagram Pye picture monitor Type 842822/02. G8AWN QTHR. Tel Blubberhouses 633.

KW107 Supermatch as new, £40. G3AAE QTHR. Tel 01-508 3669.

Standard SRC826M 12-channel fm tx/rx 5 xtals inc repeater, S20, S21, S22, 4 months old, cost £147 new, £100. M. J. White, 25 New Pastures, Newport, Mon. Tel Newport 54126 evenings.

G3KFT QTH unspoilt Cotswold village convenient Cheltenham Gloucester. 4-bedroomed modernized house with or without 1½ acres and barn with planning. Offers. G3KFT QTHR. Tel Coberley 204.

Trio JR500S amateur bands rx inc top band, spkr, 100kHz xtal cal exc cond, gone tx/rx £35 ono. G3YYG QTHR. Tel 57547 after 6pm.

TA33JRE 28m UR67 coaxial in use one month from new, £25. Buyer collects. G3JAF QTHR. Tel Lymington 3232.

500W mains isolating transformer, £8. Number of mains transformers and smoothing chokes, list free for sae. G3LBT QTHR. Tel 0268 412177.

Mains transformer, secondary tapped 2,520 and 2,820V, 700mA, weight 70lb, £15. Two 2μF 5kV paper capacitors, £3.50. Two 2H 500mA chokes £1.50. *Wanted:* 50-100W a.m. tx covering 40m band, must be wkg. G8HVZ QTHR.

Racal equipment MA197B pre-selection unit. RA218 ssb adaptor. RA70A freq converter. Each comp with handbook. One CRM1 tuning indicator in new cond. CV89 teleprinter TU. J. Morris, 3 Astley Rd, Bradshaw, Nr Bolton, Lancs. Tel Bolton 52384.

Murphy Rover 15W a.m. 2m, tx/rx comp with xtals for 2m, £15. G8EUH QTHR. Tel Elland 3062.

Clearing shack. KW Vespa Mk2. B40. Solartron double-beam scope. AF sig generator. Pen recorder. Stab PSUs. RTTY components and spares. Computer boards. Fans and other components. Offers please, sae for list. G3VWL QTHR. Tel 0903-33897.

Telford TC9 Mk2 a.m./fm tx, TC7 Mk2 Tunable i.f., bandsearcher, G4BBP converter. Comp 2m station, six-months old, as new cond. Going mobile, £125 ono. Will deliver up to 50 miles. M. Connah, 27 Lismore Rd, Highworth, Wilts. Tel 762995.

FR400SDX, £160. 2m rf/amp, £5. Collins TCS, £15. HB tx 160 + 80, £15. 2m Pye base station, £15. Comp Burns fm generator, £15. 4m fm base station £8. Will consider exchanging for tx/rx. G4CWX, 13 Haling Grove, St Augustine's Ave, South Croydon, Surrey. Tel 01-688 8045.

Heath: decade resistance box DR-IU, £5; multimeter MM-IU, £6; RC bridge C-3U, £8; solid-state voltmeter IM-17, £8; Intercom, master X1-IU and two substations X1R-IU, £12; good cond untested believed wkg. G3UUO QTHR. Tel Cirencester 3389.

"Radio Communication" from 1968 to 1973 (comp vols), *RSGB Bulletin* from 1965 to 1967 (comp vols), £1.50 per vol, post paid. B. G. Bate, 3 St Omer Rd, Acklington, Morpeth, Northumberland.

Xtals, 145MHz rx, 51·9MHz ie (51·9 × 3) — 10·7 = 145MHz, suit Cambridge Westminster etc, 60p incl pp. Also other similar freqs, eg 51-8833 (144·95 rx), 35p incl pp. Sae for list. B. Hodgson, 234 Gillingham Road, Gillingham, Kent, ME7 4QT.

Calculator, 4-function plus constant. C500 chip requires 9V power supply (or PP3 battery), £15 ono. G8EDG QTHR. Tel W'ton 763617.

Lafayette HA600A vgc, £35. Pye pocketphones with xtals for 70cm with handbook, £22 ono. Stolle rotator 6-over-6 20ft aluminium mast, offers. Pye Cambridge 6-channel a.m./fm with xtals for repeaters £34 ono. *Wanted:* Trio TR2200. J. M. Samuels, 83 High St, Chard, Somerset. Tel Chard 2834.

KW E-Zee Match (new), Yaesu spkr (new), R216 rx with birdcage aerial. Microwave Modules 2 and 4m converters neatly housed in Racal 217 cabinet with 1W amplifier and spkr. 2m and 4m aerials. £140 comp. Ewert, 35 Chislehurst Rd, Bromley, Kent. Tel 01-467 2156.

Radio rx R-361GR 3 RFs 6J4s continuously tunable 225MHz-400MHz xtal controlled oscillator double-conversion, squelch, 21 min valves. 115/230 ac circuit, £25 carriage paid. *Manuals wanted* APR-4 APR-4Y, APR-9, APR-13, APR-14, APR-17, APR-25. M. Wright, 251 Sandy Lane, Hindley, Wigan. Tel 0942-55948.

Trio JR599 custom special rx ssb fm cw a.m. 1·8 to 29·7MHz plus 144MHz converter, mint cond, buyer collects, £120. R. Bennett, 8 Hazelcroft Gdns, Alderley-Edge, Cheshire.

Vespa Mk2 no psu, £60 ono. *Wanted* Creed 7B hf filter Ez-Match, why? G3NXQ QTHR. Tel (0905) 20643.

Exchange Yaesu FR50B built-in cal 3-months old with handbook and original packing for Trio JR500 or JR310 with handbook age immaterial but must be in gd. Genuine reason for exchange. K. Hardman, 74 Strande Pk, Cookham, Berks. Tel Bourne End 26377.

8-core cable 5mm od ex-GPO 10p per metre + 10p p&p. Porter, 1 Belswains Cottages, Belswains Lane, Hemel Hempstead, Herts. Tel HH 50953.

KW2000E gift at £195. KW2000A ac/dc PSUs, £155. Heathkit SB200 linear vgc. £95. HW17A 2m tx/rx, £30. HP terms could be arranged. G3ORK QTHR. Tel Hesketh Bank 2482.

"Wireless World" vol 1, nos 8, 9, 10, 11 1913/14 best offer good cond, several vols *RSGB Bulletin, SWM,* state requirements. Grundig 600 bfo professionally added all freq medium to 30MHz, £16 perfect. G5CP QTHR. Tel 024689 253.

KW E-Zee Match, £15 or nearest offer. G4BXR QTHR. Stony Stratford 3423.

Eddystone 940 in mint cond, comp with handbook, plinth spkr, atu, Codar pre-selector, Sentinel 2m converter, £130 ono. Would deliver reasonable distance. Mrs. G. M. Apperly, 35 Denise Drive, Harborne, B'ham 17. Tel 021-427 7104, after 6pm.

Health reasons force sale of Yaesu equipment just seven weeks old FRDX400, FLDX400, spkr, YD844 mic, EK9X keyer, ME-11-B swr meter, also KW E-zee Match all virtually unused, also books etc. GW3CBA QTHR. Tel Barry 77793.

5FP7 crt three 88μH torroids and limiter panel for BATC sstv monitor, £2.50. Sync cassette by Spacemark, £1. G4HU, 34 Birch Avenue, Romiley, Ches SK6 4DG.

DL6SW 2m conv. works well, with spare board and parts, £7. General Radio 606-B sig generator, superb, £8. J-Beam 8-el 2m Yagi, £3, Tradiper TE-15 gdo, needs attention, £3. G3UML QTHR. Tel 01-550 0882.

KW Atlanta with remote vfo, £160. G3ULX QTHR. Tel Minehead 3454.

CR70A, PR30, Joymatch, spkr all in cabinet, Joystick, £35 ono. AM10F transistor base rx modified 2m, £29. Both immaculate, perf wkg order. Components, unused, pots, ww resistors, switches etc. Valves circa 1935. D. S. Marshall, "Shelwyn", Nut Orchard, Twyning, Tewkesbury, Glos GL20 GDR. Tel Tewkesbury 294082.

Siemens shortwave rx 745-E-309, full coverage 1·5—30MHz, long scale length, ie 8in for 10m. Also Siemens-Hell printer "F", manuals for both, £50 ono. Microwave Modules 2m tx, as new, no mods, £24 or why? Also 4 extra 72MHz HC-25U xtals. A. R. Morris, 25 Felstead Way, Luton, Beds. Tel Luton 414179.

EA12 rx, vgc, £120. G4DGM, 106 Goldthorn Hill, Wolverhampton.

Transistorized ssb exciter 50W, based on G3JJG design—built to professional standard both in performance and appearance, £40. Matching 400W linear, £10. Buyer inspects and collects. G3PTN QTHR. Tel Leeds 654644 evenings.

Heathkit SB101 tx/rx with cw filter, SB600 spkr and homebuilt psu. Exc cond, £150. Also SB200 linear, £90. G3AMO QTHR. Tel Totton 3820.

Hammarlund HQ145X communications rx, handbook, spkr, xtal marker (in-built), extras, £45. Transformer 4kVA 220/240, 60/120/180/240, £35. All first class. J. S. Manners, 783 London Rd, Thornton Heath, Surrey. Tel 01-684 9944.

Starr SR700A ssb rx 3·5-28MHz matching spkr, mint cond, £100 ono. *Wanted:* circuit tx T4188. G3MCL QTHR. Tel Winchester 881060.

Moving to house with figleaf garden. KW202, KW204, Heathkit IB1100 counter, £250 the lot, with many other items thrown in. G3OBW QTHR.

Telequipment scope type S51B good cond + manual, £37.50. G3YBU QTHR. Tel 0482 408677.

'S'-meter, new, £1.25. 150mV meter, new, £1.50. 500μA meter, 50p. Turner 500Ω meter fsd 1mA, 50p. Volts mA meter, 50p. SWR meter 100μA, £2. Four Mullard BY122s for psu, £2. H. H. Seymour, 74 Harold Estate, Pages Walk, London SE1 4HW.

Quad 2-el 14MHz monoband. Comp with boom cast aluminium spiders, weather-proofed bamboos, element wire and omega-match, £18. Carriage at cost. SAE photo and swr curve. G3PVA QTHR.

Pye Cambridge low band dash mounted, single channel untested, good cond. 1 @ £20 and 1 @ £18. G3YDY QTHR. Tel Chelmsford (0245) 68831.

HRO with psu, handbook, seven coils (B/S 40/20/160), B7G valves, filter wkg, xtal bfo, calibrator, offers. G3MDQ, 5 The Grove, Little Aston, Birmingham. Tel 021-353 3608.

FT-101 with 160m/fan options, cables, mic, 14AVQ with all radials, 30ft coaxial, £250 comp, all exc cond, sale due to return home. G5BHZ. Tel 01-622 5417.

SB-303/401/200, £330. LG300, £20. Psu, modulator, £7.50 each. TU5B/AS vfo, £4. Pair 813s, £3. MP-33, guyed mast, rotating head, motor, desyn indicator, dc supply, £35. Prefer collected. G4JZ QTHR. Tel 045-282 2205.

AM10D Cambridge 6-channel less rx rf board tx on 2m, needs attention, £14. Creed psu 80-0-80V 6V type 5060, as new, £4. RQ10X as new Q multiplier filter, £5. *Wanted:* LC10FM Cambridge. G8HIO QTHR. Tel Guildford 66704.

HW17/A, 2 xtals ar 145MHz with 6-el Yagi in exc cond, £37.50. *Wanted:* Minibeam or 2-el 3-band Mosley. G2BYM QTHR. Tel RDG 64649.

KW Vanguard 160/10m, clean, hand calibrated 160, £25. See and collect Swansea area. Ernest Turner 10kV electrostatic voltmeter, £10 or offer. GW2FBG QTHR. Tel Swansea 25352.

Pye transistor Ranger converted to 2m, 12V, £12.50. Pye base station tx QQVO6/40 a.m. on 2m less cabinet, £20 ono. G3KWK QTHR. Tel Redditch 63817.

AR22 rotator plus control unit suitable vhf arrays, £20. TA33 Snr 3-el beam, £25. *Wanted:* remote vfo for FT560 tx/rx and air band rx, La Fayette HA-55 or similar. G3TF1 QTHR. P. G. Stephens, 6 Norse Way, Chepstow. Tel Chepstow 2475.

Mic AKGD703 with switch, brand new, £5 + pp. Magslip transmitter, £1 + pp. Fan centrifugal 6in dia approx 115/230V, £2 + pp. Peak programme meter 2½ by 2½in, 1mA 450Ω good quality new, £2.50 + pp. Relay two pole c/o 24V dc suitable hf ae changeover, £1 + pp. G8ADX QTHR.

Burns phase modulator, £4. Garex 2m tx rf section 20W output, £5. 72·350MHz xtal HC/25U, £2. 50W audio amplifier/modulator, offers. G3YAV QTHR. Tel Brighton 735694.

Trio JR500SE rx with manual in exc cond, £45. KW Viceroy Mk4 vgc, £70. Pye AM10D Cambridge modified for 2m with crystals for 145·0MHz, £25. J. M. Livesley, 4 Pensby Avenue, Upton Park, Chester. Tel Chester 42534.

Aerialite 88XU super quality 3-el (folded dipole) channel 2 (NHT), £6. 12 duralumin pickets 24in by 1¼in heavy duty (1¼lb). 2 by 110yd BICC triple twisted bell wire 22swg flameproof covering. All items new; offers. L. C. H. Glenister, 37 Ashcombe Gardens, Weston-super-Mare. Tel 28717.

Electronic calculator by Hanimex type BC806 8-digit with constant preset or floating decimal point complete with rechargeable batt pack and charger, mint cond, £17 ono. G4CGV QTHR. Tel Littlehampton 6161, ex 55, daytime.

Heathkit HW17A modified for improved modulation, comp with mic, xtal and handbook, good cond. Also homebrew dc psu for mobile use, £60 the pair or nearest offer. G8GOC QTHR. Tel 021-523 8867.

Drake TR4 + ac psu, £280. FT101 + 160m, £200. Both mint. One owner. Buyer collect. Any test. G3YYI QTHR.

Hudson FM208 comp and wkg with xtals for 70·48MHz, £15 ono. Also FM208 lo-band less xtals, needs attn, £7 ono. G3ZRM QTHR. Tel Aldershot 26108.

Boommike, model C, ceramic unit with lapel control switch, new and unused, £6. G3VIE QTHR. Tel Wokingham 784048.

Eddystone 840C rx little used, recently overhauled, with manual, £36. Codar PR30 preselector, £6. Heathkit QPMI Q-multiplier, £4. All ono. PCR3 rx, offers. Buyer collects. Please write to Mrs B. Harwood, 21 Turpins Chase, Welwyn, Herts.

9MHz ssb filter offered in part exchange wider filter, eg XF9C. KW Viceroy 2 and psu, £40. No reply before 12 October. G3YET QTHR.

Tx/rx, 160/80m, ac/dc PSUs, £10. TF144F, £10. Cabinet 16in × 12in × 8in contains xtal tx (31MHz) + psu, £5. G3XVH QTHR.

Mobile psu for HW12, £10. Marconi TF517F/1 vhf sig gen, £5. Tx 80-10m a.m., tx 2m a.m. both with psu and modulators, £5 each. 1,400V psu and other MV psu, £5 each. G3MNV QTHR. Tel 021-353 3012.

40ft steel lattice tower BICC 4 sections, usual reason for sale, £40 ono, carriage extra. Burke, 15 Daltry Rd, Stevenage, Herts. Tel Stevenage 4251.

46-el 75Ω 70cm ae, £9, buyer collects. High-band dash Cambridge wkg unmodified, £30. Transistor Ranger tx on 2m less xtal, £10. New 2m Lines Mark equipment, £3.75. Carr extra. SAE enquiries. G8FUI QTHR.

Homebuilt 150W tx in rack 10 15 20 a.m. fm, autokeyer aerial tuner AR88LF £40. G2FPW QTHR. Phone 01-892 3089.

GEC BRT402E general coverage 150kc-30MHz fb cond and performance with makers original full manual, £55 cash. A. E. Townshend, 48 Cabrera Ave, Virginia Water, Surrey. Tel Wentworth 3472.

Hallicrafter S27 (28-143MHz), £16. Narda Microline 3cm 1W klystron and power supply, £35. 3cm slotted waveguide, probe, carriage and detector, £10. Marconi TF890 3cm signal generator/analyser, £20. Ferguson 4-track mono recorder, £20. 5W transistor tx/rx, £10. G30AD QTHR.

Eddystone 898 drive, as new plus rx case, £5. 70cm tx/rx U450L with all valves less crystals, £20. Buyer to collect. *Wanted*: KVG XF9A crystal filter. G8BIS QTHR. Tel Dartford 29799.

HRO rx, £15. CR100, £8. 400W, 12V petrol generator, £10. Nikkorex zoom 8 cine camera, £30. Buyers collect. Pawley, 52 Sumatra Road, West Hampstead, London NW6. Tel 01-794 9934.

Telford TC5 tx, £30. TC6 vfo, £20. LaFayette KT320 rx, £20. Microwave Modules 144MHz converter 2-4MHz i.f., £10, or complete 2m station for £70. Buyer collect or arrange delivery. G8FDL QTHR. Tel 0942 812955 after 8pm.

UHF transistors BF378 FT, 2·3GHz, NF 2·5dB at 500MHz for 70cm or 23cm, £1·25. 2N3866, 50p, all new. G. Elliott, Oatlands, Southend Road, Howe Green, Chelmsford, Essex. Tel. Chelmsford 71604.

Heathkit HW100 in vgc, £95. G3RUX QTHR.

Racal 1·4MHz ssb filter, £8. Xtals glass B7G Brookes 10MHz 0·005%, £2. Brookes 100kHz 0·01%, £2·50. AR88D manual, £1·25. Valves comp with bases: 6HF5, £1·75; 5B254/M, £1·50; 829B, £1·25. G3JMJ QTHR. Tel 073-271 3467.

Cossor 1035 double beam scope with trolley and manual, £10. Audio sig gen lab calibrated, £5. 3-speed tape deck. Pair 813s with bases and transformer. Various valves and variable capacitors. Offers. G3TQE QTHR. Tel 021 783 6822.

Sentinel 2m converter. i.f. 277-297MHz for use with amateur bands rx, as new, £12 ono including carriage. G4CLA, 80 Sunnyside Road, Droylesden, Manchester M35 7WE. Tel 061 370 3160.

Aerial poles dural 1¼in dia ⅛in wall, various lengths from 12ft 9in to 13ft 10in; state your needs; price 20p per foot; apply Secretary, Radio Society Harrow. G3KDL QTHR. Tel 01-902 2570.

Eddystone EC10 Mk1 All band transistorized communication rx, £35. Tel Droitwitch 4806 after 6pm.

Comp station, first-class condition, KW2000B, Shure 202 mic, E-Zee match, K103 swr power meter with all manuals, £195. Heathkit monitor scope SB610, as new, only £48, almost unused. G3WY, 5 Sandown Road, Evesham, Worcestershire. Tel Evesham 45497.

Two Pye AM10 Cambridges, both modded 2m, less xtals. One is dash 12V and the other 6-12V boot complete with control box etc, £25. G8BYL QTHR.

Drake R4B + 160m xtal, £150. *Wanted* Sig gen TF144G or why? G3MPN QTHR. Tel Wymondham 3382.

Pye tx/rx mod for 4m boot mounting, cables etc, £15 ono. Dynomotors 230/12V, £1. Auto transformer 230/110V, £1. Transformers 230/7V 7A 230 10V 7·5A large lf choke, 50p, carriage extra. Large paper capacitors 2mF 1,000V, 25p. G6MN QTHR. Tel 2190 3415.

G2DAF Mk2 tx + psu. Q'5ER as new, £4. 5in scope. DL6SW p/c board, 50p. *Wanted:* Kokusai 455kHz filter with usb and lsb xtals. 18AVT/WB ant or swop why? G2BUC QTHR. Tel 061-430-3933.

BC221, £10. USAAF vhf/rx BC639A 98/156MHz tunable, £10. 19in 6ft rack with rear door £8. Loudhailer, QRO, £10. Q5ER £4. All ono. *Wanted:* very old wireless magazines, books and catalogues. G3KPO QTHR. Tel 0177 584 485.

Valves; over 200 useful miniature types, including E180F E810F 6CH6 EF95 EF184. Some new, some used, first offer over £5. 500W mains isolation transformer £5. G8ACE QTHR. Tel Royston 41164.

Nixie drivers 74141N, 50p each. G3ROP, 12 Monks Close, Redbourn, Herts. Tel Redbourn 2904.

Pye 6-ch AM10B Cambridge, comp wkg well 2m, as new, £25. Hallicrafters SR42 2m tx/rx with manual, £35. SX96 rx 550kHz-34MHz, 80-10m, £45. G8AEV 2m converter 28-30 i.f., £10. Heath manuals HW101, HW12A, HW17, £1. Perrin 37 Cairndhu Drive, Kidderminster, Worcs. Tel Kidderminster 63358.

Heathkit MA-12 amp with Dinsdale pre-amp, £7.50. Wharfedale W15/RS and super-3 spkrs, as new, £12 and £3. BC-221 with book, £12. Rotary converter 12V/1,200V at 200mA, £1. Prefer inspect and collect or carriage extra. GM3SZP QTHR. Tel 041-776 6650.

Noise generator CT82, new, £14 plus postage. HRO g/c coils, sae for details. *Wanted:* Avo test oscillator CT378 or similar signal generator, also original S-meter for AR88. Details and price. G3GUU QTHR.

Eddystone EA12, £120 ono. G3ZWE.

NCX5 National tx/rx (digital layout) ac psu, cal, vox, irt, etc, new pa valves plus set of spare valves. Exc cond. Help with delivery, £140. A. J. Martin, Eastcote, Mill Lane, Evesham, Worcs. Tel 078988 2781.

Cambridge AM10D wkg on 2, rx tunable, £26. 7B teleprinter 24V, good wkg order, £10. Printset basi-kits unused, demodulator, afsk oscillator, tuning indicator, 1,050Hz, 1,900Hz channel, band-pass filters, £7. R. Glyn Jones, 14 Sheet Road, Ludlow, Salop. Tel Ludlow 3197.

Marconi TF801B3 signal generator 10-485MHz, good cond, £60. CT436 dual beam scope (similar to Solartron CD1014) as new cond, £45 inc handbook and spare tube. D. L. Perry, 34 Furlands, Weston, Portland. Tel 0305 820661.

Drake R4B rx two extra xtals with Drake MS4 spkr. Exc cond, £210. Buyer collects. A. Allnutt, 18 Crofton Avenue, Walton-on-Thames, Surrey KT12 3DB. Tel Walton-on-Thames 27199.

AR88D, £35, vgc, some spares, manual, spkr. CR150/3 psu, vgc, some spares, manual, £25. Buyer collects. G. F. Rhodes, 23 Whitby Avenue, Brentwood, Essex. Tel Herongate 504 after 7pm.

2m a.m. mobile tx 8W o/p 6 × 5 × 8in comp with mobile psu 4 × 5 × 5in and 4 HC6U 2m xtals, £12.50 plus postage, or will swop for Codar T28 rx or why? J. Broadley, 89 Trenchard Close, Newton, Notts.

1974 160/2m station FT101 Mk2, fan, III clipper, Europa, all under makers guarantee, £360. Collected, will separate last two. Owner going abroad. Tel first 061 761 2952.

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KVG-XF9A, KVG-XF9B xtal filter or similar with or without carrier xtals. GM8BJF QTHR. Tel 031-447-5527.

Professional advice and help from fighting amateur for aerial planning appeal enquiry. North Worcs, Birmingham area. G3JEI QTHR. Tel Hagley 3157-office, 021-550-3121.

Meter 0-30μA fsd for AVO CT38 electronic multimeter. Also borrow manual for same. G8DDT QTHR. Tel Fleet (Hants) 21218 (STD Code 025 14).

Kokusai MF455 15CK mechanical filter with or without sideband xtals. B. W. Phillips, Woody Nook, Petworth Rd, Wormley, Godalming. Tel Wormley 2104.

APR-4 rf tuning units or any other units. Panadaptor any type. Rx general or vhf any cond. Radio books or manuals, especially on APR-4Y, APR-9, APR-13, APR-14, APR-17, APR-25. All letters answered. M. Wright, 251 Sandy Lane, Hindley, Wigan. Tel 0942-55948.

Xtals HC6U between 8·003 and 8·018 also between 8·072 and 8·083 MHz. G3UJK QTHR. Tel High Wycombe 25491.

Loan of mains test card, reject test card, ht test card, for Mullard Valve Tester. Will return quickly as soon as copied. G3LTN QTHR. Tel Banbury 710623.

Manual for Collins TCS rx and tx. Also power plugs key jack and valves 12A6, 12SA7, 12SK7, 12SQ7. GW3TKG QTHR.

Klystrons for 5·6GHz amateur band. Also low-noise mixer xtals IN2IE, IN23E or why. G8AGN, QTHR. Tel Sheffield 304888.

SSB filter any type, Versatower or similar at least 50ft, 20m mono-band beam or quad, 5B220 or FL2100 FV101 very cheap KW2000 cond immaterial, XF30A ssb filter for FT101 (making clipper). D. T. Price, 34 Abbey Road, Cwmbran, Gwent. Tel Cwmbran 67124.

KTW61 EF39 6SK7 X61M ECH35 D63M 6H6G DH63 6Q7G VR150/30 6X5G valves to keep rx going. State price required etc. G3HJG, QTHR. Tel 061 748 7585.

For Mid-Lanark Radio Society GM3PXK: HF band ssb tx/rx or tx-rx combination approx £150 available. GM8BBA, QTHR. Tel Hamilton 28759.

Aerial rotator suitable vhf fm and uhf tv. E. H. Ross, 24 Ettrick Way. Glenrothes West Fife KY6 1JL. Tel (0592) 754714.

Yaesu FL-50B tx, (just passed RAE) must be in excellent mechanical electrical cond. Also top band rx in good cond. Any make or type. M. Weeks, 53 Old Quarry Rd, Shirehampton, Bristol.

Multi-band trapped dipole and dummy load for G2DAF tx. G8ECT, QTHR. Downland (07375) 54130.

Instructions for AR77 rx to buy or borrow. T. P. Emblem-English, 36 Horsley Rd, Chingford E4 7HX. Tel 01 529 4150.

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FT101B in vgc. Will collect up to 100 miles of Bedford. Also Europa transverter. All replies will be acknowledged. G2CLP, QTHR. Tel 0234-68152.

KW107 supermatch, FV101 vfo, 3-el hf beam, TH3 or similar and Europa transverter. G4DGM, 106 Goldthorn Hill, Wolverhampton.

KW2000A or KW2000B with ac psu in good cond, all enquiries answered—London area preferably. J. Rimington, 1 Rayleigh Close, London N13. Tel 01-803 3111.

WS No 19 rf amplifier, preferably mains powered. WS 19, high power, ati 19 B set circuit diagram, A set modification details. For student of limited means. Send price/details please. J. Finnegan, 65 Barrack Hill, Armagh, N Ireland.

Circuit diagram and information on C42 set, to buy or borrow. Chris McCarthy, 6 Lymington Ave, Leigh-on-Sea, Essex. Tel Southend 711742.

To copy or buy. Circuit and conversion details for scope. Indicator unit SLC No 5-ZC3488 serial No 2240. Sold on surplus market 1957. G3SM, QTHR. Tel 01-868 6841.

Elements for Bird thru-line wattmeter. State frequency and power capacity. Any ex-WD equipment particularly B47 C42 C12 C13 C11 etc. Offers please for Army Cadet Force use. Capt M. J. Buckley, 62 Ballards Way, S Croydon, CR2 7JN. Tel 01-657 4778.

Eddystone 888A also HRO with bandspread coils. G3AQF, QTHR. Tel Dobwalls 486.

Required by ZS friend, Electroniques ferrite cores 6mm dia 1mm thread pitch 12·7mm length. G2BXJ, QTHR. Tel GY 4875.

Dash mount Cambridge 4m. Control box AM25B Vanguard or channel selector from same. G13YMT, QTHR. Tel 644688.

Heathkit Mohican or early EC-10 for use as tunable i.f. not-wkg examples or homebrew transistor rx considered if price reasonable. Purchase or part exchange my HRO-5T, cash adjustment either way. R. J. Sayers, 140 Wolverley Court, Woodside, Telford, Salop.

Rotator and control gear suitable for 2m beam. Comp set-up also considered. Fox, 22 Firs Walk, Tewin Wood, Herts. Tel Tewin 433.

KW2000 with ac power supply unit required in good cond. G3ECS, QTHR. Tel 0272-622055 after 6pm.

FM Westminster dash mount any cond. Also Solatron CD1400 scope main frame. J. Adamson, Woodend, Victoria Road, Kingsdown, Deal, Kent CT14 8DY. Tel Deal (03045) 3788.

Trio TX310 ssb tx and SP10 spkr. G8FXX, QTHR. Tel 01-449 0460.

Information on tx type 87. 36·055MHz HC18/U. Swop for 38·262MHz xtal? *For Sale:* Lot as last ad. Chassis, pair chassis handles, transformers, Bulle electric clock, 2-core screened cable, 2 thermostats. Sae please. Arrange collection. A. J. Bartlett, 4 Kelsall Close, Kidbrooke, London SE3.

Urgently required, supply leads and headphones for R209 (6V) good price paid. GI4BDL QTHR.

Good cond FR50B rx. Can inspect and collect within 20 mile radius of Croydon. Please state price. N. J. Moyes, 23 Ellenbridge Way, South Croydon, Surrey. Tel 01 657 2548.

HRO dial required urgently as new. Also PR30 preselector. All letters answered. G. Rhodes, 23 Whitby Avenue, Brentwood, Essex. Tel Herongate 504.

4CX250B with uhf base chimney and blower. Separates considered. G3RWL, 60 Willow Road, Enfield, Middlesex. Tel 01-366 4297.

£2 offered for Geloso rx handbook. Also Pilot Pal marine version required. Tel Spalding 3913.

CCT diagram/manual for Cosser tx/rx 144AB Mk3-24 to buy or copy. CCT diagram for AB metal products tuner for Perdio Portarama tv. Gen coverage rx AR88D or similar; state price, condition. G8DLT QTHR. Tel Broadstone 5370.

BC221, good cond, correct charts. C. Draper, 2 Hill Bungalows, Ashcott, near Bridgwater, Somerset.

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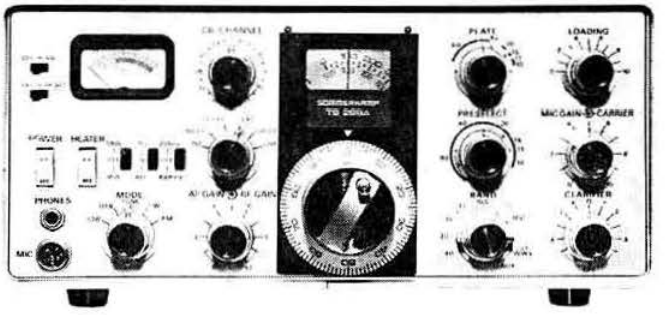

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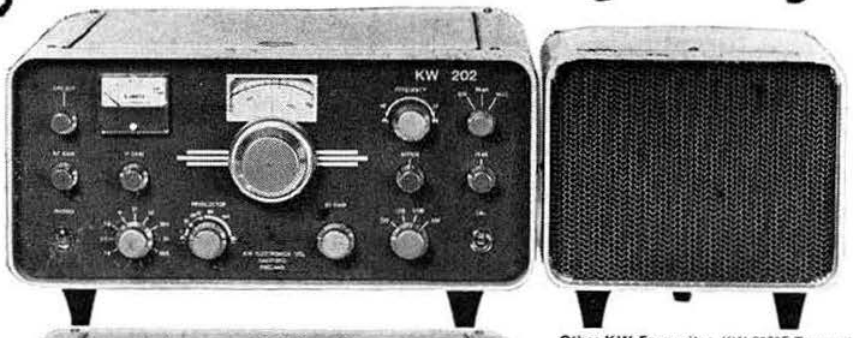

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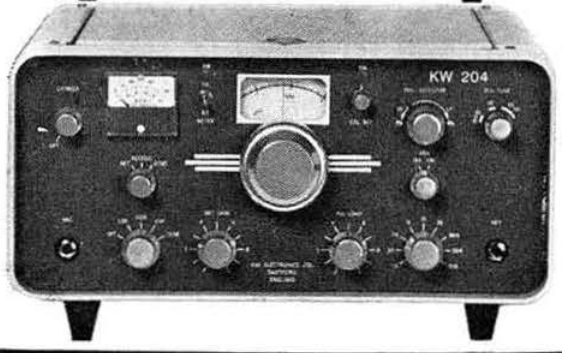

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