RADio COMmunication

May 1981

Journal of the Radio Society of Great Britain

RSGB

MAY 1981

VOLUME 57 No 5

RADio COMmunication

Contributions (**including Members' ads**) and all correspondence concerning the **content** of *Radio Communication* should be addressed to:

The Editor, RSGB,
88 Broomfield Road,
Chelmsford,
Essex CM1 1SS

Tel 0245 84938

Office hours: 0900 to 1700

ADVERTISING

Advertising, other than Members' ads, should be sent to:

Mr C. C. Lindsay,
2 Leyburn Gardens,
Croydon,
Surrey CR0 5NL

Tel 01-686 5839 *(Not RSGB)*

Hours: 0915 to 1715

Correspondence concerning the distribution of the journal and all other Society matters should be addressed to:

RSGB Headquarters,
35 Doughty St,
London WC1N 2AE

Tel 01-837 8688

Office hours: 0915 to 1715

CONTENTS

Technical articles on subjects of amateur interest are always welcome and should be sent to: The Editor, *Radio Communication*, 88 Broomfield Road, Chelmsford, Essex CM1 1SS.

All articles received are reviewed for technical merit by the RSGB Technical & Publications Committee, or an acknowledged expert on the subject, before acceptance. Payment will be made for all articles published.

The editor will be pleased to send intending authors a manuscript preparation guide and to give any other advice and assistance requested.

Radio Communication **is published by The Radio Society of Great Britain as its official journal on the first Friday of each month and is sent free and post paid to all members of the Society**

ABC MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS

26,007 copies per issue average circulation in 1980

Closing date for contributions unless otherwise notified: five weeks before publication date

TRIO *pacesetter in amateur radio*

TS-830S *V.B.T., notch, IF shift, wide dynamic range*

The TS-830S has every conceivable operating feature built-in for 160–10 metres (including the three new bands). It combines a high dynamic range with variable bandwidth tuning (VBT), IF shift, and an IF notch filter, as well as very sharp filters in the 455kHz second IF. Its optional VFO-230 remote digital VFO provides five memories.

TS-830S FEATURES:

- LSB, USB and CW on 160–10 metres, including the new 10, 18, and 24MHz bands. Receives WWV.
- Wide receiver dynamic range. Junction FETs in the balanced mixer, MOSFET RF amplifier at low level, and dual resonator for each band.
- Variable bandwidth tuning (VTB). Varies IF filter passband width.
- Notch filter (high-Q active circuit in 445kHz second IF.
- IF shift (passband tuning).
- Built-in digital display (six digits, fluorescent tubes), analog subdial, and display hold (DH) switch.
- Noise-blanker threshold level control.
- 6146B final with RF negative feedback. Runs 220W PEP (SSB)/180W dc (CW) input on all bands.
- Built-in RF speech processor.
- Narrow/wide filter selection on CW.
- SSB monitor circuit to check transmitted audio quality.
- RIT (receiver incremental tuning) and XIT (transmitter incremental tuning).

OPTIONAL ACCESSORIES:

- SP-230 external speaker with selectable audio filters.
- VFO-230 external digital VFO with 20Hz steps, five memories, digital display.
- AT-230 antenna tuner/SWR and power meter/antenna switch; 160–10 metres, including three new bands.
- YG-455C (500Hz) and YG-455CN (250Hz) CW filters for 455kHz IF.
- YK-88C (500Hz) and YK-88CN (270Hz) CW filters for 8·83MHz IF.

(VFOs for TS-830S, TS-130 Series, and TS-120S are compatible with all three series of transceivers.)

TS-830S £639.51 inc VAT. Carriage £4.50.

SP-230 TS-830S VFO-230 AT-230

TS-130S/V *processor, N/W switch, IF shift, DFC option*

The compact, all solid-state HF SSB/CW mobile or fixed station TS-130 Series transceiver covers 3·5 to 30MHz, including the three new bands.

TS-130 SERIES FEATURES:

- 80–10 metres, including the new 10, 18, and 24MHz bands. Receives WWV.
- TS-130S runs 200W PEP/160W dc input on 10–15 metres and 160W PEP/140W dc on 12 and 10 metres. TS-130V runs 25W PEP/20W dc input on all bands.
- Built-in speech processsor.
- Narrow/wide filter selection on both CW (500Hz or 270Hz) and SSB (1·8kHz) with optional filters.
- Automatic selection of sideband mode (LSB on 40 metres and below, and USB on 30 metres and above). SSB REVERSE switch provided.
- Built-in digital display.
- Built-in RF attenuator.
- IF shift (passband tuning).
- Effective noise blanker.

OPTIONAL ACCESSORIES:

- PS-30 base-station power supply.
- YK-88C (500Hz) and YK-88CN (270Hz) CW filters.
- YK-88SN (1·8kHz) narrow SSB filter.
- AT-130 compact antenna tuner (80–10 metres, including three new bands).
- SP-120 external speaker.
- VFO-120 remote VFO.
- MB-100 mobile mounting bracket.
- PS-20 base-station power supply for TS-130V.

Optional DFC-230 Digital Frequency Controller

Frequency control in 20Hz steps with UP/DOWN microphone supplied with DFC-230). Four memories and digital display. (Also operates with TS-120 and TS-830S.)

TS—130S £491.05 inc VAT. TS-130S £404.34 inc VAT. Carriage £4.50.

PS-30 SP-120 TS-130S VFO-120

LOWE ELECTRONICS Ltd

CHESTERFIELD ROAD MATLOCK DE4 5LE TEL 0629 2430/2817

TRIO *pacesetter in amateur radio*

R-820 *"the amateur band receiver plus"*

With more features than ever before available in an amateur band receiver. This triple-conversion (8·83MHz, 455kHz, and 50kHz IFs) receiver, covering all Amateur bands from 160 through 10 metres, as well as several shortwave broadcast bands, features digital as well as analog frequency readouts, notch filter, IF shift, variable bandwidth tuning, sharp IF filters, noise blanker, stepped RF attenuator, 25kHz calibrator, and many other features, providing more operating conveniences than any other receiver.

- VBT/SELECTIVITY CONTROLS Separate controls on the same shaft provide variable bandwidth tuning as well as selection of four IF filters: 250Hz*
- IF SHIFT Varies (shifts) IF passband away from interfering signal
- RIT/NOTCH CONTROLS RIT allows receiver to be tuned off frequency, while not affecting transmit frequency, when in transceive mode. Notch control tunes notch within IF passband for eliminating interference. Notch frequency remains the same, even when IF shift is utilized.
- DRS DIAL Satin-smooth VFO tuning dial system provides accurate analog frequency readout. LSB, USB, and CW frequencies are accurately read from the same pointer
- BAND SWITCHES Selects frequency bands from 15MHz (WWV), 160 through 10 metres, the 49, 31, 25, and 16-meter shortwave broadcast bands, and an auxiliary band.
- PRESELECTOR Peaks tuned circuits in RF amplifier stage for increased selectivity and sensitivity, RF amplifier coil is dual-tuned.
- AGC SWITCH Automatic-gain-control circuit switchable to slow or fast response, or completely off.
- RECORD JACK Makes recording off the air simple.
- MODE SWITCH Selection of AM, CW, upper or lower sideband or RTTY.

R-820 receiver £690 inc VAT

R-1000 *"Hear there and everywhere"*

The R-1000 is an amazingly easy-to-operate, high-performance, communications receiver, covering 200kHz to 30MHz in 30 bands. This PLL synthesized receiver features a digital frequency display and analog dial, plus a quartz digital clock and timer.

R-1000 FEATURES:

- Covers 200kHz to 30MHz continuously.
- 30 bands, each 1MHz wide.
- Five-digit frequency display with 1kHz resolution and analog dial with precise gear dial mechanism.
- Built-in 12-hour quartz digital clock with timer to turn on radio for scheduled listening or control a recorder through remote terminal.
- Step attenuator to prevent overload.
- Three IF filters for optimum AM, SSB, CW. 12kHz and 6kHz (adaptable to 6kHz and 2.7kHz) for AM wide and narrow, and 2.7kHz filter for high-quality SSB (USB and LSB) and CW reception.
- Effective noise blanker.
- Terminal for external tape recorder.
- Tone control.
- Built-in 4-inch speaker.
- Dimmer switch to control intensity of S-meter and other panel lights and digital display.
- Wire antenna terminals for 200kHz to 2MHz and 2MHz to 30MHz. Coax terminal for 2MHz to 30MHz.
- Voltage selector for 100, 120, 220, and 240 VAC.

RECEIVER WITH DC KIT FITTED £285 inc VAT
SP-100 MATCHING EXT. SPEAKER £26.45 inc VAT
CARRIAGE BY SECURICOR £4.50

APPROVED TRIO DEALER

BIRMINGHAM
Ward Electronics
Soho House,
362-364 Soho Rd.
Birmingham B21 9QL
021 554 0708

BUCKINGHAMSHIRE
Photo Accoustics Ltd
58 High St
Newport Pagnell
Bucks. 0908 610625

EAST SCOTLAND
Jay-Cee Electronics
20 Woodside Way
Glenrothes
Fife KY7 5DE. 0592-756962

ESSEX
Waters & Stanton Electronics
Warren House
18-20 Main Rd
Hockley Essex. 0702 206835

LANCASHIRE
Stephens-James Ltd
47 Warrington Rd
Leigh
0942 676790

NORTH LONDON
Radio Shack Ltd
188 Broadhurst Gardens
London NW6 3AY
01-624 7174

SOUTH LONDON
Catronics Ltd
20 Wallington Square
Wallington SM6 8RG
01-669 0700

WALES
MRS Communications Ltd
76 Park Rd
Whitchurch, Cardiff
0222 616936

W.SUSSEX
Bredhurst Electronics
High St Handcross
Haywards Heath
W. Sussex 0444 400786

YORKSHIRE
Leeds Amateur Radio
27 Cookridge St
Leeds LE2 3AG
0532 452657

TRIO

As the appointed distributors for Trio, we recommend that you purchase your Trio equipment from an approved stockist (list above). Any stockist *not* on the list has no connection with the Trio UK sales and service organisation and cannot, despite claims to the contrary, offer any meaningful guarantee of backup service on Trio equipment.

FROM THE JAPAN RADIO CO LTD

NRD-515 *Receiving for the discerning few*

The NRD 515 is a PLL-synthesised communications receiver of the highest class featuring advanced radio technology combined with the latest digital techniques.
The new NRD 515 is full of performance advantages including general coverage, all modes of operation, PLL digital VFO for digital tuning, 24-channel frequency memory (option), direct mixing, pass-band tuning, etc. JRC's 65 years of radio communications experience will give you "the world at your fingertips".
The NRD 515 is but a single item from the JRC product range which extends all the way to full marine radio installations for supertankers.

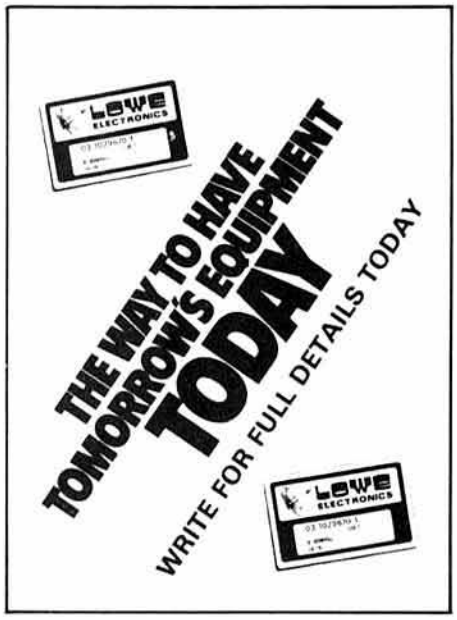
NRD 515 HF RECEIVER £948.75 inc VAT

SR9 DAIWA
2mtr FM TUNABLE/XTAL RECEIVER
£46.00 inc VAT carriage £1.50

XTLS £2.50/CH

SL-1600A
16 CHANNEL 2mtr SCANNING RECEIVER
£39.50 inc VAT carriage £1.50

MF-083 8-Channel
Marine Scanner + FM Broadcast
£85.10 inc VAT carriage £1.50



SPECIALIST RECEIVERS

Whatever your interest - be it HF, VHF, UHF, Amateur, Marine, Aircraft, Commercial, Public Service, FM or AM, general coverage or specific band, single or multi-channel, hand-held, portable, mobile, or fixed station, switched or scanning - we have a wide range of receivers (one or two illustrated), one of which will best suit your purpose.
Drop us a line, pick up the 'phone, or call and see us and we will gladly advise.

73's de

J. D. Lowe

LOWE ELECTRONICS Ltd
CHESTERFIELD ROAD MATLOCK DE4 5LE TEL 0629 2430/2817

LOWE SRX 30D

. . . . . a familiar name, but a whole new receiver

A familiar name, but a whole new receiver behind it. Building on all the excellent features of the SRX-30, including the drift cancelling system covering 500kHz to 30MHz; the selectable sidebands and AM; the easy to use tuning system; we now introduce the all new SRX30D which incorporates the suggestions made by our customers. Outstanding new features are:

- Extended coverage 200kHz–30MHz
- Digital readout in large green display units which give true unambiguous frequency information—even when you switch sidebands or use the clarifier.
- All new frequency synthesis using Plessey SL6 1641 double balanced modulator ICs for a new high standard of performance.
- All new audio system which produces outstandingly good quality on the built in speaker, and is capable of driving external hi-fi speaker units for even better sound.
- All new IF filters with optimum bandwidth for mode in use. Automatic filter selection from mode switch.

There is so much that is impressive about the SRX30D that you have to see it and handle it to really appreciate the performance.
We predict that the SRX30D will be a landmark in low cost, high performance SWL receivers. Just consider how much you should pay for a receiver covering 200kHz–30MHz with accurate digital readout; high performance USB/LSB/AM with switched filters; drift cancelling frequency synthesis; built in mains supply and built in speaker; high quality construction and advanced design—and so much more.
Then look at our price for the SRX30D and you will be even more impressed.

£195.00 inc VAT Securicor carriage £4.50

Accessories for the short-wave listener

		Inc VAT	Carr
HF5	80–10m HF vertical. No radials required when on ground post.	48.50	4.50
EIS	Small egg insulator. Glazed ceramic 40cm long.	.30	.25
EIL	Large egg insulator. Glazed ceramic 50cm long.	.45	.36
SIL	Ribbed strain insulator for dipole end or centre. 70cm long.	.35	.36
MIZUHO			
KX2	Top quality 500kHz-30MHz aerial tuner. Perfect match for R1000.	29.90	1.50
AX1	Aerial switching system. Handles 6 aerials & 6 receivers	27.03	1.00
APM1	Audio peak and notch filter. Variable bandwidth active filters	33.00	1.00
SR1	Mini rack for above the system.	14.09	1.50
MP1	Rack mount for APM1.	5.20	1.00

TRIO

pacesetter in amateur radio

Trio 8400 the new way to 70cm FM mobile, a fully synthesized 430 440MHz 10 watt output, mobile transceiver with memories, 2 separate VFO's all in a truly amazing compact package. Complete with up/down frequency shift microphone and car mounting bracket the TR8400 is the way to go . . 70cm is on the move.

TR-8400 *70cm FM mobile*

£279 inc VAT. Securicor carriage £4.50

TR-9000 The exciting TR-9000 2-metre all-mode transceiver combining the convenience of FM with long distance SSB and CW in a very compact, very affordable package. Because of its compactness the TR-9000 is ideal for mobile installation, add on its fixed station accessories and it becomes the obvious choice for your shack.

TR-9000 *2 Metre Multimode*

£345.00 inc VAT. Carriage by Securicor £4.50

TR-7800 Trio's remarkable TR-7800 2-metre FM mobile transceiver provides all the features you could desire for maximum operating enjoyment. Frequency selection is easier than ever, and the rig incorporates new memory development for repeater shift, priority, and scan. The TR-7800 by Trio, the only FM mobile.

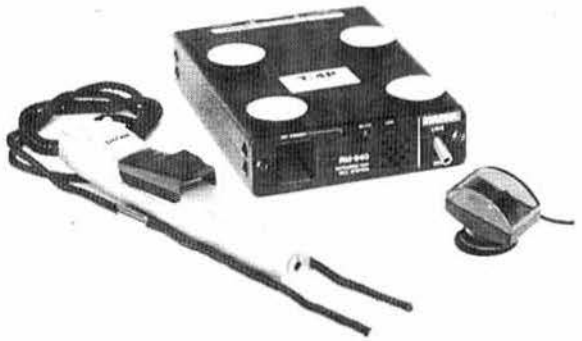
TR-7800 *The Ultimate 2 Metre Mobile FM rig*

£268 inc VAT. Carriage by Securicor £4.50

LOWE ELECTRONICS Ltd

CHESTERFIELD ROAD MATLOCK DE4 5LE TEL 0629 2430/2817

DAIWA *Distributed in the UK by Lowe Electronics Limited.*



The Daiwa infrared mike system comprising of a control box, sensor and infrared mike enables you to dispense with the hand mike and cable when operating in your car or shack. By using an infrared beam audio is transmitted from the mike to the sensor and then to the control box which activates the transmitter. To transmit, press the locking switch on the mike and talk. To receive, release the switch and your rig immediately returns to receive. When you have finished your contact return the mike to its slot in the control box and the mike nicad battery is maintained at full charge. For those of you who like fresh air and drive with all the windows open there is a matching wind shield available at an additional 75p. So there we are, the latest in technology to bring safely to your mobile operation, the Daiwa infrared mike.

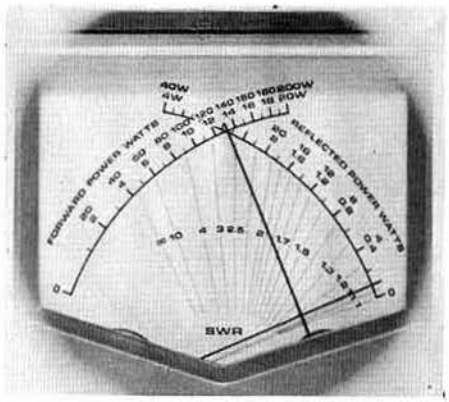
*the **DAIWA** Infrared mike £45 inc VAT carr. £1.00*

The new CNA1001A antenna tuner from Daiwa has already changed the whole concept of antenna tuning in the amateur radio station. No longer do you have to fiddle with this control and that control in order to reach a match condition, simply push a button and let the tuner do it for you.

The CNA1001A incorporates a sensitive reflected power detector which monitors SWR all the time. At the first push of the operate button, a motor driven gearbox drives the load and match variable capacitors through their entire range in overlapping small increments seeking a correct match. When matching is achieved, the motor drive stops and that's that. The CNA1001A needs only a small sniff of RF to work on (typically 5 watts) so you needn't worry about blowing up your PA, and it covers all the current and future amateur bands from 3-30MHz, includes switching for two antenna systems, a 10 watt (50 watt 1 minute) dummy load and best of all includes a cross needle power and SWR meter.

This section measures power from 0-200W in two ranges and reflected power from 0-40W together with the unique Daiwa cross pointer SWR system. All this in one compact unit requiring only 12V dc to drive the tuning motors.

***DAIWA** CNA 1001A Automatic Antenna tuner £129.50 inc VAT high power model £190 inc VAT*



*the **DAIWA** cross needle power meters*

Until recently, the in-line measurement of RF power and SWR involved calculation or the use of two instruments. Now, DAIWA have introduced a range of power meters which provide an elegant solution to the whole problem of RF measurements. Utilising two toroidal current transformers to detect true forward and reflected power, and feeding the outputs to a twin movement meter with crossed pointers, it is now possible to measure forward power (LH scale), reflected power (RH scale) and SWR (where the pointers cross) at a single glance. The photograph shows 130W forward power, 1W reflected, and an SWR of about 1·2 to 1. The DAIWA CN series power meters represent the ultimate power meter for the professional and amateur alike, and are indispensable in the fully equipped station. Three models are currently available covering frequencies right up to 2·5GHz so there's one for you whatever your interests.

CN620A	*1·8–150MHz up to 1kW*	£52.81 inc VAT
CN630	*140–450MHz up to 200W*	*£71.00 inc VAT*
CN650	*1·2–2·5GHz up to 20W*	*£95.00 inc VAT*

The Daiwa range of rotators are probably the best amateur rotators available. The quality of construction is up to the high standards we have come to expect from Daiwa and the rotator system is of a completely new design which eliminates "out of sync" operation and for the first time gives a true 360° indication on a circular scale based on a great circle map centred on the UK.

Both the DR7500 and DR7600 can be supplied with either of the controllers available, and both upper and lower mast clamps allowing mounting inside a standard tower or on the top of a pole. The DR7500 will handle beams up to and including 3-element tribanders, whilst the DR7600 will handle up to and including a 2-element 40 metre beam.

Each rotary system is supplied complete with rotator unit, control unit, and upper and lower mast clamps.

The rotators can be ordered as either "R" or "X" versions. The "R" suffix denotes the controller with the back lit scale and control by switches marked "left" and "right" to drive the rotator round. The controller pointer then smoothly indicates the direction in which the rotator is pointing. However, as an alternative, the "X" suffix unit is of the preset type where the controller pointer is turned by the operator to the beam heading required. The rotator then turns to this heading and stops. Correct operation of the rotator is indicated by a discreet flashing light on the control unit. With this type of control unit, you can go into the shack, set the rotator turning to the direction you need and then do something else whilst the rotator comes round.

Either control unit can be specified with either of the two rotators, ie DR7500R is the smaller rotator with the round control whilst DR7500X is the same rotator, but with the preset control unit.

*the **DAIWA** rotator systems*

DR7500X £98 inc VAT *DR7600X £135 inc VAT*
DR7500R £108 inc VAT *DR7600R £144.90 inc VAT*

LOWE ELECTRONICS Ltd

CHESTERFIELD ROAD MATLOCK DE4 5LE TEL 0629 2430/2817

THE SHIMIZU SS105S *80–10 metres ssb/cw transceiver*

This super new transceiver covers 80–10 metres, gives 10W out and is smaller than anything else we have seen so far. Ideal for transverter driving, the SS105S has FM transmit and receive options as well as excellent performance on SSB/CW for HF band use. The SS105S is supplied in semi kit form so as to keep down the price, but all the RF and mixer boards are ready built and aligned so no test equipment is required. All the cabinet work has been carried out so all you have to do is assemble the IF strip, xtal oscillator, and fit them to the completed chassis. Great idea and it brings back the flavour of home brew with the added advantage that the rig will work when you've finished it. For more info, just ask us or come along and see it. It's a great little rig.

		NETT	inc. VAT	CARR.
SS015S	80–10m solid state SSB/CW/FM transceiver. Semi kit form	225.00	258.75	4.50
SE-NB	Noise blanker kit	6.75	7.76	.50
SE-FMrx	RX FM discriminator kit	15.00	17.25	1.00
SE-FMtx	TX FM generator kit	11.00	12.65	1.00
SE-MK	RX marker kit	9.60	11.04	.50
0.5 CWF	500 Hz CW filter	19.50	22.43	.50
Optional band crystals		3.00	3.45	.25

AR 22 *2 metre FM pocket synthesized, 141–149MHz receiver.*

AR 240A *2 metre hand held synthesized 144–146 1½ watt transceiver*

AR22 £83 inc VAT. AR240A £158 inc VAT. Carriage £1.50.

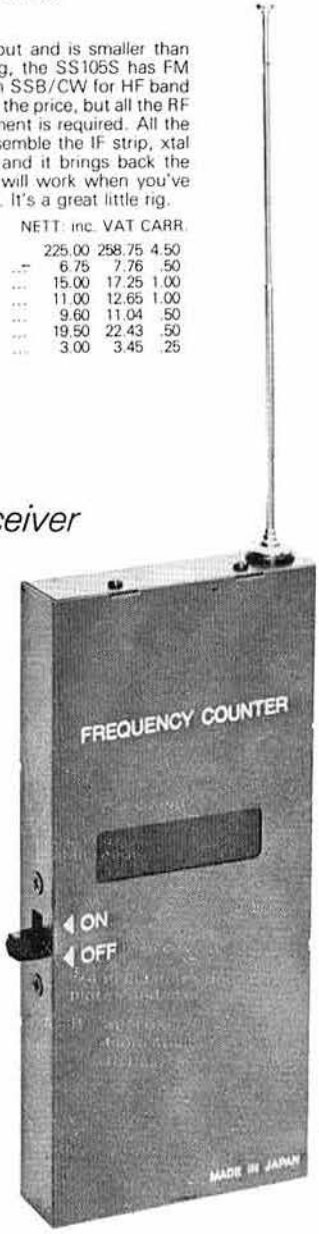
Also available is a marine version of the AR22 the AR22M, 156–162MHz £89.

SX 200 SCANNING MONITOR

The SX-200 scanning monitor receiver will enable you to enjoy a new dimension of scanning ease, convenience and efficiency. Many thousands of frequencies at your fingertips. These frequencies can be easily selected by keyboard operation, and can be monitored, searched, scanned and memorised at will, without the need to purchase expensive crystals. An additional feature is the accurate digital clock which assists accurate log keeping.

The receiver covers amateur VHF and UHF frequencies, both repeater and simplex contacts between amateurs can be monitored. Also available are aircraft and marine frequencies but please note, a licence may be required to legally listen to certain frequencies within the performance range of the SX-200 in some countries. So there we are, the SX-200, a precision instrument designed by J.I.L. to give not only ease and efficiency in use but hours of enjoyment either at home or in your car.

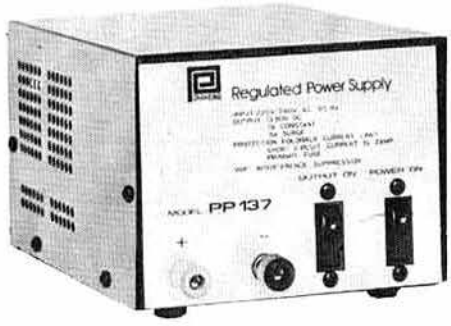
SX 200 £237 inc VAT carr £4.50



FREQUENCY COUNTER *Model HFC 55*

The HFC55 is a sensibly priced, easy to use digital frequency meter covering 10kHz–55MHz in a single range. The bright 5 digit display gives a direct reading of frequency when the built in telescopic aerial is placed near a source of RF. The HFC operates from internal dry batteries and is housed in a strong metal case to withstand regular and continuous use.

HFC 55 Frequency Counter £36.50 inc. VAT. Carriage £1.50



POWER SUPPLY UNITS

the PP1305 4 amp 13·8 volts d.c. £18.40 inc. VAT.
the PP137 7 amp 13·8 volts d.c. £32.00 inc. VAT.
the PP1310 10 amp 13·8 volts d.c. £49.50 inc. VAT.
Carriage £2

NOTE THE PRICES WITHIN OUR ADVERTISEMENT ARE CORRECT AS OF THE 8TH APRIL 1981

HEAD OFFICE AND SERVICE CENTRE
LOWE ELECTRONICS LTD, CHESTERFIELD ROAD, MATLOCK, DERBYS. TEL: 0629 2817 or 2430. TELEX: 377482. OPEN TUES FRIDAY 9-5.30, SAT 9-5
CLOSED FOR LUNCH 12.30 TO 1.30

For personal attention on the South Coast contact John, G3JYG, 16 Harvard Road, Ringmer, Lewes, Sussex. Ringmer 812071.
For equally helpful attention in Scotland contact Sim, GM3SAN, 19 Ellismuir Road, Baillieston, Nr. Glasgow. 041-771 0364.

SEND 48p IN STAMPS FOR COMPLETE CATALOGUE AND ANTENNA BOOK.
PLEASE SPECIFY ANY PARTICULAR INTEREST AND WE WILL SEND FULL INFORMATION

SOTA COMMUNICATION SYSTEMS LTD

22–26 CHILDWALL LANE, BOWRING PARK, LIVERPOOL L14 6TX, ENGLAND
Tel: 051-480 5770 Hours 9am–6pm Monday to Friday 9am–1pm Saturday Telex: 628702 SOTA G

RADIO CONSULTANTS, SUPPLIERS AND MANUFACTURERS

BARCLAYCARD **AMERICAN EXPRESS** **ACCESS**

100 WATT 144MHz MOBILE LINEAR AMPLIFIER SCL 144

- ★ 12V operation
- ★ Drive 10W
- ★ RF output 100W
- ★ Linear or Class C operation
- ★ Manual or RF keying

Price **£100** + VAT
(£115.00)

50 WATT 432MHz LINEAR AMPLIFIER

- ★ 12V operation
- ★ Drive 10W
- ★ RF output 50W
- ★ Other features as above

Price **£75.00** + VAT
(£86.25)

LUNAR

WE ARE THE OFFICIAL IMPORTERS AND DISTRIBUTORS FOR LUNAR EQUIPMENT

2M10-80P linear	**£120** + VAT
2M30-160P linear	**£160** + VAT
HF3-100L2 linear	**£120** + VAT
PA28 preamp	**£20** + VAT
PA144 preamp	**£20** + VAT
PAI144 preamp	**£28** + VAT
PA432-2 preamp	**£22** + VAT
PAE432-5 preamp (EME)	**£40** + VAT

PLEASE CONTACT US FOR FURTHER DETAILS

432MHz LINEAR TRANSVERTER

- ★ I.F. 28MHz
- ★ 432 to 436MHz
- ★ Drive 5mW to 500mW
- ★ RF output 18W
- ★ RX NF <2·0dB

Price **£140.00** + VAT
(£161.00)

1,296MHz LINEAR TRANSVERTER

- ★ I.F. 28MHz or 144MHz
- ★ 12V operation
- ★ Drive 5mW to 500mW
- ★ RF output 2·5W to 3W
- ★ RX NF <3·5dB

Price **£140·00** + VAT
(£161·00)

MZ-80K MICRO COMPUTER, PERIPHERALS AND SOFTWARE IN STOCK

SHARP

100 WATT 144MHz BASE STATION LINEAR/PREAMPLIFIER SCL 144PS

- ★ Drive 10W
- ★ RF output 100W
- ★ RX Preamp 1·5dB NF
- ★ Gain (RX) 12dB
- ★ AC power supply built in

Price **£170.00** + VAT
(£195.50)

100 WATT 144MHz MOBILE LINEAR AMPLIFIER WITH BUILT IN PREAMP SCL 144P

- ★ Linear specifications as SCL 144.
- ★ Preamp
- ★ Gain 12dB
- ★ N.F. <1·5dB

Price **£120.00** + **VAT**
(£138.00)

TRIO

As a service to our customers we are now stocking Trio equipment. We do not claim to be an authorised Trio dealer, however we are confident that we can offer an effective spares and service back up.

TR-9000	2m Multimode	**£345.00 inc VAT**
TR-7800	2m FM mobile	**£268.00 inc VAT**
TR-2400	2m FM handheld	**£199.00 inc VAT**

PACKAGE DEALS

TR-9000 + SCL 144PS	**£499.00 inc VAT**
TR-7800 + 2m30-160P	**£425.00 inc VAT**

AERIAL ROTATORS

Sky King	SU400 (inc top & bottom clamps)	**£86.25 inc VAT**
Sky King	SU2000	**£36.80 inc VAT**

SAE WITH ALL ENQUIRIES PLEASE **TRADE AND EXPORT ENQUIRIES WELCOME**

WE ARE NORTHERN REPRESENTATIVE FOR "VHF COMMUNICATIONS" MAGAZINES & KITS

TELEPHONE CREDIT CARD ORDERS TAKEN CARRIAGE OR POSTAGE FREE ON ALL EQUIPMENT

WATERS & STANTON ELECTRONICS

18/20 MAIN ROAD, HOCKLEY, ESSEX. Tel: (0702) 206835

MOBILE OR FIXED... HERE'S UNBEATABLE VALUE!

(See pages 296 and 297 for complete price list)

2m FM 25 Watts AZDEN PCS 3000 £219 inc VAT

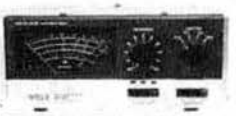
Here's a really super action packed FM mobile transceiver. Particularly ideal for the operator with very little room to accommodate the standard size of transceiver. The detachable head unit may be mounted remote from the main transceiver (optional cable kit necessary) so it can be tucked away in the smallest of spaces. Apart from this novel practical feature, there is a host of technical features. A microcomputer control panel takes care of frequency control, 8 memories, band and segment scanning, all selected by touchpad controls with back illumination. Full coverage of 144 to 146MHz is available on 25kHz or 12½kHz steps, a bar LED signal and RF meter gives positive readout as does the large LED frequency display. Other features include high/low power switching, repeater shift, tone burst, tone entry indicator, ni-cad memory back-up and much more. Why not send today for the full colour brochure?

NEW **AT1000 SWL ATU IMPROVED SELECTIVITY 0·2-30MHz**

£31.95

Cross-modulation, intermodulation, poor sensitivity etc—all problems today's short wave listener is likely to suffer. That's why we have had the AT1000 specially designed for us in Japan in order to overcome these very problems. Insert the AT1000 between your aerial and receiver for an immediate improvement. Then sit back and really hear the DX roll in. A receiver without an AT1000 will soon be a thing of the past!

"WELZ" TELLS THE TRUTH



MODELS

SP200	1·8-160MHz 20W-200W-1kW	£49.95 (n.c.)
SP300	1·8-500MHz 20W-200W-1kW	£69.95 (n.c.)
SP400	130-500MHz 5W-20W-150W	£49.95 (n.c.)

Welz VSWR/POWER meters are high quality instruments approaching laboratory accuracy. They are capable of providing extremely accurate measurements of both power and voltage standing wave ratio. Features include high sensitivity (2·5W full scale 1·8-500MHz), & completely flat response.

NO MORE SNAP, CRACKLE & POP SEIF PS134—THE RUGGED ONE 240V AC—12V DC 4AMPS

The message is beware of super cheap power supplies—they could destroy your transceiver! The SEIF unit is different. It's a really rugged unit with a heavy duty transformer ideal for running 10-15W mobile rigs. Completely stabilised and protected, this unit will give you good, reliable performances.

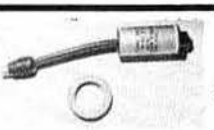
£22.95 inc VAT
£2.00 carriage

NEW **THE 'LONG JOHN' SUPER GAIN VERTICAL £19.95**

A highly compact vertical aerial that will more than double your effective radiated power. Only 4ft tall yet really outclassing all its similar sized competitors. Construction features high quality plated aluminium and stainless steel fittings. The base matching section is fully protected against the weather and the SO239 socket is fully shrouded. The aerial comes complete with mast mounting clamps. The "Long John" really packs a knock-out punch.

NEW **HANDHELD CO-LINEAR £21.95**

Surely the answer to the portable operator who seeks gain without increased battery drain. This highly compact co-linear completely folds down into its own carrying case. Yet in seconds it can be snapped together to give you up to 5dB of gain—that's nearly four times your power! Ideal for 2m handhelds and possibly a pretty good idea for RAYNET. Not only have you the advantage of the antenna gain, you also have the added gain obtained by the higher elevation of the handheld aerial. They really do work, we've tried them!



TVI CORNER

TV
If you are suffering TVI then you should try our HP3A high pass filter. Simply plug into the TV aerial socket to filter out the interference. As supplied to Home Office departments. **£3.50** inc VAT

AUDIO
Even more of a problem today is Hi-Fi interference. Our special ferrite rings are ideal for fitting to speaker leads, signal leads and mains cables—they really are magic! **£0.35** each, p&p 30p min.

SEND FOR FULL COLOUR BROCHURE

FDK M700EX 2m FM 25 WATTS £199 inc VAT

The Multi 700EX now a firm favourite with amateurs throughout the world—it embodies all the essential features of a completely self contained FM station. Its punchy 25 watt signal beats all the old 10 watt transceivers hands down. The large digital display gives clear and precise frequency readout, controlled by a "click stop" frequency selector knob that provides steps of 25kHz with an additional 12½kHz selector.
Priority scanning provides for the scanning of pre-programmed channels plus the mains dial channel. Repeater operation is taken care of by means of a 600kHz down shift selector and automatic tone-burst switch. For listening on the input frequency of the repeater, instant reverse repeater operation is available at the touch of a button. Local contacts are taken care of by a continuously variable power control that enables power to be reduced right down to 1 watt.

AMATEUR RADIO CENTRE OF THE SOUTH—well worth a visit

SPECIAL SALE PRICES ON SOME ITEMS TO PERSONAL CALLERS

Base mount single hole fixing + 3m cable	4.50(.50)
AERIAL ROTATORS (complete with control boxes)	
CDE AR40 (5 core cable)	59.80(1.50)
Channelmaster 9502 (3 core)	42.00(2.00)
Sky King SU2000 (3 core)	36.00(2.00)
Sky King SU4000 (6 core)	75.00(2.50)
KR 400RC (5 core) complete	£99.00(2.00)
CDE alignment bearing	7.75(1.00)
Channelmaster alignment	11.75(1.00)
HF ANTENNAS (various manufacturers)	
Mini-Products HQ-1 20/15/10m 2 el	96.50(2.50)
Mini-Products C4 20/15/10m vert dipole	48.50(2.00)
Mosley TD3JR 20/15/10m wire dipole	34.50(1.50)
Mosley "Mini-Beam" 20/15/10m 2 el. 600W	99.00(2.00)
Mosley "Mini-Beam" 20/15/10m 2 el. 2kW	129.00(2.00)
Mosley TA32 20/15/10m 2 el.	89.70(2.00)
Mosley TA33 20/15/10m 3 element	133.40(2.50)
Mosley Mustang 20/15/10m 3 element 2kW	166.75(4.00)
Hy-Gain 12AVQ 20/15/10m vertical	43.00(2.00)
Hy-Gain 14AVQ 40-10m vertical	60.00(2.00)
Hy-Gain 18AVT/WB 80-10m vertical	87.00(2.50)
HF5 80-10m vertical 200 watts	48.00(2.00)
Radial Kit for HF5	28.00(2.00)
Sagant EL40X 80-40 Balun fed dipole (79')	36.00(1.50)
Jaybeam TB3 HF 3 element Tribander	167.90(4.50)
Jaybeam VR3 HF Vertical Triband	42.50(3.00)
Western DX5V 5-band	89.00(3.00)
DENTRON	
MLA2500B 6 band 160-10m 2kW linear	695.00(n.c.)
Clipperton-L 6 band 160-10m 2kW linear	459.00(n.c.)
DTR-1200L 5 band 80-10m 1·2kW linear	t.b.a.(n.c.)
GLA-1000B 5 band 80-10m 1kW linear	295.00(n.c.)
DTR-3KA 1·8-30MHz ATU/2kW	t.b.a.(n.c.)
MT-3000A 1·8-30MHz ATU/3kW	275.00(n.c.)
AT-1K 1·8-30MHz ATU/1kW	99.00(n.c.)
HF200A 80-10m transceiver 100W AC PSU	399.00(n.c.)
Spare set of D50A tubes	25.00(n.c.)
All band Doublet 1·8-30MHz + 470Ω feeder	22.50(2.00)
ADONIS MICROPHONES	
AM202G Mobile safety mic	20.95(n.c.)
AM202S Mobile safety mic	20.95(n.c.)
AM202H Mobile safety mic	29.00(n.c.)
AM502G Base station compressor mic	39.00(n.c.)
AM802G Base station compressor mic	59.00(n.c.)
SEM	
2m power amplifier/pre-amplifier 5/30W	50.00(1.00)
2m power amplifier/pre-amplifier 16/50W	66.70(1.50)
2m power amplifier/pre-amplifier 16/100W	126.50(1.50)
2m converter	23.00(.35)
2m Auto switching pre-amplifier	21.73(.35)
70cm Auto switching pre-amplifier	24.73(.35)
2m pre-amplifier	14.95(.35)
70cm pre-amplifier	17.73(.35)
2-40MHz pre-amplifier auto switching	18.66(.35)
2-40MHz pre-amplifier	11.73(.35)
PA3 miniature 2m pre-amplifier	8.00(.35)
PA70 miniature 70cm pre-amplifier	10.00(.35)
Z Match Aerial tun unit 1·8-30MHz 500W	47.15(1.50)
EZITUNE Aerial tuning aid	30.48(.75)
IAMBIC Keyer	34.50(.75)
2 METRE PORTABLES	
SB2M 2m SSB portable	99.00(n.c.)
AR245 2m FM synthesized handheld, 5W	178.00(1.50)
AR245 carrying case	4.10(.50)
AR245 optional helical	4.10(.50)
AR245 12V DC car adaptor/charger	4.10(.50)
VHF/UHF MONITORS	
TM56B FM Scanner 4 + 12 channels	79.00(n.c.)
Sound Air 008 8 channel FM monitor	69.00(n.c.)
Sound Air M161 16 channel FM monitor	59.00(n.c.)
MF083 Marine or Amateur + 3 FM broad.	85.00(n.c.)
BEARCAT 220FB VHF/UHF	258.00(n.c.)
SX200 VHF/UHF. New stock just arrived!	240.00(n.c.)
SR9 Tuneable 144-148 or 156-162MHz	46.00(n.c.)
AR22 2m FM pocket synthesized handheld	83.00(n.c.)
AR22 flexible antenna	3.00(n.c.)
MOBILE AERIALS	
ASP201 2m ¼ wave with base	3.50(1.25)
ASP2009 2 5/8th wave with base	9.25(2.00)
ASP3009 2m 5/8th wave with base	9.75(2.00)
ASP462 70cm co-linear with base	8.25(1.25)
Magnetic base adaptor	8.50(.75)
ASP677 2m 5/8th wave	14.95(2.00)
ASP667 70cm co-linear	17.95(1.25)
ASPM125 27MHz ¼ wave	18.50(2.00)
Magnetic base adaptor	8.50(.75)
ASP 'no hole' boot mount adaptor	3.75(.50)
2NE 2m 7/8th mobile whip	13.00(2.00)
RG4M Base for above aerial	3.50(.75)
GSS Heavy duty gutter/boot mount	3.15(.50)
MB5 Magnetic mount with 5m coax	7.95(1.00)
10SE 28MHz whip 1·72m long	11.50(1.25)
15SE 21MHz whip 1·72m long	11.50(1.25)
20SE 14MHz whip 1·72m long	13.80(1.25)
WELZ PROFESSIONAL POWER/SWR METERS	
SP200 1·8-160MHz 20W-200W-1kW	49.95(n.c.)
SP300 1·8-500MHz 20W-200W-1kW	69.95(n.c.)
SP400 130-500MHz 5W-20W-150W	49.95(n.c.)
SHORT WAVE LISTENER AERIALS	
3-30MHz Inverted "L"	9.95(1.00)
3-30MHz Broad band dipole	29.00(1.00)
Mosley RD5 all-band dipole	40.00(1.00)
AIR BAND PORTABLE MONITORS (see also VHF/UHF Monitors)	
SHARP FX213 tuneable receiver	13.50(.75)
INGERSOLL MW/FM/Airband monitor	12.95(.75)
R517 Tuneable + 3 Xtal controlled chan's	49.50(.75)
MISC STATION ITEMS	
SEIF 13·8V 4 amp AC power supply	22.95(1.50)
PS125 6 amp AC power supply	28.00(2.00)
EK121 Katsumi Electronic Keyer	29.00(.75)
EKM12 Matching side tone monitor	10.95(.50)
CW2A general purpose morse oscillator	6.95(.50)
Telegraph CW key (manual)	10.50(.75)
YW3 Twin SWR/Pwr/Field strength meter	11.50(.50)
MF210 Self powered 2M FM monitor	12.95(.50)
FX1 d/l station w/meter 700kHz-250MHz	28.00(1.00)
DM81 700kHz-250MHz dip meter	51.75(1.00)
Station log books	1.95(.50)
12BY7A driver valves	2.75(.50)
6146B/S2001A P.A. valves	8.70(.50)
6JS6C P.A. Valves Matched pairs	9.95(.50)
PL259 plugs	.63(n.c.)
PL259 reducers	.17(n.c.)
SO239 chassis sockets	.60(.10)
PL259 joiners	.85(.10)
N. Plugs. Silver plated UR67	2.00(n.c.)
N. Plugs. Silver plated UR43	2.00(n.c.)
4 pin mic plugs	.85(.10)
3 pin mic plugs	.85(.10)
6 pin mic plugs (FDK 750)	1.00(.10)
3 pin chassic socket	.85(.10)
4 pin chassis socket	.85(.10)
BNC plugs (bayonet)	.90(.05)
Pen Cell Ni-cads (HP7 size)	1.20(.05)
Cigar lighter plugs	.55(.10)
UR67 cable 50Ω per metre	.69(.10)
UR43 cable 50Ω per metre	.23(.05)
5 core rotator cable per metre	.30(.05)
BL40X balun 50Ω	11.25(.35)
3 core rotator cable. Per metre	.22(.05)
Ferrite rings 1¼" diameter	.35(.05)
Mosley aerial insulators	.30(.05)
KX2 SWL aerial tuner 0·5-30MHz	29.90(1.50)
APM1 Audio Peak and notch filter	33.00(1.00)
HP3A TVI high pass filter (UHF T.V.)	3.95(.50)
Drake TV3300 LP Low Pass Filter	18.40(1.20)
Shure 444D high impedance desk mic	27.50(1.50)
Shure 201 high impedance hand mic	11.75(1.00)
Trio HCM10 Digital World Clock	55.20(1.50)

TRIO R1000 £285.00

The receiver that revolutionised short wave listening. Full 30 band coverage 200kHz to 30MHz SSB/CW/AM. Both digital and analogue readouts are provided together with 230V or 12V dc operation facilities. Trio engineering at its best and at a very competitive price.

TRIO TR9000 £345.00

An all mode 2 metre transceiver that serves the dual roll of mobile and base station. Features include digital readout, 12½ or 25kHz steps in FM, five memories band scanning and a lot more! Send for coloured leaflet.

TRIO TS830S £639.00

A brand new model having all nine bands fitted and providing 200 watts input SSB/CW. Built-in 230V ac supply, 6146B tubes and full digital and analogue display. Plus a really comprehensive variable selectivity and notch filtering system. The DX'ers dream.

MAIL ORDER—FASTEST IN THE BUSINESS

PLUS FREE INSURANCE ON ALL GOODS DESPATCHED. (Tel: 0702 206835)

We have probably the busiest mail order department in the country. From the time the mail arrives at 8.30 a.m. until 5.30 when the mail vans arrive, our team of packing ladies are busy despatching your orders. We know how anxious you are to receive your new equipment that's why we have tried to build up the service that we ourselves would like to receive. So wherever you are in the U.K. you can choose your equipment from the comfort of your home with the knowledge that your order will be given top priority, packed safely with free insurance and despatched immediately to you.

If you have a Barclaycard or Access Card, then simply telephone us your number. Alternatively, payment can be made by post in the form of cheque, postal order etc, made payable to Waters & Stanton. For your added convenience a special mail order slip is attached below. Please write clearly—we're pretty good at most things but useless with crystal balls!

MAIL ORDER SLIP to: Waters & Stanton Electronics, Warren House, Main Road, Hockley, Essex. (E.C. Wed. 1.00 pm)

Name .....
Address .....
.....
.....
Please rush me the above. Cheque enclosed for £.....

Goods required .....
.....
.....
.....
Please charge to credit card No. .....

Thanet Electronics for ICOM

the amateur's professional friends

Buy direct from us and get two years warranty on all equipment

IC-451 UHF Base Station

£579 inc. V.A.T.

ICOM are proud to announce the introduction of the 70cm version of their famous 2m base station – the IC-251. Of course, it is engineered to the usual high ICOM standards and includes such features as:-

* 3 memory channels
* Automatic repeater shift on switch-on
* Additional selectable shift for European DX
* Selectable channel steps for FM (supplied with 25KHz – others are diode programmable)
* Full power control on SSB/CW/FM
* Superb receiver performance using MOSFETS
* Multipurpose scanning
* Covers 430-440 MHz
* Xtal controlled Toneburst
* Cool running chopper power supply

As Versatile as an Egg
So get cracking Now!
IC-2E Handy Talky £159 INCL.

CHECK THE FEATURES

FULLY SYNTHESIZED – covering 144-145.995 in 400 5kHz steps.
POWER OUTPUT – 1.5W with the 9V rechargeable battery pack as supplied – but lower or higher output available with the optional 6V or 12V packs.
BNC ANTENNA OUTPUT SOCKET – 50 ohms for connecting to another antenna or use the Rubber Duck supplied.

SEND/BATTERY INDICATOR – Lights during transmit, but when battery power falls below 6V it doesn't light indicating the need for a recharge.
FREQUENCY SELECTION – by thumbwheel switches, indicating the frequency.

+5kHz SWITCH – adds 5kHz to the indicated frequency.
DUPLEX SIMPLEX SWITCH – gives simplex or plus 600kHz or minus 600 kHz Transmit.
HI-LOW SWITCH – reduces power output from 1.5W to 150mW reducing battery drain.
EXTERNAL MICROPHONE JACK – If you do not wish to use the built-in electret condenser mic an optional microphone/speaker with PTT control can be used. Useful for pocket operation.
EXTERNAL SPEAKER JACK – for speaker or earphone.
This little beauty is supplied ready to go complete with nicad battery pack, charger, rubber duck.

On these, and all our other products:

* Free delivery for all transceivers, using registered first class post
* H.P. and Part Exchange welcome. All prices including V.A.T.

SEND FOR TECHNICAL DETAILS

Also available from our shop in Herne Bay are:

* MICROWAVE MODULES
* RSGB PUBLICATIONS
* J-BEAM
* G-WHIP
* WESTERN
* BEARCAT
* ANTENNA SPECIALISTS
* YAESU MUSEN
* VIDEO GENIE COMPUTERS

IMPORTANT

We would like you to phone, or write to us so that we can give you as much detailed information as possible on any particular product. Use our 24 hour ansafone when calls are cheap.

Thanet for ICOM

143 RECULVER RD.,
BELTINGE,
HERNE BAY, KENT.
Tel: 02273/63859

for only £255 INCL.

IC-255E An experts mobile choice

NOW WITH IMPROVED FRONT-END

25 Watts — 5 Memories — Scanning — 600kHz
AND User Selectable Repeater Shift — Full Coverage in 5kHz or 25kHz Steps.

- Crystal controlled Tone Burst
- Full band coverage — extendable to 148MHz if required
- Four digit LED display
- 25 Watts output or 1W low power
- A superb receiver using grounded gate FET front end
- Scanning over a user programmable range
- Memory scan
- Stop on empty or busy channels
- Tuning in 25kHz or 5kHz steps
- 5 Memories — retained while the power is connected to the rig
- Built-in 600kHz Repeater Shift
- Alternative programmable shift
- Reverse Repeater facilities
- RIT (± 3kHz for those off channel stations)
- Scan control from the microphone (optional mic available)
- Good loud audio
- Optically coupled tuning between control knob and CPU
- Multiway 24 pin socket on back for touchpad, computer, or external control
- Rugged modular PA (Guaranteed of course!)
- Mobile mount which can be padlocked
- Up-down scanning microphone available

CAN YOU RESIST SUCH A TEMPTATION

Enjoy VHF mobile at it's best-IC-260E

The IC-260E offers such extras as full frequency read out, upper and lower sideband, and scanning as well as FM and CW. Thus, it makes an ideal base station, when used with a DC power supply, as well as a mobile. Now supplied with up-down scanning mic.

£339 INCL.

ICOM IC 251E

The Latest 2M Multimode Base Station

Facilities include: FM, USB, LSB and CW. Built in scanner and memories. Bright green digital readout.

only £479 INCL.

SEND FOR TECHNICAL DETAILS

AGENTS (PHONE FIRST — All evenings and weekends only

Scotland	Jack GM8GEC (031-665-2420)	Midlands	Tony G8AVH (021-329 2305)
Wales	Tony GW3FKO (0874 2772)	North West	Gordon G3LEQ (Knutsford (0565) 4040)

See us at ELVASTON CASTLE RALLY JUNE 14th

BARCLAYCARD VISA

All over the World they haven't been able to get enough!

(But things are getting better)

ICOM's new 9-band HF Transceiver – the IC-720A beats the lot!

IC-720A
£795 incl

Some features.

- 9 Bands Top to Ten including new ones!
- General Coverage Receiver – 100KHz to 30MHz.
- Tuning down to 10Hz steps – YES! 10Hz – yet stable as a rock!
- Built-in Speech Compressor which really gets excellent reports.
- The famous ICOM Band Pass Tuning.
- Memory – it even does all the band changing for you.
- Self cancelling RIT.
- 3 rates of Tuning.
- Two Independent VFOs (in band duplex possible).
- 100 W Output.
- Modes AM, SSB, CW and RTTY.

A lot in a small packet for £795 inc. VAT (13.6V operation – matching mains PSU £100)

- Solid State 500W linear available shortly.

FOR ONLY £640.00 INCL.

Tono Theta 7000E A great computer on offer from Thanet

The new THETA 7000E means that every Amateur can enjoy the visual display of CW, RTTY and ASCII in both transmit and receive modes. Just connect the TONO to any TV set via the antenna terminals or to a page printer from the parallel port provided. Bring up your CW speed in receiving or sending by either watching receiver sent or from recorded cassettes. Connection to the transceiver is via the key, phone and mic sockets.

Some of the Outstanding Features COMMUNICATIONS COMPUTER THETA 0-7000E

UHF and Composite Video Output * Printer interface * Wide range of transmitting and receiving speeds – 10CW speeds + 8RTTY * Built-in demodulator for high performance for 170, 425 and 820 Hz shift * Crystal controlled modulator for ASFK – Hi or Lo tone * Convenient ASCII key arrangement * Large capacity display memory – 2 pages 32chr x 16 lines split screen for Rx & Tx if required * Automatic transmit/receive switch * Anti-noise circuit * Battery backed-up memory 7 channels of 64chrs * Send function * Buffer memory – 53 character type ahead, rub out function * Simultaneous access of the memory – 53 character type ah
LF (line feed) cancel function * Cursor control function * Word mode operation * Automatic CR/LF (72, 60 or 80 chrs per line) * Echo function * Word Wrap around function * Transmit/receive in ASCII mode or RTTY * CW indentification function * Mark and break (space and break) system * Monitor circuit & CW practice function * Variable CW weights * Cross pattern checking output terminal * Log computer output provided * Test message function (Ry and QBF).

Phone or write for the price list of accessories for this unit.

'NEW' IC24G

£199 INCL.

The famous IC240 has finally been replaced. Many thousands are in use and its popularity was due in part to simplicity of operation, sensitivity and superb audio on TX and RX. The new IC24G has these and other features:-

Full 80 channels selected by easy-to-operate press button thumbwheel switches. Readout is by channel numbers, ie: S21=521, S16=516 and for the lower part of the band 144.5=420. This readout can be clearly seen in the brightest of sunlight. Duplex and reverse duplex is provided along with a crystal controlled tone call. Hi-10w and lo-1w RF output is available, along with a 12½KHZ upshift, should the new channel spacing be necessary. The old IC240 proved to be the most reliable rig we have ever sold - the IC24G, because it is so similar, looks like following the same pattern.

Remember, for mobile use a rig MUST be easy to operate to be safe.

SEND FOR TECHNICAL DETAILS

Thanet for ICOM

TELEX: 965179

MICROWAVE MODULES LTD

RTTY TRANSCEIVER MM4000

NEW PRODUCT!

FEATURES

- ★ COMPLETE TRANSCEIVE DATA COMMUNICATION SYSTEM USING THE LATEST STATE OF THE ART MICROPROCESSOR
- ★ WIDE RANGE OF POPULAR RTTY & ASCII SPEEDS
- ★ MESSAGE STORAGE FACILITY
- ★ COMPATIBLE WITH A STANDARD PARALLEL ASCII KEYBOARD AND PRINTER
- ★ AUTOMATIC CARRIAGE RETURN/LINE FEED
- ★ AUTOMATIC LETTER SHIFT
- ★ STORED "RY" TEST FUNCTION
- ★ UPPER AND LOWER CASE DISPLAY FOR ASCII

SPECIFICATION

Modes of operation:	**Amateur standard ASCII: 110, 150 and 300 baud. Murray coded RTTY: 45·5, 50 and 75 baud. IN EACH OF THESE MODES THE RECEIVE CONVERTER WILL ACCEPT FSK AND AFSK SIGNALS**
Transmit shift:	**170Hz**
Message storage capacity:	**1,000 characters**
Audio input socket:	**Phono**
Video output socket:	**Phono**
TV (UHF OUTPUT) socket:	**Phono**
Keyboard socket:	**25 way DB25**
Power socket/transceive control:	**5 pin DIN**
External terminal unit socket:	**8 pin DIN**
Power requirements:	**12·5V @ 800mA**
Weight:	**1Kg (2lb 2oz)**
Overall size:	**187 × 120 × 53mm (7⅜ × 4¾ × 2")**

DESCRIPTION

This MM4000 unit, when simply connected to any HF or VHF transceiver, a standard UHF TV set, and an ASCII keyboard, provides a complete data communication capability at a cost of less than half of any similar system. The MM4000 contains a terminal unit, a microprocessor controlled TV interface and the necessary transmit tone generators to enable live transceive communication of RTTY and ASCII, with the minimum of ancillary equipment.

An exceptionally useful facility is provided, in that the user can enter and recall any message or information due to the inclusion of a dedicated message store.
This facility makes the unit particularly useful as this may be used for CQ calls, station details or general short messages. This facility has a total capacity of 1,000 characters.

The necessary inter-connections are:

1. Audio from the loudspeaker socket on the transceiver to the MM4000
2. Audio to the microphone socket on the transceiver from the MM4000
3. The PTT line from the MM4000 to the transceiver
4. A coaxial lead from the MM4000 to the aerial socket on the TV set
5. A suitable ASCII keyboard to be connected to the MM4000

Transmit/receive control is achieved by specific keyboard command sequences as is the memory storage/recall. The display format is 16 lines of text each 64 characters wide, and the display on the screen of the TV set may be black on white or white on black and is switch selectable on the rear panel.
When in an ASCII mode both upper and lower case text is possible.

Red, yellow and green LED status lights provide a visual indication of "correct centre-tuning", the speed in operation, and when the unit is in the send mode.

The inclusion of automatic software routines eliminates the possibility of information being corrupted or over-written by the inclusion of automatic carriage return/line feed. (Baudot signals only.) After 15 different characters in figure shift have elapsed, the receive converter will automatically return to letter shift.
This feature alleviates the problem caused by a corrupt character forcing figure shift, but allows for repetitive underline characters. This facility may be overridden when the front panel mounted "case control" switch is in the "off" position.
This allows for continuous figure shift characters to be transmitted and received, eg Oscar prediction tables etc. (Baudot only.)

The input stage of the receive decoder is a balanced bridge frequency discriminator, with a transition frequency of 1,360Hz. It is therefore possible to receive both narrow and wide shift radio-teletype signals.
The transmit section provides a shift of 170Hz.
However, by connecting an appropriate external MODEM to the 8-pin DIN socket, located on the rear panel, other shifts and tone standards are possible.
This socket also allows an external terminal unit or AMTOR interface to be connected.

A 25-way socket (DB25) located on the rear panel is intended to interface with a standard parallel ASCII keyboard and printer.

The unit utilises 2 microprocessors, 4 memory integrated circuits and 18 other I.C.s.
All circuitry is constructed on two high quality glass-fibre printed circuit boards, and protection against reverse polarity is included.
The unit is housed in a highly durable black diecast enclosure, and all necessary plugs are supplied.

As shown on our price list, a suitable ASCII keyboard can be supplied at a special combined price.

PRICE: £269 inc VAT (p&p £2.00) OR WITH KEYBOARD: £299 inc VAT (p&p £3.00)

ALL MICROWAVE MODULES PRODUCTS ARE FULLY GUARANTEED FOR 12 MONTHS (INCLUDING PA TRANSISTORS)

Access BARCLAYCARD VISA
WELCOME

MICROWAVE MODULES
BROOKFIELD DRIVE, AINTREE, LIVERPOOL L9 7AN, ENGLAND
Telephone: 051-523 4011 Telex: 628608 MICRO G
CALLERS ARE WELCOME, PLEASE TELEPHONE FIRST

HOURS:
MONDAY-FRIDAY
9-12.30, 1-5.00

AMATEUR RADIO EXCHANGE

See us at ELVASTON CASTLE RALLY JUNE 14th

See us at ELVASTON CASTLE RALLY JUNE 14th

If you're planning to spend your hard-earned money on a new piece of Amateur Radio equipment, the only way to make sure you're buying the one that's right for you is to try as many alternatives as possible side by side. As many makes . . . as many models . . . with all the accessories . . . secondhand as well as new.

FT-707

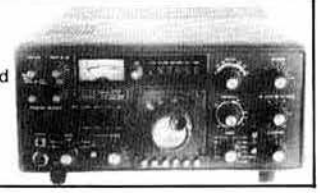
The ultimate in HF mobile transceivers from Yaesu. All the new bands, and all the latest technology.

PHONE FOR LATEST PRICE

FT101 NEW SERIES

The tried and tested Yaesu HF base station, now with audio peak filter and reject notch filter as standard, and choice of AM or FM.

FT101Z from **£499** inc. VAT and FREE
FT101ZD from **£579** cooling fan & mic



FRG-7

Still the finest value-for-money communications receiver on the market at only

£185 inc. VAT and free Heliscan aerial worth **£15**

FRG-7700

Yaesu's latest receiver with FM right across the band now offers yet more optional extras.
Memory facility . . .
Aerial tuning unit . . .
and no less than four converters

A.	118–130MHz,	130–140MHz,	140–150MHz
B.	118–140MHz,	140–150MHz,	50– 60MHz
C.	140–150MHz,	150–160MHz,	160–170MHz
D.	118–130MHz,	140–150MHz,	70– 80MHz

Basic receiver **£299** inc. VAT and **FREE** Heliscan aerial worth £15
inc. VAT and FREE power supply.

FT-107M

Yaesu's solid state, broad band tuned HF transceiver, will operate into a 3–1 SWR and still bring in the DX

£690 inc. VAT

IC-720A

Icom's superb new HF rig with general coverage receive 100kc–30MHz plus transmit facility across its entire range for commercial purposes

£795 inc.VAT

TS-830S

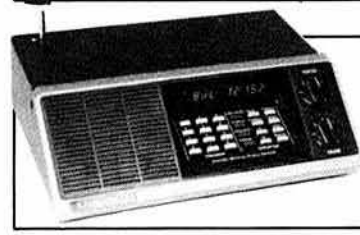
Another Trio/Kenwood development of an existing best-seller . . . the TS-820 gives way to the TS-830S, now with all the new bands, notch filter, IF shift, etc

£625 inc. VAT and free mic.

SPECIAL ANNOUNCEMENT

Now in stock

A full range of Wood & Douglas kits and modules



BEARCAT 220FB

The super scanner which brings you all the excitement of the VHF and UHF frequencies . . . aircraft, marine, amateur, plus so much more

£258.75 inc. VAT

FT-480R/FT-780R

Yaesu's pace-setting mobile format now available for either 2m or 70cm use.

FT-480R £359
FT-780R £395
} Inc. VAT and FREE power supply

TR-9000

Trio/Kenwood's long-awaited entry into the 2m all-mode mobile field with 5-channel memory, twin VFOs etc

£342 inc. VAT

LICENSED CREDIT BROKERS ★ Ask for written quotation
INSTANT HP AND 6-MONTHS NO-INTEREST HP TERMS AVAILABLE
FOR LICENSED AMATEURS AND BANK/CREDIT CARD HOLDERS

Access BARCLAYCARD VISA

Credit card sales by telephone

Prices are correct as at copy date, but owing to currency fluctuations may vary by publication date. Please phone for latest information.

AMATEUR RADIO EXCHANGE

See us at ELVASTON CASTLE RALLY JUNE 14th

And where can you find that wide a selection of gear? Here of course, in Ealing, where Brenda (G8SXY) and Bernie (G4AOG) are waiting to welcome you . . . or on our super silver stand at Ally Pally. There's just one difference—we can't serve our usual coffee at the Exhibition!

NEW

THE FANTASTIC NEW SONY ICF-2001

At last, from one of the world's electronics giants, a real HF communications receiver . . . and the very first with keyboard frequency entry . . . yet so compact you can slip it in your briefcase.

Super selectivity and sensitivity right across its range, AM/SSB 150kc to 30MHz and FM 76MHz to 108MHz.

And all for an amazingly low price of just

£159.00 inc. VAT.

YAESU's LATEST . . .

the new all-mode 2m portable FT-290

So many features ★ 10 memories ★ Memory scan ★ 2 VFOs ★ Band scan ★ Clarifier ★ FM/LSB/USB/CW ★ LCD readout ★ Real S-meter ★ Priority channel ★ 2·5w out

PHONE FOR LATEST PRICE

PCS-3000

Azden's pace-setting new 2m mobile giving 25w out, with 25kc or 12·5kc shift and 8 memories . . .

all for only **£199** inc VAT

IC-730

Icom's latest HF mobile transceiver with Band Pass tuning, 2 VFOs, 100w out.

£549.00 inc. VAT.

Service with a Smile

Components Galore

Our new Servicing Centre just across the road from the main shop also keeps in stock a vast array of those bits and pieces the enthusiast finds so difficult to get hold of for building or modifying his own gear. Things like power supplies, RF power devices, FETs, integrated circuits, diodes, capacitors, resistors, etc. You name it—we've probably got it in stock. And, if we haven't, we'll order it for you.

Up the Pole

Of particular interest at the moment, since erecting them makes such a nice outdoor job for the summer, are aerials, and all their ancillary items like rigging kits, mast clamps, couplers, di-pole centres, baluns, nylon ropes . . . the lot.

Closed Wednesday, but use our 24-hour Ansafone service.

2 NORTHFIELD ROAD, EALING, LONDON, W13 9SY. Tel: 01-579 5311

So easy for Overseas visitors—Northfields is just seven stops from Heathrow on the Piccadilly Line

AMATEUR ELECTRONICS UK

Your number one source for YAESU MUSEN

NEW

FT-101ZD Mk. III

Now from YAESU comes the latest version of the renowned FT-101 – AM/FM option, notch filter, audio peak filter, variable bandwidth – UNBEATABLE VALUE.

FT-480R High technology all-mode 2 metre mobile

The most advanced 2 metre mobile available today – USB, LSB, FM, CW full scanning with priority channel, 4 memory channels, dual synthesized VFO system.

FT-707 All solid-state HF mobile transceiver

The definitive HF mobile rig, digital, variable IF bandwidth, 100 watts PEP SSB. AM, CW (pictured here with 12 channel memory VFO).

As factory appointed distributors we offer you – widest choice, largest stocks, quickest deal and fast sure service right through–

Access

Access or attractive H.P. terms readily available for on-the-spot transactions.
Full demonstration facilities.
Free Securicor delivery.

FT-707 In base station format

Here we show the 707 together with the matching FP-707 PSU FC-707 ATU and FV-707DM VFO memory.

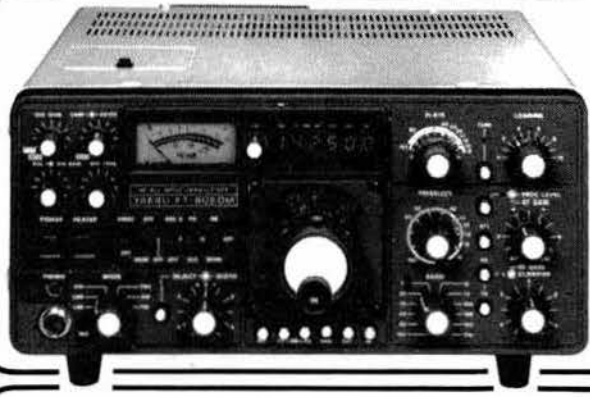
For full details of these new and exciting models, send today for the latest YAESU CATALOGUE and LEAFLETS. All you need to do to obtain the latest information about these exciting developments from the world's No. 1 manufacturer of amateur radio equipment is to send 36p in stamps and as an added bonus you will get our credit voucher value £3.60p – a 10 to 1 winning offer.

FL-2100Z High power all band HF linear

Conservatively rated at 1200W PEP input, the new WARC model incorporates all the new bands.

FRG-7700 Synthesized general coverage receiver

The very latest in receiver technology from YAESU. Receives USB, LSB, CW *and* FM–memory option with 12 channels and automatic band selection.

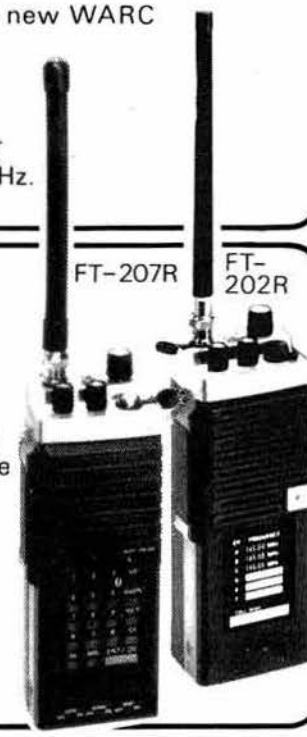


FT-902DM Competition grade HF transceiver

The YAESU world famous pace–setter with the acknowledged unbeatable reputation. 160 thru 10 metres including the new WARC bands. All–mode capability, SSB, CW, AM, FSK and FM transmit and receive. Teamed with the FTV–901R transverter coverage extends to 144 & 430MHz.

FT-225RD Deluxe 2 metre base station

The tried and proven all–mode 225RD has a very comprenensive specification including memory option, variable power output and DC operation for portable working.



FT-202R 2metre hand-held

Ultra compact lightweight (400g) FM hand–held 1 watt 6 channel, rugged and reliable –many thousands in use.

FT-207R Synthesized 2 metre hand-held

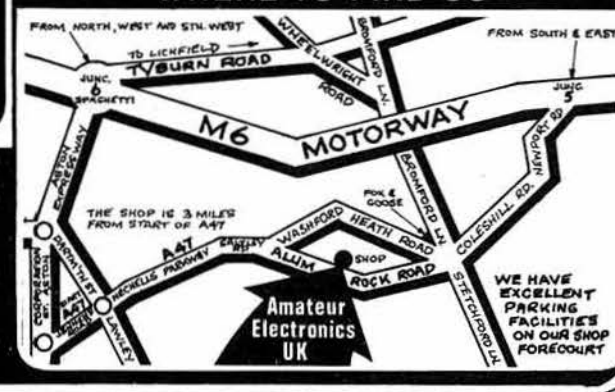
400 channels on 144–146 MHz. Memory back–up, 2·5 watt output.

AGENTS:

NORTH WEST – THANET ELECTRONICS LTD, GORDON, G3LEO. KNUTSFORD (0565) 4040.
WALES & WEST – ROSS CLARE, GW3NWS, GWENT (0633) 880 146.
EAST ANGLIA – AMATEUR ELECTRONICS UK – EAST ANGLIA. DR T. THIRST (TIM) G4CTT, NORWICH 06325 865
NORTH EAST – NORTH EAST AMATEUR RADIO. DARLINGTON 0325 56969
SOUTH EAST – AMATEUR ELECTRONICS, UK – KENT KEN McINNES, G3FTE, THANET (0843) 291297

FT-290R ?

WHERE TO FIND US



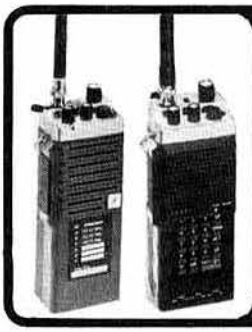
Amateur Electronics UK
508-516 Alum Rock Road·Birmingham 8
Telephone: 021-327 1497 or 021-327 6313
Telex: 337045
Opening hours: 9.30 to 5.30 Tues. to Sat. continuous – CLOSED all day Monday.

REMEMBER: When you deal with SMC you get:

The SMC 2-year guarantee on Yaesu. The speedy free Securicor service.
The security of dealing direct with the largest authorised importer.
The spacious, very well equipped, ably staffed test and service facility.
The knowledge that we carry tens of thousands of pounds of spare parts.
Our discreet "instant" H.P. Our personal export documentation scheme.
Our in-person, or over the 'phone, time saving credit card acceptance.
Our honest advice and evaluation of part exchange equipments' worth.
Our deep interest and knowledge in most facets of our common hobby.

AND DO NOT FORGET THE FREE FINANCE SCHEME

Give us a ring for full details (subject to clearance and a minimum of £100 invoice) we will help you to enjoy new regular priced Yaesu, KDK, Gem Quad, Ascot, SMCHS, CDE, Hy Gain, Stolle, Channel Master, SMC, Hansen, MFJ, KLM, Mirage, and Hi-Mound—Tomorrow!



FT207R £195 144MHz 3W 12½kHz Synth

FT202R £109 144MHz 1W 6 Chan (3 inc)

FT404R £179 432MHz 3 W 6 Channel

*9 Band Models—6 Banders in stock

FT107M £690*

160-10m, SSB, CW, FSK, AM Memory option. Deluxe all solid state

NEW

FT101ZFM £529

160-10m, 9 bands, variable IF width. AM/FM, digital/analogue, versions available.

*9 Band Models—6 Banders in stock

FT902DM £799*

10-160m, SSB, CW, AM, FM, Deluxe Digital, (DE version £713.00. D version £724.50)

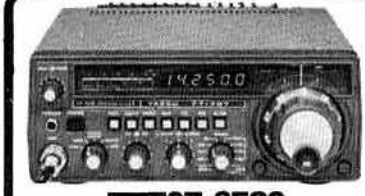
FT7B £399

80-10m, SSB, CW, AM. Audio filter for CW. 100W PEP 5 bands

SALE

FT/FP200 £335

10-80m. SSB, CW, 180W PIP, C/W, FP200 AC PSU/speaker. 5 Bander



FT707 £529

10-80m, 100W PEP, SSB, AM, CW. Variable IF Bandwidth. Digital. 8 Bander

FT480R £359

2m, Synthesized. 25, 12½, 1kHz steps FM 1kHz, 100, 10Hz, steps SSB, 10W PEP.

NEW

GaAs FET RF!!!

FT780R £409

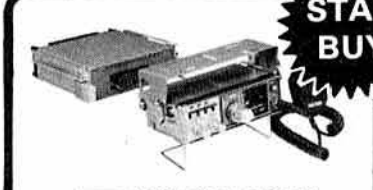
70cm, Synthesised. 100, 25, 1kHz steps FM. 1kHz, 100, 10Hz steps SSB. 10W PEP

FT225RD £565

2m. SSB, CW, FM, AM, Digital readout. 25+ watts. (Analogue version £449.00)

FRG7 £199

0·5 30MHz General Coverage Receiver. 230V ac. 12V dc, + Battery pack. AM/SSB



STAR BUY

FT720RV £253

FT720R £120, S72 £56, E72S £23, E724 £28, 720RV £133, 720RVH £143, 720RV £156

FRG7700 £309

0·15-30MHz General Coverage Receiver. AM/SSB/CW/FM (Memory Version £389)

PRICES INCLUDE VAT @ 15%

FREE SECURICOR DELIVERY

2 YEAR DISTRIBUTOR WARRANTY

SOUTH MIDLANDS COMMUNICATIONS LIMITED

S. M. HOUSE, OSBORNE ROAD, TOTTON, SOUTHAMPTON, SO4 4DN, ENGLAND
Tel: Totton (0703) 867333, Telex: 477351 SMCOMM G, Telegram: "Aerial" Southampton

VERSATOWER

TELESCOPIC & TILTOVER RADIO TOWERS

Twelve years of continuous development has produced a range of over 50 models, all of which, being made in England, conform to the current B.S.S., requiring minimum designed wind speeds of 85mph and up to 117mph.

Before purchasing a Tower, we strongly recommend consulting one of our engineers for advice regarding the most suitable combination for an installation. *It would be incorrect to nominate a specific headload as this is dependent upon load distribution, geographical location and siting.*

STANDARD TYPES

Post mounting			**Post Mounting**		
13M20P25	25'	£252	16M20P40	40'	£514
13M20P40	40'	£345	16M20P60	60'	£584
13M20P60	60'	£422	16M20P80	80'	£880
13M20P80	80'	£805	16M20P100	100'	£1,061
Fixed Base			**Fixed Base**		
13M20FB25	25'	£188	16M20FB40	40'	£404
13M20FB40	40'	£280	16M20FB60	60'	£478
13M20FB60	60'	£357	16M20FB80	80'	£752
13M20FB80	80'	£739	16M20FB100	100'	£920
Socket Types			**Socket Types**		
13M20SP25	25'	£293	16M20SP40	40'	£558
13M20SP40	40'	£386	16M20SP60	60'	£640
13M20SP60	60'	£464	16M20SP80	80'	£937
13M20SP80	80'	£847	16M20SP100	100'	£1,118
Base plate			**Base plate**		
13M20BP25	25'	£295	16M20BP40	40'	£524
13M20BP40	40'	£389	16M20BP60	60'	£606
13M20BP60	60'	£464	16M20BP80	80'	£902
13M20BP80	80'	£847	16M20BP100	100'	£1,083
Wall Mounting			**Wall Mounting**		
13M20W25	25'	£203	16M20W40	40'	£412
13M20W40	40'	£296	16M20W60	60'	£483
13M20W60	60'	£373	**Mobile Type**		
Mobile Type			16M20M40	40'	£1,723
13M20M25	25'	£1,356	16M20M60	60'	£1,823
13M20M40	40'	£1,484	16M20M80	80'	£2,241
13M20M60	60'	£1,576	16M20M100	100'	£2,316
13M20M80	80'	£1,998			

'T' Series Towers (20' sections)

13M20T85	85'	£1,135	13M20T120	120'	£1,550

The range encompasses towers between 25 and 120ft in 10, 20 or 40ft sections mounted on ground post, base plate, wall, fixed base or high speed trailer.

Towers are supplied complete to brochure specifications. Check details of luffing gear, head unit, winches and bolts against your requirements. (Standard items will be credited in full at order time).

*New reinforced head unit with provision for KS065 rotary bearing (£15.35 extra) is now available.

'30ft': 10ft SECTION "MINITOWER"

Capable of supporting a HF beam or several VHF Ants. The head unit accepts 2" tube and provides for a rotator. Operation is easy with single winch system.

10M10P30 Post mount	£307
10M10W30 Wall mount (LG1013W extra)	£295
10M10BP30 Base Plate (HD Bolts extra)	£325
10M10FB30 Fixed base (HD Bolts extra)	£285

NB. PRICES EXCLUDE VAT AT 15%
DELIVERY EXTRA (distance dependent)

HANSEN

IN LINE POWER/SWR BRIDGES P.E.P., R.M.S. 1·8–440MHz

The Hansen range covers 20 quality models with top-of-the-line the FS710. These are flat frequency response, peak envelope power and R.M.S. in-line wattmeters with many novel features. Most notable being the 'power independent' SWR scale—no forward power calibration knob, just direct reading SWR.

FT710; PEP AUTO-SWR RMS LEVEL FS710 £68

FS710H: 1·8-60MHz. 15,150, 1·5kW
FS710V: 50-150MHz. 15,150W
V.S.W.R: 4:1 and to 20:1
Accuracy: ±7% of FSD
Impedance: 50-52 Ohms
Connectors: SO239
Power: 240 Volts AC 50Hz
Weight: 3·lbs (1·5Kgs)
Size overall: 8 × 4 × 5½"
Size Meter: 2 × 3½"
Time Const: PEP follow 4 second

FS500 £53

PEAK READING LEVEL RESPONSE
FS500H 1·8-60MHz 20, 200 & 2kW
FS500V 50-150MHz 20 & 200W
Power ±7% FSD. SWR 1:1-5:1
Size: 8 × 4 × 5½"

FS600 £39

PEAK READING LEVEL RESPONSE
FS601M 1·8-30MHz 20 & 200W
FS601MH 1·8-30MHz 200 & 2kW
FS602M 50-150MHz 20 & 200W
FS603M 430-440MHz 5 & 20W
Power ±10% FSD. SWR 1:1-3:1
Size: 6½ × 2½ × 4½"

FS300 £35

LEVEL RESPONSE, LARGE METER
FS300H 1·8MHz 20, 200 1kW,
FS300V 50-150MHz 20, 200W FSD
Power ±10% SWR 1:1-3:1 ±10%
Size: 8 × 4 × 5½"

FS7 £31

VHF/UHF WATTMETER & BRIDGE
FS7 145MHz & 432MHz 5, 20, 200W
Power RMS ±10%. SWR 1:1-3:1
Power Max: 144MHz, 200W
432MHz 20W
Size: 6½ × 2½ × 4½". 'N' type sockets

FS711 £28

REMOTE INDICATOR TYPE
FS711H 1·8-30MHz 20 & 200W
FS711V 50-150MHz 20 & 200W
FS711U 430-440MHz 5 & 20W
Power ±10% SWR 1:1-3:1 ±3%
Indicator 5 × 2½ × 1½"
coupler 3½ × 2½ × 1½"

FS5E £28

INDEPENDENT TWIN METER
FS5E 3·5-150MHz 20, 200 & 1kW
Power RMS ±10%. SWR 1:1-5:1
Power Max: 1kW 3·5-30MHz
50W 50-150MHz
Size: 7 × 3 × 3½". 'On the Air' LED

FS300M £27

LEVEL RESPONSE, POWER & SWR
FS301M 1·8-30MHz 20, 200W
FS301MH 1·8-30MHz 200, 2kW
FS302M 50-150MHz 20, 200W
Power ±10%. SWR 1:1-3:1 ±3%
Size: 6½ × 2½ × 4½"

SWR3S £20

WIDE RANGE POWER & SWR
SWR3S 3·5-150MHz 20 & 200W
Power RMS ±10%. SWR 1:1-3:1
Power Max: 200W 3·5-30MHz
50W 50-150MHz
Size: 6 × 2½ × 2½". Antenna/switch

SWR50B £20

TWIN METER, RELATIVE POWER
SWR50B 3·5-150MHz Scaled 1kW
Power RMS ±20%. SWR 1:1-3:1
Power Max: HF 1kW 1:1, 300W 3:1,
VHF 50W
Size: 6 × 2½ × 2½". 'On the Air' LED

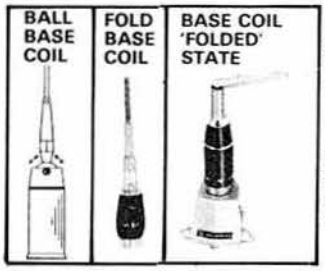
NB: PRICES EXCLUDE VAT (15%)
BUT INCLUDE POST AND PACKING

SMC-HS

INTERCHANGEABLE ELEMENT MOBILE ANTENNAS

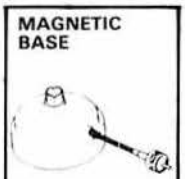
SMC HS Mobile antennas, tabulated below, feature an in-built PL259M connector which mates with the SO239M of the cable assembly (fits a ⅜" hole in car body or the cast chromed gutter mount) or the magnetic base (recommended for smaller antennas only). This arrangement is ideal for easy removal (element change, car wash and anti-vandal), tests and portable operation.

MODEL	BAND	GAIN	TYPE	POWER	LENGTH
20SE	14MHz		(¼λ)	100W	1·72m
15SE	21MHz		(¼λ)	130W	1·72m
10SE	28MHz		(¼λ)	100W	1·27m
4E	70MHz	0dB	¼λ	150W	1·03m
2VF	144MHz	3dB	½λ	50W	1·06m
2NE	144MHz	3dB	⅝λ	150W	1·30m
78F	144MHz	4·5dB	⅞λ	100W	1·75m
78B	144MHz	4·5dB	⅞λ	150W	1·72m
258	432MHz	5·5dB	2 × ⅝λ	100W	0·94m
358	432MHz	6·3dB	3 × ⅝λ	100W	1·36m



PRICES

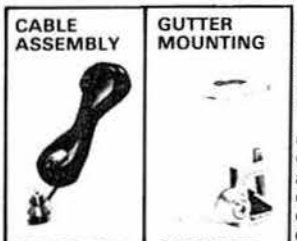
20SE	£12.00
15SE	£10.00
10SE	£10.00
4E	£6.50
2VF	£9.00
2NE	£5.50
78F	£10.00
78B	£11.00
258	£10.00
358	£12.50



Models have either a locking fold-over joint (for easy garage entry) or an in-built ball (in case the cable assembly is fitted askew).

The cable assembly (SOCA) is available in two versions—4 or 6 metres of cable. The magnetic base SMCS0MM is also supplied complete with 4m of RG58/U cable.

The ⅛'s are particularly recommended as the actual system gain, if the antenna is poorly sited, is usually very substantial.



PRICES

SOMM	T.B.A.
SOCA	£3.00
SOCAL	£3.35
GCD	£3.00

CARRIAGE
Complete antennas £1.00, or £0.50 for accessories, any quantity.

NB: PRICES EXCLUDE VAT (15%)
CARRIAGE EXTRA AS INDICATED

SOUTH MIDLANDS COMMUNICATIONS LIMITED

S. M. HOUSE, OSBORNE ROAD, TOTTON, SOUTHAMPTON SO4 4DN, ENGLAND
Tel: Totton (0703) 867333, Telex: 477351 SMCOMM G, Telegram: "Aerial" Southampton

COMMUNICATIONS LTD

SMC

SMC THE ONLY CHOICE FOR ROTATORS AND ACCESSORIES

KENPRO KR500

Elevation Rotator (180°). Up to 50kg of Load. 1½" 2½" mast 1¼" 1⅜" boom.

RC6W 6-core control cable
KR500 (post and packing free) £75.00

KENPRO K050

Rotary bearing. Dual mounting. Takes 1⅜" mast.

Post and packing £1.00
K050 £10.65

KENPRO K065

Rotary bearing. Dual mounting. Takes 2" mast.

Post and packing £1.30
K065 £15.35

CHANNEL MASTER

Upper mast support bearing. Takes 2" mast and 1¼" stub.

Post and packing £1.20
9523 £10.20

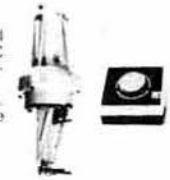
CHANNEL MASTER

Rotary bearing 3-way guying. Takes 1⅝" mast.

Post and packing 85p
9525 £11.30

SMC RLD3

Automatic control box. 24V AC motor. Light-weight head. To 2½sq feet. Takes 1⅛ 1¼" tube

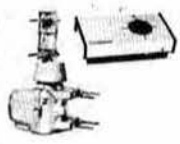


RC50W core control cable per metre **26p**
RLD3 (post and packing free) £29.35

CDE AR30

Accurate, silent self-calibrating control box. Dial up desired beam heading, push knob; motor rotates to that position and then switches off.

For UHF and small VHF use



RC5W 5-core control cable per metre **26p**
AR30 (post and packing free) £41.00

STOLLE 2050

Automatic control box. Dial desired direction and the rotator turns to the position and stops. Turning shaft (up to 1⅜") passes through rotator.

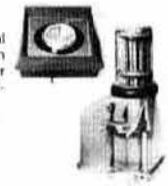
For UHF and small VHF use.

RC5W 5-core control cable per metre **26p**
2010 (post and packing free) £45.00

CHANNEL MASTER

Automatic control box. Dial direction secondary pointer gives position during travel.

Takes 1·2" mast and 1-1⅛" stub.

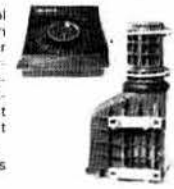


RC3W 3-core control cable per metre **26p**
9502A (post and packing free) £40.00

CHANNEL MASTER

Automatic control box. Dial direction secondary pointer gives position during travel. Stainless steel hardware. Heaviest duty "offset type". To 5sq.ft.

Takes 1·2" masts and 1·2" stub.



RC3W 3-core control cable per metre **20p**
9508 (post and packing free) £57.00

KENPRO KR250

Twist and switch controller. Rotator 200kg/m Bruke 600kg. 1" 1¼" masts.

RC6W 6 wag rotor cable
KR250 (post and packing free) £39.00

CDE AR40

Accurate, silent self-calibrating control box. Dial up desired beam heading, push knob; motor rotates to that position and then switches off.

For VHF use and light HF use c/w low casting.

RC5W 5-core control cable per metre **26p**
AR40 (post and packing free) £52.00

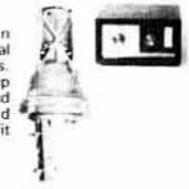
KENPRO KR400RC

360° round type meter. Max: load 200kg. Rot. 400kg/m, brake 1500 kg/m. 1½" 2½" masts. Lower casting option.

RC5W 5 way rotor cable per metre **26p**
KR400RC (post and packing free) £79.00

CDE BT1

Four position preset plus normal manual controls. Handles aerials up to 5sq.ft of wind area. Supplied with lower mast fit casting.



RC5W 5-core control cable per metre **26p**
BT1 (post and packing free) £79.50

CDE CD45

Large illuminated meter gives read out of antenna heading at all times. Armature brake. Low voltage meter. Handles antennas to 8½sq.ft.

RC8W 8-core rotor cable per metre **39p**
CD45 (Securicor Delivery free) £99.00

KENPRO KR600RC

360 round type meter. Max: load 200kg. Rot. 600kg/m, brake 400kg/m. 1½-2½" masts. Lower casting option.

RC6W 6 way rotor cable
KR600RC (post and packing free) £115.00

CDE HAM IV

Large illuminated meter gives read out of antenna heading at all times. Wedge solenoid brake mechanism. Handles antennas to 15sq.ft.

RC8W 8-core rotor cable per metre **39p**
HAM IV (Securicor Delivery free) £145.00

CDE T2X

Large illuminated meter gives read out of antenna heading at all times. Wedge solenoid brake mechanism. Handles antennas to 30sq.ft.

RC8W 8-way rotor cable per metre **39p**
T2X (Securicor Delivery free) £199.00

ALL PRICES EXCLUDE VAT (15%) CARRIAGE AS INDICATED

SMC

SOUTH MIDLANDS COMMUNICATIONS LIMITED

S. M. HOUSE, OSBORNE ROAD, TOTTON, SOUTHAMPTON, SO4 4DN, ENGLAND

Tel: Totton (0703) 867333, Telex: 477351 SMCOMM G, Telegram: "Aerial" Southampton

AGENTS

G3ZUL	Brian	Stourbridge	(03843) 5917
GI3KDR	John	Bangor	(0247) 55162
GM8GEC	Jack	Edinburgh	(031665) 2420
GI3WWY	Mervyn	Tandragee	(0762) 840656
GW3TMP	Howarth	Pontybodkin	(035287) 846/324
GW8EBB	Peter	Swansea	(0792) 872525
GJ4ICD	Geoff	Jersey	(0534) 26788

LEEDS
S.M.C. (Leeds)
Colin Thomas, G3PSM
257 Otley Road,
Leeds 16, Yorkshire.
Leeds (0532) 782326
9-5.30 Monday-Saturday

★ NEW ★

CHESTERFIELD
S.M.C. (Jack Tweedy) LTD
Roger Baines, G3YBO
102 High Street,
New Whittington, Chesterfield.
Chesterfield (0246) 453340
9-5; Tuesday-Saturday

★ NEW ★

WOODHALL SPA
S.M.C. (Jack Tweedy) LTD
Jack Tweedy, G3ZY
150 Horncastle Road,
Woodhall Spa, Lincolnshire.
Woodhall Spa (0526) 52793
9-5; Tues-Sat (+ appointments)

COUNCIL

President
B. O'Brien, G2AMV

Executive vice-President
J. Anthony, BSc, MIETE, G3KQF

Immediate past-President
P. Balestrini, TEng(CEI), MITE, G3BPT

Honorary treasurer
P. F. D. Cornish, FCA, G3COR

Ordinary members
E. J. Allaway, MB, ChB, MRCS, LRCP, G3FKM
J. Bazley, G3HCT
R. Bellerby, MA, BSc, FBIS, G3ZYE
D. S. Evans, PhD, BSc, FIM, G3RPE
K. A. M. Fisher, TEng(CEI), MIPRE, G3WSN
G. R. Jessop, CEng, MIERE, G6JP
D. M. Pratt, BTech, CEng, MIEE, MIERE, G3KEP
G. M. C. Stone, CEng, FIEE, FIERE, G3FZL

Zonal members
Zone A. J. Heathershaw, G4CHH (Mrs)
Zone B. J. Anthony, G3KQF
Zone C. *(Post vacant)*
Zone D. L. Hawkyard, G5HD
Zone E. R. G. Barrett, GW8HEZ
Zone F. *(Post vacant)*
Zone G. G. I. Knight, GM8FFX

REGIONAL REPRESENTATIVES
Region 1—W. M. Furness, G3SMM
Region 2—D. Smith, G4DAX
Region 3—H. S. Pinchin, G3VPE
Region 4—M. Shardlow, G3SZJ
Region 5—R. E. G. Kendall, G8BNE
Region 6—F. S. G. Rose, G2DRT
Region 7—D. A. G. Pedder, G3LFX
Region 8—D. N. T. Williams, G3MDO
Region 9—H. W. Leonard, G4UZ
Region 10—P. A. Jones, GW4HAT
Region 11—P. H. Hudson, GW3IEQ
Region 12—F. Hall, GM8BZX
Region 13—A. B. Givens, GM3YOR
Region 14—C. W. Tran, GM3WOJ
Region 15—I. Kyle, GI8AYZ
Region 16—M. S. Appleby, G3ZNU
Region 17—H. G. Cunningham, G8FG
Region 18—W. Ricalton, G4ADD
Region 19—R. J. Broadbent, G3AAJ
Region 20—B. L. Goddard, G4FRG

HONORARY OFFICERS
Audio tape and slide library co-ordinator
D. Simmonds, G3JKB

Awards managers
hf—P. Miles, G3KDB
vhf—Jack Hum, G5UM

Emergency communications manager
P. Balestrini, G3BPT

HF manager
E. J. Allaway, G3FKM

Intruder Watch organizer
S. Cook, G5XB

Observation Service organizer
D. M. Pratt, G3KEP

Microwave manager
D. S. Evans, G3RPE

Slow morse practice transmissions organizer
M. A. C. MacBrayne, G3KGU

Telecommunications liaison officer
R. F. Stevens, MBE, G2BVN

Trophies manager
P. A. Miles, G3KDB

VHF manager
K. A. M. Fisher, G3WSN

Video tape and film library co-ordinator
J. Anthony, G3KQF

Correspondence to RRs and honorary officers should be addressed directly to them (QTHR), not to RSGB HQ.

RSGB QSL BUREAU
QSL cards for distribution should be sent to:
Mr E. G. Allen, G3DRN, QSL Bureau manager,
30 Bodnant Gardens, London SW20 0UD

RADIO SOCIETY OF GREAT BRITAIN
(Limited by guarantee)

Registered office: **35 Doughty Street, London WC1N 2AE**
Telephone 01-837 8688. Telex 25280 (RSGBHQ G)

Founded 1913. Incorporated 1926. Member society, International Amateur Radio Union

PATRON: HRH The Prince Philip, Duke of Edinburgh, KG

The national society representing all UK radio amateurs

Membership is open to all those with an active interest in radio experimentation and communication as a hobby. Applications for membership should be made to the general manager, from whom full details of Society services may also be obtained.

GENERAL MANAGER AND SECRETARY
D. A. Evans, G3OUF

EDITOR
A. W. Hutchinson

ANNUAL SUBSCRIPTION RATES

UK corporate: £12.50, including VAT — **Overseas: £12.50**
Associates under 18: £5 — **Family member: £5**
Students aged 18 to 25: £7.50 *(Student applications should give the member's age at last renewal date and include evidence of student status)*
Associated societies: £12.50 (including *Rad Com*); **£7.50** (excluding *Rad Com*).

RSGB SUNDAY NEWS BROADCASTS

These broadcasts are made every Sunday morning on hf and vhf, giving almost complete coverage of the British Isles. All stations broadcasting these news bulletins use the callsign GB2RS, and information regarding them is given in the table below.

The purpose of these news broadcasts is to provide an outlet for amateur radio news items which, by virtue of their topicality or urgency, cannot wait for the next issue of *Radio Communication*. The bulletins are compiled on Wednesday mornings, and items for inclusion should reach RSGB HQ by letter (marked "GB2RS news") or telephone before 10am on Wednesday. No guarantee can be given of inclusion, in whole or in part, of any item submitted and, once broadcast, items are not usually repeated.

INTENDED RECEPTION AREA	NORMAL READER	RESERVE READER	LOCAL START TIME
Frequency: 3·640MHz. Mode: ssb			
NE Scotland	GM3HGA	GM3VEY	1130
Frequency: 3·650MHz. Mode: ssb			
SE England	G2MI	G4ARZ	0900
Midlands	G2CVV	G8QZ	0930
SW England/Wales	G8ML	G3JFH	1000
Northern Ireland	GI3GAL	GI3SXG	1030
NE England	G5VO	G3MCF	1100
E Scotland	GM4CUZ	GM4FLP	1430
Frequency: 3·660MHz Mode: ssb			
Central Scotland	GM3TCW	GM3ULP	1130
Frequency: 7·0475MHz. Mode: a.m.			
UK (from Northern Ireland)	GI3GGY	GI2DHB	0900
UK (from N Midlands)	G3LEQ	G2CVV	1100
Frequency: 144·250MHz. Mode: ssb (horizontal polarization)			
SW from the Midlands	G3BA	G3KQF	0930
NE from S Devon	G3CHN	G3PBV	1000
NW from Manchester	G3SMT	G4IAL	1000
NNW from Cleveland	G4JJB	G8FTZ	1000
W from Carlisle	G4LAA	(Vacancy)	1030
SE from Lincoln	G8OFQ	G3NRO	1030
SW from London	G3FZL/G3VAG	G3IIR	1030
S from Aberdeen	GM8GHV/GM8MBP		1030
W from Bristol	G4CJZ	G3ZWY	1100
W from Bangor, Co Down	GI3TLT	GI3SXG	1130
Frequency: 145·525MHz. (S21) Mode: fm (vertical polarization)			
Cornwall	G2ABC	G3NPB/G3VGO	0930
Hampshire, north	G8CKN	G3PZN	0930
Suffolk	G3ZNU	G4FSG	0930
Leeds	G3SPX	G8XGN	0930
Co Down	GI3WEM	GI4DOR	0930H
Edinburgh	GM4EHO	GM4JFS	0930
E Cornwall/S Devon	G3ZYY	G4GWJ/G4KYY	1000
Londonderry	GI2DHB	GI4AHD	1000H
London	G3FZL/G3VAG	G3IIR	1000
Birmingham	G3PWJ	G3BA	1000
Lincolnshire	G8OFQ	G3NRO	1000
Tyneside	G4FUT	G3WNR	1000
Glasgow	GM4HCO	GM4CXM/GM3VTB	1000
Elgin	GM4ILS	(Vacancy)	1000
Carlisle	G4LAA	G8OAU	1100
Southampton	G8LVC	G8ADM	1030
E Sussex coast	G8SC	G3ZFE	1030
Bristol	G4CJZ	G3ZWY/G8NNU	1030
Manchester	G3LEQ	G3JWK	1030
Brighton and coast	G3ZYE/G8GEZ	G4JGJ/AM	1100
Jersey	GJ8KNV	GJ4ICD	1100H
Gwynedd	GW4KEV	GW8TTM	1100

H = horizontal polarization

FRONT COVER

The Sindbad Voyage

To celebrate the 10th National Day of the Sultanate of Oman last November, a replica of an early Arab trading dhow, shown on the front cover of this issue, began an eight-month 6,000-mile voyage to China from Oman. The crew will trace the age-old sea route of the Arabs to the Orient, on which Arab story-tellers based the legendary voyages of Sindbad the Sailor. The route is by way of the Laccadive Islands, Maldive Islands, Sri Lanka, Nicobar Islands, Malacca, Singapore, Sumatra and Hong Kong, and the vessel should reach Singapore in mid-May and Hong Kong in July.

The dhow has a hand-hewn timber hull sewn together with coconut fibre rope, will be driven by two great triangular sails, and navigated by early Arab techniques. In addition to Omani sailors, the crew includes marine scientists to conduct marine research in addition to the historical research. Also on board is a radio operator who, as reported last month in *SWL news*, can be heard on 14,225kHz at 1745 using the callsign A4XSV/MM.

The voyage was conceived and is being led by Tim Severin, who led the Brendan voyage in 1976–7.

QTC
Amateur radio news

Resignations from Council

Mr D. J. Andrews, G3MXJ, zonal Council member for Zone C, has resigned from Council because of pressure of business and personal commitments. Mr Andrews had been a Council member since January 1976, and is currently chairman of the HF Contests Committee of which he has been a member since 1965.

Mr W. F. McGonigle, GI3GXP, zonal Council member for Zone F, has resigned from Council on health grounds. Mr McGonigle had been a member of Council since January 1971.

The Council of the RSGB has accepted these resignations with regret, and on behalf of the Society thanks them for their many years of active service on behalf of the membership.

QSL Bureau

Series G6AAA-LZZ. The sub-managers for this extended series are David and Judith Brooks, G4IAQ/G4IAR, 28 Avon Vale Road, Loughborough, Leics LE11 2AA.

Annual holiday. Advance notice is given that the QSL Bureau will be closed from 13 September to 12 October, during which time QSL cards should not be sent as no responsibility can be accepted for any which go astray as a result of their being posted during that period.

Alexandra Palace Exhibition

RSGB HQ will be closed on 28 and 29 May during the RSGB National Amateur Radio Exhibition being held at Alexandra Palace on 28–30 May.

Education Committee at Alexandra Palace

The by now established pattern of talks for beginners, and meeting with RAE instructors which is normally arranged to take place during the course of the Alexandra Palace exhibition cannot be arranged this year. This is entirely due to the pressure on space in the only alternative hall available since the fire in 1980.

Members of the Education Committee will, however, be available on the RSGB stand throughout the period of the exhibition, and will be pleased to talk informally with either beginners or RAE instructors.

Raynet

Will all Raynet controllers and members please note that with effect from 1 May 1981 there will be no charge for lamination of identity cards.

Amateur Radio Insurance Scheme

Great interest has been shown and many members have already insured their radio and other equipment through the scheme. The "free cover offer" is still available up to the first scheme entry date on 1 June. Full details and application forms are available to RSGB members from Amateur Radio Insurance Services, 19 Quarry Street, Guildford, Surrey. (Tel 0483 33771.)

Two new features:

1. **Foreign travel extension.** Cornhill Insurance Co Ltd has extended cover so that radio equipment up to a value of £500 will be fully covered under the terms of the scheme while anywhere in Europe for up to 30 days in any policy year. There is no extra premium charge for this extension.
2. **Affiliated societies and clubs public liability insurance.** Cornhill Insurance Co Ltd is offering very attractive rates (premium £15 for the sum insured £500,000) for full public liability insurance cover for societies and clubs; also competitive terms for insuring society/club equipment. Details available from Amateur Radio Insurance Services.

REGION 2 ORM

Sunday 21 June 1981
During the Denby Dale Mobile Rally
at the Shelley High School, Denby Dale

Can you help?

Mr D. H. De Souza-Kirby, G3VFP, of 100 Craddock Road, Sale, Cheshire M33 3LL, would like to hear from anyone interested in forming a technical information group to exchange circuit ideas and modifications to equipment.

Herr Joackim Warner, DL5LV, Postbox, 2370 Buedelsdorf, West Germany, who is a high school teacher, is leading a group on an educational visit to London and Brighton in September. The group has special interests in natural science and technology, and DL5LV would like to contact British amateurs who could be of assistance and who could put the group in contact with a teacher and students in the 17–18 age group. He feels it would be sufficient if such amateurs could tell him the time and QRG to meet on the lower end of 14MHz.

Trisha Day, G4KYY, the first lady reader of GB2RS news bulletins, preparing to make her debut to listeners in East Cornwall and South Devon on 15 February. Her husband, G3ZYY, is the normal reader, and she and John Butcher, G4GWJ, serve as reserve readers for that area. Trisha is also secretary of the Plymouth Radio Club. ***Photo: Western News***

Synthesized speech on GB3CE

by IAN DILWORTH, PhD, G3WRT*

In the far east of Essex things can be (and usually are) quiet on the local 432MHz repeater GB3CE, (Colne Estuary, 433·350MHz output frequency, Ch RB14). In order to generate some interest the "Wooden Fender" group (which meets every Wednesday evening at the "Wooden Fender", Harwich Road, Colchester) decided to install an experimental computer generated voice synthesizer to announce the callsign and other information over the repeater. After all, G8s may have difficulty identifying repeater callsigns given in modulated cw! This article presents brief details of a system which has a much broader spectrum of potential applications than the one to be described.

With this system it is possible to produce an audible readout in spoken numbers from any instrumented input. For example, from analogue and digital meters (including frequency counters), feedback of dialled telephone numbers, callsign generators etc. In fact, in any situation where a predetermined level or code is available to index the spoken letter or number. The advantages to a blind operator are obvious. Apart from the novelty of such a system, other serious areas of application are still to be explored.

This is now possible because of recent advances in voice synthesis and, of course, the ubiquitous microprocessor. The technology is not magic or even new. Voice feedback systems have been around for some time. What is new is that, using a relatively cheap Texas Instruments "Speak & Spell" toy equipped with a suitable interface, it is possible to drive the speech synthesizer contained within the toy from a microcomputer, and hence use the computer to control and modify the output sound. The "Speak & Spell" toy is essentially a solid state tape recorder. That is, it uses preprogrammed information from built-in read-only memories (roms) to drive the speech generation circuitry. Modification and addition to the speech generating capability of the toy is only possible if the rom-based data is bypassed and some changeable data format substituted.

The speech toy is built around the Texas TMC0270 four-bit processor, which controls it. The arrangement within the "Speak & Spell" is shown in Fig 1. It will be seen that the processor controls not only the speech synthesizer module (TMC0280) but also scans the onboard keyboard and drives the built-in alpha-numeric display. The roms store the speech data in digital form, and the TMC0270 addresses them in order to extract the required data. The onboard keyboard is used to instruct the machine which function is required. For example, the toy is equipped to speak 10 words and then requests the user to type them back in again to test spelling skills. This is done using the keyboard, which contains all the letters of the alphabet but it is not equipped with numeric keys. The roms actually contain about 800 words, including the alphabet and the numbers 0 to 9. The difficulty is in extracting these words. As will be explained later, it is not feasible to hand-produce words for the "Speak & Spell" to utter, and at this stage the experimentation is limited to using the words contained within the toy's vocabulary.

The "Speak & Spell" toy with the controlling microprocessor

It is not intended to go into the detailed workings of the speech toy, but a brief description will help in the appreciation of the possibilities and limitations of the unit as used by the "Wooden Fender" group. One of the inherent difficulties with digital speech synthesis is that of storage. Consider the normal communications bandwidth of about 3kHz. In order to record correctly the information contained within such a bandwidth, a sampling rate of twice this frequency is required. This requirement obviously places a heavy burden on the amount of memory required to record utterances or sounds for any length of time, and linear predictive coding is a digital technique which has been used for some time to reduce the number of bits needed to represent speech signals digitally.

Linear prediction

The basic idea of linear predictive coding is that if one has a sampled signal that is to be transmitted through a bandwidth limited channel, instead of digitizing and transmitting the samples directly, the signal is processed with a non-recursive filter before transmission, and at the receiving end an inverse filter is used to deconvolve the original signal from that which was transmitted. All that is required is that the two filters, and their transfer functions, be the inverse of each other.

That the coding and decoding schemes work can be seen by analysing the diagrams in Fig 2 and the information in the appendix. For more information consult [2]. Using such a scheme will result in a significant bandwidth reduction if advantage can be taken of any structure in the original signal. Speech contains certain structures which can be used in this manner. Linear predictive coding allows a reduction in the sampling rate, and hence the number of bits required to represent the speech signal, by dealing with speech as if it consisted of two components, namely a signal source and the transfer function of a variable filter through which the excitation is passed. Fig 3 shows that the pitch, energy (of the utterance) and the reflection coefficients (frequency response) of the filter are all controlled. It is necessary to produce approximately 10 coefficients for the filter at any one time. Therefore it is not feasible to store them for every sample. It is also clear that they must be stored at a non-stationary rate, otherwise the speech would be very monotonous. In the "Speak & Spell", samples are

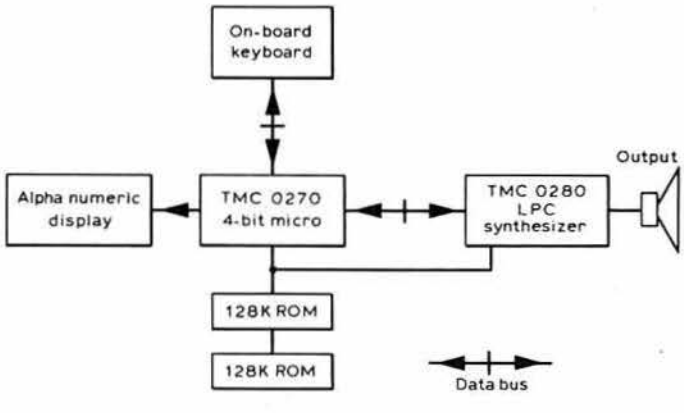


Fig 1. "Speak & Spell" toy block diagram

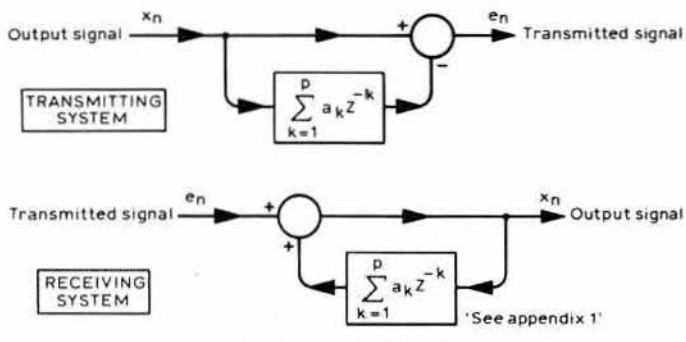


Fig 2. Linear predictive coding

*Dept of Electrical Engineering Science, University of Essex, Wivenhoe Park, Colchester, Essex CO4 3SQ.

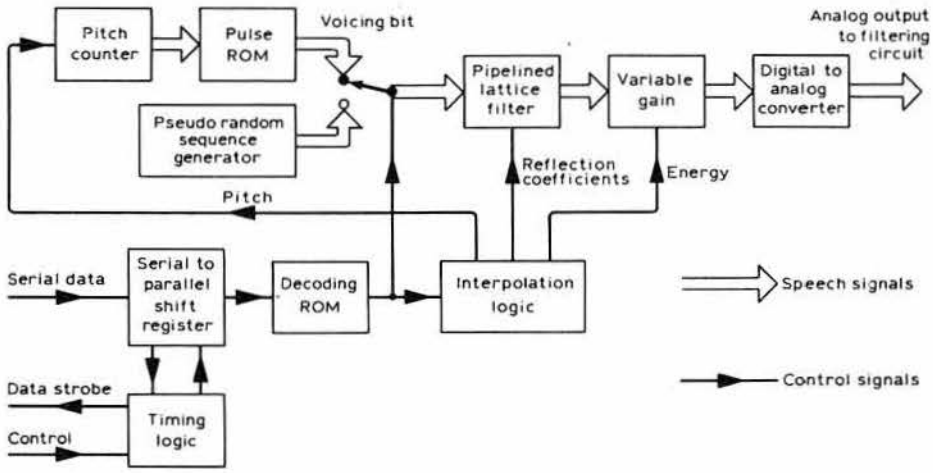


Fig 3. Linear predictive coding synthesizer

grouped into blocks, each block or frame consisting of 200 samples of 25ms length and the frame repetition rate is 40/s.

For most sounds it is desirable that the lpc parameters vary smoothly, and to do this the synthesizer contains logic to perform an approximately linear interpolation of each parameter at eight points within a frame. Linear predictive coding allows a large reduction of the number of bits required to store speech, but the "Speak & Spell" uses a few more techniques to reduce the bit count further, by a factor of approximately two, but this is affected by the statistical properties of the speech input. Overall the average bit rate for the "Speak & Spell", using the on-board roms, is 1,133 bit/s.

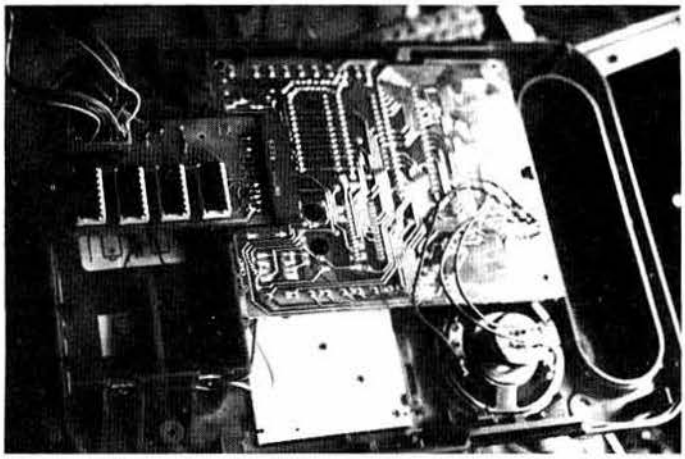
"Speak & Spell" interface

In order to communicate with a controlling processor, the speech toy requires a bi-directional interface. The group uses a versatile interface adapter (VIA type 6522) as the parallel interface to the microprocessor, which is a Synertek SYM-1, a 6502 based unit. The actual interface on the "Speak & Spell" fits on to its rom expansion connector. The interface circuitry consists of two shift registers and a controller, and is arranged to "swamp" the onboard rom data which may be simultaneously enabled.

At present only letters and words contained within the onboard roms can be modified. With the appropriate software control from the SYM-1 data from the onboard roms can be read into the SYM-1 random access memory (ram). Having placed the data in the microprocessor's memory it is possible to modify it.

It is easy to alter the pitch and length of an utterance, since one byte of data in each frame corresponds to these parameters. However, it is quite another story to modify a word in any other way, ie by changing the remaining data within a frame. This remaining data is used to control the speech toy filter (10 coefficients) and it is an almost impossible task to do this by hand and achieve anything other than unpredictable (if not interesting!) results. This is of course a major limitation, but one that is being investigated.

Systems not using the "Speak & Spell" are available which allow the synthesis of speech from written strings of phonemes. They are very expensive and the speech toy is relatively cheap, so the group is hoping to write the appropriate software so that the Texas Instruments synthesizer can be used. Another possible technique is to speak into a microphone, connected to a parallel port on the microcomputer via an analogue to digital converter. Such data could then be used to drive the speech synthesizer. However, a major drawback here is that no speech packing or bandwidth reduction would be possible at the time of recording. With such a system and a 3kHz speech bandwidth, 6k of storage space would be needed for every second of speech. Hence any reasonable length of speech consumes large amounts of memory.



The adapter fitted on to the expansion connector of the "Speak & Spell" toy

Software control

In the experimentation to date, announcements over the repeater have been limited to its callsign, QRA locator and occasionally the frequency and channel number. The main part of the controlling software is in machine code, for reasons of memory conservation rather than speed considerations. The utterances, their pitch and speed are all parameters that are selected more conveniently by a program in a high level language. The SYM-1 has a rom-based Basic and this is the language being used at present. Table 1 illustrates the ease by which the required string of voice output may be selected; it is a program written in Basic that periodically outputs the callsign (GB3CE) and the QRA locator.

Within the machine language routines a full alphabet and number table has been installed. These data were extracted from the "Speak & Spell" by feeding data from the speech toy into the SYM-1 ram. A dictionary-based look-up table is then used to output the required word(s). There are a few useful (amateur radio) words in the toy's roms, and these can also be fed into the microcomputer's ram and indexed in the same way as the letters and numbers.

Using the microcomputer and its high level language it is trivial to generate delays (FOR ..NEXT loops) and to control other repeater activity. In the sample program one of the VIA ports is used as an input to sense if the repeater is in use before initiating the callsign sequence. This is called by the PEEK command in line 800. The program shown in Table 1 uses DATA statements in order to generate a "pitch contour" for the voiced output. The pitch parameter is then POKE'd into the machine language routine at, in this case, the hexadecimal address of $11CF. The duration of the utterances may be changed in a similar manner.

One of the first ideas the group intended to implement was a verbal signal strength report via the repeater. This could be engineered simply by installing an analogue to digital converter on the repeater receiver agc line. However, this has not yet been tried as it has been discovered that the receiver is not actually equipped with one!

Conclusions

Having had a few weeks' experience with an automatic voiced callsign generator, the group feels that although it created interest it is not something that it would wish to leave permanently on the air. The standard modulated cw identification sent at a reasonable speed is pretty innocuous. Experience has shown that after a small period of monitoring one can almost ignore it. This is not so with a voiced callsign generator.

Another problem is that of mobile stations, or other situations, where a fluttery received signal can cause problems in the recognition of the received signal. As a consequence a few stations have tried to work the "voice". In defence of this objection, however, it was noticeable that the frequency of such occurrences tended to zero after locals had become accustomed to the voice.

Table 1. The program which produces the GB3CE callsign and QRA locator

```
2     REM
10    REM THE SPEAK AND SPELL PROGRAM FOR GENERATING THE CALLSIGN
11    REM OF THE LOCAL REPEATER GB3CE COLNE ESTUARY, COLCHESTER.
19    REM ROUTINE TO VECTOR THE O/P ROUTINE AT $A664 THROUGH THE
20    REM SPEAK AND SPELL ROUTINE AT HEX 116F.
21    REM
22    REM
23    A=USR(&"8886",0):REM UNWRITE PROTECT SYSTEM RAM.
25    POKE&"A664"+2**16,&"006F"
30    POKE&"A665"+2**16,&"0011"
31    REM THE ABOVE TWO LINES CAUSE THE SERIAL OUTPUT DATA TO BE
32    REM VECTORED THROUGH THE MACHINE LANGUAGE ROUTINE AT HEX 116F.
35    A=USR(&"8B9C",0):REM WRITE PROTECT SYSTEM RAM.
98    REM TIME "" FOR TIME LOOP APPROX 489798 FOR TEN MINUTES.
99    INPUT"T";T
199   N=1
200   POKE&"11C8",N
202   REM 'N' IS THE NUMBER OF FRAMES OF THE UTTERANCE. IF N IS GREATER
203   REM THAN ONE THEN THE SPEECH IS EFFECTIVELY S L O W E D DOWN.
210   P=1
220   POKE&"11CD",P
222   REM 'P' IS THE PARAMETER TO BE ALTERED IN THE FILTER CHARACTERISTIC
223   REM THERE ABOUT TEN PARAMETERS. PITCH IS PARAMETER ONE. THE OTHER
224   REM PARAMETERS CAN PRODUCE WEIRD AND UNPREDICTABLE EFFECTS!!!
230   M=16
240   POKE&"11CF",M
245   REM M IS THE PITCH VARYING FROM ABOUT 10(HIGH) TO 25(LOW).
299   X=0:REM HERE WE TURN THE REPEATER ON USING A VIA LOCATION.
300   POKE&"A002"+2**16,X
303   READP1,P2,P3,P4,P5,P6,P7,P8,P9,P10,P11,P12,P13
304   IFP1=OTHENRESTORE
305   S=&"11CF":REM THE PITCH PARAMETER.
320   POKE S,P1:PRINT " G";:REM NB A SILENCE CHARACTER PRECEEDS THE 'G'.
322   POKES,P2:PRINT"B";
324   POKES,P3:PRINT"3";
326   POKES,P4:PRINT"C";
328   POKES,P5:PRINT"E";
330   POKE S,P6:PRINT"Q";
332   POKE S,P7:PRINT"R";
334   POKE S,P8:PRINT"A";
336   POKE S,P9:PRINT "A";
338   POKE S,P10:PRINT"L";
340   POKES,P11:PRINT"1";
342   POKES,P12:PRINT"5";
344   POKES&"11C8",2:REM HERE WE LENGTHEN THE UTTERANCE I.E. N=2.
345   POKES,P13:PRINT"B"
350   POKE&"11C8",1
351   REM PUT THE UTTERANCE LENGTH BACK TO N=1
699   X=2:REM SWITCH OFF THE REPEATER.
700   POKE"A002"+2**16,X
705   REM NEXT INTO WAIT LOOP
710   FORI=1TOT:NEXT
750   REM AFTER COMING OUT OF THIS COMPULSORY WAIT LOOP WE EXAMINE
751   REM THE STATE OF THE REPEATER.IF IT'S IN USE WE LOOP UNTIL IT ISN'T
800   P=PEEK(&"A000"+2**16)
802   IFP>221THEN800
1000  GOTO299:REM NOW GO AND SWITCH THE REPEATER ON ETC...
1999  REM G B 3 C E Q R A A L 1 5 B
2000  DATA16,16,21,16,16,12,12,11,16,23,16,16,16
2010  DATA8,9,10,11,12,13,14,15,16,17,18,19,20
2020  DATA1,2,3,4,5,6,7,8,9,8,7,6,5
2030  DATA16,16,19,16,16,19,16,13,16,23,16,18
2040  DATA0
```

The group was aware of such obvious flaws in the operation of the system at the start of experimentation. However, the group felt that it was fun to experiment in this manner with an innovative idea. It will be interesting to find and evaluate other applications for this new form of output now available.

References and further reading

[1] "The Speak & Spell (TM) interface", David P. Kemp. East Coast Micro Products, 1307 Beltram Ct, Odenton, Md 21113, USA. (Contains 6502 software.)

[2] "Algorithms for adaptive linear prediction", I. H. Witten. *The Computer Journal* Vol 23, No 1. (Deals with maths and presents some algorithms in Pascal.)

[3] "Three chip system synthesizes human speech", R. Wiggins & L. Brantingham. *Electronics* 31 August 1978. (The people responsible for the Speak & Spell design.)

[4] "Adaptive prediction in speech differential encoding systems", J. D. Gibson. *Proc IEEE*, Vol 68, No 4, April 1980. (A review of this subject including 165 references. More than just lpc considered.)

[5] "Single chip speech synthesis", S. Smith. *Computer Design* November 1978.

Appendix

For transmission

$$e_n = x_n - \sum_{k=1}^{P} a_k x_{n-k}$$

$$\text{so: } \frac{E(z)}{X(z)} = 1 - \sum_{k=1}^{P} a_k z^{-k}$$

For reception

$$x_n = e_n + \sum_{k=1}^{P} a_k x_{n-k}$$

$$\text{so: } \frac{X(z)}{E(z)} = 1/\left[1 - \sum_{k=1}^{P} a_k z^{-k}\right]$$

(*Note:* merely the inverse of the transmission case.)

The filter reflection coefficients are represented by a_k, and these are to be chosen to minimize the average values of the transmitted samples. □

NEW PRODUCTS

Toko helical filters for 140–170MHz

Toko have extended the existing range of uhf helical filters with two new vhf versions: the CBT series of three-cavity filters, and the CBW series of two-cavity filters. Both feature low insertion loss, zero passband ripple and exceptionally high selectivity. The CBW range has a 3dB bandwidth of 3·7MHz, and an attenuation of 21dB minimum at 6MHz from the centre frequency. The CBT has a 21dB attenuation at 15MHz from the centre frequency—and with a 1dB insertion loss makes an ideal input filter in vhf radio telephone equipment.

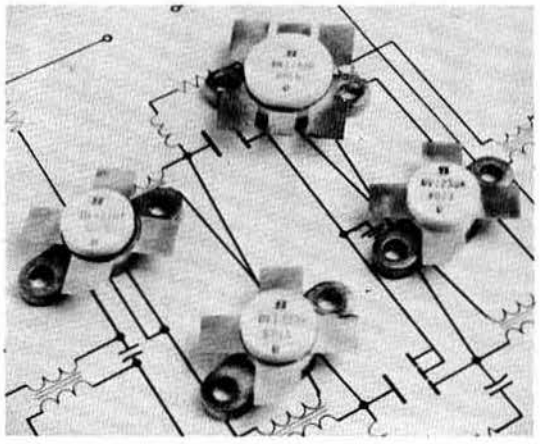
Both filters may be used either in receiver circuits or in transmit applications, where the high selectivity is well suited to cleaning up the unwanted products of low power cmos mixer synthesizers before power amplification takes place. Further information from Ambit International, 200 North Service Road, Brentwood, Essex CM14 4SG. Tel (0277) 230909.

Siliconix DV1200 power fets

Following hard on the heels of its recent rf vmos devices, Siliconix have now developed six new vmos power fets specifically designed for the mobile communications market. Called the DV1200 series, these new high frequency devices are optimized for maximum efficiency in 12V systems to allow mobile communications equipment to take advantage of vmos technology for the first time. The advantages offered by these devices are high stage gain, low base band noise, immunity to burn-out as a result of mismatch, and improved circuit stability especially in low band operation which has already made vmos popular in rf applications.

The devices are the DV1202, DV1205, DV1210, 1220, 1230 and 1240 conservatively rated at 10, 20, 30 and 40W power output at the high band test frequency of 175MHz. They can be used in Class A, B or C modes of operation, and are packaged in the popular flange ceramic stripline and C220 configurations.

Further information from Siliconix Ltd, Morriston, Swansea SA6 6NE; tel 0792 74681.



Siliconix DV1200 series power fets

EQUIPMENT REVIEW

The NEC CQ-R700 hf receiver

by P. J. HART, BSc, G3SJX*

Introduction

There are a number of communications receivers currently available offering general coverage operation over the hf spectrum. An essential feature of an hf communications receiver is the ability to set the frequency accurately anywhere within the tuning range. For a receiver covering amateur bands only, this is relatively easy to achieve due to the narrow frequency span of each band. For a general coverage receiver, a number of approaches have been adopted. Traditional receivers employ a single superheterodyne approach and a slow-motion drive with a logging scale or electrical bandspread in conjunction with a crystal calibrator. Accurate frequency setting is not easy and the tuning rate varies from band to band. The more recent approach is to use a high first intermediate frequency in conjunction with a premixed vfo or Wadley loop to cover the whole hf range in a number of bands, each band covering a small frequency span with a constant tuning rate.

The CQ-R700 is essentially a traditional design of receiver covering the frequency range 1·4 to 30MHz plus the long and medium wave broadcast bands. For frequencies below 3·5MHz, the receiver functions as a single superheterodyne with a single tuning control. Above 3·5MHz, the receiver functions as a double superheterodyne. The second conversion oscillator is made tunable over a 500kHz range to provide a bandspread facility with a constant tuning rate. The receiver is intended for 220V mains operation only, and standard features include marker calibrator, i.f. noise blanker and two i.f. bandwidth settings.

Description

The receiver is housed in a metal case measuring 305 (w) by 160 (h) by 240mm (d) and weighs 6kg. The circuitry is constructed on four easily-accessible printed boards. There is a large amount of space inside the case, and the size could have been reduced considerably. The two tuning controls are concentric with no unwanted mechanical coupling, and a drum scale is used for frequency readout. A complicated system of dial stringing is used which results in an excessive amount of backlash. The bandspread control is free of backlash and has calibration marks every 5kHz. The tuning rate is a little fast at 600kHz per revolution of the 50mm diameter knob, and care is required when tuning into ssb signals. The remaining controls are easy to use. The internal loudspeaker is mounted on the front panel, which is far superior to mounting on the top, bottom or side as is generally done. Sockets are provided for headphones, tape recording facilities and first local oscillator output. It is not practical to use this latter socket to measure the receive frequency. An externally-mounted ferrite rod antenna is provided for medium wave reception.

On the three lowest frequency ranges (bands A, B and C), the receiver functions as a single superheterodyne with an i.f. of 455kHz. Above 3·5MHz, on the three higher frequency ranges (bands D, E and F), the first i.f. is tunable from 2·15 to 1·65MHz, and the second i.f. is 455kHz. In this way 500kHz of bandspread is provided. A disadvantage of this method is that a separate tracking or preselector control is required to resonate the rf tuned circuits. Dual-gate fets are used for the rf amplifier, and both mixers and single gate fets are used for all oscillators. With the exception of integrated circuits used for the audio power amplifier, supply voltage regulator and crystal marker, all other functions are performed with bipolar transistors. Two i.f. bandwidth settings are provided. The wide position is quoted as 8kHz and uses an LC i.f. filter. The narrow position is quoted as 3·5kHz and uses a ceramic filter. An adjustable i.f. noise blanker is also provided. Diode switches are used in the signal paths.

The mains power supply develops 16V dc. This powers the audio ic directly and is regulated down to 9V to power the remainder of the receiver circuits. The on–off switch switches the 16V supply rail only, leaving the mains transformer, rectifiers and reservoir capacitor live and unfused at all times. This could be dangerous and it is recommended that the receiver is unplugged from the mains supply when not in use.

Measurements

In all cases signal input voltages are quoted in pd across the antenna terminal, and the narrow i.f. bandwidth setting was used. No measurements were made on the long or medium wavebands (bands A and B).

Sensitivity

Sensitivity measurements were made by connecting a Hewlett Packard 8640B signal generator to the antenna input and measuring the af output using a wideband voltmeter. The input level was adjusted to give a 10dB signal-plus-noise-to-noise ratio. For a.m. measurements the generator was modulated to a depth of 30 per cent with a 1kHz tone. The results were as follows:

Band	Frequency	Sensitivity ssb	Sensitivity a.m.
C	1·9MHz	0·1μV	0·58μV
C	3·5MHz	0·09μV	0·4μV
D	3·5MHz	0·13μV	0·68μV
D	7MHz	0·09μV	0·46μV
E	8MHz	0·13μV	0·62μV
E	14MHz	0·09μV	0·55μV
F	15MHz	0·22μV	1·0μV
F	21MHz	0·16μV	0·64μV
F	28MHz	0·13μV	0·70μV

These figures are within the manufacturer's specification.

S-meter calibration

Band	Frequency	Input for S1	Input for S9	Input for S9 + 20dB
C	1·9MHz	0·5μV	1·55μV	7·7μV
C	3·5MHz	0·9μV	2·75μV	14μV
D	3·5MHz	0·18μV	0·67μV	3·3μV
D	7MHz	0·04μV	0·21μV	1·2μV
E	8MHz	0·25μV	1·0μV	5·1μV
E	14MHz	0·08μV	0·35μV	2μV
F	15MHz	1·3μV	4·6μV	24μV
F	21MHz	0·62μV	2·2μV	10·5μV
F	28MHz	0·36μV	1·2μV	6·3μV

These measurements show that the S-meter is grossly over-generous. S1 to S9 shows an increase of about 11dB. S9 to S9 + 2dB shows an increase of 14dB.

I.F. and image rejection

The image rejection at $f_c + 2f_{if}$ and the i.f. rejection were measured by setting the signal generator to give the required spurious response at a level

*42 Gravel Hill, Addington, Croydon CR0 5BD.

giving 10dB s+n/n ratio. This level was then related to an on-tune signal of 10dB s+n/n ratio. The i.f. frequency is 455kHz on range C, and approximately 2MHz on ranges D, E and F.

Band	Frequency	Image rejection	I.F. rejection
C	1·9MHz	61dB	116dB
C	3·5MHz	36dB	111dB
D	3·5MHz	67dB	54dB
D	7MHz	56dB	70dB
E	8MHz	62dB	81dB
E	14MHz	52dB	91dB
F	15MHz	50dB	81dB
F	21MHz	43dB	76dB
F	28MHz	37dB	95dB

The i.f. rejection is generally adequate except at the low frequency end of range D. The image rejection falls below specification at the high frequency end of ranges C and F.

Frequency stability

The manual quotes the frequency stability as 500Hz after warming up, without quoting a frequency or time period. For a receiver using a band-switched wide-range tunable first oscillator, this order of stability is impractical to achieve. Measurements of frequency stability with time were made by assuming that the drift was largely confined to the first oscillator, and measuring the frequency of this oscillator using the socket conveniently provided. At 28MHz the receiver drifted 10kHz hf during the first 10min after switching on. At 7MHz, this figure was 2kHz during the same period. After 2h the drift at 28MHz had reduced to 1kHz in any 10min period, and at 7MHz the drift was 200Hz in the same period. The 28MHz drift figures are excessive. At the higher frequencies, pressure on the bandchange switch and flexing of the case produced small changes in frequency.

Calibration accuracy

After calibrating against the internal marker, the maximum error in frequency readout was 8kHz over the 500kHz range of the bandspread control.

I.F. selectivity

It is not practical to evaluate the i.f. selectivity of a receiver by measurements at the antenna terminal, due to possible front-end signal handling problems. The CQ-R700 is conveniently constructed to allow signals from a generator to be injected at the input of the 455kHz i.f. filter. The frequency was varied and the generator level set to give a constant S-meter reading of S3. The results were as follows:

Response	Bandwidth (narrow)	Bandwidth (wide)
−3dB	2·2kHz	2·5kHz
−6dB	3·1kHz	3·5kHz
−10dB	3·9kHz	5kHz
−20dB	5·7kHz	7kHz
−60dB	9·6kHz	21kHz

These figures do not seem to bear much resemblance to the manufacturer's unqualified figures of 3·5kHz (narrow) or 8kHz (wide). The nose selectivity of both filters is similar, and this is confirmed during listening tests when it is often difficult to tell the difference between the two filters.

Signal handling

An important quality of any receiver is the ability to resolve weak signals in the presence of strong signals on adjacent frequencies. A number of measurements may be done to assess the strong signal handling capabilities of a receiver—viz measurements on intermodulation, crossmodulation, blocking and reciprocal mixing. Two Hewlett Packard signal generators type 8640B were coupled together with an Anzac hybrid coupler and connected to the antenna input socket.

For third-order intermodulation measurements, the frequencies were set at 20kHz and 40kHz away from the frequency to which the receiver was tuned, and the levels increased equally to give an intermodulation product in the receiver passband with a s+n/n ratio of 10dB. The ratio of the generator levels to the level required to produce an on-tune signal of 10dB s+n/n ratio was 54dB at 1·9MHz, 51dB at 7MHz and 55dB at 28MHz. The absolute input levels may be deduced from the sensitivity measurements. This is a very poor result.

Crossmodulation measurements were performed with the receiver switched to a.m.. One generator was set on-tune at a level of 10μV and amplitude modulated to a depth of 30 per cent with a 1kHz audio tone. The second generator was set 50kHz higher in frequency and amplitude modulated to a depth of 30 per cent with a 400Hz audio tone. The audio output from the receiver was observed on a spectrum analyser, and the level of the second generator increased until the 400Hz audio output was observed to be 20dB below the level of the 1kHz audio signal. This occurred at levels of 600μV on 1·9MHz, 90μV on 7MHz and 210μV on 28MHz. Again, this is a poor result.

Measurements on blocking were made by monitoring the agc voltage with a digital voltmeter and applying a 10μV on-tune signal from one of the generators. The second generator was set 50kHz higher in frequency and the level increased until the receiver gain, as indicated by the agc voltage, was reduced by 3dB. This occurred at levels of 5mV on 1·9MHz, 700μV on 7MHz and 1·6mV on 28MHz.

No measurements of oscillator noise or reciprocal mixing were made.

Spurious responses

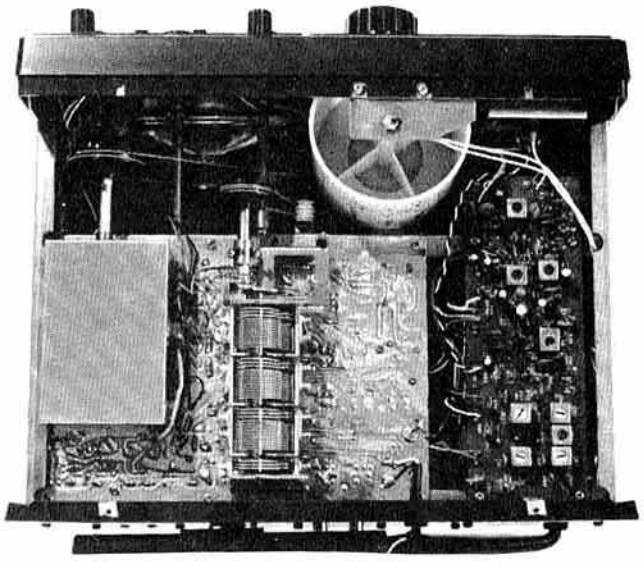
Internal spurious signals were confined to harmonics of the 455kHz bfo and second conversion oscillator, and were generally negligible. Other spurious responses, apart from image and i.f. breakthrough, were not investigated.

AGC response

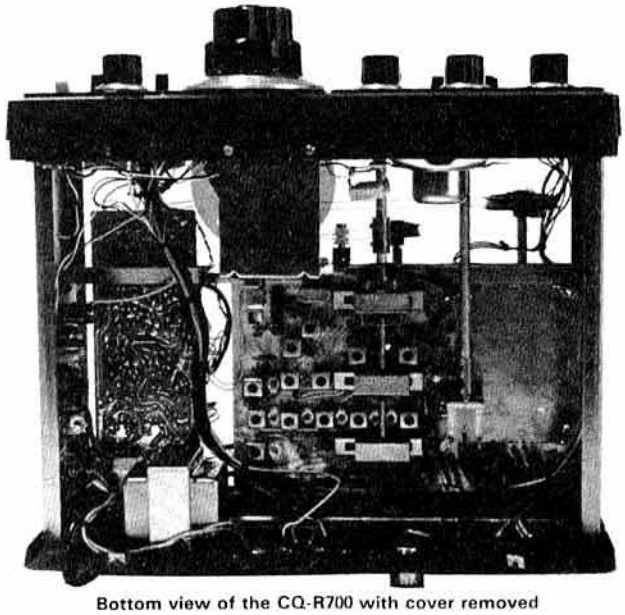
The agc threshold level was determined as 2μV at 3·5MHz on range C, 0·2μV at 7MHz on range D, and 1μV at 28MHz on range F. A 60dB increase in signal level above the agc threshold level resulted in a 13dB increase in audio output.

Conclusion

Listening tests on the receiver confirmed the high sensitivity, but the poor signal handling was most apparent in the frequency range 3·5–15MHz. Although the stability is adequate for a.m. operation, excessive drift was experienced when resolving ssb signals on 21 and 28MHz.



Top view of the CQ-R700 with cover removed



Bottom view of the CQ-R700 with cover removed

There appears to be far too much gain in the receiver, particularly ahead of the i.f. selectivity, as the S-meter sensitivity and signal handling measurements indicate. The signal handling problems probably originate in the second mixer. Best results are achieved on range C (1·4–4MHz) where the receiver functions as a single superhet and the second mixer is bypassed.

A 24-page manual is included with the receiver, 12 pages written in English and 12 pages in German. Operating instructions only are given, plus a block diagram and full circuit diagram.

The current price of the receiver is £150 inclusive of VAT. The receiver used in this review was kindly loaned by William Munro Ltd of Invergordon, Ross-shire. □

EQUIPMENT REVIEW

The Cambridge antenna noise bridge kit

by H. W. REES, G3HWR*

THIS antenna noise bridge comprises a wideband noise source directly connected to a resistance bridge with coaxial sockets for the item under test (eg the antenna) and a detector (eg a communications receiver). The unit is contained in an aluminium box measuring 140 by 75 by 40mm (5·5 by 3 by 1·62in) and operates from an internal PP3 9V battery supplied.

The sample kit was complete down to the last nut and bolt, including two plugs for the rf sockets; these are the television type to BS3041. The assembly instructions are brief, comprising a circuit diagram, component layout for the printed circuit board, and a short note. Assembly took about two hours, including time to drill the box for connectors and controls to the template also provided. It is the reviewer's prerogative to attempt to assemble the kit wrongly, there did not seem to be any way a reasonably competent constructor could do this.

The noise source comprises a biased 6·8V zener, followed by a three-stage resistance capacitance coupled amplifier. This generates much more noise at low frequencies compared with vhf and this is valuable since antenna noise is similarly frequency dependent. The diode current is adjustable over the range 0·05 to 18mA, to optimize the output at any desired frequency; the reviewer set the current for use at 144MHz, for which a current of 10mA through the diode was required. Adequate output was obtained for measurements below 30MHz at the minimum current. The amplifier consumes some 5·5mA, and a PP3 battery should last for 20 to 40h of intermittent use.

The bridge can be connected in the antenna lead of a working system, and two back-to-back diodes and a fuse in the "unknown" connector serve to protect the unit against inadvertent operation of the transmitter with the noise bridge in circuit; the reviewer has not tested the effectiveness of this provision.

In operation the bridge is connected to the unknown impedance and a receiver, and the bridge balance and the receiver tuning are adjusted for minimum noise. The receiver frequency is then that of minimum reactance, ie the resonant frequency of the unknown, and the value of its resistance can be read off from the reading of the bridge. The bridge balance is calibrated from 2 to 1,000Ω. The reviewer was able to obtain plausible balances for dummy loads of 1 and 2,700Ω at 10MHz, but these were outside the design range of the unit.

The instruction sheet also suggests methods of using the bridge to measure the "Q" of a coil, the resonant frequency of a quartz crystal, and as a noise source for aligning a receiver.

This last suggestion is interesting; with no connection to the antenna socket the noise available at the receiver socket is approximately 10pW/kHz at 10MHz into 75Ω, falling at approximately $1/f^2$ to 0·001pW/kHz at 144MHz. These are high noise levels, corresponding to noise figures of 62dB at 10MHz and 19dB at 144MHz, and are sufficient to be used for the alignment of the rf circuits of a receiver, without the time-consuming process of adjusting a signal generator from one end of the tuning range to the other. Also, if two receivers are available it is easy to measure the input resistance of a receiver; since a receiver for use at hf is often not matched to the antenna, special attention may be required for the efficient connection of converters, preselectors etc.

The principal use of the unit is, of course, for the testing of antennas without radiating a detectable signal. The power level is sufficiently low for there to be no risk of interference, and the unit is therefore ideal for swls, or transmitting amateurs interested in bands for which there is no licence to transmit, such as broadcast, satellite or "foreign" amateur bands. For the privileged few with access to a spectrum analyser to connect in place of the receiver, the reviewer can recommend the experiment; he learned more about the properties of multiband antennas in an hour than can be gleaned from any text book.

To summarize, this is a delightful little unit which, after a gdo, is the most useful box of tricks the reviewer has had in his shack.

The kit for the Cambridge antenna noise bridge is marketed by Cambridge Kits, 45 Old School Lane, Milton, Cambridge CB4 4BS. The cost is £11.80 incl VAT and p&p. □

* 43 Thomas More House, Barbican, London EC27 8BT.

NEW PRODUCTS

GVB Electronics TO1 time-out indicator

The TO1 is a 144MHz repeater time-out indicator which is fully automatic, battery operated, compact and tough, and provides a realistic solution for all amateurs—both mobile and at home. Housed in a black metallized ABS box, the instrument features three pre-set time constants, a test facility and, for those who require that little bit extra, an auxiliary position that allows the amateur to configure the TO1 easily to his own specific needs. RF sensing, up to a 3m radius, means that the TO1 is easy to use, while low current consumption ensures long battery life. Overall dimensions are 120 by 65 by 40mm.

It is priced at £15.57 incl p&p, and is available exclusively from GVB Electronics, 95 Old Worthing Road, East Preston, Littlehampton, West Sussex BN16 1DU. Tel (09062) 70260.

SOAR FC841 frequency counter

Holdings Photo Audio Centre announce the availability of the SOAR FC841 frequency counter, which covers 10Hz to 50MHz (minimum) and up to 500MHz with a prescaler. This unit also covers the whole spectrum from af to rf, and therefore can be used for such differing purposes as checking the speed of a tape recorder or the output frequency of a transmitter. The display comprises four digits with switching providing seven-digit accuracy. The sensitivity is better than 30mV over most of the range. The unit can be powered by four penlight cells or from an external supply of between 8V and 11V dc.

The basic price of the unit is £39.99 including VAT, with various options obtainable at extra cost. Further details from Holdings, Mincing Lane, Darwen Street, Blackburn BB2 2AF; tel 59595.

Simple quiet tuning and matching of antennas

by M. J. UNDERHILL, MA, PhD, Grad IERE, G3LHZ*

Introduction

Quiet tuning is a technique that can eliminate the necessity to radiate a strong carrier while an antenna tuning unit (atu) is being adjusted to match an antenna to a transmitter. In fact the tuning signal can be made so small that it cannot be detected at more than about 1λ from the antenna. Because there actually is a tuning signal the term "quiet tuning" is used, rather than "silent tuning" which would imply correct adjustment of the atu by presetting or by using received noise or signals only.

The technique has in fact been developed by the author and his colleague Peter A. Lewis at the Philips Research Laboratories for use in professional systems [1,2]. However, it is felt that in the simple form described here it should also prove to be of considerable utility to radio amateurs. To illustrate the simplicity of the basic technique, details are given here for adding a quiet tuning facility to the FT101 transceiver or to any transceiver already containing a crystal calibrator. In this case only two extra components are needed, a ferrite bead transformer and a resistor.

Principles of quiet tuning

Normally a reflectometer or standing wave ratio (swr) bridge is used to indicate the correct adjustment of an atu. The atu elements are adjusted until the fraction of the power reflected back into the transmitter is considered to be small enough, or the measured swr is considered to be close enough to 1:1. In a reflectometer or swr bridge there are normally two directional couplers which sense the forward and reflected powers and pass a small fraction of these to rf indicators. These normally consist of a diode detector feeding a fairly sensitive dc milliammeter as shown in Fig 1.

Fig 2 shows how a very large increase in sensitivity can be obtained if the rf indicators are replaced by a receiver tuned to the transmitter frequency which can be switched alternately between the forward and reverse directional couplers. The receiver S-meter can then be used to estimate the swr and to provide a tuning indication. The important point is that the transmitter power can then be reduced by several orders of magnitude and still provide a sufficiently large tuning signal for the receiver to detect. Typically the transmitter power can be reduced well below the microwatt level.

The quiet tune principle is shown in its simplest form in Fig 3. It is based on the observation that the directional couplers in a reflectometer are linear reciprocal devices. This simply means that the position of the transmitter and receiver in Fig 2 can be interchanged without changing the strength of the tuning signal as measured in the receiver. However, this interchange has a very important effect on the signal from the transmitter which passes through the atu and is radiated by the antenna; it is reduced

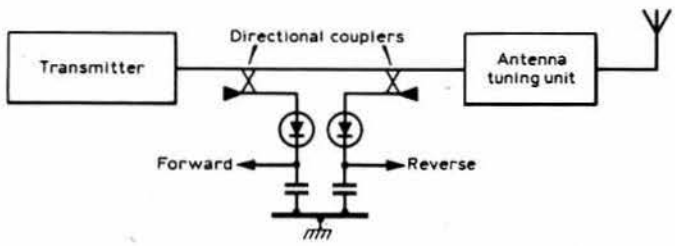


Fig 1. Conventional tuning method

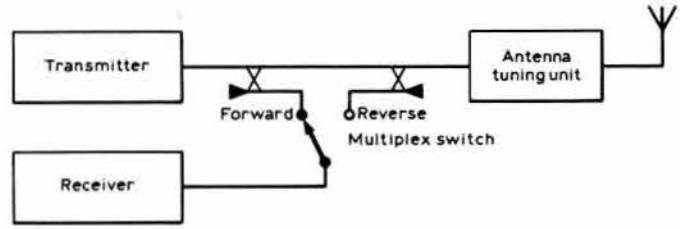


Fig 2. Use of receiver to improve sensitivity and selectivity

in level by the loss through the directional coupler, which typically may be between 20 and 40dB. (Reciprocity also says that the loss is the same for signals passing through a network in the forward direction as for signals passing through the same network or device in the reverse direction.) Under these circumstances the tuning signal need only be about 20dB stronger than any incoming signal on the frequency of interest in order that a 1·2:1 swr or better can be ensured. Such a signal cannot be detected more than about 1λ from a typical antenna [1]; these signals are in the picowatt (10^{-12}) to femtowatt (10^{-15}) range.

With most transmitters it is very difficult to produce a tuning signal which is low enough in level. The easy solution is to replace the very low power transmitter in Fig 3 by a broadband noise source (such as used in antenna bridges for instance). Such a source can cover all frequencies of interest; the receiver will then provide the choice of the tuning frequency and the necessary selectivity. This method has been used by Kit Warren at the Philips Research Laboratories to make quiet tuners which can be placed in the output feeder of any transceiver. In these it is necessary to use directional couplers with enough loss or isolation to protect the noise source from being destroyed by the transmitter power. For transmitter powers up to about 1kW the directional couplers must have a loss between 30 and 40dB so that the noise source must have enough power to overcome these losses.

One solution to this problem can be to use a protection relay to bypass the quiet tuner on transmit. This relay already exists in any transceiver in the shape of the main transmit-receiver antenna changeover relay. This is what is done in the quiet tuner described in the following sections. Another suitable source of tuning signals is the crystal calibrator found in most amateur receivers or transceivers. Clearly the tuning signals then only appear on the discrete calibration frequencies, but there is usually one of these close enough to the desired operating frequency so that any error introduced by not matching on exactly the right frequency is very minimal. Again this is used in the following description.

In operation the quiet tune method is very simple. First the receiver is tuned either on or near the required operating frequency. With the tuning signal source connected to the forward wave directional coupler the receiver S-meter reading is noted. The tuning signal is then switched to the reflected wave directional coupler and the atu adjusted until the original S-meter reading is reduced by at least 20dB (or 3 to 5 S-points). This ensures that an swr of better than 1·2:1 has been achieved on the feeder to the atu.

There is an alternative tuning procedure which eliminates the necessity for the forward wave directional coupler. The reflected wave directional coupler is left permanently connected, then to obtain the initial S-meter reading, a deliberately large mismatch is placed at the atu end of the feeder. This can be done by shorting or grossly mistuning the atu. The mismatch is then removed and the rest of the tuning procedure performed as before.

Directional couplers

The principle of operation of any directional coupler is basically the same. The transmission line voltage and current are sensed and subtracted in proportion to the transmission line impedance. For the forward power, the current and voltage are in phase and hence the resultant of the subtraction is zero. But for any reverse power reflected from an incorrectly adjusted atu, for example, these two components add and give a signal proportional to the amplitude of the reflected wave.

One of the simplest possible directional couplers is shown in Fig 4. Here, for power flowing into input A the total voltage V on the transmission line appears at point B. The current i flowing out of B creates a voltage across the resistor R, and this by transformer action appears stepped up by nine times across the nine-turn secondary winding. This voltage is given by $V_i = 9iR$ and will subtract from the line voltage V to give a voltage V_c at C_i. If a correctly matched 50Ω load is placed on the output B then by Ohm's Law $V = 50i$. From the above the voltage output from C can be calculated as

$$V_c = V - 9iR = 50i - 9iR$$

*Culross Lodge, Wimlands Lane, Faygate, Horsham, W Sussex RH12 4SP.

If we then make R = 50/9 = 5·6Ω, V_c will be zero for any current i and hence for any power input. For reflected power flowing back into B the subtraction does not occur, so that a voltage proportional to the reflected current will appear at C, which can therefore be used to detect the reflected power only.

At this stage the principle of reciprocity between the "ports" A and C can be invoked and the direction of power flow reversed. This means that provided a 50Ω load is present on port B there will be no power flow from C (the crystal calibrator input) to A (the receiver input). (Those readers who may disbelieve that reciprocity applies in this case can use the usual circuit analysis techniques to confirm this last statement, or try it in practice.)

The directional coupler shown in Fig 4 is not suitable for use with normal transmitter power levels. For example, even with a matched load of 50Ω, 10 per cent of the power put in at port A will be dissipated in the resistor R and only 90 per cent will be passed to the output B. There is therefore a power insertion loss between A and B of 0·9, equivalent to a loss of 0·5dB. When used in the quiet tune system (because of reciprocity) this loss appears in the reciver input, but as far as operation on any hf band is concerned a loss of 0·5dB can be considered to be negligible. With this simple form of directional coupler there are two other facts which might be considered undesirable for other applications, but which are not important here: the receiver connected to port A sees an impedance of 55·6Ω rather than 50Ω, and the crystal calibrator sees an input impedance of 500Ω at port C.

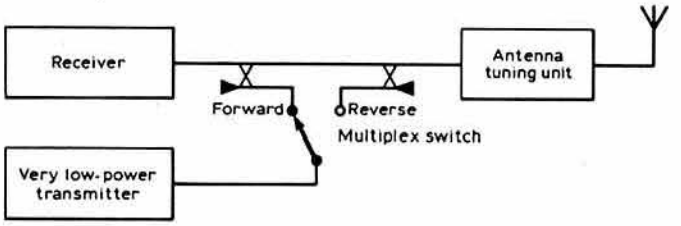


Fig 3. New quiet tuning method

The choice of the ferrite bead for the transformer is not critical, and can be made by the usual rules for good transformer design. However, after a number of trials the Mullard FX2633 8mm ferrite core was found to give the best results over the frequency range 1·8 to 30MHz. With this core in A13 ferrite, only a single-turn primary and a nine-turn secondary are required. With cores of smaller cross-section, 2 and 18 turns were found to be needed, and for larger cores the leakage inductance was found to be too high—causing loss of sensitivity (to the crystal calibrator) at the higher frequencies. (The resistor R should be non-inductive; wirewound types are not suitable.) With tightly-wound windings and the resistor R connected with short leads as close to the core as possible, one may achieve a rejection of the forward power signal by at least 30dB over the 1·8 to 30MHz range. Such an error ensures that the true swr will not be greater than 1·07:1 if the measured swr has been adjusted to exactly 1:1.

One practical point on the use of uncoated ferrite cores such as the FX2633: the edges, particularly the inside edges of the hole, are quite rough and sharp and can strip the varnish or coating of the wire as it is being wound on the core. The use of a small round file on the edges of the hole will remove the danger of shorted turns from this cause.

The simple quiet tuner

The directional coupler shown in Fig 4 is suitable for installing a quiet tuning facility on most receivers or transceivers having a crystal calibrator. Fig 5 shows how it should be connected in a transceiver such as the FT101. The important point is that when on receive the directional coupler should see the feeder to the atu directly. If there is any receiver front-end protection circuitry, as there is in the FT101, this must be left connected between the directional coupler and the receiver input, and not between the directional coupler and the antenna or antenna relay connection.

Installation of the directional coupler is very easy on the FT101. If the primary winding is made of sufficiently stiff wire the core can be supported on it and mounted on the receiver front-end protection board (PB1116). The board is near the antenna changeover relay and is mounted on the side screen of the pa compartment underneath the chassis. The crystal calibrator board lies just outside the pa compartment and very conveniently close to it. A small hole can be drilled in the screen, and the crystal calibrator output (Pin 16 on PB1079A in MJ6) disconnected from its existing connection and rewired through this hole to the directional coupler. The primary winding of the directional coupler is wired in series

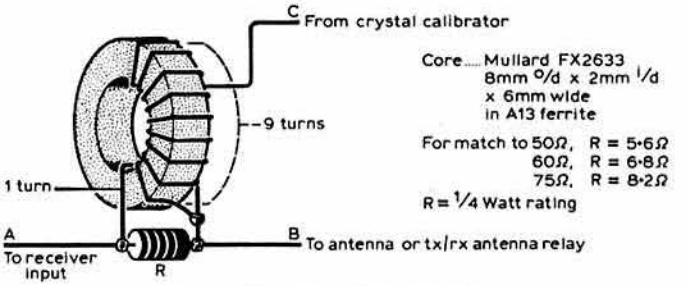


Fig 4. A simple directional coupler

with the existing connection from the receiver protection board to the antenna changeover relay. In the FT101 a 40pF isolating capacitor already exists in series with the output to the crystal calibrator so that the 47pF capacitor shown in Fig 5 is not required. If, as in the author's FT101, there is an extra 220Ω protection resistor R48 wired on the changeover, which appears as a load across the receiver input on receive, this should be removed. If desired the resistor can be rewired to shunt the receiver input on the receiver side of the directional coupler. This completes the modification.

For those who do not like making modifications inside purchased equipment, a quiet tuner can be added externally to the equipment with the use of an extra protection relay. The relay is used to bypass the unit on transmit and, if desired, when the tuning operation has been completed. For the case when the transmitter and receiver are separate there is no problem; the tuner is placed in the feeder to the receiver, and the existing electro-mechanical tr relay provides the necessary protection. Alternatively, to save the extra relay, any directional coupler capable of handling the transmit power can be left in circuit externally and used in reverse. Such directional couplers come in two types; the simpler one being the coupled transmission line type which is frequency sensitive, and the other using a ferrite core current transformer and voltage divider which basically is not frequency sensitive. These are well described in amateur radio literature, such as the *Radio Communication Handbook*, and are used in commercially-available swr bridges. The catch is that, as already mentioned, such couplers have of necessity more loss than the one shown in Fig 4. It is therefore usually necessary to amplify the tuning signal source, whether a broadband noise source or a crystal calibrator. More importantly it is necessary to design the amplifying stage to be capable of withstanding the transmitter power as coupled back through the directional coupler.

For these reasons it is felt that the simple quiet tuner described provides the easiest method of adding the quiet tune facility to most transceivers or receivers.

Results and conclusions

Many tests of the simple manual quiet tuning method have been carried out over the past months by various observers. If anything, the tuning method is easier to use than the conventional high power methods. This may be because, as the tuning signal is nulled by operating the atu, any signals being received are at the same time peaked up, and this subjectively provides confidence that the correct tuning adjustments are being made.

Opinions vary but the general concensus is that a noise tuning signal is not quite so easy to null out as a steady carrier signal, such as obtained from a crystal calibrator. The ideal situation is when the calibrator has harmonics sufficiently closely spaced to the operating frequency to be audible. The atu can then be adjusted while, for example, one is waiting to join a net or to call a new station. This indicates that a calibrator with harmonics spaced by about 2·5kHz would provide the best of both worlds, being easy to null and not requiring the receiver to be retuned after the nulling operation.

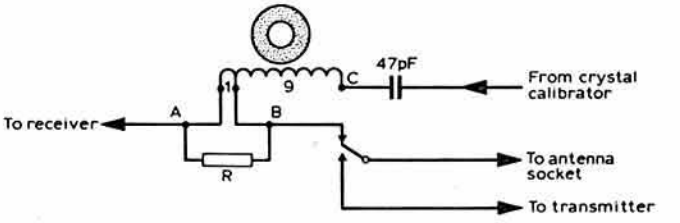


Fig 5. Connection diagram for simple quiet tuner

The quiet tuner on the author's FT101 has been in operation for over a year, and has proved to be entirely successful on all bands 1·8–28MHz. With the load mismatched the crystal calibrator strength as indicated on the S-meter would appear to be slightly stronger on the lower frequency bands 1·8 to 7MHz, but slightly weaker on the 21 and 28MHz bands. On the few occasions when a strong signal has been present on the nearest calibration point, for example on 7MHz, it has always been possible to tune on an adjacent 25kHz calibration point. The technique has proved to be so satisfactory that an swr bridge is no longer used. After quiet tuning the antenna, the transmitter or the linear is tuned and matched to give the maximum output as indicated on the built-in output meter.

In conclusion it is hoped that the more widespread use of the quiet tuning technique will contribute to the reduction of spectrum pollution on the amateur bands as well as improving the operating convenience of amateur stations.

Acknowledgements

The author acknowledges with thanks the help and contributions of Peter Lewis and Kit Warren in the work reported here.

The author would also like to thank the Philips Research Laboratories and Philips Industries for permission to publish this paper giving details of the quiet tuning technique.

References

[1] "Quiet tuning of antennas", M. J. Underhill and P. A. Lewis, *Electronics Letters* 4 January 1979, Vol 15, No 1 pp37–8.

[2] "Quiet tuning and matching of antennas for radio silence operation", P. A. Lewis and M. J. Underhill, Conference on recent advances in hf communications systems, February 1979. *IEE Colloquium Digest 1979/48.* Also published in October 1980 issue of *IEE Proceedings Part F, Communications Radar and Signal Processing.*

A 70, 144 and 432MHz interference filter for Band 2 fm receivers

by J. F. WILSON, MSc, G3UUT*

THE increasing use of Band 2 fm radios and stereo tuners has, over recent years, led to a rise in interference problems, especially from high-power vhf installations on 70, 144 and 432MHz. On investigation it is often found that the transmitter has a clean output, and the interference is being caused either by spurious responses of the receiver or by blocking, crossmodulation or intermodulation in its rf stages.

Unfortunately in these cases one has no option but to tackle the problem at the receiver. Initially it should be verified that the interference is actually entering the receiver via the antenna lead by unplugging it. If the interference is still present it is probably being caused by direct pick-up on the internal wiring or the mains and speaker leads. In this case, apart from perhaps trying decoupling capacitors across the speaker output terminals, one should seek advice and assistance from the local Post Office radio interference branch as any further work will inevitably require additions or modifications to the inside of the equipment.

Assuming that the interference is entering the equipment via its antenna lead, the next step is to determine the location of the antenna. If an indoor antenna or one inside the receiver is being used, the owner should be encouraged to install an outside antenna. This may cure the problem without further effort, the increased wanted signal effectively desensitizing the receiver to the interference. However, the outside antenna may also pick up more of the interfering signal, and in this case, and where an outside antenna is already in use, one of the following filters may cure the problem.

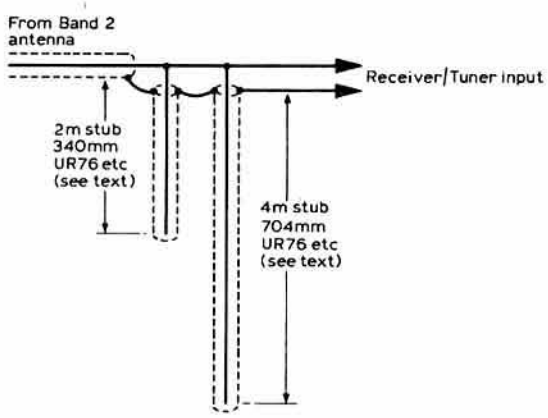


Fig 1. Basic 70, 144 and 432MHz stub filter

Stub filters

A piece of transmission line an electrical quarter-wavelength long at the interference frequency and open circuited at its far end appears as a short-circuit at that frequency. If this is placed in parallel with the antenna input of the receiver, the strength of the unwanted signal may be reduced sufficiently to cure the interference. Open circuit lines also exhibit this property at odd multiples of the frequency at which they are an electrical quarter-wavelength. This is useful because it means that a line (or stub as it is often called) cut to an electrical quarter-wavelength on 144MHz can also be used to remove interference at 432MHz and even 1,296MHz, although the performance at this frequency may not be as good.

Thus, by the use of two pieces of coaxial cable, one cut to an electrical quarter-wavelength at 70·3MHz and the other at 144·5MHz, placed across the antenna input of the receiver, interference caused by 70, 144, 432 and even 1,296MHz transmitters can be removed. The use of two stubs has additional advantages, and it is recommended that even if interference is not present from 70MHz transmissions, or if 70MHz is not used at all, that both the 70MHz and 144MHz stubs are used. The reason for this can be seen by calculating the impedance of each stub at the middle of the fm broadcast band, 94MHz. This shows that the 70MHz stub has an inductive reactance of about 30Ω, and the 144MHz stub has a capacitative reactance of about 31Ω, the two effectively cancelling each other out and forming a low-Q parallel-tuned circuit and ensuring a low loss over the fm broadcast band. The appendix shows the method for working out the lengths of the stubs and the equation for calculating the impedances.

The dimensions of the stubs are shown in Fig 1. This assumes the use of a standard solid polythene insulated coaxial cable, UR57, 67, 76 etc, with a nominal velocity factor of 0·67 (ie the electrical quarter-wavelength of the stub is 0·67 times the calculated value of a quarter-wavelength in air). If a cable with a foam or semi-air-spaced dielectric is used, the velocity factor is likely to be nearer 0·8. However, in this case it is recommended that the stubs are cut too long and trimmed to frequency using a receiver or a dip oscillator. For example, to trim the 144MHz stub, insert it across the antenna terminals of a 144MHz receiver, listen for a strong signal in the bottom half of the band (to ensure that the resonance at 432MHz is not at too high a frequency) and cut short lengths off while watching the S-meter for the minimum reading. To trim using the dip oscillator, set the oscillator to the required frequency (preferably checked on a receiver or

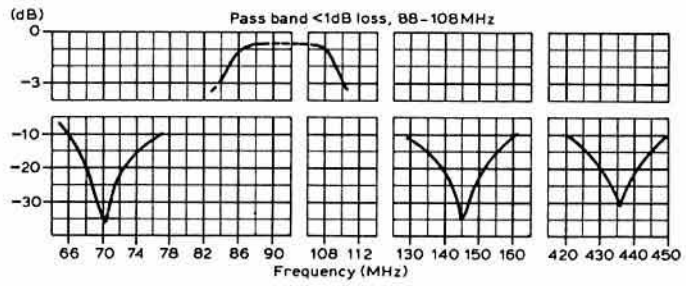


Fig 2. Frequency response of stub filter shown

*Pye Telecommunications Ltd, St Andrews Road, Cambridge CB4 1DW.

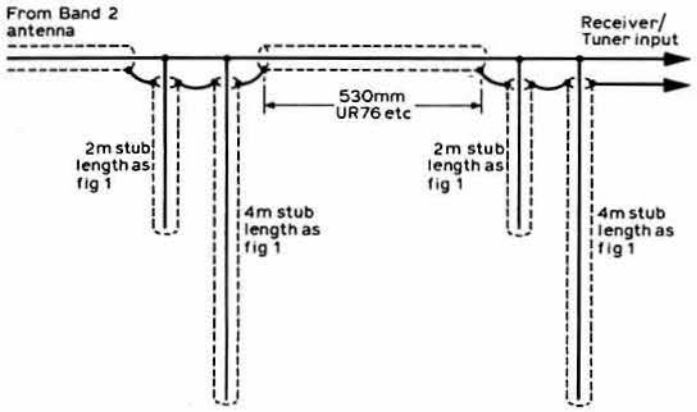


Fig 3. Double stub filter

counter) and couple into the stub by means of a single loop connected across the end; again cut short lengths off the stub to obtain the maximum dip.

Fig 2 shows the performance of this filter. The bandwidths of the notches are wide enough to give at least 20dB attenuation over the whole of the 70, 144 and 432MHz bands, ssb and fm sections, which should be sufficient to clear up most cases of interference. The loss over the fm broadcast band is less than 1dB.

Double stub filter

However, if it is found that the filter does not give sufficient attenuation at the notch frequencies, an additional pair of stubs can be added, spaced at a convenient distance up the cable towards the antenna. Fig 3 shows a diagram of this filter, the distance between the two sets of stubs being an electrical quarter-wavelength at 94MHz. Its performance is shown in Fig 4. The depth of the notches is now greater than 60dB, although the width of the passband is narrower but still adequate for the fm broadcast band.

Balanced inputs

The filters described are only really suitable for use with an antenna system feeding a 50 or 75Ω coaxial cable and a Band 2 receiver with an unbalanced input of the same impedance. Some receivers, however, have a balanced 300Ω antenna input without separate provision for the connection of a low-impedance coaxial cable.

If interference is caused to this type of installation it may be more difficult to cure, and the antenna cable itself may be contributing to the problem. The worst problems are likely to be encountered if the receiving antenna feeds the receiver with 300Ω ribbon cable, as this can easily be unbalanced by the proximity of walls etc and thus possibly pick up more interference than the antenna. Even if the antenna and feeder are balanced the feeder can pick up amateur transmissions relative to the earth of the receiver, and then any unbalance in the receiver input will result in unwanted signals getting into the rf stage and possibly causing interference.

Stub filters made from 300Ω ribbon cable placed at the receiver antenna terminals can be tried, but these will not remove interference currents flowing down both legs of the feeder to earth. It may be possible to remove this by earthing one side of the balanced receiver input to the chassis by the shortest route (this must not be done if the receiver has a live chassis connected to one side of the mains, but most modern hi-fi equipment has an earthed chassis and is quite safe). Unfortunately this will probably reduce the sensitivity of the receiver and may be unacceptable in weak signal

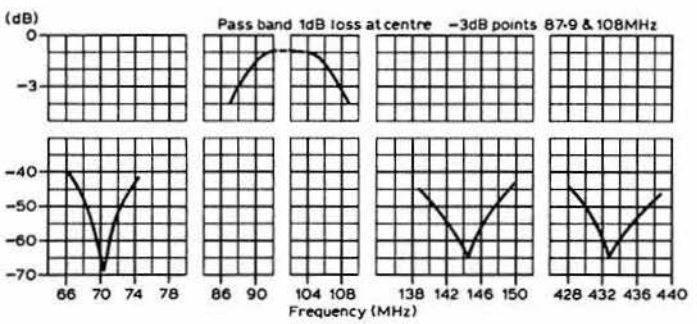


Fig 4. Frequency response of double stub filter

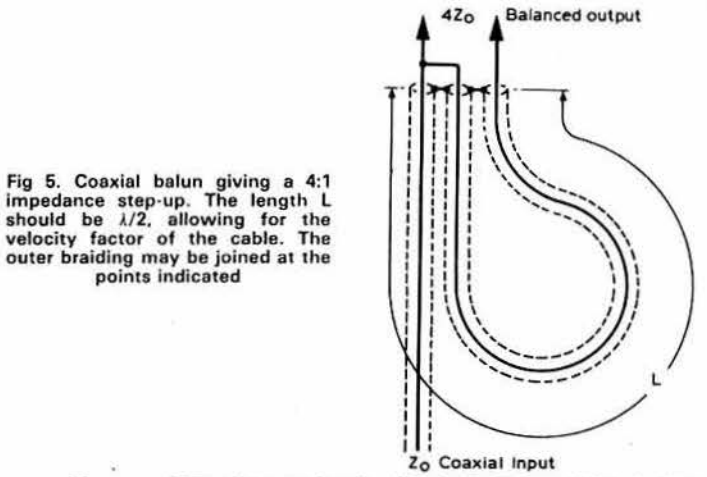


Fig 5. Coaxial balun giving a 4:1 impedance step-up. The length L should be λ/2, allowing for the velocity factor of the cable. The outer braiding may be joined at the points indicated

areas. However, if Band 2 reception is still adequate, a coaxial stub filter as Fig 1 can be used and should be more effective than a filter made of ribbon cable.

Where the antenna feeder is a 50 or 75Ω coaxial cable connected to a 300Ω balanced receiver input, there should, theoretically, be an unbalanced to balanced transformer (balun), but these are often not found to be necessary in good signal areas. In this case the screen of the coaxial cable as well as the antenna can pick up an amateur transmission. As with the previous case, stub filters can be tried first (as Fig 1), then the screen of the coaxial cable where it connects to the receiver input terminals should be connected directly to the receiver chassis (again ensuring that the receiver is not of the live-chassis type). Where this results in an unacceptable loss of signal it may be necessary to use a balun. The λ/2 coaxial balun of Fig 5 steps up the impedance of the coaxial input by a factor of four times, and also allows the screen of the antenna cable to be earthed directly to the receiver chassis without any loss of sensitivity. Stub filters can then be used to their best advantage.

Preamplifiers

A further problem may be encountered if a preamplifier, at the masthead or elsewhere, is in use at the Band 2 receiver—these are becoming more common, especially in weak signal areas. Assuming that the interference is entering the main receiver via its antenna input, it must be determined whether it is being caused by the preamp or in the receiver. This can be checked by making a filter as above and fitting it directly at the antenna input of the receiver. If the interference is still present it is likely to be caused by the preamp; in which case a filter must be inserted between the antenna and the preamp, at the masthead if necessary.

Conclusions

The filters described above will cure Band 2 interference problems in a large number of cases. However, great tact should always be used when dealing with interference problems, especially when the owner of the receiving equipment is hostile or not an immediate neighbour or acquaintance. In these cases the assistance of the Post Office radio interference branch should always be sought.

Acknowledgement

The author wishes to thank Pye Telecommunications Ltd for the use of test equipment in the preparation of this article.

Appendix

The impedance of a lossless open circuited line:

$$Z_{OC} = \frac{Z_O}{jTan\ (360.L)^\circ}$$

Z_O = Characteristic impedance
L = Electrical length of the line in wavelengths

Therefore at 94MHz, using 50Ω cable:

$$\text{Impedance of 70MHz stub, } Z = \frac{50}{jTan\left(360 \cdot \frac{1}{4} \cdot \frac{94}{70 \cdot 3}\right)^\circ} = +j29 \cdot 26\Omega$$

$$\text{Impedance of 144MHz stub, } Z = \frac{50}{jTan\left(360 \cdot \frac{1}{4} \cdot \frac{94}{144 \cdot 5}\right)^\circ} = -j30 \cdot 58\Omega$$

Therefore the two impedances are virtually equal and opposite and form a low-Q parallel-tuned circuit at this frequency. □

The astronomy of meteor scatter

by J. R. MATTHEWS, G3WZT*

OVER the past few years long distance propagation by means of meteor scatter on the 144MHz band has seen a considerable increase in activity on both ssb and cw. Several very good articles have been published in radio journals covering most aspects of this mode, but they always require the reader to refer to almanacs for information. The purpose of this article is to help operators understand the astronomy of meteor scatter, and to describe a method of determining culmination times; this will allow full use to be made of the smaller showers at optimum times. Normally the only information published in amateur radio journals are right ascension and declination angles of meteor showers; both of which provide all the information necessary to calculate culmination times.

Latitude and longitude

The meridians provide one of the co-ordinates required for fixing the position of a celestial body (longitude) but there must be a starting point; this is the meridian passing through Greenwich. For the observer on the earth's surface the meridian is defined as the plane of the great circle passing through the observer and the north and south celestial poles. It is an angular measurement in degrees or time up to 180° east or west of the Greenwich meridian. The other co-ordinate required is latitude, which is an angular measurement north or south of, and parallel to, the equator, and is defined as a small circle the plane of which cuts the sphere into unequal parts (see Fig 1).

The meridians are not only imaginary lines on the surface of the earth, but must be thought of as vertical planes extending out into the sky to the celestial sphere.

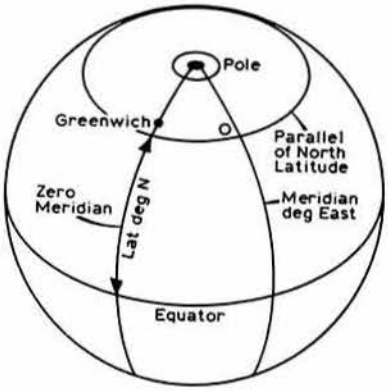


Fig 1. Diagram showing parallel of latitude and meridians. To the observer at O the meridian is his north-and-south line and should be thought of as an imaginary plane reaching out to the celestial sphere

The celestial sphere

To an observer on the earth's surface looking up at the sky on a clear evening, the stars appear as a multitude of points of light distributed over the surface of an imaginary hemisphere with the observer in the centre. It is this celestial sphere that is used geometrically to measure the co-ordinates of heavenly bodies, including meteor shower radiant points. All stars occupy a position on this imaginary spherical surface, although in fact the differences in distance from each one to earth are immense.

The celestial sphere is represented in Fig 2, with the earth at the centre (observer at O). The zenith Z is the point directly above the observer, and the horizon is the plane of the great circle NWSE at right angles to OZ cutting the sphere into hemispheres. The north celestial pole (pole star) is at P, and the celestial equator is the plane of the great circle CE at right angles to OP. The observer's meridian lies on the semi-great circle PZSP, and when an object crosses the observer's meridian it is said to transit or culminate.

*Kings Down, Church Road, Partridge Green, Horsham, Sussex RH13 8JS.

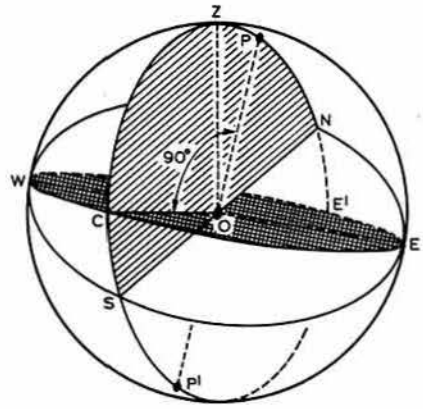


Fig 2. The celestial sphere with the observer at O. The equator is SWNE and the meridian PZSP'. The zenith Z is the point directly above the observer. The plane cutting the sphere CE' at right angles to the pole P is the celestial equator

The culmination time is an important factor when drawing plots of meteor showers to enable optimum time and direction to be established for a given shower.

Motion of the earth

If for convenience we imagine the earth as a fixed object with the sun moving around it, the plane containing the orbit is known as "the plane of the ecliptic". The rotation of the earth is approximately at right angles to this plane, but differs from the perpendicular by about 23·6° (see Fig 3) and is termed "the inclination, or obliquity of the ecliptic". The "relative" movement of the sun along the ecliptic (Ec) and the position of the celestial equator (CE) are depicted on the celestial sphere. Twice yearly the path of the ecliptic coincides with the celestial equator at ♈ and ♎. Between ♈, M, and ♎ the sun is said to have north or positive declination, and the position ♈, when the sun's declination moves from south to north is known as the vernal equinox. This reference point on the celestial equator, known as the "first point of Aries (♈), is used to obtain the right ascension (ra or ∝) of heavenly bodies, including meteor shower radiant points, and is the reference or starting point for measurement in sidereal time (star time). By definition the ra of ♈ is 0h sidereal time; ra (∝) of star S is shown in Fig 3, the angle of arc SD is the declination of S.

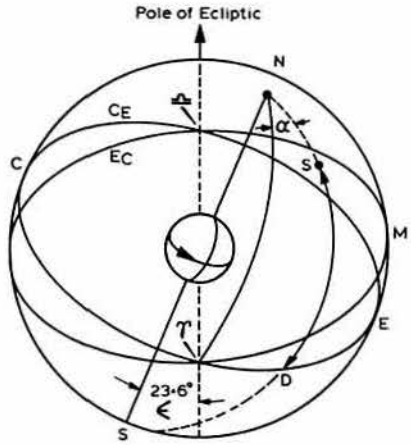


Fig 3. Seen from earth the "apparent" movement of the sun along the plane of the ecliptic is shown (Ec). The earth's axis of rotation differs from this by about 23·6° and is termed "obliquity of the ecliptic" ERA of star S is the angle ∝, and the declination is the arc SD. The vernal and autumnal equinoxes are shown at ♈ and ♎ respectively

Time

The period of rotation of the earth on its axis has been the basis of time measurement for many hundreds of years. If the interval between two successive transits of a star is timed, the period is known as the sidereal day. As with all measurements there must be a reference point. For sidereal time measurement, 0h is the transit of the first point of Aries (♈) ie when ♈ crosses the meridian the sidereal time is 0h. When ♈ has moved west by 2h, or 30°, it is said to have an hour angle of 2h, this is normally written ha♈.

If one were to observe the transit of the sun and repeat the observation one sidereal day later, it would be in a different position because during the interval it would have in fact moved about 1° further east of its original position—this period is equivalent to nearly 4min, thus the solar day is approximately 4min longer than the sidereal day. In one month, sidereal time gains about 2h on solar time.

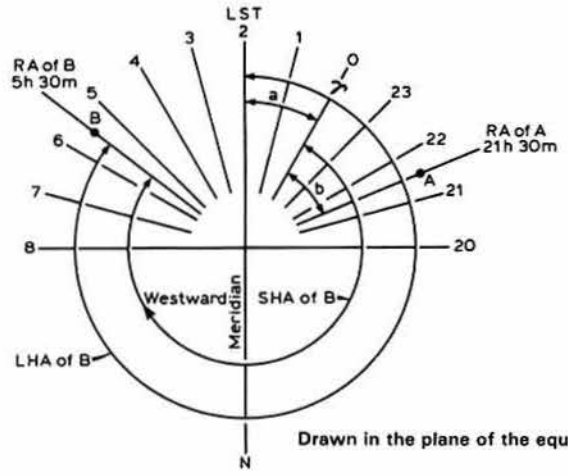


Fig 4. Local sidereal time is 2h. ♈ passed the meridian 2h ago and is said to have an hour angle of 2h (ha ♈ = 2h). a = ha♈. b = sha of star A and is the alternative to ra

In Fig 4 the local sidereal time is 2h. The star at point A has an ra of 2130h and passed the meridian 4·5h ago; the local hour angle of the star is said to be 4·5h (lha 4·5h). Star B at ra 5h 30min will not transit for another 3·5h; in other words 20·5h have passed since the last transit, and it therefore has an lha of 20h 30min. The local sidereal time at the instant of transit is equal to a star's right ascension.

In order to fix the position of a meteor shower radiant point on the celestial sphere, it is necessary to know the sidereal hour angle (b in Fig 4). The sha is an alternative co-ordinate to ra and is defined as "the angle from the hour circle of Aries to that of the star, measured towards the west along the equator up to 360°. The ra is measured from ♈ eastwards. To find the sha subtract ra from 24h: for example, the sha of star A in Fig 4 is 24h − 21h 30min = 2h 30min. The example in degrees would be 360 − 322·5 = 37·5°. The sha of star B at ra 5h 30min is 18h 30min. It is important to understand fully the meaning of sha and ra as they enable the transit or culmination times of meteor showers to be determined.

Culmination

Culmination, transit, or more specifically upper transit, refers to the star or other heavenly body crossing the observer's meridian between the north celestial pole and the south point of the horizon (see Fig 5).

The star M is said to culminate when crossing the meridian at C. As this star does not go below the observer's horizon it can also be observed at lower culmination L, and is termed a circumpolar star. Star X is not circumpolar and passes below the horizon and sets in the west and later rises in the east. It must be realized that all references to stars are equally applicable to meteor shower radiant points, which have the same apparent motion of rising in the east and setting in the west. The angles of arc DX and DM are the declination angles of X and M and are the other co-ordinates required to fix the position of a star on the celestial sphere. Declination angles are used to plot the path of the radiant point to enable optimum times to be selected for a given direction. It can be seen from Fig 5 that both M and X have the same right ascension.

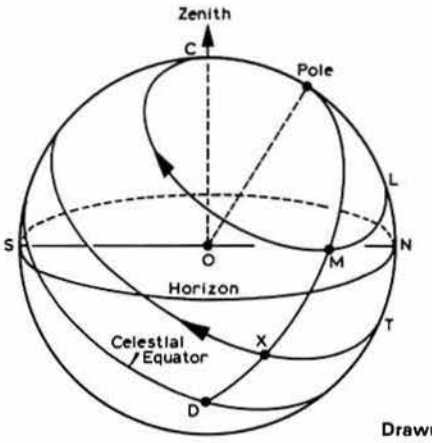


Fig 5. Star M culminates at C and is circumpolar, while star X goes below the horizon at lower transit (T). Both M and X will transit the meridian at the same instant and therefore have the same ra. Declination angles of M and X are the angles of arc DM and DX respectively

Sidereal time (st)

In order to determine local upper transit or culmination times from ra co-ordinates, a means of determining local sidereal time is required. Almanacs contain this information but may not always be available.

The path of the sun along the ecliptic is not constant, causing the solar day to vary in length. This is defined as apparent solar time and would of course be incompatible with clocks as we know them. For time keeping, a mean time of the solar day is used. This fictitious mean sun moves at a uniform rate, so keeping all days the same length; this mean time is known as Greenwich mean time or universal time (ut). (The difference between solar and mean time is known as the equation of time E.)

Earlier it was stated that the relative path of the sun (ecliptic) coincides with the celestial equator at two points (Fig 3): *(1)* the vernal equinox, or the first point of Aries ♈ occurring around 21 March; and *(2)* the autumnal equinox or the first point of Libra ♎ occurring around 23 September. When the sun passes ♈ in March, both will be on the meridian at about the same time, st will be 0h but solar time will be 12h. However, at the autumnal equinox ♎ st will be 12h and will agree with mean time. It is this fact which allows one to approximate st for any day of the year without referring to an almanac. It has already been stated that st gains around 4min each day or 2h each month on solar time. Using this simplification it is possible to approximate st with sufficient accuracy for meteor scatter work by time gained since 23 September to the day that st is required.

Example. One wishes to know the st at 0h gmt on 13 August to enable the culmination time of the Perseids meteor shower to be found.

	h	min
23 September at 0h	st = 00	00
23 July at 0h (+10 months)	20	00
13 August at 0h (+21 days)	1	24
Greenwich st =	21	24

If the observer is not on the Greenwich meridian, the longitude, measured positively westward from Greenwich, must be subtracted from gst to obtain local st (lst). For example, if the observer is 30° east of Greenwich, ie 2h, lst would be 23h 24min. To put into perspective the errors introduced by estimating by this method, it is interesting to compare with figures from an almanac.

13 August at 0h from almanac st = 21h 26min 20s
13 August at 0h estimated st = 21h 24min.

Determining culmination times

The following example shows how to find the culmination time for the Geminids meteor shower occurring on 13 December.

The ra is 113° and the observer is located on the Greenwich meridian (see Fig 6).
Estimate the lst on 13 December at 0h.

	h	min
23 September at 0h	st = 00	00
23 November at 0h (+2 months)	4	00
13 December at 0h (+20 days)	1	20
lst =	5	20

Local sidereal time is therefore 05h 20min.
Converting the ra of 113° to time, we obtain ra 7h 32min. The shower radiant X will transit the observer's meridian at ra minus lst.

	h	min
ra =	7	32
lst =	5	20
Culmination =	2	12

Therefore local mean time culmination is 2h 12min.

As the example is drawn for the Greenwich meridian, the culmination or upper transit time will occur at 02h 12min local time, in this case gmt (ut).

The second example (Fig 7) refers to an observer situated 45° east of Greenwich. All other details are identical.

Estimate lst at 0h, longitude 45° east.

	h	min
23 September at 0h	st = 00	00
23 November at 0h (+2 months)	4	00
23 December at 0h (+20 days)	1	20
Add longitude east 45°	3	00
lst =	8	20

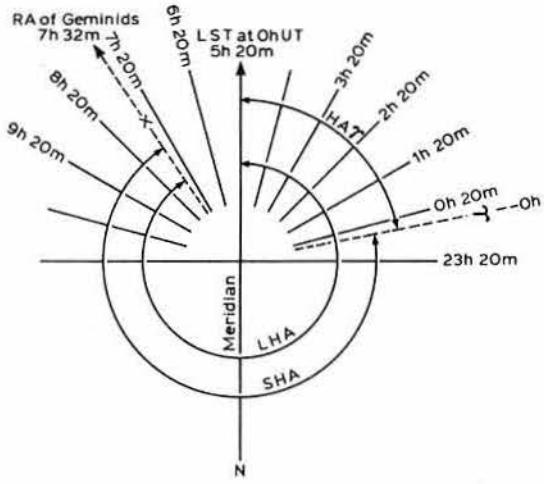


Fig 6. RA for the Geminids is 113°, ie 7h 32min. The observer is on the Greenwich meridian and lst at 0h ut is 5h 20min. The shower will transit (culminate) in: ra – lst, or 2h 12min lmt. In this example lmt equals ut

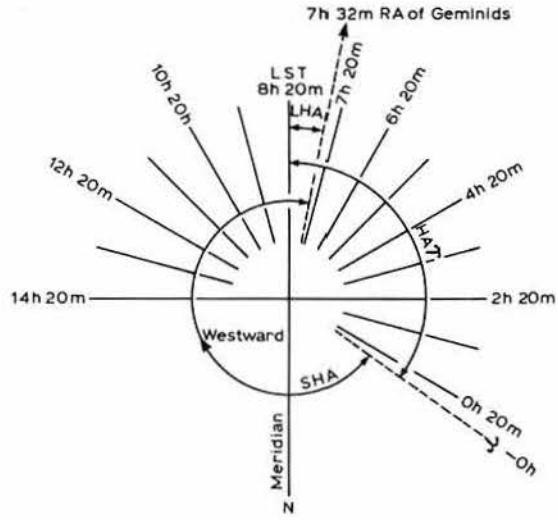


Fig 7. All details are identical to Fig 6 except that the observer is located 45° east of Greenwich. LST at 0h ut is now 8h 20min the next transit will occur in 23h 12min time; this is the mean time interval and approximate ut of transit

The radiant will transit the observer's meridian at ra – lst.

	h	min	
ra	= 7	32	
lst	= 8	20	(+24h)
Mean time interval since 0h	=23	12	
Add longitude east	= 3	00	(–24h)
Local mean time culmination	= 2	12	

Local mean time is the same in each example and should not be confused with gmt (ut). The mean time interval is near enough to gmt if preferred. Although small errors exist, as acceleration of st over mean time for the mean time interval has not been accounted for, these are only small and need not concern us.

Conclusion

There are of course other small variables and irregularities in the motion of the earth which have not been accounted for; however, the errors introduced can be considered as insignificant in this context.

It is hoped that this article will give the ms operator a broader understanding of the motion and timing of showers, and explain some of the terminology often used in the context of this mode of operation. Given the ra time, or angle, of meteor showers, it is quite possible and straightforward to estimate with reasonable accuracy the lmt of transit without using almanacs.

Methods of plotting the radiant path from declination angles are described in "VHF meteor scatter propagation" by J. D. V. Ludlow, GW3ZTH, *Radio Communciation*, February 1975, and the reader is referred to this article for complete understanding.

Bibliography

Elements of Mathematical Astronomy. Martin Davidson.
The Elements of Astronomy for Surveyors. J. B. Mackie.
Text Book on Spherical Astronomy. W. M. Smart.
Mathematical Astronomy for Amateurs. A. E. Beet.
Whitaker's Almanac 1980.

□

NEW PRODUCTS

Slim Jim super antenna

Designed by F. C. Judd, G2BCX, this new version of the "Slim Jim" antenna is only 42in long, and so slim that it is now available for mobile operation as well as for base station and ideal for portable use. Being a free-space antenna it does not rely on the ground-plane effect, and can be used on vehicles with glass-fibre bodies or roofs at full efficiency. The "Slim Jim Super" is available for normal mast mounting for base stations; or gutter mount, magnetic mount or single-hole fixing for mobile operation. The smaller dimensions and extremely high efficiency have been made possible by a unique high-Q helical stub matching system.

On the base station model the helical stub and main element are completely enclosed in a 0·75in diameter housing giving full protection against all weather conditions. The mobile version is constructed with a stainless steel flexible main element, and the stub section is completely sealed for all weather protection. Another feature of the "Slim Jim Super" is is an external sleeve adjuster for minimum vswr setting.

Price £15.25 + VAT. Further information from Wrenpro Systems, Reedham, Norfolk; tel Freethorpe 245.

Thandar TP600 frequency prescaler

Designed to provide high sensitivity (better than 10mV rms) the TP600 will extend the upper frequency limit of most frequency meters by a factor of 10×, up to a maximum of 600MHz. It can be used with the Thandar PFM200 hand-held frequency meter or the Thandar TF200 lcd frequency meter, to extend their frequency range to cover a wide range of specialized applications, including transmitter/receiver test for mobile and amateur radio, at a cost of only £37.50 plus VAT.

Further details can be obtained from Sinclair Electronics Ltd, London Road, St Ives, Huntingdon, Cambs PE17 4HJ; tel 0480 64646.

The Thandar TP600 frequency prescaler with a TF200 lcd frequency meter

How to construct a low-cost high-gain antenna

by R. D. CRIDLAND, G3ZGP*

WISHING to improve his dx capabilities without the use of linears or unsightly quad structures, the author scanned the usual advertisements but found that a durable "get-in-and-work them" system would cost several hundred pounds, which was out of the question. After assessing various designs he came up with a very easy-to-use and potent antenna installation.

The mast

With the help of a local scrap-metal yard and an electric arc welder, a self-supporting, rotatable, tiltover mast was made. This is constructed of 2in inner diameter steel tubing with a 0·187in wall, with 0·187in thick plates welded to the tubing, and with 0·75in bolts for the pivot and tie points (see Fig 1). The top 10ft of mast is of 2in outside diameter alloy similar to that used for tv receiving antenna masts.

The most labour-intensive part of the project for the constructor is digging a hole not less than a cubic yard in dimension to secure the mast against high winds. A close-fitting socket about 4ft long, into which the mast tubing can be inserted, is then located in the centre of the hole so that the top of the socket is at ground level. Plenty of rubble and concrete should be rammed into the hole, remembering to constantly check that the socket is vertical as the hole is filled, and allow a week or so for it to harden.

With the antenna in position, high winds may turn the mast, so a locking clamp should be fitted at its base. Make sure that the garden is large enough to accommodate the antenna when it is lowered to the ground. A nylon cord is required at the bottom of the tiltover section to lower it down and pull it up, and a certain amount of counter balance (for instance, a concrete section bolted on near to the nylon cord fixing point) may be required if the antenna is a little too top heavy.

The antenna

The author decided that a two-element delta loop would be visually more suitable than a quad, particularly for 14MHz. He used wire loops of 6A wire, at least 14-stranded and pvc covered, taped to what looks, from the ground, like a two-element Yagi. Four well-varnished 12ft by 1·125in bamboo canes are inserted in two 4ft lengths of alloy tubing, pinned, and secured with car body filler. The total length of the driven-element bamboo is 24ft, that of the reflector element 26ft, and the alloy boom is 10ft by 1·5in. Good quality tv mast clamps are used for boom to element fixing. This gives an "H" configuration. Tape the wire loops on to the bamboos and secure a varnished wooden 5ft boom at the bottom of the loops.

With a little adjustment this will give 1:1 swr on a chosen frequency without using a gamma match, and even without a matching section the antenna performs as well as a quad on 28MHz with a reasonably low swr. An swr bridge makes the main operating part of the band available, but a gdo or noise bridge is always useful. The front to back ratio and gain is similar to a quad, see antenna handbooks. The formulas for delta loops on any band in feet and inches are:

driven element $\frac{1005}{F}$; reflector $\frac{1030}{F}$.

The reflector will not require trimming, but it is best to start with the driven element overlength and trim it while adjusting spacing on the lower boom—70Ω low-cost coaxial or twin feeder is used to compliment this.

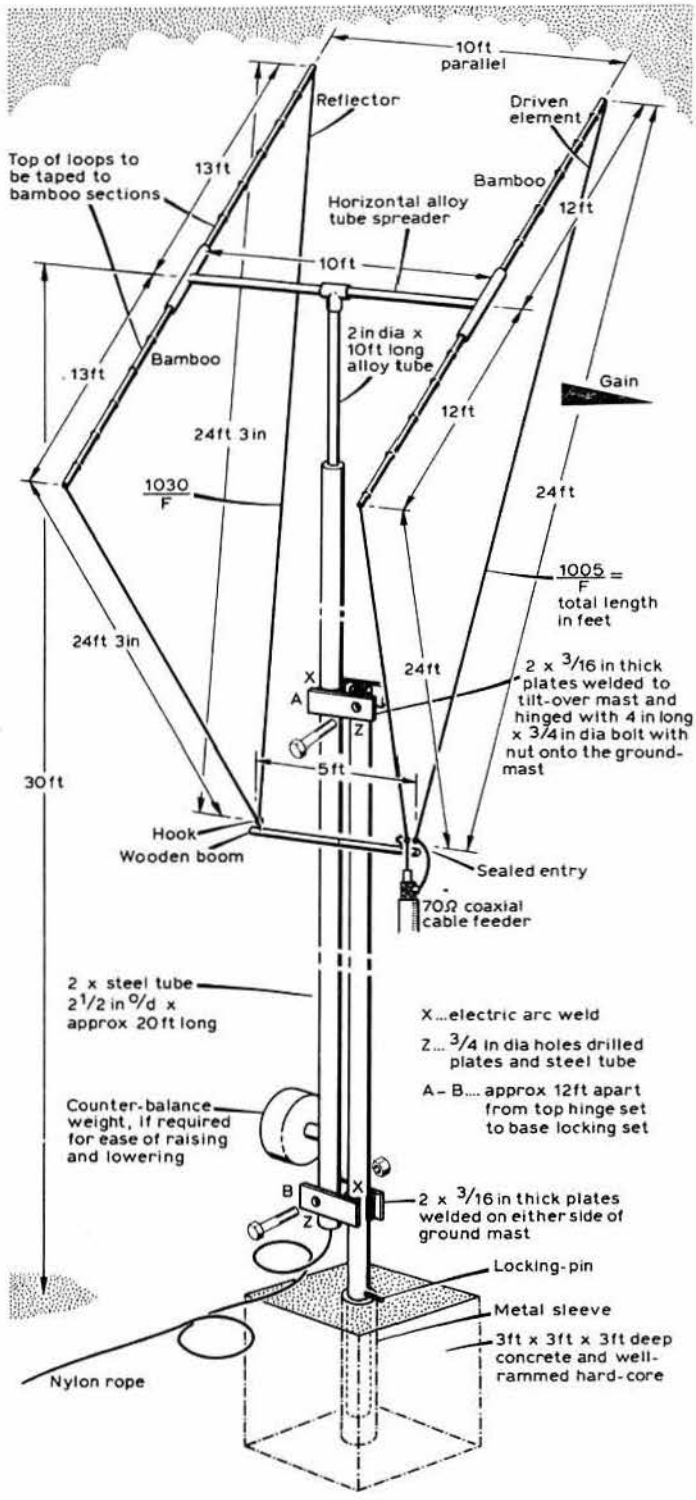


Fig 1. Construction of the antenna. Because of the spacing used, no matching systems are required. If resonant on 14,200kHz, swr is 1:1, and would be resonant around 28,400kHz with swr approximately 1·5:1, thus making a useful multiband antenna. (Lobe on each top corner on 28MHz.)

The reflector loop has to be detached from the wooden boom when lowering, so some form of hook would be ideal. With the locking clamp released, the mast and antenna can be turned by grasping the mast and rotating it. A heavier system may require a metal bar fixed near the base.

The antenna has been in use during very high coastal gales for over two years and is as good as new; obviously if more height is desired, the tubing will have to be of larger diameter. From PL259 plug to top of antenna, the cost was about £20. □

* 13 Clarendon Avenue, Redlands, Weymouth, Dorset.

An external battery pack for the Trio 2300

by G. T. THEASBY, G8BMI*

Introduction

The Trio TR2300 is an ideal rig to take on an afternoon walk or on holiday, but as it is equipped with "penlight" cell batteries one can often run them down before the day is out if there is any activity on the band. For this reason the author designed this external pack which will clip on to the transceiver and provide ample battery capacity for such occasions, without adding too much extra weight or size. For convenience a clip-on style was preferred to belt or pocket fitting.

This project was designed around two "Dryfit" type jelly electrolyte batteries, of 6V 1Ah capacity, which can be operated in any position, will not leak electrolyte and thus damage the expensive transceiver, and—unlike nicads—can also be recharged from an ordinary car battery trickle charger. They are also fitted with automotive type Lucas connectors so that connections can be quickly and reliable made. This type of battery can supply over 40A and, therefore, a 1A fuse is fitted in a panel-type fuseholder mounted in one side strap. The author believes in a "belt and braces" approach, and a sub-miniature toggle switch was wired in series with the fuse and mounted in the other side strap. There are no modifications to make to the rig, and the resale value is not affected. The general arrangement is shown in Fig 1. There is no reason why the dimensions should not be suitably altered in order to fit similar equipment, such as the Trio TR2200 series transceivers.

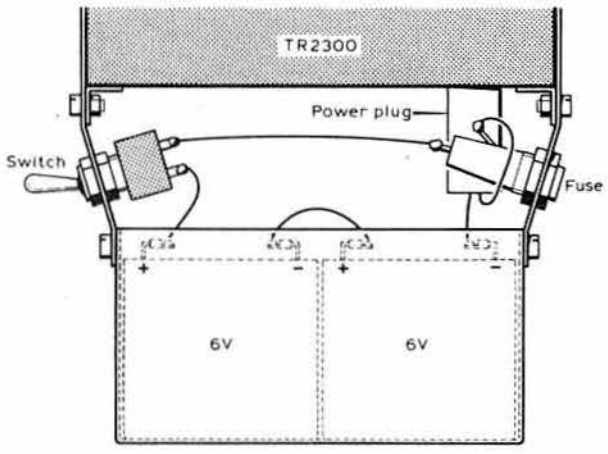


Fig 1. General arrangement of battery pack as fitted to TR2300

Construction

All sheet parts are made from 20-gauge aluminium alloy, and the dimensions are fairly critical in order to ensure a good looking square-cornered box (Fig 2). A box could be built up from flat sheets and angle, like Meccano, but the opportunities for error are much greater and the result would not be so "clean" looking.

The holes can be drilled in the flat, but in the author's case this usually results in them being out of alignment after bending. It is safer to mark out and from what will become the outside, centre-pop the hole locations in sides C and E and drill after bending. This results in perfectly aligned holes, and the use of a sharp drill will prevent the formation of burrs between the flanges. The holes should be drilled to suit M2·5 or 6BA bolts.

The significance of the short double line between A and C, and between A and E is to allow for the thickness of the brackets F, G, H and J on the end pieces B and D. The ends B and D are bent to the inside (45mm) lines, as are F, G, H and J, while the sides C and E are bent to the outside (47mm) lines. This procedure gives nice square corners without distortion.

The actual bending of the metal can be a little tricky, and the use of a vice is essential if good results are to be obtained. It may be advisable to practice on a few scrap pieces of metal before starting on the real thing if "chassis bashing" is a new activity. Mount the metal in the vice so that the correct bending line is just above, and parallel to, the jaws, and using a suitably-sized piece of wood to spread the pressure and to avoid marking the surface, tap the wood gently with a hammer so that the metal bends over slowly to a right angle. If the only vice available is longer than the 105mm dimension, the end brackets F and G should be bent first. Then bend the side pieces C and E, readjusting in the vice as required in order to reach all the bending lines, and finally bend the other end brackets H and J. It may be necessary to bend C and E in a number of attempts, a small amount at a time at each end alternately, in order to perform this operation satisfactorily. Otherwise pack the vice jaws with a material such as scrap softwood in order to give the required clearances. It sounds rather complicated, but a few minutes spent juggling with the bits and pieces will soon show how it may be done. Finally the end pieces B and D may be bent up into position, and in fact no clamping is required here as they will only bend in one place.

When all the sides and brackets are correctly bent up, the holes may be drilled and the box painted. A dull or matt black finish applied by spray or brush will match the finish of the rig [1], [2]. Pan head bolts should be used, fitted with the heads inside, as the use of other types may foul the batteries. Washers and nuts are then assembled to the bolts. Flat washers will avoid marking the paint, and self-locking nuts are best if available, although the normal nut well tightened should not work loose in the conditions prevailing here. If the bolts need cutting to length, this can be done before assembly, screwing on a nut before cutting the bolt and filing the end flat, so that when the nut is unscrewed it will remove any flash from the thread root enabling it to be refitted easily later.

Close-up view of the battery pack

*12 Southfield Avenue, Riddlesden, Keighley, W Yorks BD20 5HX.

Components list

20 gauge aluminium alloy sheet at least 215 × 157mm.
M2·5 or 6BA pan head bolts 5mm or more long, flat nuts and washers.
Miniature fuseholder panel mounting for 20mm fuses.
1A 20mm fuse.
Sub-miniature spst toggle switch.
Two 6V jelly electrolyte batteries.
External power lead to suit transceiver.
M359 elbow connector (if required).

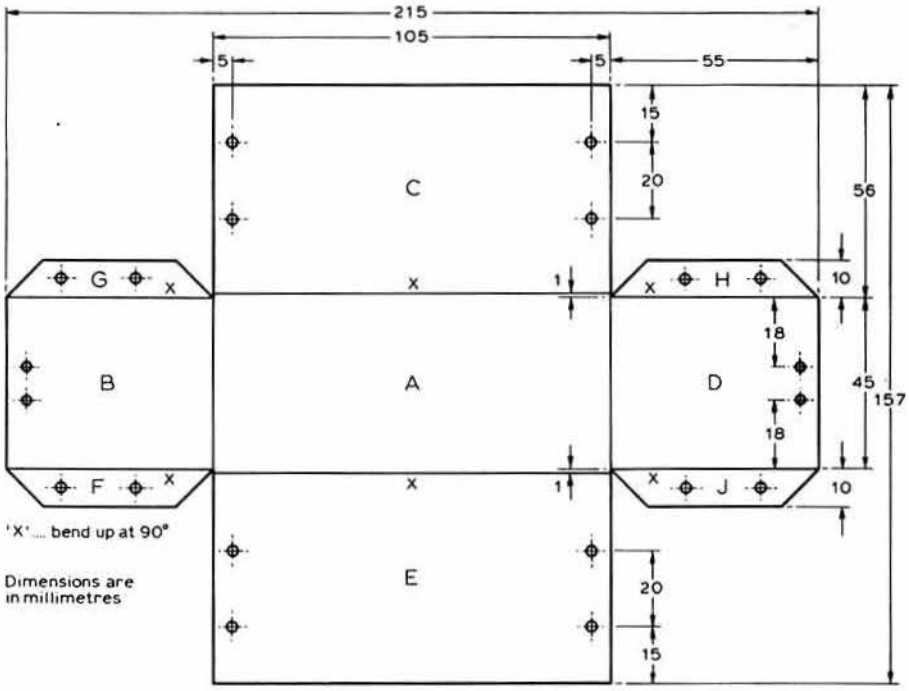


Fig 2. Metalwork dimensions and layout of battery box

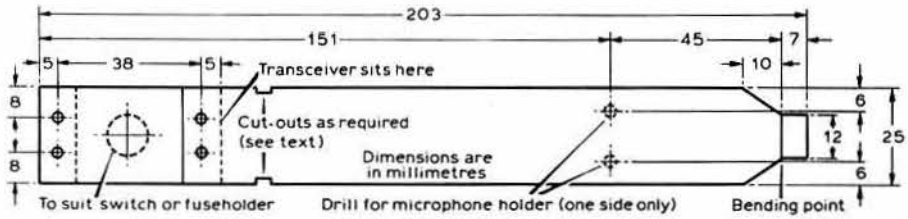


Fig 3. Metalwork dimensions and layout of side straps

With the battery box finished and put aside for the moment, the side straps can be made (Fig 3). These may need small cut-outs as shown, in order to clear the side mouldings on the back panel, and should be checked for a good fit in the side channels of the rig before painting and final assembly. The straps also incorporate rests for the rig to "sit" on, and in the prototype these were formed by cutting along the sides and top of a tab marked within the outline of the strap and then bent inwards at right angles. Such cutting should be made by drilling many holes around the tab with a 1mm drill and then cutting the webs between the holes with a sharp knife. The cut edges should be filed smooth and the tab bent over. This has proved quite satisfactory, but a more substantial method would be to mount a small right-angled piece of metal at the same point on the strap, attached with two bolts, and this method is shown in the illustrations. The careful location of these rests is, in conjunction with the procedure below, vital for the secure attachment of the battery pack.

When the side straps have been cut out, drilled, assembled and bent as required, they should be temporarily attached to the battery box ends and the fit of the assembly checked against the rig. When all is in order the tops of the side straps should be bent over into the shoulder strap brackets sufficient to mark the correct bending point. The assembly can then be removed from the rig, the side straps unbolted and the tops bent to an angle of about 100°. This ensures that they do not come away in use. The microphone mounting clip would be covered by a strap and must be re-mounted on one of them†. After painting as before, the rests are fitted with a resilient pad such as plastic foam draught excluder strip to avoid scratching the rig, and the straps can then be bolted permanently to the battery box.

More draught excluder strip should be stuck inside the battery box on the sides and base to prevent the batteries rattling, and they can then be wired up to the fuse and switch ready for use. It was not thought necessary to provide top support for the batteries as the combination is unlikely to be used upside down. If such a restraint is thought necessary, a suitably shaped piece of metal may be bolted across the battery box taking care not to short-circuit the battery terminals.

The gap between the rig and the battery box is purposely large so that there is room for the power plug, and to allow for an M359 elbow connector to be easily attached in case an external antenna is required.

Conclusion

There should be no difficulty in the construction of this project if the measurements are accurately made. The original was laid out directly on the flat metal using a scriber and a wooden rule, and the top edges of the box when formed were within 1mm all round. The vice was a woodworker's vice with 200mm jaws. All the measurements and scribed lines should be checked several times before cutting and bending begins.

A second-hand pair of Dryfit batteries gave the author about 10h of operation per charge.

References

[1] "Technical Topics", *Rad Com* November 1979. p1038.
[2] "Technical Topics", *Rad Com* February 1980, p158. □

‡Tandy sell a suitable microphone clip (part No. 21-923) which may be bolted or stuck to the battery pack, thus allowing the original clip to remain on the 2300. This type is not listed in the catalogue, but a magnetic type (part No. 21-1130) is, which can be stuck on with double-sided self-adhesive foam strips.

Twenty metres long

by JOHN B. ROSCOE, G4QK*

THE most common example of domestic "real estate" in this country is a house parallel to the road with a rectangular garden stretching behind it. The author's is the archetype of the urban garden, overshadowed by houses, trees and telephone wires. The simplest hf antenna to erect on such a property—if not, indeed, the only one possible—is likely to consist of a length of more-or-less horizontal wire attached to the house at one end and to a support near the bottom of the garden at the other. No commercial operator would contemplate operating for 5min from such a jungle, but many amateurs work for years on a site of this type—with an antenna perhaps 66ft long and at a maximum height of 30ft—and achieve remarkable results. They know that a planning application for a 100ft tower in the "backyard" would be turned down flat, and that a request for a diversion of housekeeping funds into the purchase of a mammoth beam and rotator would be given equally short shrift.

Before the last war, and for a time after it, such an antenna would have been fed with an open-wire feeder, and quite probably at the end rather than in the centre. With the spread of vhf television, however, all voltage-fed antennas became unpopular because of harmonic radiation: in particular, Channels 1 (45·0/41·4MHz) and 3 (56·75/53·25MHz) were obvious victims for tvi. This accounts for the growth in popularity of the trap dipole. With the migration of television into uhf, multi-band antennas with open-wire feeders are now coming back into use, and are much in evidence at NFD stations.

The simplest antenna of this type is, of course, the zepp. The advantages of the centre-fed zepp were listed recently in "Technical Topics", *Rad Com* June/July 1980, p637, though perhaps insufficient emphasis was given to the useful feature that all tuning and matching operations, right from the moment of erecting the antenna, can be conducted at armchair level. The end-fed zepp is essentially an unbalanced system, and in certain cases might produce tvi where a centre-fed one would not. It has two advantages: the heavy feeder is held by a firm support so that there is no sag in the top, and the fundamental wavelength is twice that of the centre-fed configuration—potentially important in a short garden.

Take the typical case of a 66ft end-fed zepp on 21MHz. This is three half-waves at that frequency, and the major radiation lobes are at about 40° each side of the wire. A glance at the RSGB Great Circle map will show that this antenna will give very useful coverage, whether running N-S or E-W. There is, in addition, with an odd number of half-waves, a minor lobe at right-angles to the wire. This is well borne out in practice, when an antenna running due west (270°) will be found to put a good signal into PY/LU (230°) and W6/W7 (310°), but a rather disappointing one into Africa.

However, even a diet of PY, LU, W6 and W7 begins to pall eventually, so other possibilities should certainly be explored. Once the radiator of the zepp is removed, the system is reduced to an elevated feedpoint at one end and a support at the other, and between the two anchorages a variety of antennas can be tried. Reasonably weatherproof connections can be provided by the usual plastic-block barrel connectors, liberally coated with graphite grease. Among the simpler types of antenna are the W8JK, the colinear, and the G8ON; and, if two end-supports are available a sufficient distance apart, the horizontal-V. The W8JK and the colinear radiate at right-angles to the wire, the V-beam along the intersection between the wires—and the G8ON radiates!

The W8JK is an excellent antenna, giving useful gain and low-angle radiation over an arc sometimes as wide as 90°. A two-section end-fed array on 14MHz (which provided the author with a DXCC in July 1951) or a three-section on 21MHz will fit nicely into this system, perhaps with the addition of some string to stabilize the end spreader. With the feeders tied together the whole system can be end-fed at lower frequencies. A word of caution is necessary, however: an antenna that radiates at 210° could prove rather disappointing, as there is an awful lot of sea in that direction! Perhaps the one disadvantage of the W8JK is that its appearance does not always attract favourable comment, and for those who would like to try something less conspicuous, though certainly less effective, a colinear antenna is a possibility.

Fig 1. Classical hf colinear representation

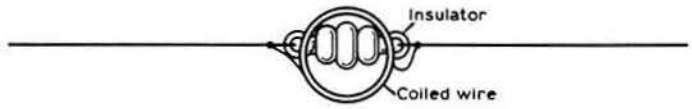


Fig 2. A typical phasing coil

In the colinear antenna the radiation from alternate half-waves is suppressed by folding the wire on itself, when the remaining half-waves add up in phase. Classically the hf colinear is always shown with open-wire stubs for the suppressed half-waves (Fig 1). Adequate results can be obtained by folding a length of quite thin enamelled wire (20-minus swg) at its centre point, rolling it into a coil, and taping the coil to the strain insulator (Fig 2). These phasing coils must obviously be cut to resonate at the correct frequency. A dip oscillator is useful here, particularly when used with a monitoring receiver, but is by no means essential. An alternative method of adjusting phasing coils (as well as many antenna systems) to resonance uses the station transmitter as the measuring instrument.

If the transmitter is loaded on the required frequency into a two-turn link, any parallel-tuned circuit placed near the link will give a clear variation of transmitter output power as it is tuned through resonance. Obviously the transmitter should be run at minimum power, both to observe the licence terms and to avoid the danger of charred insulation and sparking across the capacitor. If a length of wire not far removed from one or more half-waves is connected to one end of the coil, the capacitor will again be capable of resonating the combination; the addition of

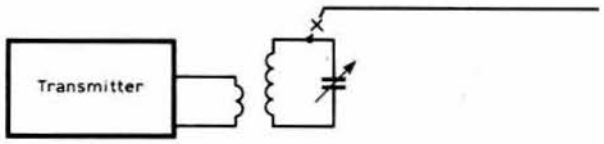


Fig 3. Location of phasing coil, "X"

capacitance will indicate that the wire is too short, and vice versa. A phasing coil inserted between the tuned circuit and a length of wire ("X", Fig 3) will equally affect the resonant frequency of the combination, and can be pruned (symmetrically) until it has no effect on the tuning because it is *exactly* resonant at the transmitter frequency.

The G8ON antenna (Fig 4) can be regarded as a top-fed vertical. The length of the return leg, which may be about 2ft above ground level, is adjusted so that the high current portion (the centre of a half-wave) occurs in the middle of the vertical section on each band: this can be done by inductive loading, trap systems, or jumpers across insulators. If an earthed metal mast is used, the vertical wire should be spaced some distance from it; or alternatively an insulated metal mast can be used as the vertical section. Unless this vertical section is appreciably more than a quarter-wave at the operating frequency, this antenna may prove unrewarding at hf, though it will still load well at lower frequencies.

In the horizontal-V beam the angle between the two wires is fixed by the radiation angles of each wire, since the lobes are arranged to coincide and reinforce. In the example already mentioned, with the main lobes at 40°, the angle between the wires will be 80°—not a useful proposition for a narrow garden. However, the claimed advantages of the V-beam include lowering of the radiation angle as well as improved gain along the axis, and it appears that some lowering of the angle can still be obtained with less than optimum configurations. No attempt will be made to justify this statement theoretically (and in any case counterpoises are rather out of fashion), but it is an easy array to erect and should certainly be tried.

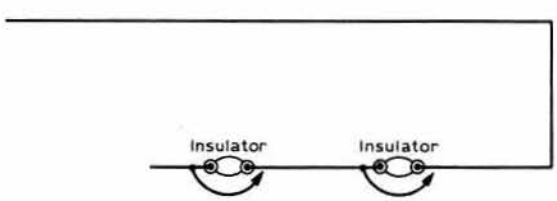


Fig 4. The G8ON antenna

*27 Northfield, Bridgwater, Somerset.

As a suggestion, one wire from the zepp feeder should be run as high as possible towards one corner of the garden, and the other wire should be run along the fence towards the other corner. At the author's site, the performance of a 66ft zepp running at 275° from 28ft down to 16ft (while the 25ft mast is being repainted) has been greatly improved by the addition of the second wire. The antenna now shows that attractive feature of low-angle radiators, the ability to raise dx stations when they are too weak for the big-beam operators to bother with them. Absolute results are not usually helpful out of context, but in a fortnight's operating this arrangement has produced rapid replies—so much more interesting than queueing—on 21MHz cw from all districts of W, VE2-3-4-6, DU, UA0, OA, CE/M, VP9, as well as HB0, JW, OH0 and TA, and is obviously going to put a consistent signal into Japan.

As a final suggestion, two G8ON antennas could be tried in a narrow V. The author has tried a switchable array of four G8ON antennas spaced 90°, feeding two adjacent ones and trying to use the others as a director. □

Modification to the control switching of the Icom IC240 transceiver

by S. EDWARDS, G8GEF*

THIS modification prevents out-of-band operation, and automatically selects simplex or duplex operation under control of the channel switch, controls the auto-toneburst, and enables reverse repeater operation when selected only on repeater channels. The result is a rig which is very easy to operate even when mobile, but with the slight inconvenience of channels being dedicated to either simplex or duplex operation—which is no longer a serious problem as most of the repeater channels are now in use. The modification was carried out on the later model of IC240 fitted with auto-toneburst and reverse repeater switching.

The additional circuitry is shown in Fig 1. Extra diodes mounted on the matrix programming board form a diode OR-gate giving a 9V level output when a repeater channel is selected. This is fed to a pair of cmos logic ics, together with 9V levels from the transmit and receive supplies and a switched 9V level when reverse repeater operation is selected. Output from the logic drive transistor TR1 switches 9V to the auto-toneburst unit, and a 9V level which controls the 600kHz duplex shift input on the main synthesizer board.

The additional circuitry was built on a small board approx 1 by 1·75in, which was mounted on a small bracket behind the microphone socket on

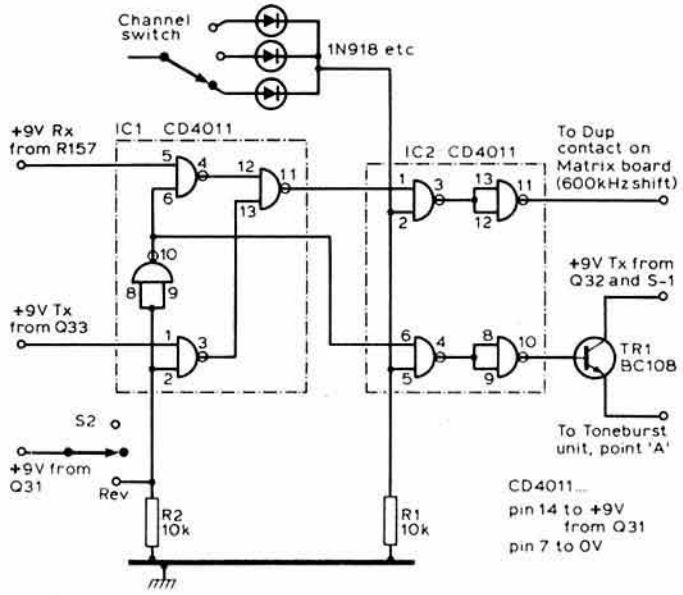
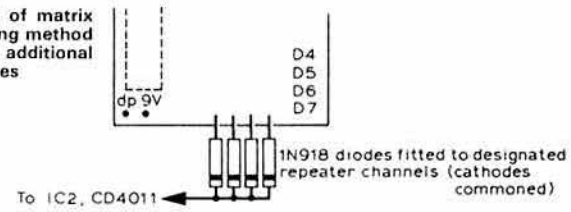


Fig 1. Additional control circuitry

*5 Lime Grove, Chinnor, Oxford OX9 4PN.

Fig 2. Detail of matrix board showing method of mounting additional diodes



the underside of the rig adjacent to the synthesizer board. There are six wires connected to the right-hand three-way "Dup A/Sim/Dup B" toggle-switch S2; these should be identified using the maker's circuit diagram, disconnected from the switch and reterminated on the new board as in Fig 1. Power for the new board must be from the synthesizer 9V supply and may be picked up from the matrix programming board. The 0V line is returned to an earth track on the upper side of the main synthesizer board adjacent to Pin 7 of IC9 (CD4011). The 9V synthesizer supply is also taken to one half of switch S2, and the return is wired back to the appropriate input on the new board so that when the switch is in the lower "Dup B" position the 9V level is switched through to the new board. For those who do not like soldering in confined spaces, the new board could probably be mounted further back where more space is available and the wires extended; however, this has not been tried and rf pickup might be a problem—particularly on transmit.

The additional diodes are mounted on the matrix board with their anodes in diode insert position D7 of the designated repeater channels; channels without the additional diode will remain as simplex channels. The diodes are bent over parallel to the board (Fig 2) and their cathodes joined and connected to the appropriate input on the new board.

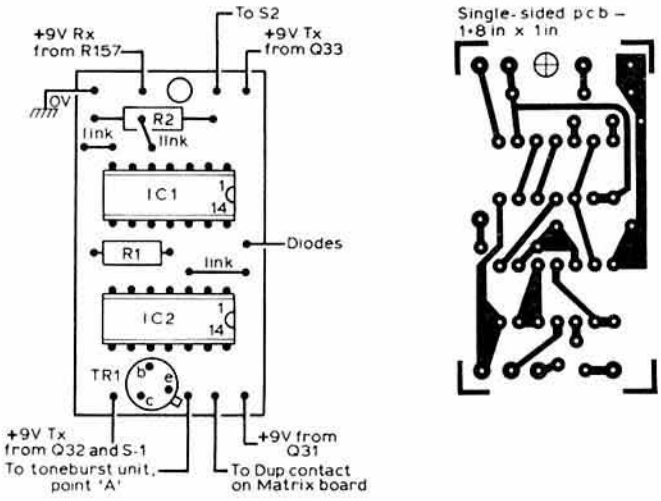


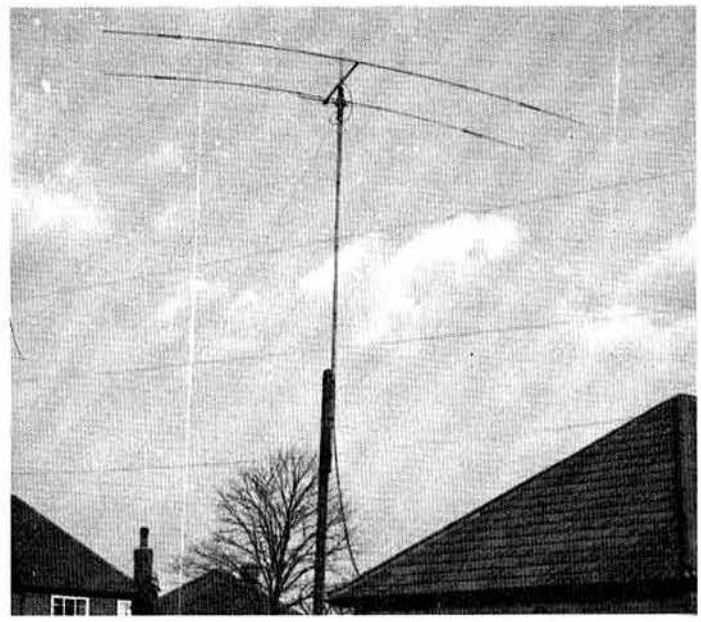
Fig 3. PCB and component layout for additional control circuitry. Note the three-wire links required on the component side of the board

If all is well with the modificaiton, simplex or duplex selection will be automatic as the channel switch is operated. The auto-toneburst will only operate on repeater channels, and will be cancelled if reverse repeater (Dup B) is selected. Perhaps more important, the rig will not operate outside the 144MHz band unless the programming is altered.

The modified rig has been in almost daily use during the past 12 months, and no problems have occurred either with, or as a result of, the modifications. Anyone contemplating carrying out the modification is reminded that any warranty is likely to be rendered invalid as a result. □

An inexpensive mast for a lightweight beam

by F. SKILLINGTON, G4DFU*



The final installation can be seen here relative to the author's home

Introduction

No originality is claimed for this idea, but it was felt that others might benefit from this relatively simple and inexpensive system.

The author has had a Mosley TA32 hf beam rotated by an AR40 rotator fixed to the top of a 2in diameter 21ft long alloy pole, clamped to a tall chimney on his bungalow and stabilized by four guys, for about five years. Although it had survived the gales of a few years ago, it was decided to seek an alternative means of supporting the alloy pole—the author having never been absolutely satisfied with the installation from a safety or visual point of view. Also, competition on the chimney was increasing following the acquisition of an fm radio Yagi together with an existing tv antenna on a rotator.

What was required was a mast which was *(1)* inexpensive; *(2)* self-supporting; *(3)* approximately 35ft high; *(4)* unobtrusive in appearance (a debatable point, but it is all in the eye of the beholder!); and *(5)* relatively easy of access to antenna/rotator for maintenance.

The telegraph pole

After a little investigation, a telegraph pole was found to be the most suitable support, both satisfying the requirements and making use of the existing items available. Used telegraph poles can be obtained from the Post Office as scrap timber; at the time of purchase (November 1979) the price was 20p/m, with a minimum charge of £2, + VAT at 15%. The most suitable poles for handling are the lightweight variety, which can be identified readily as they are stamped with the length in feet (28ft in the author's case) followed by the letter L for lightweight. After locating the depot where the poles were kept and the person responsible for their disposal, a visit to the depot was made and a suitably undamaged, non-rotten pole picked. It is worth noting that at this depot it was the purchaser's responsibility to provide his own transport to get the pole home, but assistance was given with loading.

Planning permission had not been obtained for the former installation, but it was sought for the new installation. Visits were made to the local planning office before the application was made, with a rough sketch of what was intended and when the relevant documents and drawings had been completed. This proved of great value in getting the application correct first time because of the assistance and advice given. Needless to say, some weeks later the permission arrived.

Preparation and erection

First, the pole was stripped of all its steps, eyebolts etc, and two coats of creosote were applied. A hole approximately 18in square and 5ft deep was dug, initially using a spade and, after about 3ft, a special tool (Fig 1) made to loosen the very hard clay which was removed using a garden hoe. This process is very slow and hard work but it is essential to keep the sides straight and the hole an even size.

A lead-in trench about 1ft deep was dug to guide the pole in, the pole moved into place and the top end jacked up as high as possible with a suitable support (Fig 2). A pulley block system was attached near the top of the pole and to a suitable support, together with two ropes for steadying purposes. It was found that at least four people were needed—one on each steadying rope and two on the pulley blocks. The pole was then lifted into place; as it approached vertical it slid quite slowly into the hole. Clay was then rammed in using a 4in by 4in by 5ft length of timber, taking care to site the pole vertically. The ground was left to settle for one week before the final assembly was completed.

Completion of the installation

A ladder of suitable length was placed against the pole to gain access to the top. *A word of caution here:* do not take risks, and make sure that both the ladder and yourself are secure when working at the top of the pole. First, three ex-scaffold clamps were loosely bolted into the existing holes at the top of the pole; second, the rotator was bolted to the alloy pole which was then leaned against the top of the pole; and finally, from the top of the ladder, the alloy pole was lifted in, the clamps closed and made tight, and the bolts holding the clamps to the telegraph pole also tightened securely. When the clamps were loosened but not undone the alloy pole was able to slide freely for raising or lowering.

After lowering the alloy pole, the lower clamp was tightened and the beam bolted and aligned for direction above the rotator. The coaxial cable and rotator cable were fastened securely immediately below the rotator, allowing sufficient slack in the coaxial feeder for the rotation. Before the alloy pole was raised, a halyard was fixed to the rotator, thus facilitating a fixing point for the author's inverted V, trap dipole. The raising of the beam and pole is fairly strenuous but was managed by the author; it may be necessary for two people to perform this part of the operation but there is no problem in having a second ladder on the opposite side to the first.

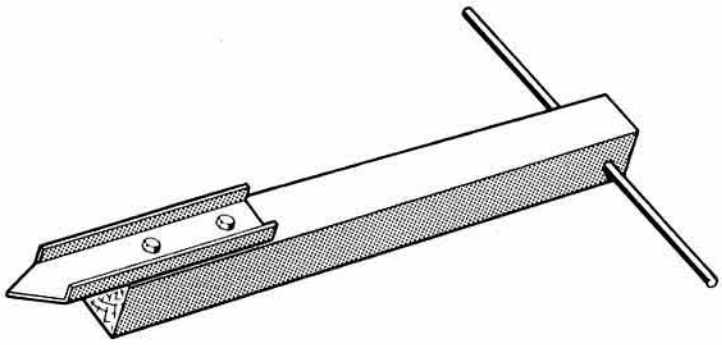


Fig 1. The special tool referred to in the text was made from a piece of timber 5ft by 4in by 4in, a 2ft by 0·6in steel bar and a piece of heavy gauge Dural channel section shaped as shown. The tool is thrust down into the hole and twisted; this repeated action loosening the clay quite easily

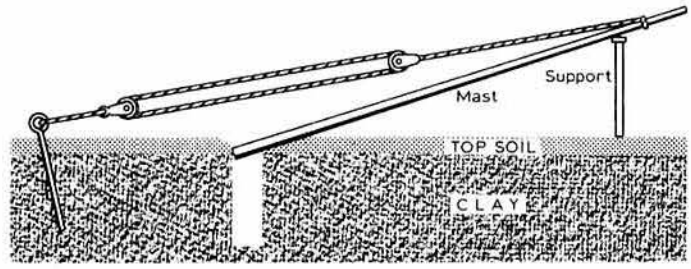


Fig 2. The pole is shown here ready to be erected. A good anchor point for the pulley block system is essential and the higher the support the easier the initial stage of erection will be

*49 Mill Road, Newthorpe, Nottingham NG16 3QH

The sequence is to release the lower clamp, lift the pole about 3 to 4ft, then secure the clamp. The cables can then be secured and the process simply repeated until the desired or optimum height is reached. Finally, copper braid was bolted to the bottom of the alloy pole, clamped down the telegraph pole and tied to a stake driven into the ground at the base of the pole. Lowering the pole is the reverse of raising, and is a little less strenuous.

A location exposed to severe winds might dictate the use of permanent guys on the alloy section, and if access to the top of the alloy section is needed frequently then a winch to lower and raise the alloy section could be fitted.

The author's system has been in use for over two years and has already stood against fairly strong winds. Maintenance amounts to looking for splits or rot in the telegraph pole, and an annual coat of creosote. The clamps should regularly be checked for tightness; and threaded parts kept well greased. □

Improving the selectivity of the FRG7—a simpler approach

by J. E. HODGKINS, G3EJF*

THE FRG7 is a stable, highly sensitive general coverage receiver whose 6kHz bandwidth is more suitable for broadcast reception than for use on the crowded amateur bands. Several articles have been published in *Rad Com* and other journals which set out to improve the selectivity of the receiver—the designs relying on the two unused sections of the mode switch to control a choice of filters; the original Yaesu ceramic filter being used for a.m., and a 2kHz filter, usually the Toko MFL455, for ssb. These modifications involve cutting the copper tracks of the printed circuit board and the use of electronic switching circuits of varying complexity, but the degree of soldering skill needed, together with the surgery on the pcb, have deterred some owners of FRG7s.

The method to be suggested involves removing one capacitor from the pcb and making connections to the points from which it was removed. Thus the modification is reversible should one wish to restore the receiver to its original circuit.

As an alternative to changing filters, an additional filter can be introduced into the i.f. chain after the existing filter and by-passed when the narrower bandwidth is not required. The MFL455 filter is supplied with matching transformers, and while the author has not seen any published figures it is assumed that the transformers are to permit the filter to be used at the low impedances typical of transistor amplifiers. Accordingly the filter is used in the base circuit of Q406, the third and final i.f. amplifier.

Construction details

The filter, complete with its matching transformers, is mounted on the pcb provided, which is then fitted to the rear of the receiver i.f./af board between the smoothing choke and the harmonic generator unit. A good short earth connection is made between the filter board and chassis. Leads from the filter board to the mode switch are prepared using miniature coaxial cable with the outer braid earthed at the filter board end.

With an ohmmeter locate the unused sections of the mode switch; on the author's receiver these were as shown in Fig 1 but it is advisable to check.

Remove C422 from the i.f./af board. This disc ceramic capacitor is located at the front of the board immediately below the centre of the speaker. Connect a 0·02μF capacitor to tag 1 of the switch from the now vacant point joined to T404, and a similar capacitor from the other vacant point to tag 6; keeping the capacitors about 1in apart. Join together tags 4, 5, 9 and 10 on the switch, keeping the wire well clear of tags 1 and 6. Connect the inner of the miniature coaxial lead from the filter input (red) transformer to tags 2 and 3, and that from the output (blue) transformer to tags 7 and 8. The outer braid of these cables is not earthed at the switch; the cables are formed so as to approach the switch from opposite directions, and are secured in position with short lengths of pvc tape. The modified circuit is shown in Fig 2.

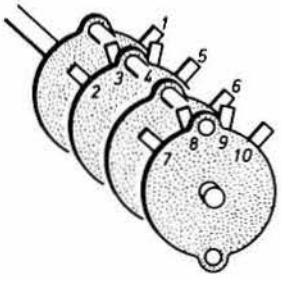


Fig 1. Unused sections of mode switch. Tag 1 is nearer the front panel than 2, 3, 4 and 5, and tag 6 is nearer the front panel than 7, 8, 9 and 10

BFO alignment

Some adjustment of the bfo is necessary, and the following procedure has proved satisfactory.

Set the TONE switch to NARROW. With the mode switch at AM, tune in an a.m. signal, switch to LSB, and adjust the cores of the filter matching transformers for maximum signal. Return the mode switch to a.m., tune in an lsb signal and carefully adjust the tuning for the loudest signal. Switch to LSB and adjust T406 until the station is correctly resolved, making a small adjustment to the tuning control if necessary. Check the setting of T406 by tuning-in several lsb signals of different signal strengths. With the mode switch still at LSB, tune carefully through a strong local broadcast station. The beat note should fall to zero beat and the other sideband should be virtually inaudible. Further careful adjustment of T406 may be necessary to achieve correct results. Once the lsb adjustments are correct, but not before, set the mode switch to AM and tune in a usb station, adjusting for maximum signal. Switch to USB and adjust TC404 for correct demodulation. Repeat on several usb stations of different signal strengths, and check for attenuation of the other sideband by tuning through the strong broadcast station. When these adjustments are complete, ssb signals should easily be resolved and the beat note from a strong carrier should be almost inaudible on one side of zero beat. It should be noted that the settings of T406 and TC404 are quite critical.

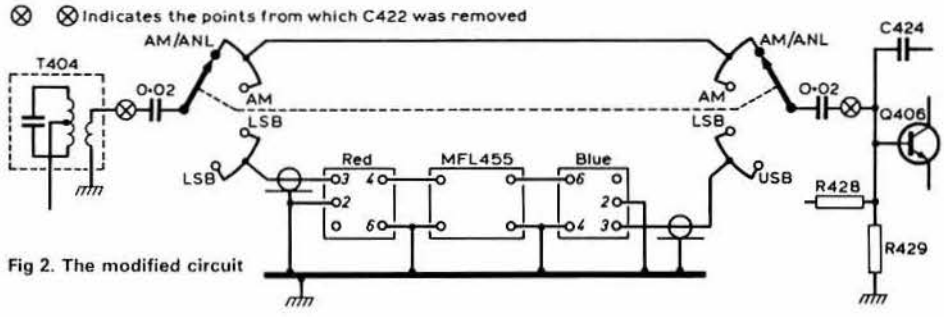


Fig 2. The modified circuit

Advantages and disadvantages

Apart from its simplicity and the minimum interference with the receiver pcb, the suggested modification has the advantage of switching at low impedance, so that stray coupling across the switch and its connections causes the least possible signal leak around the filter.

The disadvantages are twofold. The incorporation of the second filter causes an insertion loss of about 9dB, but the sensitivity of the FRG7 is such that 0·5μV of signal is still clearly audible with the additional filter in circuit, and the loss of signal can be tolerated in nearly all situations. S-meter readings will show this insertion loss but the S-meter of the FRG7 should not be taken seriously, below S9 the author's S-meter shows less than 2dB/S-point, while above S9 the accuracy is rather better. It is therefore essential, when making measurements, to alter the signal generator output voltage to restore a given S-meter reading rather than use S-meter variations.

It may be stated as an advantage that, should the insertion loss prove unacceptable, it is only necessary to dismantle the wiring to the mode switch, replace C422, and then try one of the other methods of incorporating the filter. The addition of the MFL455 filter to the FRG7 makes it a very acceptable ssb receiver and the author would agree with J. Verduyn, G5BBL/PA0VDR, (*Rad Com* December 1979) that the addition of a proper ssb filter is more useful than the fashionable digital readout. □

*Bridge House, Hunton, Nr Bedale, N Yorkshire.

TECHNICAL TOPICS

Pat Hawker, G3VA

A few thoughts culled from here and there before we get down to business. For production reasons several of the topics we had intended to cover this month will have to wait until another issue.

"The amount of genuine leisure available in a society is generally in inverse proportion to the amount of labour-saving machinery it employs"—*E. F. Schumacher.* "The developed countries are going to be less able to sustain their present standard of living from inside their own borders than are the underdeveloped countries. Developed countries are living on energy and resources from other countries and are exporting products in a manner that simply will not be sustainable. Japan is probably the most vulnerable country in the world"—*Jay Forrester,* American computer pioneer. "Sir—In this age of microchips it is possible to banish the chap waving his arms about in front of the orchestra. All that is required is a set of small coloured lights on each music stand. These would be governed by a tape cassette programmed by the arm-waver in the comfort of his study."—*Tom Carpenter,* letter to *The Guardian.* "An 82-year-old football fan has been banned from watching his local team for hooliganism"—*Daily Telegraph.* "The really well-trained dog is the one that turns his somersault when there is no whip"—*George Orwell.*

Mixers for wide dynamic range receivers

Recent years have seen a tremendous improvement in the dynamic range that can be achieved using all-solid-state receivers (the cynic would say they are now almost as good as what was possible with beam-deflection valves, balanced triode-mixers etc), though it is not always stressed sufficiently that once you have a really good mixer in a receiver you have to start worrying about quite a number of other aspects of design; for example you need oscillators of high spectral purity (low noise sidebands) often providing quite a lot of output and drawing a good deal of current. Then again a wide dynamic range will show up how well your crystal filters perform at −80 or −90dB. So while it is true to say that a receiver is only as good as its mixer(s), there is a lot more to receiver design than a single stage!

However, a useful source of information on modern high-level mixers can be found in *QST* (January 1981, pp19-23) where Doug DeMaw, W1FB, and George Collins, AD0W, report in detail on a number of good systems. These include, as a reference, a singly-balanced mixer using small-signal dual-gate mosfets; the recently introduced Plessey SL6440C doubly-balanced ic mixer as described in *TT* June/July 1980 pp643-644 (note that this device did not become readily available until some time after the *TT* notes appeared, and a number of readers may have been put off them for that reason; they are now in good supply); two VMP4 vmos power fets in a singly-balanced arrangement; and a SRA1H high-level diode quad mixer.

The SL6440c is reported by the Americans as offering "the advantage of having excellent dynamic range, conversion gain and moderate dc current requirements, with a local oscillator injection level significantly lower than for a good diode ring mixer". The power vmos fets are shown to open the way to very high dynamic range numbers but at the cost of bulk, high dc-current requirements and (if VMP4 devices are used) quite high cost. The diode quad has the advantage of requiring no dc supply. All these mixers are seen as offering significantly improved dynamic range over small-signal devices such as the 40673 and 3N211 dual-gate mosfets, which are regarded as poor choices when a high dynamic range is a design criterion. But one does need to stress that even a good mixer will not convert a poor design into a super-receiver.

Dr Ian White, G3SEK, has pointed out, for example, that we should not look for any single "magic number" such as "intermodulation intercept" or "receiver factor" (*TT* March 1980, p260) to define a receiver's strong-signal performance. He sees no reason for there to be any strong correlation between, say, imd and reciprocal mixing since the former will usually be determined by the design of the mixer; the latter by the noise-sidebands of the local oscillator. A receiver, in effect, has not a single "dynamic range" but at least three; determined by the three main overload effects of blocking, reciprocal mixing and intermodulation.

Producing reliable equipment

In *TT* (March 1981, p232) I suggested that factory-assembled products that move easily, without hassles, along a well-organized production line are likely to prove in use to be more reliable and of more consistent performance than where the opposite conditions apply. In other words, good production engineering and contented workers can be of real value if it is reliability you want from your products. In doing so, I expressed an opinion that sometimes the design engineers are not without blame for creating some of the problems.

John Haydon, G3BLP, who has had considerable experience of the consumer-electronics industry fairly points out that, in one respect, my remarks were a little wide of the target. He writes:

"Design engineers do not survive long if their prototypes are not manufacturable. The 'villains' are generally the marketing men and the 'stylists' (who like to be called 'designers'). Marketing men are always looking for something 'new' and, together with the stylists, this can be a formidable combination. What they come up with is often difficult to manufacture and can even be dangerous (brass strips that with normal manufacturing tolerances can touch 'live' parts, for example), presenting the actual design engineer with nearly insuperable problems."

G3BLP recalls examples (which will not be identified here) of styling that led in the end to the product having to be abandoned, even though the electronic and mechanical designers had pointed out the problems at an early stage. He adds that some firms have developed procedures that minimize these problems: one, which, as a chief engineer, he helped to develop, was to take a nominally completed prototype and to give this, with all the necessary information, to a small group of engineers who would be responsible for the production line. This group would then build five or six models noting all the snags encountered on the way. These models then went to a separate group which checked the models to a design specification (something that not all consumer-electronics firms work to) again noting any discrepancies. All the assembly and electrical problems would then be worked on in conjunction with the original designers, and if necessary the specifications would be modified or solutions found to the problems.

By following this procedure, the chances of the product running smoothly in the factory were much improved; indeed G3BLP mentions that one of the products for which he was responsible ran at 300,000 per annum in a UK factory, and a million per annum on the Continent. But he agrees that this procedure was not always popular with some of the younger engineers who felt it a slur on their ability!

Earth-leakage circuit breakers

The comments prompted by G3PH in the December *TT* on electrical fire hazards are endorsed by Nick Valentine, G3KWJ, who is professionally connected with the firm of Ottermill Chilton, manufacturers of a wide range of sensitive earth-leakage circuit breakers. The protection provided by an elcb against severe electric shock was described in *TT* October 1979, p940, although it was noted then that these useful devices are not cheap. G3KWJ writes:

"It is worth emphasizing that 90 per cent of electrocutions in the home are traced back to faulty appliances connected via sockets where, for example, the earth connection has broken and a 'line-to-frame' fault has developed on the appliance, leaving it "live" to touch. While in the UK such fatalities normally total less than 100 per annum, most of these could be avoided if a current-operated elcb (with an operating sensitivity of 30mA or so) had been feeding the ring mains of the property.

"A further major benefit of these devices, if current operated, is the reduction in the fire hazard due to "line-to-earth" faults. With no earth leakage protection, it is possible for there to be, say, 4A flowing to earth due to a fault, yet if the circuit is protected only by fuse or conventional circuit-breaker, no overload will be apparent. The 1kW or so being dissipated presents a severe fire hazard, yet a 30mA elcb would have tripped long before this.

"Ideally, a household installation needs to be protected by several elcbs of varying sensitivity: for example a 300mA unit at the incoming mains point to give overall fire protection without unnecessary tripping, while ring mains should be fed via 30mA units to provide shock protection. Particularly hazardous areas such as greenhouses, outbuildings, garden tools *and the shack* would be better fed by even more sensitive units, but such an arrangement is usually ruled out by the high costs.

"However, it is not often appreciated that some 30mA units can be connected to provide 15mA sensitivity. This is because the current-operated elcb is a "residual-current" device; the conductors pass through a current transformer and, as long as there is no earth leakage (ie "L" and "N" fields cancelling out) the device will not trip. However, if the out-of-balance current exceeds the rated tripping current it trips within 20ms.

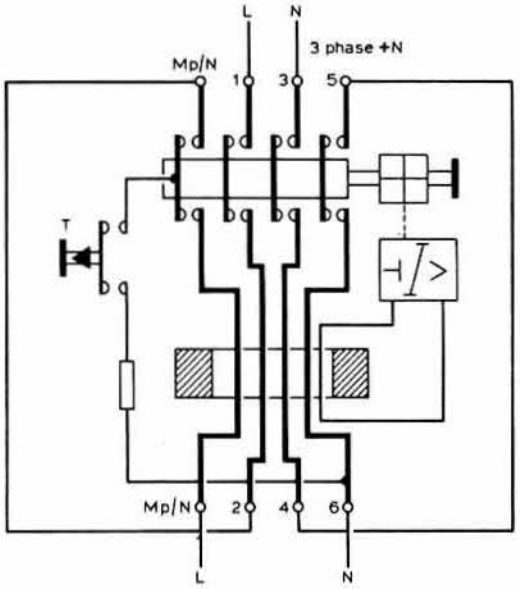


Fig 1. Showing how a four-pole earth-leakage circuit breaker designed to trip at 30mA can be used on two-phase supplies to provide tripping at 15mA

Thus if you take a "tp&n" or "four-pole" elcb and use it in a single-phase circuit with the "L" and "N" currents passing *twice* through the device the tripping current is halved, so that an elcb rated at 30mA, trips at 15mA providing exceptional safety. Fig 1 shows the connections for such an arrangement.

"Since there can be few shacks where the total current loading exceeds about 25A, an elcb such as the Chilton GF425030 (trade price £21.70) would cover the majority of amateur shacks (for the others a GF440303 rated at 40A would cost £26.50 trade). Both units would also need an enclosure (costing between £3 and £8).

"I would never advocate feeding a complete household installation through a 15mA elcb, although when you realize that the insulation resistance has to fall to around 16,000Ω or less for the device to trip in the absence of a specific fault, it makes one wonder!"

There can be little doubt that a sensitive current-operated elcb is a valuable aid to safety, though one must stress that not even an elcb would have definitely prevented the fire reported by G3PH, caused by the amateur concerned going out and leaving a soldering iron switched on—nor of course protect against shocks derived from correctly functioning power supply units!

Defeating the bath-tub syndrome!

An ingenious method of warding off the worst effects of the "infant mortality region" of the bath-tub reliability curve comes from C. J. Chapman at Aston University, Birmingham, based on a technique that one Japanese manufacturer employs: the good old-fashioned "soak test". He writes:

"One large Japanese tv manufacturer worked out that if the firm shipped a dud set half-way round the world and then had, under warranty, to have it collected from a customer and repaired at the firm's expense, this would use up all the profit on two other sets as well. The firm therefore runs their sets in the factory for 24 hours before packing—hauling out any failures in the factory where it is easy to repair them. Their 'returns' fell to a small fraction of those of most of their competitors, and their sales and profits went up! Their engineering, while competent, was not outstandingly good, nor did they use special high reliability components; they simply weeded out the early failures, and reckoned that there was a fair chance that the guarantee period would have expired before any more faults occurred!

"So, if you want to 'buy reliability' why not do as I do? I buy reasonably good quality equipment and for the *first week* after it arrives, it runs *night and day*, if possible at full power. With items including moving parts, such as tape recorders, I run the motor for only one day at the end of the six day period. This ensures that the mechanical parts are at least partly run in, and shows up any faulty bearings etc. That 150 hours or so gets you onto the 'flat' part of the bath-tub curve. Moreover, it is a little difficult for the supplier to quibble if you bring him back equipment which has failed within a week of purchase! The cost in electricity is minimal unless you have bought a 100kW transmitter.

"Let the *manufacturers* worry about the reliability of their products. We customers have problems of our own—like squaring the wife or paying for it in the first place!"

Prescaler for 23cm

Jan Martin Noeding, LA8AK, has kindly sent along an English translation of a short item by DB5DE in *cq-DL*, 11/80, p505. This notes that while many amateurs now have reasonably accurate frequency counters that will work up to 500MHz, few of them can cope with the 23cm band. DB5DE draws attention to a prescaler ic device (SDA2001) made by Siemens AG with a one-off price in the region of £2.60. This is intended for use in the type of pll-tuners now fitted in some tv receivers; although its division ratio is not ideal for a counter prescaler, it can, with the addition of just three resistors and four capacitors, provide a ttl-compatible output at frequencies well within the range of most counters.

The device is listed as having a frequency limit of 1GHz, but tests have indicated that, in practice, a minimum limit of about 1·3GHz can be confidently forecast, so that the device will extend a counter up to the 23cm band. It has an inbuilt preamplifier, and the average sensitivity is about 10mV.

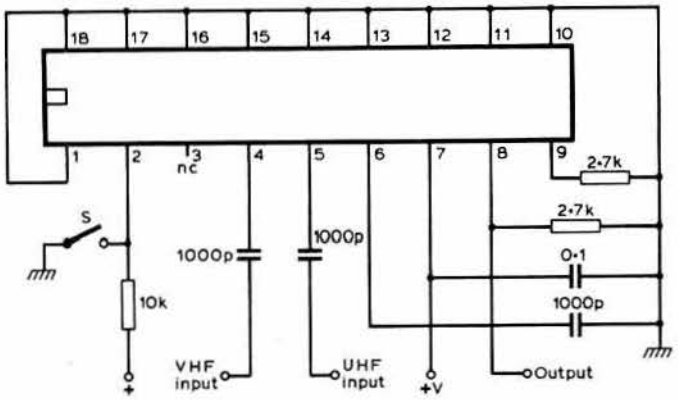


Fig 2. Simple ic prescaler to extend range of a frequency counter to about 1,300MHz, but note the 64:1 division ratio (DB5DE)

The disadvantage is the rather awkward division ratio of 64, so that one needs to make a conversion when using the digital frequency display of the counter; however, "correct" readings could be provided by changing the timebase crystal in the counter. For frequencies between 20 and 300MHz, input should go to pin 4 instead of pin 5 of the SDA2001. The prescaler copes with 20–300MHz with the switch open; 300–1,300MHz with switch closed. A supply of 6·5–7V at 300mA is required.

LA8AK comments that although DB5DE's diagram shows a 1,000pF uhf input capacitor, he recommends a lower value, preferably using a chip capacitor (*TT* January).

Accurate df of 144MHz mobiles

The problems of tracing "intruders" and others misusing the 144MHz repeaters, particularly in the London area or where the offending installation is mobile, are widely recognized. Simple df techniques tend to be of insufficient accuracy in conditions where there are many reflections (multipath) from metal surfaces on buildings, overhead power or telephone lines, gutters, roof surfaces and the like. Further, by the time satisfactory cross-bearings have been taken and the approximate area found by triangulation, the offending transmitter may be miles away.

It is interesting to compare such an approach with what can be done with the latest professional equipment. In *News from Rohde & Schwarz No 91*, 1980/IV pp26–30, a description is given of two versions of a uhf/vhf "doppler" df system, using a wide-aperture antenna based on a circular ring of elements; in effect this is a form of the Wullenweber hf df system that was one of the German wartime secret weapons (*TT* December 1978, p1024) brought up to date with complex signal processing and data transmission. This type of system uses signal integration to reduce very significantly the effects of multipath reflections, and can provide an immediate display of bearings to an accuracy of the order of ±1° on signals lasting only about 0·1s. A broadband system, PA005, operates throughout the range 20–1,000MHz; a rather simpler system, PA002, is suitable for 144MHz and provides accuracy of about ±2° on a signal lasting 0·5s. When set up in fixed locations and calibrated, it is claimed that such systems can locate a mobile transmitter to within an average of 100m anywhere throughout a large city.

The article provides a street map of Munich showing locations found within an average of less than 200m based on trials of two systems separated by a base line of only 1·3km connected by a data link. If one then had a few cruising vehicles in radio touch with the control centre, catching repeater abusers would be relatively simple.

Batteries and battery belts

Batteries are unfortunately an expensive way of powering any equipment requiring more than a few milliwatts of power, particularly when non-rechargeable primary cells are used. There are, of course, various ways in which costs can be minimized, and most of these have been mentioned from time to time in *TT* or *ART*. Battery savers can reduce the consumption of a portable transceiver by a factor of about 10 during stand-by periods, by only switching the receiver on for about a tenth of the total time; timers that automatically switch off a unit after about 10min can be a great help to those of us who regularly forget to switch off test equipment and the like; even a flashing light that reminds us that it is on can be worth while, providing that the light itself does not consume too much power. Perhaps the most important consideration of all is to ensure that one has chosen a suitable size and type of cell to suit the particular application: high-energy cells, for instance, may be uneconomical if one only imposes a small, intermittent load; in these circumstances good shelf-life and suitable storage temperature can be the more important considerations. Where the equipment is used frequently, my advice is always to use the largest possible size of cell, even if this means strapping the battery to the outside. Some useful advice on this whole subject is provided by Ian Hickman in *Wireless World* February 1981, p57–61.

The provision of rechargeable cells that can deliver some tens of watts for periods of an hour or so has received renewed attention since the development, a few years ago, of "electronic news gathering" (eng) for television broadcasting. A team needs to power a camera, often requiring 25–35W, a U-matic format video tape recorder, talk-back or microwave link equipment, and sometimes portable lights etc, and may also need to recharge batteries at a very rapid rate. However, broadcasters are usually prepared to spend quite a lot of money to ensure that batteries do not fail at crucial moments and that the teams are not so loaded down that they look like deep-sea.divers.

But even for eng, the fundamentals have not changed: lead-acid, nickel-cadmium (nicad) and silver-zinc units are the staple form of power unit, although there is reported to be R&D work going on to produce rechargeable nickel-zinc battery packs that could provide some hundreds of ampere-hours (Ah). Of the present units, often fitted in the form of "battery-belts" in the manner originally developed for film-cameramen, silver-zinc provides some three times the power/volume ratio of nicad, but is more sensitive to abuse, as well as being considerably more costly. A battery-belt with 12Ah silver-zinc batteries weighing about 5lb can easily cost some £500, or roughly three-times the cost of a 4Ah (6·5lb) nicad belt complete with charger. Batteries for portable video tape recorders can range from around £400 or so for 8Ah silver-zinc to around £80 for 4Ah nicad and about £25 for small lead-acid units. With care a nicad battery will stand recharging some 1,000 times at the one-tenth rate.

Rechargeable cells should normally be stored or kept at about room temperature (17–24°C). Nicad cells should be allowed regularly to discharge fully to prevent "memory" (depressed voltage) problems. Improper charging and allowing cells to overheat can shorten the life of almost any type of battery. Chargers intended for lead-acid batteries are seldom suitable for use with nicads, which need constant-current systems. Various forms of rapid chargers are marketed (see for example *TT* November 1977, p868).

Repairing lead-acid cells

G. W. Bateman, ZL2BHD (*Break-in* October 1980, p438) shows that with care (and taking the necessary safety precautions) it is possible to renovate a high-capacity vehicle battery that has developed a faulty cell as the result of shedding some of its lead paste. He writes:

"I swapped with a scrap merchant an old accumulator for a battery that had failed under guarantee when in service in a diesel-engined vehicle. This had exposed lead straps between the cells. If it could be repaired, it would provide an ideal power source for high current loads at up to 12V. The battery had a faulty cell that would not take a charge.

"While a badly-sulphated cell will rob a lead-acid battery of capacity, the complete failure of a cell can be due to the shedding of lead paste from the cell plates; a build up of paste short-circuiting the plates. If this short-circuit can be removed, the cell will again accept a charge.

"To attempt this I cut the lead straps of the faulty cell with a hacksaw, removed the pitch sealing the cell with a gentle screwdriver, and lifted the cell (complete with separators) out of the case. I emptied the acid from all cells, retaining it in a convenient plastics container.

"I found that the bottom half-inch or so of the plates had crumbled due to violent gassing and there was a large build-up of paste material to hose out of the cell container. I washed the cell, carefully replacing the plastic separators between the plates.

"After cleaning the cell, it was replaced; the top was resealed by melting the pitch with a heavy soldering iron. The lead straps were then resoldered, and the acid poured back into the cells. The battery was then recharged. In exchange for a morning's messy work, I now had a battery that was capable of its original function."

ZL2BHD stresses that proper precautions need always to be observed when handling acid (which will attack clothing, skin and eyes). While taking care to avoid any of these coming into contact with the acid, it is advisable to have available some baking soda dissolved in warm water, plus plenty of running water, to treat any accidental spillages etc. Carry out such work outside on a waste area. Use plastic sheeting to control any spillage. Remember that lead sulphate will do no good at all to a garden, it is *not* a fertilizer or recommended top-dressing. ZL2BHD dug a deep hole in which to dispose of the lead paste washed out of the cell.

Mains-free stations

I once worked for over a year in a multi-operator radio station with more than a dozen HRO receivers running off batteries, mainly I suspect because the chap in charge could not be convinced that it was possible to reduce mains hum to negligible proportions! We even had a special "battery-man" to keep the whole thing going (we also, I remember, used to trot along to the village pump for water until somebody discovered that the local authorities had declared it unsafe).

Nowadays quite a few people seem to be striving to get back to such conditions, convinced that they need to be ready for the coming energy crisis. For some time an American broadcasting station (WBNO Bryan, Ohio) has been running from solar power, generating up to 15kW from 33,600 solar cells to charge four very large batteries.

McRae Naughton, VE3EQQ, in *QST* January 1981, is rather less ambitious, but he has made over 250 contacts using an HW8 powered by a 12V lead-acid battery kept charged by 32 solar cells that can produce 12V, 0·3A, and with a series diode to prevent discharge when the clouds roll up.

In Switzerland, for many years they have been running a rather special type of contest, National Mountain Day, in which the complete 3·5MHz station has to be carried up one of those high Alps, so that there is a great premium on getting the weight down as low as possible. In *Old Man* 2/1981, HB9ABO and HB9BKT describe an NMD rig—transceiver, batteries and antenna—with an all-up weight of only 300g. The hf transceiver weighs 113g, the antenna system (84m delta loop) 109g, and batteries 78g. The vfo-controlled transmitter can provide up to 2W output, and the whole rig works with full break-in using an electronic keyer.

Modifying the FT101 for 10MHz

This topic continues to attract interest. Peter Mackrell, G3AEP, adds a comment on G3TSO's method of modifying the FT101 series of hf transceivers (*TT* January) to provide a transmit facility in the new 10MHz band which, hopefully, could be released to us any time after 1 January 1982. While G3AEP has successfully completed the modification as suggested by G3TSO, he suspects that some readers may not have found this quite so "simple" as it sounds. He writes:

"For the benefit of other would-be modifiers, I would make the point that the switch wafer S1g does *not* appear to be the seventh wafer from the front in my FT101E, as stated by G3TSO, but the *eighth* (ie the wafer nearest to the front *inside* the pa screening box. S1m is the rear-most ceramic wafer). The reason for the inverted commas around "simple" is that, as one might expect, the WWV contact is the least accessible, but becomes possible (just) by undoing the two screws and gently moving the small pcb of compression trimmers to one side.

"The connection from the WWV tag on S1m to the ninth turn of the pa coil can, in my opinion, be simplified. It is not the easiest of tasks to solder a tap onto this coil without bridging the turns with solder, but having finally succeeded and conducted tests, I decided to remove the tap again and simply connect WWV to the 7MHz point, since this is adjacent to turn nine. On test, this appears to be entirely satisfactory, with plenty of leeway on the 'plate' tuning capacitor (in my case indicating the 'dip' between the 7 and 14MHz settings). I feel that omitting the tap soldering could well save many yards of singed insulation!

"Referring to Fig 7(a) in the January issue, my suggestions (Fig 3) remain the same (link from WWV to 20m on S1g), but the second diagram

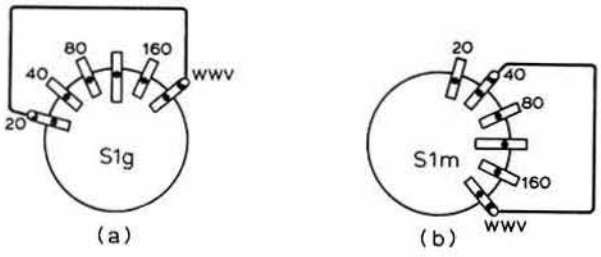


Fig 3. G3AEP's suggestions for modifying an FT101E for 10MHz

Fig 7(b) now becomes similar to (a) though with the WWV tag linked to the 40m tag on S1m wafer: Fig 3(b)."

Tape recording—opportunity lost?

In the now-distant wartime days of 1939-45, those concerned in any way with trying to find out what was happening or being planned "on the other side of the hill" soon came to realize that the most reliable information almost always came direct from the enemy; either in the form of his signals traffic or from analysis of what was published in his periodicals and technical journals. The job of intelligence analyst, code-breaker or intercept operator may be altogether safer and less glamorous than cloak-and-dagger operations but tends to produce the more valuable "product", as indicated by Dr R. V. Jones in his book *Most Secret War*.

It is often just a short report or apparently unimportant asides and footnotes, that provide the clue to secret developments. An interesting example of "one that got away" is revealed in a letter from a Danish reader, Georg Brock-Nannestad, in *Wireless World* April 1981, p57. He shows that we should have uncovered the secret of effective tape recording some four years before we did. I remember, in 1945, trying out one of the German military tape recorders and finding them much superior to and easier to use than the Allied counterpart, the American wire-recorders of relatively low audio quality. Magnetic recording was actually a 19th-century invention, but the real breakthrough was the use of coated plastic tapes in the mid-'thirties and then the German discovery of the linearizing effects of hf bias in the early 'forties, but of which I think the British remained unaware until virtually the end of the war.

Georg Brock-Nannestad has unearthed a short report that appeared on the last page of the July 1941 issue of the *Akustiche Zeitschrift* reporting a demonstration of a new Magnetophon in Berlin in June 1941, as follows: "In recent research H. J. von Braunmuhl and W. Weber (RRG) succeeded in improving the quality considerably, particularly the dynamic range, because they used high frequency magnetization in the recording head instead of dc magnetization. Thereby practically all noises originating from the tape disappear". Just a few lines, yet containing all the information needed to develop an effective tape recorder; not a war-winning invention clearly, but one that gave the Germans significant advantages in broadcasting, telecommunications interception and the like.

The Danish reader points out that this example shows that research into the history of technology cannot do without access to every page of an original publication, and cannot be done by means of abstracting services and the like. I would go further and stress the importance for those concerned with engineering development of reading, or at least browsing through, as much of the literature as they can lay their hands upon. In connection with *TT*, I often have the impression that keeping abreast of what other people are doing is taken far more seriously overseas than in the UK, where there seems an ingrained feeling among many engineers that only local research is important—part of the "not-invented-here" syndrome I suppose. Fortunately this seems far less true of amateur radio than some branches of professional engineering—though few of us read even *Rad Com* from cover to cover!

Homebrew on 10MHz

Gerald Stancey, G3MCK, feels that the 10MHz cw band should be used to encourage home construction: a simple converter along the lines, for example, of those published in the *ARRL Handbook* for either 7 or 14MHz could be easily modified to go in front of almost any receiver. For the transmitter, even a simple co-pa (preferably incorporating vxo) so that the full band could be covered with about five crystals, would give good results. For power inputs of 50W or more, G3MCK reflects the opinion expressed several times in *TT*, that valves are the logical choice if it is simplicity you want. Such rigs as the ancient DX40 could be modified quite simply for this band.

The provision of 10MHz cw facilities using this type of approach would mean that existing five- or six-band hf rigs could be retained, while at the same time the amateur regains a flavour of "home construction", or at least the use of a soldering iron!

Meanwhile G4GHB, who launched us into this topic, has been looking at another problem, spurious responses, which still affects many hf transceivers.

Rejecting 6MHz broadcast signals

When B. Kitchen found that he was receiving the BBC World Service on his FT101E on 7,045kHz, he decided something must be odd; he eventually concluded the transmissions were on 5,975kHz in the "49m broadcast band", breaking through the front-end of the receiver to mix with the vfo on 9,154kHz and producing a product within the 3,180kHz i.f. passband.

To overcome the problem (and at the same time to reduce spurii from other 6MHz broadcast signals) he devised a bandstop filter: Fig 4. This is built on a piece of 0·1in Veroboard, 24 holes long by 11 wide, with terminal pins for connection to the coaxial wires.

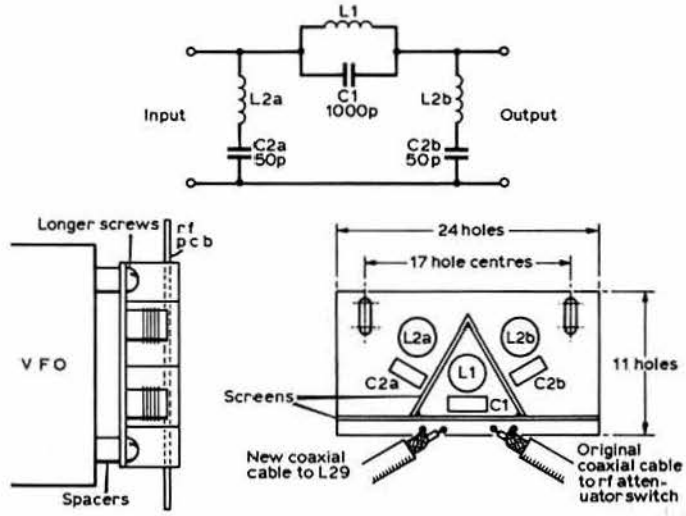


Fig 4. G4GHB's 6MHz band-reject filter to eliminate "49m broadcast" signals received on 7MHz with FT101 and similar receivers. L110t 26swg enam on 8mm former and slug; L2a, L2b 40t 38swg enam on 6mm former and slug

To wire this into the FT101E involves one extra coaxial cable and the rerouting of an existing one. On removal of the bottom covers, a yellow coaxial lead runs from L29 on the small pcb to the rf attenuator switch on the front panel. The wire is unsoldered at L29. A length of similar coaxial cable is then soldered to the now free yellow wire which is then pulled through as far as the front panel where it joins a loom of wires. This method pulls in the new cable as the yellow one is pulled out. The two joined ends are fed through a slot in the chassis near the vfo compartment to arrive on the topside of the chassis. The new coaxial cable is soldered onto the pins on L29. The two ends are then separated and soldered to the appropriate pins on the Veroboard.

The cores of the filter can be tuned without a signal generator. Put the bandswitch to "40m", preselector to zero and tune to 7,045kHz for the BBC transmission, then adjust the cores of the filter to provide minimum S-meter reading. Check on 7,010kHz for "Radio Moscow", and around 7,070kHz for another broadcast transmission; all should be considerably weaker than before. Tune the preselector to its normal 7MHz position and check again (adjustment of one core should result in the signal reappearing).

Such a filter should have no effect on signals in the 7MHz band. G4GHB finds that the filter has completely removed four heterodyne whistles in the ssb section which he had previously assumed were from broadcast intruders in the band. Similarly the filter reduces breakthrough of 6MHz transmissions on other bands. It might also be worth considering with other equipments using similar i.f. and conversion frequencies.

In installing the filter, the two slots in the Veroboard line up with two screws on the vfo compartment, these being replaced by longer screws. The board is held off with spacers or nuts of a larger size. The slots allow for adjustment between the rf pcb and the speech processor. The filter can, if necessary, be fine tuned when in its final position. A screen made from single-sided pcb encloses L1, C1 to screen it from the other two coils. This board is soldered together and held by using terminal pins soldered to the Veroboard. G4GHB considers it has proved a worthwhile addition, particularly when using 7MHz.

Man-equipment interfacing

For many years the Post Office (now British Telecom) Research Laboratories have been much concerned with the "human factors" involved in the so-called man-machine interface. At Mendlesham, considerable thought is given to the design of "workstations" to ease the application of new technology and the "electronic office". Many of the ideas that come out of this work appear to be equally applicable to improving the "operability" of the average amateur station; though one first has to overcome an interface problem in tackling the jargon of the ergonomists. For example, they claim that the practical considerations should include "user anthropometry, sensory limitations and cognitive skills".

What this means, in amateur radio terms, would appear to be: (a) you need to have a chair and operating table that really fit your own physical dimensions; (b) your sitting eye-height should influence the positioning of any visual displays, dials, meters etc that you need to look at during operation, while the length of your arms, size of your fingers, your ability to make co-ordinated movements with your hands etc should dictate the layout of equipment controls.

You should also take into account your vision, your hearing and your sense of touch, since "any circumstances which conspire to place the user at the extremes of these facilities will produce stress and fatigue, with a resultant worsening of performance. Trying to read a display in unsatisfactory lighting conditions, or to respond to an audible signal in the presence of high background noise, can be very tiring."

Cognitive skill involves recognizing the extent of your own skills as an operator in deciding the degree of complexity with which you can cope. Lighting, heating, ambient noise, acoustics, and availability of any reference material you may need in the form of books, leaflets, cards, lists etc which should be attractively presented to discourage the traditional attitude that "if all else fails read the instructions".

British Telecom would like to see offices with "computer flooring" (ie a dummy floor under which all cables can be placed, yet easily changed or repaired). Certainly this would overcome the tangle of wires on the floor of my shack, and would get rid of the electric typewriter lead I am constantly tripping over at my "workstation".

One notes that a practical problem in many modern amateur stations occurs where two or more receivers are used and cannot be conveniently placed side by side. I am always puzzled by those shack illustrations that show receivers stacked one above the other with some of the tuning knobs a foot or two above the level of the desk. How do the owners "search-tune" them without suffering agonies of discomfort?

Low drop-out ic regulator

Several recent *TT* items have indicated that, by careful design, voltage regulators for 5V or 12V power supplies can be made to have a lower input/output differential voltage (ie input voltage can be relatively close to the "drop-out" voltage) by using, for example, special forms of pnp transistors. A new National Anthem LM330 5V, 150mA ic regulator incorporates "deep base diffusion" pnp transistors, and it is claimed that this regulator will provide a regulated 5V output with inputs as low as 5·32V rather than the usual 7V or so. The lower dissipation means that it runs cooler, minimizes heat-sinking and reduces the risk to the equipment should the series-pass transistor(s) fail.

Integrated a.m. radio chip

Mullard Ltd has recently announced a new monolithic ic device, type TDA1072, that forms the heart of an a.m. radio, suitable for operation up to 30MHz. It performs all the active functions between antenna and audio power amplifier, and is claimed to be particularly suitable for use with variable-capacitance diode tuning due to the incorporation of a constant-output-voltage local oscillator. A separate local oscillator output is available for driving a digital frequency counter, and a logarithmic signal-strength output voltage is provided. The high i.f. gain makes the device suitable for use with an external ceramic i.f. filter. The af output voltage is 340mV for 2mV rf input. The TDA1072 can operate from supply voltages in the range 7·5 to 18V.

PTC thermistor temperature-sensing unit

The notes in *TT* March 1981, p228, on the use of positive temperature coefficient thermistors for temperature stabilization or protection have prompted J. Benson, G4GBH, to send along a detailed account of the Thermot/Thermistor motor protection system made by Brook Crompton Parkinson Motors. This system, originally developed in the early 'sixties, uses a ptc thermistor as a temperature sensing element; but unlike the arrangements shown in the March *TT*, in which the thermistor is connected in series with the load, the Thermot system is based on an independent control unit that de-energizes the load by means of a relay when the temperature rises beyond a pre-determined level. A small ptc thermistor is embedded in the windings of the motor connected to a two-stage transistor amplifier/relay-switching unit. It can thus be used to control much higher loads than would be possible with a series-connected ptc thermistor.

When the temperature of the motor windings rises, the resistance of the ptc thermistor will rise rapidly to several thousands ohms, resulting in a snap-action control of the relay to de-activate the motor contactor. Thermistors with critical zone temperatures ranging from 60°C to 250°C are available.

Although initially developed for motor protection, the same principle is used to provide executive-alarms for other situations where an unusually high temperature needs to be detected and countered. One could imagine a home-built version being used, for example, to protect an air-cooled pa from the consequences of a fan failure etc.

Tips and topics

Solder suckers with standard plastic tips are commonly used when removing ic and other semiconductor devices soldered directly into pads and plated-through holes in pcbs. Although this is an excellent technique for bipolar devices, *Electronics* gives a word of warning when dealing with mos-type devices. Static potentials of 5,000 to 10,000V may occur at the tip, resulting in damage or destruction of mos-type devices.

Simple ac frequency checker (*TT* February 1981, p140). Jack Anthony, G3KQF, suggests that the diodes in Fig 3 should be 1N4148 and not 1N414B (as reproduced from the Swiss journal). However, virtually any silicon diode should prove suitable in this application.

Ed Mariner, W6XM, points out that an essential part of his semi-break-in keying system (*TT* January 1981, Fig 3, p45) is a bias resistor (not shown) from the grid to cathode of the pa valve. Jan Martin Noeding, LA8AK, mentions that a later version of the 6BX7, 6AS7 type of low-perveance valve is the type 6080.

WB5NGF's tip on cleaning variable capacitors with concentrated lemon juice (*TT* March 1981, p234) has stirred R. L. Halls, G3EIW, to mention that for the past 30 years he has been using Goddards Silver Dip for cleaning all silver-plated radio components, including variable capacitors. He finds that this transforms blackened silver items into a gleaming "like new" condition in just a few seconds. Any grease or oil should be removed first with hot detergent. He adds a word of warning: Goddards Silver Dip can stain "stainless" steel; any attempt to carry out operations on the stainless kitchen drainer is likely to make you highly unpopular with "she who must be obeyed".

John A. Young, GM4DQD, would like to see some practical articles on the topic of providing variable selectivity for ssb reception. Is anybody developing further the switched-bandwidth type of crystal ladder filter proposed by G3UUR in *TT* December 1980, pp1294-5? This could prove an effective, low-cost method of providing different degrees of selectivity right down to the cw-only level.

Peter Harston, G4JQP, writes: "While attempting to use a variety of tie-clip electret microphones with a belt-worn vhf transceiver, I was puzzled when the audio kept disappearing during transmission. Ferrite beads on each end of the microphone cable did not solve the problem, even though this appeared to stem from the 400mW of rf fed to the helical antenna. The problem was eventually traced to rf being rectified *inside* the electret insert, biasing off the fet amplifier. Satisfactory decoupling was finally achieved by decoupling the 1·4V supply line and audio-output line to earth, on the back of the insert, using two 1nF miniature ceramic capacitors."

H. Du V. Ashcroft, G4CCM, includes, among a number of tips, the following: "I wanted a vhf absorption meter for 144MHz, similar to that in the *Radio Communication Handbook*, but felt that in the original design the coverage was too wide, making it impossible to discriminate between 144 and 146MHz. I tried to stretch the scale with fixed shunt and series capacitors but without success. The variable capacitor is an ex-Govt type with rotor vanes removed. Finally I found that three rotor vanes, two facing one way and the other displaced 180°, gave a range of 122-148MHz with an almost linear scale.

"The 259 plug never looks to me as though it is designed for soldering, at least except when the sheath and insulation is ptfe. I never like raising the body to soldering temperature with a large iron or blow-lamp. I turn up a hardwood plug which will just push into the screw thread, bored as a tight fit on the cable. If the cable is inserted and the braid combed out and turned back over the plug the diameter is now too large to push in, but it will screw in like a Rawlplug inside-out, making good contact with all the strands. The wood should be dry or the plug will become loose when it shrinks." □

SWL NEWS

Bob Treacher, BRS32525*

Miscellany

It seems that the information given in the November 1980 *SWL news* regarding the W1AW dx news bulletins was somewhat incorrect. Apologies. GM2HCZ has sent the updated information which is as follows: Fridays only–cw (at 18wpm)–0100, 0400, 1500, 2200; rtty–0200, 0500, 1600, 2300; ssb–0230, 0530. W1AW is active from 1400–0530 on weekdays, 2100–0530, Saturdays and Sundays, and sends morse practice from 5 to 35wpm.

Radio West is, as the name suggests, a W6-based concern for the swl. It issues a really interesting equipment magazine, and although much of the equipment advertised can be purchased on this side of "the pond", it offers some tempting sw receivers, including the NRD515, FRG7700, Satellite 3400, plus vhf scanners such as the 50-channel BC300 and the 16-channel BC160. Specification sheets are available on demand. It also offers headphones, antenna systems and numerous filters to add on to existing receivers. If any swl is interested, the address is 2015 South Escondido Boulevard, Escondido, California 92025.

QSL reminder

Due to the increased cost of postage, anyone who has envelopes with their QSL sub-managers is advised to forward the additional postage to make the envelopes "legal" and thus enable the QSLs to be forwarded.

Dave Borne, G4CYW, "our" QSL sub-manager, suggests that it would be an interesting exercise for the more experienced swl to work out what sort of a percentage return he has on QSLs—both direct and via the bureau—in a particular year. Dave in particular would find the information of interest. Details either to your scribe or directly to Dave, who is QTHR.

1·8MHz reports

The CQ WW 160m SSB Contest at the end of February provided only mediocre dx. Conditions to the USA were poor, but some Caribbean dx was audible in the shape of VP2EV, KV4FZ and NP4A, while EA8AK, RA9AJC and EA6CE were audible from other dx parts. Nearer home, OE1KW, OK1MMW, SP5IXI, UP2BAW and YU3APR were all good signals. At other times on the band W4GSM/CE0A and VS5RP were reported as active. Dave Whitaker, BRS25429, puts forward an interesting theory that 1·8MHz cw contests are always better supported than similar ssb events. He wonders why those on cw do not turn their attention to providing more stations for others to work during sideband events. Your scribe offers the view that many are simply devout cw enthusiasts and would not dream of using another mode on the band. Any other theories?

The news

David Hawes, A9191, suggests that more overseas RSGB listeners should submit scores for the countries table, as this would make it more challenging and would also make the table a world-wide "competition". Your scribe would welcome any such entries to add some exotic flavour to this piece. Perhaps we could have a regular dx listeners' paragraph each month? David also reports his own activities, which include placing a dipole on top of a telegraph pole in his back garden. Now that the antenna is so high above surrounding houses and trees etc, David has noticed that he sometimes receives stations four to five S-units louder than with his previous antenna. His best QSL returns this time were OJ0MA, VK9XI and YK1AA.

Derek Casson, BRS41992, has passed the RAE, his first exam success for over 30 years! He has been particularly pleased to hear several good dx stations—D68AM, the CE0A trip, and VK0SJ from Mawson Bay in Antarctica. He also comments on the increasing number of stations active from 5N, and hopes that some venture on to 7MHz ssb where he, and others, need the country for DXCC.

Brian Wainwright, BRS44703, reports UL7PBI and UJ8CAD in QSO with VE7AAZ/4U on 3·5MHz as his best dx heard QSO of the period.

* 79 Granby Road, Eltham, London SE9 1EH

1981 hf countries table

Station	28	21	14	7	3·5	1·8	Total	Mode
RS42604	110	123	105	104	100	14	556	ssb
BRS14585	125	115	111	76	90	4	521	ssb/cw
A8908	108	85	94	79	82	30	478	ssb/cw
BRS1066	101	102	111	75	56	26	471	ssb
BRS48909	102	123	127	54	46	12	464	ssb
BRS8841	71	74	111	69	68	2	395	ssb/cw
BRS44703	101	67	70	78	73	0	389	ssb
ARS42503	81	87	117	18	27	0	330	ssb
ARS41349	44	73	51	25	34	2	229	ssb
BRS18529	36	18	58	45	60	10	227	ssb
BRS41992	33	22	70	36	46	13	220	ssb

Harold Moss, BRS18529, submits a table entry, as does Michel Delvaux, ARS42503, who mentions adding an atu to his station, thus improving his listening capabilities. Brad Bradbury, BRS1066, provides further details of his listening. It seems that his receiver lay dormant from 1963 to June 1980 and he is now busily trying to catch up on what he missed! He recently entered BERU and was busy computing the score when he wrote. He listened for the whole 24h—he remembers the last time he did this was in 1938. He also entered the RSGB 7MHz cw and ssb contests. In the ssb event he scored 11,570 points and then did not write-up the log in time (two weeks is a bit tight when you have other commitments), but made up for this in the cw event when he entered a scored log of 76,000 points. Since re-starting last June, Brad has had confirmations from 48 countries, all direct, as it takes the QSL bureaux a little time to start working. He should know—he is a QSL sub-manager! He always includes at least two ircs with each card, obviously helping his return rate.

Howard Banks, ARS45033, reports for the first time. He mixes bc and amateur band listening using an FRG7. His favourite band is 28MHz, but he also tunes 144MHz regularly and has recently built a converter for the band. Howard asks for details of contests and awards available to listeners. Your scribe could do no better than suggest that he watches *Contest news* and *MOTA* in *Rad Com* for details.

Paul Crankshaw, BRS48909, provides a useful list of dx heard during March, in particular on 28MHz–H44SH, TL8CN and 9Q5TV.

Graeme Simpson, ARS41349, is also a first-timer to this page. He uses an Eddystone 640 and FRG7 into a Joystick antenna. Several prefix queries raised by Graeme are answered as follows: J8 is the new prefix for St Vincent (VP2S), VP6 was the prefix for 8P6 many years ago (so this was obviously a mis-logging), and RA prefixes are used by Russian amateurs on 28MHz, as are RB5, RP2, RH8 etc.

Mark Rogers, RS46276, uses a KW202 and a 66ft long wire. He has logged 190 stations since December last year. He feels that his best dx has been KL7IST, VK5AMV, AP2JL and PY4VG. Les Collinson, BRS41320, had a good month with FM7AV on 7MHz, HZ1TA and HS1AMM on 14MHz, and A9XZ, TG9GI, 3D6BP and 9X5PP on 21MHz. HM1SX on 21MHz was probably ok as well.

Finale

The big news of the month was K6LPL's unexpected trip to Juan Fernandez Is (CE0Z), which once again proved that he is indeed a really excellent operator. He was constantly working five stations every minute for long periods. He was audible on 28–14MHz, admittedly very late in the day on each band, but hopefully it proved to be an all-time new country for many. The strange thing was that the day he left the island CE5CJA landed there for a four-day expedition, although at the time of compiling this piece, your scribe has had no reports of anyone hearing him.

Other interesting happenings include a new dx net on 21MHz—the African Safari Net—which seems to meet daily at around 2000 on 21·295kHz, with the aim of pulling in Central African dx.

VK4NIC/3X continues to be very active and has been heard on 3·750MHz at around 0530. JA1JWP/JD1 has also been reported on 7·085MHz at around 1900. Other notable dx on 7MHz includes HK0FBF, HZ1AB, FH8OM, 9K2DR and 9X5BG.

Information for the **July** issue should reach your scribe by **Monday 18 May.** □

4 - 2 - 70

John Morris, G4ANB*

Transequatorial propagation on long path

SV1DH in Athens has reported the occurrence of some very unusual transequatorial propagation conditions on 16 February. Signals from Zimbabwe were detected on both 50 and 144MHz in Athens, and the South African 50MHz beacon ZS1STB was heard for the first time after more than a year of listening. Remarkably, the beacon transmission was received from the north, and nothing could be heard with the beam pointing south. As ZS1STB is located on the extreme southern tip of South Africa, it looks likely that the signals went around the earth via the long path.

On the same day a 144MHz contact took place between ZD8TC on Ascension Is and KP4EOR in Puerto Rico. This is the first recorded observation of simultaneous north–south and east–west transequatorial propagation conditions, and these results can be expected to cause much discussion among the experts.

Aurora

After the auroral events of 10 January and 6 February, many operators were poised and waiting for an opening on 5 March, during the next solar rotation, and they were not disappointed. There was a widespread aurora which started before 1200gmt and continued through to the early hours of the following day. The Meudon "A" index peaked at 69, the highest value since September 1979. VK5RN and VK5FM reported seeing the aurora australis.

Reports on this opening have been gratefully received from L. Dixon, G3XXQ, in Newcastle upon Tyne; Iain McHardy, GM3JFG (XR30b); Bill Hope, GM3MGT (YQ74f); Phil Hodson, G8RBY (ZM16e); "Brownie" Whatman, G2BQ (ZK13g); Chas Anderson, G2BS, in County Durham; John Branegan; GM4IHJ, in Fife; and Gordon Pheasant, G4BPY (YM30d). All reports will be forwarded to the Propagation Studies Committee, and some of the more interesting observations are noted below.

GM4IHJ has provided detailed notes on the event to illustrate some of the interesting questions it has raised. At 1150gmt television and fm broadcast stations from Moscow north-west across Scandinavia were being heard via the aurora. DL0PR came up on 144MHz at 1208gmt, followed by GB3GI at 1210gmt, the beam heading being 45°. The first contact was at 1235gmt, when G3BW replied to a "CQ" call. For the next 30min only G stations could be worked at very acute scatter angles, indicating that the auroral front was at nearly the same latitude as GM4IHJ. As the afternoon progressed, more and more European countries could be heard, and by 1430gmt contacts had been made into Norway and Germany. SP1JXT and HB9QQ were called, but no contact resulted. Signals began to fade at 1920gmt, and by 1940gmt only G3BW and GM3JFG were audible, alternately by tropo and aurora, until 2120gmt. By this time it was snowing heavily, and GM4IHJ soon lost the urge to go outside and look for visual aurora.

The log from GM3JFG shows over 50 auroral contacts between 1504 and 2059gmt, some of the highlights being OZ1CLL (GP23c), SM4AIQ (HT51j), SP4DCS (KN13j), UR2RQT (MS80e), SM5DFF (IS31c), DK6AS (EM64f), Y31QM/A (GL53g) and SM7JUQ (GP36h). The aurora very conveniently disappeared between 1740 and 1810gmt, just giving GM3JFG time to take a meal before coming back on the air. Although high power is useful for auroral operation, it is by no means essential, as shown by G2BS, whose 5W managed to bring in a pageful of contacts, including OZ1ASL (FO18c), OZ1CTZ (EQ67H) and EI7BB (VL12g). Both G3SEK and G4ANB noted an unusually large amount of doppler spread on the auroral signals, making ssb transmissions even more difficult to read than is normal during an aurora, and the band was noticeably quiet above 144·15MHz. Nevertheless, G8RBY managed to make several phone contacts with stations in Scotland and Northern Ireland, and GM3MGT exchanged 5/4/A reports on ssb with F6EOQ at 1755gmt. G4BPY stayed on 70MHz to work GM4DIJ (YP04C), and also EI6AS using 50–70MHz crossband.

In a commentary on this opening, GM4IHJ has suggested that openings on the scale of that of 5 March or bigger could possibly provide a transatlantic path on either 144MHz or 50–70MHz crossband. Although it is generally assumed that Canada and Scotland would be favoured for transatlantic aurora, GM4IHJ believes that more southerly latitudes would provide the best bet, because of the way the magnetic lines of latitude dip below Canada and Eastern USA.

G3XXQ assures 70MHz enthusiasts that there is some activity on that band from the north-east of England. During the aurora on 6 February contacts were made with G3IKR (YM70b), G3FDW (ZN56b) G8VR (AL42e) and G3UUT (AM61e). There was another aurora on 7 March, and G3XXQ worked GM4DIJ (YP04c).

Expedition plans

GM3WOJ has provided some details of the planned 70MHz expedition to the north of Scotland, which will be on the air from 10 to 16 August. The callsign GM3WOJ/P will be used on 70·225MHz, and there will be a "talk-link" on 3·725MHz ±QRM between 1700 and 1715gmt each day, with G8VR acting as south-east England net controller. For the first three days of the expedition the station will be located in XS square. There will be no operation, except for 3·5MHz, on 13 August. For the rest of the week, including the 70MHz trophy contest on 16 August, GM3WOJ/P will be operational from YS locator square. Attempts to make meteor scatter contacts, on both ssb and cw, will be encouraged. A detailed circular will be sent out during July to interested stations, who should contact GM3WOJ, QTHR.

G8AXE and G8AFC are planning a vhf/uhf/microwave expedition to the Republic of Ireland from 22 May to 1 June, and they hope to be allocated the same callsigns (EI2VDF and EI2VDE) as were used during a similar trip last year. The QTH will be Djouce Mountain, locator WN69h, which is in County Wicklow, 20km south of Dublin. The party, which should consist of G8AXE, G8AFC, G4BBU, G8UQE, G8UCU and G8EAV, will be equipped for high power and all modes on 144 and 432MHz, as well as some of the higher bands. 144·330MHz will be monitored at all times. Skeds may be arranged by contacting G8AXE or G8AFC (both QTHR), enclosing an sae.

Local working on 144MHz ssb

The subject of local versus dx working on 144MHz ssb has certainly raised a few hackles, and some of the correspondence generated has been, to say the least, vehement. Sadly there seems to have been a breakdown in communication at some stage, and most of the comments received are based on misinformation. Let it therefore clearly be stated: there is absolutely no intention to split the ssb portion of 144MHz into dx and local segments. There never has been such an intention, nor is there any likelihood whatsoever of such a split being made in the foreseeable future.

Had this change actually been intended, the comments from correspondents would have been entirely justified, and it is for precisely these reasons that the VHF Committee of the RSGB does *not* support any proposal along these lines. Indeed the RSGB does not even have the power to make such a dramatic addition to a band plan. These matters cannot be decided unilaterally by any country, but must be debated and considered by all of the national societies comprising IARU Region 1.

So just what has been proposed? Certainly nothing so drastic as a change to the band plan, but rather a simple arrangement to help operators make contacts of a certain type during certain periods, and it is worth looking at the reasoning behind the proposal. Devotees of the hf bands may often be heard lamenting the plethora of contests on the lower frequencies, which apparently make normal working almost impossible at some times. Users of 144MHz are rather more fortunate, in that contests are run on only a comparatively few weekends of the year. This relative infrequency means that most of those who are not actually participating in a contest still like to enter into the spirit of things and "give a few points away", perhaps picking up a new locator square on the way. Nevertheless even the keenest of operators can find contest operating beginning to pall after a few hours, and may begin to wish for a "conversational" contact with more than just a rubber stamp exchange of reports, serial numbers and locations. During major events the band can be completely full from 144·15 up to around 144·4MHz, and those wishing to make a non-contest contact are likely to find the usual ssb calling channel, 144·3MHz, somewhat noisy. For this reason it has been suggested that there should be an informal secondary calling channel in the quieter part of the band between 144·4 and 144·5MHz to provide a meeting place for those of like mind at these times.

In a letter to the VHF Committee, G2BS has summed up the position very well: "If stations in areas of high signal density find difficulty in making local contacts, there is nothing to stop them moving up to a frequency

*24 Collett Way, Grove, Wantage, Oxon OX12 0NT.

above 144·4MHz, without a change of band plan." This is absolutely correct, and the proposed secondary calling channel is designed merely as an aid in this, for use if and when required, rather than an additional piece of unnecessary complexity in the band plan.

Propagation warnings on beacons

Beacons on vhf and uhf are useful propagation indicators, as they transmit steady signals on known frequencies from known, good locations. A good idea of conditions on the bands of interest may often be had by checking signal strengths and listening for beacons which are normally inaudible. Hearing a beacon at its usual strength when the band is otherwise completely dead is also a great reassurance that the receiver is actually working.

As most beacons can be heard over wide areas, especially on 144MHz, one obvious way of making them even more useful would be to include warnings of openings in their transmissions, and several people have recently been considering ways and means of doing this. One of the most enthusiastic advocates of using beacons for the dissemination of propagation information is Jan Martin Noeding, LA8AK, who has made many suggestions as to how this concept can best be implemented.

In the design of a beacon warning system there are three important and inter-related features which must be given careful consideration from the outset: what information should be sent; where that information should come from; and how it should be encoded on to the beacon signal. At the lowest level the information sent could be no more than a simple alert when an auroral or sporadic-E event occurs. A more complex system might put out different codes for different types of propagation, perhaps including a "conditions normal" message to indicate that the hardware is working when the band is flat.

All sorts of ideas rapidly spring to mind when one begins to think about the sort of propagation information that could conceivably be sent out by a sufficiently versatile system. The time of the last message update; the highest frequency usable in a sporadic-E event; the location and direction of movement of an auroral zone—these are just a few of the many possibilities. However, before getting completely carried away by enthusiasm it would be wise to remember that all this information must come from somewhere, and some of the more esoteric ideas would require the full-time services of a well-equipped research laboratory. The most complex system which could usefully and reliably be implemented at present would probably have a repertoire of six or eight simple codes, such as morse characters following the beacon callsign, each code standing for a specific message. For example, an aurora could be signalled by the letter "A", sporadic-E by an "E", and so on.

Even on the simplest beacon warning system, care must be taken over the source of information. It would be dangerous to simply copy data from one beacon to another, as this could lead to news of a sporadic-E opening between two distant locations being propagated down a chain of beacons and causing a false alarm somewhere else. One possible way round this would be to have several levels of warning, ranging from "a rumour of sporadic-E somewhere" to "Es here and now on 144MHz". When an opening does occur within the service area of a particular beacon the appropriate warning code must be enabled promptly, either manually or by sending a suitably coded signal to the beacon. The whole question of how the alarm should be raised poses severe organizational problems, as it must be decided who can turn a warning on and off, and efficient lines of communication must be set up. No totally satisfactory solution to these problems has yet been suggested, although much will undoubtedly be learnt by experience if and when beacon warning systems come into use. In some circumstances it may also be possible for an opening, or potential opening, to be detected and the alert sent out completely automatically, particularly for aurora, and several UK amateurs have expressed interest in developing such a system.

The third design feature of a beacon warning system, the format of the messages themselves, offers some interesting possibilities. At one extreme a completely automatic system looks very attractive. The beacon would send a coded signal, which could be detected and decoded by purpose-built hardware in the shack. The thought of having a display which lights up with a warning whenever there is an opening is certainly enticing, but this approach has the big disadvantage that without the special hardware the system would be useless. It would be better to make the warning messages readable by ear, using cw or even synthesized speech. Anybody with a suitable receiver could then tune to the beacon frequency and listen for the message without having to obtain dedicated hardware. Although such a "human readable" system would be better than a purely "machine readable" one, very few people would actually care to spend hours on end monitoring a beacon and waiting for a warning to come. Best of all would be some form of compromise arrangement where any warning could be detected automatically but still be readable by ear for those without a suitable detection device.

LA8AK has suggested that the warning of an opening should include a unique code, for example a rapid series of 15 or more morse dots, which could be detected by quite simple hardware. For a simple beacon warning system, such as one only giving news of auroral events, the dots themselves would serve to alert both man and machine. A more advanced system would also send a message in cw indicating the type of opening. The dot sequence and associated message would be sent regularly for the duration of the opening.

This middle-of-the-road approach offers several levels of sophistication in the shack, the simplest being to listen to the beacon. The next stage would be to construct a circuit to monitor the beacon signal and light a lamp when a warning is detected (although in the perverse world of radio it is frustratingly probable that the glowing lamp would usually mean "there was an opening while you were out, but you missed it"). Finally, the detection circuit could be arranged to activate a tape recorder for a few seconds, to record the actual warning message (it is always nice to know what sort of opening has been missed), and LA8AK has provided several pages of circuits indicating how this could be done.

The whole concept of using vhf/uhf beacons to send out propagation information is quite fascinating in its potential applications, but before any serious steps can be taken there must of course be consultation with the licensing authorities. Much thought must obviously be given to this comparatively new subject, and it would be interesting to receive any comments and ideas.

SSB repeater proposal

February's *4-2-70* contained extracts from some of the letters received concerning the proposal for an experimental ssb repeater, GB3SF, and in March a reply by G3RKL was published. Several more correspondents have provided contributions to the debate, some coming down in favour of the idea (G8FEQ and G8RSD) and some against (G4GHB, G8LEF, G8LFJ and GW8VHI). Most of the comments received recently repeat points which have already been covered in previous issues, but they are nevertheless very useful in helping to establish the weight of opinion on this subject, and will be forwarded to the appropriate committees of the RSGB for this purpose.

Of the letters received so far, about three-quarters express opposition to the whole concept of ssb repeaters on 144MHz, and many of them suggest alternative experiments involving one or more of the higher bands. The rest are split evenly between those supporting the current GB3SF proposal, and those which do not oppose the idea but nevertheless have reservations about the particular implementation suggested by G3RKL.

Repeater news

At the end of February the list of 433MHz repeater proposals to be included in uhf Phase 6 was closed, eight units having being accepted by the Repeater Working Group. This batch of proposals will be submitted to the Home Office before the summer to be considered for licensing. The suggested callsigns, locations and channels are:

GB3FN	Farnham, Surrey	RB15	GB3HB	St Austell, Cornwall	RB15
GB3GC	Goole, Humberside	RB4	GB3PB	Peterhead, Grampian	RB10
GB3GH	Gainsborough, Lincs	RB15	GB3UL	Belfast	RB11
GB3HA	Hornsea, Humberside	RB6	GB3WU	Wakefield, W Yorks	RB11

These channel allocations are subject to the approval of the repeater groups concerned, and some of them may be changed before submission to the Home Office.

Progress is also continuing with vhf Phase 5, which should go to the Home Office in the summer; two more 144MHz repeater proposals have been accepted for inclusion in this phase, subject to the usual vetting procedure—GB3TY (R6, Corbridge, Northumberland) and GB3EV (R4, Eden Vale, Appleby, Cumbria).

The new Firth of Forth 144MHz repeater, GB3FF (R4, Burntisland, Fife) came on the air on 14 March, exactly on schedule. The antennas for GB3FF are mounted 300ft up "Craigkelly", a 440ft-tall free-standing tower used for television and radio broadcasting. The spring edition of *Central Scotland FM News* contains a graphic description of the perilous antenna-mounting operation, which took place on a wintry day in mid-February, complete with flurries of snow flying around the riggers' heads as they toiled on their high perch. As the report concludes: "Repeaters don't just come on".

This sentiment is echoed in a recently received report on the progress of uhf repeater GB3ZI (RB11, Stafford), for which the target operational date was set at 4 February. On the morning of that day the rf hardware was moved on to site, the antennas checked, and all other wiring completed. At this eleventh hour the microprocessor-based control system

developed a fault in the switching circuitry. By 7.30pm, over an hour after the anticipated switch-on time, this problem had been overcome and the control unit was working perfectly. Back at the repeater site the transmitter and receiver were "tweaked" and a dummy load connected. Upon connection of the control system, the transmitter keyed for about 15s before the interface transistors failed, causing catastrophic failure of the memory circuits. Impending final year examinations forced the builders to temporarily suspend the project after this unfortunate disaster, but they hope to have GB3ZI on the air towards the end of May.

The South West Hertfordshire UHF Group has been carrying out experiments into the angle of radiation from the dipole arrays used on its 433MHz repeater GB3HR (RB14, Bushey Heath, Herts). A new antenna system on the transmit side is planned for the spring to improve the coverage of the repeater in parts of Harrow. The group has expressed its thanks to the Radio Society of Harrow for very generous donations towards the running costs of its beacons and repeaters.

Locator systems

The question of whether the QRA should be abandoned in favour of a new, simpler locator system (*Rad Com* November 1980) has produced a copious quantity of correspondence. The response from UK vhf/uhf enthusiasts has for the most part been greatly in favour of making the change, a typical comment being that of G8GGG: "I have long felt that the QRA system leaves much to be desired, especially in terms of its limited coverage and illogical construction". The main fear expressed by those opposing the plan is of confusion during the changeover period from one system to the other. This is a valid point and, as with any change, the level of upheaval caused must be weighed in the balance against the lasting benefits which could accrue. It seems, however, that the majority of those who currently use the QRA believe that the end result would be worth the effort involved.

Unfortunately, from an international viewpoint, the matter is not quite so clear cut. One of the attractions of making a change was the possibility of having a common locator system in use all over the world. This possibility now, sadly, appears to be receding. The main stumbling block is the use by the proposed system of 2° by 1° "squares". This size of square was deliberately chosen in the design of the system to be compatible with the present QRA "large squares", so avoiding any disruption of squares-based lists and awards. On the other side of the Atlantic the question of compatibility does not arise, as no locator system at all is in use at the moment, and there is strong pressure towards the adoption of 1° by 1° squares.

The argument in favour of 1° by 1° rather than 2° by 1° is that at latitudes of less than 45° (which covers the bulk of the USA) the former is more nearly square, in kilometre by kilometre, than the latter. At latitudes greater than 45° the reverse is true, and this is the reason that 2° by 1° squares were chosen for the QRA.

Whatever the merits of various square sizes, it is very unlikely that any system not based on 2° by 1° would be generally acceptable to the amateur population of Europe, as it would mean rethinking the many squares-based awards and investment in completely new maps. It must therefore be decided whether the comparative simplicity of the proposed system compared with the QRA is in itself a good enough reason to make the change. There are no immediate plans in either IARU Regions 2 or 3 for the adoption of any locator system for use on vhf/uhf. If and when these regions begin to make such plans the use of a simple and globally available system in Region 1 would obviously be a factor in their deliberations.

432MHz at G8ECN

Chris Black, G8ECN, in Norwich, is a keen uhf dxer and manager of the 432MHz station of the Norfolk VHF-UHF Contest Group. In a letter to *4-2-70* he described some of his recent and planned activities, which include both constructing equipment and using it. Within the last few months a 27-element quad loop Yagi and a gasfet preamp have been completed. Although the loop Yagi is unwieldy, it has paid dividends in terms of dx, having about 8dB gain over the Yagi previously used. A second loop Yagi is planned, the eventual aim being a box of four.

With the single antenna and gasfet amplifier, G8ECN has been able to work into Germany on 432MHz on most evenings. The transmitter runs 400W p.e.p. output, but due to a long feeder cable only about half of this actually gets to the antenna. A new shack is on the way, and this should reduce the loss to less than 1dB, giving a significant improvement in the all-important erp.

With the exception of the prime mover, an FT101, and the gasfet, the station equipment did not cost a lot, and G8ECN has expressed surprise that so many amateurs apparently insist on buying everything. The quad loop Yagi, for example, was built for less than £10, but outperforms commercial antennas sold for many times this amount.

G8ECN is one of several operators who have written to explode the myth that "it is always dead on seventy". Not only is there a rapidly growing level of local and semi-local activity on ssb and fm, but with a reasonable front-end and a good antenna there is dx to be worked.

New awards

Following a suggestion from the vhf awards manager, G5UM, several higher categories are being added to the *4-2-70* squares series of awards. These new awards extend the scheme upwards by offering stickers for working additional large QRA squares, but with no extra country requirements. On 432MHz the highest award was previously given for working 15 countries and 60 squares, and only one operator has claimed this so far. The new categories on this band will be the 432MHz 15+70, 15+80 and 15+100 awards, requiring 70, 80 and 100 squares respectively. On 144MHz the top 20+100 award, of which four have so far been issued, is being supplemented by 20+125 and 20+150 stickers, to be given for working 20 countries and 125 or 150 squares respectively. No claims have yet been received for the top 70MHz 10+35 award, but nevertheless there are also to be two new categories for this band; 10+40 and 10+50. An examination of the QTH locator map of Europe reveals that there are only about 55 large squares—some containing only a few square miles of land—which could possibly be worked on 70MHz. To collect the 10+50 award on this band would therefore be a most impressive achievement indeed!

Award claims

Two unusual award claims recently reached the vhf awards manager on the same day. One was from Ken Osborne, G4IGO, of Bristol, who went straight from the 10+40 category in the 144MHz *4-2-70* squares series to take No 5 in the 20+100 class. G5UM observed that Ken had actually indulged in "...a spot of overkill: he submitted cards for 25 countries and 107 squares". Of the QSL cards sent in, which were collected over a two-year period, the breakdown by mode was 24 by meteor scatter, eight by aurora, eight by sporadic-E, and the rest by tropo, with a fair mixture of both ssb and cw.

The other notable claim came from Bryn Llewellyn, G4DEZ, of Essex, who has been awarded 144MHz 10+40 No 45 for operation as G4DEZ/P. This prompts the reminder that /P, /M and /A all count as different stations, and award claims may be submitted for each of these, as well as for operation from home. In fact this makes the third 144MHz 10+40 certificate for G4DEZ, who took No 4 for operation from his old Didcot QTH, and No 10 from his new home in Essex, where he managed to secure an entirely fresh lot of cards in less than a year.

There was quick work on the part of Martyn Jones, G8CXQ, also. He moved from the basic 144MHz 10+40 in March 1980, to 15+60 in September, through to 18+80 in March 1981. Sticker No 7 is now affixed to his original *4-2-70* certificate.

On the Four Metres and Down front there is no slackening of claims, and during March certificates Nos 570, 571 and 572 in the 144MHz Standard went to G4GMY, G8MKD and G8SVF respectively.

Scatter

Phil Hodson, G8RBY, receives a telephone call from GM4ILS when an aurora occurs, and would like to extend this warning net farther south. Anybody who is prepared to telephone two or three other amateurs in exchange for receiving a warning is asked to write to G8RBY, 43 Thorpe Road, Melton Mowbray, Leics LE13 1SE. He is also keen to set up a similar net for sporadic-E, and would be interested in hearing from any amateur who monitors for this propagation mode and would be prepared to call him in the event of an opening.

G8RZO and G8RZP have recently suffered the misfortune of having a batch of 120 QSL cards "go missing" in the post en route to the vhf awards manager. Although this is a rare occurrence, it may well be worth considering the use of the recorded delivery service when sending those hard-earned cards through the mails.

The radio club of Örebro (ÖSA) has extended an open invitation to a vhf/uhf/shf meeting in Ånnaboda, a sport and leisure centre located 25km north-east of Orebro City in Sweden, from 12 to 14 June. Activities will include lectures, discussions, professional measurements on participants' equipment, noise temperature measurements on antennas, and "festivity on Saturday evening". Camping facilities will be available, and there will be plenty to do for all the family, radio minded or not. Further information may be had by writing to ÖSA, PO Box 242, S-70104 Örebro,

Sweden. It would also be appreciated if intending participants could drop a line to the same address.

The "UK Horizontal FM Group" is an informal group of people who are interested in dx working on 144MHz using horizontally polarized fm. They may be found around 144·670MHz from 7.30pm on Monday evenings.

Your scribe has recently changed QTH. Please send all vhf/uhf news and views to the new address given at the foot of page 440. □

MICROWAVES

Charles Suckling, G3WDG*

Expedition to EI

An expedition to EI, from 22 May to 1 June, is being organized by G8AXE and G8AFC. They are planning to be operational on 1·3GHz fm/ssb with 10W to an array of four 15/15 antennas, and on 10GHz with low-power wide- and narrow-band equipment and 18in dishes. They will also be taking high-power equipment for 144MHz and 432MHz, so that talkback for 1·3 and 10GHz should be no problem.

They will be sited 2,500ft asl on Djouce Mountain (WN69h), which is 20km south of Dublin, and the callsigns in use will be EI2VDF and EI2VDE. Skeds can be arranged by telephoning G8AXE (061-442 0696) or G8AFC (061-865 3183) on Sunday mornings.

10GHz skeds wanted

DK2ZF will spend his 1981 summer holidays at Blavands Huk (EP31) from 15 August to 15 September especially for 10GHz tests across the North Sea. So far his best dx is 272km from FO55 to Bornholm made in September 1980 with 50mW Gunnplexers and 17dB horns at both ends. During the Denmark trip DK2ZF will use the same station but with two additional parabolic reflectors (40 and 60cm diameter). Favourable paths are to the UK and to The Netherlands and Norway. For more details please contact Rolf Niefind, DK2ZF, Lerchenstraß. 10, D-2407 Bad Schwartau.

10GHz Cumulative Contest

Now that the 10GHz contest season is here again, no doubt many new stations are taking to the hills for the first time on this band. Adequate preparation is the key to success on 10GHz, as many have found to their cost during the first time out! Perhaps the most striking difference between 10GHz and lower frequencies is the very narrow beamwidth of typical antennas, and this has a number of consequences both to equipment and to operating techniques.

First, it is almost always necessary to arrange the contact from a lower band (144MHz), because the chances of making contact at random on 10GHz are virtually nil. The use of 144MHz allows site information to be exchanged so that beam headings can be worked out. Also, the frequencies to be used on 10GHz can be agreed, and the 144MHz talkback link can be used while setting up the 10GHz contact, for example for relaying the other station's signal to allow antennas to be peaked up. The standard talkback frequency is 144·33MHz ssb (horizontally polarized)—this should only be used as a calling frequency and the contact should be moved elsewhere once it has been established—144·15 to 144·19MHz has been recommended as a working sub-band for this purpose.

It is most important to have good, reliable equipment for talkback, preferably separate from any other equipment. Handheld equipment with whip antennas is not really adequate, and a beam antenna is highly desirable; 144MHz signals are often not very strong, and QRM levels are frequently high. Many stations use 10 to 25W and up to 6-el beams. One *very* important point is that the talkback equipment should be mounted at the 10GHz operating point. It is very inconvenient when this is not the case, for example when the 10GHz equipment is mounted outside and the 144MHz equipment is inside a vehicle; one is constantly moving between both sets of equipment, which can be very annoying for both operators.

Another consequence of the narrowness of antenna beams on 10GHz is that a well-engineered antenna system is necessary for two reasons: first it must hold the antenna securely in both horizontal and vertical planes under conditions of wind-loading, and second it must be capable of being pointed quickly and accurately in any direction. These criteria militate against the use of roof-rack type operation, where the whole transmitter/receiver/antenna system is placed precariously on a car roof-rack! The use of mast- or tripod-mounted equipment is much better and will lead to considerably more efficient operation. If a tripod is used, *it must be guyed*, or the first gust of wind will blow the system over, very likely causing extensive damage.

The subjects of antenna pointing and the calculation of beam headings were discussed in *Microwaves* September and November 1980; it is vital to be familiar with these subjects *before* going out portable! Also, be sure that the national grid reference of the intended site is known beforehand.

Since the rules for the contest were published last month the Microwave Committee has decided to award an extra certificate to the leading station running non-crystal controlled equipment with less than 100mW output.

2·3GHz eme news

Several stations are now either active or on the verge of becoming active on 2·3GHz eme. Both W6YFK and the DJ4AU group are up and running, and by the time this appears in print they may have already made the first transatlantic 2·3GHz QSO. The DJ4AU group is using an 8m solid dish and a klystron amplifier with several hundred watts of output. Moon echoes are reported at nearly 20dB above noise in 1kHz bandwidth! PA0SSB is also nearing readiness for 2·3GHz eme in collaboration with PA0D??.

PA0SSB reports receiving signals on 2,275·990MHz from a scientific package left on the moon during the Apollo programme, using his 6m dish and a 2·3GHz converter with a modified local oscillator frequency. The signal received was approximately 2dB above his sun-noise level. The signal from this package is right-hand circularly polarized, and this has led to a different standard being adopted for 2·3GHz eme (transmit left-hand, receive right-hand) to that used on 1·3GHz eme. This should not cause any difficulties, since different dish feeds would be used in practice for the two bands, and it has the advantage that the Apollo package can be received continuously when operating 2·3GHz eme to help keep the antenna aimed at the moon.

2·3/3·4GHz news

The spell of good conditions at the end of January resulted in some interesting contacts being made on 2·3 and 3·4GHz. G4BYV reports that he worked DB5KS (DL square) on 2·3GHz and G8ADC (Luton). G8ADC also worked G8ADP (near Alton) on 2·3GHz. On 3·4GHz, following the mounting of his 1,152MHz to 3,456MHz varactor multiplier at the masthead, G3LQR worked five PA0 stations plus one G.

The technique of mounting a (well-behaved!) varactor multiplier at the antenna can be very useful on 2·3 and 3·4GHz, to avoid the very high feeder losses often encountered at these frequencies. Feeder losses at drive frequencies are lower, and can be taken account of by simply generating more drive.

First G-GU 1·3GHz QSO

A few months ago a possible first between GU and G on 1·3GHz was reported. It appears that this had already been done in 1978 by G8AGU/P and GU3EGV/P. Are there any still earlier claims?

Third 2·3GHz distance award issued

The third 2·3GHz microwave distance award was issued recently by G5UM to G8PQF (now G4KBC) in Essex. He fulfilled the 500km plus distance requirement easily, by a contact last May with DF9LN at 693km. The equipment used by G8PQF to make this contact is rather impressive: on transmit, over 50W p.e.p. is produced by a 7289 pa driven with 4W from a 2C39a mixer (2W at 2,160MHz from a BXY28 doubler +144MHz); on receive, a three-stage preamplifier (NE57835 +two BFR34As) is used ahead of a BRF34A mixer, with a 144MHz i.f.; and 34-el Yagi antenna.

Programs for beam heading calculations

Several stations are now using programmable calculators to ease the calculation of beam headings from national grid references during contests. G4BGP has recently written a Basic program for the handheld TRS80 machine. It will also run on the similar Sharp calculator. He will be pleased to supply listings of the program on receipt of an sae.

*46 Windsor Close, Towcester, Northants.

THE MONTH ON THE AIR

John Allaway, G3FKM*

RESPONSE to the request for "guest editorials" has been encouraging so far, and your scribe is happy to be able to print the following, the work of Angus Taylor, G8PG.

Strong—or too strong?

The amateur service is a recognized communication service under the International Telecommunications Convention, and Clause 2 of the UK Amateur Licence states that the licensee must observe and comply with the relevant provisions of the convention. One of these requires that only sufficient power to allow satisfactory communication to be established shall be used. The "S" signal strength code used by amateurs defines S9 as "extremely strong signals" and S8 as "strong signals". One would assume, therefore, that, except for communication during an emergency, S8 is the strongest signal level that conforms to the requirements of the convention, and that any station receiving an S9 or better report would immediately reduce power to bring his or her signal down to an acceptable level.

The fact that this is rarely done is responsible for a large proportion of the QRM on our bands. If it were done as a matter of course, mutual interference would be greatly reduced, co-channel usage possibilities greatly increased, and the end effect would be equivalent to the addition of several hundred kilohertz to our allocations. Radio amateurs would also once again take their place as leaders in the field of efficient operating techniques and communication skills. As with any other step towards improving the human environment, the first steps must come from those who care enough to *do something positive* about the matter—such as switching off the linear or turning down the drive control. Are *you* sufficiently forward thinking to become one of them?

Lionel Rose, G4KAB, has asked for publicity to be given to the fact that he is receiving a large number of QSLs for G4AAP. These appear to be for contacts made with a pirate.

Overseas news

Tony Dibbs, RS45830, is living in Athens, and as an Australian ex-commercial operator he applied for an amateur station licence. He has been allocated VK2DSY and is setting up his station on his 33ft auxiliary sailing ketch *Triana*. He will be on the air by June from the Aegean and Ionian Sea areas and looking for other /MM operators.

VK6HW has asked for publicity for the fact that he is off the air at present due to pirating of his callsign.

G2CKM is now in the United Arab Emirates and reports on the licensing position. He confirms that all licences have been cancelled and that no one has been authorized to operate in A6 for two years or more. The Ministry of Communications will issue a licence to authentic licence holders from other countries but this needs approval from the Ministry of Defence and the Ministry of Security, and at present neither will grant this.

Steve Lowe, G4JVG/SM0, used to be EP2SL during 1978 and 1979. He asks anyone who still needs his QSL to write to the address in last month's "QTH Corner". He also wishes to thank Colin Squires, G3XCS, who did a splendid job as his QSL manager when he was in Iran.

DX news

The *Long Island DX Bulletin* reports that TJ1BB is regularly on or near 14,010kHz from 2100—the operator is N4JR who will be in Cameroun for two years and who hopes to have his own call in due course. According to *DX News Sheet* N4HX has been given the callsign TYA11 to use until mid-1982.

Jerzey, SP6BAA, is now licensed as 9U5WR to operate on cw only. He hopes to have a TS830 and TH6DXX beam soon. QSLs should be sent via SP6FER.

FH8OM and FH8YL say that mail takes many weeks to reach them in their remote location on Mayotte Is. Their preferred operating times are between 1300 and 1400 at weekends, and they favour the low end of the 14MHz phone band. Beatrice often joins the Round Table Net on 14,175kHz at 2000 on Mondays. Other active FH8 stations include FH8CO, Lucien, who has been worked on 14MHz cw, FH8CB who has been worked on 21MHz ssb around 1830, and FH8CY who has been on 28MHz ssb at around 1500.

June and Mike Jones, ZS2TJ and ZS2MJ, in their shack at Fort Beaufort

D68AM is still very active and may be found nearly every Tuesday on 21,285kHz after 1900. He also keeps a schedule with G4CHP on 28,750kHz at 1200. *Informacion Dx* says that he is a regular check-in to the DK2OC net on 21,285kHz between 1800 and 2000, and that he operates cw or ssb on the same frequency.

S79MC says that S79RD, S79NLB, S79GM, S79WHW and he are the only active amateurs in the Seychelles. S79WHW has equipment problems. It seems that the Seychelles administration has decided to renew the existing amateur licences and also to issue new licences to permanent residents who have lived there for at least six months, but no licences will be issued to visitors.

FR7CE works a list of stations collected by his QSL manager, DF2OU, on 21,210kHz at 1230 daily. This takes place at 1300 and he then moves to 28,400kHz where the same procedure is followed. However, *DX-NL* says that DF2OU makes his 28MHz list on 28,505kHz at 1200 so that this frequency would also appear to be worth watching.

The appearance of A51PN on the air with a good signal seems to be explained by Pradhan in a letter sent to W5GAI in which he says that he has been using equipment at his place of employment. This permission may be withdrawn at any time, and equipment for his personal use is still being sought urgently to make sure that Bhutan stays on the active list.

LA1RR/ST0 is active on 14, 21 and 28MHz, and asks for QSLs to his home address. ST0AS, Albert, is also often heard, especially in the DK2OC net.

* 10 Knightlow Road, Birmingham B17 8QB

YI1BGD seems to be active again at 1900 on Tuesdays and Thursdays on 14,290kHz. A list of those wishing to make contacts is taken by I1AGC.

Up-to-date information on the New Zealand "off-shore" islands is given in *DX News Sheet*. Geoff Watts reports that Warwick, ZL3AFH/A, will be on Auckland Is until November and that he is now active on all bands 1·8 to 21MHz with cw, ssb and rtty. In mid-March he was mostly to be found near 14,005 or 14,320kHz from 0900 at weekends, using an FT101E and dipole as well as the weather station rhombics. Other frequencies worth watching include 3,505, 3,525, 3,665, 3,800, 7,005 and 7,095kHz. QSLs should go to ZL2HE accompanied by three ircs or USA $1 for a direct reply. ZL2HE now has logs and QSLs for the confirmation of ZL1BIQ/K, ZL2BCF/A and ZL5MC contacts, and draws attention to the fact that "ZL3MA/C" and "ZL3MA/K" operations are all bogus.

The new prefixes in use in St Vincent distinguish resident from visiting operators—the former use J88 and the latter J87.

The Cuban DX Group meets on Sundays near 28,505kHz at 1500 and sometimes has stations with the rarer CO prefixes in attendance.

New information has been received concerning the operating pattern of 4U1UN. On Tuesdays and Fridays the station is on the air from 2200 to 0100, and on Wednesdays and Saturdays from 1400 to 1700. Frequencies most often used include (cw) 27kHz above lower band edges, and (ssb) around 14,250, 14,332, 21,330 and 28,550kHz. QSLs still go via W2MZV.

Five members of the staff of the Australian Maritime College Dept of Radiocommunication & Electronic Engineering in Launceston, Tasmania, have opened up their station with the callsign VK7ANC. It is the only VK7 three-letter callsign, and the station hopes to keep regular schedules with similar colleges in the UK on the Maritime Mobile Net on 14,313kHz. The equipment consists of a TS830 with TH5 and 18AVT/WB antennas for hf use, and Oscar can also be used. Michael Collinson, VK7MA, a senior lecturer at the college, was formerly GM4EXL.

8Q7BF is JN1BJS and active on 14, 21 and 28MHz with a TS520D. He keeps a schedule with his QSL manager, JA1ITE, every day except Friday on either 14,255 or 21,350kHz at 0500, 0700 or 1300.

It would appear that some kind of incentive licensing has been introduced in Barbados; the 8P7 prefix is being used and is said to denote an "advanced" class licence. Ian Anderson, now J87BD, keeps a schedule with GB2SM at 1030 on Thursday on 21,050kHz.

Dxpeditions

The much-publicised expedition to Heard Is, scheduled for a few months ago, was unable to take place because of transport difficulties. However, it is hoped that when the present Antarctic winter is over the expedition will take place. Jim Smith, VK9NS, has been heard using the callsign VK0-JS/VK9 from his home on Norfolk Is, and has been a good signal on 7MHz as well as on his usual 14MHz QRG. His address is Box 103, Norfolk Is, 2899.

Long Island DX Bulletin mentions rumours of a forthcoming expedition to Aves Is (YV0) this month.

There is a possibility that PY1RO and PY1MAG may attempt to visit Peter & Paul Rocks this year. Once again cost is the main problem, and contributions would be much appreciated. They should be sent to PY1MAG (but please do not mention his callsign on the envelope) addressed to: P. N. Rabelo, Albino Pereira 355, S.Francisco, 24000 Niteroi, RJ, Brazil. PT7YS also hopes to visit the rocks, perhaps at the time the military party goes there to service the lighthouse.

Iris and Lloyd Colvin finished their operation from FG0FOK on 12 February, and left for Martinique where they intended to use the callsign FM0FOL. The "K" at the end of their callsign caused much confusion and they do not intend ever again to use a call finishing with a K. They advise all those who have an FG0FO logged to apply to them for a FG0FOK QSL. In all they worked 150 countries and made some 9,000 contacts from Guadeloupe.

Records

The excellent state of the hf bands has been marked by a number of most unusual achievements claimed recently. The *DX Bulletin* says that K6RO has worked and confirmed 200 countries in 200 days, while nearer home GW3AHN has worked 271 countries during 1980 using his home-built 5W transmitter and beam antennas. On the other side of the Bristol Channel G3AWZ claims a total of 250 countries worked in only 10 months—in his case using a modified FT301 which gives 2W output on 21 and 28MHz and 3W on 14MHz.

Referring to the note on the largest amateur family in November 1980 *MOTA*, Brian Robertson, WA3NGL/G5DSD, points out that Everest

Phil Weaver, VS6CT, at the operating position in the home of Fernando Pinto, CR9AK. CR9CT operation gave Phil over 8,000 contacts

McDade (of the McDade family of Arden, NC) administered the US Novice class examination to him some 16 years ago—so he considers the "family" is even bigger than the QSL card shows!

John, ZL1AH, has written to say that he and G6CJ have had more than 2,800 contacts over a period of 28 years—covering all bands 1·8 to 28MHz. He does not believe that this is a record even for ZL–G and thinks that there is a ZL2–G5 combination which has done even better.

Top band

VK6HD is carrying out propagation tests on 3·5 and 1·8MHz until 30 June and hopes to be on the air commencing at 15min before sunrise in VK6 each day. He will alternate between 1·8 and 3·5MHz and will be found on either 1,802 or 1,807kHz on even dates and on 3,505kHz on odd dates. Sunrise times in Western Australia are: 1 May, 2248; 11 May, 2256; 21 May, 2301; 1 June, 2309; 11 June, 2314; and 21 June, 2317.

VHF net

Not a paragraph misplaced from *4-2-70* but a reminder, via Jan Martin Noeding, LA8AK, that vhf enthusiasts tend to congregate on or near 14,340kHz between 1200 and 1600, especially at weekends, to arrange schedules and generally discuss their vhf activity. Due to the nature of vhf propagation it is not possible to carry on this kind of conversation on vhf itself, and Jan asks for other users of this part of the 14MHz band to please try to avoid this area when it is being used for this purpose.

Contests

The March issue of *CQ* magazine contained results of the **1980 CQ WW WPX SSB Contest.** Scores recorded by UK stations are as follows:

Single-operator

GM4GPN	**(All band)**	799,140 points	**G4DMN**	**(28MHz)**	1,796,208 points
GW4BLE	**(All band)**	546,120 points	**G4BWP**	**(28MHz)**	1,758,820 points
G3VAO	**(All band)**	480,396 points	G3XBY	**(28MHz)**	977,184 points
GU3YIZ	**(All band)**	230,776 points	**GM3RAO**	**(28MHz)**	585,112 points
G2AJB	**(All band)**	74,094 points	G4DKT	**(28MHz)**	121,511 points
GW4HBK	**(All band)**	51,475 points	**GD4HOX**	**(21MHz)**	21,620 points
GM5AXY	**(All band)**	12,358 points	**G4AHO**	**(3·5MHz)**	96,100 points

Multi-operator, single-transmitter

GB4DAA	7,621,888 pts	G3RRS	3,926,048 pts	G8JC	2,889,007 pts
G6UW	4,012,650 pts	G6CW	2,956,577 pts		

Multi-operator multi-transmitter

GB4ANT 7,945,168 points

QRP Section

G3FTQ (All band) 99,008 pts **GM4ELV (All band)** 40,135 pts GM3RFR **(All band)** 33,800 pts

Certificate winners are listed in bold type. Congratulations to GB4DAA and GB4ANT in coming world fifth in their respective categories—the latter was also top European.

QTH CORNER

A4XSV/MM	Royal Omani ARS, PO Box 981, Muscat, Sultanate of Oman.
C6ADV	via N7YL, Marilyn Groenig, Box 67, Cowiche, Wash, 98923, USA.
CE0CJA	PO Box 2545, Concepcion, Chile.
G3MUV/CE0	via WD4HMG, 662 Cortez Cir, Altamonte Springs, Fla, 32701, USA.
K6LPL/CE0Z	W6ORD, N. E. Friedman, 5400 Lindley Av, 312, Encino, Cal, 91316, USA.
HK0EHM	via WD9DZV, T. M. Garrity, 6035 N. Ridge Av, Chicago, Ill, 60660, USA.
HS4AMI	via VE3DPB, B. C. Dekat, Box 137, Lynden, Ont, L0R 1TO, Canada.
J5AG	via SM3CXS, J. Svensson, Berghemsv 11, 86021 Sundsbruk, Sweden.
KL7H	via W3HNK, J. Arcure Jr, Box 73, Edgemont Pa, 19028, USA.
PA3ADJ/LX PA3AIR/LX PA0INE/LX	via PA0KHS, H. van Hensbergen, Smaragdstr 53, 6534 WN Nijmegen, Netherlands.
OH0XX/OJ0	via OH2BBM, O. Rissanen, Lustokeha C 21, SF-03100 Nummela, Finland.
OH0XZ/OJ0	via OH2KI, J. Saloranta, Karhutie 39, SF-00800 Helsinki 80, Finland.
DK5BD/ST2	via DF1BP, W. Hahn, Bramstedter Str. 2, D 2808 Syke, Fed Rep of Germany.
TA1MO	PO Box 7, Osmonbey, Istanbul, Turkey (do not mention callsign).
VP1CW	DK1RG, A. Daum, Berliner Ring 38, D 3251 Aerzen 1, Fed Rep of Germany.
VP10A	via KB0U, R. L. Barnett, 8909 W. 81st St, Overland Park, Ks, 66204, USA.
VP2MIX	via W0IJN, PO Box 549, Montevideo, Minn, 56265, USA.
VP5RFS	via N5BET, B. J. Carter, 902 Pinecrest Dr, Richardson, Tx, 75080, USA.
ZF2EK	via W8TN, C. L. Stewart, 104 Henrietta St, Ravenswood, W Va, 26164, USA.
ZF2EO	via K0CS, S. P. Gecewicz, 14134 Merrywood Cir, Grandview, Mo, 64030, USA.
9H3AM	RS32525, 79 Granby Rd, London SE9 1EH.

Ibero-American Contest
2000 23 May to 2000 24 May 1981
3·5 to 28MHz—phone only. Exchange signal reports and serial numbers (from 001) with Ibero-American countries (CE, CO, CR, CT, CT2, CT3, CP, C9, CX, C31, EA, EA6, EA8, EA9, HC, HI, HK, HP, HR, KP4, LU, OA, PY, TG, TI, XE, YS, YV and ZP). Each contact counts one point and each Ibero-American country as a multiplier on each band. Logs must show band, date, time, callsign, numbers sent and received, points and multipliers. An award is issued to those with more than 50 QSOs. Logs must reach URE, PO Box 62, Mollet del Valles, Spain, no later than 15 July 1981.

The CQ-M Contest
2100 9 May to 2100 10 May
No rules had been received at the time of going to press but it is assumed that they are similar to last year's. The 1980 contest covered 3·5 to 28MHz, cw and ssb. The same station may be worked once on each band either on cw or ssb but not both. There are single-operator single-band, single-operator multi-band, multi-operator single-transmitter, and listener sections. Exchanges consist of RS/T plus serial QSO number (from 001) and USSR stations will send their oblast number. Contacts may be made with all countries, and one point is gained for QSOs with one's own continent and three with others. Own country may be worked for multiplier only. The multiplier is the number of countries worked on each band added together. The R-150-S list is used—essentially the DXCC list plus oblasts 002, 013, 014, 056, 084-098 and 159, and Novaya Zemlya, Kuril Is and New Siberian Is. Listeners gain one point for reporting one station exchange, three for both stations and their exchanges. Badges will be sent to those making more than 10 USSR contacts, and QSOs may be used for credit when applying for R-150-S, R-100-0, W-100-U, R-15-R, R-6-K, or R-10-R awards if request is made with the entry. Post before 1 July to Krenkel Central Radio Club, "CQ M" Contest Committee, PO Box 88, Moscow, USSR.

In the 1979 event there were 28 transmitting and two listener entries. Top listed were **GU3WBS** (124,098 points), **GW3NYY** (35,275), and **G3ESF** (28,640) in the multi-band class, and G3IMW (600) on 3·5MHz G4HLN (3,408) on 14MHz, G4AEO (217) on 21MHz, and G2BJY (305) on 28MHz. G-14223 was leading listener.

The G4ANT 14 (l) and 3·5MHz stations. GB4ANT was world top score in the 1980 ARRL DX Competition multi-operator multi-transmitter section. *Photo:* **J. Newstead**

World Telecommunications Day Contest
0000 to 2400 9 May (Phone)
0000 to 2400 16 May (CW)
3·5 to 28MHz. Single-operator multi-band and multi-operator multi-band categories. Contacts within own ITU zone count one point, with different zone in same continent three points, and in other continents five points. Exchanges consist of RS/T plus ITU zone number (UK is 27). The multiplier is the number of different zones worked—each counts once only. Final score is total QSO points multiplied by the number of different ITU zones contacted. Logs should be posted before 30 June to: LABRE, UIT Contest Co-ordination, PO Box 07-004, 70.000 Brasilia DF, Brazil.

Awards

Four new awards have been announced by the Nigerian ARS. They are as follows:

Worked All Nigeria Award
Issued in three classes: (1) for working two stations from each of the 19 states of Nigeria on two different bands on two different modes. QSOs with the state club stations count as two; (2) for working 38 stations as above but all on one mode, and (3) for contacting one station in each state. QSLs should not be sent but a list should be certified by the applicant's own national society awards manager. The fee is 10 ircs or NG2, and applications should be sent to the Award Manager, PO Box 2873, Lagos, Nigeria. (Note that the old 5N2 Award is now suspended but is still available provided that all claimed contacts took place before 31 December 1979.)

Worked All Nigeria Zones Award
Also in three classes: (1) for confirmed QSOs with at least five stations in each of the 10 zones 5N1-5N0, on two bands—contacts with zone directors 5N0UDB, 5N2LED, 5N3ALE, 5N4BPC, 5N5AOM, 5N6SBA, 5N6ATT, 5N8JMF, 5N8BRC, 5N9GM and 5N9SA count as with two stations, and with 5N0OBA as three; (2) work three stations from eight zones on two bands—directors and yl stations count double; and (3) work two stations from five zones on two bands. All QSOs must have been made since 1 January 1980, and the fee is as mentioned previously.

The 5NDX Award
First class, work any 100 5Ns on two bands; second class, work 50; and third class work 20. The president's station, 5N0AAJ, counts as five, and directors and yls two.

Nigerian October Award
To celebrate the anniversary of independence during October each year Nigerian stations will use the prefix of each year of celebration in place of their normal number—eg 5N0OBA was 5N20/OBA in 1980 and will be 5N21/OBA this year. This award is in two classes and is also available to listeners. First class requires 500 points, and second at least 100. QSOs with 5N0AAJ count 20 points, with directors and yls 15, and with NARS executive members 10 points. A certified copy of the applicant's log should be submitted—other details as given earlier.

DBDX—O Diploma Brasileiro de Dx
Issued by LABRE for confirmed QSOs with at least 20 DXCC countries, one of which must have been Brazil. Stickers will be issued for each additional 10 countries confirmed. All contacts must have been made on 1·8, 3·5 and 7MHz, and no crossband or cross-mode QSOs are accepted. QSOs must have been since 15 November 1945, and reports at least RS33 or RST338. Applications, accompanied by the relevant QSLs, should be sent to: LABRE Awards Manager-DBDX, PO Box 07-0004, Brasilia, DF, Brazil 70000. Return postage must be enclosed—US$2 or 10ircs.

Worked All States
ARRL has announced the availability of an attractive new certificate which has been issued to those who have applied for WAS since 31 December 1980. Since WAS No 1 was awarded to W1WV in 1936, over 35,000 have been issued and a new design was felt to be necessary. No reissuance of previously-earned awards will be made, but those with the old certificate may apply for one of the speciality/mode series which are separately numbered (eg sstv, Oscar, rtty). A 1·8MHz certificate is now available, as is one for making all contacts with Extra Class licensees on 3·8MHz (3,787kHz appears to be a net frequency for this purpose). Application details are available from ARRL HQ, 225 Main St, Newington, Conn, 06111, USA.

The IYDP Natural History Award
This is an award sponsored by the radio amateurs group of the Victorian Disabled Citizens Association (Australia) to promote amateur radio for the disabled in 1981. Rules are somewhat complicated and copies will be sent on request (sae please) to G3FKM.

Golden Jubilee Award
Sponsored by the Midland ARS of UK and available to any licensed amateur or listener throughout the world. To qualify 50 "points" must be acquired by working/hearing member stations—including GB4MAR (which counts for 25 points). Ordinary members count for three points. All QSOs must take place during June 1981 and none made via repeaters or satellites will count. Send check log, plus £1, USA $3 or five ircs to John K. Harvey, G4IVJ, 38 Bodenham Road, Birmingham B31 5DS. A list of MARS members is available from this address in exchange for an sae.

The Lion City Award
Information appearing in *Amateur Radio Awards* and elsewhere concerning this certificate appears to be incorrect. It seems that it is not yet available and, in fact, still has to be designed—this has been made clear by 9V1NR in a letter to a German listener.

The Helvetia Award
For confirmed contact with all 26 cantons since 1 January 1979. Send list and QSLs to: Walter Blattner, HB9ALF, PO Box 450, Locarno 6601, Switzerland. Endorsements for cw, phone, mixed, rtty or sstv may be requested. There is no charge for the certificate but no doubt a few ircs for return postage of QSLs and the certificate would be appreciated.

Band reports

G8KG has supplied the following report covering the period up to the end of March: "The decline in solar activity in January proved to be only temporary and by the last week in February the 27-day average of the solar flux had again risen above the 200 mark, reaching nearly 220sfu for the 27 days up to 15 March and remaining above 200 at the time of writing. Activity was highest at the end of February and beginning of March with daily values approaching the 250sfu mark.

"The geomagnetic field was disturbed for two periods at the beginning and middle of March but was otherwise fairly quiet, and hf band conditions were at least as good as in the corresponding period in 1980. The ARRL Phone Contest fortunately fell between the two disturbed periods and conditions were excellent. The Commonwealth Contest was less fortunate."

The following list of stations logged during the month was compiled from reports received from Gs 2HKU, 3HB, 5JL, 3EHQ, 3GHY, 3GVV, 3IMW, 3KSH, GM3LYY, G3NWG, GM3PPE, G3ZFC, G4s, AXD, BDQ, DBR, GW4KGR, G4JVG/SM0, and RS1066.

Stations listed in italics were using cw.

1·8MHz. **0000** *EZ5WAB.* **0100** *EZ6DEX, K1MM, RG6GBX, UA9CRS, G3PQA/5N0.* **0200** *RA9AKM.* **2200** *VK6HD.*
3·5MHz. **0100** *A4XIX, FM0FOL, J87BN, G3KTR/5N9.* **0200** *W1BIH/PJ2, 9H1CH.* **0300** *HK0BKX, TG9XGV, TI2PZ.* **0400** VP9KD. **0600** *C5AAP, HC1MD, VP1CW, VP2ED.* **0700** *FG0FOO/FS, VP5JDT, ZD7RW, ZL4IE, 3D2VU.* **2300** 3A8EE.
7MHz. **0000** *FM0FOL, FG0FOL/FS7.* **0100** A4XIH, VU2DX, ZD8RH. **0200** *A7XE, W4PRO/CE0, VP9JR, HB9BVL/5N0, 5N0WRA.* **0300** *W6TSQ, 9K1DR, 9Y4VK.* **0600** *K7CA/CE3,* HK, *VP1CW.* **0700** *C5AAP, EA9EU* (QSL to I8KDB), J88AM, *KL7Y, VK,* VK9NS, *W6 W7, ZL, K9VV/6Y5.* **0800** C6ADV, *FP0FAV, VP2EV.* **2000** *JA, VK, VU2FBN, ZD8TC.* **2300** *OX3AK.*
14MHz. **0600** *ZK1BD.* **0700** CE0CJA, T30AT. **0800** CE0AE, FO8DF, KH6, TA1MO, *ZB2EO,* ZL3AFH/A. **0900** *W4PRO/CE0, KH3AB, KL7, TA2CK, 4U1UN.* **1000** *ZL.* **1200** *P29GJ.* **1500** *T30AT, VS6, 3B8FA.* **1600** *KL7JIZ.* **1700** FR7BX, *KH6, JA, VS0EE* (?), *ZL3AFH/A.* **1800** *KH6IJ, ZL.* **1900** P29GC, ZD7AL, *G3KTR/5N9.* **2000** AP2MQ, *F0GFI/FC* (QSL to HB9ALN), VK2 VK4, ZL2. **2100** JA. **2200** 4U1UN.
21MHz. **0000** VP2MFC. **0800** P29NRG, VK, *VU2PK,* ZL. **0900** DU, *JA,* VK, ZL, 8J3XPO. **1000** OX3KM, *P29GJ,* VS6BE, 9G1RT. **1100** FR0FLO, HL, JA, KL7, *P29EJ.* **1200** FK8DH. **1300** VK, VS6. **1400** HS4AMA, KC6IN. **1600** DU, TL8RC, VU. **1700** S79NLB. **1800** 9U5JM. **1900** *EC9AQ,* KL7FI. **2000** G3MUV/CE0, *VQ9XX.* **2100** KL7, W6 W7. **2200** K6LPL/CE0Z, *VP5GT,* W6 W7. **2300** CE0AE, KC4AAB, W6 W7, 5V1GE, 9V1TK.
28MHz. **0700** AH6BK (over South Pole), HM0U, HS4AMI, K6MYC, WB7NCD (over South Pole). **0800** JA, UA9, YJ8NPS. **0900** H44s, BH, PT, WH, HL2GS, JA, *KL7, DK5BD/ST2,* SU1ER, UA0, VU, ZL, 9T1YP. **1000** JA, KL7, P29, *TA1UA,* TU, VS6, VU, *G3KTR/5N9.* **1100** A4XDU, *H44DX,* JA, *JA8AQN/JD1,* OY7NS, P29, 9K2FF (QSL to SV1JG). **1200** *C5AAP, FP0FZZ, J28CC,* DL2VK/ST3, *TA1UA, VK6VK,* 5H3AA. **1300** A7XD, A9XZ, HZ, VS6GY, 5N, 5Z4, 3B8AE/3B9. **1400** N8AJY/DU6, *FM0FOL,* FR7CE, VP2MFC (QSL to K1ZZ), *VP8ADE, VU2WTR, 9K2AH.* **1500** HK, HK0EHM, *VP2EV,* W7. **1600** *W4GSM/CE0, FG0GDI/FS7,* VE4 VE7, W6 W7. **1700** A7XA, *VP2MIX,* VP8PP, *VU2OF,* 9L1NP. **1800** VP8AEO/CE9, *K6LPL/CE0Z,* HZ1HZ, JY9RC, *VE8AA,* W6 W7, *ZF2GB, ZL2MHF.* **1900** *VP1CW.* **2000** CE, CX, FG0FOO/FS, KA4EIN/TI4, VP2GZ, *VP8ADE.* **2100** *OA,* VP2MZ, *W6.* **2200** JA7OWD, *VE,* VK2 VK3, *W.* **2300** VK2BVD, VP8WA, W6 W7, *ZL2MHF.*

Many thanks to all correspondents and also to the following for items extracted: the *DX Bulletin* (**K1TN**), the *Long Island DX Bulletin* (**W4UL/W2IYX**), *DX News Sheet* (**Geoff Watts**), *Long Skip* (**VE3BMV**), *QRZ DX* (**K5FUV**), *DX'press* (**PA0TO**), *CQ Magazine* (**W1WY**), *DX NL* (**DL3RK**), and *Informacion DX* (**EA1QF**).

Please send all items for **July** issue **to reach G3FKM** no later than **29 May**—*please note another early deadline.* □

CQ TEST QRP HA

by TONY SMITH, G4FAI*

Amateur radio contests are usually taken very seriously by their participants, and quite rightly so. This is the competitive element of our hobby and the keener contestants go to a lot of trouble to optimize their stations, antennas and operating methods in the hope of achieving a reasonable score. Of course there are some amateurs who have a go just for the fun of it. It is a good opportunity to see what their equipment can do and maybe give a few points to the keen chaps. Just occasionally there is an unexpected outcome, and this in one such story.

The author only works QRP. He has a Ten-Tec Argonaut 509 transceiver with an input of 5W, and most QRP events—be they activity periods, awards, or contests—attract him simply because they represent an opportunity to work other low power stations. One such event is the annual HA-QRP Contest organized by *Radiotechnika* magazine in Hungary. It takes place each November on 3·5MHz and lasts for seven days; the maximum power input is 5W and the mode is cw. It is quite a straightforward affair: contacts with one's own country count as one point, and other countries two points, irrespective of whether the other station is running high or low power. The total points are finally multiplied by the number of DXCC countries worked.

When the author went on the air on the first day of the 1980 contest he was not too excited about what he found. Virtually nothing could be heard on the band during the day, and it was extremely noisy in the evening—as far from ideal for a QRP contest as can be imagined. In these conditions of course the whole thing becomes quite a challenge, and as a result he went on the air whenever he could throughout the week that followed.

He had not been on 3·5MHz for some considerable time, and he was pleasantly surprised to find several old G-QRP friends around the QRP calling frequency of 3·560kHz. They had some quite long chats; not exactly the stuff that contests are made of, but QRP is like that! None of them were competing in fact, and he soon came to the conclusion that he was the only G-station working in the contest! He did find some Continental QRPers who were participating though, including some old friends there too, and right down in the noise he could hear the Hungarians calling CQ TEST QRP but he just could not raise them.

By the end of the week it had become an obsession to get at least one HA before the contest ended. Finally he worked HA2KRZ just over an hour before it all ended at midnight on 7 November. Like G4FAI he was running 5W, and both exchanged reports of 559 each way. The end result was that the author worked nine countries and scored a modest 360 points, his best dx being UK2GKW in Riga, Latvia. This really was a lower end of the table type of score, but having spent a week on the contest he felt he should put an entry in to let those HAs know that he was at least trying. Maybe next year they would remember he was there at the fringe of the contest activity area and make a special effort to look out for him.

The sequel to all this was a letter from the chief editor of *Radiotechnika* in February 1981 informing the author that he was the winner of the 1980 contest in his country! He sent him a nice "memorial leaf" certifying that he had taken part in the contest, and this is now proudly displayed on his shack notice board. He also informed the author that as a reward he was to receive a copy of *Radiotechnika* free of charge for one year. All in Hungarian!

There is a bit in the contest results on page 63 of the February issue of *Radiotechnika* which reads—"G4FAI: A magyar állomásokat egész héten hallottam, de csak az utolsó napon tudtam a HA2KRZ-1 megesinálni." Which roughly translated means: "If you want to win a contest make sure there are no other entrants" . . . hi!

Seriously though, the author is willing to pass on the year's magazines to the first Hungarian-speaking G-station to contact him, in return for a translation of the contest results and comments. With his own limited Hungarian he notes that fellow-G-QRP-Club member OK2BMA was the winner for his country with 2,568 points and that he also took third place in the list of foreign entrants. But then he is a lot nearer to all that Hungarian activity than the author!

The author also notes that the top-scoring HA kollektiv station gained 75,348 points, which were a few more than he did; he imagines they had a better antenna than his U-shaped 60ft wire, maybe a slightly better location, and they probably worked the station round the clock over the seven days of the contest.

How else could they have got those extra 75,000 points? □

* 1 Tash Place, London N11 1PA.

HF propagation study

Experience with the HF Propagation Study predictions has been that potential users require an individual explanation of how to interpret the figures and, most commonly, what the statistical inferences mean in practice. Even so, because some mental arithmetic or scratch pad work is required in order to obtain useful operating information, only those having a particular interest, notably sked keeping, then take the trouble to do the calculations when a need arises. Accordingly, in order to make the predictions easily assimilated and thereby of greater utility, a new form of presentation commences with this issue. If the aim has been met you should be able to use the table without any explanation. Try it!

Now, hopefully, there are only two doubts in your mind. Are the numbers S-units? and what do the plus signs mean? Well the numbers are not S-units, but treating them as such gives the right answer – the higher the number the better the chance of good signals. They are in fact the result of statistical operations on the hpf and luf figures as previously published to give the probability on a 0 to 9 scale of signals being audible, with 1 meaning 10 to 19 per cent of days in the month, and so on. Plus signs in the 28MHz and 3·5MHz columns indicate that these bands will be good, with at least a number 1 predicted for 50MHz and 1·8MHz respectively. At this time of year there are few, if any, of these.

A prediction number is obtained from the multiplication of two independent probabilities which exist at any given time; one depending on how far a band is above luf and the other on how far that band is below hpf. This gives rise to a difficulty in practical interpretation, since statistically speaking a number 1 means that good signals could be present on a few days (100% × 10% = 10%), or mediocre signals could be present on half the days (38% × 50% = 19%), or poor signals could be there on most days (15% × 90% = 14%), or any other combination which returns an answer between 10 and 19 per cent. However, the nature of things is that generally the higher the number the stronger and more consistent the signal. The predictions are for undisturbed ionospheric conditions, so if a high number is predicted for a certain area and you observe generally weak signals then all predicted numbers will require reducing to give a proper picture. This check is best made on signals from areas of high activity such as W1-4 and UA1-4.

During development of the new format, the grouping of routes by continent and printing of zeros as dots was found an operating convenience. An alternative format in which the numbers are grouped in columns of time sub-divided by bands was tried alongside that shown, but no strong preference was found; for some purposes one is better, and vice versa.

A4 size copies of current predictions in both formats are available on request, with an sase, to G4AQI, QTHR. Since January the predictions have been made using the same data and methods for all routes; this removed some inconsistencies between similar routes, for example New York and Montreal, which had been noted.

Band predictions for May 1981

	28MHz	21MHz	14MHz	7MHz	3·5MHz
UTC	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802
EUROPE					
Moscow	.....	...13333442.	535666666887	753111111367	42.....35
Malta	.....	...233444531	756766667898	886311112478	++3.....4+
Gibraltar	.....	....1112231.	523676666886	986422122478	++4.....4+
Iceland	.....	.....	1..133334563	776422122346	443.....23
ASIA					
Osaka	.....	...233334231	...21.13674	.....12.	.....
Hong Kong	...1121221..	1.1244446652	2.....13687	142	.....
Bangkok	...22333321.	112345456763	51.....13688	145	2
Singapore	..123333321.	212345456763	51.....13688	1.....145	2
New Delhi	..123333331.	223334457774	74.....13689	3.....146	3
Teheran	..1344444421	335544557886	974.....3689	62.....146	3.....3
Colombo	..134444432.	333445557875	84.....3689	4.....146	3
Bahrain	..2445555531	546443557887	974.....3689	72.....146	4.....3
Cyprus	...23333332.	324777778875	987543346799	762.....257	53.....24
Aden	212555666643	767544457898	985.....3689	74.....146	4.....23
OCEANIA					
Suva (s)	.....	....1112232.	..2421.1264.	.....1..	.....
Suva (l)	4223.....64	456841...186	..562...1551	.....1..	.....
Wellington (s)	.....	....12222..21	114521.12463	.....11.	.....
Wellington (l)	3213.....44	766731....87	34663...1474	..11.....11.	.....
Sydney (s)	...1221.....	1135544321.2	1.152..13565	.....14.	.....
Sydney (l)	21.11.....2	544541....47	213631..1285	...1.....3	.....
Perth	..13444.....	32456552.....	62.12...245.	1.....145	2
Honolulu	.....	11112211	.13321..23..	.1.....	.....
AFRICA					
Seychelles	212555565443	756544557898	984.....3689	73.....146	4.....23
Mauritius	2.2556666644	827545557899	9851....3689	74.....146	4.....23
Nairobi	312556677755	877644457999	9972....3689	761.....146	43.....23
Salisbury	421556777755	976754557999	9984....2689	763.....146	44.....3
Capetown	...455787754	5..875557999	97.62...2689	773.....146	44.....3
Lagos	421355778865	986864447999	99862...2689	773.....146	44.....3
Ascension Is	221.55567752	886475446897	99862...1689	774.....146	44.....3
Dakar	321254677763	887775445898	99863....589	7741.....46	44.....3
Las Palmas	22233421	532476777886	998765555799	88521...157	552.....24
S AMERICA					
South Shetland	677751	2557896	622.1...2689	7741.....135	44.....2
Falkland Is	3....1677753	832..4556898	99852...2579	7741.....26	44.....3
Rio de Janeiro	311..4566753	876435545798	99863....379	7741.....26	44.....3
Buenos Aires	2111.4566653	8766.5555788	998621....269	7741.....15	44.....2
Lima	1...11343442	753453454467	998631....16	6741.....1	34.....
Bogota	1...12233332	643345443357	998631....16	5641.....1	24.....
N AMERICA					
Barbados	1...13333442	753455433467	998631....27	7741.....2	44.....
Jamaica	1....1122222	532234343346	897631.....5	4641.....	.4.....
Bermuda	1111221	531124333366	897531....26	5641.....1	24.....
New York	1111	42...2233345	886521....15	3631.....	.3.....
Mexico	1111	41...11232233	686531.....1	1531.....	.2.....
Montreal	11	41...2222345	786421....25	2631.....	.3.....
Denver	.....	21.....1113	56541....1..1	.331.....	.....
Los Angeles	.....	2.....11122	25532....1...	.131.....	.....
Vancouver	.....	1.....11	24432...21..	.13.....	.....
Fairbanks	.....	....1...1...	123421..2211	.....	.....

Propagation predictions

Summer conditions in the ionosphere prevail in May. Compared to winter in the northern hemisphere the daytime frequencies are noticeably lower, being most pronounced on **28MHz**, and traffic with North America may only be possible on favourable days during the afternoon and evening hours. These worsening conditions will not be noticed so much in traffic with Africa and South America because the F2 mufs do not show any noticeable reduction in equatorial regions during summer. In contrast, the night-time frequencies will be higher than in winter, and this will lead to considerable improvement of dx conditions on **14MHz** during the night.

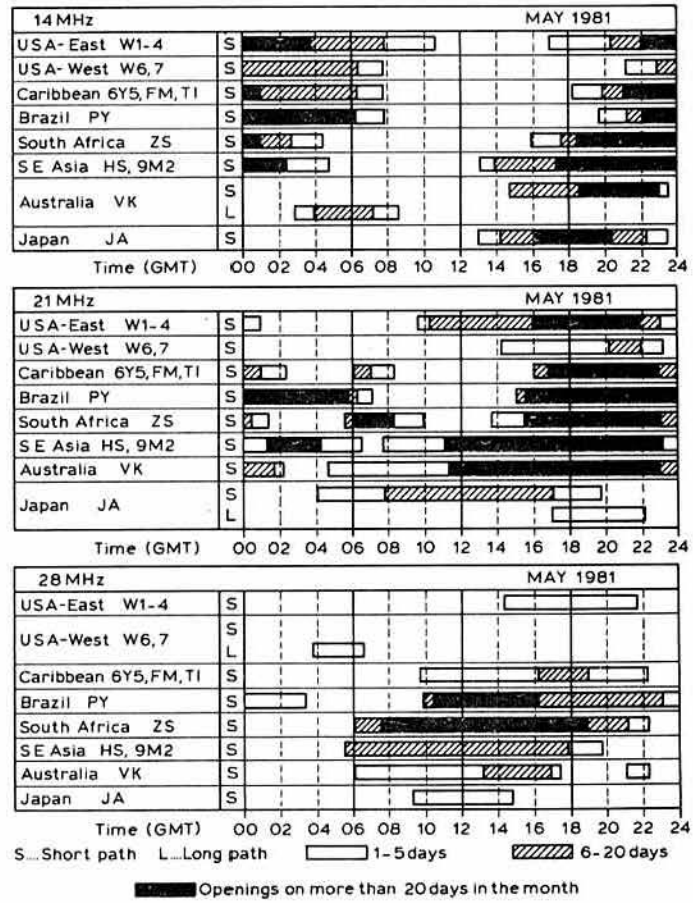
Solar activity has only decreased marginally since May 1980, so conditions will be similar to those given then. As usual, short-skip conditions start in May and they will facilitate quite sporadic contacts on **28** and **21MHz** with good results. These conditions cease as suddenly as they occur. Changes on **21MHz** will be less severe, with traffic with eastern North America being possible on favourable days during the afternoon and evening, although it will most probably be best in the evening. The start of winter in the southern hemisphere will influence traffic with South Africa, with a break in traffic between 0200 and 0700, absorption is usually too high on this path during the middle of the day.

On **14MHz**, dx will at first be possible with Asia and Australia in the afternoon, and later with North Central and South America as well; traffic will be possible throughout the night until just after sunrise. Traffic with Australia will be possible during the afternoon and the first half of the night via the eastern path, and during the night-time to sunrise via the western path.

DX will be possible on **7MHz** mainly when the whole path lies in darkness, but static and QRM will interrupt traffic. During the day this band will be most suited to local QSOs. Signals will be stronger, specially at midday, than on **3·5MHz**, although that band will provide good local traffic, and there will be no interruption by the dead zone during the second half of the night.

The provisional mean sunspot number for February 1981 was 143·5. Solar activity was fairly evenly distributed throughout the month, ranging between 185 and 98 as the highest and lowest daily numbers.

The predicted smoothed numbers for June, July and August are 127, 125 and 123 respectively. The information is provided by the Sunspot Index Data Centre, Brussels.



COUNCIL PROCEEDINGS

A brief report on the Council meeting held on 10/11 January 1981

Present: Mr B. O'Brien (President, in the chair), Dr E. J. Allaway, Messrs J. Anthony, P. Balestrini, J. Bazley, R. Bellerby, R. G. Barrett, P. F. D. Cornish, Dr D. S. Evans, Messrs K. A. M. Fisher, L. N. G. Hawkyard, Mrs J. Heathershaw, Messrs G. R. Jessop, G. I. Knight, D. M. Pratt, G. M. C. Stone (members of Council), D. A. Evans (general manager) and A. W. Hutchinson (editor).

Apologies for absence were received from Messrs D. J. Andrews and W. F. McGonigle.

Election of executive vice-President
Mr J. Anthony, G3KQF, was elected unanimously as executive vice-President for 1981.

Financial report
The hon treasurer said that the accounts to the end of December 1980 were currently being prepared, and noted that book sales in the first six months of the year had been remarkable. Membership was continuing to grow and the effects of the new subscription rates were beginning to be felt.

It was hoped to show a surplus at 31 December 1980.

General manager's report
Mr Evans reported on the staff situation following the departure of Mr Gallier and Mrs Allin, and the appointment of replacements. He also commented on the production of committee minutes and the time required at HQ for typing and circulation. After some discussion Council agreed that every effort should be made to get draft minutes to HQ within 14 days of the meeting so as to assist HQ staff and expedite circulation.

Mr Evans reported that the proposed temporary building at Alexandra Palace would not be available for 1981 RSGB Exhibition and that the smaller hall would be used. While the size of the exhibition would be reduced, this would not be allowed to affect the quality of the stands.

Review of committee business
HF (2.10.80 and 6.12.80)
Dr Evans said that the committee felt that the mobile aspects of amateur radio should be covered in the appropriate spectrum column in *Rad Com*. Mr Bazley said that the HF Committee agreed and they did not think that there would be sufficient material forthcoming to make a separate column worth considering.

HF Contests (20.11.80)
The minutes were accepted without discussion.

IARU (30.10.80 and 27.11.80)
Mr Balestrini said that he had written to the president of the IARU regarding the proposed changes to the IARU constitution.

Regarding the band changes in the USA, Dr Allaway said that he had received about five letters against the changes following a mention in *MOTA*.

Mr Balestrini confirmed that the Raynet paper for the IARU Region 1 Conference had been completed. It was agreed that the President should write to the Rt Hon Timothy Raison, MP, to ask him if he would open the conference, as the Society's patron would not be available.

Interference (24.10.80)
Some discussion on a new edition of the *Interference Manual* took place, and it was felt that interference from cb operators could be a problem in future. A new edition which could be made available to cb operators would be in the best interests of amateur radio.

Membership & Representation (18.10.80 and 27.11.80)
Following a successful meeting of the committee in Cambridge, Mr Anthony drew Council's attention to the non-attendance of some area and club representatives and others. He said that he had written to Mr Appleby, G3ZNU, RR16, to see if he could offer an explanation.

A short discussion took place regarding the Society archivist. It was agreed that this be pursued as a matter of urgency.

Microwave (2.11.80)
The committee had welcomed proposals from the Martlesham Heath Group concerning a high-power 10GHz beacon.

Dr Evans reported that several members of the committee and the general manager had done some experimental 1·3GHz mobile work and had produced a technical paper which would be circulated to Council. He felt that it was necessary for the Society to be able to counter cb claims that 928MHz exhibited poor propagation, and a final report would be submitted to the Home Office. It was considered essential to contrast the non-technical report from the CB Association with a positive technical contribution from the Society.

There was a discussion on the proposed *Microwave Manual*, and it was generally agreed that such a book would be of value to amateurs' and others' interests alike.

Rally & Exhibition (11.11.80)
A general discussion on the 1981 Alexandra Palace exhibition took place, and various aspects on the use of the small hall were considered.

Propagation Studies (22.10.80)
In a brief report on the work of the committee, Mr Stone said that in several areas the committee were well ahead of the professionals—for example, some professionals had not realized that sporadic-E propagation occurred at frequencies as high as 144MHz. Mr Knight said that he considered the work of the committee outstanding.

Raynet (22.11.80)
It was agreed to discuss Raynet Ltd as a separate item later in the meeting.

Technical & Publications (22.10.80)
Dr Evans said he was delighted to see the new format *Rad Com*, which he considered an excellent advance. He wished to thank the editor for the smooth way in which the changeover had been made.

Book sales had been consistently 30 per cent up on the previous year. It had been interesting to note that as a result of the Christmas book leaflet being included in the November *Rad Com*, the November sales were well up, while the December sales were about the same as in 1979.

Dr Evans gave details of the current book production programme.

Telecommunications Liaison (24.10.80)
In reply to a question, the general manager commented that the latest news seemed to indicate that the Syledis problem on 432MHz would probably get much worse before it got better. It was a shared band and radio amateurs only had the band on a secondary basis. Discussion with the Home Office had provided some relief by the use of directional antennas and the latest (narrower band width) equipment, but more installations were apparently being planned.

VHF (RWG) (25.10.80)
Mr Fisher said that further discussion on the possible change to the 144MHz sub-band was planned following feedback from members.

Mr Stone commented on the 1981 RSGB National VHF Convention and reported that much of the preparatory work was now being undertaken by RSGB HQ and Mr E. Yeomanson.

VHF Contests (15.10.80)
Council accepted the minutes of this meeting.

Membership and affiliation
Council waived the subscriptions in respect of four members on the grounds of disability, and approved the affiliation of the World Association of Christian Radio Amateurs and Listeners, the Farnham VHF Group, Kilmarnock & Loudoun Amateur Radio Club, and the Magherafelt Amateur Radio Society.

Appointment of honorary officers for 1981
Council approved the appointment of honorary officers (listed on page 412 of this issue).

Council agreed that reports from the majority of honorary officers were not necessary, but considered it essential that reports by the hf, vhf, microwave and emergency communications managers and the telecommunication liaison officer be made at each meeting.

Representatives on external bodies
Council agreed the names of representatives to serve on external bodies during 1981.

International Year for Disabled People (IYDP)
Council agreed to support the proposed Weekend-on-the-Air for disabled people which would take place on 1-3 August 1981. Mr Jessop suggested that the Society give further support, in any way possible, to the Radio Amateur Invalid & Blind Club. Dr Evans suggested that this could be done through the M & R Committee which he hoped would take a greater long-term role with regard to RAIBC. After discussion Council asked Mr Jessop to act as IYDP co-ordinator during 1981.

IARU Region 1 Conference 1981
Council agreed the names of the delegates and observers for the conference.

Appointment of RSGB committees for 1981
Committee appointments for 1981 were approved (a full list was published on page 346 of the April issue of *Rad Com*).

1980 AGM
Mr Balestrini said that he felt a number of actions arose from the 1980 AGM. He said he wished to see a short statement published in *Rad Com* with regard to the election and rotation of Council members, and in addition some guidance for members regarding matters which could or could not be raised under "Any other business". Mr Jessop said that he thought the general manager had clarified the position admirably, and Dr Allaway added that he too would like to see such an explanation published in the Society's magazine.

Presidential matters
The Mexican national amateur radio society had sent congratulations to Mr O'Brien on his election as President for 1981.

The President said that he and the general manager had ben invited to represent the Society at the ARRL National Convention in mid-March. He would also be visiting the St Dunstan's society on 21 February 1981, and he had been invited to the AGM of the Belgian society, UBA, on 16 May 1981.

(The President relinquished the chair in favour of the executive vice-President in order to prepare for the Presidential Installation.)

Raynet
Mr Balestrini opened the discussion by saying that the recent Raynet Newsletter circulated by Mr Lundegard just prior to Christmas had not gone through the usual channels for distribution by the Society and had not received the approval of the Raynet Committee. He considered that the content of the document was misleading; Council agreed.

Mr Bellerby said that he wished to discuss the way in which the recent Raynet elections for seven corresponding members during 1981 had been undertaken.

The executive vice-President said that he felt that it was now too late (7pm) to do full justice to this complex subject, and suggested that the meeting convene again at 9am the following morning in order to discuss this matter at much greater length. Council agreed with this suggestion, although a number of members said that they could not attend.

(The meeting was adjourned and resumed at 9am on 11 January)

Present: Mr B. O'Brien (President, in the chair), Dr E. J. Allaway, Messrs J. Anthony, P. Balestrini, R. Bellerby, P. F. D. Cornish, Dr D. S. Evans, Messrs K. A. M. Fisher, L. N. G. Hawkyard, Mrs J. Heathershaw, Messrs G. R. Jessop, G. Stone (members of Council), D. A. Evans (general manager) and A. W. Hutchinson (editor).

Council discussed the *Raynet Newsletter* referred to earlier by Mr Balestrini when this item on the agenda was opened. It was agreed that a letter should be sent to all Raynet controllers by the general manager/company secretary saying that the newsletter had not been authorized by the Society or the Raynet Committee.

Mr Bellerby returned to his earlier discussion on the election procedure for seven corresponding members of the Raynet Committee during 1981. Mr Balestrini said that in his opinion the spirit of the election of seven corresponding members for 1981 had been upheld by the election, despite some anomalies due to inaccuracies in the list and the precise location of controllers in the various zones used for the purpose of the election. Mr Balestrini said that the purpose of the planned meetings this year was to establish a permanent system of regional input which need not necessarily be similar in any way to the 1981 election procedure.

The President said that Raynet would be an on-going concern of Council during 1981.

YOUR OPINION

EQUIPMENT

The Editor
Radio Communication

Sir—Having avidly consumed the December issue of *Rad Com,* I became intrigued by the proportion of advertisements for items imported from abroad. The approximate figures are shown below:

Japanese equipment	43¾ pages
British equipment	9¼ pages
American equipment	3¼ pages
French equipment	¼ page
German equipment	¼ page
Components, crystals etc	4¾ pages

Although I immensely enjoy the pastime of amateur radio I have nagging doubts that perhaps we are not (commercially at least) really doing much good for the economy of this country. While I admit that not all the equipment in my shack was manufactured in the UK, I am annoyed every time I see more and more advertisements for imports. Are we destined in our hobby to a life-time of buying imports? If so should we perhaps consider, for instance, the implications to the national economy each time a new vhf repeater goes on the air (maybe 300 mobile rigs at £200 each totals £60,000). If 10 new repeaters come on the air that is over £0·5 million.

Should we close them all down? Should we ban all imports of anything which has transistors, valves, microphones or crystals, or just say that it is not our problem and leave it to the government to worry about? Or should we say to the few, the so very few, who produce fine equipment in this country "Well done—keep at it. Please make better British gear and not just the peripherals. We will give you our support."

I believe that the last course is the only long-term answer and that if UK manufacturers will produce technically better/cleverer and more acceptable products then we will buy them (and indeed they will be able to export them too) not *just* because the products are British but because they *are* better. Is it too much to hope that within the next few years I will be able to operate a British-built rig which has given employment on the assembly lines to a few of those who are at present apparently surplus to our nation's requirements?

Graham Shirville, G3VZV

EQUIPMENT COSTS

The Editor
Radio Communication

Sir—I have been reading my copy of *QST* and comparing the prices advertised for Japanese equipment in the USA with those for the same items in this country. The figures just do not make sense, in view of the alleged weak dollar and strong pound, even allowing for VAT.

I will cite just one item, the Trio TS830S, although the same applies to other makes and equipments.

The price for this item as advertised by a number of retailers in *Rad Com* is uniform, £639·52 including VAT. I have been told that there is only one importer in this country, but I do not know if this is true. The prices in *QST* are as follows:

Longs Electronics: $836·95, with the comment "list price $929·95"; Radio Warehouse Dallas: $829·95; Webster: $929·95, the "list" price referred to in Longs advertisement.

Assume that the exchange rate is around $2·40 to the pound, the sterling price for the TS830S at the highest price quoted in *QST*, ie $929·95 is £387·50. Add to this VAT at 15 per cent and one is left with a retail price for the UK of £445·60.

Even if VAT is paid on the import duty, the difference is really startling. In fact, unless I have slipped up somewhere, the UK amateur is asked to pay £193·92 more for his TS830S than does his American counterpart. Could some kind accountant please tell me where I have erred?

Arthur Milne, G2MI, hon member

Sir—While listening to a programme from Radio Nederland for swls, designed and produced by Jonathan Marks, G8GWH, an item arose regarding the merits of current short wave receivers now on the market.

The question of prices was discussed and, in particular, the FRG 7700 receiver was quoted at 1,100 guilders, which is approximately £220. It would appear that in this country this receiver is priced everywhere at £310, so what would the cost be if the £ was devalued to, say, US$1·75. Can somebody please explain the enormous price difference, as the sale of amateur radio equipment seems to be very profitable.

R. H. Roling, GW6WM

Sir—I feel that I must write and congratulate *Rad Com,* and Tony Bailey in particular, for his RX80 receiver project. It is up-to-date yet straightforward in design with an adequate performance at reasonable cost. This is what amateur radio is all about, and far more is achieved by building your own than by using overpriced imported black boxes.

Can somebody please answer the following simple questions for me.

1. Why does amateur radio equipment cost the same in pounds and dollars? The exchange rate is around $2·4 to £1, import duty 11 per cent + VAT. What is the rest?
2. Why do all retailers charge the *same* prices for similar items? Are they under instruction to do so. Where is the spirit of free enterprise?
3. Is the mark-up really 300-400 per cent? I am told that the retailer only makes a "token" profit.
4. Do people really pay over £100 for an antenna tuner unit?
5. With the higher reliability rate is it necessary to make so much of the "service clause"? Surely there are very few dealers who have the equipment and expertise to service modern micro-based equipment.

Cannot the RSGB or the Monopolies Commission look into the case of imported amateur radio equipment? This state of affairs should not be allowed to continue.

Ron Bravery, G3SKI

TALK-IN FOR THE MOBILE OPERATOR

The Editor
Radio Communication

Sir—While reasonably acquainted with the procedures listed by G4CCA (*Rad Com* November 1980) I am afraid there are several points on which we do not agree.

First, the microphone. A safer way is to use a microphone under the chin, the lead fed under pullover, or what have you, to the left trouser pocket, so that it can safely be coiled in the pocket when not in use. A chinstrap reduces traffic-noise even further if desired.

Second, it is not good practice to refer to a position "near Oldbury" without specifying "Oldbury, Warwicks Oldbury, Worcs, or Oldbury, Shrops". It is perhaps preferable to give a position as "Five miles west of Mansfield on the M1, *travelling south*".

Thirdly, it is often convenient, and certainly desirable, to find if possible, some mobile on a channel NOT used by the talk-in station who knows his way in and will talk you after him, ending on his tail.

But most of all. I would urge *DO NOT* call in to the talk-in station early on your journey. If you are miles away from him, either you do not yet need him or your map-reading is rotten! And if you are, say, 50 miles away you must be using such power as to deprive lower-powered stations of that service which you will not need for another hour or so; and which they are seeking already.

The talk-in at Leicester on 6 November was excellent. But at times he was loaded with people all asking the same question. Why not *listen*, while others nearer to him ask *your* question for you and get you the answer. He told G3OZN/G8ON/M the exact spot to park without hearing a single word from us!

Certainly be brief—brevity was the soul of operating even before wit was invented.

H. S. Chadwick, G8ON

BIRTH OF SSB

The Editor
Radio Communication

Sir—When was single sideband used for the first time as a practical means of communication? Most amateurs, I feel sure, would opt for the late 'thirties, at the very earliest, but the actual date would appear to be the mid-'twenties! The first edition of Reyner's *Radio Engineering*, published in September 1925, refers to a new system of modulation devised by the Western Electric Company. It continues: "In this system the carrier wave and one sideband are filtered out, and only the second sideband is radiated. In order to render the speech intelligible, however, the carrier wave must be re-introduced at the receiving point, and this is accomplished by employing an oscillating detector, the frequency of the heterodyne oscillation being the same as that of the carrier wave suppressed at the transmitting point. Since the side band amplitude is only one-half that of the carrier wave, the total power to be radiated is only one-quarter of that required with the ordinary system, while the band of wavelength required is considerably reduced."

That book was published 55 years ago, in the days of 2LO and 5XX

Douglas Byrne, G3KPO

DX OPERATING

The Editor
Radio Communication

Sir—I was operating a Jamboree-On-The-Air station on 21,296kHz on 18 October 1980, and was operating on that frequency from 0935 until I was requested to QSY at 1220gmt. The frequency was clear when I commenced transmitting, and I had a continuous series of contacts with various stations, both Scout and otherwise, in all continents. My beam heading was constant towards the west.

While having a QSO with a K3 station, and trying with difficulty to receive his address, I became aware that the noise level and the number of stations on the frequency were increasing, with various stations calling. I politely requested one of two people to QSY, as did my American counterpart, and we carried on with the information exchange. I was then told (rather arrogantly and offensively) by a very powerful WB8 station that I should leave the frequency immediately as I was upsetting hundreds of people trying to work a rare dxpedition on the frequency.

I replied politely that I would vacate the frequency under the circumstances, but that it was clear when I commenced transmitting on the frequency three hours earlier, and that I was unaware that it had been "booked" by a dxpedition. The WB8 retorted that it was unfortunate that the pile-up could not be moved to another frequency, so would I please QSY and allow everybody to work the rare island. So I QSYd and, of course, in the process lost contact with the K3 station.

It is quite usual for two QSOs to be in contact on the same frequency with minimal interference, and without either party being aware of the other's presence, and so I suppose that this was a typical example until the skip changed.

Theoretically, if the dxpedition (I think it was to KC6) moved up a couple of kilohertz, then the pile-up would have moved with it, but I presume that, as the dxpedition takes preference on the band, I was correct to vacate a frequency which I did not own but which I was using in the normally accepted manner.

Any comments?

R. J. Napper, G4FXU

HELP FOR THE DISABLED

The Editor
Radio Communication

Sir—We must all have realized by now that this is the International Year of Disabled People. So may I appeal to every member to go out and search for just one disabled person in his neighbourhood, and introduce them to the pleasures of amateur radio?

If every single one of us does something positive in this direction, we will be doing our best to bring a little happiness to those less fortunate than ourselves. The RAIBC does sterling work for its members, but there must be many disabled people who have never heard of the organization, and know little about amateur radio. It is up to all of us—shortwave listeners as well as those with transmitting licences—to explain our hobby to those who may be housebound, bed-ridden or blind. It could open the window on to a new world, and give them an entirely new interest in life.

Let us show them what is meant by the hand of friendship of amateur radio.

Douglas Byrne, G3KPO

RAE INSPIRATION

The Editor
Radio Communication

Sir—I hope this letter, if published, may give some inspiration to our unlicensed members who may doubt their abilities to sit and pass the RAE.

As an ex-RAF telegraphist one might imagine little difficulty on my part, but, alas, my radio theory training was sufficient but I lacked one ingredient, interest; how I passed the RAF examination I cannot say. However, the amateur radio bug struck in 1961 when, in the Middle-East, a licence was easily obtained by merely asking for one.

Most of my continuing overseas appointments were in locations less favourable to licensing, so short wave listening had to suffice up to August 1980. At this point I must pay tribute to Mark Marment, G8ABP, a work colleague who scoffed at my so-called "mental block and lack of mathematical talent" in regard to study, *let*

alone sitting the RAE. He obtained the *Radio Amateurs' Examination Manual* from our Society and dropped it on my desk with a determined look and a word of encouragement. Now, to me, adding scores on a dartboard is enough, but I found the manual of immense help, together of course with answers to my daily questions which almost drove him to despair.

My next problem, living where I do, isolated and with no examination centre within 80 miles (plus having no car) was quite simply solved by contacting the community tutor at our very small local comprehensive school. I asked for help and got it; two weeks later, the community tutor had arranged for me to sit the examination at the school. It was the first time this had been attempted by the school (City & Guilds courses or examinations never having been undertaken there). The school had been granted "centre status" just for me!

I sat the examination in December 1980 and passed both parts, just over three months from commencement of study. To be honest, I am finding it far harder to get planning permission to put a 16ft antenna mast in my garden than the previous problem of sitting the RAE.

My advice to those in trouble, get the manual and find an experienced, patient licensed amateur and talk electronics until he pushes you out of the door.

S. Reading, RS46435

CB

The Editor
Radio Communication

Sir—I was sorry to hear that the Home Office has finally given in to the 27MHz brigade, and is now prepared to legalize "open channel" on this band.

While most amateurs realize the disadvantages of a 27MHz service, as (presumably) does the Home Office, 27MHz cb is a fine example of "what the vocal minority claim (by continuous pirate activity) they are eventually given". Does this rule also apply for our hobby? If, for example, amateurs wanted the 50MHz band (or even medium wave) then, presumably, all we need to do is occupy the desired band with QSOs, make a nuisance of ourselves with public marches etc, and maybe the Home Office will give us any band we request—as they did with the cbers.

Hopefully most amateurs have more sense than to join in with this sort of rf anarchy that the Home Office is apparently encouraging; but the sad day has arrived when G8s and G6s have every right to feel cheated: they had to study and pass the RAE to use 144MHz and above, soon every Tom, Dick and Harry will be able to work all over the place on the "skip". Such is the fairness and wisdom of the decision makers.

A. J. Work, G8NPT

Sir—I am disgusted to learn that it is intended to legalize cb on 27MHz fm. As a holder of an amateur Class B licence, I am not permitted to transmit below 144·0MHz, yet the cb fans have taken over the 27MHz band and, by the inaction of government, police and customs, they have been able to get away with it.

If all the Class B licence holders start to use the hf bands, will that also be made legal?

Why stop there? If there is sufficient interest, why not legalize shoplifting, murder and rape?

A. Hartley, G8PRH

Sir—I have just read the letter from G4EVW ("Your Opinion" March) and note his concern at the proposed 144MHz band plan changes. I regret, as a not very active and somewhat complacent vhf operator, I am not very concerned how 144MHz is organized. I do, however, agree that all amateur bands should be used in a manner that enables all amateurs, with varying interests, the ability to pursue their own modes of experiment in an orderly manner.

I would, however, draw the attention of all amateurs to a letter in *CB World* (February/March) advocating band planning on 10m.

> ". . .I would like to suggest the possibility of retuning existing cb transceivers to the 29·0 29·7MHz band and designating these frequencies for "open channel" used jointly with amateurs. The band plan would be 29·0 29·35 for am/ssb modes, and 29·35 29·7MHz for fm channels . . ."

Now that sets my adrenalin flowing, particularly when the correspondent was that same band plan "expert", G4EVW. Really Mr Sutton, I may well read with interest your band plans for 144MHz, but to suggest we have cb as "bedfellows" on 10m leaves me speechless. I am sure it was not a serious suggestion Mr Sutton, was it?

If I may be allowed to address myself to the more committed amateur. I can only echo G3WNR's concerns ("Your Opinion" February) ref misuse of 28MHz by cb operators. I have copied those "pirates" up to 28·67MHz and am fearful of what will happen during sunspot minima. When we return for the start of Cycle 22 it could well be occupied (G4EVW band plans apart). May I therefore suggest a slight change of band plan for 28MHz and allocate say 28 to 28·020 for a.m. operation, and that club nets, rally talk-ins etc use this part of the spectrum. Who will design me a simple 28MHz a.m. transceiver? We need that barrier, believe me it will be "use or lose".

W. A. Ricalton, G4ADD

THANK YOU!

The Editor,
Radio Communication

Sir—I wish to put into writing my sincere thanks to G3KGU and his team who spend numerous hours providing slow morse transmission. Also to Dr D. A. Tong, for the development of the morse tutor, and finally but not least, to the members of the Colchester ARC, under the direction of G3FIJ, for their slow morse.

Ladies and gentlemen, thank you for the way you have given up your time so that others can learn the morse code and, like me, pass the test.

Chris Baker, G4LDS

TO THE PIRATE IT MAY CONCERN

The Editor
Radio Communication

Sir—I have looked back through my logbook, which consists of 1·8MHz a.m. contacts, with a few 3·5MHz ssb ones thrown in, but cannot find the entries for the many JA QSL cards which have come via the bureau recently. Actually my 3·5MHz signals seem a little reluctant to take the plunge into the North Sea, let alone cross it. Could the pirate who is using my callsign on the higher frequency bands therefore get in touch with me to collect these cards. It would be nice to have a few words with him!

B. Wright, G4HJW

OBITUARIES

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

Mr E. Bland, G4BOS
Ernie Bland died on 26 February, aged 58. He was a popular and active member of the Thornton Cleveleys ARS, immediate past chairman, and a committee member for the past seven years. He was a member of the RSGB and regular participant in the Royal Signals Net, active in the Fylde Raynet Group, on hf and vhf bands.

Sr S. A. Carvajal, EA7DJ
Santiago Arcos Carvajal died on 23 February, aged 58 years. He was a member of RSGB, REF, and ARRL, and one of the founder members of the Spanish national society (URE), of which he had twice been vice-president. He was well known worldwide as an amateur of outstanding courtesy and kindness.

Mr J. Cutter, G3VAN
John Cutter died on 17 March, aged 66. He was a well-known member of RSARS, and also a past-president and former secretary and chairman of Scarborough ARS, of which he had been a member for 35 years. He was active on both hf and vhf until the time of his death, and will perhaps be best remembered by SARS for his keen contribution to field days and humorous auctioneering of surplus equipment.

Mr L. J. Hellier, G3TED
Les Hellier died on 27 December 1980. He was well known in the amateur radio trade and was chairman of the Amateur Radio Retailers Association.

Mr W. Jones, G3BBF
Bill Jones died on 26 February. His main interests were cw, the hf bands and skeds. He was a member of RAFARS and Torbay ARS, and while serving overseas with the RAF, he held the callsigns VS6BJ, VS7BJ, VS9BJ, and 5A2CV.

Mr L. North, G3RTN
Leslie North died on 19 August 1980. He had been a member of the Scarborough ARS from 1975 to 1978 and was both sec and treasurer during that time. He was keen to help newcomers, especially junior members, and was an instructor for the Scouts' "communicator" badge. He was also a member of RNARS.

Also

Mr S. Absolon, RS18969, on 28 January;

Mr G. Charlesworth, RS44623, in January;

Mr B. Coulson, G4BRI, on 8 March;

Mr P. Voight, RS38087, on 7 February; and

Mr C. H. Webb, GW8PPB, on 7 January.

Looking ahead

All information for inclusion in this column must be sent to the editor, not to RSGB HQ.

28 30 May—RSGB National Amateur Radio Exhibition, Alexandra Palace, London.
21 June—ORM at the Denby Dale Mobile Rally, Shelley High School, nr Denby Dale on the B6116.
12 September—Scottish Amateur Radio Convention, Glenrothes.
27 September—Welsh Amateur Radio Convention, Blackwood.
10 October—Midlands VHF Convention, Wolverhampton Polytechnic.
11 October—EI/GI Convention, Ballymascanlon.
29 31 October—Amateur Radio Retailers Association Tenth National Amateur Radio Exhibition, Donington Park, Castle Donington, Derbyshire. **Please note change of venue.**

CONTEST NEWS

432MHz Fixed Contest results

This year the number of contests and activity have increased after last year's low. Conditions were described as poor to average, lifting towards the end of the contest. The band opened up to F and HB after the contest ended. G8ECN in AM27 was plagued with Syledis but acknowledged that the band *is* shared. G8KEN in AL77 complained about stations south of the Thames not beaming towards the South Coast. The entry from PA0VVH shows that all his QSOs except one were with G stations and he was pleased, together with others, with the contest time period.

Equipment used by the leading stations was as follows:

	Tx	Rx	Antenna
G3NNG	4CX250B	NE645/Ring	21-el at 40ft
G3XDY	4CX250B	NE21935/TS770E	21-el at 35ft
G8ECN/A	4CX250B	GAT4/3N204	27 ql at 80ft
G4BRK	2/4CX250B	BFR34A/3N204	19-el at 25ft

Certificates go to the winners and runners-up in both sections. Thanks to PE1ALA, G3RSD/P, G3YXZ, G4FUF and GW8AAP/P for their check logs, especially from Holland, which enabled the adjudicator to check Continental QSOs.

G8ACJ

SECTION S

Posn	Callsign	Points	QSOs	QRA	Best dx	Km
1	G3NNG	915	127	ZL23	DJ5BV	600
2	G3XDY	708	84	AM76	DJ5BV	432
3	G4CQR	623	109	ZL49	DD8DA	516
4	G3UBX	469	81	YM40	GJ3RAX	376
5	G3YTE	445	71	AL13	GD2HDZ	425
6	G8HHI	377	77	ZL56	DJ9DL	570
7	G6GN	354	47	YL48	PA0VVH	560
8	G4FSG	352	46	AM77	DJ5BV	437
9	GD2HDZ	333	31	XO68	G8GGP	450
10	PA0VVH	327	21	CL20	G6GN	560
11	G3PBV	260	28	YK32	G3AMV	417
12	G8KAX	228	64	AL32	PA0VVH	391
13	G4JSX	189	43	ZM45	PE1ALA	380
14	G4ERO	188	28	ZK11	EI9Q	387
15	G8FMK	187	50	ZL26	G3BW	355
16	G8KEN	170	22	AL77	DJ5GR/P	419
17	G8IEM	163	25	ZK05	F6CBC/P	826
18	G4DDL	140	48	ZL47	PA0FRE	368
19	G8IZR	125	27	YN38	G4FUF	298
20	G8SKG	119	27	ZN68	PA0VVH	474
21	G5UM	117	37	ZM35	G4FUF	148
22	G8WRD	112	40	ZL46	GD2HDZ	366
23	G4GSA	110	17	YK38	F1BUU	625
24	G4KNZ	105	41	ZL47	EI9Q	440
25	G4APA	93	41	ZL47	G8ECN/A	201
	G3FIJ	93	21	AL05	G8AGU	342
27	G3LCH	70	22	ZL50	G3AMW	280
28	G8XBH	44	20	ZL50	G6GN	173
29	G8DIU	29	21	ZL60	G3NNG	102
30	GM8BKE	13	5	XP09	G3BW	156

SECTION M

Posn	Callsign	Points	QSOs	QRA	Best dx	Km
1	G8ECN/A	810	89	AM27	DJ3CN	458
2	G4BRK	597	99	ZM68	DJ9DL	533
3	G8GXE	501	102	ZL48	F1BUU	731
4	G4HWA	414	84	ZL57	GD2HDZ	407
5	G8ADM	246	46	ZL63	PA0VVH	500
6	G8ZHP	228	52	ZM29	PE1ALA	344
7	G3XMG	199	44	YN36	G4FUF	349
8	G4BVY	198	42	YM79	ON5FF	433
9	G8OHM	186	40	ZM41	ON5FF	570
10	G8KOM/A	179	49	ZL36	DJ9DL	548
11	G3WOR/A	170	28	ZK18	HB9AEN/P	677
12	G3AMW	120	30	ZN19	G3PBV	460
13	G8EXW/A	64	26	ZM41	G8HPD/P	140

1·8 and 3·5MHz Cumulative Activity Periods results

The eight separate sessions on 3·5 and 1·8MHz were generally well-supported and over 100 different callsigns appeared in the 56 logs that were sent for checking. Most entrants commented favourably on the event, although many feel that three sessions on each band per contest are enough and that there should be two separate contests each year. Sunday sessions seemed to be more popular than Saturdays for 3·5MHz. The weekday evening 1·8MHz sessions were liked by most of the entrants, and all felt that the 2h duration was about right for both 3·5 and 1·8MHz.

The HF Contests Committee thanks all those who took part, and particularly those who supported the event by coming on for short periods to provide contacts for the newly-licensed stations who were "cutting their teeth" in their first contest. Some entrants included their club details on the entries, as was requested in the rules, and once again Stockport was well represented, with Hereford and the Surrey RCC also having multiple entrants. As many of the other entrants have club affiliation, it is a pity they did not show this on the entries so that it could have been included in the results. In addition to the many comments about the timing and duration of the contest, the following are typical of the other comments that were included with the logs: "Most enjoyable and very friendly", *G3EUE;* "An enjoyable little contest, pity there was not more activity", *G3JKS;* "Thoroughly enjoyable, thanks to the organizers", *G3BPM;* "It has encouraged me to enter other contests in the future", *G4GCB;* "It was good to see so many newly-licensed stations taking part and enjoying good operations", *GW3SB;* "Glad to see so many new stations took part", *G3YMC;* "I am a blind operator and this is my first attempt at any contest, I look forward to submitting complete logs in future cumulatives", *G4HKA;* "Glad to work a number of new callsigns as well as old friends", *G2HLU;* "It was a lot of fun", *G3MCK;* "All contacts were very kind to me and slowed down – thanks", *G4KTW;* "I think I am slowly getting the hang of it", *G4HUC;* "Thanks, these contests are of great benefit to a newcomer", *G4KGG;* "There must be more than 40 or so people who need the practice", *G3CWI;* and finally: "As a fairly new G4, I thought the contest was really excellent. I think it should be stressed that even if your cw is not very good, you can pick up what you need for the contact. These contests should have wide publicity in *Rad Com,* especially as there are so many new licences. Also very good for testing antennas!", *G4JIL.*

G6LX

In the tabulations, the points are the total of the two best sessions. Stations marked * operated on both bands. CK means check log.

3·5MHz

Callsign	Points	4 Jan	10 Jan	18 Jan	24 Jan	Club
G4HIU*	106	56	50	–	–	Stockport
G3SNX*	103	54	47	39	–	Stockport
G4FAD*	95	46	48	47	–	Hereford
G2HLU	90	44	42	46	28	–
G4KPE	90	–	42	48	–	–
G4ECI	90	48	–	42	–	Stockport
G8VF*	89	44	–	45	–	–
G3JKS	88	–	48	40	–	–
G3EUE	82	34	39	43	26	Surrey RCC
G4GLC	82	34	41	41	26	–
G3CWI	79	–	49	–	30	–
G3BPM*	78	37	35	41	30	–
G3MCK	78	23	40	38	16	–
G4HVC	78	40	36	38	25	–
G3CCZ*	77	40	35	37	26	Colchester
GW3SB	77	42	35	35	23	–
G3YMC*	75	38	–	37	–	–
G6LX*	73	CK	41	32	CK	Surrey RCC
G3DQL	68	36	32	32	20	–
GM3YOR	67	21	31	36	–	Glenrothes
G4GCB*	64	30	–	34	–	–
G4KGG*	64	34	CK	30	CK	–
GM3OXC*	63	35	–	28	–	–
GM4KGJ*	63	31	20	32	5	–
G3AWR	61	30	27	31	15	–
G4KDL	58	–	23	35	–	–
G4HKC	57	–	–	33	24	–
G4CNY*	50	–	–	50	–	Hereford
G3SEM*	45	–	45	–	–	–
G4JIL	30	CK	15	15	CK	–
G4HKA	18	–	–	–	18	Verulam
G4KTW	16	–	–	7	9	–
G3MCX*	15	–	–	15	–	Surrey RCC
G3SJE*	11	–	–	–	11	–

1·8MHz

Callsign	Points	5 Jan	13 Jan	21 Jan	29 Jan	Club
G6LX*	96	41	49	47	CK	Surrey RCC
G3BPM*	86	43	43	33	26	–
G4CNY*	83	–	45	38	–	Hereford
G4FAD*	82	CK	44	38	–	Hereford
G3SJE*	72	–	38	34	30	–
G3SNX*	67	37	30	–	CK	Stockport
G3YMC*	67	33	34	–	–	–
G4KGG*	64	32	32	29	–	–
G3XWZ	58	20	27	31	25	–
GM4KGJ*	55	22	29	26	20	–
G8RZ	52	20	27	23	25	–
G3SEM*	51	24	27	–	–	–
G3CCZ*	44	15	27	–	17	Colchester
GM3OXC*	40	21	19	–	–	–
G3MCX*	36	–	17	19	10	Surrey RCC
G4HIU*	32	32	–	–	–	Stockport
G4HKC	25	–	10	–	15	–
G4GCB*	24	10	7	–	14	–
G8VF*	21	21	–	–	–	–
G4JDI	12	–	8	–	4	Leicester
G3BFP	–	CK	CK	CK	CK	Surrey RCC
G3XTJ	–	CK	–	CK	–	–

21/28MHz Telephony Contest 1981 rules

TRANSMITTING SECTION

Licensed amateurs and swls throughout the world are invited to take part in this contest. Log and cover sheets may be obtained from: RSGB, 35 Doughty Street, London WC1N 2AE. UK members should enclose a large stamped, self-addressed envelope.

The general rules for RSGB hf contests, published in the January 1981 issue of *Radio Communication,* will apply.

1. **Eligible entrants.** British Isles: RSGB members only.
   Rest of world: All licensed amateurs.
2. **Period.** 0700gmt to 1900gmt on 11 October 1981.
3. **Sections.** (i) Single-operator; (ii) Multi-operator, multi-band only. see general rule 4.
4. **Bands.** 21MHz and 28MHz only.
5. **Exchange.** RS plus serial number starting at 001.
6. **Scoring.**
   (a) British Isles stations for a contact with a station in the rest of the world will score three points. The RSGB countries list will apply with VE, VK, W/K/N/A, ZL and ZS call areas counting as countries for this purpose.
   (b) Stations in the rest of the world for a contact with a station in the British Isles will score three points.

British Isles stations may not work each other for points or multipliers, and stations in the rest of the world must only contact stations in the British Isles. **Duplicates: any unmarked duplicates will be penalized 10 times the points claimed and any log found to include more than five unmarked duplicate contacts for which points are being claimed will be automatically disqualified.**

7. **Multipliers.** The total number of countries contacted on 21MHz *added* to the total number of countries contacted on 28MHz, then multiplied by the total of points scored on the two bands.

Multipliers for the rest of the world stations will be the total number of different G prefixes worked on 21MHz *added* to the number of different G prefixes worked on 28MHz, then multiplied by the total of points scored on the two bands.

British Isles prefixes are: G2, G3, G4, G5, G6, G8, GD2, GD3, GD4, GD5, GD6, GD8, GI2, GI3, GI4, GI5, GI6, GI8, GJ2, GJ3, GJ4, GJ5, GJ6, GJ8, GM2, GM3, GM4, GM5, GM6, GM8, GU2, GU3, GU4, GU5, GU6, GU8, GW2, GW3, GW4, GW5, GW6 and GW8. Contacts with GB stations will not count for points or multipliers.

8. Logs. Log sheets to be headed: Date/gmt; station worked; RS and serial number sent; RS and serial number received; multiplier; points claimed; separate logs are required for each band. *Summary sheet showing multipliers worked on each band must be submitted.*

9. Declaration. Each log must be accompanied by the following declaration: "I declare that my station was operated in accordance with the rules of the contest, and in accordance with the requirements of my amateur radio licence." The declaration must be signed and dated.

10. Address for logs. RSGB HF Contests Committee, PO Box 73, Lichfield, Staffs WS13 6UJ.

11. Closing date for logs. British Isles entrants should ensure their entry is received by 11 November 1981. Overseas entrants should submit their entries to arrive not later than 1 December 1981.

12. Awards. The Whitworth Trophy will be awarded to the leading British Isles entrant overall, and the Powditch Trophy will be awarded to the leading British Isles entrant on 28MHz. Certificates will be awarded to those placed second and third overall. Certificates will be awarded to those placed first, second and third in the rest of the world.

RECEIVING SECTION

Rules as transmitting section except as superseded below.

1. The general rules for RSGB hf receiving contests, published in the January 1981 issue of *Radio Communication,* will apply.

2. Eligible entrants. British Isles: RSGB members only.
Rest of world: All swls.

3. Scoring. British Isles swls should log only overseas stations in contact with British Isles stations participating in the transmitting section of the contest.

SWLs in the rest of the world should log only British Isles stations in contact with overseas stations taking part in the transmitting section of the contest.

Points scored by all swls will be as in the transmitting section.

4. Multipliers. As transmitting section.

5. Logs. Log sheets to be headed: date/gmt, callsign of station heard, RS and number sent by station heard, callsign of station being worked, bonus points, QSO points. *A summary sheet showing multipliers heard on each band must be submitted.*

NOTE: In the column headed "Station being worked" the same callsign may only appear *once* in every *six* contacts logged.

6. Declaration. Each log must be accompanied by the following declaration: "I declare that this station was operated within the rules of the contest and I do not hold a transmitting licence in any country of the world."

7. Address for logs. As transmitting section.

8. Closing date for entries. As transmitting section.

9. Awards. The Metcalfe Trophy will be awarded to the leading British Isles entrant. The Powditch Receiving Trophy will be awarded to the leading British Isles entrant on 28MHz. Certificates will be awarded to those placed second and third overall. Certificates will be awarded to those placed first, second and third in the overseas section.

21MHz CW Contest 1981 rules

The HF Contests Committee has considered the possibility of changing this event to include 28MHz, along the lines of the existing ssb contest. Before reaching a decision the committee would like to hear entrants' views, so they should feel free to include comments with their logs.

1. The general rules for RSGB hf contests, published in the January 1981 issue of *Radio Communication* will apply.

2. When. 0700gmt to 1900gmt on Sunday 18 October 1981.

3. Eligible entrants. Single-operator stations only in the following sections:

(a) British Isles section, RSGB members resident in the British Isles.

(b) QRP British Isles section, RSGB members resident in the British Isles using less than 10W input.

(c) Overseas section, licensed amateurs in all parts of the world except British Isles.

(d) QRP Overseas section, licensed amateurs in all parts of the world except British Isles using less than 10W input.

4. Contacts between stations in the British Isles are not allowed. A cw contact shall consist of the RST report plus a progressive QSO number starting with 001.

5. Scoring: British Isles stations. Each completed contact shall score three points. The final score is the number of countries worked multiplied by the total number of points. For the purpose of scoring, the RSGB countries list will apply with the exception that VE, VK, A/W/K/N, ZL and ZS call areas will count as separate countries. *Note:* different USA prefixes for the same district may not be counted more than once, eg W1, WA1, K1, N1 etc, is a single call area for the purpose of scoring.

6. Scoring: Overseas section. Each completed contact with a British Isles station will score three points. The final score is the number of British Isles prefixes multiplied by the total number of points. British Isles prefixes are G2, G3, G4, G5, G6, G8, GD2, GD3, GD4, GD5, GD6, GD8, GI2, GI3, GI4, GI5, GI6, GI8, GJ2, GJ3, GJ4, GJ5, GJ6, GJ8, GM2, GM3, GM4, GM5, GM6, GM8, GU2, GU3, GU4, GU5, GU6, GU8, GW2, GW3, GW4, GW5, GW6, GW8. Contacts with GB stations do not score points or count as multipliers.

7. Duplicate contacts. Unmarked duplicate contacts for which points have been claimed will be penalized at 10 times the claimed points. Entries containing more than five such duplicates will be automatically disqualified.

8. Entries should be addressed to Mr D. Lawley, G4BUO, 24 Glen View, Gravesend, Kent DA12 1LP, England. Entries must arrive no later than 31 December 1981 from overseas entrants, who are advised to submit their entries by air mail. British Isles entrants should ensure their entry is received by 18 November 1981.

9. Logs should be submitted on standard RSGB log sheets or A4 paper with a completed declaration cover sheet indicating antenna, equipment and power used and *must include a separate list of countries worked as specified in Rule 5 above.*

10. Awards. Certificates will be awarded to those placed first, second and third in each section.

RSGB SSB Field Day/IARU Region 1 HF Phone Field Day 1981 rules

Pending further discussion of the contest at this year's IARU Region 1 Conference in Brighton the rules remain in general, as those in 1980. However, entrants should take note of the new Rule 18.

1. Eligible entrants. Members or groups of members of the RSGB located in the British Isles.

2. The general rules for RSGB hf contests, published in the January 1981 issue of *Radio Communication,* will apply.

3. Period. 1500gmt Saturday 5 September to 1500gmt Sunday 6 September.

4. Sections.

(a) Open. Multi-operator, maximum licensed power. Equipment: one transmitter and one receiver, or one transceiver, plus an additional receiver if desired. Antenna: no restriction.

(b) Restricted. Multi-operator, 200W p.e.p. input maximum. Equipment: only one transmitter and one receiver, or one transceiver. Antenna: only one antenna may be used which must be a single element such as a dipole, long wire, W3DZZ, or trapped vertical, having not more than two elevated support points. No part of the antenna may be higher than 15m above ground level.

Notes (these apply to both sections).

(i) Stand-by equipment is allowed, but it may not be connected at the same time as the main equipment.

(ii) The use of support points for antennas from permanent buildings or structures is not permitted.

5. Location. Each portable station must operate from the same site for the duration of the contest and may not be located in a permanent building or use public mains supply.

6. Power. Power for all equipment may be derived only from a portable generator on the site, accumulators, or batteries.

7. Installation. No equipment or antennas may be installed or erected on the site prior to 24 hours before the start of the contest. This does not apply to the storage of equipment.

8. Contacts. Phone only in the 3·5, 7, 14, 21 and 28MHz bands.

9. Contest call and exchange. Call "CQ Field Day". Exchange RS plus serial number starting with 001.

10. Scoring.

(a) QSO with a fixed station in IARU Region 1 ..... 2 points

(b) QSO with any station outside IARU Region 1 ..... 3 points

(c) QSO with a portable or mobile station in IARU Region 1 ..... 5 points

See Appendix for list of IARU Region 1 countries.

11. Multiplier. Each DXCC country worked on each band gives one multiplier.

12. Final score. The total points scored on all bands is to be multiplied by the total number of different countries worked on each band to give the final score (ie total QSO points × multiplier = final score).

13. Logs. Separate logs are required for each band, together with a check list showing the countries worked on each band. Log sheets are to be headed: date/gmt; station worked; RS and serial number sent; RS and serial number received; operator; new country/multiplier; points. RSGB HF Contest Log Sheets should be used.

14. Declaration. Logs must be accompanied by an RSGB HF Contest Cover/Summary Sheet with the declaration signed by the person responsible for the contest entry.

15. Address for logs: RSGB HF Contests Committee, c/o D. Thom, 37 Whittington Road, Cheltenham, Glos GL51 6DB.

16. Deadline for logs: postmarked not later than the Monday 22 days after the end of the contest.

17. Awards. The leading station in the Open Section will receive the Northumbria Trophy. The leading station in the Restricted Section, and the entrants placed second and third in each section will receive certificates of merit. Certificates will also be awarded to the stations submitting the leading check log from each continent.

IARU Region 1 will award certificates to the top 10 stations in each section in the combined results table.

18. Any log found to contain more than five unmarked duplicate contacts for which points have been claimed will be automatically disqualified.

Appendix

IARU Region 1 countries include those in Europe, Africa, USSR, Mongolia, ITU Zone 39. For a precise definition refer to the RSGB *Amateur Radio Operating Manual.*

Summer 1·8MHz Contest 1981 rules

1. Aim of contest. To encourage the use of the 1·8MHz band.

2. Eligible entrants. Single- or multi-operator. British Isles entrants must also be members of the RSGB.

3. Period. 2100gmt Saturday 27 June to 0100gmt Sunday 28 June 1981.

4. Sections. (a) British Isles stations; **(b)** Overseas stations (including EI).

5. Frequencies/mode. 1·8-2·0MHz cw only.

6. Contest call and exchange. CQ test, RST plus serial number starting at 001. British Isles stations must also give their county code as published in the January 1981 issue of *Radio Communication.*

7. Scoring. (a) British Isles section. Three points for each contact, with a bonus of five points for the first contact with each new British Isles county/region and the first contact with each new country outside the British Isles. **(b)** Overseas section. Three points for each contact with a station in the British Isles (not EI), with a bonus of five points for the first contact with each new county/region.

8. Logs. Log sheets to be headed: date/gmt; callsign; RST/number sent; RST/number received; code received; bonus; points.

9. Declaration. Each entry must be accompanied by the following declaration, signed and dated: "I declare that this station was operated strictly in accordance with the rules and spirit of the contest, and agree that the decision of the Council of the RSGB shall be final in all cases of dispute".

10. Address for logs: RSGB HF Contests Committee, c/o R. S. Unsworth, 105 Clarendon Road, Hazel Grove, Stockport, Cheshire SK7 4NS.

11. Closing date for logs. Logs must be postmarked no later than Monday 13 July 1981.

12. Awards (a) Certificates of merit will be sent to the first three stations in each section and to the leading entrant from each overseas country. **(b)** A certificate of merit will be awarded to the highest placed entry from a station which has not entered the Summer 1·8MHz Contest before. Candidates for this award should mark their entries

"First-time Award". (c) A certificate of merit will be awarded to the highest placed entrant in the British Isles section who has reached pensionable age on or before 27 June 1981. Candidates for this award should mark their entries "Senior Citizen's Award".

144MHz QRP & SWL Contest rules

0900 1700gmt, 2 August 1981

The transmitter output power shall not exceed 1W cw or p.e.p.. If transmitter power reduction is required, then brief details of how this was achieved must be given. Station inspections will be made by members of the VHF Contests Committee.

The following general rules, published in the January 1981 issue of *Radio Communication*, will apply: 1,2,3,4f,5a,6a,7a,9,10a,11a,12a,13 24.

All entries and checklogs to: VHF Contests Committee, c/o Mr F. Mathews, G8ACJ, Easedale, Woodway, Merrow, Guildford, Surrey GU1 2TF.

70MHz & SWL Contest rules

0900 1600gmt, 7 June 1981

In each section there will be an award for the highest scoring station and runners-up, also an award will be made to the station with highest number of completed QSOs.

The following general rules, published in the January 1981 issue of *Radio Communication*, will apply: 1,2,3,4e,5a,6a,7a,10a,11a,12a,13 24.

All entries and checklogs to: VHF Contests Committee, c/o Mr J. H. Quarmby, G3XDY, 16 Pearcroft Road, Ipswich, Suffolk IP1 6PJ.

DF Qualifying Event Coventry

Date: 31 May 1981.
Map: OS Sheet 151 1:50,000 series, Stratford-upon-Avon.
Assembly: 1300bst for start at 1320bst.
Location: Near Round Hill on unclassified road 1½ miles SE of Bishops Itchington, ngr 407 570.

Competitors requiring tea are asked to notify Mr G. Whenham, 33 Chapel Street, Bishops Itchington, Leamington Spa, tel 0926 612806, not later than 24 May 1981.

Verulam ARC Contest results

1·8MHz TRANSMITTING

Posn	Callsign	Points
1	G2BBC	6,250
2	G5BK/A	3,720
3	G3VER*	3,680
4	G4IVJ	2,774
5	G4GYS	792

1·8MHz RECEIVING

Posn	Station	Points
1	B. Treacher, BRS32525	3,822
2	N. B. Henbrey, BRS28198	2,520

Check log received from G8LPN
*Club station

144MHz TRANSMITTING

Posn	Callsign	Points	Posn	Callsign	Points
1	G5BK/P	9,996	17	G8SFM	2,100
2	G8ZHP	6,519	18	G8HGN	1,925
3	G8KNU/P	5,054	19	G4JKS/A	1,827
4	G8MJD/P	4,664	20	G8YQZ	1,425
5	G8RZP	4,454	21	G8LPN	1,368
6	G8KAX/P	3,770	22	G8RZA	1,302
7	G8MFJ	3,515	23	G8TMI	1,100
8	G8TVL/A	3,480	24	G8WDI/M	920
9	G8NXS/A	3,255	25	G8NQP	874
10	G8PQG	3,115	26	G4KLX	646
11	G8VJS	3,102	27	G4GOU	600
12	G8RXK/P	2,938	28	G3FPK	544
13	G4ARI	2,424	29	G8XDU	462
14	G8TPR	2,262	30	G3WFM	504
15	G3VER*	2,160	31	G8XSG	65
16	G8XNR	2,139			

*Club station

144MHz RECEIVING

Posn	Station	Points	Posn	Station	Points
1	R. Thomas, BRS15822	1,850	3	N. B. Henbrey, BRS28198	748
2	C. Gryebieniak, RS1733	1,332			

Check logs received from G3GC, G8VJA, G8WCU

Harlow & D ARS G6UT/G6BUT 144MHz Contest rules

Saturday 29 August 1200 to 1600gmt
Sunday 30 August 1200 to 1600gmt

1. Operating procedure:
25W max output any mode;
two operators per station maximum;
reports to consist of:
RS(T), serial number and geographic county or country.
NB: Only countries outside of UK count.

2. Scoring:
One point per contact;
Four points for working club main station (G6UT);
Six points for working club "B" station (G6BUT).
NB: G6BUT will be operating intermittently, and from various locations, hence the higher points allocation.
Total score to be multiplied by number of counties and countries worked.
Stations may only be worked once.

3. Logging:
Logs to be kept separate and in the format:
Day 1: Log and score;
Day 2: Log and score;
Overall score.

4. Awards:
Overall winner ..... Plaque
Day one winner ..... Certificate
Day two winner ..... Certificate
Certificates of merit will be issued to higher scoring stations.

5. Entries:
All logs must be received by 30 September.
Entries to: G4LDY, 9 Little Grove Field, Harlow, Essex CM19 4BS.

Contests Calendar

2-3 May	144MHz & SWL *(Rules in April issue)*
2-3 May	432/1,296/2,304MHz *(Rules in April issue)*
9 May	World Telecommunications Day (Phone) *(Rules in May issue)*
9-10 May	CQ-M *(Rules in May issue)*
10 May	DF Qualifying Event Chelmsford/Colchester *(Rules in April issue)*
16 May	World Communications Day (CW) *(Rules in May issue)*
17 May	Region Round-up (CW) *(Rules in March issue)*
23-24 May	Ibero-American *(Rules in May issue)*
24 May	144MHz Low Power & SWL *(Rules in April issue)*
30-31 May	CQ WW WPX CW *(Rules in March issue)*
31 May	DF Qualifying Event Coventry
7 June	70MHz & SWL
13-14 June	HF NFD *(Rules in February issue)*
21 June	DF Qualifying Event Dartford Heath
27-28 June	Summer 1·8MHz *(Rules in May issue)*
4-5 July	VHF NFD & SWL *(Rules in March issue)*
12 July	DF Qualifying Event Salisbury
19 July	3·5MHz Field Day
26 July	DF Qualifying Event South Manchester
2 August	144MHz QRP & SWL
9 August	DF Qualifying Event Oxford
11-12 August	Meteor Scatter
16 August	70MHz Trophy & SWL
23 August	DF Qualifying Event Slade
30 August	Ropoco 2
5-6 September	SSB FD *(Rules in May issue)*
***5-6 September**	144MHz Trophy & SWL
	IARU VHF (144MHz)
20 September	DF National Final Mid-Thames
***3-4 October**	RSGB UHF/SHF
	IARU UHF/SHF
October/	432MHz Cumulatives
November	1,296MHz Cumulatives
11 October	21/28MHz (Phone) *(Rules in May issue)*
18 October	21MHz (CW) *(Rules in May issue)*
25 October	70MHz Fixed
***8 November**	144MHz (CW)
14-15 November	Second 1·8MHz
6 December	144MHz Fixed

* IARU co-ordinated date

Shefford & D ARC 144MHz Contest results

TRANSMITTING

Posn	Callsign	Points	Posn	Callsign	Points
1	G3YLG/P	7,990	15	G8TIN	1,078
2	G3NQP/P	7,680	16	G8VRJ	1,040
3	G8VWA	4,218	17	G8KMG	1,020
4	G8YQZ/P	3,604	18	G8TGM	980
5	G8TVL/A	3,600	19	G8VJS	968
6	G8KAX/P	2,520	20	G3FJE/A	935
7	G8VJJ	2,225	21	G8UYZ	896
8	G8PNM/P	2,079	22	G8LXY	742
9	G8PQG	2,040	23	G8XBB	704
10	G8NNJ/P	1,743	24	G8XYS	609
11	G8RZA	1,430	25	G8WXM	504
12	G4KNZ/A	1,344	26	G8HOD	407
13	G8TNR	1,178	27	G8TNU	210
14	G3SDC	1,098	28	G8OOC	200

RECEIVING

Posn	Station	Points	Posn	Station	Points
1	BRS15822	697	2	R. Waters	407

LEEDS "HAMFEST"

The Leeds & D ARS is organizing a "hamfest" over the weekend 26-28 June 1981, at Old Hall, Old Hall Golf Club, Woodhall Lane, Calverley, Pudsey, West Yorks. It will open with a "welly disco" from 8.30pm until midnight on Friday, at which a prize will be awarded for the best decorated "wellies", and an outdoor bar will have a time extension. On the Saturday a demonstration station, GB2WYR, will be operational throughout the day, which will end with an evening "hoe down"—again with an outdoor bar with time extension. On the Sunday the demonstration station will again be in operation; and there will also be a mini-rally, picnic, children's entertainment—welly-throwing, sack race etc. The event will close at 4pm.

Cost of tickets will be: Friday evening—adults £1, children 50p; Saturday evening—adults £2, children £1. Tickets for both evening events: adults £2.50, children £1.25. Tickets can be purchased from G4FIM, QTHR; G3YEE, QTHR; or LAR, 27 Cookridge Street, Leeds 2; and from whom further details can be obtained. Dealer enquiries invited.

Arrangements have been made for overnight camping and caravan facilities. Talk-in station on S22.

CLUB NEWS

The following is the latest information received by RRs from RSGB affiliated societies, clubs and groups in time for inclusion in this issue. Basic unchanged information on other affiliated organizations will be published in the July issue.

RSGB affiliated organizations are requested to report all programmes and news items to their regional representatives regularly. Information for inclusion in the **July** issue should reach them by **13 May** and for the **August** issue by **11June.**

Club programmes are given in order of date, subject, time and place of the meeting. All callsigns of club secretaries and other contacts are QTHR (correct in the current *RSGB Call Book*) unless otherwise stated.

All clubs welcome visitors and would be pleased to hear from potential new members.

RSGB President Basil O'Brien, G2AMV, speaking at the annual dinner/dance of the Stockport Radio Society on 14 February

REGION 1—RR W.M. Furness, G3SMM, 16 Coniston Avenue, Sale, Cheshire M33 3GT.

Ainsdale (AARC)—5 and 19 May. Ainsdale Scout HQ. Details from G2CUZ.

Barnoldswick (Rolls Royce ARC)—6 May (Fox hunt, 144MHz fm, starts 1900hrs). RR Sports and Social Club, Barnoldswick. CW classes Mondays, 7.15pm. RAE class, Tuesdays, 7pm. Sec Leslie Logan, G4ILG.

Blackburn (East Lancs ARC)—7 May ("Computers as applied to amateur radio"), 7.30pm. Shadsworth Centre, Blackburn. Sec G8TJG.

Bolton (B&DARS)—6 May (JOTA equipment demonstration, by G3WOH), 20 May (Club quiz), 27 May (Natter night, cw class), 3 June ("History of radio", by G2BTO), 8pm. Horwich Leisure Centre, Horwich, Nr Bolton. Hon sec Alan Hartley, G8PRH, tel Bolton 49023.

Bury (BRS)—12 May (Meet your RR, G3SMM), 7.30pm. Informal meetings on other Tuesdays for cw tuition and practice, "natter & noggin" sessions etc. Mosses Community Centre, Cecil Street, Bury. Full details of club and its activities from Chris Marcroft, G4JLG, tel Ramsbottom 2168.

Liverpool (UOLARS)—Informal meetings each lunchtime. Club shack at top of Old Union Building, 2 Bedford Street North, Liverpool 7. Prospective students welcome at any time—be tempted by a "free" pint of beer! Club chairman G8KWX, sec GW6AJK, treasurer—GM8OFV. Society members were much involved in UOL rag week procession with very small car sporting 16-el Tonna (144MHz), 14-el Yagi (432MHz) and a miscellany of mobile whips!

Manchester (South Manchester RC)—1 May (Mini df), 8 May ("UHF equipment", by T. Hopkins, G8TYY), 15 May (AGM), 22 May (Mystery lecture), 29 May (Mini lecture contest), 8pm. Informal meetings Mondays, 8pm. Sale Moor Community Centre, Norris Road, Sale. Sec David Holland, G3WFT, tel 061-973 1837.

St Helens (StH&DARC)—7 May (HF night on the air), 14 May (to be arranged), 21 May (Surplus equipment sale), 28 May ("History of British tv", by G8LNL), 7.45pm. Conservative Association Rooms, Boundary Road, St Helens. Club Net: Sundays 11.30am, 145·575MHz (S23); Wednesdays 7.30pm, 1·95MHz. Sec P. Gaskell, G8PQD, tel St Helens 25472.

Thornton Cleveleys (TCARS)—4 May ("Aerial matching", by Harry Gregory), 11 May (Film: "VK Land", by Handy Hardy), 18 May (Surplus sale), 25 May (Natter night), 7.30pm. Thornton Cleveleys Sports Centre, Victoria Road, Cleveleys. Slow morse transmissions, 7pm, 1·975MHz on Tuesdays and Wednesdays. Sec A. Parr, G3IWP.

Wirral (WARS)—6 May ("The amateur licence and problems of interpretation", by G3UJX), 20 May ("Cedric's gadgets", more original ideas from G4KPY), 7.45pm. Sports & Recreation Centre, Grange Road West, Claughton, Birkenhead. Sec Garry O'Keffe-Wilson, G8VPF, tel 051-677 1531.

Wirral (W&DARC)—2 3 May (144/432/1,296 contest), 6 May (DF hunt trial), 13 May (Talk by GPO interference staff), 27 May ("Computer", by Derek Roger, G3UOO), 8pm. Sports Concourse, West Kirby, Wirral. Publicity sec J. Mills, G8NOY.

G3OUL/M being operated by GW6AJK (in driving seat) and (l to r) G8KWX, GM8OFV and G8LGL in the University of Liverpool Rag Week procession. *Photo:* **UoL Photographic Society**

REGION 2 RR D. S. Smith, G4DAX, Red Roof, Goathland, Whitby, North Yorks YO22 5AN. Tel 094 786 333.

Barnsley (UK FM Group Northern)—7 June, 7.30pm. The Royal Hotel, Church Street, Barnsley. Sec G8PLJ.

Halifax (Northern Heights ARS)—Wednesdays, 7.45pm. Bradshaw Tavern, Bradshaw, Nr Halifax. Sec G8NUC. The club's sec, Marcus, has been co-opted on to the RSGB Education Committee; he is always available to help clubs and groups within the region with any education problems.

Hull (H&DARS)—8 May (Logbook keeping and QSLs past and present), 15 May (Natter night), 22, 29 May (Preparation for Hull Mobile Rally on 31 May). RAE classes at 9pm each Friday. Kingston Community Centre, Fountain Road, Hull. Sec Mrs H. Cunliffe, 12 Pearson Avenue, Hull, tel 0482 447355.

Mexborough (M&DARS)—Fridays, 7pm. Harrop Hall, Dolcliffe Road, Mexborough. Sec G3ZHI, tel Rotherham 814911. The club has published details of a 144MHz colinear which will be very useful to members just starting on the band.

Pontefract (P&DARS)—14 May (Film night: *One Man's Meat* and *Thin film microcircuits*), 28 May ("QTH squares", by G8VFV), 11 June ("New equipment" by G3PSM of SMC). G3YSC is running a series of short talks on components, specifically for beginners, after each meeting. The Pontefract Components Fair was a very successful event. Details from G4DTO.

Wakefield (W&DARS)—5 May ("Inland waterways", by G4JKH), 19 May (Junk sale), 2 June (144MHz df hunt, start Holmfield House at 7.30pm), 16 June (Natter night), 8pm. Holmfield House, Denby Dale Road, Wakefield. Sec G4BLT, tel Wakefield 255515.

York (YARS)—Fridays, except third in each month, 7.30pm. United Services Club, Micklegate, York. Sec Keith Cass, G3WVO. Preparations for GB3GYS at the Yorkshire Show (14 16 July) are well advanced, and other special stations will be run at Tollerton Show (GB3TS, 15 August), Club Day at Stockton-on-Forest (GB3YCS, 16 May) and at the Derwent School Summer Fair on 4 July. The club has been pleased to welcome an increasing number of visitors to its meetings, and their recent junk sale was a great success.

Remind your club sec to keep me up to date, if your club is not mentioned here then no-one has written to me! It is planned to hold an Official Regional Meeting at the Denby Dale Mobile Rally on 21 June. *RR2*

REGION 3—RR H. S. Pinchin, G3VPE, 61 Cole Bank Road, Hall Green, Birmingham B28 8EZ. Tel 021-777 1320.

Atherstone (AARC)—14 May ("VHF dxing", by C. T. Bown, G3EHR), 7.30pm. The Tudor Centre, Coleshill Road, Atherstone. Sec G8SYE, tel Atherstone (08277) 5995.

Birmingham (Midland ARS)—This year the club celebrates its golden jubilee with the opening of the new shack and headquarters in Broad Street. There will be a jubilee contest later in the year. 19 May ("10GHz operating techniques", by Dave Wickett, G3YJH), 8pm. 294a Broad Street, Birmingham B1 2DS. Sec G8BHE, tel 021-422 9787.

Birmingham (South Birmingham RS)—Thursdays (HF night on the air), Fridays (Construction and morse classes), 7.30pm. 3 June ("10GHz operating techniques", by Dave Wickett, G3YJH), 8pm. Hampstead House, Fairfax Road, West Heath, Birmingham B31 3QY. Sec G4GZI, tel 021-427 7104.

Birmingham (UoBARS)—Following the EGM in March, Bill Dent, G8RBT, has been elected chairman in place of Niell Taylor, G4HLX, who has now left the district for another appointment. Good wishes go with him from the club. 8 May (AGM), 8pm. Regular meetings are held lunchtimes and Fridays during term, 7.30pm. Tuesdays (RAE classes), 7.30pm. Club room, second floor Students' Union (above shop). Sec G4LCM (QTHR as G8VNC).

Kidderminster (K&DARC)—12 May (Film show), 26 May (Contact with twin town, Husum ARC, north Germany), 9 June (Natter night), 8pm. Aggborough Community Centre, Hoo Road, Kidderminster. Sec G4ILQ, tel Kidderminster (0562) 4930.

Malvern Hills (MHRAC)—12 May (Morse class followed by a demonstration of antennas by Dave Yates, G3PGQ), 7.30pm. The Foresters' Arms, Wilton Road, Barnards Green, Malvern. Sec G4BVY, 9 Wyche Road, Malvern, tel Malvern (06845) 62900.

Shrewsbury (Salop ARS)—14 May (Talk by B. W. Campbell, G4HPR), 19 May (Visit to Royal Observer Corps), 21 May (Natter night), 28 May (Foxhunt), 4 June (Natter night), 11 June (Talk by Adrian Bayling, G4AZS), 8pm. Albert Hotel, Smithfield Road, Shrewsbury. Sec G3VWH, tel Shrewsbury (0743) 51833.

Solihull (SARS)—19 May (Open forum), 7.30pm. The Manor House, High Street, Solihull. Club nets: G3GEI, Fridays, 9.30pm on 1,960kHz; G8ZLJ, Thursdays, 9pm on S19 or next lowest vacant channel. Sec G4JDL, tel 021-745 3098. Morse classes available.

Tamworth (TARS)—11 and 18 May (Night on the air at the club shack), 25 May (No meeting), 1 June (Night on the air at the club shack), 8 June (Ten minute talks by club members), 7.30pm. White Lion, Lichfield Street, Tamworth. Sec G4FZN, tel Tamworth (0827) 69708. Club net Wednesdays 145·375MHz, 9pm.

Telford (T&DARS)—13 May (Discussion on VHF Field Day with particular attention to the revised rules this year), 20 May (Talk on dx working), 27 May (Discussion on RSGB. RR3 Henry Pinchin, G3VPE, will be present), 3 June (G3ZME on the air and morse

class), 7.30pm. Phoenix Centre, Webb Crescent, Dawley. Sec G8UGL, tel Telford (0952) 584173.

Wolverhampton (WARS)—The club has moved headquarters. 11 May (Surplus sale—10 per cent commission to the club), 25 May (No meeting), 28, 29, 30 May (Club station at Wolverhampton Fiesta, West Park), 1 June (Home-built equipment competition), 8 June (Natter night), 8pm. Wolverhampton Chamber of Commerce & Industry, 93 Tettenhall Road, Wolverhampton WV3 9PE. Sec G8EDG, tel Wolverhampton (0902) 763617.

Worcester (W&DARC)—Attendance at club meetings has increased considerably in recent months. 1 June ("Radio signals from the universe", by Dr Grahame Alfrey of the University of Birmingham), 8pm. "Old Pheasant", New Street, Worcester. Sec G4EKG, tel Evesham (0386) 41105.

REGION 4—RR M. Shardlow, G3SZJ, 19 Portreath Drive, Darley Abbey, Derby DE3 2BJ. Tel Derby (0332) 556875.

Derby (D&DARS)—6 May (Junk sale), 13 May ("Railway radio systems", talk and demonstration by David Cree of BR), 20 May (Night on the air), 27 May ("Coaxial cable, its use and misuse", talk by Richard Buckby, G3VGW), 3 June (Junk sale), 7.30pm. 119 Green Lane, Derby. Sec Jenny Shardlow, G4EYM, tel Derby 556875.

Grimsby (GARC)—7 May (Guest speaker, CEGB Nuclear Energy), 14 May (DF hunt), 21 May (NFD preparation), 8pm. New Alexandra Social Club, Cleethorpes. Sec Trevor Matthews, G3RGC, tel Grimsby 884060.

Hinckley (HARAES)—6 May (Junk sale), 20 May (Open meeting). Room H8G, John Cleveland College, Butt Lane, Hinckley. Sec Norman Geary, G8STX, tel Hinckley 632778.

Ibstock (IARS)—14 May ("The metre waves then and now", by G5UM), 26 May (DF hunt), 7.30pm. The Ram Inn, High Street, Ibstock. Sec Steve Haywood, G8UZQ, tel Ibstock 62158.

Lincoln (LSWC)—13 May (Slide talk by Alan Taylor, T30AT), 27 May (AGM). RAE and morse classes every third Wednesday in each month, 7.30pm. 30 May (Exhibition station at RAF Waddington Open Day). City Engineers Sports & Social Club, Waterside South, Lincoln. Sec Mike Wells, G4JES, tel Lincoln 721277.

Louth (L&DARC)—12 May ("Oscar operating", by D. Stenning, G4ENE), 7.30pm. Eastgate Union Church, Eastgate, Louth. Sec Ron Padbury, G4GAB.

Mansfield (MARS)—1 May, 7.30pm. New Inn, Westgate, Mansfield. Sec John Coates, G4GYU, tel Mansfield 27257.

Matlock (Derwent Valley ARS)—4 May (To be announced), 1 June (To be announced), 8pm. Matlock Teachers Training College. Sec Jim Geeson, G4IDI, tel Bakewell 3784.

Melton Mowbray (MMARS)—15 May (Annual construction contest, G3XJW), 7.30pm. St Johns Ambulance Hall, Asfordby Hill, Melton Mowbray. Sec Richard Winters, G3NVK, tel Melton Mowbray 3369.

Scunthorpe (SARC)—3 May (QRP working), 12 May ("Work of the RSGB", by G3SZJ, RR4), 19 May ("Transverters", by G8VRP), 26 May (Natter night), 2 June (Discussion on demo stations). Grange Farm Hobbies Centre, Franklin Crescent, Scunthorpe. More information from sec Joe Sheardown, G8TIY, tel Scunthorpe 732438.

Spalding (S&DARS)—3 May (Spalding Rally at Spalding Grammar School, Haverfield Road, Spalding). Sec Gordon Parker, G4EMK, 29 Saxon Way, Bourne.

At the Derby & District Amateur Radio Society's 70th anniversary dinner. L to r: John Allaway, G3FKM (RSGB President 1976); Jack Anthony, G3KQF (RSGB executive vice-President 1981); Basil O'Brien, G2AMV (RSGB President 1981); Fred Ward, G2CVV (RSGB President 1971) and Lord Wallace of Coslany, BRS3003634 (RSGB President 1977). *Photo:* **G3SZJ**

REGION 5—RR R. E. G. Kendall, G8BNE, 19 Willow Green, Needingworth, Huntingdon PE17 3SW. Tel St Ives (0480) 67538.

Bedford (B&DARC)—A club contest is to take place during May/June, details from G8FMG. 13 May ("Test your rig night". A wide range of test equipment will be available and members are invited to bring their gear along for checking), 3 June (First df hunt), 10 June (Homebrew evening—no limits as to the interpretation of the term on this occasion). Club shack, Ravensden, Bedford. Sec G8PZZ/G4JTJ, tel 0234 47818.

Leighton Buzzard (LLRC)—This recently-formed club is now becoming well established and, as from April, meets on Mondays, 7.30pm. Vandyke Community College, Vandyke Road, Leighton Buzzard. Visitors and prospective members are advised to contact John Hart, G8GIK, tel Wing (029 668) 590.

Luton (Kent Process Controls ARC)—A club recently reformed and retitled. It was previously "The George Kent ARES". The club call is G4KPC. Membership is open to all Kent Process Control employees and to all employees of the Brown Boveri Kent Group worldwide. Further information may be obtained from John Allen, G3DOT, tel Luton (0582) 508515.

REGION 6—RR F. S. G. Rose, G2DRT, 84 Cock Lane, High Wycombe, Bucks HP13 7EA. Tel Penn (049481) 4240.

Harwell (HARC)—Third Tuesday in each month, 7.30pm. AERE Social Club. Details from sec D. H. Aram, 4 Severn Road, Chilton, Didcot, Oxon OX11 0PW.

Harwell (Vale of the White Horse ARS)—5 May ("Interference", by Don Franklin of British Telecom), 5 June ("The RSGB", by RSGB general manager David Evans, G3OUF. Other local clubs are welcome to attend), 8pm. White Hart, Harwell Village. Details from G4FLX, tel Wallingford 37482 or G3SEK, tel Didcot 812584.

Milton Keynes (MK&DRS)—Second Monday in each month, 8pm. Lovatt Hall, Silver Street, Newport Pagnell, Bucks. Sec D. White, tel Shenley Church End 310.

Reading (RARC)—26 May (Junk sale). Sec Chris Young, G4CCC.

REGION 8—RR D. N. T. Williams, G3MDO, Seletar, New House Lane, Thanington, Canterbury, Kent. Tel 0227 66586.

Canterbury (East Kent RS)—7 May ("Bee keeping", lecture), 21 May (Swimming at Canterbury Pool), 30 May (Coach trip to Alexandra Palace), 4 June ("Shack exposé"), June (Car rally, date to be fixed), 2 July ("Barbecue" QTH G3MDO). Further details from sec, G8PFE.

Chichester (C&D ARC)—5 May ("The use of the spectrohelioscope", by Commander Henry Hatfield), 21 May ("Talk", by Tony, G3WPO), 2 June (Visit to Swandean Telephone Exchange and museum of old telephones), 18 June (Club meeting), 7 July (Annual barbecue evening on Trundle Hill, Goodwood). Further details from sec S. Talbot, G8FCX.

Medway (MARTS)—8 May (Junk sale), 29 May (Presentation and film evening by RAF staff of careers information centre, Chatham), 5 June (Flea market), 26 June (Film evening, RSGB and/or BP films). Further details from sec G4EVY.

Maidstone (M YMCAARS)—15 May ("Colour slow scan tv", by Martin Emmerson, G3OQD), 29 May (AGM). Further details of events and forthcoming programme from Graham Edy, G4AXD.

Tunbridge Wells (West Kent ARS)—8 May (Construction contest), 22 May (HF/vhf contests, final arrangements). Further details of club meetings and programme from Brian Castle, G4DYF, tel 0732 56708.

REGION 9-RR H. W. Leonard, G4UZ, 4 Start Bay Park, Strete, Dartmouth TQ6 0RY. Tel Stoke Fleming 505.

Camborne (Cornish RAC)—7 May (Sale of surplus equipment), 4 June ("Silicon controlled recitifiers and triacs", by Keith, G3XFL), 7.30pm. SWEB Clubroom, Pool, Camborne. Cornish net weekdays on 3·714MHz and on Sundays on 3·692MHz at 11am. Full details from pro Ron, G2ABC, tel Truro 78393.

Exeter (EARS)—11 May ("Weather satellites", by G4BZE), Community Centre, St Davids Hill, Exeter. Informal meetings on first, third and fourth Mondays at the Scout Hall, Emmanuel Road, Exeter. A coach is being organized for Longleat Rally and a few seats are still available. Full details from pro Geoff Draper, 1 Carlyon Close, Heavitree, Exeter EX1 3AZ.

Exeter (EUARS)—Sundays, 2.30pm. Room 225, Applied Science Building, North Park Road, Exeter. The club hopes to put on a special event station on 2 May for the university's Silver Jubilee Open Day. Full details from Miss Anne Bellchambers (now G8ZPJ-congrats), Devonshire House, Stocker Road, Exeter EX4 4PZ.

Exmoor (ERC)—Twenty three members and friends attended the club annual dinner in March and four members will be taking the RAE in May. Second and fourth Thursdays, 7.30pm. "Loughrigg", East Street, South Molton. Full details from Mrs Pat Jemmison, "Homedale", Brayford, Nr Barnstaple EX32 7QJ, tel Brayford 327.

Newquay (N&DARS)—6 May (Visit to G8MWW at Holsworthy), 20 May ("Metal bashing", by G8OVO), 3 June (Sources and catalogues—a directed discussion), 7.30pm. Treviglas School, Newquay. Details from Bob Lawrence, G4LDA, 29 Greenhill Road, Egloshayle, Wadebridge.

North Devon (NDRC)—All meetings now held on the second Wednesday in each month, Even months at Bideford Community College, 7.30-9.30pm. Odd months at Pilton Community College, Barnstaple, 7.45-9.45pm. 13 May (Quiz on the lines of "Call my bluff" with Exmoor Radio Club). New chairman is Les Hawkyard, G5HD. Congrats to Ted Par, G6ABE, Trev Davis, G6ALX, and Al Stepney, G6AZC, on their new calls. Slow morse on S21 every night except Sunday. Full details from sec George, G4CG, tel Barnstaple 3683.

Plymouth (PRC)—11 May (RAE), 18 May (AGM), 7.30pm. Tamar Secondary School, Paradise Road, Plymouth. 24 May (PRC Mobile Rally—your RR will be running the bookstall so here's your chance to take the strain off hq book dept!). Full details from Trisha Day, G4KYY, c/o G3ZYY, tel Saltash 5913.

Members of the Scunthorpe Amateur Radio Club with guests Jean B. Escats, F6AVO, and his son Frederich, from Clamart, Nr Paris, which is Scunthorpe's twin town. L to r: (front) G8TIY, G3TMC, Frederich, F6AVO, G8GIH, G4GZB, G4JJY; (back) G4JRY, swl Ray, G8XFZ and G8VIJ. *Photo:* **G8TIY**

Saltash (S&DARC)—The club is arranging two visits open to members and visitors alike: 5 June (IBA transmitter at Caradon Hill in the evening), 18 July (British Telecoms at Goonhilly Down Satellite Station in the morning). Details of trips and club from Eddie Hayden, G8VVF, tel Tavistock 832838.
Torbay (TARS)—Fridays with special meeting on last Saturday in each month, 7.30pm. Bath Lane, rear of 94 Belgrave Road, Torquay. 134 members and friends attended the annual dinner in March. The club's mobile rally has been fixed for 30 August. 15 members attended the funeral of Bill Jones, G3BBF. Torbay net Mondays, Wednesdays and Fridays at 10.30am on 3·756MHz and on Saturdays at 10am. Full details from pro Les Mays, G2CWR, tel Paignton 558714.
Treverbyn (English China Clay RC)—Alternate Mondays at 7pm. Club net on S22 on meeting nights. ECC have a computer section and *not* Newquay club as stated in March issue. Full details from Jack Redfearn, G8HSZ, tel St Austell 3647.

REGION 10—RR P. A. Jones, GW4HAT, 68 Pastoral Way, Tycoch, Swansea SA2 9LY.
Cardiff (CRSGBG)—11 May (Film show), 8 June (Surplus sale), 7.30pm. The Pantmawr Inn, Pantmawr Estate, Cardiff. Further information from Joe Brooke, GW3GHC.
Port Talbot (British Steel Corporation ARS)—Thursdays, 7.30pm. BSC Sports & Social Club. The club radio shack is now operational (GW3EOP) and morse tuition is given at each meeting. The first Thursday in each month is a general meeting and various lecture programmes are being arranged to cover the following topics: radio astronomy; alignment of vhf/uhf equipment; and police communication systems. Further details from Reg Bray, GW4ESV, 56 Greenwood Road, Baglan, Port Talbot.

Many members co-operated in setting up and operating the St David's Day special event station, GB2SDD, at the Afon Lido on 1 March. It is believed that this is the first occasion that such an event has been organized in commemoration of a national day. Stations were worked on lf, hf and vhf throughout the day, and over 750 QSOs made. Special QSL cards were designed, and an award scheme developed that has increased activity for Welsh amateurs throughout March. Everyone enjoyed this event and it is hoped to operate again in 1982. The QSL award manager is John Elwood, GW4JLK.
Swansea (SARS)—Thursdays, fortnightly, commencing 14 May. Various talks are being arranged but no definite dates confirmed at press time. The club secretary would like to hear from interested parties who would be prepared to give a talk or series of talks of interest to club members, eg tvi/rfi and its cures, microwaves, etc. The club net controller, Cen Rudd, GW4BIQ, would like to hear more calls appear on the club net 1000gmt, Sundays, 28·530MHz. Don't just listen—call in! Further club details from Roger Williams, GW4HSH, tel Swansea 404422.

RR10 is very concerned at the lack of interest shown by the majority of club secretaries in this region towards "Club News". This new format is for your benefit so please write to GW4HAT.

The St David's Day special event station GB2SDD: GW4HOQ nearest camera, with GW3TFQ on his left.

REGION 14—RR C. W. Tran, GM3WOJ, 21 Richmond Avenue, Dumfries DG2 7JS.
Dumfries (D&GREC)—First and third Monday in each month. 7.30pm. Cargenholm Hotel, Dumfries. Details from sec GM4JAP.
Kilmarnock (K&LARC)—First and third Tuesday in each month. 7.30pm. The Buchanan Centre, Riccarton, Kilmarnock. Newly-formed club, details from sec GM3ZRT.
Motherwell (Mid-Lanark ARS)—Fridays, 7.30pm. Wrangholm Hall Community Centre, Jerviston Street, Motherwell. Details from sec GM4FKD.
Stranraer (SARC)—Fourth Thursday in each month, 7.30pm. Stranraer Community Centre, Lewis Street, Stranraer. Details from sec GM8RUG.

REGION 15—RR I. J. Kyle, GI8AYZ, 2 Galgorm Gardens, Ballymena, Co Antrim BT42 1BA. Tel 0266 2024.
Londonderry (North West Ireland ARS)—First Monday in each month. Templemore School, Londonderry. Sec GI2DHB.

Once again no other reports have been received from clubs. It is no good complaining about lack of news if you do not report any. Also, gabbled announcements or "by the way's" to me on repeaters at late hours of the night do not constitute a report in my book. Not even I can drive and type at the same time. I shall not be continuing as regional representative, so please do better by my successor.

By the time this appears in print, the Mid-Ulster Parkanaur Rally (17 May) will be upon us, so do not forget your entry for the construction contest, and if you want a pass, your amateur radio licence, some means of identification (driving licence quite acceptable) and money. If you can drop me a card in advance giving your name, address, telephone number and callsign, blanks can be prepared and the process speeded up. *RR15.*

REGION 16—RR M. S. Appleby, G3ZNU, 45 Cedar Avenue, Kesgrave, Ipswich IP5 7HA. Tel Ipswich (0473) 622559.
Braintree (B&DARS)—First Monday (Informal), 8pm. Third Monday (Formal) in each month, 7.45pm. Braintree Community Centre, Victoria Street. 12 May (Visit to Ongar Radio Station), 18 May ("The achievements of Marconi", by Mrs B Hance, company historian for GEC-Marconi Electronics Ltd), 28 May (Visit to studio of Radio Orwell). Visits are for club members only, and numbers are restricted. The club is starting short lectures on radio and associated topics for swl and junior members to be given by Danny Begg, G3YXJ, at 7.30pm on informal meeting evenings. Details from Alan Heritage, G4EOG, tel Braintree 25109.
Chelmsford (CARS)—5 May ("Interference", by G3PMX), 2 June (Constructor's competition), 7.30pm. Marconi College, Arbour Lane. Details from Andrew Mead, G4KQE (ex-G8KQE), tel Silver End 83094. 10 May DF hunt with the Colchester club (see Colchester entry), 22 May (Top band df hunt, 7.30pm, Tiptree Heath, ngr 884148. OS Map No 168 will be required). Details of df hunts from Dick Brocks, G3WHR, tel Maldon 55707.
Colchester (CRA)—14 May (NFD and Anglian Mobile Rally organization meeting), Colchester Institute, Sheepen Road. 10 May (DF hunt (together with the Chelmsford club), 1pm, Fordham Heath, by the Star public house, ngr 945264. OS Map No 168 will be required). Details of df hunt, together with requests for teas, from Ian Butson, G4HKC, tel Colchester 860724. Details of club meetings from Frank Howe, G3FIJ, tel Colchester 70189.
Ipswich (IRC)—The club is pleased to be able to report a large increase in the attendance at meetings since the change of venue. 13 May ("HF contest operating", by Pat Gillen, G4GVW), 20 May (Final planning for East Suffolk Wireless Revival), 24 May (East Suffolk Wireless Revival, at The Hollies, Bucklesham, nr Ipswich), 27 May (Post mortem on ESWR). Club Room, Rose and Crown, Norwich Road. Details from Jack Tootill, G4IFF, tel Ipswich 44047.
Martlesham (MRS)—6 May (Transmitter/receiver clinic). British Telecom Research Laboratories, Martlesham Heath, Ipswich. Visitors are welcome, but must first contact Simon Garrett G4EVN for security clearance.
Vange (VARS)—Thursdays, with first meeting of the month as regular junk sale. 14 May (Talk by G4COU), 21 May ("Kites on top band", by G3ZOF), 28 May (HF Field Day talk), 8pm. Barstable Tenants' Community Association, Long Riding, Basildon. The club will also be operating demonstration stations on the hf bands at Mayflower School on 16 May. Details from Mrs D. Thompson, 10 Feering Row, Basildon SS14 1TE.
Southend (S&DRS)—8 May (Talk on health and the environment), 22 May (144MHz fox hunt), 8pm. St Michaels Church Hall, Sir Walter Raleigh Drive, Rayleigh. Details from sec A. Adams, G3YOA.

REGION 17—RR H. G. Cunningham, G8FG, 235 Station Road, West Moors, Wimborne, Dorset BH22 0HZ, tel Ferndown (0202) 876018.
Fareham (F&DARC)—6 May (Transmitters and tvi), 20 May (Power supplies), 3 June (Measurements and how to use test equipment), 7.30pm. Porchester Community Centre. Sec G4ITG.
Poole (PRAS)—30 May (Coach to Alexandra Palace is organized, return fare £5.50. Bids for seats to sec). Sec G3XBZ, tel Poole 730012.

REGION 19—RR R. J. C. Broadbent, G3AAJ, 94 Herongate Road, Wanstead Park, London E12 5EQ.
Barking (BRES)—Thursdays. 14 May ("Professional radio communications", by D. Thorpe, G4FKI), 7.30pm. Rag chew nights Mondays, cw practice Tuesdays. Westbury Recreation Centre, Westbury School, Ripple Road, Barking. Sec A. Sammons, G8IZN, tel 01-594 2471.
Cheshunt (CDRC)—6 May (RAE revision), 13 May (Natter night), 20 May (Slide talk on Sierra Leone, by G8DJU), 27 May (Natter night), 3 June ("Components", by G8HTA), 8pm. Church Rooms, Church Lane, Wormley, Herts. Sec M. Bragg, 2 Elm Drive, Cheshunt, tel Waltham Cross 32114.
Chiswick (ABCARC)—19 May ("QRP on 40m", by G4HMC), 7.30pm. The Committee Room, Chiswick Town Hall, High Road, Chiswick. Sec W. G. Dyer, G3GEH, tel 01-992 3778 for all details of membership and meetings.
Edgware (E&DRS)—Second and fourth Thursday in each month. 7 May (RSGB "Open Door" programme on amateur radio), 21 May (Informal discussion on restricted section for VHF Field Day). Watling Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware. Sec G4HMD, tel 01-952 6462. Club net on 1·875MHz, Mondays, 2200 (local). Why not have a go?
Havering (H&DARC)—13 May (Talk by G8IXC), 8pm. Fairkytes Arts Centre, Billet Lane, Hornchurch. Sec Alf Negus, G8DQT, tel Upminster 24059.
St Albans (Verulam ARC)—26 May (Talks about "BCI and tvi", by I. Jackson, G3OHX). Charles Morris Memorial Hall, Tyttenhanger Green, Tyttenhanger, Nr St Albans, Herts. Sec Hilary Claytonsmith, G4JKS, tel 0727 59318 for all details.
Wanstead (East London RSGBG)—No meeting until third Sunday in September except proposed hf and vhf stations operating at Wanstead House Fair on 13 June. Details in next issue. Sec G3PKQ, tel 01-558 2928.

RR19 thanks club secretaries who have replied generally within the terms of announcement made in "Club News" January 1981 on the subject of the new format. He would however like the *dates* of meetings not "third Tuesday, twice removed, of every month unless it falls on the xyl's birthday" sort of announcement!

REGION 20—RR B. L. Goddard, G4FRG, 2 Greenfield Park, Portishead, Bristol BS20 8NQ.
Bristol (BARC)—Tuesdays. 12 May (Talk on hf linears), 26 May (Nascom Users Computer Club night), 2 June (Film show), 7.30pm. The University Settlement, Barton Hill, Bristol 5. RAE classes, etc. Sec G8GFZ.
Bristol (BRSGBG)—25 May (General meeting, visit of Les Hawkyard, G5HD, zonal rep), 7.15pm. Queens Building, Bristol University. Sec G8GLQ.
Bristol (North Bristol ARC)—Fridays, 7.30pm. c/o Self Help Enterprise, Braemer Crescent (off Braemar Avenue), Northville, Bristol. 10 May (Mobile picnic). Please note new secretary, Ted Bidmeade, G4EUV, tel Bristol 691685.
Bristol (UoBAR&CS)—May meeting ("Computer programs"). Sec L. Mather, G8OKI, c/o 36 University Close, Parrys Lane, Bristol.
Cheltenham (CARA)—7 May ("Raynet in Gloucestershire", by G8JXS), 15 May (Natter night), 4 June ("1980 translantic meteor scatter tests", by G4ASR), 7.30pm. The Old Bakery, Chester Walk, Clarence Street, Cheltenham. Sec G4ILI.
Cheltenham (Smiths Industries RS)—Third Wednesday in each month, 7.30pm. Club House, Newlands, Bishops Cleeve, Cheltenham GL52 4SF. Sec Roger Hawkins, G8UJJ, c/o 101 Tobysfield Road, Bishops Cleeve, Cheltenham, Glos. tel 0242 67 2175.
Yeovil (Y&DARC)—Thursday, 7.30pm. Building 101, Houndstone Camp, Yeovil. New RAE class starts in May. Sec G3NOF, tel Yeovil (0935) 24956.

MEMBERS' ADS

CONDITIONS OF ACCEPTANCE

These subsidized flat-rate advertisements are accepted as a service to members of the RSGB only. They must be submitted on the Member's Ad form printed on the back of a *recent* address label carrier used to mail *Rad Com* to the advertiser: this will automatically provide proof of membership and should not be more than two months old. No acknowledgment of receipt will be sent, and advertisements not clearly worded or punctuated, or which do not comply with the conditions of acceptance, will be returned. No correspondence concerning this service will be entered into.

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. Traders who are members must enclose a signed declaration that the items for sale or wanted are part of, or intended for, their own personal amateur station.

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 for 27MHz equipment will not be accepted.

Warning. Members are advised that they should, as far as possible, ensure that the equipment they intend to purchase is not subject to a current hire purchase agreement. The "purchase" of goods legally owned by a finance company could result in the "purchaser" losing both the goods and the cash paid.

The current rate is £1 for 40 words or less: advertisements containing more than 40 words will cost an additional £1 for every additional 40 or less words. Each advertisement must be accompanied by the correct remittance, either as a cheque or postal order made payable to Radio Society of Great Britain.

No guarantee of inclusion in a specific issue can be given, other than the first possible issue after receipt. Closing dates in 1981 for issues in brackets, are: **20 May** (July), **18 June** (August), **16 July** (September), **27 August** (October), **24 September** (November), **22 October** (December), **19 November** (January 1982), **17 December** (February 1982).

Post to: MEMBERS' ADS, RSGB, 88 BROOMFIELD ROAD, CHELMSFORD, ESSEX CM1 1SS
Do not post to RSGB HQ or Advertising representative

FOR SALE

Icom IC215, as new cond, 14chs fitted, comp with carrying case, new mobile mount, helical whip, £120 ono. G8NGF, QTHR. Tel 01-527 6502, after 7pm.

TR2400, spare nicads, carry case, 12V quick charger, used little, mint cond, cost £240, sell for £190. AR30 rotator, cable, used indoors few hours only, £35. G8JXT NOT QTHR. Tel Laurence Taylor, 01-858 2154, afternoons and evenings.

Ex-USAF audio oscillator, 20 200kHz, precision instrument, technical manual, mint, £25 plus carriage. Cabinets RA17 117, SP600, AR88, sae details. Large roller coaster with turns indicator, brand new, £16 plus postage. *Wanted:* CRTS 3WP1 (CV3946), 89J (CV2750). Manual for HQ145. G3GUU, QTHR.

TR9000, comp with BO9 base, PS20 and SP120 spkr, only used for about 5h, available from April, £370. A number of brand new QQVO640 valves, £10 each. G3NKO, QTHR. Tel 07014 53621.

Swan 270B tx/rx, 250 p.e.p. compact, £180. DX40 plus VF1U, £20. AT5 plus mains psu, £12. G3VMJ, QTHR. Tel 0245 76910, after 7pm.

Monoscope tube test card "C", type 1693K/T2, Heathkit Decade capacitance bridge type IN27, Farnell eht unit, 500 9kV, uhf/vhf Philips tuners with scale, all new, offers. Hawes, 24 London Road, Kessingland, Suffolk. Tel 0502 740336.

Quality regulated psus: Coutant 5V, 3A, £15. Roband 12V, 10A, £20. DMAC 20V, 10A, £10. Carriage extra or collect from Derby. G8JPL, QTHR. Tel 021-706 1259, weekends only.

FT101E, immac cond, no mods, £385. One pair PF1 Pocketfones with rx, tx, batteries, Pye battery charger, £30. Prefer buyer collect. G4GWZ, QTHR. Tel Stroud 2429, evenings.

Trio TS700G 2m multimode tx/rx, preamp and piptone fitted, £300. Icom IC255E 2m fm tx/rx, with scanning mic, £180. G8GYO, QTHR. Tel 051-342 7155.

Heath HR1680, 80 10m, ssb/cw rx, £100 ono, or exchange Palm 2/4, cash adjustment. G4JQP, QTHR. Tel 0761 34216.

Oscilloscope Tektronix 535A with ca plug-in, 15 20MHz, £95. Universal bridge, Wayne-Kerr B642 0·1 per cent, £50. Marconi spectrum analyser, OA1094/3 for spares or repair, very large but on trolley, £40, offers considered. G8NJT, QTHR. Tel 0705 593107.

YC601 digital display unit for FT101 series, mint, £85. KP202 2W handheld, fitted S20, S22, R0, R5 7, auto toneburst, nicads, charger, helical whip, leather case, £90. *Wanted:* Pye Bantam a.m. high band. G3WIF, QTHR. Tel 0272 293738.

FT221R, used little, mint, rf board modified, lunar preamp fitted, £320. MMT432/144R transverter, £100. Crossed Yagi switching unit by UKW-Technik, gives hp, vp, left/right circular polarization, £20. SWR25, £5. G8GEA, QTHR. Tel 9.30am 6pm, 021-745 2580, weekends, Orpington 31156.

Trio TS520 tx/rx, 240V ac, mic, £350. Yaesu FV101, sep vfo, £50. SP101 spkr, £10. 2m converter, 4 6MHz i.f., int psu, £10. KW p.e.p. meter, £15. BC221 int psu, £15. KW low pass filter, £5. G3WEX, QTHR. Tel 021-354 4265.

FT101E, mint cond, all leads and accessories, orig packing, £410. GM3LNE, QTHR. Tel Edinburgh 031-443 5097.

IC202E with MEL 202 25P, 25W linear and preamp, ICSM2 desk mic with preamp, £165. G3XKZ, QTHR. Tel Warwick (0926) 496449.

Liner 2, 2m ssb, preamp, piptone, manual, mobile bracket, spare mic, comp with homebrew QQV0640A linear and psus, £130 ono. May split. Gone G4LBH, ex-G8KYU, QTHR. Tel Luton 415846.

Creed 444 and 54R, good cond, sync motors, gears available for 45·5 baud, Creed 6S6 tape reader, £40, £20, £5 respectively. IC720A, psu, unused, in orig packing, reason for sale, rather large unexpected bill! £750 ono. GW4BCF, QTHR. Tel 065 671 5173, after 6pm.

TS700, vgc, five fix, vox, orig packing, auto toneburst, £250. TR2200GX, 14ch, nicads, 240/12V chargers, mobile mount, helical, auto toneburst, vgc, £110. Eddystone EC10 Mk2, mains and battery packs, 0·5 30MHz, Joystick system "A", £110. G3TCG, QTHR. Tel Fairseat (0732) 822043.

TS520, Icom 701, HQ1 minibeam, mobile antenna transformer, Atlas dummy load, pair 6SJ6Cs. Various hv transformers. *Wanted:* Wide-spaced tuning capacitors, TU5B or similar. G3NZT, QTHR. Tel Newby Bridge 31550.

SU2000 rotator, TR8300 70cm, Icom 202E 3W, Geloso G4216 rx, Sommerkamp TS280 fm, tel for details. *Wanted:* Sugiyawa F850 or w.h.y? Possible exchange or cash adjustment. G8XCF, 94 Faringdon Avenue, Blackpool FY4 3QT. Tel 0253 404459.

KW2000A, revalved, exc cond, £180. G3ZLN, QTHR. Tel 49139.

Multimode vhf/uhf mobile or base station: Icom 260E 144/148MHz fm/ssb/cw mobile tx/rx, scanning mic, connecting Microwave Modules transverter, 144/70, 10W output, stabilized, 110/230V/13·2V at 3A base power supply, £450. G3RQY, QTHR. Tel 0603 42967.

Yaesu FT480R multimode 2m tx/rx, exc cond, under guarantee, £310 ovno. SWR50 swr power meter, £8. 3A power supply at 12·8V, £15. G4DXG, QTHR. Tel 01-679 3215, after 7pm.

TV sound through your hi-fi, motion electronics tv sound tuner, £35. Sommerkamp FR100B communications rx, Racal SA505 frequency counter, £65. G3VWE, QTHR. Tel 0272 656783.

Standard 2m fm transceiver C8800, £225. FDK Multi U11, 70cm, £150 ono. Six-channel a.m. high band Westminster, untouched, £75. Wood, 91 North Street, Bristol 3. Tel Bristol 665332.

IC202S 2m ssb tx/rx, xtalled for 144·0 144·6, 145·8 146·0 (Oscar), rubber duck, SO239/BNC adaptor, good cond, orig packing, handbook, ccts etc, £105. Buyer collects or postage extra. G8JMY, QTHR. Tel Dave, Basingstoke 780779.

Eddystone 750, £65. PF1s, dual RB14/SU8, £34. Creed 75, 50/45 bauds, £75. FT2 auto, £88. FT2F, £49. Uher portable four-speed reel recorder, £46. Heathkit dual trace scope, audio and rf generators, offers. KP202 Palm 2, £85 each. All ono. G3LZN, QTHR.

FT225RD with Mutek front end, cw, Datong automatic rf speech processor, all fb cond, inspect and collect, one lot, £500 for quick sale. G3NJM, QTHR. Tel 01-393 2280.

Marconi Atalanta rx, 15kHz 28MHz, ac psu, £75 or offers. G3SHQ NOT QTHR. Tel 0962 713003.

FRSDX400, 160 2m rx, FLSDX400 80 10m tx, spare valves, SP600 spkr, £300. PA28 10m preamp, £15. 2m 5/8 gp, £8. Five-way antenna switch, £7. YD844 mic, £8. 500Ω dynamic mic, £4. *Radio Communications,* 1974 9, £10. IRCs, 11 for £2. G4CVZ, QTHR. Tel 051-220 5470, after 6pm.

DX300 gen cov rx, mint (1980), used little, £180 ono. G3JKX, Sgts Mess, RAF Hereford.

FT200, FP200, mic, new finals, £200. G4COA, QTHR. Tel Banbury (0295) 65915.

FT101E, perfect, £350. YO100 monitorscope, £60. HW32A ssb tx/rx, 20m hb psu, £50. FT207 2m handheld, slight case damage, remote spkr/mic, charger, £150. DX4OU a.m./cw tx, £10. SWR/pwr meter, £7. Buyer collects. Tel 021-429 6783.

Yaesu FT501 with FP501 psu, £275. Yaesu table mic, 50K imp, £10. 572B valve, used little, £15. Datong rf clipper, £35. Matched pair 6KD6, unused, £8. Try offers. GW4BIQ, QTHR. Tel 044 128 3245.

FT202R handheld, nicads, S20 23, R5, 144·8, YM24 spkr/mic, £85. G8RYP, QTHR. Tel Gosport 83700.

If you would pay me £1,000 for my IC202S, nicad, case and charger, I'd be ecstatic, but being a realist, I'll settle for £155. Interested? . . . and so you should be. G8PPM. Tel Chris, Worthing (0903) 38309, evenings w/ends, 01-760 7182, during office hours.

Trio TS700G, 2m multimode, good cond, £270 ono. R. Warner, G3SAR, QTHR. Tel 0732 58743, home, 0732 832424, office.

Must go for shack clearout: Creed 7ERP; cover; new ribbons; much paper tape; Royd Slim Jim; Creed 6S6; orig spares; AR88; fm discriminator; RCA S-meter, revalved; Emsac 2 10m converter, professional unit; offers? G4AIC, QTHR 1981. Tel Knowle 78218, anytime.

Heathkit gear: solid state, fetvm, IM5238, £85. Scope, 1012U, £30. VTVM, £25. Sinesquare generator, £35. Advance sig gen, 100MHz, £25. Avo sig gen, 80MHz, £15. Jasonkit wobbulator, £20. Avominor, £20. All ono. Property deceased enthusiast. List available. Other gear. G3IJI. Tel 0602 654138.

TR9000 2m multimode mobile, clean cond, no mods, incl full service manual, best reasonable offer. G3ONP, QTHR. Tel Wolverhampton 788459.

FTDX401 cw filter, fan, some spare valves, £200. Bauer paddle, plus ttl keyer, £15. KW Valiant cw tx, plus psu, £25. G4HVC, 2 Brandon Road, Stubton, Newark, Notts. Tel 063 684 450.

Radio Communication November 1978 to December 1980, £10 the lot incl post. Paul Fulford, 43 Cunningham Drive, Eastbourne, Sussex.

Yaesu YO101 scope, latest, new, unwanted gift, £130. Sony 4in reel tape recorder, comp, £15. Home-built a.m. top band tx, comp, needs slight attention, wkg, £15. All items cash, collect or plus carriage. G3OSH, QTHR. Tel Ilminster 3349.

Drake T4XC R4C AC4/MS4 noise blanker, additional xtals, offers around £500. PM2000 power/swr meter, £29. G2BOZ, QTHR. Tel Bewdley 402488.

Trio 2200GX, 12 channels, case, nicads, charger etc, MM 144/25 pa/preamp, £130 ono. G4GHG, QTHR. Tel Torquay (0803) 37050.

R107 in good cond with set of new valves fitted, £20. Buyer collects. 4 Tiverton Road, Bedford. Tel 56043.

EMS music synthesizer type Synthi A, as new cond, £300 ono. Liner 2, £70. MM2000 rtty-tv, £150. Buyer collects large items. G4EAS, QTHR. Tel 0305 67636, 6 7pm.

FT101ZD, immac, warranty, filter fan, FC901/atu, £550. Heath SB200 linear, unused, £250. HR1680 high performance ssb/cw rx, £135. SB401 ssb/cw tx, unmarked, £175. Heathkit HW8 tx/rx, HWA71 psu, £125. KW109/atu, £100. KW107/atu, £75. Manuals. Keyers: Hallicrafters HA1 digital, immac, £35. Spacemark ETM2B, £25. ETM2, £20. Telegraphy SK2, iambic, £20. Vibroplex deluxe, chromium-plated, new, £30. Heathkit ID1410 iambic, twin-paddle, £35. Junker precision, £25. Enclosed key, 8 by 3 by 3in calibrated space tension, £10. G3ANK, QTHR. Tel 01-302 0865.

TS120S, £335. FT401 450W p.e.p., incl spare valves, £175. Stabilized psu, suitable 120S, 0 20A, fully

metered, £25. Duckworth; G4BG, Little Court, Pound Lane, Shaldon, S Devon. Tel Salisbury 5379.

FT200, FP200 + FV200 remote vfo, late model, used little, orig packing, £285 ono. Teletype 28KSR, Murray code teleprinter with 240V mains transformer, £40. Marriage forces sale! Would deliver locally. G4AFQ, QTHR. Tel Ashford (Middx) (07842) 54307, after 6pm, any evening.

High power 2m fm mobile, Sommerkamp TS280FM, still under guarantee, gone homebrew, £160 incl Securicor. Cheap wkg S100 computer with 5in disc and video terminal, £395 ono. Adrian Andrews, 27 Manor Close, Templecombe, Somerset. Tel Templecombe (0963) 70587, evenings, weekends.

Radio Communication: April 1968 to December 1980, offers. G3XHK, 9 Wensleydale Gardens, Hampton, Middx TW12 2LU. Tel 01-979 8779.

IC202E, comp, unmodified, orig packing, fitted 144·144·4, 145·8 146, £105. 8XY/2M, comp with 50ft UR67 in three lengths, polarization switch, £18. Will deliver 50 mile radius for cost of petrol, otherwise delivery at cost. G3LFM, QTHR. Tel Reading 64712, evenings.

FT101E, unmarked cond, no mods, little used, fan, mic, £350. G2KU, QTHR. Tel 01-657 1126.

Solartron CT316 scope, £25. Neat rack mounting scope, £20. Mullard valve tester with two boxes cards, £30. Pair 28MHz walky-talkies, Repco matrix printer, incl paper, spares, £50. Paper tape reader, £10. JVC stereo cassette mechanism, new, £15. 110V monitor, £10. 6-30V 10A regulated supply, ex-computer (run mobile rigs at home), three available, £18. Nixie tubes, new 50p, ex, 20p. Buyers collect. Smith, 1 Belle Vue Road, Herne Bay, Kent. Tel 5355, evenings.

Bearcat 220FB scanning rx, vhf, vhf frequencies, rx hardly used, more interest in hf, comp with all accessories, box, £225 ono. Alan Brown, GM8LTN. 169 Lindores Drive, East Kilbride. Tel 21071.

FT101Z, immac, fan, handbook, £375. Tel 01-640 6020, 9am-4pm.

Deceased amateur's (RS31862) equipment: Yaesu FT101B, orig packing, hardly used, mint cond, £350. Tel Scunthorpe 844760, after 6pm.

Liner 2, Belcom psu, new 5-el Yagi, old 8/8 slot, £80. P/ex Mk3 Viceroy. Weir 2m converter, Sentinel preamp, £15 pair. Emsac TX2 psu 2, £10. Collectors piece: Pye Cambridge 8W1B rx, £25. Buyers collect. *Wanted:* BC221. G8IHY, QTHR. Tel 0793 826325.

KW202 rx, 160/10m, Q-mult, notch filter, matching spkr, spare set of new valves, handbook, exc cond, £130. Buyer to collect. RSGB *Amateur Radio Handbook* 1941 edition, offers. G3RY, QTHR.

Pye Cambridge 2m, dash mounting, a.m./fm selectable by front panel switch, six channels, auto toneburst fitted, fully serviced and aligned, including circuit sheets, S20, S22, R5, 145 8, R3, car dash mounting bracket, £65. FT101E, fan, speech processor, 350Hz cw filter, 12V and 240V operation, mic, manual, all leads, immac cond, swr/power meter, 50Ω high power dummy load, £425. G4GJH. Tel 0388 745126.

SRX30 gen cov rx, £125. Sinclair Mk14 computer with extra ram and calculator keyboard, £25. G3YQV, QTHR. Tel Cheltenham 513776.

Kenwood TS820S digital readout and cw filter, SP520 spkr, mint cond, £500. Going QRP. G3HRU, QTHR. Tel Leeds 677178.

Trio TS510/PS510, vgc, service manual/handbook, mic incl, £200 ono. HF5 HF5R vert antenna, £40 ono or all at £220 ono. GM8ZHT, St Mary's Well, Aboyne AB3 5BS. Tel Aboyne (0339) 2386, after 7pm.

Atlas 210X, psu with spkr for home operation, car mounting cradle, G-whip, base, Atlas whip loading transformer unit, all in perfect wkg order, offers around £350. Gilbert, G4CEB. Tel Reading 415725, evenings and weekends.

Trio TS130S, 200W p.e.p, new bands, bargain offer, £85 off list with PS30 supply. Will take reasonably priced p/exch. Trio 2kW hf linear, offers. G4JKP, QTHR. Tel Russ, Leicester (0533) 899958.

Trio 2m tx/rx, TR7500, Trio PS6 psu, cost £295, used 22h only, comp with manual, packing, £225. KW Vanguard tx, £30. Trio SP820 spkr, £20. G3UGE. Tel 021-553 0409.

KW2000 160-10m tx/rx, ac psu, spkr, Shure 401A mic, £110. MM50/500 freq counter, new, boxed, £45. Both ono. G4EMV, QTHR. Tel Peter, 0892 21504, evenings/weekends.

FT101E, exc cond, orig packing, handbook, etc, £420 ono. Pye F450 uhf base station tx/rx, £40 ono. Carriage extra. GM3RVL, QTHR. Tel 031-334 7152.

NDI HC1400 2m fm, 5 or 25W, 144·148MHz, £170. G3DUW, QTHR. Tel 0423 863663.

Collectors item: Hallicrafters SX101A, wkg, needs S-meter, £50. SB102, used little, SP600 power pack/spkr, £200. HM102 swr/power meter, £15. Cambridge kits, audio filter, not assembled, £8. Heathkit TFM1 tuner (88-108), TSA12 amplifier, £10 each. Tel Huntingdon (0480) 810073, evenings.

G3ZVC, ssb module, £80. DJ5HD 2m vfo, as *VHF Comm,* January 1971, £40. Catronics 2m preamp, £5. All incl circuits. QM Electronics pa, 0·5mW in, 2W out, suits ZVC, £40. Doram 2m 5/8 whip, £5. Offers considered. G8KZG, QTHR. Tel Reading 695213.

Scopex 4D10A 'scope, 10MHz, double beam, £95 ono. Dana 4200 digital multimeter, mains operated, £50 ono. Eagle TPA45 pa amplifier, 35W output, mains or 12V dc operation, £35 ono. G4FIG, QTHR. Tel Lancing (Sussex) 62134.

Solid-state 144MHz linear amplifier, fm/ssb, 90W output, brand new, made in USA, £80. Chris Pedder, G3VBL, Thorncliffe, 5 Royalty Lane, New Longton, Preston, Lancs PR4 4JD. Tel 0772 612289.

SB620 Heathkit panoramic adaptor, fine cond, £50. USN LM13 precision oscillator, very similar to BC221, £25. GU5ZC, QTHR. Tel 0481 54833.

New boxed QQVO750, £12. Used QQVO640, £2.50. Base, £1.50. QY3125, £5. QQVO310, £1. Burns lp filter, 4m band, £5. Trio 3·4MHz ssb filter with both carrier xtals, new, £12. Potted transformer, 550V centre-tapped, 250mA + heavy duty (10kg), £5. G3RDQ, QTHR. Tel 026-474 244.

AR88LF, perfect wkg order, service manual, £35. G3WMT, QTHR. Tel 01-303 1721.

Storno Viscount CQM1925 manual photocopy, offers. G8EZT, QTHR. Tel 01-749 2584.

TS520 tx/rx with cw filter, dc, conv, manual, exc cond, new spare 6146s, £320. ASCII AR33TU 110 baud teletype, fully working with paper tape reader, £120. G3WRT. Tel 0206 45099.

Trio TS820S digital tx/rx, AT200 atu, VFO520, used 14h only due to nature of employment, log available for inspection, £650. SM220 monitorscope, fitted BS8 scan board, as new, incl manuals, packings, £200. G3UGE. Tel 021-553 0409.

Microwave Modules MMT144/28 transverter, good cond, £60 ono. 432MHz IN4387 varactor diode tripler, 18W o/p, £14 ono. Unused RSW tuned lines, silver-plated for QQVO640A 144MHz pa, £6. G8AYY, QTHR. Tel 021-783 2996, evenings only.

Yaesu FRDX, FLDX400, separates as tx/rx, vgc, 2m-160m tx, calbr, transit boxes etc, £260. G3KPW, QTHR. Tel Gravesend (0474) 62051.

TC7 and TC9 tx/rx, 2m, used about 10h, stored five years, manuals, bandsearcher unit, 240 or 12V operation, tx requires attention, £100. G3MIZ, QTHR. Tel 074-981 2473.

IC202, nicads, charger, helical whip, £120. MM 5W, 2m tx, 144/432 varactor tripler, £20. Steve Cowie, G8KUX, 4 Porter Close, Odiham, Hants.

Hygain 18AVTWB, exc cond, £30. Cushcraft ATV4, as new, £35. Buyer to collect please. G4BXY, 372 Gosbrook Road, Caversham, Reading, Berks.

Racal RA17L rx, RA98D ssb unit, RA197B protector preselector unit, MA168B diversity unit, immac cond, inspection invited, incl all manuals, £360 the lot. G3UGE. Tel 021-553 0409.

Yaesu FT7 tx/rx, 80-10m, ssb/cw, 20W input, mic, manual, mobile bracket, orig packing, fb cond, comp with ac psu, £260. G4GGN, QTHR South Birmingham. Tel 021-705 0759.

FT200/FP200, full 10m coverage, exc cond, £230 ono. G3LCW, QTHR. Tel Deal 64197.

FT101EX, exc cond, spare valves, cw filter fitted, £370 ono. MMT28/144 transverter, services, used little, £65. G3ZAG, QTHR. Tel 01-205 5601.

Radio Communication 1974-77, comp, *Short Wave Magazine* 1974-77, comp, buyer collects. Offers. Tel Basingstoke 770421.

FT401B QRO tx/rx 80-10m, comp with desk mic, low pass filter, handbook, new pas fitted, £225 ono. G4EET. Tel Steve, 021-743 9591, evenings.

Trio R1000, cond as new, superb gen cov rx, £220 ono. Tel Manchester 061-485 5851.

Drake TR4 with ac and dc psus, £300. Sommerkamp FLDX500 tx, £100. Prefer buyer collects. G3YQL, QTHR. Tel 074381 230.

Trio 2300 2m fm with repeater, nicads, charger, £120. Trio 7010 2m ssb with cw xtal, £130. MM28/144 transverter, £80. All ono. Good cond, orig packing. C.N. Bauers. 16 Methley View, Leeds LS7 3NH.

Station sale: SB300, SB400, SB610, LG300, BC221, AT5, HROMX, Heath scope, Lynx tv camera, power units, all in good wkg order, send sae for full details. G3LP, QTHR.

Kenwood 2300 handheld, nicads, charger, etc, £120. FRDX400 rx, 160-2m, all options, £120. AR40 rotator, used indoors, £25. All exc cond, buyer collects. GM4KGH NOT QTHR. Tel East Kilbride 41659, anytime.

Trio TR9000 multimode with BO9 base unit, SP120 spkr, mint cond, six months old, orig packing, QTH purchase forces sale, £310. G4EYA, QTHR. Tel 01-777 9908, evenings and weekends.

Yaesu FT7 plus FP4 psu, mic, mobile mount, handbook, boxed, £250. Yaesu FT707 plus FP707, YM35, handbook, boxed, £450. G3CDC, QTHR. Tel Nottingham (0602) 653361.

Drake cw station: 2NT tx, 2C rx, 2CQ spkr, Q-multiplier, TenTec solid-state vfo, 275W Matchbox, all 115V stepdown transformer incl, perfect cond, all for £200. G5DDC. Tel 01-486 4137.

FT101 Mk2, exc, mic/fan, £290 ono. Datong model ASP speech processor, as new, £55. HRO rx, two psus, eight coil packs incl bs, £15. G3PHU, QTHR. Tel 01-450 4466.

RTTY: Creed 7B teleprinter, professionally checked out, 250V ac mains supply or ideal for micro-Nascom 1 details available, £25. FT202R handheld, fully xtalled, nicads, charger, ext mic, orig packing, £90. G8XVI. Tel 0742 20212, daytime or 882913, evenings.

Trio TR2200GX, S0, S21, R3-7, charger, nicads, new case, £95. Heathkit Cantenna dummy load, £8. G4AZC NOT QTHR. Tel Thanet 587509.

TR2200GX, vgc, comp with all accessories, soft case, charger, mic, nicads, manual, helical and telescopic antennas etc, bargain at £90. VB2200GX pa, £40. Both in orig packing. G4BRG, QTHR. Tel 01-529 3803.

ITT Starphones, easily converted to 70cm, single channel, without nicads and xtals but with circuit/data, £12 each. TS520 cw dc-dc 12V power supply, £340. MM 2m transverter, suit above, £50. G8MYH, QTHR. Tel 01-949 3415.

CR100, £10. R1155, £10. ARAC102, £50. All have been idle for years. HRO "kit" coils, 200kHz-30MHz, dial chassis etc, £15. 16 line, 64 char vdu, pcb, £30. 2m quad, £10. Frisby, G3ZNY. Tel Milton Keynes 562780.

Yaesu FL, FRDX400, 2 and 5m rx, handbooks, tx used only 3h, vgc, £300 ono. Trio R300, perfect, £70 ono. GW8GOL, QTHR. Tel Penarth 701240.

FT7, exc cond, used to drive transverter only, £190 ono. Sinclair ZX80 computer, extra 2K memory, offers. *Fundamental Algorithms,* by Knuth, Vol 1, £2. GW8KSF, QTHR. Tel Alan, 0978 759732, after 5pm.

Four channel stereo Sanyo rx/amplifier DCX3300KA, £90 or offers. G8YNV. Tel Richard, Milton Keynes (0908) 562886, evenings.

Storno 500 2m handheld, toneburst, leather case, charger, spare nicads, cond indicator, handbook, antenna, £85. 12/52MHz 2m xtals, £3 pair. Frequency counter, unfinished, £20. 17in three-tier cabinet, £5. VSWR meter, £15. 70cm 18E Parabeam, £15. LB Viscount, £8. Tel Reading 332582.

IC202 with nicads, one extra xtal, £100. Tel 01-843 2411, ext 539, 9am-4pm weekdays.

TS520S, immac cond, £350. DG5 digital readout and counter, £75. FDK700E 25W synth, £150. *Wanted:* Unit five Wharfedale kit. Reel-to-reel hi-fi three-head tape deck. G3UCE, QTHR. Tel Heysham 51760, after 6pm.

Sommerkamp TS280FM, 50W, SMC 7λ8, never used, £170. Buyer inspect/collect. M. Brenton, 1A Albion Place, Canterbury, Kent CT1 1LH.

Exchange IC240, xtal toneburst, simple scanner, switchbox for quality portable: IC215, IC2E, TR2300, etc or IC240 plus 5ch M5 Starphone RB0, 2, 4, 6, 10 for IC30A, Multi U11 in good cond. G8GVV NOT QTHR. Tel Phil, Daventry 4295.

KW201 rx, 100kHz calibrator, KW Q-multiplier, £75. Mosley TD3JR trap dipole, £15. Postage extra or buyer collect. G3YIU, QTHR. Tel Brighton (0273) 602727.

Datong FL1 audio filter with psu, mint cond, 3h use only, £50. FRG7, fitted 2kHz filter, mint cond, orig box, atu, £150. 144/28MHz converter, £12. Datong morse tutor, £35. 33 New Road, Horbury, Wakefield. Tel 270525.

Mizuho SB2M with mains psu and carrying case, £90. G8CXQ, QTHR. Tel Martyn, 0926 313669.

QTH: mature four bedroom semi, Ainsdale Village, Southport. Incl new "granny" suite, no garage, drive accommodates two cars, extensive shack in loft, rewired, gas central heating, close to amenities, one mile from shore, £32,250 ono. Tel Duncan, 0704 74658, evenings.

FT101E, exc cond, £400. Microwave Modules MMD050/500 freq counter, as brand new, never been used, £50. Ferrograph Series 4 professional reel-to-reel tape recorder, mono, £50. Hill, G4HZE. Tel 0752 361944.

Exchange Mustang 3-el, dismantled, clean, good cond, Telomast with all rigging, guy plates, serviceable cond, hand-rotated, erectable single-handed, straight swop good 18AVTWB. The catch is that you collect/deliver. G8DV, QTHR. Tel Cheltenham (0242) 20195.

TR9000 2m multimode, orig packing, £300. MM 432/144 70cm transverter, £85. Pye F460 base with talk-through (70cm repeater), £110. Telequip S51B oscilloscope, £65. Zycom CI110 rf pa, 130W, out, £80. FP301 psu, 13·8V, 25A, £70. SBE Optiscan scanner, 30-512MHz, £75. G4AFY, QTHR. Tel Kidderminster (0562) 63358.

Pye PMR2, modern transistor, high band fm, 150W dc, 03S for 20db, tone notch, time out indicator, cw mic, cables, spkr, cradle, eight-channel control box, never used, orig packing, unique rig, £170 ono. Set boards like above for 29·36MHz band, £40. G8GHZ, QTHR. Tel 0249 4188, ext 141, office hours.

10GHz equipment: homebrew separate rx, tx with focal plane dishes, homebrew tx/rx, dummy load, horn antennas, diode detectors, attenuator, phaser, wavemeter, micrometer, many other parts, together is ideal experimental kit, £85. Buyer collects. G3NFB, QTHR. Tel 0925 815394.

FT101B, FV101B ac/dc leads, fan, mic, manuals, both immac, orig packing, £365, or offers for split sale. Liner 2, preamp, extended range, mic, mobile mount, manual, vgc, £100 ono. Nife battery, 12V 120AHr, £15. G3ZTZ, QTHR. Tel 0276 25430, evenings.

TS520S, £395. SEM Z-Match with 160m, £45. Keyer with two 1k memories, £45. CW filter for TS range, £25. SB610 monitorscope, £45. G3SJJ, QTHR. Tel 0602 253102.

JR599 Custom Special, 2m and 4m converters, £140. Datong FL1 active audio filter, £45. Philips N4506 tape deck, five tapes, £200. G8PAC, QTHR. Tel 061-456 3375.

SB104A and hb psu, built into matching SB604 spkr case, cw mic, handbooks, £295. Minimitter Mercury hf tx, 150W, cw, a.m., cw lpf, handbook, £20. TW 160m tx, cw, a.m., £20. G4HFT, QTHR. Tel Gloucester (0452) 33698.

FT207R 2m fm tx/rx with external mic, NC2 charger + spare battery, £150. Creed 444 teleprinter, £99. Heathkit IO-102 scope, £60. Belcom AMR104 2m scanning rx, £60. FTDX500 amateur band rx fitted 2m/4m Microwave Modules converters, £135. G3OUF, QTHR. Tel Amersham 5988.

Racal RA17 rx, 1-30MHz, £250. Solartron CD513 oscilloscope, £30. Universal avometer model 7, £35. Avo all-wave oscillator, £25 ono. Tel Stamford (Lincs) 54845.

2m Sentinel converter, 28MHz op, serviced by SEM, £13, p&p extra. B44 Mk3 4m tx/rx, £5. Wavemeter class D No 2, £10 ono. Collect only. C. J. Coward, G3YTU, QTHR. Tel 0444 58992.

TR7010 2m ssb, 144·1-144·335, £130. TR2200GX, auto toneburst, mobile mount, eight channels, £100. Both exc cond, boxed, 4CX250B new, unused, £8. G8HAY, QTHR. Tel Driffield (0377) 46919.

TR2200G, fitted S20-22, R5, R7, reverse R7 with nicads, charger, case, bargain at £80 ono. F460T, not converted, make exc 70cm fm base station or repeater, manuals, £120 ono. G8MKX, QTHR. Tel 0342 26366.

Trio QR666 gen cov rx, marker, fm detector, £80. Digitronics five to eight channel optical tape reader, £15. Peripheral Dynamics punched card reader, £25. Heathkit HFW1 oscillator, £19. Singer line printer and spares, drive belt broken, £45. G8EII. Tel Letchworth 6324.

TR2200GX, immac, S18, S20-23, R2, R4-7, nicads, helical, carrying case, charger, etc, boxed, £100. MMD050/500 500MHz counter, perfect, £50. G4JCX, QTHR. Tel Saltash (075 55) 3503, evenings, weekends.

Microwave Modules 144/28 transverter, £65. Trio VFO30G vfo for TR2200GX or TR7200, £55. Yaesu FT7, 10W hf tx/rx, mint cond, never used mobile, all 10m xtals, £260. G8GHU, 29 Overlands Road, Wyke Regis, Weymouth, Dorset DT4 9HS.

FT101E, fan, mic, speech processor, dust cover, used little, mint cond, need smaller rig for mobile, £385. G3WPB, QTHR. Tel 0202 644546.

TS820 with cw filter, £420. AT200, £60. Both in mint cond, all accessories, handbooks, boxes, etc. Beef up your TA33JR with a DX31 2kW trap dipole, unused, £30. G3NWG, QTHR. Tel 0245 83520, evenings.

Katsumi EK150 cw keyer, mint, £50. Shure 444 desk mic, new, boxed, £22. Trio LF30A hf filter, 1kW, new, boxed, £12. Three 2V 30AH accumulators, new, £15 lot. R. Frew, G3SEF. Tel Cheslyn Hay 415369.

FT202R handheld, 6ch, 5ch fitted, nicads, charger, £80. FT227R, no mods, £175. Solartron CD1400 double beam scope, wide band, plug-in amps, £45. G8CZH, QTHR. Tel 01-859 1852.

Mentor (Muirhead) M100M professional partial-synthesis rx, 100kHz-30MHz in seven bands, digital readout to 10Hz, bandpass rf stages, Schottky diode mixers, mosfets in rf stages, list price £1,552, bargain at £350. Tel Reading (0734) 474064.

FT101ZD (WARC), nine band tx/rx, as new, mic, fan, spare pa valves, going mobile, £475 ono. Liner 2, fitted preamp, £80. Datong FL2 audio filter, as new, £60. G4KSI. Tel Hatfield 65182.

FT10B, cw filter; FV101B Europa Bs, 2m and 4m, as new; Heath micro trainer ET3400 and EE3401; Heath ET3200 digital trainer; HW17A with fm; Heath vfo HG10B; CT471A electronic voltmeter probe; Info Tec code reader tx/mon read-out; BC221 psu charts. Sensible offers. G4DEL, QTHR.

TR2300 tx/rx, nicads, helical, mobile mount, orig packing, VB2300 10W/2W preamp, £200 ono. C146A tx/rx, handheld, fitted four channels, case, nicads, helical, + 10W/2W homebuilt preamp, built-in charger, £70 ono. G8TBI, QTHR. Tel 01-500 4183.

Heathkit HW100, psu with QRP switch, spkr, speech processor/cw filter, IRT, mods, well-documented, quality xtal mic, manual, £125. HF/vhf vswr/power meter, £6. G2DYM trap dipole and balun, £20. 20ft al mast, 0·187in wall, £15. Comp hf base station, £150. XCR30 Mk2, mains psu, dual-gate fr amp, gains control, plug-in xtal, driven 100/10kHz markers, 2m converter C.O. het, covers shipping band by switched preset varactors, well documented mods, manual, £75. G4IVE, Eastwood area of Leigh-on-Sea. Tel Southend (0702) 529188.

Tower, 60ft in 10ft sections, galvanized, perfect, two bases, top bearings, will self-support to 40ft, offers? Jaybeams D82M slot, £20. 4Y4M Yagi, £15. Sentinel 2m converter, Mosfet 2-4MHz i.f., £15. Pair 28MHz handitalkies, £25. BC221, orig charts, £18. Burns FMD1 fm module, £5. Brand new HC6U xtals, R6 7 rx 45MHz, tx 8MHz. £3 pair. Hewlett Packard 430C microwave power meter, £10. RTTY teletype 14 tape reader, £10. Creed tape punch with tapes, £10. Centronics 101 printer, 165 cps, 132 col, £225. SWTP CT64 terminal, £200. Marconi Elliott Videodata 4000 terminal, tx/rx ASCII or Baudot, £125. Autonomics vdu with 35mm back-projector (not wkg), £15. Moving so must clear. G3IUZ, QTHR. Tel 0525 220261.

HW101, HP23 psu, late model, fitted cw filter, spare valves, manual, no mods, exc, £185. G3CPM, QTHR. Tel 0386 852753.

New leather safety belt, suitable pole or tower work, £10 plus p & p. Tel 0427 611160.

Standard C146A five channel 2m fm handheld, 2W, charger/base unit, helical stub antenna, quarter wave whip, leather case, external rechargeable battery pack (deac cells), £80 ono. G8VGM, QTHR. Tel Scarborough 69592.

FT101E, exc, cw filter, dc lead, £400 ono. TS700G, perfect, £345 ono. ATU HC250, £30. Panting, G4ELY, QTHR. Tel 0734 694367.

Oscilloscope type 13A, Hartley Electromotives, twin-beam, leads, probe, good wkg order, £45. Tel Romford (0708) 45257.

TS820, not digital, less than three years old, unmodified, in exc cond, manual, orig boxes, £410. *Wanted:* Hygain 18V antenna. G3KOU, QTHR. Tel 02357 66462, evenings.

TS700G, matching spkr unit, £290. MMA144V, £25. 16-el Tonna, £20. CDE TR44 rotator, £50. Stolle rotator, £28. G3POX, QTHR. Tel 0480 811549.

Trio TR7500 2m fm tx/rx, exc cond, £190. Belcom Liner 2 2m ssb tx/rx, cw mod, £90. G3LNW, QTHR. Tel 0761 32248, before 1 June.

FT101E, exc cond, orig packing, all accessories, prefer buyer collect, £390. G3JGW, QTHR. Tel Cuffley 5080.

Mutek rx front end board for FT221/FT225, £42. FT221R, no mods, exc cond, orig packing, £290. G8BWR, QTHR. Tel 0926 498388.

Stolle 2050 rotator, never used, £33. Microwave Modules 70cm converter, MMC432/144S, £23. G4CLA, QTHR. Tel 061-370 3160.

VHF pa chassis, QVO640A, 2X4CX250B, £15. Cowl gill rotator, control box, cables, £15. 500MHz dfm, ovened, £35. 50MHz dfm module, new, £30. 2m 5-el Yagi, 10m UR67, £10. 13·5V 20A transformer, £7. Carriage extra. *Wanted:* 2m ssb rig, pa. G8MLK NOT QTHR. Tel 01-289 7415, evenings.

Icom 202 ssb, mic, vgc, £110. TM5613 2m rx, 10 xtals for S20, S22, £30. Pye Westminster W15, fm, S20-23, S0, five repeater channels, mic, £80 ono. G6AUW. Tel Weymouth 786930.

14AVQ/WB, new Nov 80, £50. 2 Beechmill Drive, Culcheth, nr Warrington, Cheshire. Tel Culcheth 4797, evenings.

Heathkit 2m fm tx/rx HW202, six channel scanner, mic, toneburst, realigned Heathkit, £65. 80m direct conversion rx, small, neat, £15. Doyle, G3RDK, QTHR. Tel 01-856 7478.

FT401 mic, no mods, exc cond, £240. Valradio transverter, input 12V dc, output 115-230 50Hz, 250W, £50. G2VO, QTHR. Tel 0535 603021.

Drake TR4C tx/rx, TA33JR triband beam, AR40 rotator, all hardly used, offers. G3YFW, QTHR. Tel 586 8678, evenings.

Heathkit HW100, 180W p.e.p., 170W cw, 80-10m, homebrew psu, used little, vgc, fitted rit, £150. Buyer collect. G4BTV, QTHR. Tel Fareham 235164.

Icom IC211E automatic toneburst, nine months old, in orig packing, vgc, £360 ono. Pye Cambridge U10B, six channel capability, RB0, SU8 xtals, incl toneburst, £50 ono. G8BQ, QTHR. Tel 0205 65975.

FT101ZD, six-band, fan, cw filter, £460. CW filter for FT101 Mk1 etc, £15. G3LLL clipper for FT101 Mk1, £10. HQ1 mini-quad, damaged, £20. G3XTT, QTHR. Tel 0604 37894, after 6.30pm.

Regulated mains psu, modular construction, 13·8V at 15A continuous, overvoltage protection, fully adjustable current limit, suit mobile rig and linear amplifier, £40. G8MNZ, QTHR. Tel 0604 410420, after 7pm.

KW202 rx, KW204 tx, KW107 atu, a complete hf station for £400. G4ICY, West London. Tel 01-568 5019.

Eddystone 740A communications rx, gen cov 600kHz-30MHz, matching spkr, Q-multiplier, full data, exc wkg order, can deliver 50 miles or buyer collects, £40. Werra Zeiss 35mm camera, good cond, £15. G3KRT, QTHR. Tel Ruislip 38287.

Pye Cambridge AM10B 12V, high band, complete, unmod, qty two, £25 each of £40 for pair. G8RGW, QTHR.

FRG7, new Jan 1980, mint cond, orig packing, handbook, minimal use, £150. G4EHI, SE Kent. Tel 030384 629, evenings.

TS120S, hardly used, lost interest in hf bands, £320. Buyer collects or pays carriage, would consider QRO 2m, or 70cm linear, must be well made, in part exchange. *Wanted:* Sota 1,296/144MHz transverter. G8PPR, QTHR. Tel Bradford (0274) 674396.

FTDX401, FV400S, Shure 526T desk mic, all exc cond, £300. Morse vdu comprising Xitex MRS100, G3PLX vdu, Apple 2 keyboard, 10in black and white monitor, £300. GM3RUI, QTHR. Tel 0224 741741.

MM432/28S transverter, £110. QM70 432/28 transverter, £80. IC210 2m fm 10W vfo, £170. Lafayette mains/12V rx, fm 144-170MHz, £25. FT401 with matching mic and spkr, cw filter, 560W p.e.p. input, £250. JXK converter, 10/2m, £5. Oscaramp 10m preamp, £5. G4ALV, QTHR. Tel 01-460 3852.

Morse key, type F, £3. Preselector, three gang condenser for KW2000, £3. New Gardners mains transformer, 260V, 55mA twice, 310V, 210mA, 6·3V, 2·2A, 1·25A, 1A, 0·3A, £4. Three 8mfd 600V paper condensers, Z112825, £4. G3MBL, QTHR. Tel 01-445 4321.

Trio TS130V with SP120 and mic, mint cond, £345. Microwave Modules transverter 432/28S, £95. Shure 444 mic, £15. 10·245MHz xtal, £1. *Wanted:* Microwave Modules 432/144 transverter, can deliver/collect reasonable distance. John Lemay. G8KAX, QTHR. Tel Chelmsford 67131 ext 241, daytime.

2m multimode FT220, 16 memo (4 by 4), cw, usb, lsb, fm, norm rev repeater, tb, sidetone, 240/12V operation preamp, £170. Trio 7800 fm 2m mobile, exc rig, 15 memo, £180. Tel 0702 557374.

TR2200GX, 12 channels, charger, carry case, homebrew 15W pa, incl a low noise preamp, £110 ono. G8SFM, QTHR. Tel 066-68 307.

FT101, fitted with top band, nice cond, cw filter fitted, orig packing, manual etc, £260 incl Securicor delivery. Demo if required. Large selection radio control equipment, radio, phones, engines, boots, sell or exchange for radio equipment. Tel 0269 860649.

Yaesu FT2 auto 10W 2m fm, xtalled R0, R3, R6-7, S20-23, autoscan, 12V or mains wkg, vgc, in orig packing, £100. GW4JZY, S Wales. Tel 0495-290 139.

Drake TR4CW tx/rx, ac psu AC4, dc psu DC3, RV4C remote vfo, spkr, spare valves, pas, Drake mic, separate spkr in wood enclosure, ETM3C el-bug keyer, the lot, £420. Reason for sale, going overseas, temp QRT. G4LAC NOT QTHR. Tel 0253 729998, Lancashire.

Drake SSR1 communications rx, 0·5-30MHz, u/lsb, synthesized. Compact 6MHz oscilloscope, complete with probes and leads. BC221 frequency meter, charts and mains psu. Tel 01-949 2317.

WANTED

Pye PF2 Pocketfone nicad battery charger, single unit. G4BRL, QTHR. Tel 022-023 3013.

VHF a.m./fm rx, continuous tuning from 50-250MHz preferably. Must be commercially built and in reasonable condition. Collection can be arranged. G3LSL, QTHR. Tel Dave, 0858 880746, after 7pm.

CW tx or tx/rx. AR88LF main dial or US AR88LF for spares. 2m 5/8 whip. *For sale:* Eddystone 8802, offers. AR88 cabinet, £15. 5X62 rx, £50. Mullard valve tester, £5. Cain, 18 Oaky Balks, Alnwick, Northumberland. Tel 602487.

VFO30 for Trio 7200G or details to build vfo for same. Purchase or loan. H. Hull, 56 Weymouth House, Lichfield Street, Tamworth, Staffs B79 7BE. Tel Tamworth (0827) 50488 or Tamworth 68576.

Collins late round dot, series 75S3C, new, mint cond, not marked, no mods etc, serial number above 30,000, full details and price please. Collins mechanical filters, F455 FA31 and F455 FA40, any other Collins S-line spares. G3DAM, QTHR.

Trio R1000 rx, good cond essential. G3WEX, QTHR. Tel 021-354 4265.

Royal Navy B29 rx vlf/lf, info on low power mf/hf tx as fitted Mull of Kintyre type hq ship. LF df loop antenna, control motor. GM4HXW, QTHR. Tel 050-55 2712.

Veritone rx, DX Mates CR150. Any info, diagram. Loan to copy or buy. G4BCJ, QTHR. Tel 01-478 5303.

£40 offered for Marconi rf absorption wattmeter type CT401-TF1205/5. Will collect. G4JCG. Tel Measham 72275, evenings or weekends.

B2 suitcase set or any other wartime suitcase/spy type radio. Any cond or incomplete welcome. G8VDZ, QTHR. Tel 01-949 2317.

Compact top band cw/a.m. tx with ac power supply,

pref internal. Will collect reasonable distance Merseyside. G3JIC, QTHR.
Computing mags by new enthusiast, good QRP hf rig. Details to EI1DH, QTHR. Tel Dublin 507141.
Early *Wireless Worlds,* pre-1938 for study and reference. I have a large number of duplicate *WWs* 1944-80 incl comp years. Prefer to exchange. G8PWO, QTHR. Tel Sevenoaks (0732) 6241, evenings.
Original cabinet for the Murphy three-band, M-L-S bands, A104 table model, cost of sending will be refunded to sender on receiving cabinet sent. Mr N. Mortimore, 62 Ashbourne Road, Mitcham, Surrey CR4 2BA.
Exchange antique guns or good English shotguns for modern Drake or Collins hf rig. Tel 021-556 1322, business hours, for details.
Icom IC2F service manual, circuit diagram or alignment instructions for purchase or loan. G8POC NOT QTHR. Tel Cumnor 2823, evenings only.
4D22 or 4D32 valve. Hellschreiber rx printer. G3RFI, QTHR. Tel Potton (0767) 260800.
HF tx/rx for use in a primary school, KW2000 series or similar. Must be reasonably priced. G3UIE, QTHR Hants. Tel 04895 2108.
450H af choke for BC221. Mains psu, 600V, 250mA output. G8IEM, QTHR. Tel Horndean (0705) 591735.
HW101, HW100, FT101, Trio 559 Custom Special tx, all with handbooks and power packs, wkg or not. W.H.Y? G2DCF, QTHR.
Trio VFO5D in good cond. Adrian Andrews, 27 Manor Close, Templecombe, Somerset. Tel Templecombe (0963) 70587 evenings/weekends.
Aircraft rxs: R1155. BC348, and command rx/txs in restorable cond by amateur interested in second world war aircraft. Manuals also needed. Price and cond to G3UKH, 58 Bolbec Road, Newcastle upon Tyne NE4 9EP. Tel Newcastle (0632) 744115.
RAE correspondence course, must be complete and in good cond with all study notes. P. C. Astfalck, 5 Eastlands Grove, Coventry. Tel Coventry 592792 or Coventry 456666, works.
TA33 or similar 3-el triband beam. G4IRN, QTHR. Tel 061-865 0456.
Desperate: Pye Starphone uhf handheld circuit diagram or manual, purchase or loan for photocopy. Will gratefully refund any costs. Model 30LRU36P. Please help, run out of guesses. G8GON, 29 Dukes Road, Budleigh Salterton, Devon. Tel 03954 3735.
FRG7 or equivalent gen cov rx for young swl. GM3RVL, 5 Hillview Drive, Edinburgh EH12 8QW. Tel 031-334 7152.
Eddystone 898 dial or similar rectangular dial with straight scales. Gilmour, 48 Kinlock Avenue, Stewarton, Ayrshire. Tel 0560 83093, after 6.15pm.
B2 tx/rx, any units or accessories, cond unimportant. Canadian 52 tx and accessories. Morriss, G4GEN, QTHR. Tel 082 571 2205.
Yaesu FL50B tx and FV50B vfo. Buyer will collect. Five-band 10-80m vertical antenna. D. Wright. Tel Orpington 29586.
Trio 7500, must be vgc with manual, standard accessories, details please to G. Foster, 23 Coberley Road, Cheltenham, Glos. Tel 0242 515074.
Antenna tower, 30ft, self-supporting, rotator, swr gdo. AR88, good cond. G3PVT, QTHR. Tel 021-373 0060.
Grundig Satellite rx in good cond with bfo. Can collect. G4JQI, QTHR. Tel 025482-3366.
KW E-Zee Match. G4BRE, QTHR. Tel Crawley, Sussex (0293) 25903.
AR88 or similar gen cov rx. Must be wkg, reasonable price. Can collect within limits. G8DRI, QTHR. Tel Chesterfield (0246) 850726, after 6pm.
Microwave Modules transverter type MMT28/144 (to give 10m band coverage from a 2m tx/rx). Elements for Bird Thruline, wkg or faulty. Bencher keying lever. Solid-state 100W 10m linear amplifier for mobile use. G3AZI, QTHR. Tel 0772 37815.
Circuit diagram for Venus SS2, sstv monitor, loan or buy or photostat copy. GM4DAE, QTHR. Tel 041-778 5040.
RSGB tie pin with emblem—no longer in production. Has anyone still got one not in use? G3OJI, QTHR. Tel Ware (0920) 4316, evenings.
A reliable, reasonably priced communications rx for enthusiastic schoolboy. Lafayette or similar. GW4KGI, "Eleven" Bryn Derwen, Abergele, Clwyd.
Traps for 40m multiband antenna. Resonate at 14MHz for K2GU design (similar to W3DZZ but shorter). Tel Histon 2365.

Mobile rallies calendar

All information for inclusion in this column must be sent to the editor, not to RSGB HQ.

3 May—Maidstone Mobile Rally, Y Sports Centre, Melrose Close, Cripple Street, Maidstone, Kent. 10am-5pm, trade stands open at 11am. A special event station, GB2YSC, will be in operation. A beer tent will be open during the rally. Details from G4GKW, c/o Y Sports Centre.
3 May—Spalding & DARS Tulip Time Mobile Rally, The Grammar School, Haverfield Road, Spalding. Start 10.30am. Talk-in on 144 and 432MHz. Details from sec G. Parker, G4EMK, 29 Saxon Way, Bourne, Lincs.
10 May—Barry College of Further Education RS Mobile Rally, Barry Memorial Hall. Bar and food available. Talk-in on S22. Details from K. B. Hodge, GW8BIP, Grafton, Claude Road West, Barry CF6 3JG.
17 May—Northern Mobile Rally, Victoria Hall, Victoria Park, Keighley. Organized by the Otley R&ES. Doors open 11am, 10.45 for wheelchair and blind visitors. Talk-in on 144MHz and on GB3WF, RB14. Many attractions including film shows and safe play area for junior ops. Details from P. A. Horne, G8KRU, QTHR, tel 0943 74986, after 5.30pm.
24 May—East Suffolk Wireless Revival, Ipswich. Talk-in on 144MHz by GB4SWR. There will be a transceiver clinic and antenna testing range plus all the usual attractions: sideshows, stalls, light refreshments and bring and buy etc. Further details from Jack Toothill, G4IFF, QTHR. Tel 0473 44047.
24 May—Plymouth Radio Club Rally, Tamar Secondary School, Paradise Road, Stoke, Plymouth. Open 10.30am-4.30pm. Talk-in on S22, SU8 and RB2 by GB2PRC. All primary routes to rally signposted. Ample car parking. Equipment, components, RSGB bookstall, bring and buy, raffles, Raynet, GB3NC and GB3CH repeater groups, etc. Licensed bar, refreshments and food available. Details from John Benoy, G8PSC, QTHR.
7 June—Hull & DARS Mobile Rally, University of Hull Students' Union Building, Cottingham Road, Hull. Opens 12am. Talk-in on S22 fm, GB3HS monitored for calls. All usual attractions including trade stands, bring and buy etc. Further details from I. B. Caress, G8EAH, 124 Dayton Road, Priory Road, Hull, Yorks.
14 June—RNARS 21st Birthday Mobile Rally. HMS Mercury, 10am-5.30pm. There will be talk-in on 432, 144 and 3·5MHz. Plenty of parking, with on-site space for invalid visitors. The usual trade stands and arena events will be present. Details from G4DIU, QTHR.
14 June—Elvaston Mobile Rally, Elvaston Country Park, 5 miles south-east of Derby on B5010. Organized by the Nunsfield House ARG. Open 10am. Trade stands, displays, Post Office etc. On-site catering facilities. Grand bring and buy sale. Talk-in on 144 and 432MHz. Further details from I. Cage, G4CTZ, QTHR, tel Derby (0332) 71875.
21 June—Denby Dale & DARS Rally, Shelley High School, Nr Denby Dale on the B6116, access from M1 junction 38 or 39 and M62 junction 23 or 29. Open 11am. Talk-in on GB4CDD on S22 and GB8CDD on SU8. Trade stands, bring and buy, refreshments and licensed bar. Car parking and picnic area. Details from J. Clegg, G3FQH, QTHR.
28 June—Longleat Mobile Rally, Longleat Park, Warminster, Wilts. Talk-in on 144MHz, callsign GB3LMR. New site closer to house. Restaurant available. Please see display ad for details of camping etc. Details from G4FRG, QTHR.
28 June—Rolls Royce Radio Club (Barnoldswick) Mobile Rally, Sports & Social Club, Barnoldswick. Trade stands, refreshments, bring and buy stall etc. Radio talk-in. Details from L. G. Logan, G4ILG, QTHR.
28 June—Bangor & DARS Mobile Rally. New venue: Crawfordsburn Scout Camp, Crawfordsburn County Park, nr Bangor (Co Down). Usual attractions, bring and buy, refreshments, coastal walks, beach within ½ mile. Further details tba. Enquiries to club sec Roy Evans, GI4KZN, Tel Bangor 4072.
12 July—Worcester & DRS Rally, formerly Upton Rally. **New venue:** Droitwich High School, Droitwich, Worcs, three miles from M5, junction 5. Further information will be announced later. Details from Tony Blisett, G8NSL, QTHR, tel Worcester 620507 or Mike Tittensor, G4EKG, QTHR, Tel Evesham 41105.
19 July—Sussex Mobile Rally, Brighton Raceground, Racehill, Brighton, Sussex, 10.30am. Special event station GB2SMR will be in operation. Many attractions including free minibus trips to Brighton beach. Free parking for 4,000 cars. Further details from A. K. Barker, 38 Elphick Road, Newhaven, Sussex BN9 9SY.
19 July—Cornish RAC Mobile Rally, at the Cornwall Technical College, Pool, Camborne. Details from G2ABC, QTHR.
26 July—Anglian Mobile Rally, Stanway School, Colchester, Essex. Open 10am-5pm. Talk-in on 144MHz. Further details from G3YAJ, tel 0206 39 3938.
26 July—Scarborough ARS Mobile Rally, The Spa Ocean Room, The Sea Front. Open 10.45am. Talk-in on S22 and GB3NY (RB0). Refreshments, licensed bar, bring and buy, raffle etc. Free admission. Help available for RAIBC members wishing to attend if contacted in advance. Details from Margaret Crofts, G4JAQ, 43 Broadlands Drive, East Ayton, Scarborough, N. Yorks YO13 9ET, tel 0723 862638.
9 August—Derby & District ARS Mobile Rally. Lower Bemrose School, Littleover, Derby, site as previous years. All usual attractions. Details from hon sec Jenny Shardlow, G4EYM, QTHR, tel Derby (0332) 556875.
16 August—Preston ARS 13th Annual Mobile Rally, Walton-le-Dale County High School, Bamber Bridge, Preston (one mile from M6 junction 29). Talk-in on S22. Usual attractions including bring and buy stand. Open 11am. Details from G4KMC, ex-G8SIV, QTHR.
6 September—Vange ARS Mobile Rally, Nicholas School, Basildon, Essex. 10am-5pm. 144MHz talk-in station, callsign GB4VMR. Many attractions including trade stands, bring and buy, raffle, and refreshments. Details from Albert Smith, G4FMK, QTHR, tel 03743 3805.
13 September—Telford Mobile Rally, Telford New Town Centre Malls, Shropshire. All usual attractions plus some unique to this rally. Full catering and licensed premises on site. Over 50 trade stands. Further details from G8DIR, tel Shrewsbury 64273; G8UGL, tel Telford 584173; or G3UKV, tel Telford 55416, all QTHR.
20 September—Peterborough Mobile Rally. New venue: Wirrina Sports Stadium. Talk-in on vhf, uhf and hf, GB3PMR. Many facilities, plenty of free parking, overnight caravan sites by arrangement. All the usual radio attractions in the sports hall, bring and buy, bar, refreshments available. Details from D. T. Wilson, G4KSW, 4 Conway Avenue, Peterborough, tel 76238, after 2pm and weekends.
27 September—Harrow Mobile Rally. The new venue is Harlow Sports Centre details to follow. Further information from Phil Dunbar, G8FRG, QTHR, tel 0279 39851, ext 251, office, 32486, home.

Special event stations

All information for inclusion in this column must be sent to the editor, not to RSGB HQ.

GB4MAR, 1-30 June
Station will operate at Midlands ARS club headquarters, 294A Broad Street, Birmingham 1, on all bands, all modes, to celebrate the golden jubilee of MARS. There will also be a special contest, and awards. Details from G4IVJ or G8BHE, both QTHR.
GB2MN, 1-30 June
This station will be part of the RNARS 21st birthday celebrations. It will be on all hf bands, operated from the College of Nautical Studies, Warsash, Southampton. Special QSL cards will be available, and maritime stations are especially welcome.
GB4STD, 7-8 July
Open days, St Dunstans, Ian Fraser House, Ovingdean, Nr Brighton, Sussex. Operating on all bands using audible aids. Details from Ted John, G3SEJ, QTHR.

DATONG ELECTRONICS LIMITED

...and the beauty isn't just skin deep!

Multi-mode Audio Filter — Model FL2

Adds variable selectivity to existing communications receivers without internal modifications. Gives extremely sharp pass-band edges for truly exceptional filtering performance on all modes but especially for SSB. Its 10 poles of fully variable low and high pass filtering **give sharper filter edges even than normal crystal filters**. A separate manually tuned notch filter is also fitted. In "cw" mode all 12 poles of filtering are combined to give exceptional skirt selectivity.
Connects in series with loudspeaker.

General Coverage Converter — Model PC1

Model PC1 converts any good two metre SSB receiver or transceiver into a **superb general coverage communications receiver.** Coverage is 0 to 30 MHz in thirty synthesised bands of 1 MHz and no receiver modifications are required.
Advanced **parametric mixer** and **LS1 frequency synthesiser** ensure that the overall performance is limited only by that of the main receiver.
Also usable with 28-29 MHz receivers via a conventional 2-metre converter.

Automatic r.f. Speech Processor — Model ASP

Makes your transmitted speech louder and clearer for a given transmitter power. The 'Rolls-Royce' of r.f. speech processors Model ASP **adjusts itself to suit your voice level** and your microphone. Simply select the degree of r.f. clipping in steps of 6 dbs. Connects in series with microphone.

The Answer to the Morse Test. Model D70

The Datong Morse Tutor (Model D70) is your passport to a full licence. Compact with internal battery and speaker plus personal earphone it provides unlimited random morse for practice.
With Model D70 you can practice morse anywhere anytime, and at your own pace.
With the Morse Tutor practice becomes a pleasure because you get results quickly.

Active Receiving Antennas — **Models AD270, AD370**

Ultra-compact receiving antenna systems giving wideband coverage from 200kHz to over 30MHz at high sensitivity.
Models AD270 and AD370 give **similar receive performance to large conventional antenna systems yet are only 3 metres in overall length.** The balanced dipole configuration also gives good rejection of local interference.

Model AD270 (an upgraded version of Model AD170) is for indoor mounting.
Model AD370 is waterproofed for outdoor use. Model AD370 & AD270 head units only are also available separately for upgrading earlier AD170 systems.

Model D75 RF Speech Processor

Model D75 uses the same method of r.f. clipping as in Model ASP but features manual adjustment of input level rather than the automatic system used in Model ASP.

Like all our r.f. clippers the unit helps your speech signals stand out from the next under DX conditions. Many users consider the use of our r.f. clippers more effective than a linear.

MODEL FL1 Frequency-agile Audio Filter

As unique now as when we first invented it, model FL1 is still the only audio filter which is able to automatically notch out an interfering heterodyne from SSB speech signals. This ability provides the perfect answer to those who "tune up" on occupied channels. As a cw filter it is surpassed only by our new Model FL2. Independent control of bandwidth and centre frequency gives beautifully smooth adaptability to varying conditions.

INGENIEURBÜRO ULRICH HANSEN

VHF & UHF PREAMPLIFIERS: A new range from Ulrich Hansen of West Germany

A range of high quality in-line preamplifiers for 2 metres or 70 cms, featuring ultra-low noise figures and state-of-the-art design. The range includes R.F. switching capability from 60 watts P.E.P. to 500 watts P.E.P. and choice of silicon low noise devices or the latest gallium arsenide MESFETs for best possible noise figure. Indoor or mast mounted options are also included.
Full details free on request.
These units represent a cost-effective way of improving your DX receiving capability.

Products not shown in this advertisement

Model Datest 1 Transistor Tester
Model Datest 2 Transistor Tester
R.F. Speech Processor
Model RFC/M,R,F. Speech Processor PCB Module
Model MPU. Mains Power Unit.
Accessory Leads.

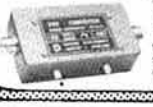
PRICES: All prices include delivery in U.K. basic prices in £ are shown with VAT-inclusive prices in brackets.

FL1	59.00	(67.85)	AD270	33.00	(37.95)
FL2	78.00	(89.70)	AD370	45.00	(51.75)
PC1	105.00	(120.75)	AD270 + MPU		
ASP	69.00	(79.35)		37.00	(42.55)
VLF	22.00	(25.30)	AD370 + MPU		
D70	43.00	(49.45)		49.00	(56.35)
D75	49.00	(56.35)	MPU	6.00	(6.90)
RFC/M	23.00	(26.45)	DC144/28	31.00	(35.65)

NEW PRODUCT — **NOW AVAILABLE**

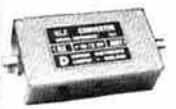
TWO METRE CONVERTER MODEL DC144/28

A high performance two metre to 28 MHz converter designed both for use with Model PC1 to give general coverage with ten metre receivers or as a stand-alone converter where low noise and high signal handling capability are important. It features a 3SK88 low noise MOSFET into a high level hot carrier diode mixer followed by a J310 post amplifier. Variable attenuators at input and output allow optimum gain distribution in all applications. Other features include plated through PCB, interstage screening, SO239 connectors. Appearance is like Model VLF.



VERY LOW FREQUENCY CONVERTER MODEL VLF

If your communications receiver gives poor results below 500 kHz Model VLF is the answer. It also adds MW and LW coverage to amateur bands-only receivers for news, time checks etc.
Connected in series with the antenna Model VLF allows you to tune the 0 to 500 kHz range (and above at reduced sensitivity) using the ten metre band (28-30 MHz) on your normal receiver.



NEW PRODUCT — **PREVIEW**

MORSE KEYBOARD MODEL MK

A keyboard operated morse sender with a host of features to make CW sending a dream.
The comprehensive character set includes procedure signals and there are four separate 64 character message memories with programmed pause capability. Plus a buffer memory for perfect sending despite imperfect typing. Memory contents are retained when switched off and four internal pen cells give an amazing 300 hours life. All you have to do is plug it into your key jack.

DATONG ELECTRONICS LIMITED

Spence Mills, Mill Lane, Bramley, Leeds LS13 3HE, England. Tel: (0532) 552461

KDK KYOKUTO

NEW PRICE!

SYNTHESIZED TRANSCEIVER

144MHz – 25W – 12½/25kHz

KDK 2025

- ★ Custom designed microprocessor control
- ★ 25kHz *and* 12·5kHz synthesizer steps!!
- ★ 'Instant QSY', 10 times rate button
- ★ 25 Watts of reliable RF output
- ★ Band scan between any 'easy set' limits
- ★ 10 write-in non-volatile memory channels
- ★ Memory scanning with hold facility
- ★ Standard ± 600kHz or any repeater split

The KDK FM2025E is a 12V dc two-metre FM transceiver for mobile or base station use. Although feature packed, operational ease is assured by use of a "custom microprocessor".

Digital frequency synthesis provides full band coverage in 12·5kHz or 25kHz steps. "Single knob" frequency selection is by an optically coupled encoder. A dialling speed switch (increases tuning steps) facilitates rapid QSY's.

A 10 slot memory with Ni-Cad back-up, provides 10 simplex (with ±600kHz shift) and/or 5 semi-duplex channels, making the 2025 as easy to use mobile as a crystal controlled transceiver. One memory is semi-dedicated to "priority" and programmable when the 2025 is dial controlled.

The 2025 embodies the best non-lockout scanner. It scans occupied or empty channels and a flick switch enables immediate transmission. The scanner works on the memories and across any selected portion of the band (scan limits are defined by two of the memories).

Dual gate UHF MOSFETS in the RF and mixer provide superior intermodulation performance with high sensitivity maintained over the band by auto-varicap tuning. A monolithic crystal filter in the first IF and a 15 pole ceramic filter in the second provides excellent selectivity.

The single conversion transmitter uses a balanced mixer and a VCO on the signal frequency (directly modulated for superb FM) and a hybrid power module for 25W (or 3W) RF. The PA is impervious to breakdowns under infinite VSWR.

Necessary control function instructions are programmed into the microprocessor itself. But by re-arranging a diode matrix, the lower frequency transceive limit, the high frequency receive limit and the high frequency transmit limit may be altered to allow for changes of band plan or location.

Switchable auto-tone-burst, RF attenuator, squelch, microphone, microphone clip, power lead, mounting bracket, handbook are, of course, part of the package.

"What's the catch?" "None!" Compare the specifications, the features, the construction, the quality and the price.

★ £199 INC. VAT AT 15% AND SECURICOR ★

The 2025 is available from the importers or selected dealers

SOUTH MIDLANDS COMMUNICATIONS LTD

OSBORNE ROAD, TOTTON
SOUTHAMPTON SO4 4DN

Telex: 477351 SMCOMM G
Tel: Totton (0703) 867333

CQ THE CQ CENTRE

10 Merton Park Parade, Kingston Road SW19.
(Nr. Nelson Hospital) 01-543 5150

LONDON'S NEWEST & BRIGHTEST EMPORIUM

We are, as ever, happy to welcome all Amateurs and Short-Wave Listeners to London's newest emporium.

Come along and see our wide range of new and s/hand equipment including **Standard–Yaesu–FDK–Trio–Azden–Cushcraft,** etc. We can supply and fit the well-known **Mutek** Products and we have a varied selection of antennas and accessories.

Many stations are now using the HB9CV 2-element 2m beam. This is ideal for portable use or where limitations exist to the use of outside aerials. We are Sole London Agents for the HB9CV and welcome trade enquiries.

We will part exchange new or used equipment and are keen to buy s/hand items at fair prices, working or faulty. We will also display and sell your equipment on a commission basis.

We have just obtained dealership for the **G.M.T.C. Answerphone Machine.** This is nationally advertised and is excellent value at **£123.25** + V.A.T. (less than a year's rental with other makes). This machine is, of course, G.P.O. approved.

If you are unable to call in for coffee and a chat then please ring us–we are always ready to discuss your needs and problems. As a goodwill gesture we will deliver most items, same day, free of charge anywhere in the Greater London area.

Looking forward to meeting you, 73's de Bob, Ian, Paul.

Late nights Wednesdays and Fridays till 8

SMC (Leeds)

South Midlands Communications Limited

commodore

The ONE STOP SHOP for the latest in amateur communications technology

UPDATE YOUR STATION
Send NOW for new price list

AUTHORISED DEALERS FOR COMMODORE PET & KIM MICROCOMPUTERS AND ASSOCIATED PERIPHERALS.

Easily accessible by road, we are located on the A660 four miles north of Leeds city centre and 400 yards from the A6120 ring road. Bus services 1, 4, 96 and 755 amongst others stop outside the door, and car parking presents no problems. Apart from the SMC lines advertised elsewhere, we consider we stock the largest selection of Jaybeam and Microwave Modules in the North of England.

G3PSM *G8SMC*

BARCLAYCARD–HIRE PURCHASE–PART EXCHANGE–ACCESS A PLEASURE

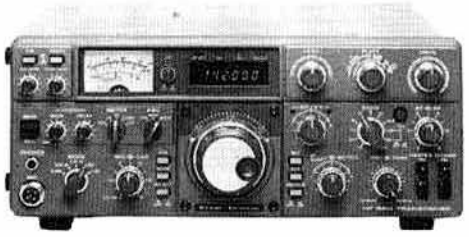
257 OTLEY ROAD, LEEDS, YORKSHIRE LS16 5LQ
Telephone: Leeds (0532) 782326
Monday to Saturday open 9–5.30pm

STEPHENS-JAMES LIMITED

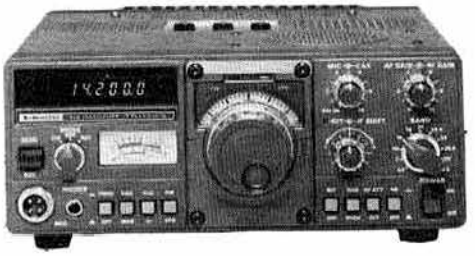
TRIO R-1000

TR-9000

TRIO TS-830S



TRIO TS-130S



TRIO PRICES												
Full Range of Accessories Available	AT130	£72.89	AT230	£106.72	TR8400	£279.00	TR7800	£268.00
	TS830S	£639.52	TS120V	£347.30	DM801	£51.75	TR9000	£345.00
	TS130S	£491.00	TS130V	£404.34	TL922	£595.70	R820	£690.00
	TR2300	£166.75	TR2400	£198.95	TS770E	£730.25	TS180S	£679.60

DRAKE TR7 TRANSCEIVER

Solid state broadband circuits. Receiver coverage 1·5MHz to 30MHz continuous. 250 Watt PEP SSB.R.I.T.

SECONDHAND EQUIPMENT

We carry a good range of secondhand equipment and we shall be pleased to send you details on receipt of an SAE. Good clean equipment wanted and purchased for cash, or we can sell your unwanted equipment on a commission basis. **PLEASE NOTE DUE TO POSTAL CHARGES BEING INCREASED ALL ENQUIRIES MUST INCLUDE SAE. WE REGRET WE CANNOT SEND ANY INFORMATION FREE OF POST.**

YAESU	
FRG7 Receiver	£189.00
DRAKE	
TR7 Transceiver and AC PSU	£1,242.00
MN7 Antenna Matching Unit	£124.20
R7 General coverage receiver	£989.00
Other Drake equipment available to order.	
S.T.E. MILAN	
AA1 Audio Module	£4.95
AR20 C.C. FM Receiver	£50.00
AG10 Tone Burst unit	£4.50
STABILISED POWER SUPPLIES	
Model 125 10-15V 5A	£28.00
Model 1210/1 10A 13·5V	£65.00
Model 156S 4-15V 6A Twin Meter	£40.00
Model 1210S 4-20V 10A Twin Meter	£88.00
Model 1220 13·5V 20A	£95.00
Maximum ratings quoted.	
MICROWAVE MODULES	
MMC144/28Lo 2m Converter	£29.90
MMC432/28S 70cm Converter	£34.90
MMC432/144S 70cm Converter	£34.90
MMC1296/28 23cm Converter	£32.20
MMC1296/144 23cm Converter	£59.80
MMV1296 23cm Tripler	£44.50
MMDO50/500 500MHz Freq. Counter	£69.00
MMT432/28S 70cm Transverter	£149.00
MMT432/144R 70cm Transverter	£184.00
MMT144/28 2m Transverter	£99.00
MMA144 2m Preamp	£34.90
MML144/100 2m Linear Amplifier	£142.60
MML144/25 2m Linear Amplifier	£59.00
TRANSCEIVERS AND RECEIVERS	
SRX30 Solid State Receiver	£158.00
Sky Ace aircraft band hand held receiver	£49.00

R512 Aircraft Band Scanning Receiver	£138.00
Digital Flight Scan Airband Receiver	£230.00
SR9 2m FM Receiver	£46.00
FDK TM56B FM Scanning Receiver	£109.00
AMR217B 2m Scanning Receiver	£120.75
Bearcat 220FB Scanning Receiver	£258.75
Standard C8800 FM Transceiver	£252.00
AR22 2m Handheld Receiver	£85.00
SX200 Scanning Receiver	£239.00
HY-GAIN	
12AVQ 10-15-20m Vertical Antenna	£43.13
14VQ/WB 10-15-20-40m Vertical	£60.38
18AVT5WB 10-15-20-40-80m Vertical	£87.40
VARIOUS ANTENNA	
HF5 vertical 10-through 80m	£41.40
Discone 5 Antenna 50-480MHz	£36.80
C4X 10-15-20m Vertical	£46.00
HQ-1 Minibeam Tribander	£96.76
Complete range of JAYBEAM HF AND VHF-UHF Antennas, send 15p for catalogue and price list.	
G-WHIP. Mobile Antenna Range	
Tribander Helical 10-15-20m	£23.00
LF Coils for above	£6.56
LF Telescopic for coils	£3.00
Standard Basemount	£4.20
MultiMobile 10-15-20m	£26.45
Coils for above	£6.56
Extendarod	£10.93
Flexiwhip 10m	£16.00
Coils for above	£6.56
FDK	
Multi 700EX Transceiver	£199.00
Multi 750 Transceiver	£290.00
Palm 2 Portable Transceiver	£89.00

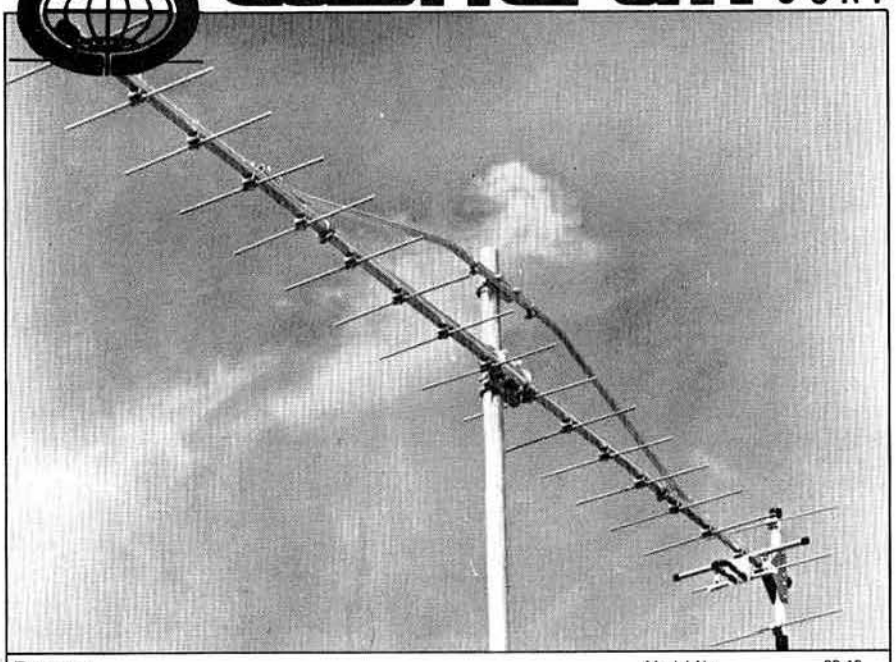
NRD-515 RECEIVER

For the discerning DXER comes the modern NRD-515 general coverage receiver ● Full of all performance advantages offered by any receiver ● All modes of operation PLL Digital VFO ● Solid state ● Up conversion type double conversion ● Frequency coverage 100kHz to 30MHz ● LF/MF bands below 1·6MHz are clearly receivable through the use of a filter/tuned circuit ● Band Pass tuning ● Noise Blanker ● RIR ● Attentuator ● AGC ● Recording terminal ● Mute terminal, etc which permits operation with the NSD-505 transmitter or ant transmitter ● Optional: speaker, memory unit, cw filter available. PRICE: **£948.75** inc VAT

Shop Hours: Mon to Fri 9.30am to 5.30pm
Saturday 9.30am to 4.30pm ACCESS and Barclaycard facilities
HP terms arranged. Part exchanges always welcome
We are located on the A574. Turn at the Greyhound Motel on the A580 (East Lancs Road) and we are about ½-mile on right. No parking problems at any time.

STEPHENS-JAMES
LIMITED
47 WARRINGTON ROAD
LEIGH WN7 3EA
ENGLAND
Telephone (0942) 676790

cushcraft CORPORATION



Boomer

Boomers are your best antenna choice today. They offer the maximum gain available for their boom lengths They feature carefully trimmed and spaced elements, T-match driven elements with 1-1 balun for perfect match. They have Trigon reflectors for excellent front to back ratio and cleaner patterns. Fasteners are all stainless steel and heavy gauge heat treated aluminium tubing is used for all models.

Whatever your choice of 2 metre activity, Boomers will fill your needs. For FM at the high end use the 214FB or 228FB. For CW/SSB on the low end use the 32-19 or 214B, in EME, DX or regular QSO's Boomer will perform for you. Now 220 MHz has been added to complement the Boomer series. Models are available for the bands from 50 through 220 MHz.

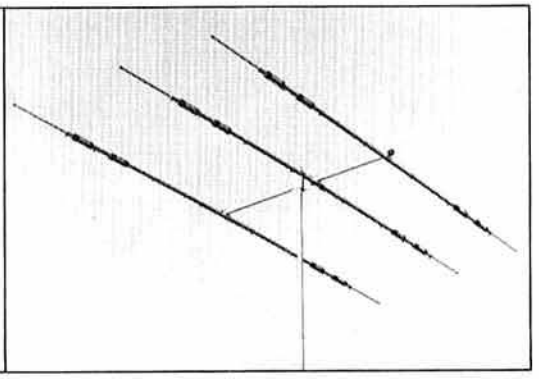
Power dividers are available separately.

Model No.	32-19
Frequency range (MHz)	144-146
Forward gain dBd	16.2
Front to back ratio dB	24
SWR (typical)	1.2:1
Impedance (ohm)	50
Weight (lb)	12
(kg)	5.44
Length (ft)	22
(m)	6.71
Turning radius (ft)	11
(mm)	3.35
Windload (ft^2)	3.5
(m^2)	.33

A3 3 Element 20/ 15/ 10 metres

Make friends of your neighbours with A3 compact dimensions low profile and small turn radius. Satisfy your budget with A3 economy pricing. You will also realise savings by using a lighter weight tower and rotator. This is one compact beam that has the strength and power of most larger antennas.

Forward Gain	8 dBd
Front to back Ratio (Avg)	25 dBd
VSWR	1.2-1 Typical
Bandwidth (Avg)	500 KHz
Power rating	2000 W PEP
Feed Point impedance	50 ohms
Boom (ft-in)	14' × 1.63" × 150"
(cm)	426.7 × 4.13-3.81
Weight (lb)	27
(kg)	2.19
Turning Radius (ft)	15.50 '
(m)	4.72



HF Verticals 10 to 80 metres

3 band
20-15-10 metres
Model ATV-3

5 band
80-40-20-15-10 metres
Model ATV-5

Efficient top ring

Fibreglass trap forms

Enamelled wire coils

Solid aluminium capacitors

No tuning required

Full compression clamps

Omnidirectional coverage

Reinforced base

Mast or ground mounting

pre-marked sections

Easy assembly

Superior quality

Sole Importers and Distributors

Telecommunications Accessories Ltd.
Thame Industrial Estate, Bandet Way, Thame, .
Oxon OX9 3SS,
Great Britain.
Telephone
Thame 3621/2/3.
Telex 837206.

Available from these dealers:–

Thanet Electronics
143 Reculver Road,
Beltinge,
Herne Bay, Kent.
Tel: (02273) 63859

Leeds Amateur Radio Limited
27 Cookridge Street,
Leeds.
Tel: 0532 782224

Amateur Electronics UK
508-514 Alum Road,
Birmingham 8.
Tel: 021-327 1497/6313

Amateur Radio Exchange
2 Northfield Road,
London W13
Tel: 01-579 5311

Northern Communications
303 Claremount Road,
Halifax.
Tel: 0422 40792

Harvey Lexton Ltd
191 Francis Road
Leyton,
London, E10.
Tel: 01-558 0854

MOSLEY WE ARE THE ANTENNA PEOPLE

Mustang	3 elements, 10, 15 and 20 metres	£145.00
TA-33 Jr.	High Power model incl. Balun 3 elements, 10, 15 and 20 metres	£132.00
TA-33 Jr.	3 elements, 10, 15 and 20 metres	£116.00
TA32 Jr.	2 elements, 10, 15 and 20 metres	£78.00
TA31 Jr.	Rotary dipole, 10, 15 and 20 metres	£50.00
ELAN	3 elements, 10 and 15 metres	£93.00
TD-2	Trap Dipole 40 and 80 metres	£40.00
TD-3 Jr.	Trap Dipole 10, 15 and 20 metres	POA
TCD-2	Trap Dipole 40 and 80 metres compressed	£50.00
V-3 Jr.	Trap Vertical 10, 15 and 20 metres	£35.00
Atlas	Trap Vertical, 10, 15, 20 and 40 metres	£60.00
SWL-7	Dipole 11, 13, 16, 19, 25, 31 and 49 metres	£35.00
RD-5	Dipole 10, 15, 20, 40 and 80 metres	£35.00
Orbit	Vertical 11, 13, 16, 19, 25, 31 and 49 metres	£55.00

Administrative Address only (All antennas available ex works, carriage and VAT extra)

MOSLEY ELECTRONICS LIMITED

196 Norwich Road, New Costessey, Norwich NR5 0EX

Send for HANDBOOK containing full range of Antennas and technical information, 28 pages **80p**. *Refundable upon purchase of Antennas.*

KW RETURNS!

THE RELIABLE SERVICE FOR THE RADIO AMATEUR

KW COMMUNICATIONS LTD.
VANGUARD WORKS, JENKINS DALE,
CHATHAM, KENT, ME4 5RT

2m 12V Power Amplifier assembled and tested. Board size 180 × 30mm. 25W minimum out with 150mW drive. Aerial filter included 70dB attenuation **£20.**
Single Channel (HC25U socket, multiplication × 12) driver board with audio processor suitable for above P.A. Board size 180 × 60mm **£25.**
2m 12V 6-channel 1W Transmitter (3W version also available). Aerial filter and audio processor included. Board size 140 × 82mm **£30.**
Semiconductors as per January advertisement still available.

Mail order only. £3 min, p&p 40p. 15% VAT to be added to total

HELLER ELECTRONICS LTD 49 Blossom Waye, Hounslow, Middx TW5 9HB

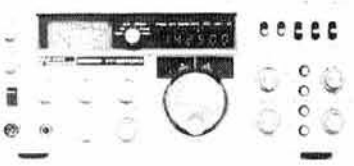
IT'S ALL AT ARROW

"Didn't know you stocked those", they said. "Oh, yes!" we said, "plus Yaesu Musen, Standard, Shure, Microwave Modules, Hi-Mound, CDE, Stolle, Vibroplex, Telecomm, Cushcraft, Swan ...". "OK, that's enough", they said. "I'll send for your list—how much?" "FREE, of course", we said. "But a stamped addressed envelope would be nice."

TS280FM
£199.00

World's most compact 80 channel 50W 2 metre mobile rig. With auto select of repeater/simplex. Digital readout of channel.
AND NOW WITH VOLUME CONTROL ON MIC AND AUTOMATIC TONEBURST R0-R7 PLUS INPUT MONITOR CAPABILITY.
(Optional extra).
TS280LP NEW LOW PRICE **£159.00**
16Watt version 80Ch
NOW WITH AUTO TONEBURST R0-R7 & INPUT LISTEN.
(Optional extra).

NOW STOCKING:



FT107 Yaesu Basic set **£690.00**
FT307DMS Sommerkamp with Int. PSU & DMS unit. Mic. ..... **POA**

AND SOME OF THE REST:

FT7B— Still one of the best HF Mobiles—with mike and mobile mount **£399.00**

C8800— Standard 2m FM mobile with digital display, scan with Microphone control: come and see it **£252.00**

C7800— Standard's beautiful 70cm FM Box. Really nice unit, scans, mic. control etc. **£275.00**

SX200— Revco's super scanner with 26-514MHz (less a couple of gaps!!) Clock, Digital display, 16-channel memory and much more ... **£239.00**

VHFL— New discone antenna for the SX200 or sim **£17.95**

IC2E ICOM's famous "pocket" portable supplied with **free** leather case **£159.00**

DP1— Trap Dipoles for 80/40/20/10 or 80/40/15/10 from stock **£25.30**

G4MH— "Jim's" famous beam from ARROW, a two Element for 20/15/10 for **£79.95** cant be bad!!

ARROW now stock 4 versions of this excellent transceiver:

FT101Z with Analogue dial **£445.00**
FT101ZD Digital—WARC version **£569.00**
FT277ZD Sommerkamp Digital + WARC and all options **£649.00**
FT101ZD Mark 3, WARC & FM!! **£599.00**

Two versions of the "Wayfarer" from stock.

FT707 Yaesu **£529.00**
FT767DX Sommerkamp with CW Filter & Mic. **£579.00**

FREE THIS MONTH WITH RECEIVERS (NOT FRG7700) HEADPHONES by YAESU

R1000 Kenwood **£289.00**
FRG-7 Yaesu **£189.00**
FRG7700 Yaesu **£309.00**
FRG7700 + Mem. **£389.00**
FRG7000 ..... **£259.00**

FT207R 12·5kHz model with leather case, nicad, and Helical **£195.00**
NC3A Slot in charger **£39.50**
YM24 Speaker Mic. **£16.85**

MASPRO 7/8 wavelength 2m antennas now in **£17.85**

NEW: 2 metre ground planes beautifully made 6dB gain **£34.95**
70cm version 6dB gain **£34.95**

PLEASE SEND FOR OUR 1981 LIST, MAYBE THERE WILL BE SOMETHING YOU CAN'T GET ELSEWHERE—REMEMBER ALSO OUR LARGE COMPONENT STOCK IS STILL AVAILABLE MAIL ORDER—PLEASE ASK IF YOU'D LIKE A COPY OF OUR COMPONENTS LIST.
REMEMBER ARROW *ONLY* STOCK FOR THE AMATEUR & ELECTRONIC ENTHUSIAST WE DON'T OFFER YOU A SHOWROOM OF DOMESTIC HI-FI & ONE EYED MONSTERS!!

ALL-IN POLICY: ALL ADVERTISED PRICES INCLUDE TAX AND FREE DELIVERY (SECURICOR FOR RIGS)

See us at ELVASTON CASTLE RALLY JUNE 14th

ARROW ELECTRONICS LTD

7 Coptfold Road, Brentwood, Essex CM14 4BN
Tel: 0277 226470 or 219435 Ansafone on 219435 Telex: 995801
Open 5 days a week. Closed Thurs.
ACCESS ● VISA ● INSTANT HP ● TWO YEARS' WARRANTY ● BEST TRADE-IN PRICES
NEW 1981 CATALOGUE FREE ON REQUEST (SAE PLEASE)

Access
BARCLAYCARD VISA

73's FROM G3LST — PETER : G6AKL — BOB : KEN — FAY — BRENDA — OLIVE

Lee Electronics Ltd

LEE LEE

THE STANDARD RANGE OF QUALITY PRODUCTS

(with mounting cradle and linear amplifier)

C78 UHF FM TRANSPORTABLE

A truly remarkable set with unexcelled versatility. In its portable form the unit can be used anywhere either on dry cell or on the preferred Ni-Cad batteries. The microprocessor has been derived from the C8800/7800 (with all their features included) so it's a good tried and tested design.
For mobile use the C78 simply slots into a mounted cradle, picking up power and antenna connections easily with no leads to unscrew and screw up every time. An optional bolt on 10W linear is available to give that extra power if required.

Inc VAT £209.00 & carr.

CL8 Carrying case	**£6.95** inc VAT & carr.
CM8 Mobile mounting cradle	**£17.95** inc VAT & carr.
CPB78 IOW linear amplifier	**£65.00** inc VAT & carr.
NC78 Ni-Cad battery pack	**£11.00** inc VAT & carr.

C8800

FM VHF MOBILE TRANSCEIVER

Well, what can we say about this set? Standard communications pride themselves on being one of Japan's leading manufacturers of professional VHF/UHF communications equipment with a reputation for excellent quality control, so all their know-how has gone into making a truly remarkable set with all the features anyone could need in a mobile unit (come in and see it for yourself).

Inc VAT £250.00 & carr.

C7800

FM UHF MOBILE TRANSCEIVER

This is the logical follow-on to the C8800, offering all its excellent features but in a UHF version. The standard designed microprocessor is used to control all the functions in a precise and accurate manner, leaving no room for error. The specifications are excellent and designed along the lines of Standard's professional range of equipment.

Inc VAT £275.00 & carr.

FOR FURTHER DETAILS ON ANY OF THE ABOVE, PLEASE CONTACT US.

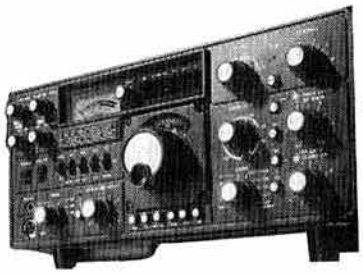
LEE ELECTRONICS LTD
400 EDGWARE ROAD, LONDON W2
Tel: 01-723 5521. Telex: 298765

HF & PART EXCHANGES WELCOME
SAE FOR FULL DETAILS

Access BARCLAYCARD VISA

BUY ONE - TAKE ONE

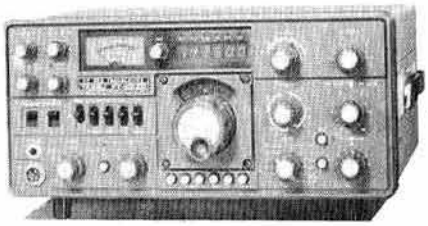
A YAESU SPECTACULAR FROM THEIR NUMBER ONE UK RETAIL OUTLET WITH FULL FACTORY BACKED SERVICE.



Buy this FT902 DM at £799.00

AND TAKE
1 Skymaster 4000 Rotor *Worth £85.00*
or
1 Astatic Silver Eagle Mic
Worth £50.00

Free



Buy this FT101ZD at £569.00

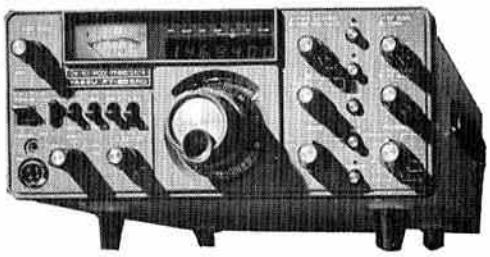
AND TAKE
1 Shure 526T Mic
Worth £40.00
or
1 Oskerbloc or 200B SWR/PWR Meter *Worth £40.00*

Free

Buy this FT707 at £529.00

AND TAKE
1 Shure 526T Mic
Worth £40.00
or
1 Killowatt Dummy Load
Worth £35.00

Free



Buy this FT225 RD at £565.00

AND TAKE
1 AR40 Rotor
Worth 59.00
or
1 Shure 526T
Worth £40

Free

Buy this FT480 at £359.00.

AND TAKE
1 Jaybeam 4 Element Quad
Worth £23.69
or
1 Jaybeam 8 x y/2m Antenna
Worth £28.40

Free

AMCOMM SERVICES
194 NORTHOLT ROAD, SOUTH HARROW, MIDDX.
Telephone: 01-864 1166, 01-422 9585
Opposite South Harrow Tube Station on Piccadilly Line

ALL ITEMS INCLUDE VAT + CARRIAGE

Showroom Opening Hours:
Tuesday to Saturday 9.00 - 5.30 Sunday by Appointment

Please send me _____
at _____
_____ enclosed cheque/P.O. for
_____ or charge my VISA/ACCESS
Nr. _____
Name _____
Address _____
_____ Post Code _____

Amcomm Services
194 Northolt Road,
South Harrow,
Middx HA2 0RN.

Amateur Radio Shop
Tel: 20774

See us at ELVASTON CASTLE RALLY JUNE 14th

4 Cross Church Street Huddersfield West Yorkshire

ANNOUNCEMENT
NOW AVAILABLE—THE G4MH MINI-BEAM KIT
COILS, SPOKES, DOWELS, PLATES, ONLY **£55.00** incl VAT P/P £1.50
SAE DETAILS

NOW IN OUR 20th YEAR—ESTABLISHED 1960

NEW G4MH MINI BEAM

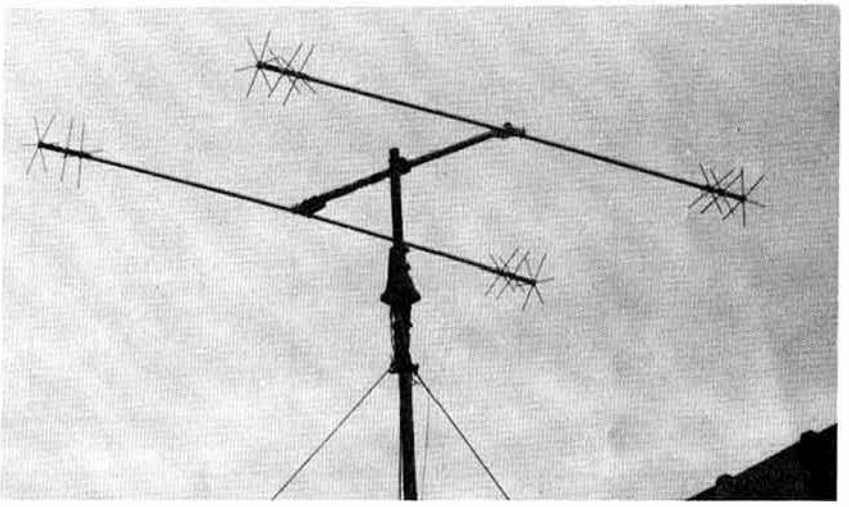
Price: £77.50 + £2.50 p&p in UK
PACKAGE: beam, rotator, 15m coax UR43, 15m 5 core — **£145.00**

Designed and manufactured in the UK

SPECIFICATION

Element length	11 feet
Boom length	60 inches
Turning radius	7 feet
Operating frequencies	10m, 15m, 20m
Forward gain (ref D pole = 1:00)	3·6 dB
SWR at resonance	1·5 to 1:00 maximum
Power rating	1400 watts PEP
Input impedance	50 ohms
Wind resistance	80 mph
Weight	14 lbs
Rotator requirements	AR40

SAE for details, Coax UR43, UR67 and 5 core available



IN STOCK — Yaesu – Trio – Sommerkamp –Bearcat – S.E.M. – J-Beam – G-Whips

FACILITIES — Instant Hp – Creditcharge – Barclaycard – Access

SECONDHAND — Always large stocks, ever-changing – SAE for lists – We buy secondhand gear, cash

YAESU — FT7B – FT107 – FT901DM – FT101Z FT101ZD – FT707 – FT480 – FRG7

OVERSEAS AGENTS REQUIRED FOR THE MINI-BEAM

NEW! — FRG7700 now in stock

NEW! — 2 metre 5/8 wave mobile antenna, 3·5dB with mag mount – only **£12** complete (Whip inc balun, mag mount, PL259 fitted)

FULL RANGE — SWR inds – coax – keys – books – etc

ALSO ON DISPLAY — MICROPROCESORS – Apple – Sharp – Video Genie – ITT 2020 – Super Board – Sorcerer

PX WELCOME — We have Hi-Fi – Ham Radio – Computers – What have you?

OVER 2000 sq.ft SHOWROOM AREA

Our Staff: Jim G4MH, Ray G8IOF, Chris G8PUT, Ted G3UUA, Norman G3WAH

Open Mon–Sat 9.00am to 5.30pm, late night Thursday till 8.00pm.

Send 50p for our comprehensive catalogue. Trade enquiries welcome.

TRIO WARD ELECTRONICS TRIO

G3XWX G4CLX

TR-9000 £345.00

2m multimode—all the facilities you want at a price you can afford

TS-830S £639.52

9 Band (160-10m) coverage. Flexible IF tuning and RF speech processor for optimum receive and transmit capability

TS-130S £491.05

8 Band (80-10m) 200W PEP input Solid State Transceiver

TS-180S 160-10m deluxe solid state transceiver	£679.65
PS-30 PSU for 180S or 130S	£85.10
R-1000 general coverage receiver. High sensitivity tuning accuracy and stability	£285.00
TS-120V 10W 80-10m	£347.30
★ NEW ★ TR-8400 70cm synthesized FM	£279.00
TR-7800 2m deluxe FM	£268.00
TR-2300 The popular do-anything, go-anywhere FM rig	£166.75
VB-2300 FM 10W amplifier for TR2300	£49.45
HS-5 Trio deluxe communications headphones	£21.85
HC-1400 Synthesized FM	£189.00

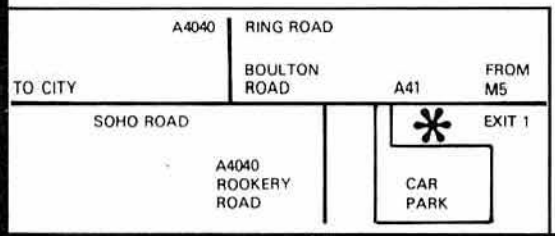
KX-2 SWL ATU	£29.90
Cross pointers power meters	
CN-620A 1-8-150MHz	£52.81
CN-630 140-450MHz	£71.00
APPLE II Microcomputer	£799.00
EG303 Microcomputer	£365.00

Computer books and storage media for callers
Cassette discs. Printed paper.
Amateur radio software from PLASMA
Morse trainer. Avey line DX paths
QRA Locator/distances. Hi/Lo pass filters

HFDX Predictor
All programs on tape at £5 each

★ ★ ★ A snip for April! WIRECUTTERS £1.00 per pair excellent quality.

DM81 GDO 700kHz-250MHz	£51.75
FXI Wavemeter 700kHz-250MHz	£28.00
DR7500R Rotator	£108.00
RM940 Mobile mic	£45.00
SR9 VFO/Crystal FM RX	£46.00
SL1600 Scanner	£39.50



ALL PRICES SHOWN INCLUDE VAT AT 15%

WARD ELECTRONICS

SOHO HOUSE (First floor)
362-4 SOHO ROAD, HANDSWORTH
BIRMINGHAM B21 9QL. Tel: 021-554 0708
OPEN TUES-SAT
Also evenings and weekends
Ring Tony, G4CLX, on Kidderminster 851255

TS802

GEMINI COMMUNICATIONS

TS802 Handheld 80 ch 2m Transceiver with scanner, LED channel readout, tone burst, reverse repeater. 2 watts/0·2 watts output. See previous issues of "Radio Communication" for full spec. Complete with 12V charger. New low price, **£129**.

1 RAILWAY ROAD, BLACKBURN, LANCS.
Telephone: 51842 (Evenings: Bolton 592929 G4GHE)

YOUR SOMMERKAMP IMPORTER

FT480R

Sommerkamp's new FT480R 2 metre multimode. Ideal base station/mobile rig with satellite offset facilities. Tunes 143·5-148·5MHz in 100MHz,1kHz, 12·5kHz & 25kHz steps. Four memory channels may also be scanned. 30W p.e.p. input on SSB and 30W DC on FM and CW. Complete with scanning microphone and mobile mount. **£349**. Matching power unit **£49**.

TS280FM Two versions of this popular model are now available. Both have 80 channels with auto repeater offset. Complete with mobile mount and microphone — and, of course, reverse repeater.
TS280 H/P with 50 watts/8 watts output, **£199**.
TS280 L/P with 10 watts/1 watt output, **£159**.

TS280FM

FT767DX Similar to FT707 with CW filter and scanning microphone, **£499** inc. VAT. Mains power unit, **£105** inc. VAT.
FT227ZD Similar to FT101ZD but includes cw filter, 12V converter, cooling fan and microphone — extras worth at least **£95**. **£589**.
FT901DM including such extras as AM and CW crystal filters, electronic keyer, inbuilt AC and DC power supplies, microphone, frequency memory and cooling fan, **£795**.
FT307 Similar to FT107 with CW filter, memory circuit, scanning microphone and AC/DC power supplies, **£899**.

FRG7 0·5-30MHz receiver **£188**.
FT225RD Multimode 2 metre **£495**.
FT404 70cm handheld *POA*.
FRG7700 HF receiver and memories **£379**.
FT207 FM hand portable transceiver **£179**.
TS788DX 10 mtr, all mode 10/100W **£325**.

We stock genuine Sommerkamp quality accessories.
NT30 12V 3A regulated power supply, **£23**. **NT60** 12V 3A regulated power supply, **£39**.
YS200 SWR bridge & power meter, reads 200W output from 1·8-150MHz, **£54**.
YS2000 SWR bridge & power meter, reads 2kW output from 1·8-60MHz, **£72**.

ALL PRICES INCLUDE VAT
HP TERMS AVAILABLE

ACCESS & BARCLAYCARD
PART EXCHANGE WELCOMED

KW

FOR ALL KW EQUIPMENTS REPAIRS AND SERVICING

WATCH FOR FURTHER ANNOUNCEMENTS

KW COMMUNICATIONS LTD.
VANGUARD WORKS, JENKINS DALE,
CHATHAM, KENT, ME4 5RT

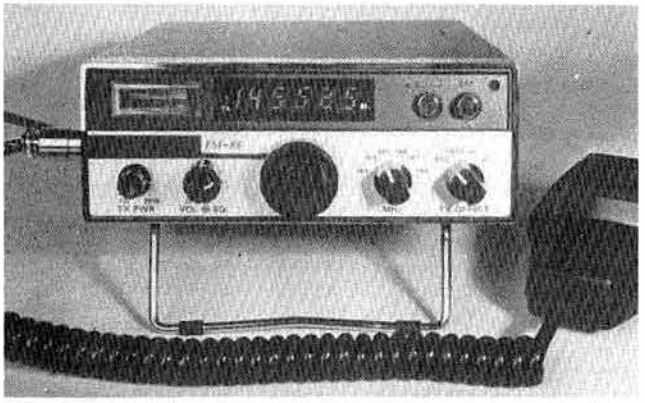
PNP COMMUNICATIONS
POWERBOX POWER SUPPLIES
Protected against S/C
AND OVERVOLTAGE

Model 49 12V 3A	£35.75
Model 50 13·8V 5A	£42.50
Model 51 12V 5A	£42.50

P&P £2.50
62, Lawes Avenue, Newhaven
E. Sussex BN9 9SB

ANTI-T.V.I. TRAP DIPOLES:
S.W.L. Indoor models **£14.50** & **£27.50**
S.W.L. Outdoor models **£30.00** & **£36.00**
Tx-ing models £52.50 & **£59.75**
Lists 10 × 8in **17p** SAE. Aerial Guide **50p**.
Publication—Indoor and invisible aerials **£3.50**
Callers welcome **Tel: 03986 215**
G2DYM, Uplowman, Tiverton, Devon.

FM88 2M TRANSCEIVER



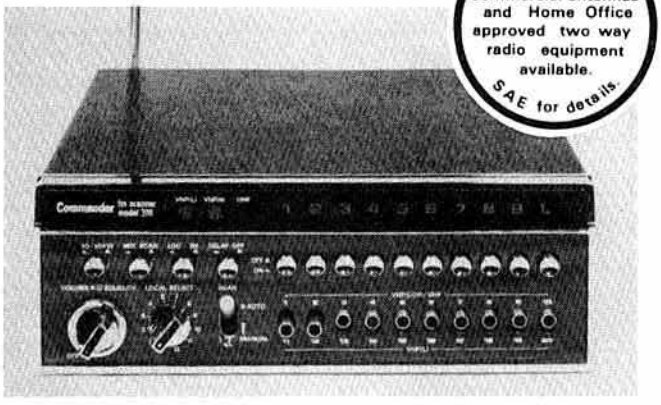
We are convinced that the FM88 is one of the most reliable 2 metre rigs being offered today. The construction has to be seen to be believed, and all the frills which normally lower reliability have been omitted.

If you are considering buying a new 2 metre transceiver, you owe it to yourself to consider a unit which has proven itself with thousands of hours of reliable "on the Air" operation in the USA. 25 Watts output. 143-149 mHz in 5KHz steps.

INTRODUCTORY PRICE £178.00 inc VAT

318-FM SCANNING MONITOR

Full range of amateur and commercial antennas and Home Office approved two way radio equipment available. SAE for details.



A compact unit suitable for fixed or mobile service, giving the option of scanning in user programmed order up to 20 channels in the 430-470 MHz, 140-175 MHz or 68-88 MHz frequency ranges.

Manual/automatic and fast/slow scan with channel lockout and delay. Mains or battery operation. Vehicle Mount Supplied.

PRICE: £95.00 inc VAT

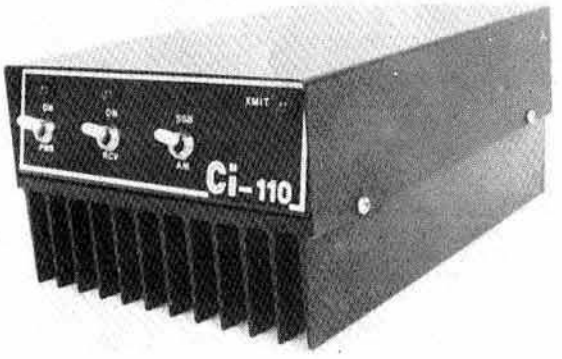
STOCK CRYSTALS: S20, 21, 22, 23 — RO to 7 — SU 8 and 20 — RBO, 2, 4, 6, 10, 14 — MO, 6, 10, 16 — 70.26 MHz. PRICE: £3.00 each inc VAT.

Zycomm Z5800 Hand Portable

A no nonsense sythesised rig, free of gimmicks yet offering high power and good sensitivity. Covers 144-148 HMz with channels in 5 KHz spacing selected by decade switches. Slide switches control simplex or repeater and high or low power operation. Low power level is adjustable by internal preset. Maximum power (5 watts nominal) may exceed 7.5 watts from internal NiCd battery pack. Antenna has BNC connector.

PRICES: Z5800 £175.00 inc VAT
Desk Charger £19.00 inc VAT
Remote Mic/Speaker £18.00 inc VAT
INCLUSIVE PRICE: £199.00 inc VAT

Ci-110 Mk2 POWER AMP



A Solid State, all modes unit covering 1.7 to 38 MHz. Typical power output 130 watts for 215 watts DC input and 4-7 watts drive (15 watts SSB). RF sensing VOX circuit. Switchable receive pre-amp. Supply requirements: 13.8V at 20A, Negative Earth. Size: 5" w x 7" l x 3" h. Weight: 2.5 lbs.

PRICE: £99.00 inc VAT

Zycomm Electronics Ltd.
G3ZYC G8CNB G3NJX G3ZYD G8ZYC
47/51 Pentrich Rd., Ripley, Derby DE5 3DS
Tel Ripley (0773) 44281 Telex 377466

Agents: Clem Tabor (G3UGR), Banksia, Queen Camel, Yeovil, Somerset 0935-850463 (Evenings & Weekends only)
Alan Kenyon (GW4DOO), 24 Connaught Street, Port Talbot, Glamorgan 0639-887963
Peter Clark (G4IUV), 91 Farmer Road, Leyton, London E10 5DJ 01-539 3385
Bob Finch (G4DDM), REF Electronics, Church Road, Pen, High Wycombe 049 481-4483
Ted Bowen (G4JKQ), Coalville Communications, 6 Ashby Road, Coalville, Leicestershire 0530-38779 (Day) 0530-60396 (Evenings)

FORTHCOMING RALLIES

RSGB (BRISTOL GROUP) MOBILE RALLY LONGLEAT 28 JUNE—NEW SITE

Longleat Estate authorities now charge for all overnight campers/caravanners. Charges: Caravans £2.25; Tents £1.50. Toilets, standpipe and sewage disposal facilities are on rally site near Longleat Arms. 2m Talk-in; RSGB President attending.
Further info: Brian Goddard, G4FRG.

ROYAL NAVAL AMATEUR RADIO SOCIETY

Twenty-first Birthday MOBILE RALLY

AT

HMS Mercury, (nr. Petersfield), HANTS
SUNDAY 14 JUNE from 10·00 to 17·30
Arena Displays from 13·30 to 17·00
★ Grand Raffle ★ Swings and Slides
★ Refreshments ★ Trade Stands Galore

For further information contact A. G. Walker, G4DIU.

Peterborough Radio & Electronics Society

MOBILE RALLY

Sunday 20th September, 1981

NEW VENUE

WIRRINA SPORTS STADIUM
BISHOPS ROAD, PETERBOROUGH

OPEN 10.30 a.m. till 5.00 p.m.

ADMISSION 25p by Draw Ticket at door or in advance on application. Discount of 10 per cent for parties of 10 or more. S.A.E. please.

DIFFERENT STROKES FOR DIFFERENT FOLKS
For the Radio minded—9,000 square feet of trade area
For the Wife—Stalls and attractions
For the Hungry or not so—On-site snack bar or Restaurant
For the Thirsty—On-site Pub (Exhibition License applied for)
For the Energetic—Indoor and outdoor swimming pools
For the Religious—Only 500 yards from our Cathedral
For the Nautical—Boating on the River Nene
For the Outdoor type—On-site caravaning over the weekend
For the Motorist—Free parking for up to 1,200 vehicles
For the Lucky—Grand Draw for prestige prizes on your ticket
For the Salesman—Bring and Buy
For the Sceptic—Come and see for yourself

Talk in on 145·550MHz and SU20 GB2PMR also GB3PB
Easy access from bus and railway stations

All details from D. T. Wilson, G4KSW,
4 Conway Avenue, Peterborough. Tel: Peterborough 76238

NUNSFIELD HOUSE AMATEUR RADIO GROUP PRESENT THE TWELFTH

ELVASTON CASTLE

See us at ELVASTON CASTLE RALLY JUNE 14th

See us at ELVASTON CASTLE RALLY JUNE 14th

MOBILE RADIO RALLY

SUNDAY 14TH JUNE 1981

TALK-IN BY GB2ECR ON 144 & 432MHz FM

ADMISSION FREE

Car Parking 30p [Charges levied
Coaches £1.50p [by Local Council]

RALLY OPENS 10 a.m.

FULL ON-SITE CATERING AVAILABLE

ATTRACTIONS INCLUDE

★ RSGB Bookstall ★ Prize Draw ★ Grand Bring & Buy Sideshows ★ British Rail Silver Band ★ TA Display PO Display ★ Derbyshire Building Society Hot Air Balloon ★ British Legion Pipe Band ★ Midland Kite Flyers ★ Childrens Rides & Entertainment ★ Etc

TRADE EXHIBITORS AT THE TIME OF GOING TO PRESS

Radiotronics
SGS Electronics
Garex Electronics
CHC Electronics
New Cross Radio
W. H. Westlake
PM Electronic Services
Packer Communication
Thanet Electronics Ltd
Lowe Electronics Ltd
Sentinel Supply
Micro-Print Ltd
Arrow Electronics Ltd
F. H. Instruments
Ace Mailtronics Ltd
NW Electronics
Display Electronics
Eurover Ltd
M & B Radio (Leeds)
Wilson Valves
Elplan Electronics
Bedford Amateur Radio Supplies
J. Birkett
GHz Enterprises
Gemini Communications
Amateur Radio Exchange
MK Electronics
Bredhurst Electronics
Chris Moulding Radio Services
Mechanelec Ltd
Royd Electronics
D.S. Electronics
SMC (Jack Tweedy) Ltd
Amateur Radio Shop
Newton Engraving
Keytronics
A. H. Thacker & Sons Ltd
Radio Telephone Services
AJH Electronics
J. Peterson
Marco Trading
John's Radio
Northampton Radio Club
PKG Electronics
Ipcomms
JPS (Micro-Electronics) Ltd
Radtech
Peter Simpkin
Chordgate

ELVASTON CASTLE IS LOCATED ON THE B5010, 5 MILES S.E. OF DERBY

TRADE ENQUIRIES: RICHARD WOOLLEY, G4HIJ
29, BELLE VUE ROAD, ASHBOURNE, DERBYSHIRE
TEL: ASHBOURNE (0335) 43241

OTHER ENQUIRIES: IAN CAGE, G4CTZ
25, PETERSHAM DRIVE, ALVASTON, DERBY
TEL: DERBY (0332) 71875/799452

Something special from G3LLL

FT101Z/ZD FM Plus Audio Notch and Peak Filter

BELT AND BRACES SERVICE

All our Yaesu comes from official importers. In nine years we have never returned an FT101 for service, but it is nice to know that the full back-up is available just in case!
REPAIRS. Our own customers come first, but providing your rig is over two years old we will try and fit you in.
EXPERIENCE. Yaesu have built quite a few of our mods into the rigs and we are widely known as "THE FT101 EXPERTS".
PERSONAL SERVICE. We are small enough to appreciate your custom.
SECURICOR DELIVERY. If required – but its nice to see you.

UPGRADE YOUR OLD FT101

NEW DOUBLE BALANCED 1st MIXER. Simple to fit and does improve the receiver for FT101 Mk II/B/E/EE. *Not* for original FT101 Mk I. **£11.50** inc VAT and post.
RF CLIPPER. Models for FT101 Mk I to FT101E. More receive selectivity and "a better RF Clipper than Yaesu's". That's what we've been told many times. ***£35.00** inc VAT and post.
FM UNIT. For FT101 Mk I to FT101E. Now only **£35.00*** inc VAT and post.
TX and RX unit ask for copies of reviews of above. Rpt. shift **£7.00.** Tone burst **£5.50.**
**May be slightly marked or minus engraved front panel.*

444 MIC MOD KIT. Matches 444 mic to FT101/ZD. Includes plug, capacitors, instructions and transformer. Local/DX equalization. **£3.99** post paid.
SPARE EPYCYCLIC DRIVES. Make your old FT101 tuning feel like new. Two for **£4.50** post paid. (Not for FT101Z/ZD)
FT CLUB LEVEL CONTROLS FOR EARLY FT101E. Fits in loading position with dual concentric Yaesu knobs and does job of level control as fitted later FT101E's **£7.00** post paid.
FREQUENCY COUNTERS. See page 284, March 1981, and ring re. prices.

BARCLAYCARD OR ACCESS – OR TEMPT US WITH REAL MONEY!!

HOLDINGS PHOTO AUDIO CENTRE,
39/41 Mincing Lane, Blackburn BB2 2AF,
Tel: (0254) 59595/6. Closed Thursday

FT902 DM
FT 707
FT101Z/ZD FM ?

Securicor delivery

FT101Z/ZD FM offers most extra features at lowest price CW SSB FM, Audio peak/notch filter, 2 CW positions, 4 diode mixer, variable selectivity, excellent noise blanker, RF processor, 6146B PA.

FT902 DM has most of above plus memory, Curtis keyer, AM *and* FM, DC/AC PSU fan and mic.

FT707 super mobile/home solid state rig. Stacking system for high power home micro-station. Ideal caravan rig – special offer for callers.

2-METRE RIGS FDK and Yaesu in stock.

CW FILTERS FOR YAESU & TRIO. 8-pole 250Hz, **£21.49**. TS520, TS820, FT901, FT902, FT101, FT101ZD, FT301.

YAESU & TRIO VALVES.

6KD6 Toshiba, original boxes	FT401	**£18** pair
6JS6C Toshiba, original boxes	FT101	**£30** pair
6JS6C NEC, original boxes	FT101	**£13** pair
12BY7A Toshiba, original boxes	FT101	**£10** each
12BY7A NEC, original boxes	FT101	**£3** each
All above as used by Yaesu in original production.		
6JS6C Unstamped O.K. FT101		**£9** pair
6JS6C Branded American *TV Use Only, not* suitable FT101		**£3** each
12BY7A Unstamped, O.K. FT101		**£2** each
6146B G.E.* fitted FT101Z O.K. Trio		**£17** pair

* Some other brands make receiver noisy!!
Post 50p per order

GAREX (G3ZV1)

KDK 2025 2m SYNTHESISED TRANSCEIVER
Full band coverage 25 or 12½kHz steps/10 channel memory/scans memories or selected band portion/3W or 25W Tx/All the features you need at **£225** inc **VAT.**
VHF FM MONITOR RECEIVERS
HF 12 POCKET SIZE 12 channel xtal controlled 4MHz bandwidth in range 130-175MHz. With nicad and charger **£57.95.** Xtals extra, see below. Helical aerial **£4.40.**
SOUNDAIR 008 PORTABLE SCANNER 8 channel xtal controlled. 140-170MHz (6MHz bandwidth). With nicad and charger **£59.** Xtals extra.
SR-9 top-selling monitor: 2m FM with 144-146MHz full coverage VFO plus 11 xtal controlled channels, ideal for fixed, /M, and /P use. 12V DC operation **£47.50.**
MARINE BAND version, 156-162MHz, same spec and price.
CRYSTALS FOR NR-56, SR-9, HF-12, SOUNDAIR 008 TM56B, SR-11 All 2m channels from 0 (145·00) to 32 (145·80) incl. at **£2.46** (+ **15p** post). Over 40 popular marine channels at **£2.85** (+ **15p** post). Sae list.
CRYSTALS FOR 28·5MHz. 3rd overtone suit most Jap/USA 10m rigs. 28·5MHz Tx and 28·045MHz Rx HC18U **£4.60 per pair.**
RESISTOR KITS new extended range at old prices E12 series 10Ω to 1M, 61 values, 5% carbon film, General purpose ratings ¼W or ½W (state which). Replenishments available. Starter pack, 5 ea value (305) **£3.10.** Standard pack, 10 ea (610) **£5.55.** Mixed pack 5 ea ¼W + ½W (610) **£5.55.** Giant pack 25 ea (1525) **£13.60.**
NICAD RECHARGEABLES – physically as zinc carbon: (AA/U7) **£1.30**, C(U11) **£3.35**; PP3 **£5.55.** ANY 5+ : less 10% ANY 10+ : less 20%.
GAREX FM detector and squelch conversion ready assembled with full fitting instructions. Tailor made, easy-fit design for AM Cambridge, replaces squelch board with minimum of other modifications **£5.75.** Transistor Vanguard (AM25T) version (modified squelch) **£6.35**
PYE CAMBRIDGE SPARES (sae full list). Rx RF board 68-88MHz **£5.95.** 10·7MHz I.F. **£3.65.** 2nd mixer 10·7MHz to 455kHz **£3.** 455kHz block filter 12½kHz **£9.40**, ditto 25kHz **£3.** 455kHz AM I.F. **£3.65.** Audio bd **£1.95.** AM squelch **75p.** Many other PYE parts in stock.

MAIN DISTRIBUTOR OF REVCO AERIALS & SPECIAL PRODUCTS

PRICES INCLUDE UK POST & PACKING & 15% VAT.

Access

GAREX ELECTRONICS, 7 NORVIC ROAD, MARSWORTH, TRING, HERTS HP23 4LS.
MAIL ORDER ONLY
Phone 0296 668684. Callers by appointment.

BARCLAYCARD VISA

COAX	UR67/RG213 50 ohms 10·3mm, **51p/m** (6p/m – **£1** min.) 60m max. by post				
	UR76/RG58 50 ohms 4·95mm, **21p/m** (3p/m – **50p** min.)				
VALVES	6AV6 – **£1.30**;	6AV11 – **£1.75**;	6AW8A – **£2.05**;	6BA6 – **£1.55**;	6BA7 – **£4.20**;
	6BN8 – **£2.25**;	6BV8 – **£2.40**;	6BZ6 – **£1.45**;	6C10 – **£2.15**;	6CB6 – **£1.65**;
	6CL6 – **£2.25**;	6DQ5 – **£3.55**;	6EA8 – **£1.80**;	6EJ7 – **£1.68**;	6EV7 – **£1.80**;
	6EW6 – **£1.65**;	6GK6 – **£1.95**;	6GW8 – **£2.30**;	6GX6 – **£1.50**;	6HF8 – **£2.30**
	6HS6 – **£2.90**;	6JB6 – **£2.90**;	6JS6C – **£3.50**;	6KD6 – **£3.75**;	6LQ6 – **£3.85**
	12AV6 – **£1.40**;	12AX7 – **£1.40**;	12BY7 – **£1.65**;	12GN7 – **£2.50**;	OA2 – **£1.40**
	6146A – **£5.10**;	6146B – **£5.10**;	7360 – **£8.60**;	8950 – **£6.90**;	572B – **£25.00**
	Ask for quote for other types (**20p** each, free over £15)				
CONNS	PL259 special, UR67 fit	– **£1.07**;	UR76/UR43/RG58 fit	– **£0.92**	
	BNC 50 ohms, free plug (5mm)	– **£0.50**;	4-hole socket	– **£0.50**	
	N 50 ohms, free plug (UR67)	– **£0.97**;	free socket for UR67	– **£0.79**	
	SO239 4-hole socket	– **£0.40**.	(**30p/order** free over £15)		
DMM	3½ digit LCD multimeters, LMM200 hand-held – **£43** (£1) – kit **£38** (£1)				
	Bench model LMM100 – **£87** (£1.5). s.a.e. for brochure				
	Mail Orders please (P&P) but callers welcome by appointment				

EUROVER ELECTRONICS, Chelmer Close, Little Totham, Maldon, Essex CM9 8JN

MODULAR ELECTRONICS 95 High St, Selsey, W. Sussex PO20 0QL. Selsey (024361) 2916
S.S.M. RF Power Transistors, Specialist RF components. Low noise Devices.
2N3866 **98p.** 2N4427 **£1.06.** 2N3553 **£1.17.** 2N5913 **£1.61.** 2N6080 **£4.72.** 2N6081 **£7.94.** 2N6082 **£8.63.** 2N6084 **£12.65.** 2N5590 **£6.33.** 2N5591 **£7.94.** 2N5944 **£6.79.** 2N5945 **£8.63.** 2N5946 **£10.93.** 2N5914 **£4.60.** SD1127 **£2.42.** SD1143 **£6.90.** SD1416 **£24.15.** SD1019 **£18.40.** SD1135 **£5.20.** SD1136 **£7.77.** SD1088 **£18.40.** SD1089 **£25.30.** SD1434 **£26.45.** SD1477 **£28.75.** SD Devices cover 4 to 100w out. Ex Equip RF. 2N5070 **£2.50.** 2N3632 **£2.50.** Low noise Small Signal BFR90 **£2.82.** BFR91 **£3.45.** BFR34a **£2.25.** TP491 **£3.68.** 40673 **92p.** 3N204 **£1.55.** BF900 **£1.30.** BFY90 **£1.15.** BFT66 **£2.59.** SD201 **£2.45.** SD306 **£2.60.** 2N918 **60p.** 2N5179 **82p.** BF115 **50p.** BF180 **50p.** ST2110 = 2N2369/BSX20 **30p.** ZS276 1.5a 600v **12p.** 400v 2.5aBr **50p.** H.P. Diodes 5082.2800 **£1.10.** 2835 **98p.** 3010 **98p.** Ant Relays 12v **£8.57.** PTFE Sheet 30cm Sq **£2.30.** Xtl Filt 10·7MHz 25kHz **£8.05.** Trimmers. Tetfer 10pf **33p.** PTFE Film 9pf or 18pf **28p.** 25pf **15p.** BNC Plug **70p.** BNC S/H sock **69p.** 4h Sock **63p.** 600MHz – 10 i.c. MC12013p **£11.50.** BF900 preamp (144) **£8.05.** BFR34a pre/a (432) **£8.62.** Ferrites FX1115 **6p.** FX1898 **13p.** FX2049 **12p.** Heatsink 6M1 6" **£1.90.** 4" **£1.25.** TBA120 I.F I/C **82p.** Modules. RF Amp with C/O. CPM15-2 1·5w = 15w **£27.03.** CPM25-3 3w = 20w **£28.46.** Send for details. RF amps 50 in/out no C/O. PM2-10 0·4w = 10w **£18.50.** PM2-15 1·5w = 15w **£19.60.** PM2-25 3w = 20w **£21.00.** RF Amps 50 in/out no C/O. PM70-10 1·7w = 10w (432) **£21.50.** PM70-4 0·4w = 4w **£19.60.**
All Prices Inc VAT at 15% Add 50p Post and Packing. Sae with enquiries.

MICROWAVE MODULES LTD

NOW EVEN BETTER!!

Now available at short notice is our new even-better-than-ever 2-metre 100W amplifier.

With this new MML144/100-S you can now switch in and out both linear power amplifier and receive pre-amplifier without disturbing the inter-connecting cables.

A straight through facility is provided by front panel mounted switches.

A complete set of L.E.D.'s indicate the status of this amplifier. The unit is fully protected, and is available from us and our agents.

At £142.60 inc VAT (p&p £2.75)

Brookfield Drive, Aintree, Liverpool, L9 7AN 051-523 4011

KW

ANTENNAS & EQUIPMENT FOR THE RADIO AMATEUR

WATCH FOR FURTHER ANNOUNCEMENTS

KW COMMUNICATIONS LTD.
VANGUARD WORKS, JENKINS DALE,
CHATHAM, KENT, ME4 5RT

VALVES VALVES VALVES

The following valves in matched pairs 6JS6/C, 6KD6, 6JB6/A, 6LQ6, 6HF5, 6146A, 6146B. **YES** the 6JS6/C is Japanese and works in the FT101. Most amateur radio valves including difficult to obtain types **EX STOCK.** Quotations without obligation. If we don't stock your type we may be able to import for you, PLEASE ENQUIRE. REMEMBER over 200 types **EX STOCK.** Sae for list. 'Phone for assistance re types suitable for your equipment. USA and Jap manufacture of popular types available.

DON'T DELAY 'PHONE TODAY 0204 54165, G4AZM
Wilson, 20 Croft Gate, Harwood, Bolton BL2 3JJ

Radio Shack Ltd for Amateur Radio

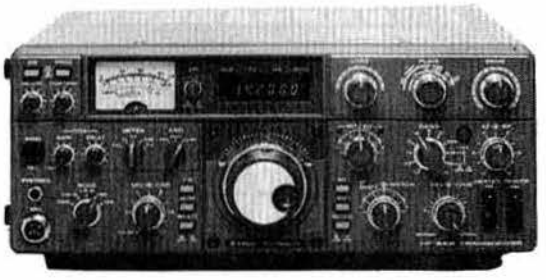
DRAKE
TR-7 TRANSCEIVER,
R-7 FULL COVERAGE
RECEIVER
AND ALL ACCESSORIES

BEARCAT 220FB
SCANNING RECEIVER
THE SCANNER WITH
THE GREAT
REPUTATION

KWM-380

THE LATEST FROM THE
FAMOUS FIRM THAT
HAS CONTRIBUTED SO
MUCH TO AMATEUR
RADIO

TRIO'S ENTIRE RANGE
OF HF, VHF & UHF
EQUIPMENT WITH ALL
THEIR ACCESSORIES



HUSTLER ★ HY-GAIN ★ TEN-TEC ★ MACROTRONICS ★ AVANTI ★ CDE ★ HAL
J-BEAM ★ FDK ★ KDK ★ TRIO ★ TRS-80

for details send 15p stamps or 4 international reply coupons

Access

DRAKE ★ SALES ★ SERVICE

RADIO SHACK LTD. 188 BROADHURST GARDENS, LONDON NW6 3AY

BARCLAYCARD VISA

Giro Account No. 588 7151 Telephone 01-624 7174 Cables: Radio Shack, NW6. Telex: 23718

NORTHERN COMMUNICATIONS

AMATEUR ★ COMMERCIAL ★ MARINE

YAESU ● FDK ● AZDEN ● DENTRON ● STANDARD ● JAYBEAM ● NAG ● ASP ● SWAN ● G-WHIP ● MM ● CDE ● SEM

IMPORTANT NOTICE

We are proud to announce the official completion of our New Sales and Service facilities.
Come and see for yourself the finest names in Amateur Radio equipment, including YAESU FR7700 RX, FT480R, FT780, the fabulous FT107M, FT101ZD and super FT707 HF ranges. The Swan Cubic 100MX special offer, the unique Astro 150 and now the revolutionary 103BX.
We will also be delighted to show you much more including STANDARD'S C7800, C8800 and the delightful C78; FDK's good value Multi 700EX, M750E Multimode and accessories. Or how about the Bearcat 220 or SX200A scanners at special prices?
Cushcraft is a main distribution line. Have you seen the new Ringo Ranger conversion kit, to Ringo 2 spec? (£12.75) Excellent stocks of Antennas and accessories by famous makers.
Customer satisfaction is what we aim for, so looking, buying, or just nattering—why not try it our way? You may be in for a pleasant surprise!

NEW! WIDE BAND ANTENNA—NORCONE
The new NORCONE DISC 512 is a wide band unity gain antenna, specially developed for coverage of 66MHz–512MHz. An ideal partner for the BEARCAT SX200N and other scanning monitor receivers. It may also be used for transmission; full coverage of 70, 144 and 432MHz amateur bands and aircraft, marine and public services. (a) **£24.95**

CUSHCRAFT Power & Performance ANTENNAS

ATV3	Vertical 10/15/20	(a)	£34.00
ATV5	Vertical 80/10m	(b)	£74.00
A144/7	7-element 10·5dB Yagi 144MHz	(a)	£24.95
A144/11	11-element 13dB Yagi 144MHz	(b)	£27.85
214B	14-element 15dB long Yagi 144MHz	(c)	£49.50
A3219	19-element "Boomer" 16·5dB long Yagi 144MHz	(c)	£62.00
ARX2	Ringo Ranger 6dB Vertical 144MHz	(a)	£24.75
AR10	Ringo vertical 10 metres	(a)	£22.00
A10/3	3-element Yagi 7·6dB 10 metres	(b)	£52.00
A15/3	3-element Yagi 7·6dB 15 metres	(b)	£72.00
A20/3	3-element Yagi 7·6dB 20 metres	(c)	£139.75
AS3	3-band HF Yagi 8dB 10/15/20 metres	(*)	£147.00

ZL12—our very own 2 metre SPECIAL element
ZL12 13dB gain, 10' 6" long. Split boom (a) **£28.75**

ZL8 Compact 2 metre SPECIAL element
2ZL8 9dB gain, only 6' 0" long. Split boom (a) **£17.25**

*Prices include VAT, *carriage extra. (a) £1.75 (b) £2.75 (c) £3.75*

SPECIAL OFFER
SX200N + Norcone 512 complete inc VAT **£260.00**

Buy it with Access

299/303 CLAREMOUNT ROAD, HALIFAX HX3 6AW, WEST YORKSHIRE

Tuesday to Saturday inclusive 9.45am–5.30pm **Telephone: (0422) 40792—24-hour answering service G3UGF**

BARCLAYCARD VISA

BRAND NEW COMPONENTS BY RETURN OF POST

VAT Inclusive. Postage 15p (Free over £5). List Free

HIGH STABILITY RESISTORS 5% Tolerance
¼W carbon film E12 series 1R to 10MO. (E24 series to 6M2) **1p**
Metal Film ¼W & ½W 10R to 2M2 & 1W 10R to 10MO E12 Series. **2p**

CAPACITORS
Mullard Subminiature Ceramic Plate capacitors 100V E12 Series
2% 1·8pf to 47pf **3p**. 2% 56pf to 330pf **4p**. 10% 390pf to 4700pf **4p**
Plate Ceramic Capacitors 50V working for vertical mounting
E12 Series from 22pf to 1000pf then E6 series 1k 5pf to 47k pf. **2p**
Miniature Polyester capacitors 250V working for vertical mounting
·01, ·015, ·022, ·033, ·047, ·068 **4p**. 0·1 **5p**. 0·15 & 0·22 **6p**
0·33 & 0·47 **8p**. 0·68 (63V) **11p**. 1·0 **15p**. 1·5 **20p**. 2·2 **22p**

ELECTROLYTICS Wire Ended (Mfds/Volts)

·47/50 **5p**	10/50 **5p**	47/16 **6p**	100/25 **7p**	220/25 **8p**	470/40 **16p**
1·0/50 **5p**	22/16 **6p**	47/25 **6p**	100/50 **8p**	220/50 **10p**	1000/15 **15p**
2·2/50 **5p**	22/25 **6p**	47/50 **6p**	150/16 **7p**	470/16 **11p**	1000/25 **18p**
4·7/50 **5p**	22/50 **6p**	100/16 **7p**	220/16 **8p**	470/25 **11p**	1000/40 **35p**

TAG-ENDED CANS: 3300/25 **20p**. 4700/16 **25p**. 2500+2500/63 **£1.00**.

TANTALUM BEAD ELECTROLYTICS Subminiature vertical Mounting (Mfds/Volts)

0·1/35 **14p**	2·2/35 **15p**	15/16 **20p**	22/16 **30p**	47/16 **80p**
0·22/35 **14p**	4·7/6 **14p**	15/25 **35p**	22/25 **35p**	68/3 **30p**
0·47/35 **14p**	4·7/25 **15p**	22/6 **20p**	33/10 **30p**	100/3 **35p**
1·0/35 **14p**	10/25 **29p**	22/10 **25p**	47/6 **30p**	220/16 **£1.20**

POLYSTYRENE Capacitors 63V working E12 Series Long Axial Wires
10pf to 820pf **3p** 1kpf to 10kpf **4p** 12kpf **5p**

TRANSISTORS

BC107/8/9 **10p**	BC547C/8C/9C **7p**	BC212L **8p**	BFY50/51/52 **18p**	BFX88 **25p**
BC147/8/9 **10p**	BC557C/58C/9C **7p**	BC70 **15p**	2N2926 **7p**	BSX19&20 **15p**
BC157/8/9 **10p**	BC182L, 184L **8p**	BF195&7 **10p**	2N3055 **50p**	BD135&6 **25p**

8 pin i.c.s. 741 **18p** 555 **24p** Holders 8 pin **9p** 14 pin **12p** 16 pin **14p** 28 pin **25p** 40 pin **40p**

DIODES (p.i.v./amps)

75/25mA 1N4148 **2p**	800/1A 1N4006 **6p**	400/3A 1N5404 **14p**	115/15mA OA91 **6p**
100/1A 1N4002 **4p**	1000/1A 1N4007 **7p**	60/1·5a S1M1 **5p**	100/1A Bridge **25p**
400/1A 1N4004 **5p**	1250/1A BY127 **10p**	30/45mA OA90 **6p**	30/150mA AAY32 **12p**

Zener Diodes E24 series 400mW. 3V3 to 33V **8p**. 1 watt 3V9 to 33V **12p**
LEDs 3 & 5mm. Red **10p**, Green & Yellow **14p**. Grommets 3mm 1½p 5mm **2p**
Fuses 20mm glass 100mA to 5A. Q.Blow **3p**. A/Surge **5p**. Holders **5p**. (p.c. or chassis)

The C.K. Supply Co, 127 Chesterfield Rd, Sheffield S8 0RN. Tel: 57771

TANGERINE A BRITISH COMPUTER—see it at our SHOP

Microtan 65 kit	£79.35	10K Microsoft BASIC in Eprom	£56.35
Microtan 65 assembled	£90.85	X-Bug	£19.95
Tanex (min. confg) kit	£49.95	Tanram (min. confg) assemb.	£87.40
Tanex (min. confg) assem	£60.95	Tanram expanded assemb.	£143.90
Expanded Tanex Kit	£103.16	Mini-Mother Board	£11.50
Expanded Tanex asemb.	£114.66	Mini-Rack with Power supply	£56.35
20-way Keypad	£11.50	Keyboard case	£23.00
Full ASCII keyboard	£69.95	Manuals available separately	£5.00

Micron.....£395.00
TUSCAN from £271.00 + VAT; VIDEO GENIE £350.00 + VAT

ACCESS / BARCLAYCARD — 24 HOUR ORDER SERVICE — LARGE SELECTION OF BOOKS — POST EXTRA VAT INCL.

MICRO-PRINT LTD.

59 Church Street, Stoke on Trent. Tel: (0782) 48348. SAE for details or ask for Alan Gray.

ROBOT '800' SUPER TERMINAL*

THE FIRST INTEGRATED RTTY, ASCII, MORSE, SSTV, TERMINAL
***NOW WITH EXTRA FEATURES**

Please send 14p stamp for full details

£675 inc VAT

AERO & GENERAL SUPPLIES

Building 33, East Midlands Airport, Castle Donington, Derby. Tel: (0332) 812446

PACKER COMMUNICATIONS

Remember! To be legal you must have a **WAVEMETER**

WM-2 for 2m 130-300MHz (includes that vital 288MHz).....**£20.85**
WM-4 for 4m 65-150MHz (for 4m, 6m, pmr and air band).....**£20.85**
WM-7 for 70cm 400-900MHz (the ONLY one we know of)...**£21.95**
p&p **£1.15** per wavemeter

TVI, BCI, HiFi!! Probably the greatest problem facing Hams. Many of the filters available are useless in the U.K. as they are intended for the USA/Euro markets (VHF TV, 110/220V—not the UK UHF TV, 230/240V) Try ours, we think they are the best!

ULF-8 UHF Hipass, a real stopper!.....**£4.68**
ULF-4 For FM radio and VHF TV.....**£3.50**
HF-DIN-A 5 pin DIN plug and socket (stereo)..**£3.95**
HF-RCA Phone plugs and sockets (stereo)....**£3.95**
Others available on request. Big Ferrite rings (25mm hole) **95p** (**£1.20** each inc. VAT and p&p)

Match that antenna! Many Jap rigs are for 52, not 50Ω. Coax can be "off", antennas are rarely perfect; get the most from your rig with our ATU's.

AT-145 for 2m 500W S0239, BNC or N connectors.....**£19.45**
AT-6N4 for 4 and 6m—use for fixed or mobile.....**£19.65**

"SELL YOUR GEAR HERE" SERVICE will be operating at most rallies this summer. Raise the cash to buy the rig you always wanted. We sell on commission or buy outright.
"COMP-CALL" Ring us for components or gear. We despatch promptly and include invoice. Please pay promptly!
ACCESS now available Quote your card number over the phone. Add 15% VAT to order plus p&p. Send SAE for details on all our products

BRIDGE END BARN, SOUTERGATE, CUMBRIA, LA17 7TW. 0229 89448

---

2 METRE RECEIVE CONVERTER with 10 Metre IF type RC2-10, also 4 Metre to 10 Metre Converter type RC4-10, and types RC10-2, RC4-2 and RC4-6. All at **£23.80** built or **£11.30** kit.
TONE GENERATORS, KT1000 Kaytone 1000 Hz dah-di-dah built **£7.00** or kit **£4.50. PT1000 Piptone £5.00** or kit **£3.00.**

SPECTRUM COMMUNICATIONS
12 Weatherbury Way, Dorchester, Dorset DT1 2EF

G2BAR HAM BAND AERIALS

10-15-20m **MONOBAND YAGI BEAMS**
2-element and 3-element with **GAMMA MATCH**
complete from **£32.20** to **£65.50** inc. VAT.
For details and price lists send 30p stamps.

UPPINGTON TELE-RADIO (Bristol) LTD
12-14 Pennywell Road, Bristol BS5 0TJ. Tel: 0272 557732

RSGB PUBLICATIONS ARE LISTED ON PAGE 488

INDEX TO ADVERTISERS

CLASSIFIED ADVERTISEMENTS

Classified advertisements **20p** per word, minimum **£4.00**
Box Number £1.00 extra to wordage or minimum.
Semi-display 1/8 page 2¼" × 3½" (57 × 91mm) **£58.00**
3/32 page 1⅞" × 3½" (42 × 91mm) **£45.00**
1/16 page 1" × 3½" (26 × 91mm) **£32.00**
1/32 page 1" × 1⅞" (26 × 43mm) **£18.00**
Please write clearly. No responsibility accepted for errors.
Latest date for acceptance—7 weeks before 1st of issue month.
All classified and semi-display advertisements MUST be prepaid.

Copy and remittance to: **C. C. LINDSAY (cheques payable to RSGB), 2 Leyburn Gardens, Croydon CR0 5NL. Tel: 01-686 5839.**

Members' Ads must be sent to the editor at Chelmsford.

FOR SALE

QSL CARDS printed to your own specifications on white gloss cards. SAE to Caswell Press, 11 Barons Way, Woodhatch, Reigate, Surrey.

LARGE STATION LOGBOOKS. Printed with your callsign plus useful reference information £2.25. Mobile Minilogs: 80p. Callsign Window Stickers: £1.50. Beauprint (G3OYI) Meltham Road, Honley, Huddersfield.

QSL CARDS. Quality printing on gloss or tinted cards. SAE for samples. Express Printing Services, 28 Payne Avenue, Hove Sussex.

TVI/AFI? Cure it with ferrite rings, 67p each incl postage. TMP ELECTRONICS, Britannia Stores, Leeswood, Nr Mold, Clwyd CH7 4RU.

AERIAL WIRE 14swg hard drawn copper, 70' coils £5.50 140' £8.90 incl postage. TMP ELECTRONICS, Britannia Stores, Leeswood, Nr Mold, Clwyd CH7 4RU.

UK AIRCRAFT FREQUENCIES LIST Spot HF, VHF, UHF, frequencies, airports, air traffic control, etc, £1. UK marine frequencies list spot MF, HF, VHF, frequencies, coast stations, ship to shore, etc, £1. International distress frequencies chart 75p. PLH Electronics, 20 Vallis Road, Frome, Somerset BA11 3EH.

CRYSTALS MADE TO ORDER within six weeks, 4–105MHz, wire or pins, £3.90 each inclusive. 70cm and 2m FM crystals from stock, £2.95. SAE list. Hartley Crystals, Green Lane, Milford, Godalming, Surrey GU8 5BG.

MEMORIES AND MICROPROCESSOR PERIPHERALS. Expanding your RAM or extending a floppy? Parts available at competitive pricing. TDS, 57 Westmead, Woking, Surrey GU12 3BS. 04862 20435.

CALLSIGN JUMPERS. Smart tailored V-neck jumpers, machine lettered with your callsign/message. Colours black, navy, grey, bottle, chocolate, white, red. Chest 28"–44" £7.90 including p&p. 'Mountain Tops', 26 Chapel Street, Enderby, Leics.

QSL CARDS Quality printing on coloured gloss cards, at competitive prices. SAE for samples. S. M. Tatham, "Woodside", Orchard Way, Fontwell, Arundel, West Sussex.

HELICAL FLEXIBLE AERIALS. 25–1500MHz. For hand-held or portable transceivers. Virtually unbreakable and highly efficient. For amateur, marine, aircraft, FM bands, commercial PMR, etc in a wide variety of fittings. SAE for new lists. Crayford Electronics, 6 Lovelace Close, West Kingsdown, Kent, TN15 6DJ. Tel: 047485 2577 (24hr).

KEYER WITH MEMORY. Straight paddle or lambic, dot and dash store. High quality pcb £9.62; built and tested £44.95. SAE for details. REPEATER TIME OUT INDICATOR. Switchable 50, 80, 110 seconds. Rf sensing. No rig connection required. £14.82 p&p 50p. GVB Electronics, 95 Old Worthing Road, East Preston, West Sussex. 09062 70260.

BUGGED? UNDER SURVEILLANCE? *"The Bugging Game"* is a unique, previously restricted book describing modern countersurveillance and eavesdropping techniques. A virtual encyclopaedia of "hidden knowledge" it tells ALL YOU NEED TO KNOW about professional and secret service methods! Part 1—Telephone Systems. Part 2—Radio & Microphone Systems. Part 3—Electronic Surveillance & Countermeasures. 300 pages of unobtainable information! DON'T WAIT! . . . this book could easily disappear from the market. Price £9.00 per set plus £1.00 post & packing. Cyberscan International, 35 Dell Farm Road, Ruislip, Middlesex, HA4 7TX. Tel: (08956) 73265.

TWO PYE VANGUARDS AM2ST, £25.00 each. AM25B high band, £15.00. Sic Cambridges AM10D, £30.00 each. Two F27AM base stations, £50.00 each. All complete working unmodified 12½kHz low band AM. C. Walton, Southampton 551580.

HOLIDAY ACCOMMODATION

BOURNEMOUTH. DOLBADARN PRIVATE HOTEL. 8 Grand Avenue, Southbourne, BH6 3SU, between sea and shops. Residential licence, bedroom radio, call and tea making facilities. Excellent food. Dinner, bed and breakfast from £9.00 daily. 0202 424826. E. W. & J. M. Batten (G3BKN).

SUSSEX, NEAR WORTHING/BRIGHTON, bed and breakfast, 18th century flint cottage, car space, shack available, G8SUU. QTHR. Tel: Lancing 3102.

TREVEGLOS GUEST HOUSE, 17 The Terrace, St Ives, Cornwall; 0736 797115; bed, breakfast, evening meal, £57.50. Situated close coach and railway station, car park and town. Overlooking Porthminster beach. Denis and Stella Whitehouse, G8FCZ and XYL.

CORNWALL. Well equipped self catering farmhouse, own grounds, on A394. Sleeps 7, every comfort; panoramic views farmland/sea coast 6 miles; use of HF shack; discounts "Hams", R. Signals, Burma Stars—stamp for details. Stan Cotton (G4FKJ), Little Manhay, Helston. Tel: (03265) 2044.

WANTED

GOOD SECONDHAND EQUIPMENT ALWAYS WANTED. Come to Amateur Radio Exchange for the best deal. 2 Northfield Road, Ealing, London W13. Tel: 01-579 5311.

MISCELLANEOUS

COURSES—RADIO AMATEURS EXAMINATION. City and Guilds. Pass this important examination and obtain your G6 licence, with an RRC Home Study Course. For details of this and other courses (GCE, Professional Examinations, etc) write or phone: The Rapid Results College, Dept JT1, Tuition House, London SW19 4DS. Tel: 01-947 7272 (Careers Advisory Service) or for prospectus requests ring 01-946 1102 (24hr Recordacall).

PATENTS and **TRADE MARKS**—Booklet on request, King's Patent Agency Ltd (B. T. King, Reg Pat Agent)—146A Queen Victoria Street, London EC4. Tel: 01-248 6161. Telex: 8833805. Established 1886.

EQUIPMENT WANTED

SPOT CASH PAID FOR GOOD USED AMATEUR AND MARINE RADIO EQUIPMENT—OR—YOUR EQUIPMENT SOLD AT YOUR PRICE ON SMALL COMMISSION—NO SALE—NO CHARGE

TEL: AMCOMM: 01-864 1166, 01-422 9585

SITUATIONS VACANT

BRANCH MANAGERS
VARIOUS UK CITY LOCATIONS

Our clients are a well established successful private company with diverse interests within the communications industry. To further expand their retailing activities a number of branch managers are required to organise both premises and staff.

The ideal applicant will be a licenced Radio Amateur, with a sound knowledge of commercially available equipment of the last decade. A personable manner fostering excellent customer relations is essential and an ability to communicate ideas and views to head office is desirable. Suitable backgrounds are sales/service in the amateur/marine/PMR fields or management or the Services with a technical bias.

Salary and potential benefits package is negotiable.

If you would like to become part of a growing company and think you have something to offer in line with the above requirements please reply enclosing a full curriculum vitae, which unless marked "attention Mr C. C. Lindsay" with a note of companies to which it may not be sent, will be forwarded direct to our clients.

Please reply to: Box 183, RSGB, 2 Leyburn Gardens, Croydon CR0 5NL.

RSGB MAIL-ORDER PRICE LIST

RSGB PUBLICATIONS

Books

A Guide to Amateur Radio (18th edn, paperback)	£3.07
A Guide to Amateur Radio (18th edn, hardback)	£6.32
Amateur Radio Awards (2nd edn)	£3.41
Amateur Radio Techniques (7th edn)	£6.16
Amateur Radio Operating Manual	£4.96
Morse Code for Radio Amateurs	£1.31
OSCAR-Amateur Radio Satellites	£4.50
RSGB Amateur Radio Call Book (1981 edn)	£4.37
Radio Amateurs' Examination Manual (8th edn)	£2.73
Radio Communication Handbook (5th edn) Vol 1	£10.20
Radio Communication Handbook (5th edn) Vol 2	£9.06
Radio Data Reference Book (4th edn)	£5.02
Test Equipment for the Radio Amateur (2nd edn)	£5.86
TVI Manual (2nd edn)	£1.95
VHF/UHF Manual (3rd edn)	£8.70
World at their Fingertips	£4.28

Logbooks

Amateur Radio Logbook	£2.86
Mobile Logbook	£1.14
Receiving Station Logbook	£2.68

Maps, charts and lists

Countries List/HF Awards List	34p
DX Globe (incl Securicor delivery)	£88
Great Circle DX Map (wall)	£2.12
IARU Region 1 Beacon List	32p
IARU QTH Locator Map of Europe (wall)	£1.34
Oscar Map (in tube)	56p
QTH Locator Map of Western Europe (wall)	£1.34
QTH Locator Map of Europe (card for desk)	69p
UK Beacon List	32p
UK Repeater List	32p
World Prefix Map (wall)	£2.23

Members' sundries

RSGB hf contest log sheets (100)	£2.28
RSGB leather belt	£6.32
RSGB teeshirt (small, medium, large) (new design)	£3.41
RSGB tie (blue, maroon, green)	£3.34
RSGB pennant	£2.47
RSGB station callsign plaque*	£6.75
RSGB deluxe lapel badge*	£3.82
Callsign lapel badge*	£2.12
Lapel badge (RSGB emblem, pin fitting)	75p
Members' headed notepaper (50 sheets) quarto	£1.07
Members' headed notepaper (50 sheets) octavo	76p
QSL card holders	£1.14
Radio Communication back issues (*As available*)	97p
Radio Communication bound volume, 1978	£14.83
Radio Communication bound volume, 1979	£13.55
Radio Communication bound volume, 1980 (Parts 1 and 2)	£14.53
Radio Communication Easibinder (old size)	£4.24

**Delivery approximately five weeks*

Car window stickers

"I'm on the air with amateur radio" (four colours)	84p
"I'm monitoring ·5 are you?" (two colours)	68p
RSGB badge	40p

ORDERING INFORMATION

PRICES. These include postage, packing and VAT where applicable. For airmail despatch, please ask for price before ordering. Goods are obtainable, less p & p, at RSGB headquarters between 9.30am and 5pm, Monday to Friday.

MEMBERSHIP DISCOUNT. RSGB members can obtain a 10 per cent discount on the prices listed here at the time of ordering (excluding *Ham Radio Magazine).* To obtain the discount, deduct 10 per cent, calculated to the nearest penny, from the total value of the order (using the latest price list) and enclose a remittance for the balance. Also enclose a recent *Radio Communication* address label as proof of membership.

POSTAL TERMS. Cash with order. Stamps and book tokens cannot be accepted. Cheques and postal orders should be crossed and made payable to "Radio Society of Great Britain". Giro A/C No 533 5256. Please write your name and address clearly on the order.

ORDER FROM: RSGB Publications (Sales), 35 Doughty Street, London WC1N 2AE

(Raynet supplies should be obtained from Mrs Balestrini, QTHR G3BPT)

OTHER PUBLICATIONS

Title	Publisher	Price
A Course in Radio Fundamentals	ARRL	£3.24
ABCs of Antennas	Sams	£3.94
ABCs of Capacitors	Sams	£4.44
ABCs of Fets	Sams	£4.04
ABCs of Integrated Circuits	Sams	£3.59
Active-filter Cookbook	Sams	£12.69
All About Cubical Quad Antennas	RPI	£2.92
Amateur Single Sideband	Ham Radio	£4.58
Amateur Television Handbook	BATC	£2.39
Amateur Tests and Measurements	Sams	£5.34
Antenna Anthology	ARRL	£3.71
ARRL Electronics Data Book	ARRL	£3.58
Beam Antenna Handbook	RPI	£4.22
Beginners Handbook of Amateur Radio	Sams	£8.26
Best of Oscar News	AMSAT-UK	£1.64
Better Short Wave Reception	RPI	£3.65
Care and Feeding of Power Grid Tubes	Varian	£2.98
CMOS Cookbook	Sams	£9.59
Electronics for the Amateur	Sams	£7.53
FET Circuits	Sams	£4.46
FET Principles, Experiments and Projects	Sams	£7.98
FM and Repeaters for the Radio Amateur	ARRL	£4.08
Frequency and its Measurement	Sams	£3.59
Hints and Kinks for the Radio Amateur	ARRL	£3.32
IC Op-amp Cookbook	Sams	£11.82
IC Timer Cookbook	Sams	£8.76
Practical Antennas for the Radio Amateur	Scelbi	£8.02
Radio Amateur Callbook-DX Listings (1981 edn)	ARCI	£10.45
Radio Amateur Callbook-USA Listings (1981 edn)	ARCI	£10.95
Radio Frequency Interference	ARRL	£3.09
Radio Transmitter Principles and Projects	Sams	£6.28
Radio Valve and Semiconductor Data Book	Newnes	£4.48
RC Circuits	Sams	£4.51
RTTY the Easy Way	BARTG	£1.14
Saga of the Vacuum Tube	Sams	£9.09
Simple Low-cost Wire Antennas	RPI	£3.16
Single Sideband for the Radio Amateur	ARRL	£3.84
Solid State Basics	ARRL	£4.85
Solid State Design for the Radio Amateur	ARRL	£6.25
Specialised Communication Techniques	ARRL	£3.49
The ARRL Antenna Book	ARRL	£4.30
The Cheap Video Cookbook	Sams	£5.47
The Complete Handbook of Slow Scan TV	Tab	£5.76
The Radio Amateurs Handbook (Paperback 1981 edn)	ARRL	£8.56
The Radio Amateurs Handbook (Hardback 1981 edn)	ARRL	£12.06
The Radio Amateurs VHF Manual	ARRL	£4.15
The 8080A Bugbook	Sams	£9.59
TTL Cookbook	Sams	£8.48
TV Typewriter Cookbook	Sams	£8.70
Understanding Amateur Radio	ARRL	£4.32
Unique IC Op-amp Applications	Sams	£4.58
Vertical Beam and Triangle Antennas	Sams	£5.01
World Atlas	RACI	£1.91
World Radio and TV Handbook (1981 edn)	Billboard	£10.62
80 Meter DXing	CTI	£3.03
99 Ways to Improve your Short-wave Listening	Sams	£4.44

MORSE INSTRUCTION AIDS

Morse code cassette. Stage 1	£3.85
G3HSC Rhythm method of morse tuition	
Complete course (Two 3-speed lp records and one ep, plus books)	£6.45
Beginner's course (One 3-speed lp and one ep plus book)	£4.97
Beginner's lp (0–15wpm) plus book	£4.29
Three-speed simulated PO test (7in d/s ep)	£2.00

On all overseas orders for G3HSC course, including orders from Eire, add £1.12 for additional packing and postage from supplier

MAGAZINE SUBSCRIPTIONS

QST (including ARRL membership). One year	£11.84
Two years	£22.60
Three years	£32.85
Air mail, one year	£20.00

Send *QST* subscriptions to RSGB, 35 Doughty Street, London WC1N 2AE.

Ham Radio Magazine (per annum) (incl air delivery) £14.00

Subscriptions and changes of address for *Ham Radio Magazine* should be sent to: Ham Radio Magazine (UK), PO Box 63, Harrow, Middx HA3 6HS.

YAESU MUSEN

FT707
SOLID-STATE HF TRANSCEIVER "WAYFARER"

The FT707 "The Wayfarer" is an ultra-compact solid-state transceiver ideally suited for the home station or as a travelling companion, providing performance previously proffered only by the "Top liners".

The FT707 is THE radio of the eighties: 80–10m, including 30, 17 and 12m—all factory installed—100W output (10W 'S' model) 50% developed in 3:1 VSWR—Digital, bright LED's in mode sensitive counter plus analogue readout—Transceiver status at a glance from string LED and single displays—16 poles of crystal filtering provides continuously adjustable IF bandwidth 2·4kHz to 300Hz (N.B. This is true "variable bandwidth" that minimises much of the adjacent channel interference not "IF shift")—Noise blanker of most advanced design using local AGC loop—Schottky diode ring module, power transistor buffers, ultra clean, low noise local oscillator are combined to produce, size and price notwithstanding a most remarkable receiver.

The FV707DM is an external digital VFO that uses an advanced twin loop PLL to provide 10Hz tuning steps with excellent spectral purity. The addition of this 1" high package, with its 12 channels of memory with Receiver independent tune and internal/external (mic), up/down, fast/slow scanning, perfects the FT707 for mobile or contest use.

Illustrated below (L to R): The FP707 regulated power supply, the FT707 and the FC707 antenna coupler/switch/SWR meter on top of the FV707DM.

For further details of this exciting new system, please contact any authorised sales outlet for a free colour brochure. Better still: *see it for yourself—try one out today!!!*

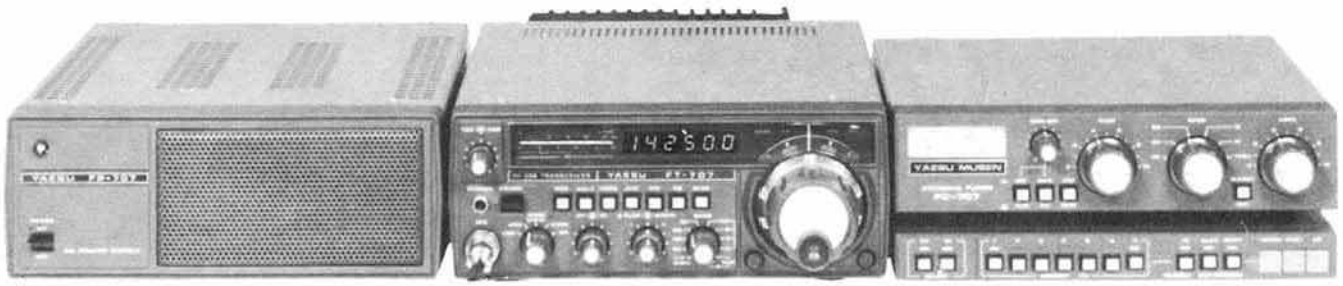
FT707

- ★ 80–10 metres (including 10, 18 and 24MHz bands!!!!)
- ★ USB—LSB—CWW—CWN—AM (Tx and Rx operation)
- ★ All solid state—including "advanced" final amplifier
- ★ 100W PEP. 50% power output at 3:1 VSWR
- ★ Full "broad band" no tune output stage
- ★ Excellent Rx. dynamic range, power transistor buffers
- ★ Rx Schottky diode ring mixer module
- ★ Local oscillator with ultra-low noise floor
- ★ Variable IF bandwidth—16 crystal poles
- ★ Bandwidths 6kHz* 2·4kHz–300Hz (600–350)Hz*–300Hz*
- ★ AGC; slow-fast switchable from the front panel
- ★ VOX built-in and adjustable from the front panel
- ★ Semi-break in with side tone for excellent CW
- ★ Digital (100Hz) plus analogue frequency display
- ★ LED Level meter reads: S, PO and ALC
- ★ Convenient concentric AF/RF gain controls
- ★ Indicators for: calibrator, fix, int/ext VFO
- ★ Receiver offset tuning (RIT-clarifier) control
- ★ Advanced noise blanker with local loop AGC
- ★ 25kHz crystal calibrator feature
- ★ Internal, xtal or external VFO control

FV707DM

- ★ 12 memory channels with RIT
- ★ Twin PLL system with 10Hz steps
- ★ Scanning: up/down, fast/slow from mic or unit

**Optional* *E&OE*



WORKING FOR OUR COMMON INTERESTS—at Yaesu Musen communication equipment is not a sideline but the only business. Over 130 licensed amateurs proudly produce the most diverse product line available, SSB, CW, AM or FM for mobile, portable or base use.

SOUTH MIDLANDS COMMUNICATIONS LTD
SM HOUSE, OSBORNE ROAD
TOTTON, SOUTHAMPTON SO4 4DN

SMC

YAESU MUSEN'S ONLY AUTHORISED UK AGENTS

G3FIK

AMATEUR ELECTRONICS UK
508–514 ALUM ROCK ROAD
ALUM ROCK,
BIRMINGHAM 8

A COMPLETE VHF/UHF STATION COSTS SURPRISINGLY LITTLE WHEN IT'S FDK

M750E	£299
EXPANDER 430	£169
PS750	£69

Pictured above is the famous Multi 750E FM/SSB/CW transceiver covering 144–146MHz (4MHz option available) with 10 Watts output, ideal for mobile or base station use. Below the Multi 750E is the new 430MHz EXPANDER unit providing complete coverage of 70cms, 430–440MHz, and fully controllable from the front panel of the Multi 750E, thus providing a complete dual band station. Simplex, repeater shift and even split band operation are all possible with this combination. And to power the station the matching PS750 provides a smart solution and also incorporates a matching front mounted speaker. To learn more about the Multi 750E and its matching units send stamped addressed envelope today.

SOLE UK DISTRIBUTORS Waters & Stanton Electronics Main Road Hockley Essex Tel (0702) 206835

Printed in Great Britain for the RADIO SOCIETY OF GREAT BRITAIN, 35 Doughty Street, London, WC1N 2AE
by E T Heron & Co Ltd, Essex and London