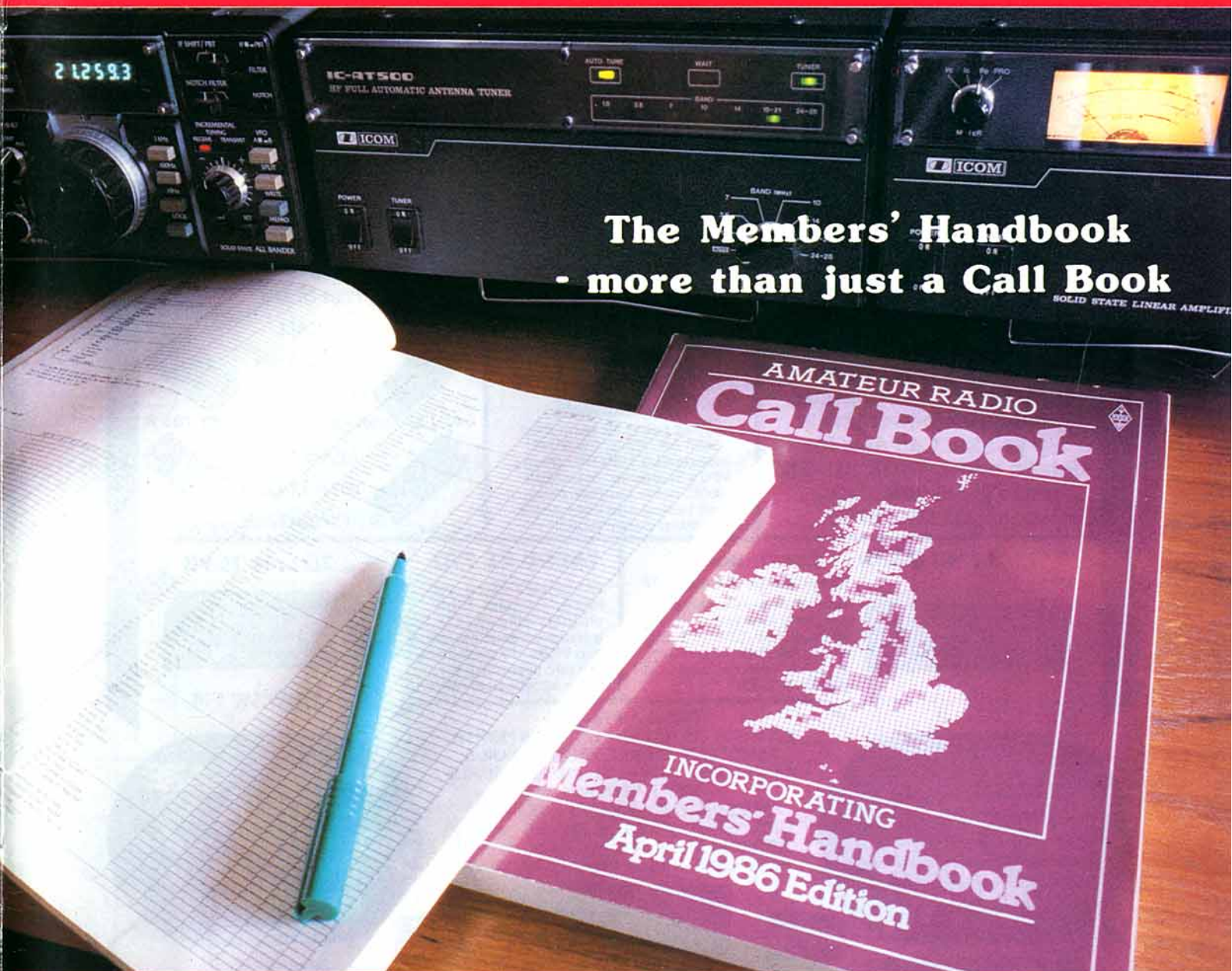


# RADiO COMmunication

June 1986



**The Members' Handbook**  
**- more than just a Call Book**

Journal of the Radio Society of Great Britain



# Where a good deal more costs a good deal less . . .

**ICOM**

IC 745



Call or telephone 01-992 5765 for latest prices and information plus full range of H.F. equipment and accessories.

IC 751A



## NEW FROM YAESU — FL7000



A major leap forward in amplifier design YAESU's new HF fully automatic unit will soon be available and introduces a whole new approach to transistor use at high power. Incorporates fully automatic antenna coupling and band changing!  
**FULL DETAILS NOW AVAILABLE**  
— WRITE OR PHONE 01-992 5765

FT 757

**YAESU**

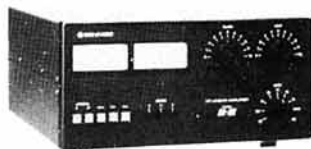


Telephone 01-992 5765 for latest information on the YAESU value for money high performance equipment. Full range of accessories available.

FT 980



## NEW THE TOKYO TRIPLITS . . .



Available in June — 3 new HF linears from Tokyo High Power. All Amateur bands with power levels up to 3kw. Call now for details on HL-1KGX, HL-2K and HL-3K. Telephone today: 01-992 5765.

EXPECTED  
EARLY JUNE

## CAPCO S.P.C. 300 ANTENNA COUPLER



We are now sole worldwide distributor of this remarkably robust unit. Will match anything from a piece of wire to a halfwave 160m through to 10m — up to 1kw P.E.P.

## ICOM R71 General Coverage Receiver



Keypad entry, 32 memories SSB, AM, RTTY, CW & FM (optional) 0.1-30 MHz. Twin VFO's Scanning, Selectable AGC, noise blanker, pass band tuning and deep notch filter! Super value!!

MASSIVE STOCKS  
OF MANY  
HAND HELD  
TRANSCIVERS  
INCLUDING  
PMR UNITS  
— CALL  
01-992 5765  
FOR PRICES  
AND DESCRIPTIVE  
LEAFLETS  
WITH FULL  
SPECIFICATION.



## YAESU FRG 8800 — Continuous Coverage Receiver



Twin VFO's plus keyboard / computer interface control — all mode SSB, CW, AM & FM. Memories, scanning, filters. Includes 2-dimensional LCD, graphical SIMPO.

## YAESU FT 770

Extremely rugged, yet highly compact. High visibility display LCD. Dual microprocessor design — two VFO's, 10 memories, flexible scanning, etc. Voice synthesizer option.

70 cms TCVR



— 25W/3W FM

**OUR BIG  
BUYING POWER  
GUARANTEES YOU  
EUROPE'S No. 1 DEAL  
ALL ROUND. SEND 90p  
FOR OUR BUMPER  
LITERATURE  
PACK!**

**FREE ANTENNA**  
WITH ANY HF RIG BOUGHT THIS MONTH,  
TAKE YOUR CHOICE FROM 3, 4 OR 5  
BAND VERTICALS — 10 AND 15M QUADS  
— WHILE STOCKS LAST!  
**MASSIVE WORKING DISPLAY**  
FIFTY (50) NEW TRANSCEIVERS HF / VHF  
AND UHF ALL WORKING. SELECTION OF  
RECEIVERS — UHF / VHF ALL WORKING!

**AMCOMM — ARE**  
— WHERE A  
GOOD DEAL MORE  
COSTS A GOOD  
DEAL LESS!!!



ICOM 7000 £849



FRG 9600 £449



AR 2002 £425

Prices subject to currency fluctuations.

**AMCOMM ARE**

HOURS: 9:30 — 5:00  
CLOSED MONDAYS.

373 Uxbridge Road, London W3 9RN Telephone: 01-992 5765/6

Telex: 334312 E. & O.E.



JUNE 1986

VOLUME 62 No 6

# RADIO COMMUNICATION

## EDITOR

A W Hutchinson

## Editorial assistant

Miss S J Smith

## Draughtsman

D E Cole

## Editorial secretary

Mrs A M Celand

All contributions and 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: 0915 to 1715

## ADVERTISING

Advertisements, other than Members' Ads, should be sent to:

M J Hawkins, G3ZNI,  
RSGB Advertisement Officer,  
PO Box 599,  
Cobham,  
Surrey KT11 2QE

Tel 037 284 3955

Prestel 372843955

## EDITORIAL BOARD

D A Evans, G3OUF

A W Hutchinson

D S Evans, G3RPE

Correspondence concerning the *RSGB News Bulletin* (including Members' Ads), the distribution of the journal, and all other Society matters should be addressed to:

RSGB Headquarters,  
Lambda House,  
Cranborne Road,  
Potters Bar,  
Herts EN6 3JW

Tel 0707 59015

Business hours: 1000 to 1600

## Headline News

Tel 0707 59312 for a recording of the latest amateur radio news

RSGB Data Box (Prestel compatible)

Tel 0707 52242

## CONTENTS

- 396 Editorial—New members—please
- 397 Amateur Radio News
- 398 Special Event Stations  
Mobile Rallies Calendar
- 399 Other Events  
Obituaries
- 400 Members' Mailbag
- 404 A single-stage linear amplifier for 50MHz—John Matthews, G3WZT
- 410 Equipment review—The Icom IC751A hf transceiver—Peter Hart, G3SJX
- 415 Amateur radio software—Graham Cluer, G4AVV
- 416 Technical Topics—Pat Hawker, G3VA
- 422 News & Views  
VHF/UHF—Ken Willis, G8VR
- 424 HF—John Allaway, G3FKM
- 427 HF f-layer Propagation Predictions  
SWL—Bob Treacher, BR532525
- 428 Satellites—Bob Phillips, G4IQQ
- 429 QRP—George Dobbs, G3RJV
- 430 Microwaves—Mike Dixon, G3PFR
- 431 Computing—John Morris, GM4ANB
- 432 Data Comms—Ian Wade, G3NRW
- 433 Contest News
- 435 Contests Calendar
- 437 Club News

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 at high competitive rates will be made for all articles published.

A contribution will only be considered for publication on the understanding that the person submitting it is the original author and owner of the whole copyright, and that on acceptance for publication such copyright will become the property of the RSGB in consideration of the above-mentioned payment by the RSGB to the contributor.

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



36,244 copies per  
issue average  
circulation in 1985

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

© RADIO SOCIETY OF  
GREAT BRITAIN 1986

# the **NEW** TRIO TS440S amateur bands transceiver plus general coverage receiver.



With the advent of the TRIO TS440S, the compact HF transceiver that we have known since the late seventies, has taken a major step forward. The new transceiver has provision for fitting an internal aerial tuning unit operating between 3.5 and 28 MHz. A front panel numeric keypad makes frequency selection and subsequent entry to one of the hundred memory channels or two VFO's a simple operation and, of course, frequencies can be quickly selected from memory and transferred to either VFO. The TS440S is also an excellent general coverage receiver tuning from 100 kHz to 30 MHz. Combined with TRIO's now well-known attention to ergonomics, the performance and facilities of the TRIO TS440S make this the transceiver for your shack.

The TRIO TS440S operates from 13.8 volts DC, 20 amps. Input power is 250 watts pep on all modes throughout the band except on AM where it is 110 watts. When using the TRIO PS50 power supply unit transmission time at full output with the TS440S transceiver can be up to one hour in any mode.

Operating on USB, LSB, AM, FM and AFSK the TRIO TS440S has full and semi break-in on CW. Rapid transmit/receive switching also makes the TS440S suitable for AMTOR use. FM is fitted as standard to the transceiver as is squelch which operates on all modes. Bandwidth selection manual or automatic. When the bandwidth switch is in the auto position the rig selects the IF bandwidth to match the mode. Of course, the rig's selection can be overridden. The TS440S has provision for four different bandwidths. The W (AM) and M2 (SSB) positions are

fitted with 6kHz and 2.4kHz 455kHz ceramic filters, the M1 and N positions are for optional filters, eg. 500 or 250Hz CW (YK88C or YK88CN) in position N and a 1.8 kHz narrow SSB filter (YK88SN) in position M1. Alternatively a 2.4 kHz (YK88S) filter can be fitted in the M1 position resulting in an even better filter shape for SSB use. The TRIO TS440S has two switchable rates of AGC, fast or slow.

Careful appraisal of operating techniques has enabled TRIO to provide the TS440S with a comprehensive system of memories, search and scanning modes and keyboard frequency entry.

- The two VFO's, A and B can be used individually or when used together in split mode, for cross band and even cross mode contacts. Normally used on the same band, the system provides the same flexibility as if the operator were using a separate VFO and is ideal for DX working. Whilst listening in split mode, the transmit frequency of the other VFO can quickly be checked by pressing the front panel switch, T-F SET. A front panel control, A = B instantly puts the "idle" VFO on the frequency of the VFO in use.
- The desired operating frequency can be arrived at by use of the tuning knob and megahertz up/down switches. On the TS440S frequencies can also be entered by means of a front panel numeric keypad.
- One hundred memory channels are available, each storing frequency and mode. Frequencies can be entered into any selected memory channel from either of the VFO's or by using the keypad, memories 0 to 89 are simplex, memories 90 to 99 hold split frequencies. Both frequency and mode can easily be transferred from memory to either VFO. When transferring a split memory channel (90 to 99) the receive frequency is entered into VFO A and the transmit frequency into VFO B.

Memories are scanned in banks of ten, eg. 20 to 29, 40 to 49, 70 to 79 etc.

- Two search ranges are available, the frequency limits being user programmable. Two rates of scan can be set when in search mode.
- When set to memory channel instead of VFO, the entire contents of the one hundred memories can be swiftly reviewed by using the main tuning knob, the megahertz up/down switches on the front panel or the up/down buttons of the microphone.

Rapid selection of the required amateur bands is achieved by means of the front panel up/down switches. Alternatively the switches can be preset to step in megahertz units.

The TRIO TS440S is fitted with a speech processor which can be switched on to enhance transmitted audio when working DX. To improve receive audio the transceiver has both notch filter and IF shift.

An optional computer interface (IF232C) is available for the transceiver.

For the blind operator the TRIO TS440S is ideal. When fitted with the VS1 board (optional), a digitally encoded girl's voice will announce on request the operating frequency and as each mode is selected a tone gives the appropriate morse letter (F for FM, U for USB, etc).

With the TS440S, TRIO have produced a transceiver that combines excellent performance with unparalleled operating facilities in an extremely compact package. The result is a transceiver suitable for mobile and portable use as well as the shack.

TS440S.....£950.00 inc VAT carriage £7.00.  
AT440.....£125.00 inc VAT carriage £7.00.  
PS50.....£192.60 inc VAT carriage £7.00.

## LOWE ELECTRONICS LTD.

Chesterfield Road, Matlock, Derbyshire DE4 5LE  
Telephone 0629 2817, 2430, 4057, 4995.

send £1 for complete mail order catalogue.





remember the TR9000 two metre multimode,  
that revolutionized mobile operation,  
the TR9130, that improved the unimprovable,

now, better than ever, the **NEW** TRIO  
two metre multimode,  
the **TR751E**.



There has been a TRIO two metre multi-mode mobile transceiver for the last six years. Beginning with the successful TR9000 and continuing with the TR9130, amateurs have always found the series to be reliable and above all easy to operate, especially whilst mobile. Advances in technology have enabled TRIO to further improve on the TR9130. Additional operating features have resulted in an even easier to use and smaller transceiver. However TRIO have not discarded the valuable experience gained over the last six years. The result is the TR751E, a new generation of multi-mode mobile transceiver.

The TR751E is the first multi-mode mobile transceiver that can be set to select the correct mode whilst scanning the band. By setting the rig to VFO and selecting AUTO mode before pressing SCAN button, the TR751E will move up or down the band changing both mode and step rate according to the band plan (5kHz/SSB, 12.5kHz/FM or 1kHz/SSB, 5kHz/FM depending on the selected frequency step).

The transceiver has two VFO's and 10 memory channels. Memory information is easily transferred to either VFO. Each memory holds information on frequency, mode and also the step rate to be set when

transferring the memory information to VFO. Memory channel one is also the ALERT frequency, memories 7 and 8 relate to DCL and memory 9 programs the user defined limits of frequency scan.

The TR751E can be set to scan between user programmed limits or around them depending on the frequency set when the scan is started. When AUTO mode is set the transceiver will select the correct mode as it scans. In addition to scanning each memory, the TR751E can be set to scan those memories programmed with the same mode. Pause on an occupied channel is time operated but can be changed to carrier hold by an internal modification.

Operating on 13.8 volts DC, power output from the transceiver is 25 watts (high) and approximately 5 watts (low). The low power setting applies to all modes. When compared with the TR9130, the TR751E is smaller and lighter, TR751E (TR9130) 180mm (175mm) wide, 60mm (68mm) high, 213mm (253mm) deep, 2.1Kgs (2.4 Kgs).

The TR751E is perfect for base station use. When operating on SSB, signals can easily be found using the frequency step set to 5kHz, fine tuning quickly achieved by switching to the 50Hz rate. Operation is also ideal on FM, the rig stepping in either 12.5 or 5 kHz steps. Full repeater facilities are also available including Reverse Repeater. Receiver performance is excellent, our first sample amazed us, FM, 0.14µV for 12dB SINAD and SSB, 0.09µV for 10dB S+N/N.

As an option, the TR751E can be fitted with DCL. Compatible with the DCS system, DCL (Digital Channel Link) enables your rig to automatically QSY to an open channel. The DCL system searches for an open channel (checks the next eleven 25kHz spaced frequencies above the one stored in memory 7), remembers it, returns to the original frequency and transmits control information to the other DCL equipped station that switches BOTH rigs to the clear channel.

For the blind operator the TRIO TR751E is perfect. As each mode is selected a tone gives the appropriate morse letter (F for FM, U for USB, etc) and when fitted with the optional VSI board, a digitally encoded girl's voice will announce on request the operating frequency.

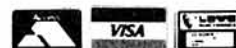
In addition, the TR751E has an illuminated analogue S/Rf meter, all mode squelch, MHz select keys, a noise blanker, semi break-in CW with side tone, RIT, memory channel up/down keys and a frequency lock. TRIO's attention to detail can be seen in the design of the included mobile mount, a clamp system with rubber pads protecting the rig as it is slid in and out and for security, the clamp can be easily locked in the closed position.

Better than the TR9130 and at the same price, there is so much more to say about the TR751E, so why not ring us and let's talk about it.

## LOWE ELECTRONICS LTD.

Chesterfield Road, Matlock, Derbyshire DE4 5LE  
Telephone 0629 2817, 2430, 4057, 4995.

send £1 for complete mail order catalogue.



## LOWE SHOPS

### In Glasgow,

the shop manager is Sim, GM3SAN,  
the address, 4/5 Queen Margaret Road, off Queen Margaret Drive,  
Glasgow,  
telephone 041-945 2626.

### In the North East,

the shop manager is Don, G3GEA,  
the address, 56 North Road, Darlington,  
telephone 0325 486121.

### In Cambridge,

the shop manager is Tony, G4NBS,  
the address, 162 High Street, Chesterton, Cambridge,  
telephone 0223 311230.

### In Cardiff,

the shop manager is Carl, GW0CAB,  
the address, c/o South Wales Carpets, Clifton Street, Cardiff,  
telephone 0222 464154.

### In London,

the shop manager is Andy, G4DHQ,  
the address, 223/225 Field End Road, Eastcote, Middlesex,  
telephone 01-429 3256.

### In Bournemouth,

the shop manager is Colin, G3XAS,  
the address, 27 Gillam Road, Northbourne, Bournemouth,  
telephone 0202 577760.

Although not a shop, there is on the South Coast a source of good advice and equipment, John, G3JYG. His address is Abbotsley, 14 Grovelands Road, Hailsham, East Sussex. An evening or weekend call will put you in touch with him. His telephone number is 0323 848077.

## AR2002 interface.

AR2002

RC PACK



Now available for the AR2002 is an RS232 interface (RC PACK) which consists of an 8 bit CPU with its own ROM and RAM.

Designed to be connected directly to the AR2002 or with an additional adapter to the AR 2001, the RC PACK gives two methods of controlling the receiver.

Using the internal software and with your own computer acting as a dumb terminal, the RC PACK provides 50 memory channels, 10 search bands, selectable up/down steps and adjustable delay times etc. You can also assign station descriptions to each listed memory.

If you wish to write your own programs using the RC PACK as an interface then "the sky's the limit".

For those who own a BBC computer we have designed an additional control system which is available in ROM.

The RS232 settings of the interface are 8 bit, no parity, 1 stop bit and either 2400, 4800 or 9600 baud (internally switchable).

AR2002.....£435.00 inc VAT carriage £7.00

RC Pack.....£221.00 inc VAT carriage £7.00

ARPROM (BBC).....£10.00 inc VAT carriage £1.00

## NEW from TRIO, a 45 watt fm mobile.....



The TRIO TM2550E is a high power 2 metre FM mobile transceiver.

Power output from the TM2550E is 45 watts. Current drain is approximately 9.5 amps in the high power position (45 watts) and approximately 3 amps in the low power position (5 watts). Low power can be adjusted up to 40 watts. Power requirement of the transceiver is 13.8 volts DC.

Frequency selection is easy using the backlit front panel keypad. The selected frequency is displayed on a backlit LCD together with

additional operating information, eg priority channel, reverse repeater, simplex or repeater shift etc.

The TM2550E has 23 memory channels into which frequencies are easily written. The TM2550E automatically selects simplex or repeater mode in accordance with the band plan. This function is easily overridden by using the "OS" key.

Scanning operations are divided into keyboard, memory and priority scan. Frequency hold on an occupied channel can be either "time" or "carrier" operated.

As an option, the TM2550E can be fitted with the DCS system, DCL (Digital Channel Link) enables your rig to automatically QSY to an open channel. The DCL system searches for an open channel (checks the next eleven 25kHz spaced frequencies above a user designated one), remembers it, returns to the original frequency and transmits control information to the other DCL equipped station that switches BOTH rigs to the clear channel.

TM2550.....£399.00 inc vat, carriage £7.00.

MU1 DCL unit.....£26.78 inc vat, carriage £1.00.

## LOWE ELECTRONICS LTD.

Chesterfield Road, Matlock, Derbyshire DE4 5LE  
Telephone 0629 2817, 2430, 4057, 4995.



send £1 for complete mail order catalogue.

RADIO COMMUNICATION June 1986



# NEW from the Japan Radio Company, the **NRD525**



The enthusiastic short wave listener knows all too well the excellent performance of the NRD505 and NRD515 general coverage receivers from the JAPAN RADIO COMPANY. Building on the experience gained from the production of these outstanding receivers, JRC introduce a new model, the NRD525, combining advanced performance with the first class construction of the NRD505.

The NRD525 is a double superheterodyne receiver having a first IF of 70.45399/70.453MHz and a second of 455kHz. The receiver covers frequencies from 90kHz to 34MHz. An optional internally fitted converter (CMK165) will be available adding the following frequency ranges, 34 to 60MHz, 114 to 174MHz and 423 to 456MHz.

Modes of operation for the JRC NRD525 are USB, LSB, CW, AM, FM and RTTY. An optional RTTY demodulator (CMH530) will be available enabling a printer to be directly connected to the receiver. The receiver also has a squelch control which operates on all modes.

The NRD525 has been designed to perform when conditions for reception are far from perfect. To help copy weak signals on a crowded band both notch filter and pass band tuning controls are included. The receiver has, as standard, a 3kHz filter for USB and LSB (INTER), a 6kHz filter for AM (WIDE) and in the AUX position on a bandwidth of 12kHz. If an optional filter is placed in the AUX position the 12kHz bandwidth ceases to be available. For CW and RTTY reception the NARR position can be fitted with the optional 500kHz filter (CFL232). In the FM mode (narrow band FM), BANDWIDTH and AGC switches do not function.

The NRD525 is extremely "user friendly" having an easy to use numeric keypad for frequency entry and memory selection. Whether you are entering a full shortwave frequency, Vatican Radio on 6185kHz, or the three digits of Radio Czechoslovakia's long wave transmission on 272kHz, entry is simple, key in the digits as read and press enter. A megahertz only frequency can also be easily entered into the NRD525, simply key in the required number, eg 6 and press the button marked MHz. Switch pads select mode and bandwidth whilst a large heavy knob makes fine tuning a pleasure. A quick tune up or down the band is easily achieved using the up/down pads conveniently located above the tuning knob.

Memory capacity is 200 channels. As well as frequency, each memory holds mode, bandwidth, AGC setting (slow, fast and off) and whether or not the attenuator (approx 20dB) is on or off. Frequencies can be easily transferred from memory to VFO.

The NRD525 has both memory scan and frequency sweep. The receiver can be quickly programmed with the START and END memory channel numbers. Pressing the run button initiates memory channel scan. Operation of frequency sweep is similar, START and END frequencies being entered before commencing sweep.

By pressing numeric key 4, the input RF filters are bypassed or inserted in circuit. When bypassed the display indicates PASS, an excellent feature when receiving very weak signals.

The NRD525 will operate from either 100/120/220/240 volts AC (selectable on back panel) or 13.8 volts DC so making it suitable for use at home or, when out, portable. Add to the above an audio tone control, a tunable BFO for enhanced CW operation, an adjustable level noise blanker, a dimmer switch for the fluorescent display, the ability to connect a high or low impedance aerial and switch between the two, a mute jack socket for use with a separate transmitter and the result is the NRD525 from the JAPAN RADIO COMPANY, a first class receiver purpose built for the dedicated short wave listener.

HK704

## KEYS & keyers.

HK708  
HK702  
TX3

EK150

DK210

MK1024

BST 1

TX3. Morse practice oscillator.  
£11.65 inc VAT, carr. £1.50  
HK708. Straight key.  
£18.09 inc VAT, carr. £2.50  
HK702. Deluxe version on marble base.  
£34.44 inc VAT, carr. £3.00  
HK704. Squeeze paddle.  
£17.10 inc VAT, carr. £1.50  
EK150. Electronic keyer with built-in  
sidetone. Solid state or relay keying.  
£114.85 inc VAT, carr. £3.00  
MK1024. Electronic keyer with 1024 bit  
memory.  
£198.00 inc VAT, carr. £3.00  
DK210. DAIWA electronic keyer. Re-  
quires paddle.  
£59.93 inc VAT, carr. £2.50

BY2

BENCHER Iambic Paddles.  
BY1 Black base, £67.42. BY2 Chrome base, £76.97  
BY3 Gold plated base, £141.75. VAT inc.  
BENCHER Single Paddle.  
BST1 Black base, £67.42. BST2 Chrome base,  
£76.97. VAT inc.  
Carriage on BY & BST series, £3.00

## LOWE IN NORWICH

On Sunday 22nd June 1986 from 2.00pm to 4.30pm, Lowe Electronics will be at the Post House, Ipswich Road, Norwich. On display will be the TRIO range of equipment. Coffee and biscuits will be free for the first fifty people to arrive. The local Norwich amateur radio club will operate the two metre talk-in station on S22 (callsign G8LOW/A) from 1.30pm.

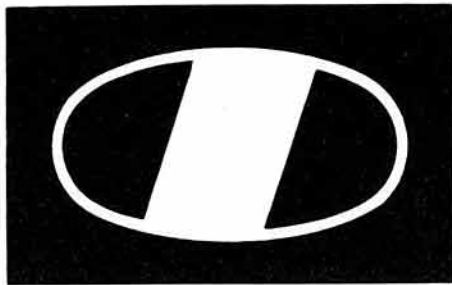
So, after the roast beef and Yorkshire pudding, put down your Sunday paper, have coffee with Lowe Electronics and see the latest amateur radio equipment from TRIO.

## LOWE ELECTRONICS LTD.

Chesterfield Road, Matlock, Derbyshire DE4 5LE  
Telephone 0629 2817, 2430, 4057, 4995.



send £1 for complete mail order catalogue.



# ICOM

## 25-2000MHz, Commercial



ICOM introduces the IC-R7000, advanced technology, continuous coverage communications receiver. It covers Aircraft, Marine, F.M, Broadcast, Amateur Radio, Television and Weather Satellite bands. The IC-R7000 incorporates FM wide/FM narrow, A.M., upper and lower SSB modes of operation with six tuning speeds: - 0.1, 1.0, 5, 10, 12.5, 25KHz. Frequency coverage 25-1000MHz and 1025-2000MHz (25-1000MHz and 1260-1300MHz guaranteed specification).

With the IC-R7000 you have normal tuning capability with the front panel tuning knob or for quick tuning of a desired frequency by using the front panel key-pad. A total of 99 memory channels are available for storage of received frequencies and operating mode.

Memory channels can be called up by pressing the memory switch then rotating the memory channel knob or by direct keyboard entry.

A sophisticated scanning system provides instant access to specific frequency ranges. By depressing the Auto M switch, the IC-R7000 automatically memorises frequencies that are in use, whilst in the scan mode and can be recalled later. The scanning speed is adjustable and the scanning system includes memory selected frequency ranges or priority channels. All functions including memory channel readout are clearly shown on a dual-colour fluorescent display with dimmer switch. Other features include dial-lock, noise blanker, S-meter and attenuator.



**Thanet ICOM** **Thanet ICOM** **Thanet ICOM** **Thanet ICOM** **Thanet ICOM** **Thanet ICOM** **Thanet ICOM** **Thanet ICOM** **Thanet ICOM** **Thanet ICOM**



# IC-R7000

## Commercial quality receiver



Actual Size

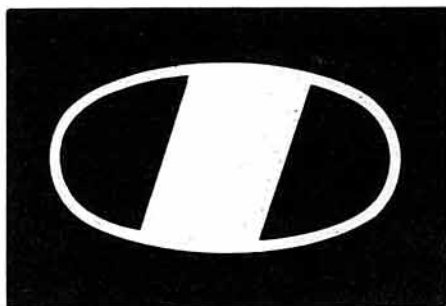
Options include: RC12 infra red remote controller, voice synthesizer, external loudspeaker, HP1 headphones and the ICOM AH-7000 super wideband omnidirectional discone antenna.

There are two ways of using this advertisement, one is to cut out the life-size photograph of the R7000 and paste it to the side of an old shoe box, who knows if your shack is dimly lit visiting Amateurs will be impressed by your excellent choice. The alternative (and one we strongly recommend) is if you are an Amateur or SWL call us on free HELPLINE 0800-521145 for the location of your local ICOM dealer where you can see and actually buy the competitively priced R7000, you have the choice.

**Computer Control** The IC-R7000 can be easily connected to a computer terminal via a very simple interface. Receiver control is performed serially in the IC-R7000 by ICOM's C1-V communication interface system. Operation is possible with a personal computer that has an RS-232c serial port.

H	HELP	↔	Frequency Steps
F0	Frequency	↑ ↓	Up/Down (arrows)
F1	Select Mode	M	Memory Channel
F2	Freq/Memory Scan	..	Memory Up/Down
F3	Mode Scan	/	VFO/Memory
F4	VFO → Memory	B	Bargraph Select
F5	Memory Write	@	Occupancy On/Off
F6	Memory Clear	:	Scan Stop Off/On
F7	Set 'SIG' Level	S	Change Set
F8	Memory File Read	DEL	Speech (If fitted)
F9	Memory File Write	Q	Quit





# ICOM

**What's this? \_IC-28E,  
the very latest 2m. FM mobile  
transceiver from ICOM.**



**Contact us for the facts, NOW!**

## IC-271 & 471 Multimode Base stations

ICOM can introduce you to a whole new world via the world-communication satellite OSCAR. Did you know that you can Tx to OSCAR on the 430-440 MHz IC-471 and Rx on the 2m IC-271.

By making simple modifications, you can track the VFO's of the Rx and Tx either normally or reverse. This is unique to these ICOM rigs and therefore very useful for OSCAR 10 communications. Digital A.F.C. can also be provided for UOSAT etc. This will give automatic tracking of the receiver with digital readout of the doppler shift. The easy modifications needed to give you this

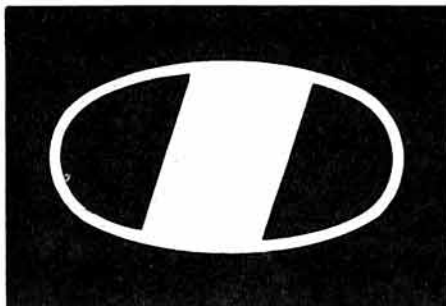
unique communications opportunity are published in the December '84 issue of OSCAR NEWS. Back issues of OSCAR NEWS can be obtained from AMSAT (UK), LONDON E12 5EQ.

This range includes the IC-271E-10W, IC-271E-25W, 271H-100W and the 70cm versions IC-471E-25W and 471H-75W r.f. output. The 271E has an optional switchable front-end pre-amp. The 271H can use the pre-amp AG-25, with the 471E and 471H using the AG35 mast-head pre-amp. Other options include internal switch-mode PSU's: the 271E and 471E use the PS25 and the 271H and 471H use the PS35.



**Tha-net ICOM**  
**Tha-net ICOM**  
**Tha-net ICOM**  
**Tha-net ICOM**  
**Tha-net ICOM**  
**Tha-net ICOM**  
**Tha-net ICOM**  
**Tha-net ICOM**  
**Tha-net ICOM**  
**Tha-net ICOM**





# ICOM



## IC-02E/04E Handportables

These direct entry micro-processor controlled handhelds, one for 2 metres, the other for 70 centimetres. Scanning, 10 memories, duplex offset storage in memory and odd offsets also stored in memory. Keyboard entry is made through the 16 button pad allowing easy access to frequencies, duplex, memories, memory scan and priority. They have a LCD readout indicating frequency, memory channel, signal strength, transmitter/output and scanning functions. A range of accessories include the HS10 Headset and boom microphone, HS10SB PTT switch box with pre-amp, HS10SA voice operated (VOX) switch box. The IC-2E and IC-4E still continue to be available.



### New Retail Shop

We are pleased to announce that we have moved to a new larger retail shop. This will be managed by Andy G6MRI and is situated on the corner of Stanley Road and Kings Road, Herne Bay, Kent. Tel: (0227) 369464. Give it a visit for demonstrations and advice on anything to do with your shack. BCNU.

You can get what you want just by picking up the telephone. Our Mail Order department offers you free same day despatch whenever possible, instant credit, interest free H.P. Telephone Barclaycard and Access facility, 24 hr answerphone service.

## WANT TO LEARN MORE?

Telephone us free-of-charge on:

# HELPLINE 0800-521145.

— Mon-Fri 09.00-13.00 and 1400-17.30 —

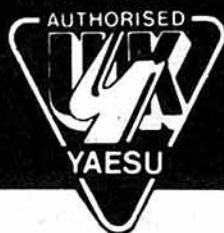
*This is strictly a helpline for obtaining information about or ordering ICOM equipment. We regret this service cannot be used by dealers or for repair enquiries and parts orders. Thank you.*

Listed here are just some of the authorised dealers who can demonstrate ICOM equipment all year round. This list covers most areas of the U.K. but if you have difficulty finding a dealer near you, contact Thanet Electronics and we will be able to help you.

Alyntronics, Newcastle, 0632-761002.  
Amateur Radio Exchange, London (Ealing), 01-992 5765.  
Amcomm, London (S. Harrow), 01-422 9585.  
A.R.E. Comms, Earlestown, Merseyside, 09252-29881.  
Arrow Electronics Ltd., Chelmsford, Essex, 0245-381673/26.  
Beamrite, Cardiff, 0222-486884.  
Booth Holdings (Bath) Ltd., Bristol, 02217-2402.  
Bredhurst Electronics Ltd., W. Sussex, 0444-400786.  
D.P. Hobbs, Norwich, 0603-615786.  
Dressler (UK) Ltd., London (Leyton), 01-558 0854.  
D.W. Electronics, Widnes, Cheshire, 051-420 2559.  
Eastern Communications, Norwich, 0603 667189.

Hobbytronics, Knutsford, Cheshire, 0565-4040. Until 10pm daily.  
Poole Logic, Poole, Dorset, 0202 683093.  
Photo Acoustics Ltd., Buckinghamshire, 0908-610625.  
Radcomm Electronics, Co. Cork, Ireland, 01035321-632725.  
Radio Shack Ltd., London NW6, 01-624 7174.  
R.A.S. Nottingham, 0602-280267.  
Ray Withers Comms, Warley, West Midlands, 021-421 8201.  
Scotcomms, Edinburgh, 031-657 2430.  
South Midlands Comms. & branches, 0703 867333.  
Tyrone Amateur Electronics, Co. Tyrone, N. Ireland, 0662-42043.  
Reg Ward & Co. Ltd., S.W. England, 0297-34918.  
Waters & Stanton Electronics, Hockley, Essex, 0702-206835.

**Thanet Electronics**  
Sea Street, Herne Bay, Kent CT16 8LD  
Tel: (0227) 363859  
Dept. RC



# YAESU

THINK YAESU . . . THINK AMATEUR ELECTRONICS . . .

**FAST  
DELIVERY —  
PROMPT ATTENTION  
FREE POST AND  
EXCELLENT  
PART-EXCH.**



**NEW SERVICE  
NEW PREMISES  
NEW PRODUCTS  
— FROM AMATEUR  
ELECTRONICS**

## All the extras . . . All built in — The remarkable Yaesu 757GX!

They call it the "rig with everything" — another superb HF transceiver from YAESU — now a really big seller! There's a whole host of facilities that usually come as extras that the 757 GX provides as standard features — just look at this incredible specification:

- All amateur bands (continuous coverage receiver 0.5-30 MHz).
- Dual VFO's.
- Eight memories — microprocessor controlled.
- Switchable AGC and 20 dB attenuator.
- 100 watts PEP output.
- Semi break in or QSK available for CW.

STANDARD — BUT USUALLY SOLD AS EXTRAS.

- All modes: SSB, CW, AM and FM
- 600 Hz CW Filter.
- Iambic keyer with dot-dash memory.
- 25 KHz marker.
- Effective noise blanker.
- IF shift/width filter.
- AF speech processor.



**FT 209R** — 2m synthesised  
FM handle 350 mW/3W **£265.00**  
**FT 209RH** — 2m synthesised  
FM handle 500 mW/5W **£279.00**  
**NC 15** — base station-charger/  
adaptor **£65.00**



**FT 203** — 2m synthesised  
handie thumbwheel tuning  
& FNB3 **£225.00**  
**FT 203** — 2m synthesised  
handie thumbwheel tuning  
& FNB4 **£229.00**  
**FT 203R** — as above & FBA5  
(access. as for FT 209R) **£195.00**



**FT 703R** — 70cm handle  
thumbwheel tuning & FNB3 **£255.00**  
**FT 703R** — 70cm handle  
thumbwheel tuning & FNB4 **£260.00**  
**FT 709R** — 70cm handle  
portable synthesised from **£255.00**

OPEN: TUESDAY-SATURDAY 9.00-5.00 pm.

• FREE SECURICOR ON ALL MAJOR YAESU ITEMS.

FREEPOST — MAIL ORDER ENQUIRIES: AMATEUR

E&OE



Diners Club  
International

## AMATEUR ELECTRONICS

**THE AE CONNECTION —  
SERVING THE NATION**



• NORTH

Holdings, 45 Johnston St.,  
Blackburn. Tel: 0254 59595

• YORKSHIRE

A.J. Hooker, 42 Nether Hall Rd.,  
Doncaster. Tel: 0302 25690

• E ANGLIA

Eastern Comms, 31 Cattlemarket St.,  
Norwich. Tel: 0603 667189

504 ALUM ROCK ROAD, ALUM ROCK, BIRMINGHAM B8 3HX. TEL: 021-327 1497/6313



# YAESU



## From the Nation's leading Distributor...



FRG 9600 £469.00



FT 726R £899.00



FRG 8800 £575.00

### YAESU

FT 757GX	HF transceiver gen coverage all modes	879.00
FC-757AT	Automatic antenna tuner	318.00
FP-757GX	Switched mode PSU - 50% duty	199.00
FP-757HD	Heavy duty PSU - 100% duty	199.00
FIF-65	Computer interface Apple II	56.00
FIF-80	Computer interface N.E.C.	130.00
FIF-232C	Computer interface RS-232	68.90
FRG-8800	Gen coverage Rx. 150 kHz-30 MHz. AM. CW SSB NBFM	575.00
FRV-8800	Converter 118-174 MHz	90.00
NTSC	Video unit for FRG 9600	10.00

### YAESU

FT-726R	Multimode transceiver 2m fitted	899.00
21/22/28	HF module	249.00
50/726	6m module	228.00
430/726	70cm module	309.00
SAT-726	Duplex module	116.00
XF-455MC	300Hz CW Filter (Ceramic)	54.00
FT-290R	2m Portable/mobile/base/multimode	369.00
MMB-11	Mobile mount	33.00
NC11C	Charger	10.00
FT-980	HF transceiver with gen coverage RX (CAT system)	1759.00
SP-980	External speaker with audio filter	99.00

### YAESU

CSC-1A	Case	6.50
YM-49	Spkr mic	19.00
MH-12A2B	Spkr mic	20.00
FT-2700	Dual band receiver 2m and 70cm.	
RH	Full duplex. Scanning priority. 10 mems. Dual VFO	499.00
FVS-1	Voice synthesiser module	25.00
FT-270R	2m FM transceiver 25W. Scanning mems. Dual VFO	359.00
FT-270	2m FM transceiver 45W. Scanning mems. Dual VFO	399.00
FVS-1	Voice-synthesiser 270R/270RH	25.00

WE ALSO STOCK-



DATONG  
ELECTRONICS LIMITED

PC1	Gen. Cov. Con.	137.40
FL3	Audio filter for receivers	129.00
ASP/A	r.f. speech clipper for Yaesu	82.80
D75	Manual RF speech clipper	56.35
D70	Morse Tutor	56.35
MK	Keyboard morse sender	137.40
RFA	RF switched pre-amp	33.90
AD270-MPU	Active dipole with mains psu	51.75
AD370-MPU	Active dipole with mains psu	69.00
DC144/28	2m converter	39.67
ANF	Automatic notch filter	67.85
SRB2	Auto Woodpecker blanker	85.25

+ muTek limited +

B.N.O.S.  
ELECTRONICS

TOKYO HY-POWER

ATU's		
HC-200	HF bands ATU 200W PEP	115.00
HC-400L	HF bands ATU 350W PEP	199.00
LINEARS VHF		
HL-30V	30W 2m linear 0.5-3W input	54.00
HL-35V	VHF linear 0.5-5W (3W in 30W out)	76.00
HL-110V	110W 2m linear	199.00
HL-160V	160W 2m linear 10W input	249.00
LINEAR UHF		
HL-20U	20W 70cm linear	82.90
HL-60U	60W 70cm linear 10W input	215.00
PREAMPS		
HRA-2	2m mast head pre-amp	103.29
HRA-7	70cm mast head pre-amp	103.29

### HI-MOUND KEYS

HI-MOUND MORSE KEYS		
HK702	Up down keyer marble base	30.95
HK703	Up down keyer	29.35
HK704	Up down keyer	19.95
HK705	Up down keyer	15.49
HK706	Up down keyer	16.96
HK708	Up down keyer	14.95
HK802	Up down solid brass	86.31
HK803	Up down brass	82.64
HK808	Up down keyer	39.95
MK704	Twin paddle keyer	13.50
MK705	Twin paddle keyer marble base	25.65

+ KENPRO + DRAE +

### AGENTS

WALES & WEST  
Ross Clare, GW3NWS. (0633) 880 146

NORTH STAFFS  
Bob Ainge, G4XEK (0538) 754553

SHROPSHIRE  
Syd Poole, G3IMP, Newport, SALOP. (0952) 812134

• DELIVERY NORMALLY BY RETURN DUE TO HUGE STOCKS

ELECTRONICS LTD FREEPOST BIRMINGHAM B8 1BR



Diners Club  
International

E&OE

# AMATEUR ELECTRONICS

#### • E MIDLANDS

R.A.S. Notts., 3 Farndon Green,  
Wollaton Park, Nottingham. Tel: 0602 280267

#### • MIDLANDS

Elliot Electronics,  
26-28 Braunstone Gate, Leicester.  
Tel: 0533 553293

#### • SE MIDLANDS

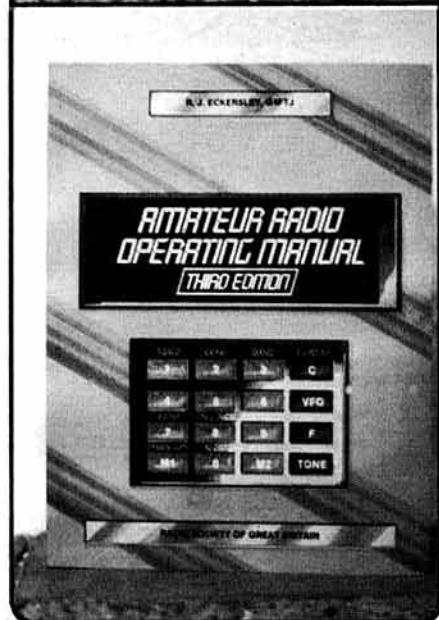
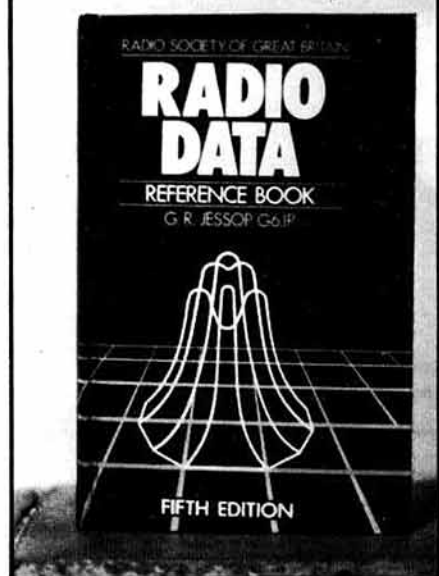
A.J.H., 151a Bilton Rd., Rugby, Warwickshire. Tel: 0788 76473

#### • S WEST

Uppington, 12-14 Pennywell Rd  
Bristol. Tel: 0272 557732

504 ALUM ROCK ROAD, ALUM ROCK, BIRMINGHAM B8 3HX. TEL: 021-327 1497/6313





# THE LATEST FROM RSGB

**AMATEUR RADIO SOFTWARE** by John Morris, GM4ANB. Designed to be a sourcebook for the radio amateur program. Contains 86 programs written in BASIC and 6 in assembly language. The introductory chapter describes the differences between various versions of BASIC so that the programs presented can be modified slightly in order to be used on as many types of computer as possible. The remaining 8 chapters cover: CW, sending and receiving; RTTY and Data including Amtor and packet; Antennas and Propagation, predicting path loss, propagation predictions; Distances, Bearings and Locators; Satellites, predicting elliptical and geostationary orbits; Sun and Moon; Circuit Design Aids, filters and matching networks; Miscellany, a simple data base system and network analysis package. Copyright 1985, 328 pages, £7.39 hardbound. First Edition.

**RADIO DATA REFERENCE BOOK** by G. R. Jessop, G6JP. This handy publication is divided into 9 chapters: Units and symbols, Basic calculations, Resonant circuits and filters, Circuit design, Antennas and transmission lines, Radio and TV services, Geographical and meteorological data, Materials and engineering data, and Mathematical tables. You'll find hundreds of useful tables, charts and formulas. Fifth Edition, Copyright 1985, 244 pages, £7.76 hardbound.

**AMATEUR RADIO OPERATING MANUAL** by R. J. Eckersley, G4FTJ. Besides such chapters as Setting up a station, and Mobile, Portable and Repeater Operation, the reader will find information in the Appendices most useful. There are continental and regional maps which show the prefixes assigned to each area and listing of countries showing ITU callsign allocations, callsign systems for each country, notes on foreign amateur operation, addresses of licensing administrations and the names and addresses of National Amateur Radio Societies. Third Edition, Copyright 1985, 204 pages. Softbound £5.54.

**1986 RSGB Amateur Radio Call Book now available**



**RSGB PUBLICATIONS (SALES)**  
LAMBDA HOUSE, CRANBORNE ROAD  
POTTERS BAR, HERTS EN6 3JE



# **IQD MOBILE RADIO COMMUNICATIONS**



## **WORLD LEADERS IN DTMF TECHNOLOGY**

**IQD MICROPAD (600 Series)** The industry standard in DTMF microphones. Different models available include: ANI, amplified, high impedance and autodial.

**IQD SELCALL (600/700D Series)** A unique DTMF selective calling system for mobile and hand-held radio with the operators number held within the microphone.

**IQD TONEPAD (200 Series)** These compact DTMF encoders are suitable for any hand-held radio and are available with either integral or remote electronics.

**IQD SMARTPATCH (5700 Series)\*** A microprocessor controlled autopatch that allows the user to make and receive telephone calls using any simplex mobile radio system.

**IQD SUPERPATCH (520D Series)** A highly sophisticated duplex autopatch which gives true two way conversation between duplex mobile radio and the public telephone network.

Other products from IQD include cellular radio equipment; a unique remote control system; a telephone switchboard by-pass; and the complete range of quartz crystals, oscillators and filters of which we are the major manufacturer and supplier in this country.

# **IQD**

**IQD Limited**  
North Street, Crewkerne  
Somerset, TA18 7AR, England  
Telephone (0460) 74433  
Telex 46283

**\* APPROVED for use**  
with telecommunication systems  
run by British Telecommunications  
in accordance with the conditions  
in the instructions for use.  
B.T. APPROVAL NO. NS/1629/3/F/451112





Brenda  
G4VXL

# A.R.E. Communications Ltd.

38 BRIDGE ST.,  
EARLESTOWN,  
NEWTON-LE-WILLOWS,  
MERSEYSIDE.  
TEL: 09252-29881



Bernie  
G4AOG

This month we have selected 3 items which, we consider, offer top value but, remember, at Earlestown we hold massive stocks of all types and models of amateur radio equipment which can be purchased by telephone through our mail order system.



## FT690 for 6 metres

At a price less than you would expect to pay for a 6m transverter we are offering an all-mode transceiver which, in it's 2m version, is the most popular transceiver ever produced.

FM-AM-SSB-CW-3 watts RF will on operate on internal batteries.

10 memories—2 VFO's

**£229.00 inc. VAT**

## FT290R



Undoubtedly the best of bunch

Keyboard entry  
10 memories  
Variable duplex operation

3 watts out

Scan

LCD display

Normal list price  
£279.00

OUR PRICE

**£225.00**

including charger and carrying case



## CWR 880

We are pleased to announce a new TELEREADER for CW, RTTY and TOR.  
CW 4-40 WPM  
BAUDOT 4515-50-57-75  
TOR MODE A & B  
ASCII 75-110-300  
Video display or L.C.D. display or will couple to printer **£260.00**



# AT LAST!

The long awaited Solid State HF Linear with Built-in Automatic A.T.U. is about to arrive from YAESU  
500 Watts P.E.P. from a 100 Watt drive  
Built-in Antenna Switching

Phone 09252-29881 for all mail order—Access & Barclaycard accepted

Trade enquiries welcome

All prices include VAT and are correct as we go to press

Opening hours: Tuesday-Saturday  
10am-5pm

# ICS

presents the brilliant  
**ALINCO**

## 2 Metre Transceivers

**ALR-206E**

**25 watts**

**2 metre mobile transceiver**



- 144-146 MHz FM
- 25 watts output
- 10 memory channels, band scan
- All programming from key pad on microphone
- Back lit LCD frequency display with LCD 'S' meter
- Frequency selection from front panel or microphone
- Mobile mount included

The ALR-206E is an exciting new mobile transceiver from Alinco. Micro processor controlled versatility and programming from the microphone in a compact package.

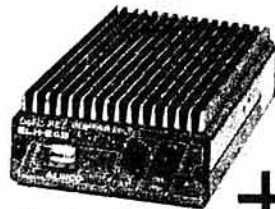
ALR-206E Price: £295 inc.VAT  
(p & p £2.50)

**ALM-203E/H**

**High Power**

**2 metre handheld system**

Complete  
system only  
£249.95p  
inc VAT  
(p&p £4.00)



30 watt amplifier  
with Ga AS FET  
Pre-amp



3 watt handheld  
with NiCad  
and charger



- 144-146 MHz FM
- 3 watts with NiCad, 5 watts with DC/DC converter
- 10 memory channels
- Programable band scan
- Switchable 150-160 MHz Rx (marine band)
- 'S' meter
- Toneburst
- NiCad, charger supplied as standard
- 30 watt FM amplifier with Ga AS FET pre-amp

### Options:

Spare Nicad	£33.75
Dry cell case	£7.50
DC/DC converter	£13.50
Case	£14.50
Cigar plug cable	£4.50
Mobile charger mount	£26.50
Speaker/microphone	£18.50

(prices do not include post & packing)

### Total Flexibility

for mobile, base station or handheld use. Install the amplifier, which comes complete with mobile mount and connecting lead permanently in your car or at home.

Retain the advantages and flexibility of handheld use on trips or outdoors.

Why buy two rigs when one will do?

# ICS

ICS Electronics Ltd.,  
PO Box 2  
Arundel  
West Sussex BN18 0NX  
Telephone: 024 365 590

12 months parts + labour warranty  
Dealers throughout U.K.  
Prices may vary with  
exchange rate.  
Callers by appointment





# South Midlands

HQ & MAIL ORDER S.M. HOUSE, RUMBRIDGE ST, TOTTON, SOUTHAMPTON

## IMPROVED SERVICE

DUE TO

## CHANGE OF ADDRESS

## AND NEW LARGER SHOWROOM

SEE NEXT MONTH'S ISSUE FOR FULL DETAILS

## THE ULTIMATE HF STATION

### FT 757GX HF TRANSCEIVER



All Mode (LSB, USB, CW-W/N, AM, FM) Dual VFO's and Eight Memories, 100% Duty Cycle (even on FM!), Inbuilt Iambic Dot-dash Keyer, Computer Compatibility, Optional Matching Automatic A.T.U.

### FL 7000 HF LINEAR



3.5-30MHz (HAM BANDS). 500W P.E.P. Output. Internal Automatic A.T.U. Amtor/Packet Radio Compatibility. Twin Meter Monitoring. Fully Overload Protected.

## YAESU's MOBILES and PORTABLES

Never before possible from such a compact package, true multimode operation is yours to enjoy. With CW and SSB activity at an all-time high, you will not be left out of the satellite or DX action and you can still ragchew on FM simplex or even via a repeater.

Advances in microprocessor circuitry allows selectable synthesizer steps, up/down scanning from the microphone, priority channel operation, and ten memories (with memory scan), all called up with fingertip ease.

A large Liquid Crystal Display provides readout of the operating frequency. It is highly readable under conditions of bright sunlight and is backed up by a lamp for night-time operation.

The optimum synthesizer steps for SSB/CW FM operation are very different. That's why Yaesu gives you the flexibility of two synthesizer steps per mode: 100Hz or 1kHz



per step on SSB, AM & CW, and 12½/25kHz on FM. When changing modes from SSB/CW to FM, your transceiver is automatically set to the nearest standard channel when you start scanning or tuning.

As many as ten frequencies may be stored into memory, for instant recall. The priority feature allows you to check a favourite frequency every few seconds, with automatic hailing (FM mode) when the channel is clear or busy, as desired. Memory backup is provided by a built-in lithium cell.

These transceivers feature a digitally synthesized dual VFO system which provides tremendous flexibility in day to day operation. For example, one VFO may be set up in the SSB portion of the band, and the other in FM sub-band, for immediate QSY when changing modes.

Among the many features adding to the convenience of the transceiver is a supplied portable antenna, a high-performance noise blanker, a high/low power switch. A clarifier allows you to follow unstable or Doppler-shifted signals.

### FT-290R

**Frequency coverage (MHz):**  
144-146 or 144-148  
**Modes of operation:**  
SSB (USB, LSB) CW & FM  
**Synthesizer steps:**  
SSB/CW : 100Hz/1kHz  
FM : 12.5/25kHz  
**Sensitivity (better than):**  
SSB/CW : 0.5µV for 20dB S/N  
FM : 0.25µV for 12dB SINAD  
**Selectivity:**  
SSB/CW : 2.4kHz @ -6dB  
4.1kHz @ -60dB  
FM : 14kHz @ -6dB  
25kHz @ -60dB  
**Repeater split:**  
600kHz (+ and -)  
**Tone burst frequency:**  
1.750Hz

### GENERAL FEATURES

**Power Output:** 2.5 Watts at 12VDC  
**Frequency response:** 300-2, 700Hz @ -6dB  
**Carrier Suppression:** Better than -40dB  
**Sideband Suppression:** Better than -40dB  
**FM Deviation:** +5kHz (max)  
**Spurious radiation:** Better than -60dB  
**Intermediate frequencies:** 1st IF 10.81MHz  
2nd IF 455kHz (FM)  
**Image rejection:** Better than -60dB  
**Audio output:** 1 Watt @ 10% THD  
**Audio output impedance:** 8 Ohms  
**Antenna:** SO239 on rear  
**Dimensions:** 58H x 150W x 195D mm  
1.3kg (without cells)  
**Current consumption:** 70mA receive  
800mA Tx (2.5 W RF FM)  
**Power requirements:**  
8 x C size dry cells  
8 x C size Nicad cells  
External 8.5-15.2VDC  
Memory backup: Lithium cell  
**Microphone:** (YM47 supplied)  
600 ohms ppt with scan

### FT 690R

**Frequency coverage (MHz):**  
50-54  
**Modes of operation:**  
USB, CW, AM & FM  
**Synthesizer steps:**  
SSB/CW/AM : 100Hz/1kHz  
FM : 10/20kHz  
**Sensitivity (better than):**  
SSB/CW/AM : 0.5µV for 20dB S/N  
FM : 0.25µV for 12dB SINAD  
**Selectivity:**  
SSB/CW : 2.4kHz @ -6dB  
4.1kHz @ -60dB  
AM : 4kHz @ -6dB  
15kHz @ -60dB  
FM : 14kHz @ -6dB  
25kHz @ -60dB  
**Repeater shift:**  
1MHz (+ & -)

**LEEDS**  
SMC (Leeds)  
257 Otley Road,  
Leeds 16, Yorkshire.  
Leeds (0532) 782326  
9-5.30 Mon-Sat

**CHESTERFIELD**  
SMC (Jack Tweedy) Ltd  
102 High Street,  
New Whittingdon, Chesterfield.  
Chesterfield (0246) 453340  
9.30-5.30 Tue-Sat

**BUCKLEY**  
SMC (TMP)  
Unit 27, Pinfold Lane,  
Buckley, Clwyd.  
Buckley (0244) 549563  
10-5 Tue, Wed, Fri  
10-4 Sat

**STOKE**  
SMS (Stoke)  
76 High Street,  
Talkie Pits, Stoke.  
Kidsgrove (07816) 72644  
9-5.30 Tue-Sat

**HUMBERSIDE**  
SMC (Humburside)  
247A Freeman Street,  
Grimsby, Humberside  
Grimsby (0472) 59388  
9.30-5.30 Mon-Sat

**JERSEY**  
SMC (Jersey)  
1 Belmont Gardens,  
St Helier, Jersey.  
Jersey (0534) 77067  
9-5 Mon-Sat  
Closed Wednesday

**N. IRELAND**  
SMC (N Ireland)  
10 Ward Avenue,  
Bangor, Co Down.  
Bangor (0247) 464875

Southampton Showroom open 9-5.30 pm Monday to Friday, 9-1pm Saturday.

AGENTS NORMAN DILLEY, DARTCOMMS, DARTMOUTH (08043) 3534 and PAT GILLEN, IPSWICH, COMMS, IPSWICH (0473) 462173



# Communications Ltd.



SO4 4DP, ENGLAND. Tel: (0703) 867333, Telex: 477351 SMCMM G.

**FRG 9600**  
**£465**



## YAESU'S TOP RECEIVERS

**FRG 8800**  
**£575**



Yaesu's serious about giving you better ways to tune into the world around you. And whether it's for local activity or worldwide DX, you'll find our VHF, UHF and HF receivers are the superior choice for all your listening needs.

**The FRG9600.** A high grade VHF/UHF Scanning Receiver. The FRG9600 is not just another scanner and it's easy to see why; with continuous coverage from 60-905MHz.

You have more operating modes; Upper and Lower Sidebands; CW, AM Wide & Narrow and FM Wide & Narrow.

Store any frequency and its related mode into any of the 99 memories. Scan the memories, or in between them, stepping in either 5, 10, 12½, 25 or 100kHz steps or simply "Dial Up" the frequency using the Colour Coded Keypad.

There's also for your information and pleasure a 24hr Clock, LCD readout, Signal Strength Meter, Optional Computer Interface and AC Adaptor.

**The FRG8800.** HF Receiver, altogether a better way to listen to the world. If you're looking for a 'Total Receiver System' then the FRG8800 is for you.

With continuous worldwide coverage from 150kHz to 30MHz and local coverage from 118 to 174MHz with the optional VHF Converter.

Listen in on any mode; Upper and Lower Sideband, CW, AM Wide and Narrow or FM.

Store mode and frequency in any one of twelve memories for instant recall or use one of the many programmable scanning functions for monitoring the bands.

Also included for ease and pleasure of operation are a keyboard—for quick frequency entry, a Digital Sinpo Meter, Computer Interface Capability, Dual 24 hour Clocks and much more.

## ONE FOR EVERY OCCASION

The FT2700RH is constructed on a unique massive diecast aluminium ducted heatsink which enables significantly larger output powers to be obtained from a transceiver substantially smaller than any similar radio to date. The FT2700RH, with fan assisted cooling provides 45W RF output and is fitted with a "low" power switch which provides around 10% of full output.

The dual 4-bit microprocessors of the FT2700RH provide maximum ease of use combined with an extremely wide range of operating functions. Dual VFO's, ten memories and programmable band scan limits are all easily selectable from the front panel.

The FT2700RH can memorise a number of scanning parameters for maximising performance. Upper and lower limits may be set (for quick scanning of the band). The ten memories may be scanned for a busy channel or for monitoring a priority channel. The scanning can be either manually or carrier controlled.

For easier and safer 'eyes on the road' mobile operation an optional voice synthesiser (FVS-1) is available to give an audible indication of frequency, memory channels and VFO selections at the touch of a convenient microphone mounted button. The FVS-1 is of course ideal for those with impaired vision.



The FT2700R, virtually two transceivers in one case, is designed to be the ultimate in convenience, for FM mobile or base station operation, on the 144 and 430MHz bands. Using Yaesu's new one piece die-cast aluminium chassis concept, the FT2700R provides 25 Watts continuous output on either band, for full duplex (or simplex!) operation whilst obtaining optimum circuit shielding and efficient heat dissipation.

Two 4-bit CPU's provide convenient control together with simple operation of the dual VFO's, 10 channel memory with back up and two calling frequencies.

Dual receiver front ends, local synthesisers, IF's and transmitter RF states make this the first mobile transceiver capable of true duplex cross-band operation.

Comprehensive scanning features include "PMS" (programmable memory scan) which permits continuous or skip-scanning between two memory channels in the same band. A MHz "stepping" switch is fitted for quick transition from one band to another. Priority channel monitoring is available whilst on the same or another band!

### FT2700RH

### GENERAL SPECIFICATIONS

### FT2700RH

**Frequency** : 144-146MHz  
: 430-440MHz  
**Power out** : 2m 25/3W  
: 70cm 25/3W  
**Supply** : 7A (25W Tx)  
: 3A (3W Tx)  
: 0.6A (Sq Rx)  
**Stability** : 2M ± 10ppm, -5 + 50°C  
: 70cm ± 5ppm, -5 + 50°C  
**Dimensions (Ex/Inc Projections)**  
150W, 50H, 130/185D mm, 1.6kg

**Mode** : FM (F3, G3E)  
**Supply** : 13.8V ± 15%  
**Circuit** : Double conversion  
: 21.6MHz, 455KHz  
**Sensitivity** : 0.2µV @ 12dB Sinad  
: 1.0µV @ 30dB Sinad  
**Selectivity** : 14KHz - 6dB  
: 28KHz - 60dB  
: -60dB (or better)  
**Image** : 4 to 16ohms  
**Audio** : 2W in 8ohms

**Antenna** : 50ohms, unbalanced  
**Modulation** : Variable reactance  
**Deviation** : ± 5KHz  
**Tone Burst** : 1,750Hz  
**Spurious** : -60dB (or better)  
**Maximum BW** : 16KHz  
**Microphone** : 600ohms, nominal  
**Temperature** : -10°C + 60°C

**OPTIONS**  
FVS-1, MF-1B3B, SP55, YH1, SB10

**Frequency** : 144-146MHz  
**Power out** : RH: 45W/5W  
: R: 25W/3W  
**Supply** : RH: 9A/3.5A Tx  
: R: 6A/2.5A Tx  
: 0.6A (Sq Rx) R/RH  
**Stability** : ± 10ppm (-5 + 50°C)  
**Dimensions (Ex/Inc Projections)**  
140W, 40H, 143/175D mm, 1.25kg

★ **FREE FINANCE**  
On many regular priced items SMC offers  
Free Finance (on invoice balances over £120)  
20% down and the balance over 6 months or  
50% down and the balance over a year.  
You pay no more than the cash price!  
details on eligible items on request.

**SMC SERVICE**  
Free Securicor delivery on major equipment.  
Access and Barclaycard over the phone.  
Biggest branch agent and dealer network.  
Securicor 'B' Service contract at £5.00.  
Biggest stockist of amateur equipment.  
Same day despatch possible.

**GUARANTEE**  
Importer warranty on Yaesu Musen products.  
Able staffed and equipped Service Department.  
Daily contact with the Yaesu Musen factory.  
Tens of thousands of spares and test equipment.  
Twenty-five years of professional experience.  
● 2 Year warranty on regular priced Yaesu products.



AGENTS: JOHN DOYLE, TRANSWORLD COMMS, NEATH (0639) 52374 DAY (0639) 2942 EVE and JACK McVICAR, SCOTCOMMS, EDINBURGH 031-657 2430



# JUST BARGAINS

## COLLECTION OF THIS MONTH'S SMC BARGAINS

**JUST BARGAINS** Why 'just', because all the items offered below are genuine. S.M.C. are the largest amateur company in Europe and are therefore able to buy at the best prices to provide you with the best bargains and support. S.M.C. the first and only Company who offers both 2-year guarantee and free finance of Yaesu equipment, supports this offer with £100,000 of spares and service engineers. We have more spares and back-up than most amateur companies' total stocks. Buy direct and be content that you have the back-up of the U.K.'s largest (and one of Europe's leading) companies.

### JAY BEAM

THIS MONTH'S BARGAINS	FREE DELIVERY	SAVE POUNDS
TB1 hi 3 ele beam	£230.00	
TB2 hi 2 ele beam	£155.25	
TB1 hi rotary dipole	£83.38	
CK1-2 conv. kit TB1-2	£79.93	
CK1-3 conv. kit TB1-3	£155.25	
CK2-3 conv. kit TB2-3	£87.40	
UGP/2m ground plane	£14.84	
C5 vert. 4.8dBd	£86.25	
LR1/2m vert. 4.3dBd	£34.62	
LR2/2m vert. omni	£27.20	
LW5/2m 5 el 7.8dBd	£16.68	
LW8/2m 8 el 9.5dBd	£21.05	
LW10/2m 10 el 10.5	£27.20	
LW16/2m 16 el 13.4	£40.83	
PBM10/2m parabm 11.7	£53.13	
PMM14/2m parabm 13.7	£55.49	
04/2m qd 4 el 9.4dBd	£33.98	
06/2m qd 6 el 10.9dBd	£44.51	
08/2m qd 8 el 11.9dBd	£55.60	
05/2m 5 over 5.10dBd	£29.67	
08/2m 8 over 8.11.1	£40.77	
5X/2m 5 el crossed	£32.14	
8X/2m 8 el crossed	£41.40	
10X/2m 10 el crossed	£51.92	
10X/137 Sat Xd yagi	£55.20	
10X/B7/G hussess 137	£34.50	
X6/2m X12/70 2m/70cm	£47.55	
C8/70 vert. 6.1dBd	£92.00	
D8/70 8 over 8.12.3	£30.30	
PBM18/70 parabm 13.1	£37.09	
PBM24/70 parabm 15	£49.45	
LW24/70 24 el 14.8dBd	£33.35	
MBM28/70 mult 11.5	£24.73	
MBM48/70 mult 14dBd	£40.83	
MBM68/70 mult 16.3	£55.78	
8X/70 crossed 10dBd	£48.24	
12X/70 crossed 12dBd	£59.28	
CR2/23cm cr ref 613.5	£43.70	



ICV751 HF tcvr	£1299.00
IC745 tcvr	£899.00
IC735 HF tcvr	£839.00
PS35 PSU	£174.00
PS15 PSU	£145.00
PS55 PSU	£168.00
SM6	£40.25
ICR71 Receiver	£699.00
IC271E 2m base	£729.00
IC471E 70cm base	£829.00
Higher power units available	
IC290D All-mode	£479.00
IC27E 2m FM	£379.00
IC47E 70 cm FM	£469.00
IC2E 2m	£199.00
IC02E 2m	£265.00
IC04E 70cm	£275.00
BP3 Ni-cad pack	£27.00
LC3 Case	£5.50
LC11 Case	£6.80

### MICROWAVE M.

MML144/30LS	£94.30
MML144/50S	£106.95
MML144/100S	£149.95
MML144/100HS	£159.85
MML143/30L	£169.95
MML143/50	£149.95
MML143/100	£299.00
MNG144V	£37.90
MMT144/28R	£236.90
MNC435/600	£35.65
MNC50/28S	£35.65
MNC432/28S	£39.90
MNC432/144S	£39.90
MMK1296/144	£129.95

### OSCAR MOBILE

ELEMENT ONLY, BASE EXTRA	
370F 4m 2dB1/4	£18.50
20W 2m 1/4	£2.96
2NE 2m 5/8	£8.94
78F 2m 7/8	£18.64
78B 2m 7/8	£18.64
78SF 2m 1/8 short whip	£18.64
88F 2m 5.2	£24.10
258 70cm 5.5dB1/4	£29.37
268 70cm 6dB1/4	£29.37
358 70cm 6.3dB1/4	£33.73
70N2DX 2m/70 2.7.5.1	£25.90
2N6M 50/144	£10.47
72SM 2S 2m/70cm	£9.20
38F 2m mobile ele	£10.47
HS70 144/432 duplex	£21.30
GCCA Gutter 4m cable	£12.65
SOCA 4m cable + PL259	£6.90
SOCA 6m cable + PL259	£7.20
SOCALLR 4m long reach	£8.60
TMCA5 trunk mount 6m	£11.75
TMCA H.D. trunk mt	£16.10
SOMM magnetic mt 4m	£12.45
SOWM adj wing mount	£6.00
GCD gutter dli adj	£6.45
BSD bumper strap	£11.50
HS88BK bumper mt ext	£23.35
CARRIAGE EXTRA £2	
BASES FREE WITH ELEMENTS	

### OSCAR BASE ANTENNAS

GDX1 Discone 80-480	£51.00
GDX2 Discone 50-480	£84.00
GDXA Discone 100-440	£43.00
VHFL Discone Rx only 65-520	£21.00
GP23 2m vert 7.8dB1/4	£51.00
GP144W 2m vert 6.4dB1/4	£35.00
GPV144DX 2m vert s/s 6.4dB1/4	£46.00
GPV55 2m vert h duty 6.4dB1/4	£37.00
GP2M grnd plane 3.4	£24.00
SD144 SWS quad vert	£87.95
GP432X 70cm vert 13.4	£38.00
GP714 70cm vert 10dB	£90.00
70N2V 2m/70cm2 8.5.7	£38.00
HS70 144/70 duplr	£21.55
LT606 log 50-500MHz	£163.00
OSCAR CARRIAGE PAID	

### MET ANTENNAS

432/5B 40cm 5 ele.	£16.95
432/17X 70cm crossed	£49.17
432/17T 70cm 15dB	£32.20
144/19T 70cm 14.2dBd	£55.88
50.5 6M 5 ele.	£59.90
CARRIAGE EXTRA £2.65	

### JVL QUADLOOP

144-160L 2m 16dBd	£
144-260L 2m 18.5dBd	£
432-190L 70cm 16.5	£45.00
432-270L 70cm 18.5	£55.00
1296-260L 23cm 18.5	£49.00
1296-470L 23cm 22	£79.00
2320-440L 13cm 21	£49.00
CARRIAGE EXTRA £2.50	

### BNOS

25Amp P.S.U.	£149.00
40Amp P.S.U.	£296.00
2M 3-50 no pre-amp	£108.00
2M 10-50W no pre-amp	£108.00
2M 1/100W	£181.00
2M 3/100	£181.00
2M 10/100	£157.00
2M 25/160	£217.00
70cm 3-50	£235.00
70cm 10-50	£195.00
70cm 10/100	£335.00

### COAX CABLE

LDF2/50A	£3.68/M
LDF4/50A	£4.43/M
UR4350R	£31p/M
UR7650R	£32p/M
UR7650R	£39p/M
UR3975R	£56p/M
UR5775R	£71p/M
CARRIAGE £1 UP TO 20 MTRS	
£2.50 OVER 20 MTRS	

### COAX CONNECTORS

UHF COAX PLUGS:	
PL259 UR67/R68	£0.66
PL259 UR67 push fit	£0.93
UR175 reducer 50	£0.18
UR176 reducer 75	£0.18
PL259R reducer 50	£0.77
PL259A de luxe UR67	£3.25
PL259B de luxe UR43/76	£2.58
PL259E L angle 5mm	£1.05
PL259M metric	£0.88
UHF COAX SOCKETS:	
SO239F 4 hole fix	£0.66
SO239F100 de luxe	£1.71
SO239T 2 hole fix	£0.62
SO239N nut inner	£0.75
SO239N nut outer	£0.75
SO239E free angle SM	£1.38
PL258 back/B female	£1.05
PL274 back/B chassis	£1.60
PL/PL back/B male	£1.71
M359 elbow m/f	£1.60
M358 22f/m	£1.92
M358AF 3F	£2.15
M458 3F/m	£3.14
N PLUGS 50 OHMS:	
UG536 small	£2.31
UG21 large	£2.27
N SOCKETS 50 OHMS:	
UG58 4 hole	£1.51
NSN nut inner	£1.55
UG1052 free small	£2.30
UG23 free large	£1.85
N ADAPTORS:	
UG107 22f/m	£3.99
UG28 73f	£3.45
UG57 double male	£3.52
UG29 double female	£2.58
UG27 elbow f/m	£2.81
INTERSERIES CONNECTORS:	
UG255 u/hf-bncp	£2.04
UG273 u/hf-bncS	£2.04
UG146 u/hf-NP	£3.14
UG83 u/hf 'N'S	£3.14
SO/NF u/hf 'N'S	£3.80
UG201 'N'-bncS	£3.80
UG349 'N'-bncP	£3.80
UG606 'N'S-bncS	£3.80
POST AND PACKING 65p	

### MORSE KEYS

HK703 straight key	£29.95
HK704 straight key	£19.95
HK706 straight key	£19.95
HK707 straight key	£18.25
HK710 straight key	£39.95
HK808 straight key	£58.65
HK711 knee key	£34.50
HK802 straight key	£36.30
HK803 straight key	£82.65
HK804 straight key	£78.25
MHK831 st & squeeze	£189.00
BK100 mech. bug	£31.00
MK701 single paddle	£28.50
MK702 single paddle	£29.95
MK703 squeeze	£31.00
MK705 squeeze	£27.60
MK706 squeeze	£25.30
POST & PACKING £1.50	

### MORSE TUTORS

Datong D70 go anywhere	£56.65
battery powered	£115.00
M/M Morse talker	£169.00
M/M Morse Caller	

### TELO MASTS

TELESCOPIC 10m SECTIONS, GUYED	
MAST ONLY	
30m	£39.10 carr £5.00
40m	£63.25 carr £5.00
50m	£78.20 carr £5.00
RIGGING KITS	
30m	£45.00 carr £5.00
40m	£56.35 carr £5.00
50m	£72.45 carr £5.00

### HYGAIN

BUY NOW	
There will never be a better time. We will not be able to repeat these prices with new stocks.	
12AVO 10-20m vert TD	£81.00
14AVO 10-40m vert TD	£109.00
18V 10-80m tppd coil	£51.00
103BA 3 el 10m Yagi	£102.00
103BA 3 el 15m Yagi	£223.00
103BA 3 el 20m Yagi	£138.00
103BA 4 el 20m Yagi	£263.00
103BA 5 el 20m Yagi	£425.00
103BA 5 el 20m Yagi	£500.00
DB10-15 3 el 10-15m	£213.00
TH3JR 3 el 10-20m	£303.00
TH2MK3 3 el 10-20	£286.00
EX14 5 el 10-20m	£506.00
OK710 40M kit Ex14	£145.00
TH5MK2 5 el 10-20m	£655.00
TH7DX 7 el 10-20m	£759.00
392S Mod kit TH6-7	£255.00
CARRIAGE PAID	

### ROTATORS

S.M.C. search the world for only the best rotators. We are pleased to advise the most suitable for your installation.	
FU200 Offset	£59.00
KR250 Small bell	£69.00
KR400 Popular bell	£119.00
KR400RC D.L. bell	£147.95
KR600RC MD bell	£199.00
AR40 CDE bell	£115.00
CD45 HD bell	£189.95
HAM1V VHD bell	£379.00
KR500 Elevation	£139.95
KR5400 Az. & elev	£240.00
KR5400A Comp. control	£285.00
KR5600 HD Az. & elev	£349.00
KR5600A Comp control	£369.00
CARRIAGE PAID	
KR600RC	

### COAX SWITCHES

S2U 2way vht	£11.95
S2N 2way 'N'	£19.45
KP21N 2way 'N'	£24.15
AN2 3way slide	£4.60
AN3 3way slide	£5.00
POST AND PACKING £1.65	

### COAX RELAYS

CX120A Cable Entry	£16.90
CX520D 3 'N'	£46.00
CX540D 3 BNC	£46.00
CX600N 3 'N'	£46.00
CX600N 4 'N'	£68.00
ALL P&P £1.50	

DB4 486M

### DUOBANDER

£115.00

TB1, TB2, TB3, VR3

MKIII TB1 £85 TB3 £250  
TRIBANDERS TB2 £170 VR3 £58

LIMITED STOCKS OF MKII TRIBANDERS AT OLD PRICES

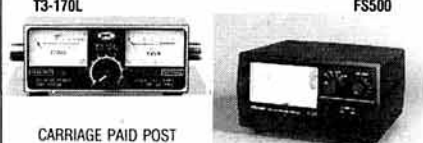
### POWER METERS

**HANSEN + S.M.C.**  
IN LINE POWER/SWR BRIDGES  
P.E.P., AVERAGE 1.8-440MHz

The Hansen range covers 30 quality models with top-of-the-line the FS710. This is a flat frequency response, peak envelope power and average in-line wattmeter with many novel features. Notable being the 'power independent' SWR scale - no forward power calibration knob, just direct reading SWR.

FS710V	50-150MHz	15/150W	Pep	£107.80
FS50HP	1.8-60MHz	20/200/2000W	Pep	£106.70
FS50VP	50-150MHz	20/200W	Pep	£106.70
FS500H	1.8-60MHz	20/200/2000W	Pep	£81.95
FS500V	50-150MHz	20/200W	Pep	£81.95
FS300V	50-150MHz	20/200W	Pep	£53.50
FS601M	1.8-30MHz	20/200W	Pep	£62.15
FS603M	430-440MHz	5/20W	Pep	£62.15
FS210	1.8-150MHz	20/200W	Auto-SWR	£65.50
FS301M	2-30MHz	20/200W		£42.25
FS301MH	2-30MHz	200/2000W		£42.25
FS711H	2-30MHz	20/200W	Head Display	£43.65
FS711V	50-150MHz	20/200W	Head Display	£43.65
FS711U	430-440MHz	5/20W	Head Display	£43.65
FSSE	3.5-150MHz	20/200/1000W	HF	£42.75
FS5S	1.8-150MHz	20/200/2000W	HF	£42.75
SWR3E	3.5-150MHz	20/200/1000W	HF	£28.75
SWR50B	3.5-150MHz	Twin Meter		£30.50
FS20DL	3-150MHz	1/10W		£43.65
FS20D	3-150MHz	5/20W		£43.65

JD				
JD110	1.5-150MHz	10/100W	SMC	£16.50
S3-30L	Mini (CB style)			£9.20
T3-170L	3.5-170MHz	Relative	Twin Meter	£17.25
T3-170L			FS500	



# WATERS & STANTON TRIO

APPROVED DEALER FOR ESSEX & THE SOUTH

## ELECTRONICS

AVAILABLE AGAIN! OUR COMPLETE MAIL ORDER PRICE LIST. Send S.A.E.

### WELZ FAMOUS RF PRODUCTS

#### NEW CT530 LOAD



50 ohms 100W  
500W  
(intermittent)

£82.00

#### NEW CT1010 LOAD



50 ohms 200W  
1kW (intermittent)

£97.00

At last you can read — PEP — RMS — VSWR

#### SP220

1.8-200MHz  
2/20/200 watts  
Remote sensor

£59.95

#### SP225

1.8-160MHz  
5/15/150 watts  
Twin meters

£109.95



#### SP420

140-525MHz  
4/20/200 watts  
Remote sensor

£71.00

#### SP425

140-525MHz  
5/15/150 watts  
Twin meters

£109.95

#### NEW SP825 1.8-1300MHz



£163.00

The new SP825 covers all amateur bands from 1.8 to 1300MHz. Made by the famous Welz company its the complete station VSWR/POWER meter. It measures power between 1 and 150 watts. A few in stock now.

### WELZ-DIAMOND D130 DISCONE

25-1300MHz (Tx on \*6m, 2m, 70cm, 23cm)

\*not permitted in UK

see illustration below

£69.95

### FABULOUS SONY AIR-7

108-136MHz; 144-174MHz; 76-108MHz; + LW/MW/SW

The new Sony Air-7 is a superb new monitor with a performance and presentation that outperforms the competition. The PLL circuitry, LCD readout and 40 memories (10 on each band) make a most versatile package. Such features as priority channel, channel lockout, and delay are all included and the sensitivity puts most of the competition to shame! It also includes the broadcast bands both VHF and LW/MW and covers such things as NDB beacons as well as part of the marine band to 2194MHz. We are impressed and so will you be when you try it!



£249



£329

#### SONY 2001D

150kHz-30MHz  
76-108MHz  
108-136MHz  
32 memories  
AM/SSB/FM BROADCAST

New from Sony is the 2001D general coverage portable receiver. It gives superb performance on the short wave bands using PLL circuitry and has separate filters for SSB and AM. A novel system of synchronous excited-carrier provides a dramatic reduction in interference when receiving AM broadcast stations. Features include LCD readout, clock, scanning, timer, RF gain control, comprehensive memories and a host of features that make it an incredible performer. It equals or betters many base station receivers we sell and the SSB performance with switchable upper and lower sideband is a joy to use.

## BOOKS YOU SHOULD HAVE!

### UK LISTENERS CONFIDENTIAL FREQUENCY LIST NEW THIRD EDITION

Now completely updated with over 50% more information and a smart new presentation. No self respecting listener should be without a copy. If you enjoy exploring the short wave bands then this new third edition is just the job! It covers the HF spectrum from 2 to 30MHz and gives comprehensive details of transmissions outside the amateur bands. Specially compiled for the UK and European listener it sets out in a very easy way a complete list of hundreds of interesting transmissions that will keep you occupied for days on end! A fraction of the cost of other similar publications, it contains details of Marine, Air, Military, Embassy, Press and News agencies. Many listings have time schedules included with comprehensive RTTY details. It lists the HF frequencies used by civil and military aircraft, when and where to pick up the press bulletins, long distance marine traffic, plus broadcast etc and much more. Send today for your copy of this invaluable publication.

£5.95 + 75p p&p

### SCANNER OPERATORS GUIDE TO THE VHF/UHF SPECTRUM NEW LARGER SECOND EDITION AVAILABLE JUNE!

If you're one of the many new owners of a scanning receiver and are not sure where to listen then this is for you. Only just published and covering the range 27 to 130MHz it provides details of frequencies that the various services operate on. Fascinating reading for the student of the radio spectrum it will put you at a tremendous advantage to those who just 'fumble about in the dark'. At this price can you afford not to have a copy beside you.

£3.95 + 40p p&p

### VHF/UHF AIRBAND FREQUENCY LIST

This frequency manual is without doubt the most comprehensive list of VHF/UHF aircraft listings available in the UK. Of vital importance to the airband enthusiast or indeed any keen VHF/UHF listener it sets out in a very easy to follow manner full details of a whole host of stations. Every known UK airfield that has radio facilities is listed including Civil, RAF, USAF, MOD, Navy, Radar, Rescue etc. Both VHF and UHF frequencies are listed and you will probably be surprised to learn just how much activity there is between 200 and 400MHz! Also included are air to air frequencies, Red Arrows contact frequency and much much more. Send today for your copy and find out just how much you have been missing.

£3.95 + 40p p&p

### WORLD RADIO TELETYPE HF FREQUENCY LIST

A new publication produced by popular request. If you are interested in RTTY or thinking of taking it up, this book will be a very handy frequency guide. It lists full details of the World's RTTY services including meteorological, press and marine. They are all entered in country order plus a separate listing under transmission times (GMT). Simplex and duplex frequencies are listed with details of languages and also a handy reference section on band plans and prefixes etc. Altogether a handy guide to have around the shack or just for interesting reading.

£3.95 + 40p p&p

### SCANNERS A VHF/UHF LISTENERS GUIDE

Recently published, "Scanners" is a book specially for the owner or would-be owner of a scanning receiver. It covers a whole host of topics from receivers and aerials to comprehensive details regarding the types of services that make use of the VHF/UHF spectrum. Subjects covered are receivers (with technical details); aerials, operational "tricks", computer interfaces, Aeronautical bands, Maritimes band, land mobile; space satellites etc. It covers the subject in a very thorough manner and its 175 pages form a handy reference.

£7.95 + 75p p&p

### AIRBAND RADIO HANDBOOK

Just published, this book has been written by David Smith a professional air traffic controller. Its main aim is to give the airband enthusiast a comprehensive guide into the whole subject of airband listening. Topics covered include terminology, types of airspace, Navigational aids, Oceanic control, air displays, weather, emergencies, beacons, and much more. Read in conjunction with our VHF/UHF frequency list it forms an ideal combination.

£4.99 + 75p p&p

### AIR TRAFFIC CONTROL

Air Traffic Control written by David Adair is a welcome addition to this fascinating subject. With a heavy bias towards the radio side of Air Traffic Control, its 175 pages are packed with information that unravels many of the mysteries and skills associated with this profession. If you ever spend any time monitoring the airband frequencies then you cannot fail to be enthralled with this publication. It even takes the reader on a simulated flight which graphically illustrates the complexities of the subject. Packed with illustrations and a very handy reference book.

£6.99 + 75p p&p

### OCEANIC AIR BAND HF SUPPLEMENT NEW SECOND EDITION

Should be in stock by the time you read this.

£2.95 + 40p p&p

### NEW

### SUPER LOW PRICE!

AZDEN PCS5000  
2m FM 25w  
140-150MHz  
(Tx 144-146MHz)



£279

At last an FM transceiver with an up to the minute specification with an old fashioned price! Highly compact measuring 50 x 140 x 182mm, its 25 watts and high performance front end give superb coverage under mobile or fixed operation. The back lighted LCD readout and key-pad makes for easy operation and the computer controlled frequency selection is a joy to use. Two banks of 10 memories are scanned, consecutively or separately with channel lockout on any or all memories. Priority channel can be used to check your favourite frequency whilst monitoring any other channel and the priority channel can be instantly recalled via a side button on the mic.



MAIL ORDER &  
MAIN SHOWROOM:  
BRANCH:

18-20 MAIN ROAD, HOCKLEY, ESSEX. Tel: Southend (0702) 206835 & 204965  
12 NORTH STREET, HORNCHURCH, ESSEX. Tel: Hornchurch (04024) 44765  
HOURS: MON-SAT 9.00 am-5.30 pm. E.C. WED 1.00 pm





# RADIO SOCIETY OF GREAT BRITAIN

## THE NATIONAL SOCIETY REPRESENTING ALL UK RADIO AMATEURS

Founded 1913

Incorporated 1926

Limited by guarantee

A member society of the International Amateur Radio Union

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

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

Headquarters and registered office: **Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JW**

Telephone 0707 59015. Telex 25280 (RSGBHQ G)

Secretary and general manager: **D A Evans, G3OUF**

### COUNCIL OF THE SOCIETY

**PRESIDENT:** W J McClintock, MSc, G3VPK

**EXECUTIVE VICE-PRESIDENT:** K E V Willis, BSc, ARCS, CEng, MIEE, G8VR

**IMMEDIATE PAST-PRESIDENT:** J Heathershaw, G4CHH (Mrs)

**HONORARY TREASURER:** P F D Cornish, FCA, G3COR

**ORDINARY MEMBERS OF COUNCIL**

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

D S Evans, PhD, FIM, CEng, G3RPE

J D Heys, G3BDQ

A McKenzie, MBE, CEng, FIERE, FAES, G3OSS

B O'Brien, G2AMV

N F O'Brien, FAAI, FSCA, ACIS, MIMI, G3LP

F S G Rose, G2DRT

**ZONAL MEMBERS OF COUNCIL**

**Zone A** (Regions 1, 2 and 18)

D S Smith, G4DAX

**Zone B** (Regions 3, 4 and 5)

H S Pinchin, BSc, MBIM, G3VPE

**Zone C** (Regions 7, 8, 16 and 19)

J Greenwell, AMIEE, G3AEZ

**Zone D** (Regions 6, 9, 17 and 20)

J N Gannaway, G3YGF

**Zone E** (Regions 10 and 11)

E J Case, GW4HWR

**Zone F** (Region 15)

J T Barnes, G13USS

**Zone G** (Regions 12, 13 and 14)

F Hall, GM8BZX

### REGIONAL REPRESENTATIVES

**Region 1** B Donn, G3XSN, tel 051-722 3644

(Cheshire, Cumbria, G Manchester, I o Man, Lancs, Merseyside)

**Region 2** P R Sheppard, G4EJP

(Humberside N of Humber; N, S and W Yorks)

**Region 3** G Ross, G8MWR, tel 0203 616941

(Hereford & Worcs, Salop, Staffs, Warks, W Midlands)

**Region 4** M Shardlow, G3SZJ, tel 0332 556875

(Derbys, Humberside S of Humber, Leics, Lincs, Notts)

**Region 5** J S Allen, G3DOT, tel 0582 21151

(Beds, Cambs, Northants)

**Region 6** (Post vacant)

(Berks, Bucks, Oxon)

**Region 7** R Sykes, G3NFV, tel 0372 372587

(G London S of Thames, Surrey including part of London

N of Thames administered by Surrey)

**Region 8** M Elliott, G4VEC, tel 0795 70132

(Kent, E Sussex, W Sussex)

**Region 9** A H Hammett, G3VWV

(Cornwall, Devon)

**Region 10** (Post vacant)

(Dyfed, Gwent, Powys; Mid, S and W Glam)

**Region 11** B H Green, GW2FLZ, tel 0492 49288

(Clwyd, Gwynedd)

**Region 12** M R Hobson, GM8KPH, tel 0796 2140

(Grampian, Highland, Island Authorities, Tayside)

**Region 13** A J Scott, GM8BDX

(Borders, Fife, Lothian)

**Region 14** T G Wylie, GM4FDM, tel 0505 22749

(Central, Dumfries & Galloway, Strathclyde)

**Region 15** R R Parsons, G13HXV, tel 0232 612322

(Northern Ireland)

**Region 16** A Owen, G4HMF, tel 0473 51319

(Essex, Norfolk, Suffolk)

**Region 17** T M Emery, G3KWU, tel 0703 812435

(I o Wight, Channel Is, Dorset, Hants, Wilts)

**Region 18** I Gibbs, G4GWB, tel 0670 790090

(Cleveland, Durham, Northumberland, Tyne & Wear)

**Region 19** R J Broadbent, G3AAJ, tel 01-989 6741

(G London N of Thames, Herts)

**Region 20** (Post vacant)

(Avon, Gloucester, Somerset)

### HONORARY OFFICERS

**Aerial Planning Panel co-ordinator:** (c/o MSO, RSGB HQ)

**Audio Visual Library co-ordinator:** R G Auckland, G2PA

**Awards managers:** HF: P Miles, G3KDB; VHF: Jack Hum, G5UM

**HF manager:** E J Allaway, G3FKM

**Microwave manager:** D S Evans, G3RPE

**Observation Service organizer:** R J Osborne, G4FJN

**Slow morse practice transmissions organizer:** (Post vacant)

**Trophies manager:** Mrs H Claytons-Smith, G4JKS

**VHF manager:** K A M Fisher, G3WSN

Correspondence to RRs and honorary officers should be

addressed directly to them (QTHR), not to RSGB HQ

### ANNUAL SUBSCRIPTION RATES

**Corporate member:** UK and overseas (Radio Communication by surface

mail): £16.50.

**UK associate member under 18:** £6.20. **Family member:** £6.60

**UK students over 18 and under 25:** £9.30 (Applications should give applicant's

age at last renewal date and include evidence of student status)

**Affiliated club or society/registered group (UK):** £16.50 (including Radio

Communication); £9.90 (excluding Radio Communication)

(Subscriptions include VAT)

## EDITORIAL

### NEW MEMBERS—PLEASE

With this issue of *Radio Communication* is an invitation for you to pass to another amateur radio enthusiast who is not already a member of the RSGB to encourage him/her to join. In this, we are seeking the active help of all existing members to ensure that we attract into the Society anyone who can contribute to its efforts, now and in the future.

One could give many reasons why the Society needs to continue to expand its membership. Let us take one topic as an example—licensing. Here we have been reasonably successful in a number of areas; the 50MHz experiment is making good progress, well ahead of other countries in IARU Region 1; it has just been announced that the facility for Class B licensees to use morse is now a permanent feature of that licence; the morse testing service now provided by the Society has got off to a good start; and we are making good progress with dealing with the licensing aspects of packet radio, which has important implications in the handling of third party messages. I need hardly point out that these advances benefit members and non-members alike.

On the other hand, other areas are causing great concern. The changed role of the Radio Investigation Service, the vulnerability of our frequency allocations, emc and antenna planning problems could, unless the Society does what needs to be done, drastically change amateur radio as we know it today.

For the Society to be successful in dealing with these problems, there is no substitute for good old-fashioned clout. This means two things. First, the more members we can claim to represent, the better. Second, we should have as high a proportion as possible of licensed amateurs as members (at present, just over half of all licensees are members, which we believe corresponds to over 80 per cent of active licensees). One reason for this is the simple argument which those professionals in Government, who have a major role in the future of amateur radio, could well adopt; namely, "If the amateurs themselves do not recognise the value of their own Society sufficiently to give it their support, why should we?"

A third reason why we need more members is simple economics: as we increase the number of members, the services we can provide increases very rapidly.

So, what are we trying to achieve? Certainly not an increase in membership at any price, but rather getting as members those who reflect the best traditions of self-discipline, good operating practices and consideration for others that have always been a feature of amateur radio. We are looking for responsible individuals who will contribute to the work of the Society in any way they can: we are looking for the newcomers on whom the future of the Society, and amateur radio, will depend.

In seeking out these people, we are asking for the help of each and every member, for who are better placed to act as our ambassadors for this most important job than the members of the Society.

David Evans, G3OUF

## CHANGE OF ADDRESS

With effect from 1 July 1986, the *Radio Communication* editorial department will be transferred from Chelmsford to RSGB headquarters at Potters Bar.

To facilitate this move, the closing date for "copy" for the August issue will be seven days earlier than normal, and the closing date for the September issue will be two working days earlier.

Publication dates will not be affected.

### Scottish trophies

Two trophies are awarded annually in Scotland: the Jack Wyllie Trophy to the Scottish RSGB member, society, club or group thought to have done most for amateur radio in Scotland, in general terms, in the past year; and the Jock Kyle Trophy to the Scottish RSGB member, society, club or group thought to have done the most in Scotland in the vhf field in the past year.

In 1985 the Jack Wyllie Trophy was awarded to Eric Garrington, GM3RFA, for his work in connection with Raynet. No nominations were received in respect of the Jock Kyle Trophy and no award of this trophy was made.

Nominations for each of the trophies, along with citations, are required from at least five RSGB members resident in Scotland, who should send them to their respective regional representatives by 15 August 1986. To be eligible for the awards, the member, or group of members, shall have been resident in Scotland for the period for which the award is made.

In the event of no nominations being received, the trophies shall pass to the zonal manager for safe keeping until nominations are called for in 1987.

### VACANCY

#### VHF Contests Committee

The VHF Contests Committee is charged with the organization of RSGB contests on all bands above 30MHz, and recommends the award of a number of RSGB trophies and certificates. A vacancy on the committee will arise shortly, and we are looking for someone with a keen interest in vhf/uhf contests, who has time available to attend committee meetings and adjudicate about three contests per year. The committee meets monthly at London House, Mecklenburgh Square, London WC1, on a Wednesday evening, from 6.30pm until 9.30pm, and discusses policy, sets rules, and ratifies results. The bulk of adjudication work is done at home, and may take from 4 to 40 hours per event depending on the size of the entry. Access to a home computer would be useful for checking purposes.

If you are interested in this opportunity of making a contribution to the work of the society, please write to: The Chairman, VHF Contests Committee, 12 Chestnut Close, Rushmere St Andrew, Ipswich IP5 7ED.

### RADIO COMMUNICATION leads the field

The *Circulation Review* for the year to December 1985, just published by the Audit Bureau of Circulations, shows that *Radio Communication* had the largest circulation of any UK amateur radio magazine supplying independently audited figures to the ABC.

While the average 1985 monthly circulation figure of *Radio Communication* increased, there was a marked decline in those of commercial magazines serving the same market.

### Amateur radio at EXPO 86

A state of the art amateur radio station VE7 EXPO is operational at EXPO 86, the World's Fair on Transportation and Communication being held in Vancouver, BC, from 2 May to 13 October this year. The station, located in the main exhibit hall of the Canada Pavilion, is operating on all bands from 1.8MHz to 1.2GHz, all modes including ssb, cw, rtty, amtor, packet, fm, atv and sstv. It is operational from 10am to 10pm every day, and should

provide an introduction to amateur radio for many of the more than 13 million visitors expected at EXPO 86.

The station, which will feature Icom's newest equipment on all bands, will have five operating positions: one each for packet, satellite and vhf/uhf; and two on hf. HF antennas include a Sommer multi-band Yagi, Butternut verticals and homebrew bazookas. The satellite system will use two 14-turn helices on 434 and a pair of 22-el Yagis on 144MHz. The packet station uses the latest VADCG TNC+ packet radio interface, and a Multitech Popular 500 computer system to allow the public to ask questions about amateur radio—via a packet radio link to the VADCG (the pioneers of packet radio in North America) bulletin board. The TNC+ can use the Vancouver V2 and V3 protocols as well as AX.25, so packeters are encouraged to link to the station as well.

The station will be active during as many contests as possible, and count as a special 20-point bonus station during the 1 July Canada Day Contest. All contacts will be QSLd through the VE7 bureau, with outgoing cards via the CARF outgoing bureau.

Foreign visitors are encouraged to drop by and operate (with a valid licence or callbook address). Visiting hams who wish to take part as a group, or who wish to arrange skeds for special events, should contact the VE7EXPO Amateur Radio Society at 202-13640 67 Ave Surrey BC, Canada V3W 6X5.

### Radio Fraternity Lodge

Mr Sam Fisher, G4AKT, was recently installed as Worshipful Master of the Radio Fraternity Lodge of Freemasons for 1986-7. The secretary of the lodge is Maurice A Pyle, G2BLA, QTHR, and he would be pleased to hear from any reader who has a call and is also a member of a lodge.

### Stolen equipment

On 3 April from a car in Worthing: Yaesu FT2700RH, serial number 5D030746; MH14A8 hand mic; YH1 headset and SB10 ptt switchbox. Information to Worthing police, tel 0903 31821, or G1JVQ, tel 0903 504430.



Four radio amateurs of Maldon, Essex, seen here "flying the flag" at a recent local event. Known collectively, with others, as the "G6 Preservation Society", they are (l to r): John White, G6LJF; John Theobald, G4XHU; Mike Littlewood, G0CJ1; Colin Heavyside, G4RWU; and Andy Bright, G1BQG. Photo: Pat Higham, G8JLM



## Yet another pirate

David Bradfield, G4YHV, advises that his call sign is being pirated on 144MHz ssb in the London area. G4YHV, who has no 144MHz ssb facility, was in south London over the weekend 22/23 March and the pirate heard him working a special event station.

## RAE class

We are advised that an RAE course is being held at Coleg Meirionydd, Dolgellau, Gwynedd; tel Dolgellau 422827. Tutor: M D Fowler, GW3GKZ.

## Steeholme Is, 1081KI/WAB ST26

Stroud ARS will operate G4SRS from this uninhabited island from 1100gmt 7 June to 1400gmt 8 June, on 144MHz ssb and fm, and on 1-8, 3-5, 7 and occasionally 14, 21 and 28MHz. Special QSL card. Details: Tel Stroud 3303 ext 75456 (day) or Stonehouse 4531 (evening).

## Special Event Stations

All information for inclusion in this column must be sent to the editor, not to RSGB HQ.

**1 May-26 October, GB4NGF, GB8NGF, GB2NGF**  
North Staffs ARS are operating three special event stations, for the National Garden Festival, Stoke-on-Trent. GB4 and GB8 will be on the Festival site, GB2 is located at the QTH of G4XEE. Open 11am-8pm. Transmission on all bands using cw, rtty and tv. Special QSL cards. Details G6MLI, tel 0782 332657.

### June, GB4OH, GB0IOW

GB4OH will be operational from Osborne House, East Cowes, Isle of Wight and GB0IOW will be operational from the Royal Needles Complex, Isle of Wight in commemoration of the 89th anniversary of Marconi Early Experiments 1897, 1898. Both stations will operate for one week in the first week of June. Details V G Scambell, 50 Park Ave, Witley, nr Purbrook, Hants.

### 1-6 June, GB2NM

Centenary of Gerald Marcuse, G2NM, Radio Pioneer. Operation from Chalk Pits Museum, Amberley, Arundel, W Sussex on 3-5 and 144MHz. Special exhibits and QSL cards. Details G4EHG, tel 0243 789587.

### 7 June, GB4LAD

Station run during Luton and Dunstable Hospital Fete by Dunstable Portable ARG in conjunction with Dunstable Downs RC. Operation on 3-5, 14 and 144MHz, 8am-6pm. Details G0COQ, tel 0582 508259. The group is being sponsored on the number of contacts made, and all proceeds will go to the hospital.

### 7-15 June, GB0BCO

Station operated by members of Dudley ARC at the Dudley Leisure Centre in connection with "Black Country Olympics". All modes, rtty, hf, vhf and fast scan tv. Details G4NRA, tel 0384 278300.

### 13-14 June, GB2RGD

Supporters open-day for the Redbridge Guide-dogs for the Blind Training Centre, Woodford Bridge, Essex. Operated by local amateurs on hf, vhf and uhf. Details G4BCJ, tel 01-478 5303.

### 14 June, GB2NIB

A social gathering for members and friends of the Norfolk group of the RAIBC to be held at "Sleepy Nook", Holt Road, Little Snoring, Fakenham, Norfolk NR21 0AY. Activity on hf, vhf and uhf. Details G4DCJ or G1IEG.

### 14-15 June, GB2GF

Operated on behalf of the Greenwich Festival by the Cray Valley RS. Activity on hf and vhf. Special QSL cards. Details G4DFI.

### 20, 21, 22 June, GB8MM

Operated by WACRAL from Trentham Gardens, nr Stoke-on-Trent for Bi-centenary celebrations of Methodist Missionary Society. Activity on all bands hf, hf and vhf. Sponsorship of contacts being organized. Details G3AGX or G4EBD.

### 20-22 June, GB2MMB

Celebrating 200 years of Methodist Mission overseas. Station located at New Rd, Methodist Church, Stourbridge. Operating on hf bands 144 and 432MHz. Details G4IEB, tel Stourbridge 392006.

### 21 June, GB0PGD

Station operated on Plessey Gala Day, Plessey Sports Ground, Beeston. Organized by the

Plessey (Beeston) ARC. Operation on hf and 144MHz. Special QSL cards. Details G4VFK, tel 0602 226321.

### 23 June, GB2FNC

Fleetwood Nautical College Open Day. Station operated by college students on Open Day (also from 20 June-4 July). Activity on 1-8, 3-5, 7, 14, 21, and 28MHz, cw/ssb/rtty and 144MHz fm. Details G4ZVJ.

### 29 June, GB4BPM

Annual Bromley Pageant of Motoring, Norman Bromley Park, Bromley, Kent. This is a sponsored station operating on hf and vhf. Special QSL cards. Money to charity. Details G0CRI.

### 5 July, GB2BAE

This station will be located at the British Aerospace Civil Division, Hatfield, Herts, during the annual public open day. Operating from 8am-4pm on 3-5, 7-5, 15, 20MHz using cw, ssb and rtty. Talk-in on 145-550MHz. Details G6IYF, tel 07072-62300 8489.

### 5-6 July, G0MFC

Martham Fund Carnival, Norfolk. Operation from WABTG41 on 3-5, 14, 21 and 144MHz. Sponsors welcomed. Details G0APV, tel 0692 670600.

### 12 July, GB0RAF

Operating from RAF Hendon Museum on 144, 14 and 3-5MHz from 9am to 4pm. Transmission on 3,740kHz ssb, 14,015kHz cw, 144-170MHz ssb plus or minus QRM. QSL cards via bureau or direct. RAFARS members required to man the station. Contact G4PSH tel 01-446 0266.

### 12 July, GB2RAF

Operating from the RAF Digby fete for 24h non-stop. Activity on hf and vhf. Special QSL cards. Reports from swls welcomed. Local volunteers especially welcome to come and help operate the station. Details G4ZYR, tel 0529 306089

### 13 July and 17 August, GB4BGG

GB4BGG will operate on all major hf, vhf and uhf bands from BBC Beechgrove Gardens, centre of Aberdeen. Open morning and afternoon. Forms part of the activities associated with the twice yearly opening of the gardens to the public. Special QSL card. A QSL card from this station will count as a "wildcard" towards the Worked all Scottish Regions Award, WASR, operated for the ARS by GM4BKV. Details GM4GXD, tel Pitcaple 251.

### 19-21 July, GB2RPC

Commemorates 100 years of Plumbers' Registration. Operation on hf and vhf from the Institute of Plumbers' HQ, 64 Station Lane, Hornchurch RM12 6NB. Details G4VIV, tel 04024 45199.

### 23, 24 July, GB2WAD

Celebrates the Annual Great Weston Air Days, from Beach Lawns, Weston-super-Mare. Operated by members of the Weston-super-Mare RS, 10am-6pm. Transmissions on hf, 144 and 432MHz. Details G1DJW, tel 0934 514429.

### 24 July-2 August, GB8CG

Commemorates the 1986 Commonwealth Games, Edinburgh. Organized by the Lothian RS from a venue near to Meadowbank Stadium. Operation on as many hf bands as possible and 144MHz fm ssb. Special QSL cards via bureau. QRP contacts welcome. Details GM6JAG, tel 031-664 5403.

### 31 July-12 August, GB4MEJ

International Scout and Guide Jamboree, Mount Edgcombe Park, Torpoint, Cornwall. Operated by Torbay and Plymouth AR societies on all bands from 1-8MHz to 30MHz, also 144MHz. QSL cards to all contacts and swl reports. Details G4SBH, tel 0803 34640.

### 8-10 August, GB2YFT

Yeovil ARC will be operating from the Yeovil Festival of Transport, Yeovil Showground on 3-5 to 432MHz ssb and cw. Meteor scatter is planned from the evening of 8 August on 144MHz and skeds would be appreciated. Details G4JBH, tel 0935 23873.

### 16 August, GB2MSS

Yeovil ARC will be operating from the Mid-Somerset Show, Shepton Mallet Showground, on 3-5 to 144MHz ssb and cw. Details G4JBH, tel 0935 23873.

### 23-25 August, GB2RSG, GB1RSG

Saga 86, Star & Garter Appeal run by West Middlesex RG. Operational 9am-7pm. Looking for sponsors. Details G1DDR, tel 01-579 7860.

### 1 September, GB2STC

Celebrates the centenary of the official opening of the Severn Tunnel, at Piling Railway Station. Operational 10am-6pm on hf, 144 and 432MHz. Details G1DJW, tel 0934 514429.

### 13 September, GB2WMF

Celebrates Annual Winscombe Michaelmas Fair, Winscombe, Somerset. Operated by Weston-super-Mare RS on hf, 432 and 144MHz. Open

10am-6pm. Details G1DJW, tel Weston 514429

### 15-22 September, GB2GAF

Commemorates Battle of Britain Week. The station will be operated by the Gloucester ARS from the RAF Association Club, Gloucester. Activity on hf and vhf. Special QSL cards. Details G3MA, 40 Calton Rd, Gloucester GL1 5DY.

### 25, 26 October, GB2EMR

On the occasion of the International Endurocross Motor Cycle Races, from Beach Lawns, Weston-super-Mare. Operated 10am-5pm each day by members of the Weston-super-Mare RS. Transmissions on hf, 144 and 432MHz. Details G1DJW, tel 0934 514429.

### 3-9 November, GB4PW

In remembrance of Poppy Week. Station operational from The Royal British Legion HQ, 49 Pall Mall, London SW1. Open 10am-8pm on 3-5, 14, 144MHz, cw, ssb and fm. Operators required from Services & Royal British Legion Members, class A or B. Contact G4PSH, tel 01-446 0266, giving name, call sign and days/you wish to attend. SWLs welcome to assist in keeping log and QSL cards up to date.

## Mobile Rallies Calendar

All information for inclusion in this column must be sent to the editor, not to RSGB HQ.

### 1 June

Southend & D RS Mobile Rally, Rocheway Centre, Rochford, Essex. Opens 10.30am. On site parking. Talk-in on S22. RSGB Morse tests to be advised. Details G6SOH, tel 0702 713211 or G4RDS, tel 03745 50494.

### 1 June

Spalding & D ARS Rally, Springfields Gardens, Spalding. Opens 10am. Talk-in. Details G4OO, tel 0775 86382.

### 8 June

Elvaston Castle Mobile Radio Rally, Elvaston Castle Country Park, five miles south-east of Derby on B5010. Talk-in by GB2ECR on 144MHz and 432MHz. Details G4PZY, tel 0332 767994, G4CTZ tel 0332 799452 or club HQ 0332 755900. Trade enquiries to G4HIJ, tel Ashbourne 43241.

### 15 June

RNARS Mobile Rally, HMS Mercury, Leydene, near Petersfield, Hants. Details G4DIU.

### 29 June

29th Longleat Amateur Mobile Radio Rally, Longleat Park, Warminster. Organized by the City of Bristol RSGB Group. Talk-in on S22 and SU8 by GB4LMR. Camping and caravan site. Details G4FRG, tel 0272 848140.

### 13 July

Sussex Mobile Rally, Brighton Racecourse. Opens 10.30am. Talk-in via GB2SMR on 145-550MHz and 3-5MHz. Details from G8JVE or G4UAW, evenings.

### 13 July

Worcester & DARC Droitwich Rally, High School, Droitwich. Bring and buy, and events for all the family. Details G8ASO.

### 20 July

Anglian Mobile Rally, Highwoods Sports Centre, Colchester. Open 10am. Talk-in on 144MHz. Details G6HQI, tel 0206 862403 after 7pm.

### 20 July

Cornish Radio Amateur Club Rally, Camborne School, Camborne. Open 10am-5pm. Talk-in on S22. NB new QTH. Details G4MSV, tel 0736 763549.

### 20 July

McMichael Mobile Rally, Haymill Centre, Burnham, Slough. Open 11am. Talk-in on S22 and SU8. Enquiries to G0BTY, tel 0494 29868.

### 27 July

Scarborough ARS Rally, The Spa, Scarborough. Open 11am. Talk-in 144MHz (S22), and 432MHz (SU8) and RB0-GB3NY. Details G4UQP.

### 3 August

RSGB National Mobile Rally, Woburn Abbey.

### 3 August

Rolls-Royce ARC Mobile Rally, Rolls-Royce Sports & Social Club, Barnoldswick, Skipton. Access from A59 and A56. Open 11am. Free car park and entrance. Enquiries to G4ILG, tel 0282 813271 ext 337, daytime, or 0282 812288 evenings.

### 10 August

29th Annual Mobile Rally celebrating the 75th anniversary of the Derby Wireless Club, Lower Bemrose School, St Albans Rd (off Derby Ring Road A5111) Derby. Open 10.30am. Talk-in by GB3ERD. Details G4EYM, tel Derby 556875.

### 10 August

Hamfest '86, Flight Refuelling Sports & Social



Club grounds, Merley, Nr Wimborne, Dorset. Details Ashley Hulme, G0CDY, 71 Victoria Gardens, Ferndown, Wimborne, Dorset BH22 9JQ, tel 0202 872503.

#### 17 August

West Manchester RC Red Rose Rally, Haydock Park Racecourse, Newton Le Willows (one mile from M6 junction 23). Open 10am. Talk-in on S22. Details G1100, tel 0204 24104 evenings.

#### 24 August

1986 BARTG Annual Mobile Rally, Sandown Park Racecourse, Portsmouth Road, Esher. BARTG Kits Components. Car boot sale. Free car park. Open 10.30am-5pm. Talk-in on S22. Details G8VXY, tel 021-453 2676.

#### 24 August

Preston ARS 19th Annual Rally, Lancaster University. Details G3DWQ, tel 0772 53810.

#### 24 August

Torbay ARS Rally, STC Social Club, Brixham Rd, Paignton, Devon. Open 10am. Talk-in on S22 and demonstration hf station with GB2NJA. Free car park. Details G1EUA, tel Teignmouth 78554.

#### 31 August

Telford Mobile Rally, Telford, Racquet & Fitness Centre, Telford Centre, Shropshire. Details G3UKV, tel Telford 55416 or G8UGL, tel Telford 584173.

#### 7 September

Lincoln Hamfest, Lincolnshire Showground. Further details to be published at a later date.

#### 7 September

Vange ARS Rally, Nicholas School, Basildon. Open 10am-5pm. Talk-in on 144MHz. Details Mrs D Thompson, 10 Feering Row, Basildon, Essex SS14 1TE, or G4OJUN.

#### 13 September

Wight Rally, Wireless Museum, Arreton Manor, Nr Newport, IOW. Details G3KPO, tel 0983 67665.

#### 13 September

Ballymena ARC 12th Annual Rally, Ballee High School. Opening address given by RSGB President, G3VPK. Talk-in S22. Details G14HCN, tel 0266 3044.

#### 21 September

Harlow Mobile Rally, Harlow Sports Centre, Hammarskjold Road, Harlow, Essex. Open 10am. Talk-in on S22. Details G4KVR, tel 0279 22365, day, or G3UEG, tel 0279 27788 evenings.

#### 21 September

National ARC Car Boot Sale, The Shuttleworth Collection, Old Warden Aerodrome, nr Biggleswade. Open 10am-5pm. Talk-in on S22, GB4SC. Aircraft and motor museum. Free car park. Admission 20p. Details and advance bookings G6EES, tel 0582 607623 evenings.

#### 21 September

Peterborough R&ES Mobile Rally, Wirrina Sports Stadium, Bishops Road, Peterborough. Open 10.30am to 5pm. Free car parking. Food in the adjacent Tropicana Restaurant. Bar until 3pm. Details G4PNW.

#### 5 October

Great Lumley AR Rally, Community Centre, Great Lumley, Chester-Le-Street. Open 11am (10.30am for disabled). Talk-in S22 and RB0 (GB3NT). Details G4MSF, tel 091 4693955.

#### 5 October

Wakefield Mobile Rally, Outwood Grange School, Potovens Lane, Wakefield. Open 11am (10.30am for disabled). Free admission, easy parking. Talk-in on S22, GB3WU. Dealer enquiries and further details G4RCH, tel Leeds 536633 or G3SPX, tel Wakefield 828520.

#### 12 October

Carmarthen ARS Rally, St Peter's Civic Hall, Nott Square, Carmarthen. Open 10.30am-5pm. Talk-in on S22. Free parking. Details GW3GVE, tel 026-783 460.

#### 19 October

South Bristol ARC present the Second Bristol Radio Rally at Hartcliffe Youth Centre, Harecliffe Avenue, Hartcliffe, Bristol. Open 10am-5pm. Talk-in and special event station, GB2BRR. Details G1LDJ, tel 0272 667179.

#### 23 November

West Manchester RC Mobile Rally, Pembroke Halls, Walkden, Worsley, Gtr Manchester. Details G1100, tel 0204 24104 evenings.

#### 7 December

Verulam Christmas Rally, The City Hall, St Albans. Open 11am-5pm. Talk-in on S22 and SU8. Details G4JKS, tel St Albans 59318.

#### 14 December

Leeds & DARS Annual Christmas Rally, Pudsey Civic Centre, Dawson's Corner, Pudsey. Open 11am (10.30am for disabled). Talk-in on S22. Trade enquiries G4WYD, tel 0274 685039, details G1EBS, tel 0274 665355.

## Other Events

All information for inclusion in this column must be sent to the editor, not to RSGB HQ.

#### 5, 6 July

Wembley '86 Amateur Radio & Electronics Hobby Fair, Wembley Conference Centre, London. Details tel 021-421 5516.

#### 20 July

RAIBC Picnic, Broadlands, Romsey, Hants. Talk-in on S22. Details G4COM, tel 0703 693017.

#### 13 September

Scotam '86, Lomond Centre, Glenrothes. Details GM3YBQ.

#### 28 September

RSGB HF Convention, Belfry Hotel and Conference Centre, just outside Oxford on the M40.

#### 11 October

RSGB Midlands VHF Convention, Madeley Court Centre, Telford, Shropshire. Details G3UBX.

## OBITUARIES

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

#### Mr C F Atkins, G3HCY

"Tom" Atkins, who died on 15 March, was first licensed in 1950. He was active mainly at the weekends on cw, on 7 and 15MHz and had obtained a number of operating awards including WAC and DXCC.

#### Mr W H Banks, G2ARX

Bill Banks had been active in amateur radio since 1922 when he obtained an experimental licence. He was also a founder member and former president of the Stockport Radio Society. He was active on 144MHz until a few weeks before his death.

#### Mr M J V Chown, G4RJT

Malcolm Chown died on 17 April aged 51. He had been interested in amateur radio since childhood. He was a keen member of the Northampton RC and the Northampton Scout ARG and he made most of his own equipment.

#### Mr P Day, G1MPX

Phil Day, who died on 28 February, was a keen and active member of Surrey Raynet. Although he had been involved with the group for less than a year he was already on the committee and only a week before his death had organized coverage of a large and complex car rally involving liaison with two other Raynet groups. This event showed him to be one of the most useful and promising of Surrey Raynet's members.

#### Miss F Fisher, G1RAU

Francis Fisher died on 19 March aged 72. Severely disabled by arthritis and blind, Francis came late in life to amateur radio. Encouraged by G1GZQ and the RAIBC, she passed the RAE in 1985 and became active on 144MHz.

#### Mr R Halhead, GW3KOR

Bob Halhead died on 11 March aged 55. He was a founder member and secretary of the Meirion ARS and a member of the Liverpool & DARS for many years, and its chairman, before moving to North Wales. He was a cw man who loved contests, and was instrumental in Meirion ARS participating in RSGB field days. He had the ability to send with his right hand while filling out the log with his left hand.

#### Mr J Jardine, G3ECB

"Jock" Jardine died on 14 April. He was a well known amateur and was regularly heard on 3.5MHz prior to his death. He was a founder member and sole survivor of the group known as the "Nine O'Clock News", which was a daily feature of 3.5MHz that operated throughout the 'sixties and 'seventies. His skill in cw was learnt as a professional when he flew with Imperial Airways and was maintained throughout his life.

#### Mr W Mackune, G8CFM

Bill Mackune died on 13 March aged 57 years. He had been a member of the Liverpool & DARS for

over 35 years and for three years was its President. A member of RSARS, he served with the Royal Signals in Kenya and Palestine as a linesman. He was well known for helping new recruits into amateur radio.

#### Mr J Martin, GM4WEQ

John Martin, who died on 2 April aged 65, was area representative for the Society in Dundee. He was also secretary of the Kingsway Technical College ARC and when not engaged in the administrative side of his hobby he could be found on the hf bands where he was well known for his cw and phone operation.

#### Mr A J Mouton, G8QU

"Percy" Mouton died on 14 March. He was a devotee of the hobby and an active member of several clubs in London before he retired to live in Sussex. Although ill-health had slowed down his activities recently, he was engaged in setting up his station with new equipment shortly before his death.

#### Mr A Percival, 9Y4NP

Allan "Nick" Percival died on 13 March. Immediate past president of the TTARS and president of the TTARS for 10 consecutive years, he pioneered 144MHz radio communications in Trinidad and Tobago.

#### Mr N Richardson, G3NAD

Norman Richardson died on 23 February. Although he was QRT for many years, he had, in recent years, renewed his enthusiasm and remained active up to the day of his death.

#### Mr H C J Seagood, G6SG

Mr Seagood died on 24 February aged 74. He had not enjoyed good health for a number of years but still remained active until just before his death. He served in the RAF during WW2 and had worked for the Marconi Company for many years as a closed circuit television engineer. He had also been a member of Raynet.

#### Mr G R B Thornley, G2DAF

Dick Thornley was bitten by the radio bug at the age of 12. During the late 'twenties and early 'thirties, he made his own components, including large "bas et wound" coils, fixed condensers, grid leaks etc. He was allocated 2DAF in 1938 and became a member of the RAF Civilian Wireless Reserve.

He joined the RAF on 4 September 1939 and trained as a wireless operator/mechanic. After service in France he returned to England in 1940. Later he was posted to the RAF No1 Signals School, Cranwell, on an advanced signals course and subsequently became an assistant signals officer at several RAF stations, and in 1945-6 he was station signals officer at RAF Benbecula. During this period he was seconded to Training Command to build experimental antennas at Stornoway.

From 1949 he contributed the monthly "Single Sideband" feature, in RSGB Bulletin and was the author of several constructional articles published in the "Bull", and subsequently in handbook form. Two of these are *Communication Receiver Design Considerations* and the companion transmitting book *SSB Equipment*.

He received the following RSGB awards:

- (1) The Bevan Swift Memorial Premium for the article "The G2DAF SSB Transmitter" in 1960.
- (2) The Ostermeyer Trophy for the article "Communication Receiver Design Considerations" in 1961.
- (3) The Courtney Price Trophy for outstanding technical development in the field of amateur radio, with particular reference to the article "The G2DAF Linear Amplifier" in 1963.

In 1961 he was granted a patent for "Simplification and Improvements in Linear Amplifier Operation".

His homebuilt equipment, drawings and files have been donated to the RSGB by his two sons.

Also:

Mr J Adams, G15AJ, on 4 March.

Mr A A Brind, G3OZU.

Mr B Holmes, G6RH, on 16 January.

Mrs M Livingstone, GM6BSY, on 29 October 1985.

Mr J A Morris, G8NHC, on 8 November 1985.

Mr C G Pfaff, G1CTP, in February.

Mr B L P Terry, G3PW, on 13 February.

Mr W J Tonks, G6LJO, in December 1985.

Mr W C Torode, RS26870, on 25 January.

# Members' Mailbag

THE EDITOR,  
RADIO COMMUNICATION  
88 BROOMFIELD ROAD,  
CHELMSFORD, ESSEX  
CM1 1SS

The views expressed in published correspondence are not necessarily those of the RSGB, and readers are urged to verify independently any factual statements on which they may wish to rely as it cannot be guaranteed that such statements are correct.

## G4OEP'S PARADOX

Sir—It is interesting that A J Smith, G4OEP, (*Rad Com* February 1986) in Bristol, has brought up the electron beam paradox. I recall how in 1958, as a student in the physics department at Bristol, we were warned about this very point.

The two electron beams do indeed move apart. The nub of the problem is that in a wire the conduction electrons are moving through a cloud of stationary positively-charged metal atoms. So while the electrons on the whole regard the electrons in the other wire as keeping station, there is relative motion with respect to the positive ions. We are now into relativity. The positive charges, or, if you like, the field due to them, appear compressed, or more dense, so their attraction wins over the repulsion of the electrons.

This may seem surprising, that we are into relativity, when everybody knows that the electrons generally move quite slowly for currents that normally interest us. But the size of the effect calculates out to equal that ascribed to the magnetic field. In fact any magnetic field is nothing more than a manifestation of a relatively moving electrostatic field.

Nice to know, don't you think, that all our tuned circuits, motors, alternators etc are strictly relativistic time machines!

Mike White, G4IPY

Sir—A J Smith, G4OEP, in your February 1986 issue has lost his sleep because he has posed himself a non-equivalent pair of situations.

A flow of current in a conductor is a drift of thousands of millions of millions ( $10^{23}/\text{cm}^3$ ) of electrons through an electrically neutral lattice of atoms. Any electric field towards the electrons moving in the other wire is cancelled to zero before it can get out of the wire. That is also why there is hardly any voltage drop along a copper conductor.

In the case of the two electron beams, the current is composed of free electrons (ie, unneutralized electrostatically) in much smaller numbers moving much faster; considerable voltage drop occurs along the beam. The electric field forces are fully exerted and dominate; repulsion occurs. The small magnetic effect will be undetectable by comparison.

This is well explained in *Special Relativity* by A P French (Nelson 1968), in his last chapter based on papers by Jack Tassman showing that all magnetic effects are attributable to unneutralized resultants of electric field due to Lorentz contraction among moving electrons.

Maurice C Hatley, GM3HAT

Sir—G4OEP has certainly thrown down the gauntlet with his paradox. I wonder if he realizes just how much physics lies behind his simple problem. At the risk of being too verbose, I think a short history lesson is called for.

By the mid-19th century, the classical age of physics had well and truly arrived. The great brains of the day had cracked mechanics, geometrical and physical optics, electricity and magnetism, and the beauty of the theory was that it required only three fundamental assumptions: (a) the validity of Newton's laws, (b) the validity of Maxwell's equations, and (c) the validity of the Galilean transformation. A truly impressive achievement!

I am sure that you are all familiar with (a) and (b). The Galilean transformation is a mathematical mechanism for transforming between two frames of reference that are in uniform translation with respect to each other. The

most important assumption of the Galilean transformation is that the measurement of time is the same in all frames of reference.

Newton's laws are invariant under the Galilean transformation, which means that all inertial frames in uniform translation with respect to one another are equivalent as far as mechanical phenomena are concerned. Conversely you cannot differentiate between inertial frames using mechanical experiments. Steve Davis would play the same game of snooker in The Crucible and on a high-speed train!

The fly in the ointment is Maxwell's equations. These do change their form under the Galilean transformation. Maxwell's equations predict the existence of an electromagnetic phenomenon (radio, heat, light and X-rays) which propagates with a characteristic velocity. But our heroes required some medium for these waves to propagate through, although it needed some fantastic physical properties. The "ether" was born!

Maxwell's equations, evaluated in the frame of reference that was stationary with respect to the ether, yielded the velocity of light to be  $c = 3.00 \times 10^{10} \text{ cm/s}$ . However, calculation in any other frame of reference gives a different answer. The measured velocity of light should be the vectorial addition of  $c$  with the velocity of the frame of reference with respect to the ether.

Physicists love a challenge, and although this velocity variation is quite small, in 1887 Michelson and Morley performed an ingenious experiment designed to detect and measure this variation. Disaster! No variation was detected, and though many people repeated the experiment, it appeared that  $c$  was independent of the reference frame. This experimental result is so crucial to modern physics that it is still periodically repeated to ever greater and greater accuracy. Mechanisms to explain the negative result were devised: "ether drag", "Lorentz contraction" and "emission theories", but all had to be discarded in the light of experimental evidence.

So experiment said that all inertial frames of reference propagate light with velocity  $c$  in direct contradiction with Maxwell's equations. This rocked the very foundations of classical physics—at least one of the basic assumptions was wrong!

We had to wait until 1905 for Einstein to resolve the problem with two postulates. The laws of electromagnetism and mechanics are the same in all inertial frames, and the velocity of light is independent of the motion of its source.

So we retain Newton's laws and Maxwell's equations and dispense with the Galilean transformation in favour of the Lorentz transformation and the Special Theory of Relativity. This theory requires that all mathematics is performed in four dimensional space, time being the additional variable. When Maxwell's equations are formulated in four space we find that they are invariant under a Lorentz transformation. Great, we have consistency again!

But real life is not so simple, for the measurable solutions of Maxwell's equations (the electric field  $E$  and the magnetic field  $H$ ) are affected by the Lorentz transformation and will transform into combinations of each other. Thus G3OEP is quite correct when his moving observer sees no  $H$  field generated from either electron beam. This is exactly what we require, for a static charge is not a current and the laws of electromagnetism must hold true in this moving frame of reference.

"But haven't I just accepted the paradox", I hear you say. The answer is "No". But to see why, we must first consider current flow in a single conducting wire. The free carriers, the electrons, are physically confined to the wire because they are bound in orbits around the nuclei that make up the wire's lattice structure. A lot of energy is required before free electrons are emitted from the surface of the wire. However, the electrons are not so tightly bound

that they cannot be induced to migrate from nucleus to nucleus under the influence of the electric field produced by a battery. Such a current flow will produce a measurable magnetic field outside of the wire. Now what happens if I dash along the wire at the drift velocity of the electrons. To me they will appear stationary and hence there will be no electric current. But the nuclei will be dashing past at a great rate of knots and they will look like a current which will account for the magnetic field I observe outside the wire. There is no inconsistency between the frames of reference.

Now we can return to the electron beam, and again, for simplicity, consider only one beam. To the moving observer they appear as a stationary line. But like charges repel, so the beam should disperse under the interacting electrostatic fields. The beam is inherently unstable. The only way to hold the electrons stationary in space is to apply a combination of electric and magnetic fields to the area of space around the beam. If we now apply the Lorentz transformation to return to the lab frame, these fields, though modified, must still be there. Just think how your television works, let alone the Joint European Torus.

So I am sorry, Mr Smith, but you have fallen into the trap of not specifying the physical system completely. Include the restraining fields and there is no paradox. I hope you can now return to untroubled daydreaming. I had one sleepless night, even though I believe in the validity of the Lorentz transformation!

Steve Fraser, G1FBQ

We had seven letters on this topic—these three seem to summarize most of our correspondents' comments.

## WELL DONE, FANNY HILL!

Sir—You were kind enough to include advance publicity for the sponsored station GB4CIN in your "Special Event Stations" column in November of last year.

I thought you would be pleased to learn that the station raised a sum in excess of £1,280 for the BBC "Children in Need" appeal.

I would be grateful if you could include this news in your magazine, plus our sincere thanks to all the radio amateurs who took the trouble to contact the station over the weekend 23/24 November, thus making possible this fine charitable gesture on behalf of amateur radio.

J Bailey, G4MDG, Hon Sec, Fanny Hill Radio Club, RS85830

## EMERGENCY REGISTER

Sir—I note, with some dismay, the letter in your February issue from G3ZCG on the subject of the BARTG Emergency Register. It is unfortunate that we were overtaken by events before it was published.

G3ZCG resigned from the BARTG Committee, and hence ceased to be chairman of our group, on 4 December 1985, and as I write (in late February) it is still uncertain whether Ken is prepared to remain a member of the BARTG Committee.

At our committee meeting held on 25 January 1986, Ken's resignation and the BARTG Register were extensively discussed. This discussion had two outcomes, (1) BARTG now dissociates itself from the register, which G3GJW will continue to administer on his own account as the "Data And Teleprinter Emergency Register" (DATER), and not as a BARTG activity, and (2) I was appointed by the committee to fill the vacant position of chairman of BARTG.

Turning now to the points raised in the letter from G3ZCG. After any committee meeting, there are probably as many different recollections of the meeting as there are members of the committee. For this reason, there can only be one true and accurate record of a meeting for reference purposes, particularly after the interval of nearly 12 months, and that is the written minutes of the meeting as corrected and agreed at the next meeting. All members,



of every committee, have the right to have the minutes corrected, before they are signed, if they do not accurately reflect the proceedings of the meeting. If this right is not exercised at the appropriate time, it cannot be invoked at a later date.

I have no wish to continue washing our dirty linen in public, but nowhere in the minutes of the committee meeting held on 30 March 1985, which was prior to the issue of the registration form, is there any reference to the register being considered "controversial"; indeed, the minutes contain no adverse comments at all, on the register. A registration form was then inserted in the spring 1985 issue of *Datacom*, as agreed by the committee.

Following the issue of the registration form to the BARTG membership, the minutes of the committee meeting held on 22 June 1985 contain no reference to the register. No letters were received from the BARTG membership to be included in the summer 1985 issue of *Datacom*. The minutes of the committee meeting held on 17 August 1985 contain no reference to the register. The autumn 1985 issue of *Datacom* contained a letter from G4PIP which also appeared in a number of other amateur magazines, including *Radio Communication*. If G4PIP really felt that the BARTG Committee was acting against the best interests of the BARTG membership, then surely a direct approach to the committee would have been more appropriate than sending the same letter to a number of magazines unconnected with BARTG.

This must serve to indicate how controversial the register really was; the controversy seeming only to arise at the time of the RSGB Council elections. It should also be noted that the matter was not raised by any of the membership at the BARTG agm which was held in November 1985, and that the committee endorsed its decision to support the register as the "BARTG Emergency Register" at the meeting held on 30 November 1985.

To suggest that G3GJW has actively canvassed for the register outside the BARTG membership is news to both G3GJW and myself; no evidence for this has ever been placed before the BARTG Committee. If there is evidence, it should be produced, otherwise the remark should be withdrawn.

BARTG as an organization has been in the forefront of data communications ever since its founding by a dedicated group of amateurs in 1959, and still continues to be so, with new developments such as packet radio transmission. Surely BARTG has considerably more important matters to discuss than to continue with the petty politics which, to many of us, seem to be mainly influenced by matters outside BARTG.

Alan G Hobbs, G8GOJ  
Chairman, BARTG

#### MORSE TESTS

Sir—I would like to bring to your attention a point that has not been made clear in connection with the morse test that will become the responsibility of the RSGB in April.

This is as to how disabled or housebound people will be able to take the test. Previously this problem was taken care of by a test examiner going to the homes of such people when this was needed. I am myself one of the disabled who will have difficulty if this is not done in future.

Please let us know what will happen, as there are possibly others like myself who would like this clarified as soon as possible.

D Dunn, G1GYV

*Disabled or housebound people will be catered for under the new arrangements, although final arrangements had not been made as we went to press; the Society awaits further input and clarification from the DTI. Details will be given in Radio Communication and elsewhere as soon as they are available.*

Sir—As someone who is currently struggling to attain a level of morse proficiency sufficient to pass the test, and being the father of a profoundly deaf child, I read with great interest the remarks of Pat Hawker, G3VA, under the heading "Morse and the deaf" (TT February 1986).

I do not necessarily agree that morse should

be taught in all schools for deaf children. Thank goodness my son attends a school where the emphasis is placed on lip-reading (signing is absolutely forbidden), as this will result in him being able to communicate face to face with hearing people without the need for special skills on their part.

It had always been a matter of sadness to me that my son would never be able to experience the pleasures that I derive from radio communication. However, recently he has taken an interest in my morse practice sessions and, I discovered, to my great delight, that he is as capable as I at resolving morse code, albeit at high audio output levels and the use of headphones, and that his deafness is not in itself an impediment to him also obtaining the same level of satisfaction out of the hobby, should his interest continue and develop.

I would therefore wholeheartedly agree that, where possible, any group interest in amateur radio among pupils at any school for deaf children should be actively encouraged and positively supported, not only by the school itself, but also by the National Deaf Children's Society and the RSGB. Perhaps the RSGB could take the initiative and open a dialogue with the NDCS.

C J Challinor, G1JPV

#### 144MHZ REPEATERS

Sir—I wonder if I may comment on Mr Swift's suggestion re 144MHz repeaters in your February issue. Certainly, in the Dorset/Wiltshire/Somerset border area our local 144MHz repeater ceased being an aid to mobile-to-mobile communication long ago, and when I last listened to it (over a year ago) it had taken on the role of nothing more than an anti-RSGB soapbox. With Class Bs being, for the time being anyway, denied the use of 50MHz, I expect there's mass wailing and bickering by now.

What happens, though, if the 144MHz machines were to close? There's no doubt that we want more operators on 432MHz, but one thing we don't want are the operating standards of 144MHz fm to be brought with them. You know the sort of thing—the dropping of the G from the callsign is the favourite one!

I suggest Mr Swift does the same as I've done. On my 144MHz receiver there's a control marked ON/OFF. I turned the switch to OFF 18 months ago, and that's where it will stay. The 432MHz band is the place to be: the standard of operating is excellent, repeater users actually answer strangers to the area, and—perhaps the greatest thing—one can converse at reasonable length with one's fellow operator without some spotted Herbert coming up and shouting "break—break" for no apparent reason other than the fact that he/she is probably getting bored stiff listening to the current windbag with his one-watt-to-a-Slim-Jim-in-the-loft wittering on trying to work out when he last worked you.

No, Neddie. Think sanity—think seventy! Hey, how about that for your theme for 86? You could even design car-stickers with the same message, or how about "144MHZ REPEATERS CAN DAMAGE YOUR HEALTH"?

Richard J Ware, RS32457

#### OPERATING IN AURORA

Sir—What a pleasure it was to have been able to participate on 144MHz in the auroral opening on 7-8 February. It was probably the most intense and most widespread event that I remember since that of November 1982. Sixteen countries were worked, including OE, OK and SP, with over 50 squares.

What a pity it was to have yet another good opening marred by what now appears to be an almost customary display of ill-mannered operating by some newly-licensed (and some not so newly-licensed) G, GM and GW stations who persistently responded to specifically directional "CQ DX" calls. As the event intensified I continually found myself fighting an impenetrable wall of mainland stations coming back to my "CQ DX Europe/Scandinavia" calls on cw. I eventually had to move to the ssb segment of the band where I was able to begin to work some real dx after making very much more pointed directional calls, but even on ssb the situation was only slightly better than a marginal improvement.

What on earth is the point, gentlemen, during a really good event such as this, in trying persistently to establish a contact all over the top of what may be some exceptionally choice dx, in order to return an unwanted S9 signal report to what is essentially a "local" station within the context of that event? Why not save your report for a weaker phase or weaker event when it may actually be helpful and welcome? I find myself left wondering (as usual) just how far I really could have worked on cw when, as in this instance, my ssb signals were S9 into SP and S7 into OK.

Our Continental friends have a lesson for us here. It has been my experience that on the odd occasion that mainland stations can be persuaded not to call, most Continental stations are reasonably well behaved and will shut up (not to make too fine a point) until called by square or country, thus making the best of the event.

I realize that this problem is an old chestnut, well roasted in the fires of time by now, but even in my limited time chasing dx on 144MHz I can see a steady decline in both operating standards and manners, particularly during openings. If we don't reverse this trend soon, it won't be worthwhile switching on the rig to come on the band.

I also realize that GI is a new country for some mainland stations, but we are always up here if you would only turn your beams. It is surprising how often east and southeast coast squares can be worked from Belfast with just a little enhancement in the band and just a little perseverance (of the proper kind). If you really need to work GI then G4OMK and G6ATZ are QRV most weekends for any tropo skeds, both are QRO and QTHR (see please). Failing that, try G4VIP/P May and September 144MHz contests when we will be delighted to make the contact (giving the WAB if you require) and I can guarantee a QSL card.

Meanwhile, gentlemen, I look forward to a hard-won tropo contact with you on a flat or slightly enhanced band, but when the next really good opening occurs with some real dx around, forgive me when I don't and won't take up your response to my "CQ DX" calls, giving you a very "cold shoulder".

Philip Murphy, G4OMK

PS. When we are fortunate enough to have a good opening I do try to remember to make the occasional call for QRP stations or those still needing GI, but my enthusiasm to make such calls is usually inversely proportional to the QRM level.

*G4OMK was an extremely strong signal in London, and presumably a good auroral opening is the only way in which stations with poor sites to the north and northwest can work Scotland; and Northern Ireland; there is always a conflict under these circumstances. Perhaps it would be a good idea if all vhf and uhf dx stations set aside 5min every half-hour to work the "locals".*

#### PARCELS BY POST

Sir—As a rider to G4WAL's letter headed "Post Office Parcels" in your February issue, I think it would be useful to add that the PO's Datapost service offers the same kind of security and special handling as Securicor at a very competitive price. A big "plus" is automatic compensation cover up to £5,000 (not £50 as per Securicor). I have used this service to send a big hf linear to an address at the other end of the country. Posted at 5pm it arrived at its destination at 9.30am next day safe and sound.

Contact your local PO or dial Freephone Datapost for details.

Dave Richardson, G4GED

Sir—With reference to the letter from Pete Walton, G4WAL, I too, am bemused. My advice to any member who needs to have insurance cover for his equipment in transit for servicing, or who may take it to a rally etc, is to take out a policy with the Amateur Radio Insurance Scheme. My annual premium is only £15 for £3,000 of equipment. May I state that I have no connection with ARIS, just a satisfied customer with peace of mind.

D R Wilde, G3EBA



## QRP

Sir—For many years I have been a keen dxer, and still enjoy working the rare ones, but at the same time I get a kick out of digging in the noise to work a weak station running low power and a simple antenna. I know the satisfaction it gives, as I started with just such equipment. Now I have a beam and linear, and the dx comes much more easily.

However, I believe the majority of self-confessed QRPers are a nuisance. They tune the band for a strong station, believing that it will have a beam and good receiving system and more likely to hear their weak signals. When contact is established they start to rag chew oblivious of the fact that the bloke on the receiving end has headphones on, the gain is turned up and he is struggling to copy them. If I switch the linear off and drop my power to 60W they come back with "please put the linear back on, I can't hear you", or "sorry, you're down in the noise and I can't read you", or they don't come back at all. If they can't hear 60W, how do they expect me to hear 10W or less?

F J Hall G3NSY

Would any of the QRP fraternity care to comment?

## EXPENSIVE SPARES

Sir—Mr Ussher's letter in your February issue prompts me to write on the same subject. I needed a replacement mic gain/cw drive control for my recently-acquired secondhand HW101. The control is a dual potentiometer with a common drive spindle, the only unusual feature being that the two tracks were of differing resistance values, ie 10kΩ and 1MΩ.

A quotation was received from Heath Kit UK, and the price of a new control was £13.85 plus post and VAT—in all, nearly £17! Needless to say, I didn't pay this price, but made up a potentiometer from two dual-gang potentiometers obtained from Maplin for £1.49 each.

At these sort of jacked-up prices, I dread to think of what, for example, a bandswitch would cost for this rig. How can these prices be justified?

The lesson to be learned is this: before parting with your hard-earned cash—think hard . . . it will pay you to!

K R Hepke, G4NJB

## 50MHz ALLOCATION

Sir—It seems to be most unfortunate that my renewal subscription to the RSGB falls due in February of each year with the claim written on the slip that "a number of enhancements have been made to both the A and B licence".

Last year I wrote concerning the introduction of the Maidenhead locator system, most suited in my opinion to the A licensee and the hf bands. As a fairly dedicated vhf ssb amateur, my experience during this year has unfortunately tended to support this view, but I have to accept that I am only a B licensee and as such must be an inexperienced ex-cb operator incapable of expressing opinion of any note.

In fact I passed the RAE in 1966 and have spent 20 years deeply involved in amateur radio and electronics. The latter has included much constructional work; many years of listening on both hf and vhf bands, and even learning the morse code to a level which allows me to copy something like 10wpm. But I have made the conscious and deliberate decision that the impersonal nature of morse communication is not a mode which I wish to pursue (a sentiment with which a rather large number of A licensees would appear to agree, judging by the extent to which ssb is used on the hf bands). I am neither a professional nor an expert, but at the risk of being accused of arrogance I am claiming that in common with many others in a similar situation, even though only a B-licensee, I am an experienced radio amateur capable of constructing and operating my equipment with a fairly high level of competence.

The bitterness which you will detect arises this year as a consequence of the method of allocation of the new 50MHz band. I fully appreciate the necessity for the restrictions imposed by the DTI on the 50MHz allocation as outlined in *Rad Com* January 1986, but I would question some of the reasoning, or the implications of that reasoning, as given in the article "The 50MHz band—some questions

answered by the DTI" on page 22 of that issue. The section "Will the restrictions remain?" states:

"The . . . (RSGB) wanted Class B licensees to have access to the band, and this point was fully considered. However, there is a need to minimize potential interference to the services of other administrations. At the outset, therefore, the Department has decided to limit the numbers of radio amateurs using the new band."

There is obviously a need to minimize potential interference, and the limitation of numbers would seem a logical conclusion on this point—but why was there the apparently unquestioned assumption that in order to achieve this limitation on numbers it should be the Class B licensee who has to be sacrificed? Could not the statement have equally read "The . . . (RSGB) wanted Class A licensees to have access to the band . . . etc." with the conclusion that initially the allocation would only go to the B licensees?—There are various possible answers to this question, but I would just like to consider four:

(1) Class B licensees are not capable of ensuring that they "minimize potential interference" ie they have an inferior technical ability compared to the A licensee. It also follows that the ability to send and receive morse at a speed of 12wpm gives one this ability!

(2) If the allocation was only given to the Class B licensee it would not be possible to monitor the success of cw on the new band.

(3) The possibility of the introduction of a European licensing system which will limit all B licensees to frequencies above 144MHz makes allocation of the 50MHz band to A licensees inevitable, and so there would be little point in giving it to the former now only to remove it later.

(4) The DTI and the RSGB believe that they exist to serve the Class A licensee first, and only after their needs have been satisfied will they consider the B licensee.

In terms of the first suggested reason, I imagine that all amateurs would acknowledge that, when first qualified, experience is usually at a minimum and the necessary technical expertise may be lacking. However, this does not just apply to the B licensee—it can be equally true for Class A. I know of many ex-cb operators who have passed the RAE and morse test at virtually the same time. The mere possession of a Class A licence obviously cannot be taken to imply a high level of technical competence—both the DTI and the RSGB must be well aware of this situation, and so, although "experience" is a valid factor in the reasoning, it cannot be the whole answer.

The second suggestion would seem more reasonable. Morse telegraphy is a valid form of communication with different properties, and to fail to evaluate this mode would be an error. (As an aside, it was disappointing to see that the RSGB 50MHz station GB3RS used only J3E over the first five days of operation—RSGB *News Bulletin* March.) Nevertheless, perhaps the Class B licensee will have to accept that the need for cw had to be met.

The almost casual suggestion regarding the adoption of a European licence (January, *Rad Com* p20) is even more sinister and depressing. If this was a reason for the method of allocation for 50MHz, then why is there so much reference to the review and possible extension of allocation to Class B after the trial period of one year? Is the issue of this European licence (of which I had not previously heard) going to be openly discussed, or will it become another Maidenhead case. Surely the RSGB will be consulting all of the radio amateurs which they claim to represent on such an important issue.

The fourth suggested reason is in the category of the "sour grapes" brigade—a group to which I did not think I belonged, but a group which is very evident from reading the amateur radio press—and, as such, a growing group! I do not believe and do not want to believe that my fourth suggestion is the real reason for the Class A allocation but I can understand why so many amateurs are beginning to think that this is the real thinking behind RSGB policy. I say that I do not wish to believe the latter since I am convinced that as

a group we must maintain the RSGB as a national body representing the interests of all radio amateurs if we are to resist the inevitable pressures in the coming years.

So where does this get us in terms of the 50MHz allocation? As far as the introduction of a European licence is concerned I have no answer, except perhaps to ask why the RSGB has allowed the ability to send and receive morse code at a speed of 12wpm to become rather like a "sacred cow" dividing radio amateurs into the "haves" and "have-nots" regardless of experience and technical competence? Surely a test of the latter would be more appropriate.

I can see and accept the desire for (a) a limitation on numbers, (b) the need for an element of experience in the amateurs involved, and (c) a case for including cw during the trial period. However, does this mean that the only solution open to the RSGB was the divisive action of an allocation to A licensees to the exclusion of Class B? I think not. Would it not have been possible to make the allocation on the basis of call signs which give a fairly clear indication of experience? If some such system had been proposed, then both A and B licensees could have been included, numbers could have been limited, all modes would be involved, and the RSGB could truly say that they represent all radio amateurs.

Did the RSGB make any such proposals to the DTI or is the "sour-grapes" brigade right after all?

A F Butcher, G8ZFL

*The Society can only reiterate that, while accepting the DTI's case for limiting activity at 50MHz, it did not accept that making the allocation available to Class A licensees only was the best solution. There was no question of this being an " . . . apparently unquestioned assumption" on the Society's part. The Society put forward several proposals for limiting the number of amateurs operating at 50MHz, but the DTI rejected them in favour of a simple split between Class A and Class B licensees on the grounds that this was administratively the easiest solution.*

*It is worth pointing out that the Class B licence would not exist at all had the Society not pressed for its introduction many years ago. To be positive; what has been agreed is that the DTI will review the position of Class B licensees after 12 months' operation. The Society remains optimistic that, following the review, Class B licensees will be able to use the 50MHz allocation. Most important of all is the fact that the Society must applaud the DTI for its stance in allowing the 50MHz experiment to continue against the wishes of neighbouring countries.*

## "A DX TRAILER"

Sir—In reply to Mr R Wallis, RS86700, ("Mailbag" April 1986), I would like to point out to Mr Wallis and anyone else concerned that I went to the Automobile Association and was given their leaflet L46 "The Law About Trailers". I suggest that anyone intending to build a trailer, obtains these rules and regulations.

As far as my own trailer is concerned, I took it to the local police station when it was completed and asked if anything more needed to be done . . . the answer was NO.

D A Reid, GM0BZF

## "FRUSTRATIONS" FEEDBACK

Sir—With reference to the letter from GM4ALA in your March issue, I would like to point out one or two misconceptions and inaccuracies.

1. The 6dB height gain for doubling the height of an antenna only strictly applies for vhf line-of-sight signals and not to round-the-world contacts via the ionosphere. (Height is important for long-distance contacts to get the low-angle radiation which is necessary, and the gain can be much greater or smaller than the 12dB quoted. Low angle radiation can also be achieved with verticals.)

2. Adding up the gains quoted by GM4ALA in my book comes to 45dB or about 7.5 S-points (ie 12dB for height + 20dB for antennas + 13dB for power) and not 55dB.

3. If GM4ALA is receiving a 50μV signal from one of his modest fraternity he will not be



swamped by a fortieth-of-a-volt signal, as that is the strength of signal received only by another super station and that would mean that the super station would be receiving an S9 + 30dB report.

Using GM4ALA's own figures, he can regain 29dB of this gain on receive by working one of the super stations, leaving him only a deficit of 16dB or less than three S-points. If the super stations are giving one another S9 then he should be receiving an S6/7 signal. When he transmits with 100W he will be a further 13dB down, so he is likely to receive only an S4 report. This is the crux of the problem. With such a modest station—a dipole at 30ft and only a quarter of legal output—he cannot expect to work around the world with ease at the bottom of a sunspot cycle. Perhaps I could suggest that he works cw for his dx, where he is more likely to be on more even terms with the other stations. Finally, getting everything absolutely correct is the only real answer.

A M Mills, GW3NNF

Sir—I can partly sympathize with GM4ALA at not getting out into the wide world of dxing, with his 100W p.e.p. and single dipole at 30ft, but I think he could do better than grit his teeth with frustration, and call "CQ" into the white noise. I suggest he tries some experiments with his antenna. The *Radio Amateur Antenna Handbook* is a good basis for experimentation, is well illustrated, and a mine of information.

I have had an "A" licence for five months, and with my TS530SP plus  $\lambda/2$  dipole with director (the VO1KE wire beam) I have had good contact with USA, Italy and Germany. My antenna is in the roof of our bungalow, and as it is for 14MHz the end 6in has to be bent. The output from my transceiver is 100W and I use an atu and a home-made balun (as per the antenna book). There is no tv. My main interest is experimenting with fairly simple wire loft antennas, and my next project is to try two  $\lambda/2$  75m wire antennas in parallel, as 21MHz is not as crowded as 14MHz and is quite capable of worldwide transmissions.

I have previously spent two years on 144MHz ("B" licence) and have built several antennas, mainly ZL-Specials, which worked very well from reports received, but I have had my disappointments, which is all part of the game. I think the secret is to build your antenna exactly as per the design, use good coaxial cable (I use UR67) and make sure all joints are well soldered.

Ironically, I have never contacted a "GM" station, so I will now grit my teeth, and get on with my antenna experiments in the true spirit of amateur radio.

A Rawlins, G0DIF

#### THE TRIO SAGA CONTINUES

Sir—I read the two letters by G1OLA and G3XHK in your March issue with great interest. Being involved in the retail trade, I know the position from "both sides of the counter", and I feel compelled to write on this topic.

As a retailer, I know that you have two main aims: to make a profit, and to please the customers as best as is humanly possible. (This second one is very difficult at times, due to some people never being satisfied.) However, for Lowe Electronics and the other Trio agents to take the petty view that they are of Kenwood equipment makes me furious.

These radios are all built in the same factory, on the same production line, so how can they refuse to service Kenwood equipment? (Also, why did Lowe sell me a pair of Kenwood headphones, and not Trio?)

If Lowe were to sell at the same price as the Kenwood dealers, then I could accept this, but for them to charge "X" per cent more for Trio equipment is just plain greedy. The equipment is no better, and no worse than Kenwood, so how can they possibly do this? You can try to make too much profit, you know!

I cannot see that the import prices of Kenwood and Trio are any different, so someone is making a hell of a lot of money somewhere.

As for Kenwood being a trade-mark of Thorn-EMI, then what about "Omega"? In this country you can buy watches, suitcases and light bulbs all called Omega. Surely these aren't built in

the same hi-tec, spotlessly-clean factory that knock out the watches?

Also, look at the prices charged for postage: £7 on all rigs; if I was buying a £400-£500 radio I would not pay any more for postage. During the last two months I have bought an Icom IC490E from Thanet, and a Yaesu FT203R from Ammcom, and have not been charged postage (both come Securicor).

While on the subject of Yaesu, why is it that my FT203R cost £175 from Ammcom, but all the other Yaesu dealers were charging £195 for the same thing? Another big killing, eh?

Finally, I would like to thank both Ammcom and Thanet for their very quick and courteous service, the best that I have ever come across; and I would say the same about the quality of the Icom equipment, both the radio and the accessories.

It is a great pity that Yaesu cannot supply mobile mounting brackets with their mobile radios; Icom supply them, but not only that, they are so strong that you could hang a double-decker bus from them!

M F Newell, G1HGD

Sir—In August 1982 I purchased a TS530S transceiver from one of Lowe's authorized dealers at the full list price. About a year later I read in *Radio Communication* that Lowe only sells Trio equipment, and now find that they will only service Trio equipment.

Could I make it clear to Lowe Electronics Ltd and to your readers that the badge on the front panel of my rig says KENWOOD TS530S! Does it get a passport or is it an illegal immigrant?

K R Robson, G3VTY

*How many readers spotted that the Trio TS930S reviewed in the May issue had "Trio" on the front and "Kenwood" on the back?—Ed.*

#### THANKS, KW

Sir—Some time ago I needed a circuit diagram of a TEN-TEC transceiver, and I was unable to obtain one. I wrote to KW Electronics and asked if they could help me. They replied that they knew nothing of the transceiver, but that they would ask TEN-TEC USA.

I have now received full circuits and instructions from TEN-TEC via KW, and I find it very refreshing in this day and age of greed and selfishness that this company went out of its way to help me without asking for any charge or favour and standing to gain nothing except my heartfelt gratitude.

I wonder what interest Japanese companies would show if asked for help concerning a rig obsolete for 16 years!

My warmest thanks to G3HOH of KW Electronics for his great help.

C Loftus, G4VGE

#### RFI

Sir—"If you can't hear 'em you can't work 'em" has been an amateur radio maxim for many years, usually trotted out to support the need for a good antenna system, but today it seems to be taking on rather more serious significance. I don't know whether my QTH is typical of others, but compared with only a few years ago I am finding it increasingly difficult to hear anything on any amateur band at certain times of the day—and it's nothing to do with either my receivers or my ears!

While not exactly in a city environment, neither do I live in splendid isolation, having several hundred houses within a quarter-mile radius, and, being on fairly high ground, quite a number of non-amateur radio transmitters, some only a few hundred metres away. I am assured by their respective owners that all these transmitters are operating well within their technical specifications, and yet I find spurious radiation from almost all of them occupying some part of one or more amateur bands. One notorious Home Office transmitter operating 24h/day just outside the 144MHz band prevents me attempting any Oscar work at all, wiping out everything above 145-900MHz for me; it is located over five miles away! A British Telecom radiopager on 153MHz puts up squiggles all over 144MHz, and so on. . . .

It is not only transmitters that cause problems. Poor thermostats and the like have been with us for a long time, but now there

seem to be far more. The other day I counted 12 different patterns of wideband noise interference apparently due to this sort of thing. One of them produced S9 noise at all frequencies from 100kHz up to 144MHz and beyond, and stayed on for several minutes at a time, repeating every few minutes. And of course we all know about computer radiation. The latest addition to this cacophony, of all things, has been a British Telecom telephone exchange, which over a distance of several hundred metres is radiating data-modulated carriers at every multiple of 50kHz up to 200MHz or more. Overhead telephone lines make lovely antennas! One would have thought that a responsible body like BT would have thought of this at the design stage, but it seems not. Perhaps they don't have any amateurs on their staff!

Since neither good antennas nor good receivers can do anything about any of this, the effect is to increasingly quickly force me off the air as fewer and fewer bands are left that I can use, and I wonder how many other amateurs are affected in this way?

Much of this has come about simply because no-one has seriously considered the rfi problem in the design stage of much electronic and electrical apparatus. The cure of many of the wideband hash problems is quite simple once the offender is located, but that can take a great deal of time and effort, and when new ones seem to appear every week it becomes simply impossible to sort them all out. Many of the transmitter-induced problems could be eliminated simply by being more careful over siting. It is astonishing that although planning constraints on visual amenity are quite strict, there is absolutely no control whatsoever on spectrum pollution caused by siting transmitters too close to habitation. Maybe one of the environmental groups would like to take up this one!

To me, this all seems to be rapidly gaining ground as the single biggest problem to face amateur radio since vhf tv, and I would certainly like to see the RSGB become very much more active in setting standards. We are just as entitled to our enjoyment of one of Nature's gifts as others are to use it for setting up so-called public services which, on analysis, are used much of the time for entirely frivolous purposes. It would be a great pity if in another 20 or 30 years' time the only way we could enjoy our hobby would be to take off into the wilderness for the odd weekend or two every year!

Walter F Blanchard, FRIN, G3JKV

*The headquarters station GB3RS is virtually unusable on 50MHz during the day because of noise problems, most of which originate on the local industrial estate. The "Ambassador" saga suggests that BT pays no attention whatsoever to rfi matters at the design stage, but no doubt there are many other offenders. The Society continues to do what it can to improve the situation, and was largely instrumental in solving the "Ambassador" problems and also the Milton Keynes cable tv difficulty.*

*Incidentally, does anyone know why interference from domestic thermostats seems to peak in the 50MHz band? Feedback from members suggests that 50MHz suffers from more QRN in more varieties than any other amateur allocation.*

#### SPOOFED!

Sir—Further to my spoof letter in the April issue, I received a letter from a ham in the south of the UK, a medical man, no less.

In kindly terms, suitable for one who never got further than Form IVD parallel in the local comprehensive, he explained to me that Eddy & Co were not chaps at all but technical terms! He even gave me the derivations!

Maybe we had better be serious in *Radio Communication* from now on.

Fred Ness, G03ESV

#### HOW DO YOU SAY?

Sir—Could any of your readers tell me how to send in Russian cw the following:

"Your transmission is at least . . . . kHz wide, suggest you go back to the drawing board".

Frank Armstrong, G3CNM

# A SINGLE-STAGE LINEAR AMPLIFIER FOR 50MHz

JOHN MATTHEWS, G3WZT\*

## INTRODUCTION

Since the allocation of 50MHz in the UK, activity and interest in this fascinating band has increased, and it is obvious from working on the band that many stations have realized that a four- or five-element Yagi is larger than anticipated, and have had to resort to a rotatable dipole. Although there is no substitute for large antenna arrays, the simple dipole can, and will, provide good performance while remaining unobtrusive. Due to its wide horizontal and vertical radiation pattern, it has also proven to be a very effective antenna for meteor scatter working.

So why all the preamble about antennas when this article is about amplifiers?

50MHz is our only allocation which is limited by *erp*. When using *ssb* the limitation is 20dBW *p.e.p* or 100W *p.e.p* *erp*. When using a dipole antenna the limit is 100W *p.e.p* at the antenna feedpoint.

The purpose of this article is to describe the design and construction of a single-stage transistor amplifier for the 50MHz band. The gain of the amplifier is approximately 12dB, and the quoted output of 100W *p.e.p* will be obtained with 6-7W of drive, which is within the capability of nearly all commercially-manufactured transceivers and transverters. Although the design is for use on 50MHz, it is hoped that the general design philosophy presented will encourage others to design and build simple, single-stage amplifiers for other frequencies using readily-available manufacturers' data.

There are many differing solutions which may be used to match transistors to their input/output sources and loads. The approach has been deliberately kept as simple as possible, which allows all matching component values to be realized using a simple pocket calculator.

Amplifier input and output are designed for 50Ω termination, and the unit contains built-in coaxial changeover relays. Transmit and receive signals are directly fed through when the amplifier is switched off. Power supply requirements are 48V at approximately 5A.

## OBJECTIVES

Although I am a self-confessed valve man where high-power linear amplifiers are concerned, certain aspects favour the use of transistors in medium-power linear amplifiers. An equivalent valve amplifier would need to use the QOV-0750 family with the increased complexity of multiple voltage power supplies. For the constructor with a junk box brimming over with valves, bases and high voltage transformers, the question of cost does not arise, but for those who need to purchase these components, prices may be a little higher than expected!

The BLW96 used in this design is capable of excellent linearity at the quoted output power, and is ideally suited for operation at 50MHz.

## POWER SUPPLY CONSIDERATIONS

Why 48V? Historically, 13.8V devices have been used for mobile installations. There are few power transistors capable of delivering 100W output from a 13.8V supply with good linearity. Some 28V devices exist which will give the required power, but if it is decided to move away from



G3WZT is a development engineer in the communications division of MEL, and has been licensed since 1967. During the past 18 years he has been active at some time on all bands 1.8 to 1,296MHz, his main interest being 50, 144 and 432MHz, with a strong bias towards 144MHz dx. He was chairman for three years of the Horsham ARC. His other main interest is gliding.

the 13.8V convention, then it is far better to use 48V. It is far easier to construct a power unit supplying 48V at 5A than one for 13.8V at 18A.

Details of a suitable 48V regulated *psu* which provides foldback current limiting, short-circuit shutdown and over-voltage protection are given later.

## AMPLIFIER DESIGN

### Input matching

The input matching consists of two T-networks which match the required drive impedance of 50Ω to the complex input impedance of the BLW96. T-networks are used in preference to the more simple L arrangement, as there is no control of the working Q when using the latter. As the Q of an L network increases with the ratio of transformed impedances, high circuit Qs can exist. This makes adjustment very critical and temperature sensitive and also causes unwanted narrow bandwidth and high circulating rf currents. Inspection of the manufacturer's data for the BLW96 shows an input impedance of  $0.37 + j0.15\Omega$  (equivalent series components) at 50MHz. The reactive part of the input is very small (0.47nH) and in this instance may be ignored. However, other devices may have a much higher reactive component in the input impedance, and for this reason it will be taken into account as part of the input matching network in order to demonstrate the method.

To start the design, it is first necessary to decide the intermediate resistance between the two T-match sections (see Fig 2). Assuming both sections have the same Q, the intermediate resistance is the geometric mean value of source and load resistance  $R_1$  and  $R_2'$ . Therefore, intermediate resistance ( $R_1$ ) =  $\sqrt{0.37 \times 50} = 4.3\Omega$ . Working from the base, the first T-match section transforms from 0.37Ω to 4.3Ω, and the second section from 4.3Ω to the design source impedance of 50Ω.

The next requirement is to define the working Q of the sections. If too low a value is selected, component values become impractical; too high a value leads to the unwanted problems described earlier. The minimum working Q for given values of  $R_1$  and  $R_2'$ , is when  $R_1(Q^2 + 1)/R_2$  is greater than 1. If variables are selected which give a value less than 1, the value of A cannot be solved. In order to satisfy this requirement, and avoid high Q values for the reasons described earlier, a Q of 4 in both sections is used for this design.

Referring to Fig 1, the following formulas are applied to obtain the values for XL, XC1 and XC2.

$$XL = QR_1 \quad \dots \dots \dots (1)$$

$$XC2 = AR_2 \quad \dots \dots \dots (2)$$

$$XC1 = B/Q - A \quad \dots \dots \dots (3)$$

$$\text{Where } A = (B/R_2 - 1)^{0.5} \quad \dots \dots \dots (4)$$

$$B = R_1(Q^2 + 1) \quad \dots \dots \dots (5)$$

Inserting values into the formulas gives the following values:

From (5) . . . .  $B = 0.37(4^2 + 1)$ . Therefore  $B = 6.29$ .

From (4) . . . .  $A = (6.29/4.3 - 1)^{0.5}$ . Therefore  $A = 0.68$ .

From (3) . . . .  $XC1 = 6.29/4 - 0.68$ . Therefore  $XC1' = 1.89\Omega$ .

From (2) . . . .  $XC2 = 0.68 \times 4.3$ . Therefore  $XC2' = 2.92\Omega$ .

From (1) . . . .  $XL1 = 4 \times 0.37$ . Therefore  $XL1' = 1.48\Omega$ .

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



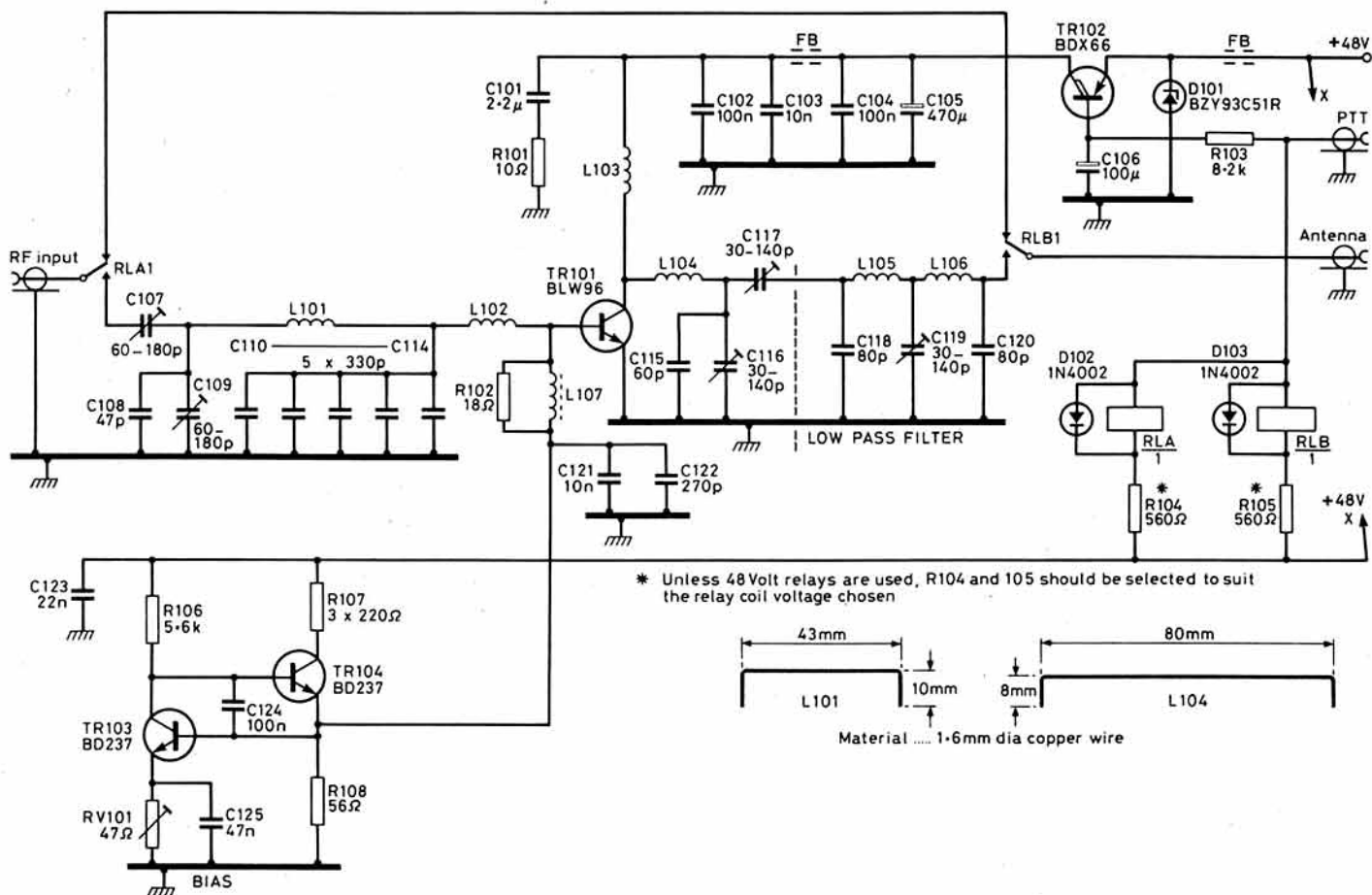


Fig 1. Circuit diagram of the amplifier

To calculate the component values:

$$C = 1/2\pi f XC \quad \dots \dots \dots (6)$$

$$L = XL/2\pi f \quad \dots \dots \dots (7)$$

$$\text{Therefore } C1 = 1/2\pi \times 50 \times 10^6 \times 1.89 = 1,684\text{pF}$$

$$\text{and } C2 = 1/2\pi \times 50 \times 10^6 \times 2.92 = 1,090\text{pF}$$

$$L1 = 1.48/2\pi \times 50 \times 10^6 = 4.71\text{nH}$$

The final configuration and values for the first matching section are shown in Fig 3(a). Although in this case the inductive reactance of the transistor input is insignificant from a practical point of view, it will be subtracted from the value of L1 in order to keep the example correct. The value of L1 then becomes  $4.7 - 0.47 = 4.23\text{nH}$  ( $XL1 = 1.48 - 0.15\Omega$ ). The second matching section, transforming the intermediate value of  $4.3\Omega$  up to the required driving impedance of  $50\Omega$ , is obtained in the same way.

A working Q of 4 is used again. Refer to Fig 2.

$$\text{From (5) } \dots B = 4.3(4^2 + 1). \text{ Therefore } B = 73.1.$$

$$\text{From (4) } \dots A = (73.1/50 - 1)^{0.5}. \text{ Therefore } A = 0.68.$$

$$\text{From (3) } \dots XC1' = 73.1/4 = 0.68. \text{ Therefore } XC1' = 22\Omega.$$

$$\text{From (2) } \dots XC2' = 0.68 \times 50. \text{ Therefore } XC2' = 34\Omega.$$

$$\text{From (1) } \dots XL1' = 4 \times 4.3. \text{ Therefore } XL1' = 17.2\Omega.$$

$$\text{From (6) } \dots C1' = 1/2\pi \times 50 \times 10^6 \times 22. \text{ Therefore } C1' = 145\text{pF}.$$

$$C2' = 1/2\pi \times 50 \times 10^6 \times 34. \text{ Therefore } C2' = 94\text{pF}.$$

$$\text{From (7) } \dots L1' = 17.2/2\pi \times 50 \times 10^6. \text{ Therefore } L1' = 55\text{nH}.$$

The circuit configuration, with values, is shown in Fig 3b. In practice the series components C2 and L1' are combined into one component. The capacitive reactance value ( $2.92\Omega$ ) is subtracted from the value of inductive reactance ( $17.2\Omega$ ). This leaves an effective inductive reactance of  $14.28\Omega$ ,

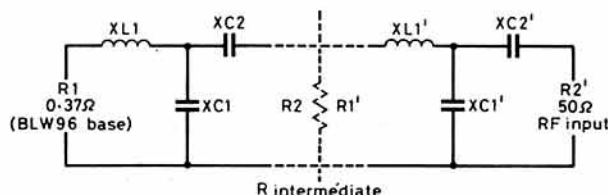


Fig 2. Input matching arrangement

which represent a value of  $45.5\text{nH}$ . The values shown in the circuit diagram represent this effective inductance. The calculated values tend to be rather impractical, of course, and far from standard value components. Where practical, mica compression trimmers are used based on the calculated component values.

### Output matching circuit

Before work on the output matching is started, it will be necessary to determine the output impedance of the BLW96. This may be done in two ways. The first, by taking the values directly from the manufacturer's data sheets (only valid for a specific power level); or second, if these are not available, by means of a simple calculation.

Most data sheets include a simple graph of resistance and reactance plotted against frequency for a given output power. For the BLW96 at 50MHz the equivalent series load impedance is  $4 + j3\Omega$ . Unfortunately this value is quoted at the wrong power level for this design. It should be made clear that these values are the complex conjugate of the transistor load impedance and represent the *load* required to match the device correctly. In this particular case, the transistor is represented by a  $4\Omega$  resistor in a series with a  $1,060\text{pF}$  capacitor. If a full data sheet is not available or, as in this

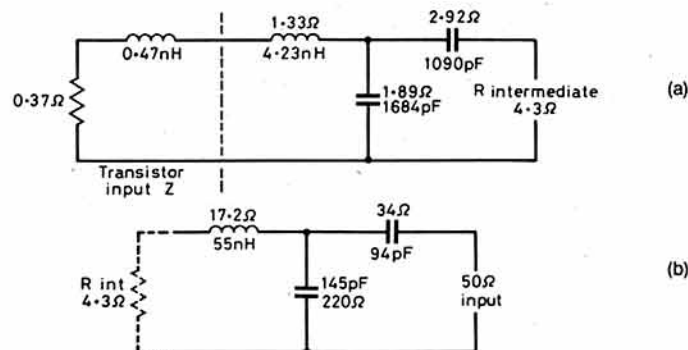


Fig 3. (a) First T-match section (input). (b) Second T-match section (input)

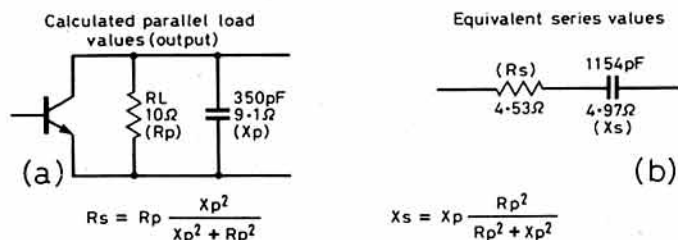


Fig 4. Output load conversions. (a) Calculated parallel load values. (b) Equivalent series values

example, values are quoted at the wrong power level, a close approximation may be made by using the following formula in conjunction with the output capacitance.

$$R_L = (V_{cc} - V_{sat})^2 / 2 \times P_{out}$$

Based on a saturation voltage of 2V, and a power output of 100W p.e.p., the value of \$R\_L\$ is:

$$(48 - 2)^2 / 2 \times 100. \text{ Therefore } R_L = 10.58\Omega.$$

The collector capacitance against voltage will normally be shown in the form of a graph, or published in tabular form.

As large changes in capacitance occur over the range of collector voltages, a general rule of thumb is to take the value shown at 50 per cent of the supply. In this case, \$C\_c\$ amounts to 350pF (\$X\_c = 9\Omega\$) at a \$V\_{cb}\$ of 25V. This value is in parallel with the load resistance of 10Ω previously calculated.

For ease of matching, and to enable a comparison to be made with the published figures, the parallel circuit must be converted into an equivalent series circuit. The conversion formulas with the calculated values are shown in Fig 4. It will be seen that these figures differ slightly from the values in the data sheet as the calculation was carried out at a different power level. A good degree of accuracy is obtained if no other data is available at a specific power level.

Now that the required collector load impedance is defined, the output matching circuit can be designed to match from 4.5-j5Ω to the required output of 50Ω. Unlike the input matching, only one T-match section will be required as the impedance step up ratio is lower.

Referring back to equations (1)-(5), and using a Q of 4:

$$B = 4.5(4^2 + 1). \text{ Therefore } B = 76.5.$$

$$\text{From (5) } \dots A = (76.5/50 - 1)^{0.5}. \text{ Therefore } A = 0.728.$$

$$\text{From (1) } \dots X_L = 4 \times 4.5. \text{ Therefore } X_L = 18\Omega.$$

$$\text{From (2) } \dots X_{C2} = 0.728 \times 50. \text{ Therefore } X_{C2} = 36.4\Omega.$$

$$\text{From (3) } \dots X_{C1} = 76.5/4 - 0.728. \text{ Therefore } X_{C1} = 23.38\Omega.$$

$$\text{From (6) } \dots C_1 = 1/2\pi \times 50 \times 10^6 \times 23.38. \text{ Therefore } C_1 = 136\text{pF}.$$

$$\text{From (6) } \dots C_2 = 1/2\pi \times 50 \times 10^6 \times 36.4. \text{ Therefore } C_2 = 87.4\text{pF}.$$

$$\text{From (7) } \dots L = 18/2\pi \times 50 \times 10^6. \text{ Therefore } L = 57.3\text{nH}.$$

The final matching circuit values are shown in Fig 5. An additional 5Ω must be included in the value of \$X\_L\$, making a total of 23Ω. This additional reactance, being opposite sign, cancels the capacitive reactance part of the transistor output impedance (-j5Ω). Both the 16nH and 57nH inductors are combined into a single component.

## Bias

As this amplifier is required for linear service, a temperature compensated adjustable bias supply is required. It is important to ensure that the output impedance of the biasing circuitry is low enough to supply adequate base current at any power level within the design ratings of the amplifier. The zero signal quiescent current is set at 100mA.

Two BD237 transistors are used in the bias supply; these are TO126 plastic types which are mounted onto the heatsink. Although the temperature compensation sensing transistor (TR103) is dissipating only a small amount of power, a power transistor must be used as a low \$V\_{be}\$ is required to enable adequate range of bias adjustment.

The bias arrangement used is based on circuits published in the Mullard technical handbook on rf devices. It has proved successful in past amplifier projects, and provides good compensation over a wide range of temperatures. Adjustable bias is fed via L107 to the base of the BLW96. RV101 is adjusted for a quiescent collector current of 100mA.

## DC supply and switching

Due to the very high available gain of most hf/vhf transistors at low frequencies (the BLW96 has 30dB gain at 1MHz), it is important to provide adequate supply decoupling, from hf to vhf. C201 to C205 provide this in conjunction with a ferrite suppression bead. Supply for the power amplifier is fed via the rfc L103. The value of L103 is not critical but should present a high impedance relative to the output impedance of the power amplifier

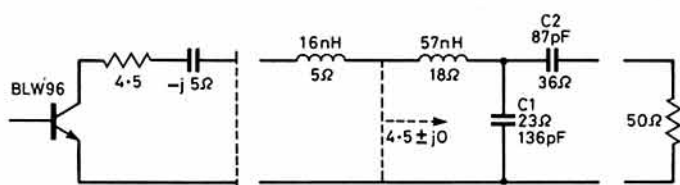


Fig 5. Output matching with values

transistor. If made too high, unwanted resonances can occur, and if too low, gain reduction will be evident. A good approximation is to use an inductive reactance of 15 to 25 times the collector impedance.

In this example, the BLW96 represents 4Ω at the collector. A reactance of 100Ω at 50MHz gives a value of 0.3μH for L103. During receive, supply voltage for the amplifier is removed by the series Darlington switch TR202. When the ptt line is grounded, TR202 switches on, C206 and R204 providing a short time delay (about 40ms) for the amplifier collector supply, which allows time for the coaxial relays to operate before rf power is applied to them. Any pnp Darlington device capable of switching the required voltage and current may be used for TR202, or one may be made up from two discrete devices if preferred.

## Lowpass filter

Output from the amplifier is fed via a five-pole Tchebyscheff lowpass filter with a 3dB cut-off frequency of 60MHz. Input and output impedances are 50Ω. The inclusion of this filter reduces the second harmonic content at the output to better than -50dB, and the third, better than -55dB. It is not the intention of this article to venture into the design of filters, as many books are written on this subject alone! Values for the lpf included in this design were taken from normalized tables which may be found in references [1] and [2]. The normalized values with the appropriate formulas are shown in Fig 5.

## Inductance formulas

Having calculated various inductance values in the design of matching sections and filters, the problem then arises of converting the theoretical values into physical inductors. For low values such as those used in the input and output matching, straight wire inductors were chosen. In order to calculate the inductance of a straight wire the following formula is used:

$$L = 0.002 l (\log_e 4l/d - 1)$$

Where: L = Inductance in microhenries

l = Length of wire in centimetres

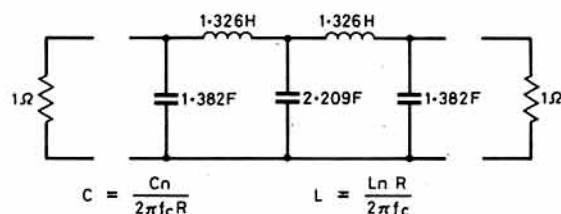
d = Diameter of wire in centimetres

It must be emphasised that the value of l used is not exact, and does vary according to the frequency. To be precise, a skin effect correction factor should be included. However, at vhf this effect is catered for by using the value shown. Additional information which includes tables for skin effect correction factors may be found in reference [3].

For conventionally-wound inductors, tables are the quickest and most convenient means of determining dimensions. Excellent design charts for vhf inductors may be found in the RSGB publication, *Radio Data Reference Book*, 5th edn, pp46-7. A wide range of coil diameters and wire gauges are included, and accurate results are obtained when coils are wound as specified.

## Amplifier construction

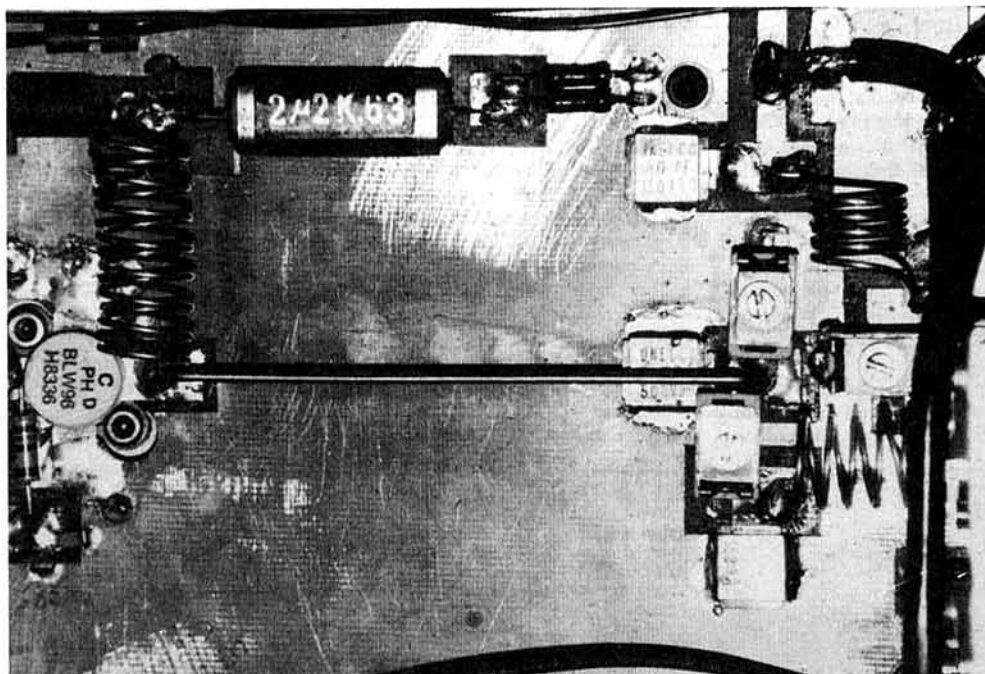
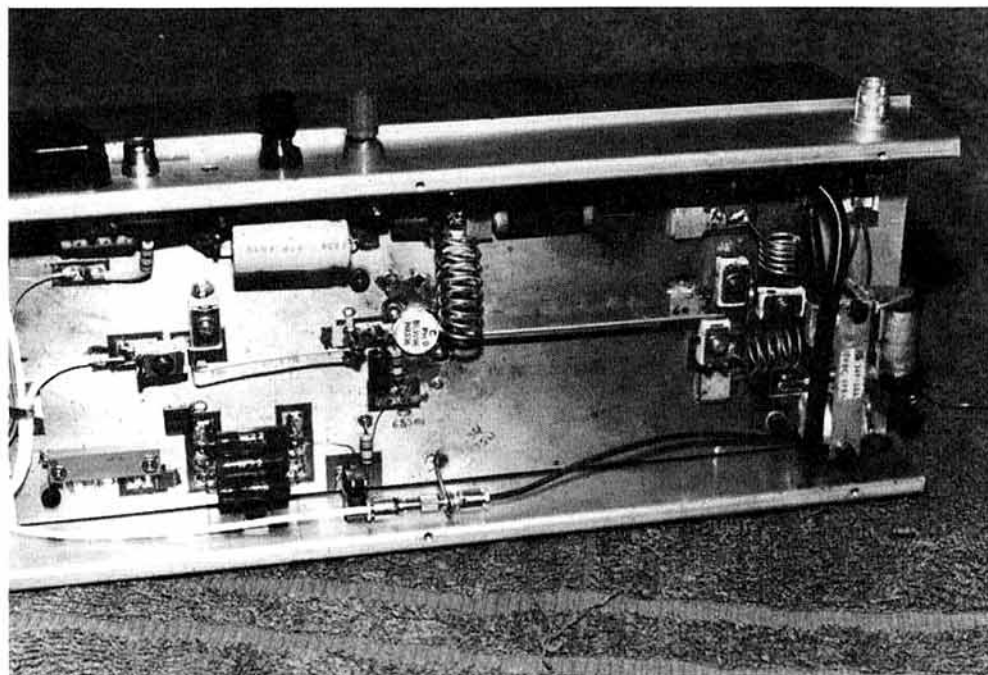
The amplifier is constructed on a 1.6mm double-copper-clad glass fibre board measuring 238 by 100mm. Isolated pads are cut using a sharp knife, the unwanted copper being lifted by applying heat from a 40W soldering iron. This form of construction allows components to be mounted between pads and the earth plane with a minimum amount of lead inductance. The



Where \$C\_n\$ = Normalised capacitance value (Farads)  
 \$L\_n\$ = Normalised inductance value (Henries)  
 \$f\_c\$ = Filter 3dB cut-off frequency (Hz)  
 \$R\$ = Filter input/output impedance (50Ω)

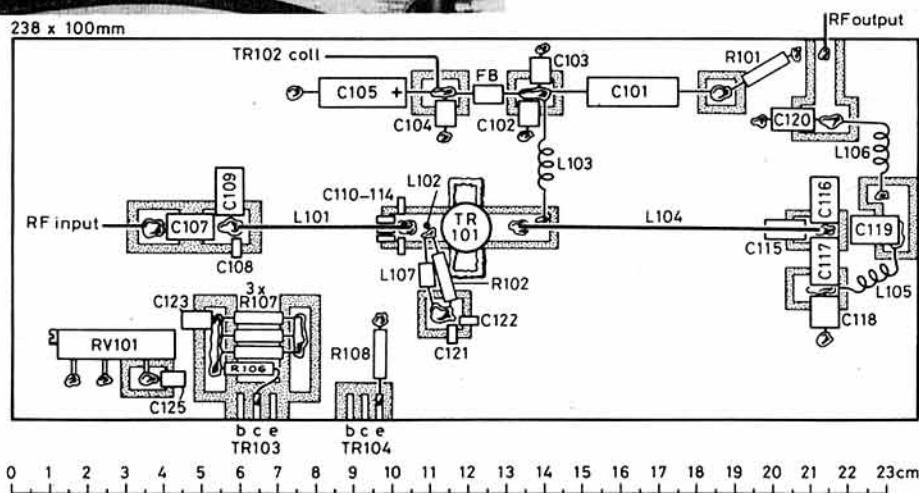
Fig 6. Lowpass filter normalized values

The underside view of the amplifier. The output components can be seen on the right of the amplifier with the lowpass filter components adjacent to the coaxial relay. Bias components are located in the left-hand corner. Input matching components can be seen on the left-hand side



Close up view of the output matching components and the lowpass filter

Fig 7. Main board layout





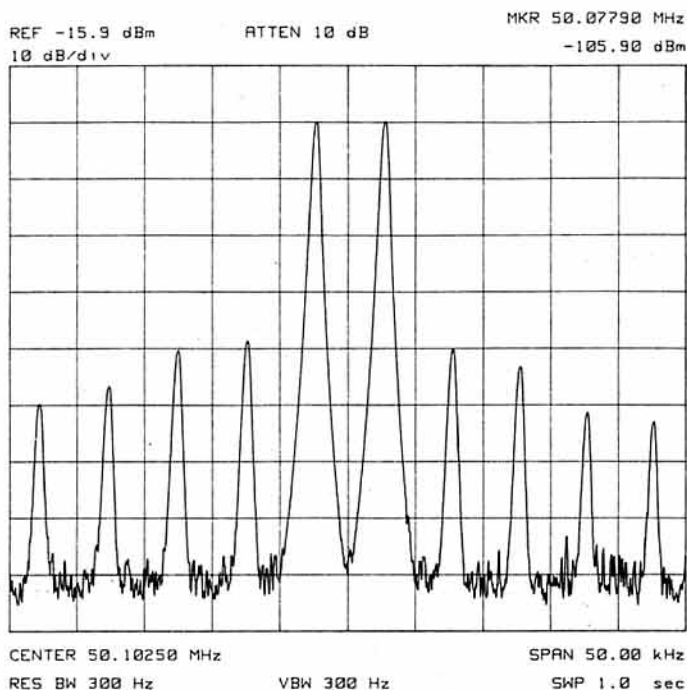


Fig 8. Intermodulation products at 100W p.e.p

underside of the board is left as a complete earth plane except for one small area. A square of copper must be removed beneath the pad at the junction of L104, C115 and C117. Connections between earth-planes on each side of the board are made by drilling and pinning four holes around each emitter lead of the BLW96. Component locations and dimensions for the board are shown in Fig 6.

The completed amplifier was mounted on a large finned heatsink with a thermal resistance of approximately 0.3°C/W. This provides more than adequate cooling for normal ssb and cw operation. Total thermal resistance between the transistor junction and air, when using the above-mentioned heatsink rating, is 1.13°C/W. In real terms this means that 150W can be dissipated at an ambient temperature of 30°C before the maximum junction temperature is exceeded.

In common with all power devices, great care should be taken to ensure that the mounting surface is perfectly flat. After drilling and tapping the mounting holes, do not de-burr the holes by counter sinking, as this action

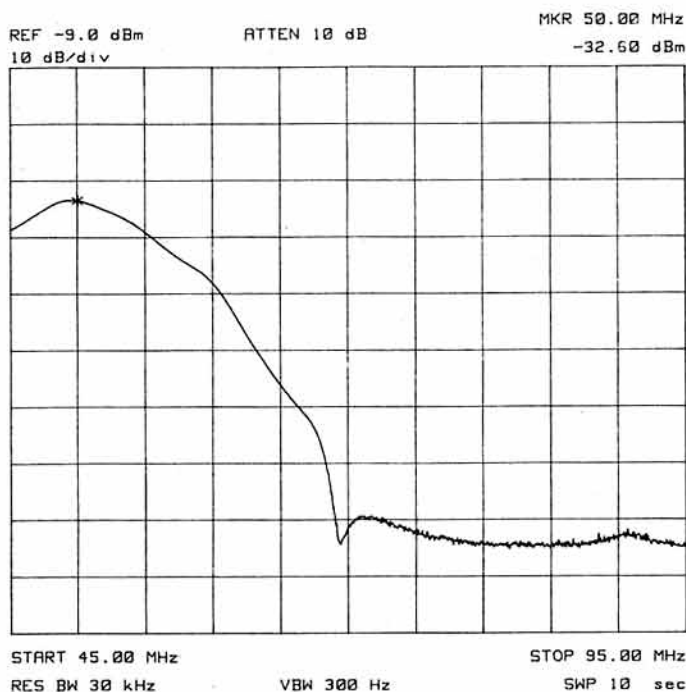


Fig 9. Amplifier frequency response

degrades the thermal resistance. Any burrs should be removed with a safety-razor blade or with a flat block and fine-grade wet and dry.

### Bias adjustment

Remove the earthy end of L103 and turn RV101 to minimum resistance. Apply 48V to the dc input socket and earth the ptt line. With 48V input, TR102 collector should be at 46.8V. Release the ptt and TR102 collector should return to 0V. Connect an ammeter in series with L103, terminate rf input and output with 50Ω loads, and earth the ptt line. Adjust RV101 for a standing current of 100mA, remove the dc supply and replace L103.

### Alignment

The input matching capacitors C107 and C109 should be adjusted for optimum vswr using a low-level drive source (1-2W). After the initial adjustment, C116 and C117 may be adjusted for maximum power output. Increase the drive level to 4W and repeat the input adjustments for best

### Components List

#### AMPLIFIER

R101	10Ω 0.5W cf	C115	60pF 250V Um
R102	18Ω 0.5W cf	C116, 117, 119	30-140pF mct
R103	8.2kΩ 0.25W cf	C118, 120	80pF 250V Um
R104, 105	Select to suit relays used	C122	270pF 100V mc
R106	5.6kΩ 0.5W cf	C123	22nF 100V mc
R107	3 x 220Ω 6W w/w	C124	100nF 100V mc
R108	56Ω 0.5W cf	C125	47nF 100V mc
RV101	47Ω ct		
C101	2.2μF 63V pc		
C102, 104	100nF 100V mc		
C103, 121	10nF 100V mc		
C105	470μF 63V te		
C106	100μF 63V te		
C107, 109	60-180pF mct		
C108	47pF 50V cc		
C110-114	330pF 50V cc		
D101	BZY93 C51R zener		
D102, 103	1N4002		
TR101	BLW96		
TR102	BDX66 npn Darlington		
TR103, TR104	BD237		
FB	Suppression bead. Material, 3S2 (blue)		
L101	See separate drawing		
L102	15 x 7mm pad on pcb		
L103	12t 1.2mm copper wire, 9mm id, 28mm long		
L104	See separate drawing		
L105, 106	4.5t 1.2mm copper wire, 10mm id		
L107	2.5t 0.5mm enam copper wire wound through six-hole ferrite bead		
RLA, RLB	50Ω coaxial Type CX120P		

#### POWER SUPPLY UNIT

R201, 202	0.5Ω 10W w/w	R209	330Ω 25W a/c (see text)
R203	390Ω 2.5W w/w	R210	1.5Ω 10W w/w
R204, 213	3.0kΩ 0.25W cf	R211	120Ω 0.25W cf
R205	2.2kΩ 0.25W cf	R212	180Ω 0.25W cf
R206	39kΩ 0.25W cf	R214	220Ω 0.5W cf
R207	27kΩ 0.25W cf	RV201	1.0kΩ ct
R208	560Ω 5W w/w	RV202	10kΩ ct
C201	10,000μF x 3 100V		
C202	10nF 100V		
C203	470pF 100V		
C204	15μF a/e 63V		
C205	10μF a/e 63V		
C206	100nF 100V		
C207, 208	1nF c 50V		
C209	0.1μF pc 250V		
TR201, 202	BDX67 npn Darlington		
IC201	uA723		
ZD201	36V 5W zener		
ZD202	See text		
TH201	BTY79-400R		
SW201	DPDT 250V ac at 5A		
SW202	Momentary push 250V ac at 5A		
RLC	48V dc coil. 5A contact rating		
Mains tfmr	55V ac 300VA		
Rectifier	25A 200V bridge module		
Filter	5A mains rfi filter.		

#### Abbreviations

w/w = wirewound. cf = carbon film.  
a/c = aluminium clad. ct = cermet trimpot.  
a/e aluminium electrolyte. c = ceramic. cc = ceramic chip.  
e = electrolytic. mc = monolithic ceramic.  
mct = mica compression trimmer. pc = polycarbonate.  
te = tubular electrolytic. Um = Unelco mica or atc.

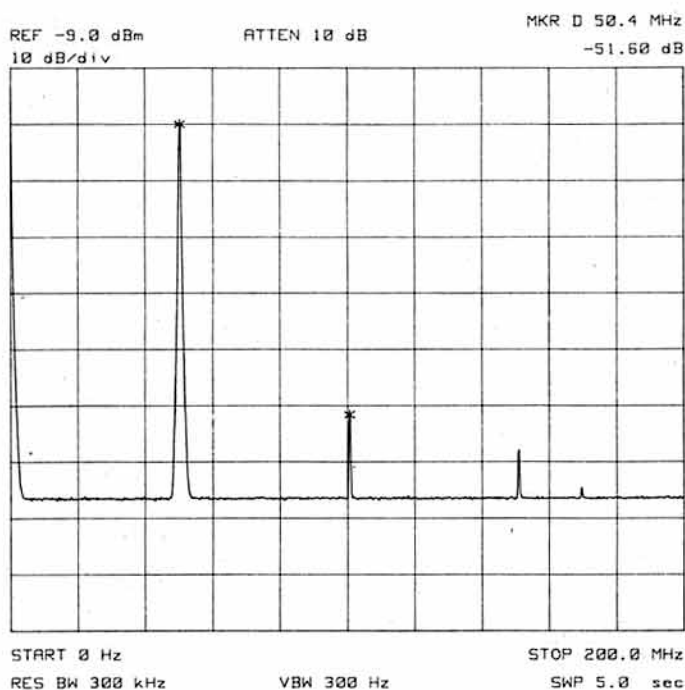


Fig 10. Amplifier harmonics

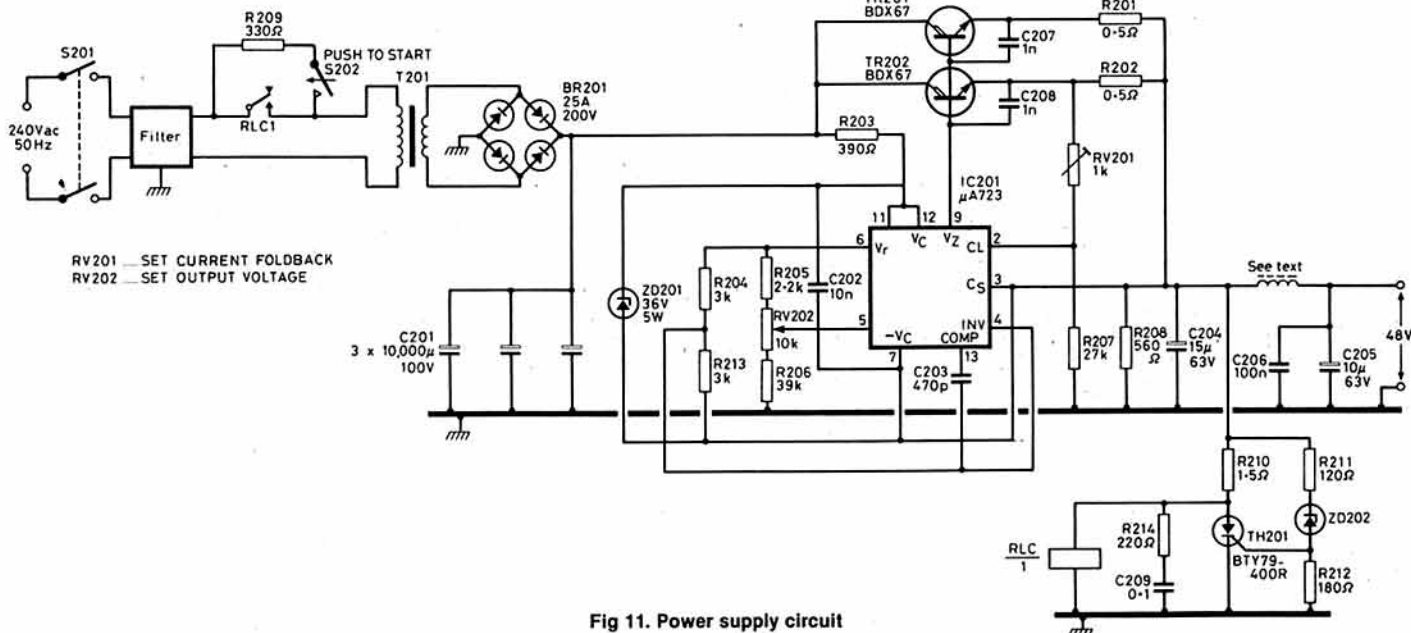


Fig 11. Power supply circuit

vswr, and the output tuning for maximum power. At this stage the turns on L105 and L106 can be compressed or opened out and C119 adjusted to obtain maximum output power. If all is well, 60-70W should be available with 4W of drive.

Final adjustments can be made at 100W p.e.p output, but beware, power transistors can also act as very high speed fuses! Severe detuning at high power levels can lead to instant destruction of any solidstate pa. Having said this, it must be stated that the BLW96 is a very rugged device and will withstand a vswr of 50:1 through all phases up to 150W p.e.p at 28MHz.

Linearity of this amplifier is very good and plots of intermodulation product are shown in Fig 8. Frequency response characteristics are shown in Fig 9. Harmonic levels at the rated output are shown in Fig 10.

## POWER SUPPLY UNIT

It is not intended to give a detailed description of the power supply used, as most constructors seem to have their own ideas, particularly where protection circuitry is concerned. However, it is hoped that the circuit shown in Fig 11 may provide ideas for those not wishing to duplicate exactly what is shown here.

This psu is identical in design to one powering the amplifier just described. It is also used to power a similar power amplifier for the 70MHz band. Voltage regulation with current foldback is controlled by a 723 precision regulator.

Two npn Darlington power transistors with current sharing resistors (R201 and R202) are used as series-pass elements. Owing to the very high gain of the BD67 it is possible to drive the bases directly from the Vz output of the 723. Foldback current limiting is set by the potential divider RV201 and R202. Output voltage is controlled by RV202.

As the 723 has a maximum input rating of 40V, it is not possible to use it directly across the supply. For this reason the 723 is connected as a floating regulator across the series-pass Darlington transistors. Zener diode ZD201 and resistor R203 limit the voltage across the 723 to 36V. Over-voltage protection is provided by a simple thyristor crowbar, zener diode combination, TH201 and ZD202. If the value of ZD202 is selected for the required over-voltage protection value, reliable operation will be obtained, but do not rely on the marked zener voltage for the trip value. In the prototype, two series zeners (33 + 18V) were used to provide shutdown at 50V.

Specialized ICs are available to drive a thyristor which do a similar job, ie the MC3423, but have a maximum protection threshold of 45V. If thought necessary, it should be possible to use one of these ICs. However, the negative supply and associated components will need to be returned to a point which is about 10V with respect to chassis. This will allow the protection threshold to be set at 50V.

When an over-voltage condition occurs, the crowbar thyristor fires and RLC de-energizes, switching the psu off. If excessive current is demanded, the current foldback circuit operates and reduces the output voltage to a low level. As before, RLC is de-energized, and the mains supply removed.

R209 reduces the switch-on surge current, and the value shown in the

circuit diagram (330Ω) is only suitable when starting with low load current. If high current is demanded when starting, R201 will need to be reduced in value to allow the output voltage to rise.

The transformer used was "ex-equipment", and gave 55Vrms when loaded at 8A. Power rating will need to be 300VA. Mains input to the unit is fed via a 5A rfi filter. DC output leads are filtered by winding five turns of the lead-out wire around a toroid core placed as close as possible to the output terminals.

## REFERENCES

- [1] *High Frequency Circuit Design*. James Hardy.
- [2] *A Handbook on Electrical Filters*. D R J White.
- [3] *Radio Engineers Handbook*. Terman.

*Motorola RF Data Manual*. 2nd Edn.

*Radio Data Reference Book*. 5th Edn. RSGB.

*Solid State Design for the Radio Amateur*. ARRL.

*Mullard Technical Handbook (RF Devices)*, Book 1, part 2B.

# Equipment Review

## THE ICOM IC751A HF TRANSCEIVER

Peter Hart, G3SJX\*

### INTRODUCTION

The IC751 was introduced during the summer of 1983 as the top of the line in Icom's range of hf transceivers. An updated version has recently been unveiled, the IC751A, incorporating a number of technical improvements and including a built-in keyer, cw filter and better ssb filter. The reviewer was fortunate to obtain the loan of one of the very first samples to be shipped into the UK.

### PRINCIPAL FEATURES

The features provided on the IC751A are virtually identical to its predecessor. An amateur bands transceiver is combined with a general-coverage receiver tuning 100kHz to 30MHz. CW, ssb, a.m., fm and rtty modes are provided (rtty for Region 2/3 tones 2,125/2,295Hz only, but can be modified for Region 1 tones, 1,275/1,445Hz).

The 50mm diameter main tuning knob has three separate functions. Firstly, the receiver may be tuned at 10Hz/step, 2kHz/revolution. This speeds up automatically to 50Hz/step when the knob is rotated fast. 1kHz/step is also selectable for rapid changes in frequency. The second function of the main tuning knob is to step up or down through the bands. In the general-coverage mode, this bandchange is in 1MHz increments. The third function of this knob is to select from one of the 32 memories. Illuminated latching buttons to the right of the main tuning knob determine which function is selected. Twin vfos store selected mode in addition to frequency and allow split frequency and/or mode operation. Incremental tuning of both the receiver (rit) and transmitter (xit) provides up to  $\pm 9.9$ kHz offset in 10Hz steps. This offset may be added to the main tuning, a useful little facility. Thirty-two memories are incorporated, and these store mode as well as frequency. An on-board lithium battery retains the memory contents when the power is removed. Three scan modes are provided: sequential scan through all memory locations; scan only memory locations with selected mode; scan between any two frequencies at 2kHz/s, with optional stop/dwell on signal found.

A red/blue fluorescent display panel indicates frequency to 100Hz resolution, memory number, rit/xit offset and the selected mode, vfo, scan status etc.

Receiver functions include passband tuning, notch filter, narrow filter selection, two-speed agc plus off, dual adjustable noise blanker for "woodpecker" and ignition noise, all-mode squelch, tone control, switchable rf preamp/attenuator and 10kHz marker calibrator.

Transmitter functions include rf speech processor, audio monitor, vox, cw full break-in, built-in electronic keyer, variable output power and a thermostatically-controlled fan. Metering is provided for alc, power output, speech compression level, vswr, pa voltage and current.



The rear panel carries the usual range of connectors: power, antenna, antenna to external receiver, external receive antenna, key, external speaker, t/r and alc for external linear, and low-power rf for transverter. A multi-pin accessory connector provides audio input/output, rtty interface, band data for the automatic atu and linear, ptt, alc, etc.

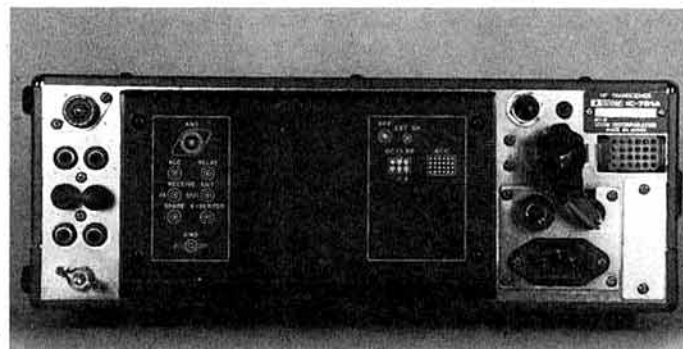
A number of internally-fitted optional facilities are available. These include alternative bandwidth cw and a.m. 9MHz i.f. filters, cw bandwidth 455kHz filter, speech synthesizer to announce the displayed frequency in a synthesized voice, computer interface, high-stability crystal oscillator, and a built-in switched-mode mains psu. The basic transceiver is 12V operated. With the built-in psu, the IC751A becomes one of the smallest mains-operated fully-featured hf transceivers available at the present time.

Matching accessories include external psus, external speaker, terminal unit, automatic atus and linear. In conjunction with the IC2KL linear and ICAT500 atu, tune-up is totally eliminated for high power multiband operation.

### DESCRIPTION

The IC751A measures 32.2 (w) by 12.0 (h) by 38.5cm (d) and weighs 8.5kg. Construction of the transceiver is very similar to many others from Japan. A steel chassis is used with a number of relatively-accessible pcbs interconnected by cable harnesses with plugs and sockets or flexible ribbon cable. The front panel is a detachable sub-assembly which contains the bulk of the controls. Some lesser-used controls are located upwards-facing on the top of the front-panel assembly. The switched-mode psu is housed in a separate fully-shielded diecast box which is fixed to the bottom half of the case (see photo). A 7cm-diameter speaker is mounted on the side panel.

Fig 1 shows a simplified block diagram of the IC751A. The receiver is quadruple conversion with i.f.s of 70.4515MHz, 9.0115MHz, 455kHz and

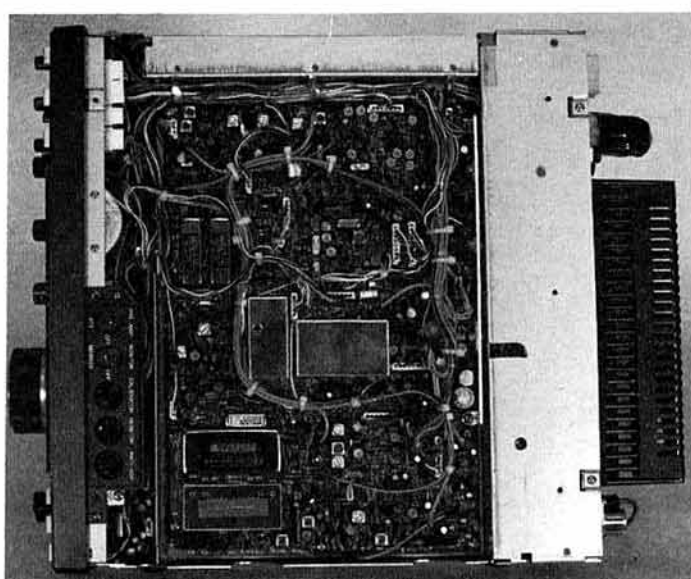


Rear view of the IC751A

\*42 Gravel Hill, Addington, Croydon, Surrey CR0 5BD





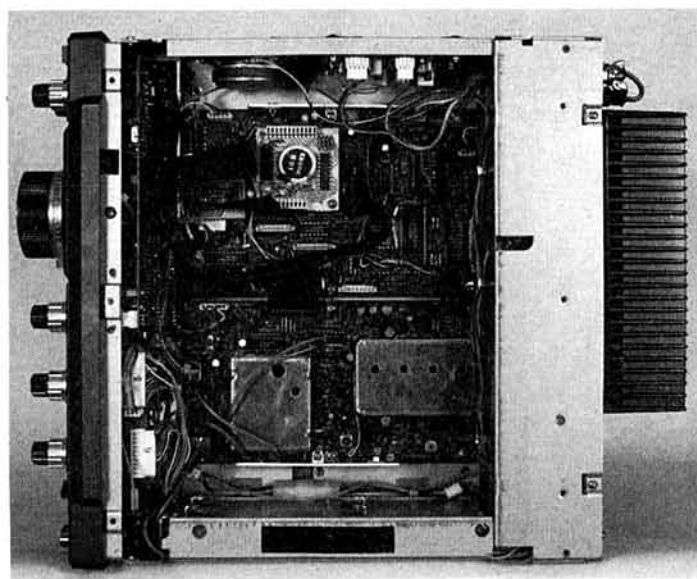


Top view of the IC751A with cover removed

The linearity is reasonable. On fm the S-meter is grossly over-sensitive and non-linear, S9 being  $1\mu\text{V}$  and S9 + 40 being  $3.5\mu\text{V}$  with the preamp in.

### SPURIOUS RESPONSES

Table 1 also shows the figures obtained for the 70.451MHz i.f. rejection and image rejection which occurs 140.902MHz above the on-tune frequency. Rejection of all other spurious responses, including sub-multiples of the first i.f., 9MHz i.f. and non-i.f.-related spurs, was in excess of 96dB. Only one very weak internal spurious was found (28,060kHz). Overall, this is an excellent performance, no doubt helped by the high (70MHz) first i.f.



Bottom view of the IC751A with cover removed

### AGC PERFORMANCE

The agc threshold was measured as  $2\mu\text{V}$ . A 110dB increase in signal level above the threshold gave a 1dB increase in audio output. The attack time was 1-2ms and the decay time 0.2-0.4s (fast) or 2-4s (slow) depending on signal level. This is an excellent characteristic.

### SELECTIVITY

The IC751A is fitted with a narrow cw filter and an improved shape factor ssb filter in the 9MHz i.f. Although a 500Hz bandwidth narrow cw filter is normally fitted as standard, a 250Hz bandwidth filter is available as an option and this was the filter fitted into the review transceiver. Very steep slope 455kHz filters are also available as options (480Hz at -60dB) but this was not fitted in the reviewed item. The measured bandwidths in the various modes were as follows:

Response	BANDWIDTH				
	SSB/CW(W)	CW(N)	A.M(W)	A.M(N)	FM
-6dB	2.24kHz	270Hz	8.33kHz	2.89kHz	16.48kHz
-60dB	3.35kHz	1.35kHz	14.04kHz	3.98kHz	26.48kHz

The bandwidth on a.m. (wide) and fm is rather too wide, particularly on 29MHz fm, for 10kHz channel spacings. The narrow bandwidth a.m. setting is far too narrow.

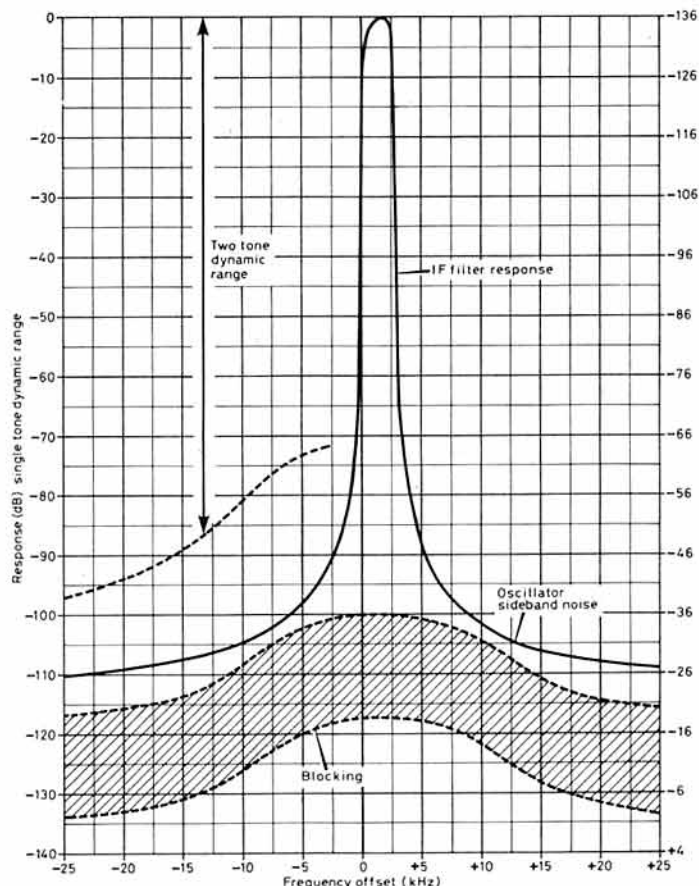
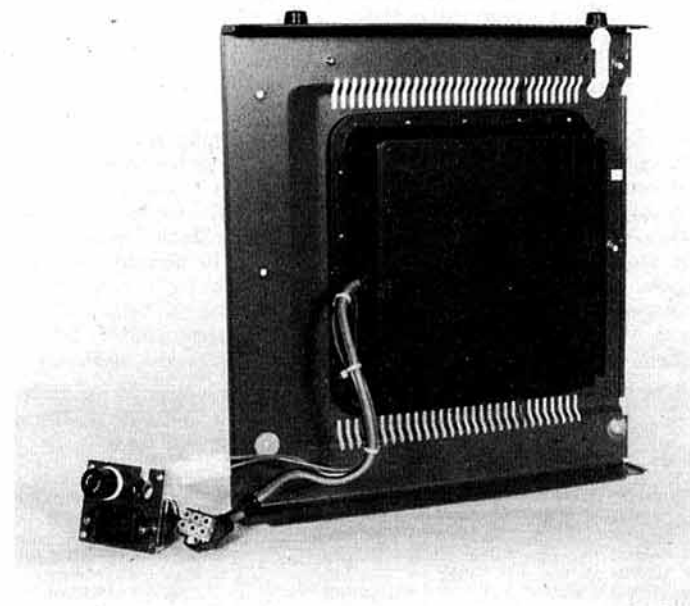


Fig 2. IC751A effective selectivity curve on ssb



Switched mode mains psu attached to the bottom cover

## RECIPROCAL MIXING

In measuring reciprocal mixing, slight problems were experienced with the onset of blocking (see next section). Measurements made at 21.4MHz on ssb were:

Frequency offset	Input level	Level with respect to noise floor
3kHz	-43dBm	93dB
5kHz	-38dBm	98dB
10kHz	-31dBm	105dB
20kHz	-27dBm	109dB
30kHz	-23dBm	113dB
50kHz	-20dBm	116dB
100kHz	-15dBm	121dB
200kHz	-11dBm	125dB
300kHz	-10dBm	126dB

These figures are the best that I have measured for a synthesized transceiver, all the more surprising considering the high frequency at which the first local oscillator operates. An oscillator noise sideband performance of -138dBc/Hz at 10kHz off-tune is indicated. The IC740 also had a fairly good reciprocal mixing performance [5], Icom seem to be able to design low-noise synthesizers.

## BLOCKING

Due to the action of front-end agc, blocking levels varied with on-tune signal level. In addition, the receiver exhibited a rather strange very soft blocking characteristic, making the determination of an absolute level difficult. For 1dB compression and at greater than 30kHz spacing from the on-tune frequency, blocking occurred at +7dBm for S9 on-channel signals or about -15dBm for S3 signals. At the S3 level, slight blocking could still be detected down to -30dBm. At offsets closer than 30kHz from the carrier, the blocking performance degraded by up to 35dB. All the above figures were obtained with the preamp switched in. With the preamp switched out, these figures increase by 10dB.

## THIRD-ORDER INTERMODULATION

The intermodulation performance was evaluated at 7MHz on ssb as follows:

Tone spacing	THIRD-ORDER INTERCEPT		TWO-TONE DYNAMIC RANGE	
	Preamp in	Preamp out	Preamp in	Preamp out
<5kHz	-24dBm	-15dBm	73dB	75dB
10kHz	-12dBm	-4dBm	81dB	83dB
20kHz	+7dBm	+13dBm	94dB	94dB
30kHz	+12dBm	+16dBm	97dB	96dB
>35kHz	+18dBm	+28dBm	101dB	104dB

A similar dynamic range was achieved on 21 and 28MHz, but was a couple of decibels lower on the other bands. This is the only amateur transceiver which I have measured which has achieved greater than 100dB dynamic range in ssb bandwidths. The usual degradation in dynamic range was exhibited within the bandwidth of the first i.f. filter. The noise blanker did not degrade the intermodulation performance.

Overall inband linearity as measured with 200Hz signal spacings gave intermodulation products at -28dB for signal levels up to 1mV, degrading rapidly above this level. This is not a very good result but could be improved to -40dB or better by reducing the rf gain control.

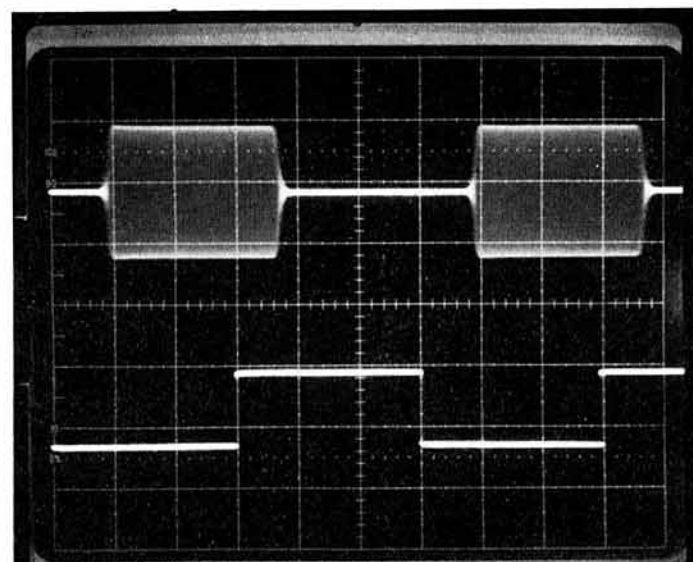


Fig 3. CW keying waveform (bottom) and rf envelope (top) at 40wpm in semi-break-in mode. Horizontal scale 10ms/division

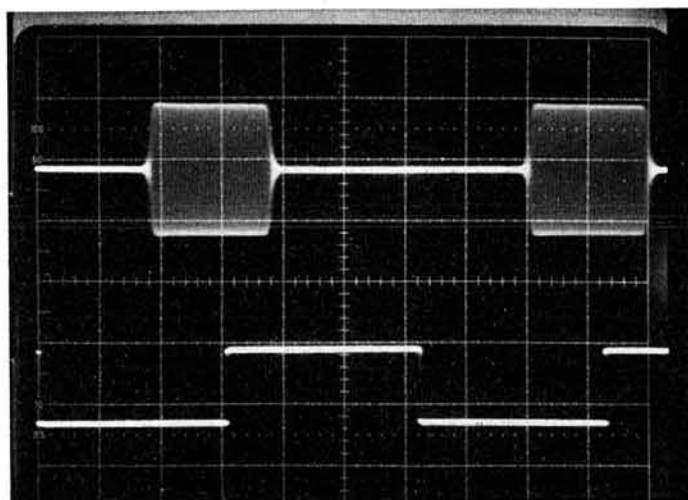


Fig 4. CW keying waveform (bottom) and rf envelope (top) at 40wpm in full break-in mode. Horizontal scale 10ms/division

## AUDIO

The maximum power output into an 8Ω load before the onset of clipping was 1.7W. Up to this level, the distortion was less than one per cent. Maximum audio output could be achieved with 1.3μV input signal.

## TRANSMITTER MEASUREMENTS

### CW POWER OUTPUT, HARMONICS AND SPURII

Very consistent results were obtained from band to band. The maximum power output ranged from 108 to 102W reducable to about 6W, second-harmonic output was -54 to -58dB with third, fourth and fifth harmonics at -57 to -60dB. Other spurious outputs were low, less than -65dB on the hf bands and less than -80dB on the lower frequency bands. A strange noise peak was visible on the spectrum on all bands above 3.5MHz, centred at 2MHz and at a level -75 to -85dB. The power level scale on the meter read consistently 10 per cent high.

Fig 3 shows the cw keying envelope when keying dots at 40wpm in the semi-break-in mode. There is negligible distortion, but rise and fall times are too sharp and will result in key clicks. Fig 4 shows the same result in full-break-in mode which displays some character shortening.

### SSB POWER OUTPUT AND DISTORTION

With maximum two-tone audio drive set to the top of the alc range, the following results were obtained with the processor off:

Frequency	Power output (p.e.p.)	Third-order ips	Fifth-order ips
1.8MHz	106W	-26dB	-38dB
3.5MHz	106W	-26dB	-38dB
7MHz	106W	-30dB	-36dB
10MHz	107W	-28dB	-38dB
14MHz	109W	-31dB	-35dB
18MHz	106W	-20dB	-37dB
21MHz	106W	-14dB	-28dB
24MHz	109W	-20dB	-33dB
28MHz	102W	-30dB	-33dB

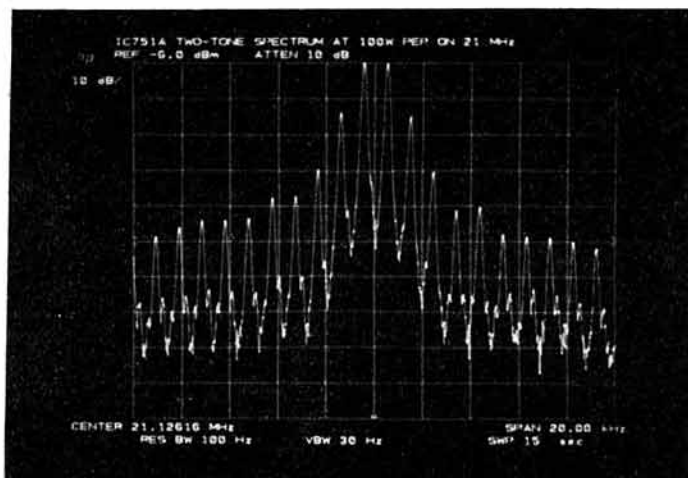


Fig 5. Two-tone transmitter spectrum on 21MHz with processor off. Vertical scale 10dB/division. Horizontal scale 2kHz/division



The intermodulation product level at  $\pm 10$  kHz was  $-50$  to  $-60$  dB and at  $\pm 20$  kHz  $-70$  to  $-80$  dB (except 21 MHz at  $-63$  dB). With 20 dB speech compression, inband levels degraded severely but the wideband levels remained unchanged. The worst band is undoubtedly 21 MHz (see Fig 5). This band was prone to instability on early IC751 power amplifiers and the fault may not have been totally cured. The power meter scale was remarkably accurate on two-tone signals (within 10 per cent).

The carrier suppression was 60 dB, and the sideband suppression with a 1 kHz audio tone was 80 dB.

## AUDIO

The  $-6$  dB audio bandwidth was measured as 256–2,880 Hz on usb and 544–3,110 Hz on lsb, a little asymmetric with respect to the carrier. Full output could be achieved with 0.5 mV audio input at the microphone, and audio distortion was very low at about 0.3 per cent.

## TRANSMITTER NOISE OUTPUT

Noise measurements at full output on cw at 21.4 MHz (see [2]) were:

Frequency offset	Noise output	Noise output with respect to carrier in a 2.5 kHz bandwidth
5 kHz	$-73$ dBm/Hz	$-89$ dB
10 kHz	$-77$ dBm/Hz	$-93$ dB
20 kHz	$-78$ dBm/Hz	$-94$ dB
50 kHz	$-81$ dBm/Hz	$-97$ dB

## OPERATION INTO MISMATCHED LOADS

On 28 MHz with full cw power output, the transmitter delivered between 57 and 88 W into a 2:1 load vswr, and between 26 and 58 W into a 3:1 load vswr.

## LOW POWER (TRANSVERTER) OUTPUT

$-6$  dBm cw and p.e.p. output at  $-34$  dB intermodulation product level was obtained on most bands. This is a rather low level. Fig 6 shows the spectrum on 28 MHz.

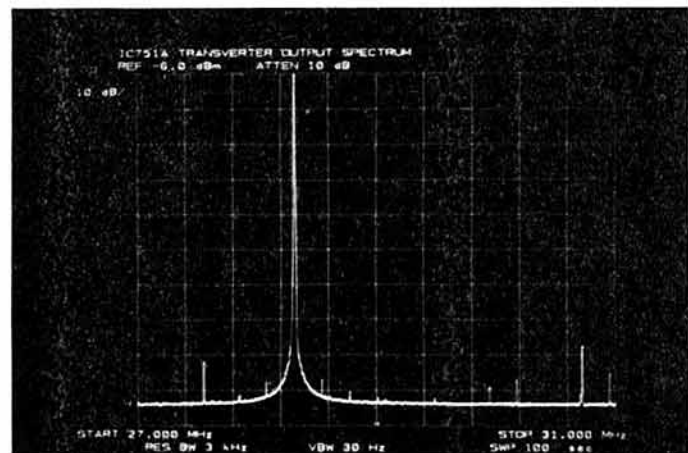


Fig 6. Transverter low-power output spectrum on 28 MHz. Horizontal span 27 to 31 MHz. Vertical scale 10 dB/division

## OTHER MEASUREMENTS

### TRANSMIT-RECEIVE SWITCHING SPEED

This parameter was measured on ssb as a direct result of switching the ptt line.

- Time to mute receiver ... 1 ms
- Time to activate receiver ... 15 ms (see text)
- Time to mute transmitter ... 1 ms
- Time to activate transmitter ... 6 ms

These times should permit satisfactory amtor operation. A strange effect was noticed in the receiver recovery characteristic. For signal levels up to S7, a clean recovery after 15 ms was obtained. At higher signal levels, a further period of signal breakup was observed up to 50 ms in length, becoming progressively worse at higher signal levels. With the front-end preamp switched out and the attenuator switched in, no breakup occurred until signals reached 20 dB over S9.

## ON-THE-AIR PERFORMANCE

The wide receiver dynamic range measured in the laboratory was confirmed in practice, with the IC751A consistently outperforming lesser receivers in copying dx signals on 3.5 and 7 MHz ssb. The receiver electrical performance on ssb/cw was excellent, and the filters were good with no sign

of leak through low down the skirts on very strong adjacent signals. The 9 MHz crystal notch filter was really effective, and the electrical performance of the frequency synthesizer very good with few clicks and little noise when tuning near strong carriers. Some drift of the pbt oscillator was experienced with temperature, requiring offsetting of the pbt control. The audio quality was a little "boxy", possibly due in part to the slightly narrow ssb filter. On a.m. broadcast stations the performance was satisfactory although it was necessary to switch in the input attenuator on medium waves to prevent distortion on the stronger signals. The noise blander was totally ineffective on the "woodpecker" although quite effective on ignition noise.

Quality reports on transmit were a little disappointing. On cw, key clicks were audible up to 3 kHz off frequency. The internal iambic keyer requires a keying paddle with a stereo jack and can be operated over wide speed limits. For external keying, a stereo jack must also be used. Full break-in operated satisfactorily up to quite high speeds, but on a noisy channel it was preferable to turn down the rf gain control to prevent "chatter" between characters. On ssb, using the HM-36 electret condenser microphone which is supplied with the equipment, the transmission was a little bassy and lacked punch. Alternative microphones may be more suitable. The processor did not seem to add at all to the intelligibility of the transmission.

Probably the least-liked features were those associated with the tuning ergonomics. Although the weighted flywheel knob has a very pleasant action, the overall tuning rate is too slow due to the relatively small number of steps/revolution. The speed-up feature comes into operation at too low a rotation rate, at about normal tuning speed, and this produces an effect similar to backlash in mechanical drives. Although speed-up in theory allows for much more rapid changes in frequency, in practice a speed-up factor of only about  $\times 2$  is achieved. The control unit does not appear able to cope with the rapid train of pulses from the shaft encoder when the knob is rotated fast, and some are ignored. I found the multiplexed function of the main tuning knob for tuning, bandchange and memory selection inconvenient. A dedicated set of band buttons would be much preferred. The larger than usual number of memories, accessible in one bank, is a useful facility. Another negative feature, in my opinion, is that when changing bands the selected vfo resets to a specific common frequency about 50 kHz from the low end of that band. A more convenient arrangement would be to switch the megahertz but leave the kilohertz unchanged, as is done in the majority of other transceivers. The scanning features are most comprehensive and well conceived although the scanning rate is rather slow. However, I question the usefulness of scanning in an hf transceiver.

## CONCLUSIONS

The electrical performance of the IC751A receiver is most impressive, exhibiting the highest dynamic range and lowest reciprocal mixing figures of any transceiver measured to date. However, the usual degradation in close-in dynamic range was observed, as is common with all up-conversion receivers. The transmitter is easy to use but the performance was a little disappointing. My chief criticism lies with the tuning ergonomics, but this may be more of a personal view.

The basic transceiver costs £1,399, with an additional £182.85 for the built-in mains psu. Alternative bandwidth 9 MHz filters cost £40–£50, and the high slope 455 kHz cw filters £98.90. The voice synthesizer module is £42.55. All prices include VAT and were current in April 1986.

## ACKNOWLEDGEMENTS

I would like to thank G3UFY and G3WRR for the usual critical comments on the transmission quality, and Thanet Electronics Ltd for the loan of the equipment.

## REFERENCES

- [1] "The Icom IC720A hf transceiver", P J Hart, G3SIX. *Rad Com* February 1982, pp129–33.
- [2] "The Yaesu Muse FT102 hf transceiver", P J Hart, G3SIX. *Rad Com* January 1983, pp32–6.
- [3] "The Yaesu Muse FT77 hf transceiver", P J Hart, G3SIX. *Rad Com* June 1984, pp482–6.
- [4] "The Yaesu Muse FT757GX hf transceiver", P J Hart, G3SIX. *Rad Com* May 1985, pp351–5.
- [5] "The Icom IC740 hf transceiver", P J Hart, G3SIX. *Rad Com* November 1983, pp985–9.

# Review

## AMATEUR RADIO SOFTWARE

Graham Cluer, G4AVV\*

THIS REVIEW considers the type of commercially-produced software available to the radio amateur and the sort of facilities that are on offer. It is particularly biased towards the BBC computer, but most of the firms mentioned (with others) offer similar programs for other computers. All of the firms who advertise in *Radio Communication*, and some who do not, were invited to supply programs for review, but the programs mentioned are by no means the only ones available nor the only ones worth considering.

The expansion ports on the BBC computer, and the power of its programming language, have made it one of the natural choices for the radio amateur. Amateur radio software is a specialist market, and even in *Radio Communication* advertisements for quality programs can still be found in the classified section. However, the size of the market, rather than the quality of the product, bears the responsibility for this. Most of the available programs are of very high quality.

I split the software available into two groups. Firstly, there is the group where the computer is simply a tool in the shack, but in the second group it actually operates the radio or decodes signals received by it.

### Morse tutors

There are a number of ways to approach writing a morse tutor program. Some send letters as you type them in, and this is useful in the early stages so that you can get the "feel" of the letters. Some may send the sound to you as the computer displays the letter on the screen for a similar effect. One program, G4UXD's, has a mode whereby one sound is sent then the student has to type the response on the keyboard. This can improve your typing as well as your morse, and I found it surprisingly helpful.

A more useful mode is for the computer to send you random words or phrases followed by a display of what was sent so that you can check your own attempts at receiving. Variations here are whether continuous strings of letters or letter groups, random English words or complete sentences are sent. It may seem that it would be better to learn using only random characters, but many students find, as I did, that the chance of predicting a word actually adds another distraction and is more difficult in the early stages. Most programs allow you to add your own text, and some have a large example text provided by the software author. Mention must be made again of G4UXD's program which comes with five hours-worth of morse tests plus the ability to add your own.

Obviously the speed range is a relevant consideration, but I found that all went from a sensible slow speed (about 5wpm) to 25wpm or more. This will suit a beginner but, if you want to go further then Technical Software's program goes up to 40wpm. I would also rate highly the ability of the program to send characters at normal speed but with longer than usual spacing; this facility enables the student to learn the right sound of the letters but gives more thinking time. Only Scarab System's and G4UXD's programs will really allow this.

Surprisingly, I have not come across a program which truly enables you to ask for extra frequency of some letters which you find difficult, though many do allow you to ask for a restricted alphabet to be sent.

As a final utility some morse tutor programs allow you to send code to the computer and the BBC attempts to decode it. I must admit to some scepticism as to whether such a facility would be really helpful, but I was pleasantly surprised by programs from Binary Star and G4UXD. These not only decode the morse, they report on dot/dash length and inter-letter gaps etc. Having said that, I would strongly advise anyone to avoid this facility until they were proficient at receiving morse code. Perhaps I am biased, as I couldn't get either program to accept as perfect my hand-generated morse! Scarab's morse tutor also has a reception facility but without reporting on the code received. The program from G4UXD gave slightly more information as to what was wrong with my morse, and for a number of reasons this is the one I would recommend.

### Locators and contest loggers

These two different programs are often combined. A locator program will convert between latitude and longitude, QTH locator and the Maidenhead locator, and often given distances between two stations and the beam heading of one from the other.

Contest scoring programs will also find the distance between two locator references and usually the score based on 50km radial rings. This is a job which used to have to be done with large maps and a compass, and I have known amateurs buy a computer just for this facility. These are now essential programs if you enter vhf contests.

Many locator programs also include a logging program. These will keep for you a contest log, usually adding automatically the serial number sent with the time, and ask for an input of callsign, report received and locator. Score is calculated and totalled. I have not yet found one which can read the report sent from the receiver's age line!

I would be most wary of a contest program which did not keep a tape or disc file of stations worked, but most did this. They also search this file when you enter a callsign to warn you before you complete a duplicate contact. This search needs to be fast. I found no program would let you correct an earlier entry, and this could be a weakness of too rigorous a duplicate contact checker. Programs also differ as to whether they consider suffixes when looking for duplicates.

For distances, beam headings and conversion of locators, the Scarab Systems program is easily the best of those I have seen. Not only is it the only one to allow entry by national grid reference (a clever piece of programming, as ngr lines do not run parallel to latitude and longitude lines) but it also detects whether you have entered Maidenhead or QTH locator and converts accordingly.

Technical Software produce a comprehensive contest logger. Multiple bands, hf and vhf are catered for, and scoring is automatic. The program also saves to tape as entries are made. Printout is during or at the end of the contest and in the correct format. Unfortunately this program will only accept Maidenhead locators. While this may be the "official" locator system now in use, it has to be accepted that, in practice, some stations have not converted to it. Nevertheless, as a straightforward contest logger this is recommended.

### Others

Although the morse tutor and the locator are the standard type of program in this field, there are also programs to enable you to predict the position and elevation of Oscar satellites. Not surprisingly, Amsat-UK publish a very comprehensive program which computes the direction and elevation of Oscar 10 at any time, and indicates whether it is in range of your home QTH and a selection of cities worldwide. It will also give downlink frequencies for any uplink frequency (corrected for doppler) and even drive your antenna rotators if you have a suitable hardware interface. Amsat have recently released a program ("Satfoot") which draws a world map on which is superimposed circles representing the coverage of Oscar 10 and other satellites. Using this program, anyone should be able to get a good idea as to which satellites are within range.

Paean Systems sell a program written by G4MGD which will give the likely minimum and maximum usable frequencies on hf to a certain location at all times of the day. Sunspot numbers can be added from data in *Radio Communication* or predicted from the date, and a graph is produced of the usable frequency range or usable bands. This is a helpful program if you intend to contact a certain country and wish to know the band most likely to be open.

Peysoft produce a very comprehensive "amateur radio database". This is included under locators/loggers as it is both a duplicate callsign checker for 2,000 callsigns and a distance and bearing calculator. However, added to this is a "help" file of hf and vhf band plans, beacons and repeaters, a local times program (to display local time in 330 different countries) and a

(Continued on page 421)

\* 12 Bingham Road, Addiscombe, Croydon CR0 7EB.



# Technical Topics

by Pat Hawker, G3VA

KH6B's idea of celebrating this year's 50th anniversary of the introduction of the 6L6 beam tetrode family of valves by building a simple one- or two-stage cw or a.m. valve transmitter has tempted several more readers to delve into the depth of their junk boxes. Syd Fenwich, G3AIO, is putting together a 6V6-6L6 co-pa for 3.5, 7 and 10MHz. He even recalls a 3.5MHz contact with G3VA many years ago when he (G3AIO) was using a single KT66, the British near-equivalent of the 6L6G. J Bowling, G3FXP, agrees there is still a place for simple a.m. rigs on the underused 1.9 and 29MHz portions of the 1.8 and 28MHz bands. He mentions that there is a 1.9MHz a.m. net operating most afternoons in the Melton Mowbray area. He would like to see a spot frequency designated for a.m. about 29MHz, and suggests 29,160kHz as reasonably clear of other mode users. Though he notes a shortage of reasonably-priced receivers suitable for a.m. reception on the 28MHz band (best buys are probably the older communication receivers that still turn up in "Members Ads"). It is possible to get about 5W out of a single power fet and a 24V supply for those who regard valves as turning the clock back!

## Screening cables to reduce rfi

The difficulty of screening equipment and interconnecting cables to minimize either or both incoming and outgoing rf signals is a reflection of the increasing use of digital techniques. With so many high-speed pulses being generated in computer-type equipment, the problems of radio-frequency and electromagnetic interference (rfi/emi) and electromagnetic compatibility (emc) are increasingly evident.

John Greenwell, G3AEZ, brings to attention an announcement by Holden Cords (Holden Cords Ltd, Bowater Road, London SE18 5TF, tel: 01-855 9821). This company has recently introduced a cable screening technique which they claim offers virtually "100 per cent screening against rfi/emi": Fig 1. This involves the use of two metalized foils, or one metalized foil and a braid. It is thus rather like some of the coaxial cables that have been introduced specifically for cable tv distribution. The method, it is stated, shows many benefits over the more traditional braided screening process only. The metalized tapes are constructed as a laminate of aluminum on a polyester base. The two tapes are then wrapped around the cable with the metalized surfaces in contact with each other and a drain wire sandwiched between. If a single foil and braid is used, the braid acts as the drain wire.

The screening of cables by laminated tapes provides 100 per cent coverage of the protected conductors, which cannot be provided by a braid alone.

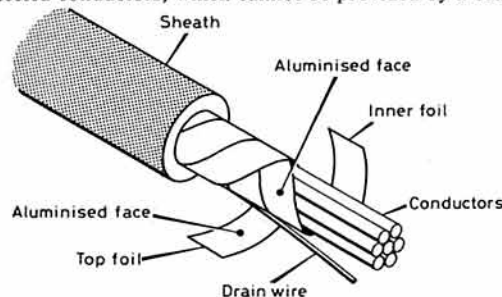


Fig 1. Use of twin foil screening to provide improved rfi/emi protection of multi-conductor cables and cable harnesses (Holden)

## Morse and the hard-of-hearing

Comments continue to arrive stressing the value of morse to amateurs facing the common problem of some progressive loss of hearing. Morse undoubtedly provides a bonus in the form of effective person-to-person communication for the many whose hearing loss ranges from slight to very severe.

Archie Couser, G3CZG, recalls the story of a former Merchant Navy radio officer who, while recovering from an operation for the removal of a brain tumour, was for some days quite unable to speak yet was able to

communicate fluently, via another morse-wise patient, with the surgeon and medical staff. G3CZG also notes from personal experience that some loss of hearing has not impaired in any way his ability to copy even the weakest cw signals.

Syd Fenwich, G3AIO, experiences distortion of speech, particularly in one ear, that severely limits his use of ssb; yet, thanks to cw, he still communicates worldwide and chases the dx.

Roy Oliver mentions that WB4MBK is deaf but receives cw "on the tv set" presumably using automatic decoding. The value of the subtitling services on Ceefax and Oracle teletext services is well established, though I am not sure that I would regard microprocessor-decoded telegraphy and data as true person-to-person communication in the way that we have been discussing.

Nigel Neame, who launched us into this debate, mentions in a further letter that he hopes to remove that "ex" from his ex-G2AUB designation. He does, however, stress the need for the hard-of-hearing to take some care in the strength of signals when listening on headphones. He writes: "There are two main forms of deafness, 'nerve' and that caused by 'mechanical failure' (ie collapse or malfunctions of the tiny bones between the eardrum and the inner ear). Either can produce varying degrees of deafness, from slight to total. In each case, when headphones are employed, automatic limiting of peak audio output is *essential*, otherwise any hearing ability remaining could be further impaired, even destroyed."

Personally, I believe that all those who use headphones, no matter what the state of their hearing, should use peak audio limiting. My own choice for many years has been one or two pairs of back-to-back anti-parallel diodes across the leads of high-impedance phones (or alternatively, if low-impedance phones are used, at a suitably high impedance stage). Such a limiter protects the ears from loud crashes, particularly if the receiver is not fully muted during transmission. On the few occasions that my limiter has been disconnected I seem almost to blow my head off!

## Those were the days

My recent confession that I still make good use of a 'fifties LG300 transmitter and a 'forties Hammarlund HQ129X receiver has found some echoes among those who fear that modern equipment has a greater degree of built-in obsolescence and may be destined for an appreciably shorter operational life.

Syd Fenwich, G3AIO, writes: "Like you, I run an LG300 transmitter for cw on the hf bands. It is about 25 years old. The 813 is still going strong after much use and abuse—and plenty of the latter. It runs 150W input quite effortlessly, the 813 merely ticking over at this power. The signals bring favourable comments from old hands. I wonder how many of the solidstate rigs will be performing as well after 25 years of knock-about use?"

David Marsden, G4RMC, feels that the Japanese manufacturers may have misjudged the demand for simple, economy rigs. He is not convinced that amateurs do really want "all-singing, all-dancing" models as much as the marketing men would have us believe. He points to the continuing popularity of the FT101, TS520 in support of his view. He notes that Trio actually reintroduced the TS530 after discontinuing it for a time. He also mentions an incident concerning the problem of repairing equipment based on surface-mounted technology (smd). "Two or three days ago I happened to visit a radio repair shop as a radio pager unit was being repaired. I was shown one board, about 1.5 by 0.75in which was a masterpiece of miniaturization. No doubt it was very good in every respect, except that a film resistor is prone to frequent failure. When this happens the whole board is replaced at a cost of £47. I came away even more convinced of the continuing value of 'kiss' designs!"

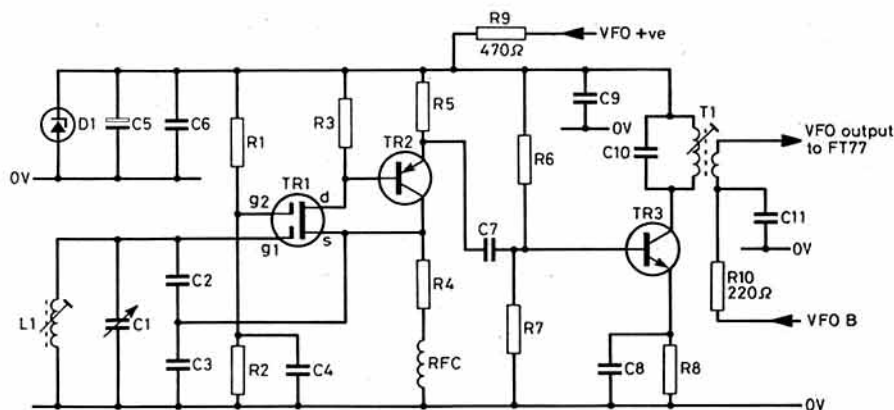
## Stable vfo with bipolar-assisted mosfet

It seems a long time since *TT* has featured a new design for a stable vfo, possible as a result of presenting in *TT*, *ART*, *Radio Communication Handbook* etc, what became virtually a standard vfo design by G3PDM using a 2N3819 fet as the basic Colpitts oscillator. With this design, it was



emphasized strongly that good vfo performance depends as much or more on good construction as upon the circuitry. A total of some 15 constructional hints were listed, and these remain valid if minimum long-term and short-term frequency drift is to be achieved.

**Fig 2.** G4UAZ's 5 to 5.5MHz stable vfo. R1, 2—100k $\Omega$ ; R3, 1k $\Omega$ ; R4, 5—270k $\Omega$ ; R6, 56k $\Omega$ ; R7, 22k $\Omega$ ; R8, 10—220 $\Omega$ ; R9, 470 $\Omega$ ; C1, double-bearing variable; C2, 3—2,200pF polystyrene; C4, 6, 7, 8, 9, 11—10nF ceramic disc; C5, 5—6 $\mu$ F; C10, 100pF silvered mica; TR1, 3N200 or 3N140 (but handle with care!); TR2, BFR99 or any high (1GHz) FT pnp; TR3, 2N2369 or 2N2222; D1 6—8V zener BZY88; L1, about 5t 18swg enamelled on 5mm former with "purple" core; T1, 30t primary, 15t secondary (same former as L1); rfc, 1mH choke



John Hawes, G4UAZ, however, believes with some justification that "the problem of building frequency-stable vfos has always been the bane of the home-constructor" often, unfortunately, ending in "a chase with a receiver to see where they have drifted to"—that is, the ones that can be persuaded actually to oscillate readily.

In the *CARA Newsletter* of August 1985 he expressed his delight in finally evolving a circuit for a vfo which seems to give good stability easily. This design evolved to meet a requirement for an 11MHz vfo for a 1.8MHz transceiver, but has been used also for the standard vfo range of 5 to 5.5MHz.

Earlier work had emphasized the difficulties that can be experienced in coaxing junction and dual-gate fets to oscillate in the Colpitts configuration. Bipolar transistors, on the other hand, oscillated readily but dragged down the  $Q$  of the tuned circuit and tended to result in drift. A high- $Q$  is needed to give a sufficiently rapid change of phase at the frequency of operation.

The answer, G4UAZ found, was to use a compound circuit comprising both a dual-gate mosfet to provide very high input impedance and so maintain the  $Q$  of the tuned circuit plus a bipolar transistor to provide the gain necessary to ensure ready oscillation. Note that in Fig 2 TR2 is not a buffer stage but is essentially part of the oscillator stage.

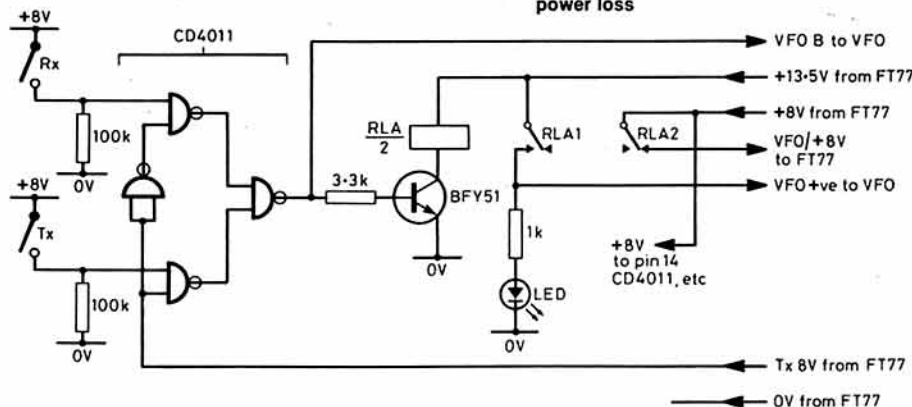
The version shown in Fig 2 tunes from 5 to 5.5MHz for use as an external vfo, in G4UAZ's case, with an FT77. Component values are not unduly critical, the tuning capacitor being a junk box item in the form of a sturdy two-gang, dual-bearing type with each section having a maximum capacitance of about 100pF (only one section was used in practice). C2 and C3 are polystyrene film capacitors (the type in which the aluminium film can be seen rolled up inside a transparent plastic casing). These capacitors are pretty stable, almost as good as silvered mica but with a negative temperature coefficient.

G4UAZ built his unit on Veroboard, and melted some candle wax over the coil, the tuned-circuit fixed capacitors and other nearby oscillator components in order to anchor the components and prevent short-term drift due to draughts around individual components. He strongly advises checking out the oscillator before applying the wax! Fig 3 shows his circuitry for interfacing the vfo with his FT77 via the external vfo socket. Despite his feeling that constant running of the vfo would result in optimum stability, he follows the FT77 practice in turning off the vfo when not in use.

The entire unit is housed in an ex-video-game sloping-front plastic box. Frequency drift is rarely sufficient to change the 100Hz digit of the FT77 frequency display in half an hour, easily adequate for any use. Switch-on drift is negligible, showing the degree to which oscillator frequency is independent of the sustaining amplifier.

G4UAZ claims it is the least critical vfo he has ever come across.

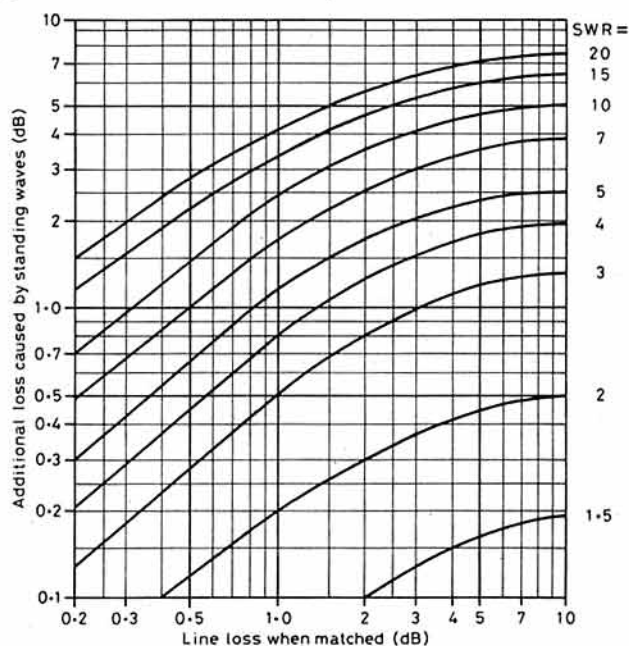
**Fig 3.** Arrangement for connecting an external vfo, such as that of Fig 2, to a transceiver such as the FT77



## Fooling the swr meter

A few years ago, following a lead by Walter Maxwell, W2DU, a serious attempt was made in *TT* to destroy the widely-held myth that power "reflected" from the antenna (due to a mismatch between the antenna element and the

transmission line), is absorbed in the transmitter (possibly damaging the output stage) and is entirely lost. W2DU reminded us that, in practice: (1) any power returning down the feeder (and this really *does* happen), is not absorbed in the transmitter but is promptly reflected back up the transmission line and most of it radiated eventually; and (2) power losses due to a modest mismatch are usually so low as to be virtually negligible and related directly to the basic attenuation of the transmission line: Fig 4. It was shown that the power loss with open-wire transmission lines can remain very low indeed even when these are operated as a "resonate" line with an



**Fig 4.** A standard diagram showing by how much (or at hf usually how little), additional power is lost in a feeder having a moderate vswr compared with the same transmission line when accurately matched to the antenna element and thus having a 1:1 vswr. Remember that the transmission line vswr is not changed by means of an atu and that an atu may itself introduce significant power loss

almost infinitely high swr. Even with more "lossy" coaxial cable the loss on hf due to an swr ratio of, say, 2:1 or 3:1 is of little consequence unless the transmission line is unusually long or unusually lossy.

All this implied that amateurs who worried, as many of them did (and still do), at not being able to make their swr meters read 1.0, 1.1, 1.5 or even 1.8 would almost certainly be wasting time and money if they took "corrective" measures such as adding (for this reason) an atu, trimming their antenna elements, discarding an antenna system as useless etc. There is even a range of expensive "antenna matchers" being made in the USA which are little more than a toroidal balun transformer shunted by high power load resistors and thus capable of offering an swr of only 1.4:1 even with no antenna connected! QST exposed this "con" in November 1984 and *Amateur Radio* (VK) in April 1985 (brought to my notice by J E Price, G4OIK). Offered as sealed units at prices up to \$1,000 it took x-ray photographs to reveal that unwitting amateurs were buying dummy loads rather than antenna matching units!

But the attempts to wean amateurs away from the fetish of the swr meter and the pointless search for "perfect" (1:1 swr) impedance matching have been only partially successful. Just as the message was beginning to get through, massive "interference" in the form of solidstate protection circuitry began to blot out the weaker signals of technical commonsense! Because many solidstate amplifiers are vulnerable to the higher voltages that exist when feeding directly a transmission line having even quite a modest swr, it is an almost essential precaution for designers to incorporate circuitry that severely cuts back the power output of a transmitter when this is "looking into" an swr of more than about 2:1. In some cases the amplifiers begin to throttle-back when the swr rises to not much more than 1.5:1. This has meant that amateurs using such rigs do need to get the swr down to less than about 1.5:1 even though this usually has only a marginal effect on the efficiency of the antenna system.

As a result, the antenna matching or tuning unit has come back into favour, even though the use of an atu with a coaxial cable transmission line has no effect on the cable itself and, indeed, often introduces quite significant power losses since an atu can (and often does), dissipate a lot of power, at least on some bands. Admittedly, the atu may (or may not) have a useful function in reducing harmonic output, and is essential for feeding many types of antennas, but one must sympathise with the view of Norman Sedgwick, G8WV (*Rad Com* May 1986, p335 *et seq*), when in this connection he regards "atus as rather sneaky devices which conceal the antenna's shortcomings from the operator but (also) conceal them from the transmitter, which is the important thing".

It is also paradoxical that many amateurs buy "broadband" transmitters that do not require retuning when changing frequency, but then find they need to use an atu which does! In turn this has brought about a demand for automatic tuning units that are by no means cheap. Remember that with a coaxial feeder the "sneaky" atu does absolutely nothing to increase the efficiency of the antenna system and may actually reduce the radiated power! It seems logical, wherever possible, to dispense with an atu for those antenna systems such as a dipole with coaxial cable feeder which do not inherently require a matching unit.

## Increasing antenna bandwidth

As we have noted before, the wider 3.5MHz band (3,500 to 4,000kHz) available in some regions has encouraged the development of techniques that extend the bandwidth over which a dipole element and coaxial cable feeder results in an swr of less than, say, 2:1. A wire element will normally not do this over more than five per cent of its resonant frequency. Fatter elements, including the folded dipole element, have a lower *Q* and hence rather greater bandwidth. Bent and loaded elements tend to have higher *Q* and hence less bandwidth for a given swr ratio.

Bill McLeod, VK3MI, has tackled this problem in a novel way. In a recent article "Mis-matching for extended bandwidth", *Amateur Radio* (VK) April 1986, pp18-9, he shows how by the use of a quarter-wave impedance transformer and a compensating capacitance (which can be constructed from a length of feeder), an antenna element that is deliberately slightly mismatched at its resonant frequency can provide an extended bandwidth over which the swr remains below 2:1. Instead of about five per cent, which is, say, 180kHz at 3,600kHz with a conventional dipole, this technique can result in better than 10 per cent bandwidth for an swr of less than 2:1. This would enable a Region 1 operator to cover the entire 3.5MHz band with a wire dipole without an atu, yet without exceeding an swr of 2:1.

In practice, VK3MI has taken this technique to its extreme by using it in connection also with a "thick" dipole element made from a 15cm (6in)-wide ribbon of hot-dip galvanized wire mesh. This has a normal low-swr bandwidth of 300kHz, but his mis-matching technique extends this to 580kHz, thus covering the whole of the Region 2 and Region 3 band. To quote the introductory paragraphs to his article:

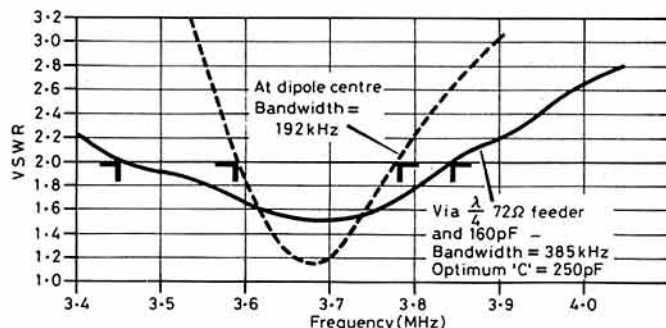


Fig 5. Showing how VK3MI finds that the bandwidth of a dipole can be increased by deliberately mis-matching a 50Ω dipole by feeding it with 72Ω cable and then providing capacitance compensation. In the example shown, the minimum vswr is about 1.5:1 but the bandwidth for which the vswr remains below 2:1 is increased from 192kHz to 385kHz

"The finicky transmitter that requires no greater than a 2:1 vswr from its nominal 50Ω implies that any load impedance from 25 to 100Ω would be satisfactory. There, matching it to a 50Ω load (in the conventional manner), that rises in a complex manner on either side of resonance, allows only half of the available range to be used.

"Why not match it to 25Ω at antenna resonance for a rising characteristic, or alternatively to 100Ω with an inverted impedance characteristic? Then, look at the hf coaxial feeder which is almost never a 'flat' 50Ω . . . The antenna, particularly for 3.5MHz, is usually a half-wave dipole of low height (10m or less), with a bandwidth around five per cent of resonant frequency (for 2:1 vswr), and a mid-band impedance about 55Ω. Only at the mid-band frequencies can a random length of 50Ω cable be successful.

"Now consider the quarter-wave transformer: (a) it transforms the load impedance across its Zo by the square of the ratio between the two; (b) it inverts the load impedance characteristic over the bandwidth from a u shape to an n shape; (c) it transposes inductive reactance to capacitive reactance and vice versa; and (d) only half of the total load/source vswr shows at each end (more accurately the root of the ratio).

"With an electrical quarter-wavelength of 72Ω coaxial cable (eg UR70) between the element and the transmitter, a 55Ω element impedance can be inverted and transformed for the transmitter to "see" 94Ω at mid-band, falling away each side down through the nominal transmitter output impedance of 50Ω for the bandwidth to increase by a useful factor of 1.5. This can be further increased to a factor of 2 by compensating the capacitance mis-match at the antenna junction: Fig 5.

"The compensation required for the quoted example of 55/72Ω is 300pF at 3.65MHz, consisting of the difference between the total capacitance of the quarter wavelength of cable actually used (920pF for UR70 at 69pF/m), and that for a similar notional cable matching the antenna (1,220pF for 55Ω). This value is not critical and can be varied by 30 per cent or more to adjust the lowest vswr point two or three per cent for convenient system corrections.

"The capacitor can consist of an open stub of the same cable, cut for the required capacitance (eg 4.5m of UR70 taped to the feeder, or a fixed mica capacitor of suitable voltage rating (250V or higher), depending on arrangements for waterproofing at the element feedpoint.

"For those with a transmitter sited more than 13m from the antenna feedpoint, there are two alternatives. One is to use a three-quarter wavelength of 72Ω cable, with any excess stored in the rafters or attic. The other is to extend the antenna centre for the first quarter-wave using a matching cable (eg UR43 52Ω cable), then transform with a further quarterwave of 37Ω cable."

## Compact transmitting loop antennas

From time to time, ever since the publication in the mid-'sixties of the details of an octagonal loop antenna made up from six straight 5ft tubes and developed by the US Army Limited War Laboratory (see most editions of *ART*), references have been made in *TT* to electrically-small transmitting loops both for amateur and professional radio communications. The key features are that the loop must have extremely low ohmic rf impedance and that there must be no undue losses in the matching arrangements. These basic essentials point to the use of copper- or even silver-plated tubing of several inches diameter for the loop—although the outer braid of good quality 0.5in coaxial cable has been used with reasonable success—and the use of a capacitive matching network rather than having any coils in the matching unit. It must be appreciated that a small loop used on say, 3.5MHz is likely to have a radiation resistance of only a tiny fraction of 1Ω, and that in these circumstances ohmic losses assume great importance.

In *TT* July 1984, p580, a note from Ron Rew, G3HAZ, drew attention to a professional pedestal-mounted loop made by Antenna Research Associates. It was 5ft high and 7ft wide and had a claimed radiation efficiency of 98 per cent at 14MHz. A basically similar product was marketed several years before this by Technology for Communications International (TCI) for such purposes as diplomatic communications networks operated from embassies etc. These antennas used remote-controlled motorized vacuum-type capacitors to tune the loop to the operating frequency, offering a tuning range of several octaves.

It was pointed out that although manufacturers may claim a "directive gain" of around 5dBi, this should not be confused with "power gain"—particularly at the lower end of the tuning range where the radiation efficiency inevitably drops due to the progressive reduction of radiation resistance as the loop becomes increasingly small in relation to the wavelength.

The original claim for the US military loop was that it could perform almost as well as a dipole at a height of 40ft. It is a pity that some articles in amateur radio journals have made excessive claims based on the theoretical gain at low vertical radiation angles of short vertically-polarized antennas over perfect earth. Such claims lead only to disappointment and ultimate rejection of the whole concept. Nevertheless, a small transmitting loop, provided the losses can be kept low, does offer scope for use in some awkward locations. It is, for example, well suited for use in buildings having a small flat roof that would not permit the erection of a conventional dipole.

A contribution to this technique stems from J H Dunlavy, who obtained a US Patent 3,588,905 (28 June 1971), for a "wide range tunable transmitting antenna" based on a configuration that has become known as a "miniloop". In this antenna an electrically small, capacitively-tuned outer loop is excited by an even smaller inner loop that can be fed directly by the coaxial cable feeder. A technique that also forms the basis of A R Carr's US Patent 4,433,336 of 21 February, 1984 for a "three-element antenna".

Fig 6 shows the "miniloop" principle, together with equivalent circuits for both inductively-fed and directly-fed loops. In effect, inductive feeding of a high-*Q* resonant loop antenna is simply a version of the once popular "link coupling" between resonant circuits with the aid of a low-impedance line.

Operation and equivalent circuits are discussed in a paper by Donald E Barrick (Ocean Surface Research) in *IEEE Transactions on Antennas & Propagation*, Vol AP-34, No 1, January 1986, pp111-4. Although his paper points out that this technique is not suitable for hf radars designed to measure ocean currents and waves, since the *Q* is so high that it stretches and delays short pulses, he does point out its advantages over systems using the outer loop alone, fed directly, for communications applications. He writes:

"It's main features (and differences in operation from the outer loop fed alone) are: (1) the input resistance to the inner loop can be large (eg 50Ω), although the input (radiation) resistance when the outer loop alone is fed

is generally a fraction of an ohm (decreasing as  $f_0^{-4}$ ; hence feeding is easier for the miniloop; and (2) a fairly good match to the line can be maintained over nearly a decade bandwidth as long as the outer loop is tuned to the desired operating frequency and is electrically small at the upper end of the band."

Inductive coupling to a resonant loop was also used in the professional Swedish design that was tested initially on the 3.5, 7 and 14MHz amateur bands and described at an IERE conference in 1981 (*TT* September 1981, p821). This comprised a three-turn silver-plated radiating square loop with 500mm sides and using a ferrite balun to match a 52Ω coaxial cable to a 200Ω feedpoint of the coupling loop.

There is no longer any doubt that compact hf transmitting loops can be made to work efficiently provided that great care is taken to minimize losses and to tune it accurately to the operating frequency.

## HF active receiving loop antenna

While transmitting loops are still unfamiliar and rather strange beasts, simple loop receiving antennas date back to the earliest days. However, they are coming back into favour as the basic element of compact "active" antennas. John Hawes, G4UAZ, has drawn my attention to a design for a matching amplifier that he published in the *CARA Newsletter* (December 1984), of the Cheltenham Amateur Radio Association. He writes:

"Several active antennas have already been featured in *TT*, but I believe mine has the virtue of great simplicity yet seems to have good signal-handling capabilities, despite being essentially a broadband, untuned antenna."

The following notes are extracted from the original article:

"Small antennas (compared with the wavelength) are dogged with the problem of low radiation resistance. This means that an incoming signal must be transformed to the impedance of the receiver input with low loss. Conventionally this implies a narrow bandwidth, and matching difficulties. An answer is the so-called 'active' antenna with a small passive antenna element directly coupled to an impedance-transforming amplifier. Most commercial models use a small rod element and high input-impedance amplifier. Bipolar transistors do not lend themselves to this type of amplifier, and even fet devices have a large input capacitance.

"It seems more feasible to use a small loop antenna with a low input impedance. Such systems have been described before in *TT* but I wanted a simple amplifier that could be built in an evening or two: see Fig 7. I used BFW17A transistors, but any general-purpose rf type should work.

"The design uses a push-pull (long-tailed pair) configuration, presenting a balanced input to the loop. Shunt voltage-feedback is used to reduce the input impedance as well as to linearize the amplifier. Used with a square loop with 2m sides made from 16swg enamelled copper wire, it received

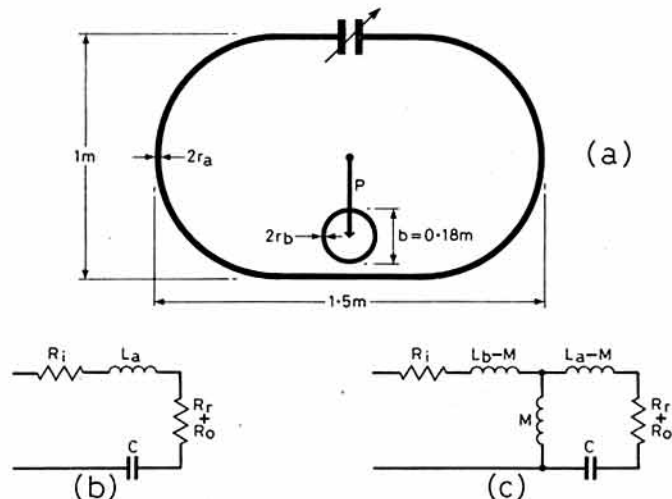


Fig 6. (a) Configuration of a typical miniloop structure designed as a transmitting loop from 3 to 24MHz. The outer loop is capacitively tuned to the frequency of operation. In this example the outer loop tubing has a radius of 0.04m and the coupling loop radius 0.006m, using copper tubing for both loops. (b) shows the equivalent circuit for an outer loop fed directly, while (c) represents the miniloop system with the inner loop fed and inductively coupled to the outer loop; in both cases,  $R_i$  represents the internal resistances of the source and transmission line

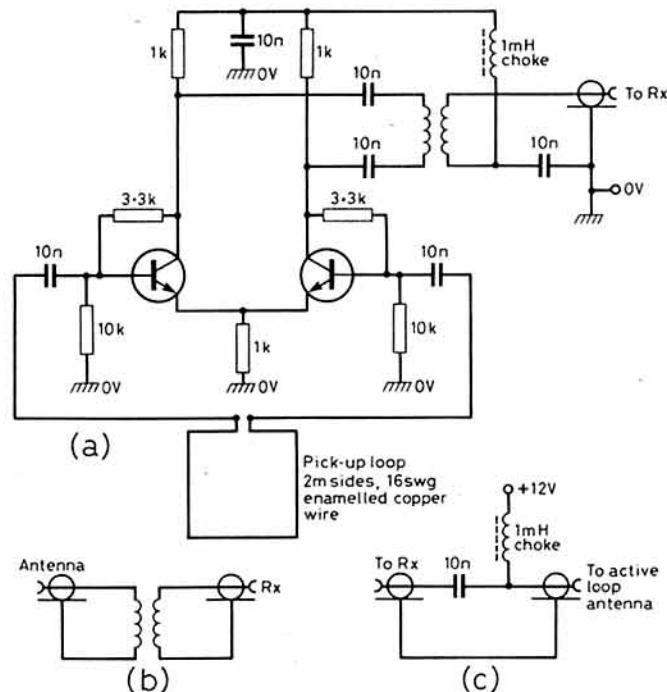


Fig 7. G4UAZ's active loop receiving antenna for use throughout the hf range. (b) Broadband toroidal coupling coil at receiver input. (c) Method of feeding active antenna over the coaxial cable transmission line



signals on 7MHz equivalent to my full-sized G5RV (with loop in vertical plane), and works over the full hf range. My amplifier was built on Veroboard with "ugly" wiring. The only difficult component is the 1:1 rf transformer for which I used a toroidal core from the junk box. Several turns of twisted bifilar wire were wound on the core, and checked as follows: First, one of the windings should be wired across the input of a receiver tuned to the lowest band of interest. The other winding must be open-circuit, and little reduction in signal should be noted provided the primary inductance is adequate. Then wire in receiver as in Fig 7(b). Before trying the amplifier, a dc check is worthwhile, about 10·5V on the collectors and about 3V on emitters should be found with a 12V supply. I power my amplifier through the coaxial feeder with the circuit of Fig 7(c), but if you do not wish to spend money on 1mH chokes, running a separate supply wire would be entirely satisfactory. It makes an interesting constructional project."

## Top band antenna and atu

Dr Constantine Feruglio, IV3VS, uses a "double Zepp" (centre-fed dipole with balanced 300Ω ribbon feeder) plus atu. This works well on 3·5 to 28MHz, with the antenna having a horizontal span of 40m. However, he found that results were "only middling" on 1·8MHz, and has lengthened the top section by folding in extra wire as shown in Fig 8(b). While the folding results in a lower radiation resistance than had the "top" being in a straight line, the antenna works reasonably well on all bands from 1·8 to 30MHz and permits working "all over Europe" on 1·8MHz. Marconi "end-fed" antennas are ruled out on the grounds of tvi, IV3VS being a "third-floor" dweller.

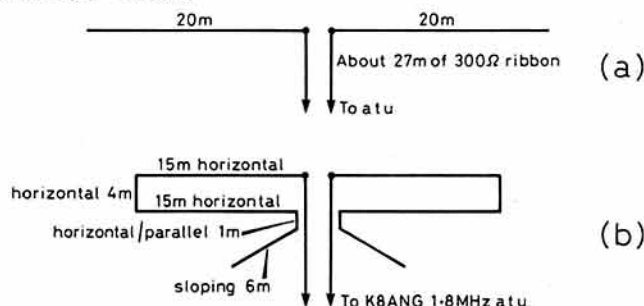


Fig 8. (a) Centre-fed dipole as used by IV3VS but providing only marginal results on 1·8MHz. (b) Additional wire loading to improve results on 1·8MHz

As a flexible 1·8MHz atu he uses an arrangement described by John Skubick, K8ANG, in *73 Magazine* (date unknown): Fig 9(b). This is a variation of an atu that similarly delivers a balanced output based on pi-networks that has previously been described in *TT* and other RSGB publications (I used this arrangement for a number of years on 14 and 21MHz for feeding a folded dipole made from 300Ω line): Fig 9(a).

IV3VS constructed L1 and L2 using two perspex (lucite) pipes. L2 comprises 50 plus 50 turns on 56mm diameter pipe using 1mm diameter

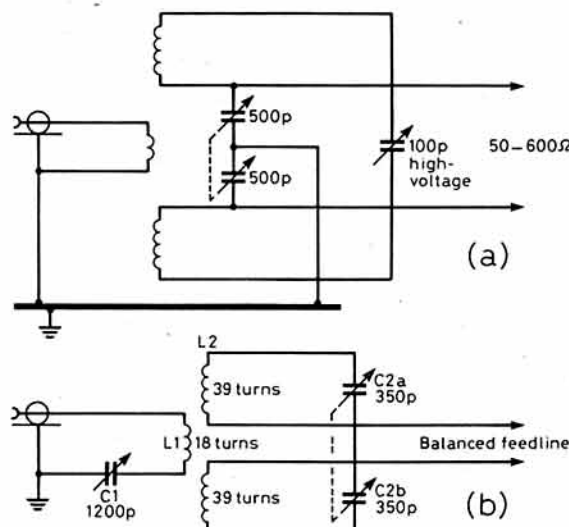


Fig 9. Antenna matching units that provide balanced output suitable for open-wire or 300Ω balanced feeders. (a) System used at G3VA for 14 and 21MHz for a number of years. (b) The K8ANG arrangement used by IV3VS and suitable for 1·8MHz

enamelled copper wire, winding length about 110 plus 110mm. L1 on 70mm diameter pipe comprises 20 turns of 1mm diameter enamel copper wire, winding length 50mm and positioned over the centre of L2. C1 can be made from a three-section broadcast-type ganged capacitor. K8ANG advises not to earth any portion of L2 or C2 but leave them "floating" above earth on insulators.

## Making a pcb—Mark 2

*TT* November 1985, page 860, included a note from G8XEH outlining a simple way of transferring pcb layouts from diagrams on to the boards using a scribe and centre punch. Jim Cookson, G4XWD (his callsign reflects his interest in restoring old ex-WD equipment!) suggests "an even easier way". He writes:

"Obtain a photocopy of the pcb layout drawing. Make the copy as dense as possible, then lay it toner side down on to the cleaned copper side of the laminate and, using an ordinary domestic electric iron just hot enough to scorch the paper lightly, firmly iron it down. (Note that the copy must be made with a modern electrostatic type of plain paper copier using toner powder). Leave it to cool, peel off the paper and it will be found that a good outline of the image will be seen on the copper board. This may need a little final touching up with a Dalo pen, but it is certainly a very quick and easy method of preparing boards. If a laterally-inverted image is required, a copy should be made on to a transparency and the other side copied. I work for Rank Xerox and have made quite a few pcbs in this way."

## Restoring ex-WD equipment

In connection with his interest in restoring ex-WD equipment, G4XWD would like to see more sharing of information on circuit diagrams, ideas for making improvised component parts to replace those that are long out of production, etc. He points out, for instance, that it is often difficult to renovate the paintwork on ex-military sets but that many motor car accessory shops are selling off "old colours" in spray cans. In Birmingham it is often possible to buy about three cans for £1, and that frequently a good match can be obtained for an old set at minimum cost. Large old-style capacitors can be unsoldered and modern components fitted actually inside the cans which, when re-soldered and re-sprayed, retain the original appearance. He has just finished restoring an old Hallicrafters S27A receiver that had been reduced almost to scrap due to rust and the use on it of a "blowlamp" soldering technique. He removed most of the components from the chassis, emery-clothed the rust off and sprayed the chassis with silver paint, followed by a coat of clear cellulose. Although not original, the result is very attractive and the set now works well. G4XWD is anxious to obtain the manual for the ZC1 Mk2 transmitter-receiver (one time very popular in New Zealand and Australia as an amateur rig).

## Tips and topics

Evert Kaleveld, PA0XE/DL0XJ, a wartime Dutch underground operator, has raised a topic which is, perhaps, strictly operating practice rather than technical but nevertheless is one that surely needs airing. He notes that although the origins of such abbreviations as 73 and 88 stretch back into the 19th century American telegraph codes, the German-originated abbreviation 55 (often listed as *viele erflug ie much pleasure*) seems to be of quite recent origin, having been first listed in the German *QRV* journal of February/March 1947. Today it is very widely used in cw contacts, not only by German and Austrian amateurs.

But why 55? Could it be, PA0XE surmises, that in the immediate post-war years, when all operation by German nationals was covert, that some misguided humourist took a secret delight in simply modifying the "HH" (Heil Hitler) abbreviation that had been virtually obligatory for German amateurs from 1933 right up to May 1945 (Yes, some Germans were permitted to operate as amateurs throughout the war under the supervision of an SS general). He simply added an extra dit to the four dits of each H and so created 55.

HH was listed in the *Signal-buch fuer den Funkverkehr* published in Vienna in 1941. This also listed 73, 88 and even the little used 99, but had no trace of 55. Evert stresses that if, as he believes, 55 was a "black joke" it certainly does not mean that those German amateurs using 55 today have the slightest idea that unbeknowningly they may be perpetuating a Nazi salute. Personally, I suspect that HH may indeed be the origin of 55, and since the idea was first put to me I for one have stopped using it!

Chas Claydon, GM4GNB, following up the items on the April Fool resonate earphones, recalls the famous Brown Type A which were standard Naval issue for many years and suggests these used the principle of the "tuned reed" and had a natural resonance at 800Hz. As one who wore these phones for several years I agree in part, although they would certainly respond reasonably well to speech and music: the knurled knob on the side of each phone was, as GM4GNB says, to adjust the gap in order to obtain

maximum sensitivity. The technique of adjustable diaphragms was used by Telefunken for lightweight phones widely used in the German forces, as Ken Mildren, G3FVD, reminds us, and as indeed I can confirm since I still often use a pair of these phones which have a captive diaphragm in the cover and a locking ring to adjust for sensitivity (but not for adjusting the resonance).

An unintended result of my notes (TT March) on cordless telephones is that it has apparently given some readers, who must remain nameless, a new interest in listening near top band. It contravenes the Wireless Telegraphy Acts, of course, but I am told it can be highly entertaining. It also confirms how far the fundamentals of these cordless phones can reach. My advice is watch what you say on them—better still, stick to the cord type!

Richard Barber, G4LXG, writes from Canada to suggest that it is possible to be misled by small-scale ground conductivity maps such as that

given in Fig 6 of the February TT. He comments: "I fully appreciate that it is intended only as a rough guide, but from my own experience I know that proper testing of the site is the only satisfactory method of conductivity determination. My former QTH sat above rather more than 27ft of wet clay with only 9in of topsoil. Within a few hundred yards the clay gave way to a substantial seam of sandstone in which the local electricity board had difficulty establishing a good earth. Perhaps the recently updated map of soils of the UK may provide better local information. These maps are available from the Agricultural Development Advisory Service."

In the January TT (p37), it was noted that recent work at the high-power hf "ionospheric heating" transmitter at Ramfjord in northern Norway included the generation of frequencies in the range 1 to 1.5kHz by using the non-linear effects in order to modulate and radiate elf signals from the polar electrojet. This technique has now also been used in the USA. □

## REVIEW—AMATEUR RADIO SOFTWARE

(Continued from page 415)

### MORSE TUTORS

	Speed	Check sending	Vary spacing	Text	Groups	Punctuation	Letter sounded as typed	Select letters	Comment
Scarab	3-30	Yes, receive only	Yes	750-word vocab	Yes	No	No	Yes	Protected disk.
Binary Star	5-27	Yes, reporting	Yes, by whole seconds	400 words, 180 phrases, or enter own	No	No	Yes	Certain sections of alphabet	Also on Rom
Technical Software	1-40	No	No	Enter own	Yes	No	No	Select three options	
G4UXD	1-30	Yes, reporting	Yes, or enter own	5h of text	Yes	Yes	Yes	Special with extra short letters	

### LOCATORS

	Lat & Long	QTH	Maidenhead	NGR	Distance between Maidenhead locator	Direction of stations	Duplicate checker	Notes
Peysoft	Yes	No	Yes	No	Yes	Yes	Yes	
Scarab	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Binary Star	Yes	Yes	Yes	No	Yes	Yes	Yes	Also on Rom
Technical Software	Yes	Yes	Yes	No	Yes	Yes	—	
Locator Contest	No	No	Yes	No	—	—	Yes	

country prefix database. This will start with a whole callsign, stripping of the last letters in turn until a match is found with a country prefix. It will also give the prefix having been given the country. I appreciated having this program in my collection even though much of the program simply displays information that printed lists could also do.

### Operating aids

Despite the theoretical possibilities of driving a rig from a computer, there are two main problems found in practice. On transmit the rf in the vicinity of the computer can cause the program to "crash", and on receive the rf generated by the computer can affect reception. Nevertheless, there are programs to receive just about every mode available, and this can offer a relatively cheap and easy way of finding out about a new mode.

### RTTY

Using a microcomputer it is possible to try out rtty without heavy and noisy mechanical teleprinters. While there are many rtty programs, they all basically provide the same functions. All will cope with various speeds, and the differences are mainly in screen layout and whether you can start typing your over while still receiving. One reception-only program from Technical Software accepts tones from the rig's loudspeaker socket via a very simple one-transistor interface, but it will also accept the more usual input from a terminal unit. On all but strong signals or on vhf I found a terminal unit was really needed for serious operation.

Of the transmitting and receiving rtty programs, the choice for some time has been between Scarab Systems rather basic but perfectly adequate program and G3WHO's more sophisticated one. The latter has the "split

screen type ahead facility"—you start typing your reply as you receive the incoming over. I am pleased to see that a program from Ham-Tel has now been made available on disc. This offers more facilities and, once I had become used to its operation, I found it to be the most useful. Facilities include a message editor, a "QSO review", the ability to print text to a printer (either or both sides of the contact), a callsign capture facility and continuously variable speeds.

No cw program can hope to compete with the skills of a good cw operator. The ability of the human ear to follow a weak signal up and down in the noise on a crowded hf band helps to make this such an effective mode. All the cw QSO programs that I looked at could follow morse at impressive speeds but all required a good, clean signal. A good receiver with a narrow filter and an efficient agc line helps reception. Scarab Systems suggest a design of phased-locked-loop tone decoder interface which made a useful contribution. Even so, an experienced human operator would do far better.

Packet radio is another recently-introduced mode which can be used with the aid of a home micro. This mode was reviewed in *Radio Communication* March 1985, and it is possible to try out a version of it using a program from G4NWH. It is fascinating to listen to the rig transmitting packets of information in turn and watching it listen for acknowledgements and retransmit if they are not heard. I don't find this program very "user friendly", and I look forward to seeing some other packet radio programs that are being produced.

SSTV and amtor programs are available from a number of suppliers. Most require an interface between rig and computer, and without building each interface it would be unfair to offer comparative comments. Scarab Systems and Technical Software both offer sstv. Results that I have seen show that these programs do their job well depending on the design of the interface. I was particularly impressed with the very helpful instruction book which came with the amtor program on rom from G3WHO.

Mention must be made again of "RX4" from Technical Software which offers reception (but not transmission) of cw, rtty, amtor and sstv, all with a very simple one-transistor interface. Because of the simplicity of the interface its performance is not suitable for serious dx work, but as a means of whetting your appetite I found it most interesting.

In writing this review of a selection of available software, I have been most impressed by its high standard. Most firms support other popular computers, and I hope that I have given you some idea of how you can use your computer to support your hobby. □

### Names and addresses of suppliers

Amsat-UK, 94 Herongate Rd, Wanstead Park, London E12 5EQ.  
 Binary Star Technology, 6 Waveney Terrace, Haverhill, Suffolk CB9 8DZ.  
 G4UXD, D Brandon, Woodlands Rd, Chester CH4 8LB.  
 Ham-Tel, Rockhill, Llanarthne, Camarthen, Dyfed SA32 8LJ.  
 JEP Electronics, New Road Complex, New Road, Kidderminster DY10 1AL.  
 Paeon Systems, Quebec Marketing, Little Bealings, Woodbridge, Suffolk IP13 6LT.  
 Peysoft, 1 Retreat Cottages, Church Lane, Broadbridge Heath, Horsham, W Sussex RH12 3ND.  
 Scarab Systems, 39 Stafford St, Gillingham, Kent ME7 5EN.  
 Technical Software, Upper Llandwrog, Caernafon, Gwynedd LL54 7RF.



# NEWS & VIEWS

## VHF/UHF

Ken Willis, G8VR\*

### Sporadic-E

June is the month when sporadic-E propagation appears on the 144MHz band, and you may already have worked some dx when you read this. The first and third weeks in June have for some years been favoured with this type of propagation, and since we don't know the cause of this type of event we can only rely on statistical evidence which suggests that certain periods such as these are likely to provide extreme range dx by this mechanism.

With the advent of the 50MHz band, however, Es may well have appeared much earlier than June, though the limitation here is the lack of European stations authorized to use this band. There will of course be great hopes for a further "double-hop" path opening up between the USA and the UK on this band during the Es season.

Sid Lieberman, WA2FXB, has made a study of sporadic-E propagation over many years and has sent me much information related to his findings, unfortunately much too detailed to publish here. He describes formation of "windows" which open to enable transatlantic Es contacts to be made on 50MHz, sometimes of very short duration. The geographic position of stations with respect to the window is crucial, which may explain the somewhat directional nature of this form of propagation as witnessed in the openings last year. Sid believes that the limit of the east-west path is determined by the "geographic" midnight, which occurs 11° (of earth rotation) before local midnight, and that the ionized cloud supporting propagation is basically stationary above the earth, which rotates under it; the cloud height being estimated at about 50 miles above the earth's surface. There is much more to it than this potted version, including some papers published by scientists studying the subject at Boulder, Colorado, so I will try to come up with a shortened form of the arguments when space and time permit. Many others are studying Es. Graham Kimbell, G3TCT (Leatherhead), carried out an analysis of the 50MHz transatlantic openings and summarized his findings as follows:

- Such openings occur on days of low geomagnetic activity and may therefore exhibit a 27-day cycle (this was in fact noticed last year);
- The optimum period is June and July, optimum times being between (approx) 2100 and 0020gmt;
- Since there appears to be no correlation with sunspot activity, sporadic-E is the probable cause.

Graham points out that reliable high-power beacons in the USA and Canada would be a great help in furthering these studies. To approach the problems of possible transatlantic contacts on 144MHz by these means, Graham suggests monitoring 28.885 and 50MHz for evidence of activity, and to have as many stations participating as possible due to the "geographic selectivity" displayed by these events (see also Sid Lieberman's comments). Finally, it is not only the transatlantic path which is feasible; there ought to be equivalent paths to the east which open more frequently because of the higher incidence of Es over the Mediterranean. Good places to look for would be Saudi Arabia, Yemen, Oman and Bhutan, with an optimum time of 1500 to 1730gmt, since "these are only a bit further than 4X4" which has been worked by G3VYF in the past. Sid Lieberman is of the opinion that a 144MHz path to the USA from the UK by sporadic-E is unlikely, since the path is too long to support his window theory, whereas 50MHz paths fit his formula admirably.

The RSGB Propagation Studies Committee is participating in a European VHF Sporadic-E Study which began as far back as Spring 1982. A study period of four or five years is envisaged, and Ray Flavell, G3LTP, chairman of the committee, points out that professional researchers into propagation are taking a great interest in what amateurs are achieving, but find that currently-accepted theories cannot apply at 144MHz and higher, so that what we have been observing and reporting over a quarter-century may be quite a different process than that which leads to sporadic-E

propagation in the hf bands. The committee particularly needs observations of the duration of long ionospheric "sporadic-E" signals from distant stations which are fairly close together—say, within 100km of each other. Reports relating to any transmissions above 50MHz will be welcomed, provided that positive locations can be given. Send any such to G3LTP, QTHR, or to this column.

### VHF-UHF awards

The Mid-Cheshire ARS is offering a new award, the Vale Royal Award, with the aim of publicising the district of Vale Royal in the heart of Cheshire. There are two classes of award, Class A for single-band multi-mode operation, and Class B for multi-band, multi-mode. For full details, send an sae to Jack Loader, G6HXU, QTHR. The local council has financed the printing of the certificates, which are very handsome, and after the costs of administering the award have been met, the surplus will go to the Radio Amateur Invalid and Blind Club (RAIBC) and the Hebden Green Special School for Handicapped children. These are eminently good causes, so why not enclose a few extra stamps with the sae to help out?

The ARRL VHF-UHF Century Club (VUCC) awards, which were instituted with the adoption of "grid-squares" in the USA to encourage more operation on the vhf-uhf bands, have been claimed by some UK operators who have expressed great satisfaction at the artwork and quality of the certificates awarded. G8VR is European awards manager for this award, and to date has been pleased to approve applications from G6JNS (100/144 and 50/432—squares-band), G4UXC (100/144), G6HKM (100/144 and 60/432), G6DZH (100/144 and 70/432), G4XEX (100/144), G4PRJ (25/1,296) and DL6LAU (185/144). All contacts have to be made after 1982. For full details, send a large sae to G8VR, address at foot of preceding column, not as 1985 *Callbook*.

### FAl propagation

Anyone interested in making dx contacts via sporadic-E (or what we call Es), should also be aware of another propagation mechanism which occurs during much the same season, ie May to August each year. Es, the propagation at vhf by reflection from ionized patches in the E layer is a regular feature of these months. Less well known is the fact that, as the sun sets and Es fades, the same ionization is sometimes re-aligned down along the dipping earth's magnetic field lines to produce a crude "radio mirror", tilted to the south.

Several readers have asked for information on this type of propagation, call fai (field-aligned irregularities), so I asked John Branegan, GM4IHJ, to describe its features and possibilities since he is making a study of it. He says: "This field-aligned ionospheric irregularity (the crude mirror) can provide propagation by scattering over an arc to the south, to any station able to access its southern face. Stations to the north of fai cannot use it. A typical incident seems to have occurred on Friday 8 June 1984. Towards the end of a day of varied sporadic-E, many UK stations made excellent contacts deep into Russia. Fig 1 shows the probable position of this Russia-propagating Es cloud. As the Es faded, a new kind of propagation commenced from exactly the same place in the E-layer. This time it did not refract and forward-scatter signals along the same (great circle) path, but instead, turned and scattered them across a wide arc to the south of the scattering area, putting signals from Kent into Hungary and Yugoslavia. This effect is shown in Fig 2, an fai contour plot made by GM4IHJ's Spectrum computer program for fais. G3POI (Downe, Kent), who made good use of this propagation, had to keep aim at the former location of the Es centre where the fai had formed. He did not aim in the HG or YU directions which was where his new contacts were coming from."

John goes on to comment: "Any station hearing sporadic-E this summer should try to work out the rough location of the reflecting area, which is usually about half-way between your station and the one you are hearing via Es. Then, as the Es fades during the evening, try for contacts on 2 or 6m (144 or 50MHz) while still aiming at the last place the sporadic-E centre was observed. There is a temptation for stations hearing a dx signal via fai not to realize that it is this form of propagation and to aim the antenna

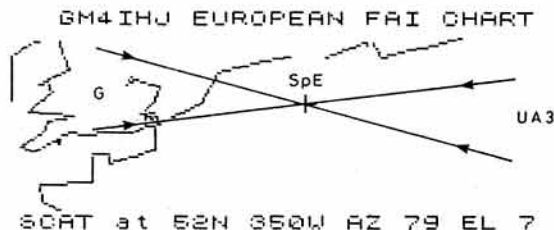


Fig 1. Approximate location of Es centre 8 June 1984. Courtesy: GM4IHJ

\*6 Lerryn Gardens, Broadstairs, Kent CT10 3BH.



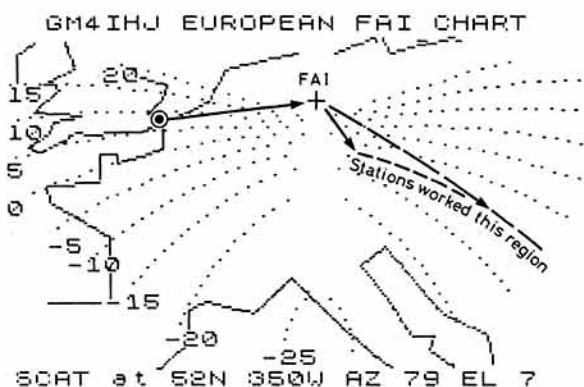


Fig 2. Computer-derived fai chart. Courtesy: GM4IHJ

towards the station heard. This will be fatal. Both stations must point towards the scattering area." John quotes a classic example of a G station who heard an OX calling on 144MHz and realized that although the OX was working Oscar 7, he was hearing him direct in the UK via fai. The G went on to the satellite and asked the OX to come up on 144MHz to listen for him, direct, on that band. The OX started to comply, putting a beautiful signal into the UK, which gradually faded as he trained his antenna "to point more directly at G". John says: "Don't be surprised if most stations make this mistake, which will recur until the word spreads about how to work this mode."

Another interesting point John raises is that Es which is intense enough only to produce contacts up to the 50MHz band may well be followed by fai which will support propagation on the 144MHz band, so monitoring 50MHz for Es can be rewarding for reasons other than those for which we have done this in the past. This could be an interesting summer!

GM4IHJ has written a computer program for the Sinclair Spectrum which produced the actual reflectance contour maps. He was commissioned to do this work by a group of Swiss amateurs, who, John says, are likely in their location to see more fais than we in the UK. John says that if there is sufficient interest in the program to make it worthwhile, he may be able to persuade the Swiss to distribute it. In any event, please do not write to John about it. This column will carry details of any developments in this connection, including evidence from GM4IHJ that the UK sees many more fais associated with the later stages of an aurora, and that some hf scatter propagation seems to be an F2 version of fai.

## The conventions

It was good to meet so many readers at both the VHF Convention, Sandown Park, on 16 March, and at the NEC on 5/6 April. The VHF Committee featured the 50MHz band on its stands, and Ray Cracknell, G2AHU, gave a fascinating lecture indicating what might be expected from this new allocation for UK operators (hopefully everyone in due course). Another great attraction was the lecture by Jim Bacon of tv weather-service fame, who intrigued a packed audience with his description of tropospheric propagation and its dependence on weather conditions. Both events will be the subject of more comprehensive reports in future issues of *Radio Communication*.

Keep an eye open for advance details of the Midlands VHF Convention planned for October, which will be published in due course. It is scheduled for 11 October 1986 in Telford.

## Expeditions

Michel Monteil, F/G6WDK (Egletons, France), plans to be active this year from Andorra during NFD (7-8 June), but still awaits completion of the "red-tape" associated with his portable licence. He hopes to have about 50W on 144MHz into a 9- or 13-element antenna, plus about 2W on 432MHz into a 19-element. There is a chance that he will be able to come up also on 1.3GHz. Location will be AC square (JN02) in the northern part of the country, and it is possible that he will be active from the same location during more than one weekend this summer. He gives preferred frequencies as 144.220 and 432.220MHz and particularly looks forward to working G stations.

At the NEC in April, the Square Bashers Expedition Group handed out further details of their proposed trip to Scotland, mentioned briefly last month. From 2 to 8 August they will be in ZR (IO97), hopefully signing GB2ZR if this is sanctioned. Mostly on tropo, they will accept a limited number of ms skeds, contact being G4VXE, QTHR. Then, from 9 to 16 August they will operate from YS (IO88), callsign applied for being GB2YS. This time will be mainly ms, though they will be keen to work any

stations that hear them via tropo. Skeds for this square will be arranged by GW4LXO, QTHR. Dates may vary slightly depending on road conditions etc, so it may be 4 August before they are QRV if they run into problems, so keep monitoring for them. Bands activated will be 50, 70, 144, 432, 1,296, 2,320MHz, plus 3.4, 5.7, 10 and 24GHz (G4FRE permitting, so they say! The full list of operators is GW3NYY, GW4LXO, GW4TTU, G4VXE, G4FRE, G8TFI and GW8TVX, so you couldn't wish for a more experienced bunch capable of digging the weak signals out of the noise.

As mentioned on the RSGB newscast on 13 April, experienced 144 and 432MHz operators willing to provide their own equipment and to live under canvas for a five day stretch on Snowdon are invited to apply to Howard Phillips, G8YHB, on 01-743 0747, day or evening. The aim is to man a special event station on this site on the summit during June, July and August.

There will be another chance to work the Isles of Scilly between 2 and 25 July when Dave Gray, G8YYB, will be there on holiday and operating on both 144 and 432MHz. His preferred operating frequencies will be 144.222 and 432.222MHz, and the location will be WJ19f (IN69UW). He promises that all contacts will be confirmed as soon as possible after his return to his Twickenham address. Dave comments that anyone who still requires a card from his visit to the Scillies last year should QSL via the bureau or direct QTHR. But he makes a plea; put the correct time, date etc on your card, since last year there were so many who did not, that it took much searching and head-scratching to sort things out from a very full log of contacts.

From the SM6EOC/SM6AFH 144MHz news sheet, G0AHQ will be active from UL square, and possibly UM square from 17 to 22 August and from WM square 24 to 29 August, on both 144 and 432MHz. No other information is available, so drop him a line QTHR.

## Aurora

Since the big auroras of 7 and 8 February, there has not been a lot of activity from this type of event, although several stations reported a recurrence of the February aurora 27 days later as the sun came around to present the same face towards the earth.

John Branegan, GM4IHJ (Fife) sent in his usual list of auroral "happenings", only a few of which will have reached very far south, but they are worthy of recording so that those who keep a check on these events can bring their notes up to date. John, of course, was in the thick of the "big ones", but also heard some GM signals tone-A on 11 and 23 February, and on 6 March. He copied Arctic television and Wick radar on 17, 22, 23 and 28 February, and on 1, 6, 7 and 8 March. At 1652gmt on 7 March he had clear Arctic television pictures via auroral-E, which lasted until 1717gmt when it reverted to a purely auroral and noisy signal.

GM4IHJ reported that Wick radar seemed to go off the air between 17 and 26 February, and returned with a totally new keying pattern, 200ppm with a short break in transmission on the minute, every minute. John says it sounds much rougher now and he guesses it has been modified. Does anyone else use this auroral indicator? I have not yet heard it in the south, but maybe someone has done so.

Jussi, OH5LK, has some useful comments to make about operating procedures during a big aurora. He says that if he gets more than one station responding to his CQ call, he listens until all have finished calling and then "seldom calls the strongest one". He said it was "quite frustrating to sit on G4—'s frequency from ZM square and listen to his pile-up, hearing him reply every time to a (presumably) loud GM station when the real dx was trying to attract his attention". Other stations Jussi heard (at 1,900km) and called without success (but not as a result of their bad operating!) were G4SWX (AM), G4DCV (AL), G3LTF (AL—who sent QRZ?) and G3IMV (ZL). Jussi said there were at least two "clouds" operating simultaneously in this event. He could work UA4s and UA9s with QTF 45-70°, and G/GM/PA/D/Y/SP on a heading of 265-280. He did not beam between 280 and 45° because too many Scandinavians were active, but the evidence is that one cloud was exactly to his west. The moral is, when we next get a big aurora (or even a little one), don't rush to work someone you have worked before just because it is a loud signal. There may be someone lurking there from a much greater distance, and you can always come back to get the more local stations as things begin to subside.

## Repeater news

Things must be very quiet on the repeater front since very little news has reached me lately. However, Geoff Booth, G8DZJ, sent some comments and a photograph relating to the effects of the winter on GB3SM, near Leek ("Staffordshire Moorlands"), which operates on RB13 with 10W erp. The area encountered the worst weather for 40 years with 60mph gales and heavy snow, which snapped power lines and blew up transformers on the electricity supply. It took workers six days to restore power to the area, and when GB3SM came back on the air its signal was down a bit—on

investigation it proved to have gathered some 10in of ice on three of its four dipoles. This repeater is some 1,450ft asl, so it caught the worst of the weather. Geoff says that membership of his repeater group is only £4 pa. Information from G8DZJ, QTHR.

From Spain, English emigré Doug Barnsley, EB5FYQ (Javea), sent a list of 144MHz repeaters used by the Javea club (near Alicante on the east coast), during the past 12 months, which may be of interest to those visiting Spain this year. I list the frequencies (output presumably), which he gives, rather than attempting to give appropriate UK channel numbers so there is no confusion. They are: Valencia (625); Gandia, Majorca N (650); Ibiza, Barcelona, Almeria (675); Murcia, Monte Linbara (700); Majorca E (712.5); Murcia (725); Denia (737.5); Alicante, Madrid (750); Valencia (775) and Castellon (800). Some of these do not tie up with the *International VHF-FM Guide*, published by G3UHK/G8AUU, but *aficionados* will no doubt be able to identify repeaters in areas they intend to visit.

## From the postbag

Remember that big aurora in February when it was reported (VHF/UHF April 1986) that KA1ZE (Connecticut) worked WB0DRL for a new US auroral record for 144MHz of 1,348 miles? The March 1986 *Midwest VHF Report* published by WB0DGF says that there was another contact at exactly the same distance—at least as far as can be judged—when in the same event WA0TKJ also worked KA1ZE. Apparently the record goes to the W0 station who was sitting furthest to the west in his shack at the time!

Emil Pocock, W3EP, is revising the vhf propagation section of the ARRL 1987 *Amateur Radio Handbook*, and wants details of any unusual contacts on 50MHz and above. Send anything you think qualifies to me, and I will arrange onward transmission.

John, G3OIC (Birmingham), is very interested in any antenna which would operate on both 70 and 50MHz. G3IMW used one with interlaced elements which he said worked well, but John referred me to an article in *RSGB Bulletin* (the previous name of *Radio Communication* December 1956, pp254-5. This described a three-band minibeam for 4, 5 and 6m (75, 60 and 50MHz) designed by "Dickie" Bird, G4ZU, based on the "ZL Special". John wonders if anyone could come up with a modernised design for this antenna, since the original was fed with 75Ω coaxial cable. This would be a very worthwhile project since most of us are limited in the number of antennas we can erect, so the possibility of using new bands when they become available is always tinged with the fear that the neighbours will regard yet another antenna as the proverbial breaking straw. Read the original article if you can lay hands on it, and let's hear your views on how to modify it for 50 and 70MHz. Did God so design things that resonant lengths of conductor or dishes must be used in antenna systems? Everything else has been miniaturized so effectively, but the antenna is just as big today as it was when I first got started many years back. Wouldn't it be nice if someone found a tiny semiconductor device which exhibited a gain of 12dB or so, was very directional and indistinguishable from some household object so we could all have antenna farms without the need for planning permission!

Steven Katz, WB2WIK, reminds us that the Second Annual CQ Wide-World VHF WPX Contest is scheduled for 19-20 July 1986. It is an international event, and all operators using 50MHz and above can participate. It starts 0000gmt 19 July and ends 2400gmt 20 July. Details from G8VR (see plus one 12p stamp for photocopy please), though log sheets must be obtained from CQ Publishing, 76 Broadway, Hicksville, NY 11801, USA, unless you want to photocopy the single sheet which Steven sent to me. The success of this as far as Europe is concerned will undoubtedly depend on how the news gets around, so pass it on to any of those enthusiastic types.

From SM6EOC/SM6AFH there is news that OZ1DJJ is going to Greenland for about two years, and plans to be active on 50, 144 and 432MHz. He requires an amplifier to work 432MHz eme. Any offers to OZ7IS. From the same source, OX3VHF beacon in Greenland should be now operational on 50.045 and 144.902MHz.

The 6 Metre Group suggests an activity night on 50MHz every Friday from 7pm until midnight, on the hour for calls. The VHF Committee wishes 432MHz operators to continue working for the "Monday Night Award", and will shortly issue regulations which allow the totals to be worked in any year, starting from the date of the first contact claimed, so continue to operate this band on Mondays (and Tuesdays, Wednesdays . . .)

DL6NAK reminds us that the AGCW-DL VHF/UHF CW Contest is scheduled for 28 June 1986. Times are 1600-1900gmt for 144.010 to 144.150MHz, and 1900-2100gmt for 432.010-432.150MHz. Call "CQ AGCW Test". There are three classes: class A (below 3.5W output); Class B (up to 25W); and Class C (over 25W output). Message format should be RST plus contact number, class, locator, for example 579004/A/JO31PK.

He says the "strokes must be transmitted". Scores are: A with A, 9 points, A with B, 7 points, A with C, 5 points, B with B, 4 points, B with C, 3 points and C with C, 2 points. Multipliers are one for each square worked and 5 for every country, including one's own country and square. He says total score is QSO points times multiplier, so it seems your score goes up five times every time a new country is worked, if this is really so. Logs to: DF7DJ, Bergkamener Str 76, D-4708, Kamen, W Germany.

Paul Turner, G4IJE, says that meteor scatter activity on 50MHz is definitely increasing, but more support for the Sunday morning activity periods is required. He suggests starting random ms on 50.350MHz on both Saturdays and Sundays from 0700 to 0900 clock time for the G to GM path. He also says there is much activity on the 3,718 or 3,720kHz 50MHz net starting around 7.30am, especially at weekends, which is a good place for newcomers to make skeds.

## HF

### John Allaway, G3FKM\*

An early mention of an item which normally appears last in this column! Please note that due to reorganization of the editorial department, the latest date by which material can be accepted for use in the August issue has had to be brought forward by one week—this means that the closing date will be 12 June. The September issue deadline will only be slightly affected and thereafter things should return to normal. Those who enter the various tables organized by G3GIQ are advised to send him their scores a week earlier than they would normally have done.

A point raised by G3XQU who worked a station believed to be the last expedition to Clipperton Is on 10 April 1985 at about 1830 on 14,195kHz. It seems that he has had his QSL returned marked "not in log" and he has heard of others suffering the same fate. He would like to know how many others were in fact returned.

## Miscellaneous news items

The latest list received from ITU detailing those countries which do not wish amateur service and amateur satellite service stations to exchange messages with other countries shows that this is the case in Angola, Saudi Arabia, Ethiopia, Ghana, Iraq, Suriname and Zaire. Thailand indicates "permitted on special request", and Iran, Kenya, Algeria, Cameroon and Qatar have restriction in the list of countries which they are permitted to contact.

At a board meeting in late January the directors of the ARRL decided that contacts made on the 18 and 24MHz bands should in future count for the DXCC award programme with no date restrictions.

A group of Dutch naturists will celebrate the 25th anniversary of the NFN by trying to establish contact with other naturists during the weekend of 14/15 June. A special QSL card will be issued for QSOs with PA2CJH/A which will operate near 3,770 and 14,270kHz. More information from Theo Vlaar, PA3CBH, Primulastraat 14, 5644 LK Eindhoven, Netherlands (please enclose return postage).

PA6VHS is on the air until 30 October on the occasion of the 25th anniversary of the formation of the VHSC. It will be operated from 1 May until 30 June by PA0INA, from 1 July to 31 August by PA0LOU, and then until 30 October by PA0SOL. QSL to the address in "QTH Corner".

## DX news

AB4Y is said to have now left Mozambique, where he had been unable to obtain a licence during his stay in Maputo. FT8YA is a new station on the air from Adleie Land, and has been worked on 14MHz ssb from the UK in the early mornings. F6AJN was expected to be returning to Tchad for two months or so commencing in April. 5R8AL is often to be found near 14,160kHz on Mondays and Fridays after 1800. He has also been worked on 21MHz a little earlier, and frequents 7MHz quite often. TL8MET is said to visit Snooky's Net, which meets on 14,183kHz from 1800.

According to *DX News Sheet*, PY1APS recently visited Angola on business and tried to obtain operating permission via the official channels. The official reply from the Angolan Ministry of Transport & Communications stated quite clearly that "amateur radio operation is not

\*10 Knightlow Road, Birmingham B17 8QB.



permitted in the Angolan territory". This raises some doubts about the legality of contacts with D2BCW.

Another country with licensing problems is Ethiopia. ET3PG seems to be authorized and may be found on Fridays on 14,220kHz between 0600 and 0630. Paul, F8HH, who used to be 5U7AW, is hoping to return to Niger for a two-month holiday at the end of the year.

N6MCD/OX will be in Greenland for several years. At present he is using ssb only and runs 30W into a loop antenna—he will be on cw in due course. OZ1DJJ is now OX3LX and will be in Julianahab for two years.

PA0VDV, who was very active a few years ago as PJ2VD, has recently visited Aruba and is convinced that it should count as a new DXCC country. It has its own government, parliament, money and stamps, and the Aruba Amateur Radio Club is intending to apply for membership of IARU Region 2. Amateur licences are now issued by the local administration and not by that of the Netherlands Antilles. Joeke suggests that Netherlands Antilles should become a deleted country and be replaced by Aruba and Netherlands Antilles (Curacao and Bonaire). There is a new station on the air from the Galapagos Is—this is HC8NGR, who has been active on 3-5MHz ssb.

The special callsign FV6NDX has been issued to the French publication *Les Nouvelles DX* for use this year. It will be used during contests and also from some of the French off-shore islands.

JT5AA has been reported on 14MHz, and OK1XC/JT has been on 7MHz cw around midnight and on 14MHz ssb around mid-day. The JT0 prefix is no longer issued to visitors.

DX-NL carries the news that a group of USSR amateurs have plans to put YA0A in the air from Afghanistan.

V85HG frequents 14MHz ssb. G4EFE has received no logs from VS5DD/V85DD since the prefix changeover in Brunei, and asks for patience. He would like those who work Rob to ask him to please send his logs to him as soon as possible.

There is a new operator on Chatham Is; this is ZL7TZ, who has been joining in with ZL2AAG's 7MHz net on 7,085kHz.

HF0POL is on the air again and regularly on the low end of 7MHz on cw in the early mornings. He also uses the other bands, and should be there for a year.

Market Reef has until now been using the OJ0 prefix. However, it is understood that the Finnish authorities will issue callsigns with the prefix OH0M in future and that all OJ0 callsigns have now expired.

## Overseas news

Ross Forbes, WB6GFJ/FO0FB, has let it be known that he will be back in French Polynesia again this year around 6 July and hopes to stay there for four to six weeks. He believes that his callsign will still be FO0FB but says that from 1 July all resident FOs will begin to follow the new French callsign system and become FO4s and FO5s. Look for Ross on 14,145, 14,180, or between 14,190 and 14,200kHz. During the IARU HF Championship contest he will be active on ssb. Last year he worked into the UK at 0600 on 11 July, which was a day with a solar flux figure of 94, and he suggests looking for a similar day this year! He says that if he finds a path open into Europe he will have the pile-up stand-by and take calls from Europe.

## HF QRP Day

17 June has been designated as an international HF QRP Day. It is suggested that on that day we all use low power—and we might just possibly have a pleasant surprise at the results that can be achieved! The G-QRP Club organizes a "QRP Summer Ramble" for its members which runs from 14 to 22 June. Particulars of the club can be obtained from Rev G Dobbs, G3RJV, St Aidan's Vicarage, 498 Manchester Rd, Rochdale, Lancs OL11 3HE. Membership costs £4.50 a year and includes four copies of *Sprat*, which is full of hints and tips and circuits of simple equipment which can be home-built.

## 28MHz propagation

G8PG has forwarded a most interesting report which he received from Miguel, EA3FHC, about his studies of sporadic-E on the band in 1985. The period reviewed was from May to July, although several openings were noted in April and during September and October. A total of 1,135 QSOs were made. QRP was used, but the worst report received was RST569, and S9 plus 40dB was common. Fifty-five per cent of QSOs were with the UK, the Netherlands and FR Germany. Miguel believes that too few people are aware of sporadic-E and this ability to work successfully with very low power—some of the time he used an antenna 1m long and battery-powered equipment from the beach! Normally a vertical groundplane with 1W of cw or 3W p.e.p. of ssb was in use, and an average of eight contacts a day was made, with a maximum of 90 on 13 July. Seventy-five per cent of QSOs resulted from "CQ" calls, and 70 per cent were on cw with a few

## ALL-TIME BAND TABLE - CURRENT COUNTRIES No 4

	1-8MHz	3-5MHz	7MHz	14MHz	21MHz	28MHz	Total
G3KMA	124	230	293	316	314	300	1577
G3GIQ	69	202	251	312	312	294	1440
G3MCS	49	203	252	312	312	294	1422
G4DYO	61	174	221	308	300	283	1344
G3XTT	131	188	228	279	274	244	1344
G3UML	30	211	225	314	284	243	1307
G4FAM	63	178	233	267	267	241	1249
G2DMR	52	164	173	299	291	257	1236
G4GIR	67	166	200	260	248	243	1184
G3XOU	44	155	178	285	270	242	1174
G3RUV	6	148	178	298	291	236	1157
GW4BLE	24	166	180	271	268	240	1149
G4BWP	64	179	197	253	213	235	1141
G3RUR	1	153	184	286	261	225	1110
G3TXF	59	161	180	252	245	205	1102
G3IGW	99	150	234	225	197	182	1097
G3NOF	4	83	82	312	308	264	1053
G4LJF	28	162	186	257	218	191	1042
G3YMC	75	102	166	235	237	184	999
GW4OFQ	50	197	181	208	189	135	940
GM3YOR	67	126	168	205	192	179	937 (all cw)
G4OBK	114	97	120	180	153	122	786
G4JBR	60	134	120	140	153	158	765
Average	58	162	192	264	252	226	1154

Next deadline: All-time, with deletions - to reach G3GIQ no later than 15 July please.

## 1986 28MHz COUNTRIES TABLE

G4JBR - 36	G4XAH - 23	G3XBM - 6 (QRP)
G0AEV - 34	G4OBK - 18	5B4DN - 2
G3XOU - 26	G4MUW - 12	G4YWG - 1
G0AGP - 25		

fm contacts added in the 29-29.5MHz section of the band. Very interesting and well worth more investigation. EA3FHC is active on most days on 28,060kHz or nearby and would of course welcome callers.

## Southern 10metre FM Group

Enthusiasts in the south have formed this group with the prime objective of keeping the 28MHz band active during sunspot minimum periods. It intends to publish a regular newsletter covering propagation, technical tips, availability of equipment, members advertisements, and any other news of interest to band users. Membership is open to all and costs £1 per annum. Enquiries and subscriptions should be sent to Jim Hicks, G4XRU, 33 Hayling Rise, Worthing, Sussex BN13 3AL.

## Welcome...

...to the following new overseas members of the Society who joined during March: EA3DEP, EI2FZ, EI5CDB, EI5FK, EI7LD, ON8WN, SK7DD, SM6BQN, SM5EJN, VS6TU, VS6XMQ, YB5AK, YC5BEE, YC5BEH, GW4VBN/4X, and listeners K Sanderson (ZC4), A Andres (HZ), D Gibbons (EI) and P De Blieck (ON).

## Contests

Apologies are extended to G4RKK, whose callsign was inadvertently given as G4RRK in the listing of results of the 1985 CQ M Contest in the April issue under the 21MHz heading and to GM3ITN who scored 13,912 on 14MHz and GM8SQ 2,244 points in the all-band section.

## IARU HF Championship

1200 12 July to 1200 13 July.  
1-8 to 28MHz but not 10, 18 or 24MHz. Single-operator phone, cw or mixed, and multi-operator single-transmitter only. Object is to work as many stations throughout the world as possible—particularly including IARU member society hq stations. Exchanges consist of RS/T plus ITU zone number (UK is 27). HQ stations will send RS/T and official society abbreviation (eg RSGB). A station may be worked once per band per mode but only in the recommended sections of the bands appropriate for each mode. Crossband, mixed-mode and repeater QSOs do not count. In Region 1 entrants are asked to please use the contest preferred segments where appropriate (see below). Contacts with own ITU zone and hq stations count one point, with other zones in same continent three points, and with different continents five points. The multiplier is the number of ITU zones plus hq stations worked on each band totalled together (NB: hq stations do not count for zone multipliers). All entrants are advised to use official log stationery which is available from: IARU Secretariat, Box AAA, Newington, Conn, 06111, USA (please send a few 100s with request). A small supply may be available from G3FKM. Logs must show time, band, mode, callsign and exchanges, and multipliers should be clearly marked. Dupe sheets are needed if more than 500 QSOs have been made. Entries must be postmarked no later than 13 August 1986. Certificates will be awarded to top cw, phone, mixed-mode and multi-operator entrant in each ITU zone and DXCC country, and achievement level awards will be made to those making at least 250 QSOs or having a multiplier total of 50 or more. An entry may be disqualified if it contains errors which reduce the claimed score by more than two per cent and if more than two per cent of duplicates are found. Each mispelled callsign or duplicate will result in a deduction of the equivalent of the points from three QSOs.

Contest preferred segments in Region 1 are: 3,500-3,560kHz and 3,600-3,650kHz (cw); 3,700-3,800kHz (phone); and 14,000-14,060kHz (cw) and 14,125-14,300kHz (phone). At present there are no recommended segments on the other bands.

In the 1985 EA DX CW Contest, GM3ITN scored 1,102 points, G3ESF 999, and G4ODV 651.



## QTH CORNER

<b>BT0PK</b> FH/F6DZD	via JA1HGY, N Mashita, 8-2-4 Akasaka, Minato, Tokyo, Japan. F6DZD, J F Breton, Muncq Nieuwet, F-62890 Tournem sur la Hem, France.
<b>HC8NGR</b> JW1LK	Guido, San Cristobal, Galapagos Is, Ecuador. A Aavik, LA1LK, Box 1010, Lyngaaen, N-8801, Sandnessjaen, Norway.
<b>JW6WDA</b> PA6VHS	M Bjerring, LA5NM, Box 500, N-9170 Longyearbyen, Norway. D Hoogma, PA0DIN, Schoustr 15, NL-6525, XR Nijmegen, Netherlands.
<b>UA10T</b> V85TT VK0SJ	via UB5KW. Box 419, Brunei City, Brunei. R A Mann, VK7RM, 57B Wellersley St, Hobart, 7000 Tasmania, Australia.
<b>VQ9QA</b> ZD8KM	C Coursey, N3QA, 903 May Lane, Stevensville, Md, 21666, USA. G31FB, Coppalex, North Rd, The Reddings, Cheltenham, Glos GL51 6RE.
<b>ZF1MM/ZF9</b> 3C1MB 9L1IS	D Renwick, Box 50, Clairnet, Saskatchewan, S0K 0Y0, Canada. via EA7KF, Italiza 1, Calencia de la Concepcion, Seville, Spain. PO Box 1269, Freetown, Sierra Leone.

## All Asian DX Contest

0000 21 June to 2400 22 June (Phone section).  
1-8 to 28MHz. Single-operator single- or multi-band, and multi-operator multi-band sections. Stations send RS plus age (ladies in this case send 00!). Non-Asian stations work Asian stations and count three points on 1-8MHz, two on 3-5MHz, and one on the other bands for each contact. The multiplier is the number of different Asian prefixes worked on each band. Please note that contacts with USA military stations and those in the Minamitorishima part of JD do not count for credit. Photocopies of summary and log forms are available from G3FKM (sase please). All times must be given in gmt and entries must reach JARL, Box 377, Tokyo Central, Japan, no later than 30 September.

Results of the 1985 CQ WW WPX SSB Contest have been published and UK scores are as follows:

SINGLE-OPERATOR, SINGLE-TRANSMITTER					
Call sign	Band(s)	Points	Call sign	Band(s)	Points
GB07NB	All	654,833	G4ULZ	All	27,280
GM3KLA	All	181,056	G0ABW	All	4,182
GM4WEV	All	130,143	G4NXL	21MHz	784
G4XKR	All	84,600	G3F8B	14MHz	3,390,363
G3ICG	All	80,181	GW4BLE	14MHz	2,697,634
G0AEV	All	43,512	GB3RN	14MHz	321,126
G4OKN	All	30,081	G8VF	14MHz	36,378
G6GQ	All	29,626	G4TXM	7MHz	93,500
MULTI-OPERATOR, SINGLE TRANSMITTER					
GB2PX		4,967,865	G6CW		1,625,210
GB0WAS		4,511,430	GMOAEE/P		222,807
GB0WPX		2,811,375	G3UDA		206,780
MULTI-OPERATOR, MULTI-TRANSMITTER					
GB4ANT		6,848,424 points			

Congratulations to G3F8B who won the Myrton E Crofoot, WB4VQO, Trophy for having the top single-band score in Europe—he was also second in the world on 14MHz. GW4BLE was world fifth on 14MHz, GB2PX world 13th in the multi-single category, and GB4ANT sixth in the multi-multi class.

## Colombian Independence Contest

0000 19 July to 2359 20 July.  
Phone and cw (ie, mixed) and phone-only sections. Photocopies of rules are available from G3FKM (sase please).

## Awards

### Diplome de Corse

Available to licensed amateurs and also to listeners on a heard basis. Confirmations from at least five different TK stations are required but these may not include contacts made via terrestrial repeaters or with non-resident stations operating in Corsica. There are no date or mode restrictions, and the certificate is available for all cw, all phone, all rty or mixed-modes. Send a photocopy of the relevant QSLs plus 15 valid ircs to Roland Colin, TK5CH, Awards Manager, rue Jean-Nicoli, Rocce Poretta, 20210 Porto Vecchio, Corsica, France. Please note that FC contacts are not eligible for this award.

### Diplome des Petits Etats d'Europe

A new award issued by ARM for confirmed contacts with Monaco, Vatican, Liechtenstein, Andorra, Malta, SO of Malta, San Marino, and Luxembourg. Two classes: Class 1 for working all eight, and Class 2 for working three countries as well as Monaco. There is no date limit, and the award accepts all modes/bands but not contacts made via repeater. Send list certified by national award manager or two other licensed amateurs plus 10 ircs or US\$6 (US\$10 for airmail) to Award Manager, ARM, PO Box 2, MC 98001 Monaco-Principaute.

### VHSC Jubilee Award VHSCJA

1 May 1986 is the 25th anniversary of the formation of the Very High Speed Club (VHSC), and on the occasion of this event and to honour the good relations between VHSC members and the many other friends of radio telegraphy, VHSC is offering this award—owners will be nominated as "Friends of VHSC". It is available to licensed amateurs and listeners who have made or heard QSOs with VHSC members during the period 1 May 1986-31 December 1987. At least 25 points are needed: QSOs with VHSC members in one's own country count two points, in other European countries four points, and outside Europe six. Each VHSC member counts once only and all bands may be used all QSOs to be on A1A only of course. Applications should consist of a log extract checked and signed by two licensed amateurs and should be sent, together with five ircs, to PA0DIN, Din J Hoogma, Schoustraat 15, XR Nijmegen, Netherlands. A membership list is available from PA0DIN in exchange for an irc.

### The Vale Royal Award

This is being issued in two classes: A, which is single-band, multi-mode, and B which is multi-band, multi-mode. It is necessary to work nine stations

situated in Vale Royal or who are members of the Mid-Cheshire ARS, in addition to making one QSO with the society station G3ZTT/G8ZTT. Alternatively it is possible to work both G3ZTT and G8ZTT plus the Delamere Forest Microwave Activity Group station G4ZTT and the Vale Royal Contest Group station G6ZTT. Send signed log extract (certified as correct by the applicant and another licensed amateur) plus £1 or five ircs (cheques should be made payable to the MCARS) to Hans M Field, 6 Llandoverly Close, Winsford, Cheshire CW7 1NA.

## Around the bands

A detailed report from G8KG this month reads as follows: "As well as causing much excitement among the vhf fraternity, the sharp upsurge in solar activity early in February had its effects on the hf bands, not all of them bad. On 4 February the daily sunspot number peaked at 58 and the solar flux rose above 100sfu, while at this stage the geomagnetic field was still largely undisturbed so that conditions on the hf bands showed some improvement up to about the sixth of the month. Subsequently, of course, there was a massive magnetic disturbance and a major aurora, both of which did more harm than good at hf.

The active region responsible for all this was still present at reduced intensity in the next solar rotation and conditions again improved. In the period from 1 March to 12 April the 28MHz band was open for several hours daily and to all continents except Oceania. This looked like a classic example of a major rise in F-layer muf in the initial stages of an intense disturbance.

As a result of all this the 27-day average of solar flux rose steadily from 73 to 85fu, but by the end of March had fallen back to 75, indicating that the enhanced activity was probably over. The enhancement was even large enough to cause the smoothed sunspot curve to show a slight rise, and people have been heard to speculate that we might be seeing the start of the new cycle. This is not the case. The spots belonged to Cycle 21, and those of the new cycle will have reversed magnetic polarity.

As it has progressed, the shape of Cycle 21 has come more and more to resemble that of Cycle 11 (1876-2-1878-9). The correlation is very marked (r = 0.99) but may be fortuitous. Should it continue we should expect to see the beginning of Cycle 22 early in 1988."

This month's column was supported by logs from: G2HKU, G3YY, G8KG, GM3CSM, G3s GVV, IGW, KSH, LOL, PJT, PXT/M, G4s EHQ, JBR, GW4KGR, G4s LRS, MUW, OBK, UOL, UZN, XAH, G0AEV and G0AGP, and RSs 10906, 84869 and 88639.

Call signs printed in italics were those of stations using A1A.

**1-8MHz.** 0000 K8MFO, LX1WH, W1BIH/PJ2, VQ9QA, UA6HOF. 0600 VP2VA, LZ3GQ. 2200 UA9YJD.

**3-5MHz.** 0000 HK1HIX, PU6WRF, PZ1AP, W0GE. 0100 CX7BBX, LU, 4Z1Q. 0200 KP4BI, 0300 ZF1MM. 0500 C01RH, K2IE, T10Y, ZF1MM. 0600 CN8AD, V2RO, VK9NS, ZL, ZL1AZE, 4IE. 0700 XE1ALH. 1900 ZL4BO. 2000 EA8ZI, UVI00. 2100 CT3DL, TA2D, Z21EV, 5B4FN. 2200 W2Z2/CT3, OY5NS, UZ1PWA, VK6LK, VQ9QM. 2300 EL2CJ, LX1WW, W1-4, 9, 8R1RPN.

**7MHz.** 0000 JY8GO. 0100 J37AE, VU2AU. 0400 VP2KA. 0500 SM5DFW/KP4, OA4JR, VK2ZC, YV1AD, ZL. 0700 ZL4AW. 1700 XX9CW. 1900 HV2ZP. 2200 UZ1WPA, VQ9QM, VU2BK. 2300 H10JR, HK2DP, J28EG.

**10MHz.** 0600 F8YA, VKs1-6, ZL3AAM, LZ7Z. 0700 VK2,3,7,ZL2, ZL4RD. 0800 VK6AKG, YV1BVJ. 1000 K1GOW, VE1BB, VP2VA. 1100 KA3GZD, W2FJ. 1500 VE2LI. 1600 KA0VAL, G4DMAVE8. 1700 JH0MGJ, 4X4WF. 1900 HB0I, DJ2CS, VE1, VP2VA, W1-4,8,9. 2000 FG5s AM, CX, FM5WD, JA1FP, VE, W1-4, 9, J6LAD/9Y4. 2100 KP4GJ, LU9CV, W1BIH/PJ2, TA1C, VK3KS, ZS6CEV, 9H1BB. 2200 FM5WD, HP1XSO, G4DMAVE8, W8AVP, W0EUQ (N. Dak), WP4L, YV1BVJ. 2300 OX3CS, VP2VA, W2GW.

**14MHz.** 0600 VK2-4. 0700 EL2BA, JA, KL7, VK, ZL3FV. 0800 AL7BL, JA. 0900 BY4AA, KH0AC, TA2D. 1000 HL9CW, KL7, J37ZD, JW0A, ZL80Y. 1100 KH0AC, UZ0QWN, J73AAB. 1200 EP2DL, UVI00, VP5GT. 1300 DU9RG. 1400 JA, VU2GRS. 1500 JA, SU1ER, V85TT, W6-W7, Y11BTG, 9M2HB, 9K2YA. 1600 OX3MV, UA10T, VE7, VQ9RB, VS6A0, 9M2CW. 1700 HV3SJ, J28EM, TA2C, TR8AH, W6-W7, 8QAV. 1800 OD5OK, PY0FI, VP2MR, ZD9CI, JR4QZ/H4S7. 1900 JW6WDA, KC0BF (N. Dak), KL7Y, T77C, VP8LP, ZD8KM, 5T5SL. 2000 KL7XD, ZL4GO. 2100 J88AB, KP2AH, VK4IM, VP2MCG, VP9HS, W7KSA, 8R1AMO. 2200 C6ANU, V44KQ, ZF1MM/ZF9.

**18MHz.** 1500 ZS3AT. 1700 SV0AH. 1900 PY2BZD.  
**21MHz.** 0800 SV5TS. 0900 A4XZF, VK. 1000 A25/S6BRZ, EL2BY, L4D, VQ9EE, VU2MAL, 9X5MH. 1100 HZ1HZ, PY, TR0A, YE0X, 3D6BQ, 5X5GK. 1200 HK0BKX, TA1F, VQ9QM. 1300 FR7ZD, YB, 5X5MB. 1400 FR7BT, TL8MEE, VP2MBA, YB3DO/9. 1500 JY5CI, OA, VQ9XM, ZS, 388FP, 8R1RPN. 1600 EL5G, G0AWFITA2, X72BR VP8s JC, VK, 7P8CM, 9L1DH. 1700 CP8AB, TA7A, ZS6BYG. 1800 PY0FI, TR8AH, ZT6FS, 5Y3HM. 1900 CE, CX, EL, LU, PY, VP8, W1-W4. 2000 AZ1ARU, CE, LU, PY, 6W1JN.

**28MHz.** 1000 FH8CB, J28DN, 9J2LC. 1100 A22BJ. 1200 TU2DN. 1300 JY8GO, JY9VQ, TR8s JLD, LE, Z23JO, ZS2DR, 5X5GK. 1400 A22BW, A71BJ, 5B4DN, 5H3ZR. 1500 EA6SN, VE1BNN, X72BR, ZD9GI. 1600 CX, G4CJC/EA8, ZS3SWA, 5N3RFT, 9Y4BA. 1700 CX2AAL, L4H, PY5TT, ZD7CW, 9Q5MA. 1800 CE3s, EL2BY, LU, PY1NEZ, TZ6FS. 1900 AZ1ARU, EA8, LU1UEO, TZ6FE, 5T5RG.

Acknowledgements to the writers of the following for items extracted: DXNL (DL3RK), Long-Island DX Bulletin (W21YX), DX News Sheet (G4DYO), the Ex-G Radio Club Bulletin (G10EN/W6), Long Skip (VE3IPR), Lynx DX Group Bulletin (EA2JGO), the DX Family News Letter (JH1KRC), DX'press (PA3CXC), and CQ Magazine (W1WY).

Please send everything for the August issue to reach G3FKM no later than 12 June.

## HF f-layer propagation predictions for June 1986

Using the table

For each route, the bands appear vertically and the time horizontally, as indicated in the left-hand KEY blocks of the top two rows.

The probability of signals being heard is given on a 0 (indicated by a dot) to 9 scale; the higher the number the greater the probability, with 1 meaning 10 to 19 per cent of days, and so on. Additional 50 and 1.8MHz openings are indicated by a plus (+) sign in the 28 and the 3.5MHz rows respectively.

KEY TO BANDS	MOSCOW	MALTA	GIBRALTAR
28 MHz	.....	.....	.....
21 MHz	.....1.....12.	.....11.....23.	.....1.....2.
14 MHz	213566556786	1..566556896	1..155434785
10 MHz	756554445789	745655556789	721666556799
7 MHz	75322222468	986432223578	976543333578
3.5 MHz	42.....45	++3.....24+	++42.....24+
KEY TO TIMES GMT	ICELAND	OSAKA	HONGKONG
000001111122	.....	.....	.....
024680246802	1..24333365	112244334243	1..2244334534
.....	64456555678	111122112463	2..11112465
.....	77654333456	.....241	.....253
.....	4442.....24	.....	.....2.
BANGKOK	SINGAPORE	NEW DELHI	TEHERAN
.....	.....	.....	.....
.....112.....1.	.....1221.....	.....1121.131.	.....22211254.
1.2234335542	1.224433.	112333335773	114333335786
31..11112576	31..11111.	521..112577	6431..112578
1.....256	2.....121	41.....256	73.....256
.....23	.....23	.....24	4.....24
COLOMBO	BAHRAIN	CYPRUS	ADEN
.....	.....	.....	.....
.....122112.....	.....22311354.	.....234223661	.....1.32245.
.....12324335.	214322345787	425666666898	313322345766
221..1112332	7431..112578	876433334689	8541..12578
51.....256	731.....257	86311111367	751.....257
2.....24	4.....24	4.....35	42.....24
SUVA/S	SUVA/L	WELLINGTON/S	WELLINGTON/L
.....	.....	.....	.....
.....112332.....153	21.2.....44	2233.....64	31.....4
113432.....342	112411..1142	22441.111163	3331.....24
.....11.....11.	.....12.....12.	.....11.....131	.....122.....131
SYDNEY/S	SYDNEY/L	PERTH	HONOLULU
.....	.....	.....	.....
.....11355.....11.4	4.....1.....5	1.3552.	112223..2332
222421.12445	3214.....35	422221..134.	1443211231.
.....1.....252	.....12.....142	21.....255	.....12.....
.....2.	.....	.....24	.....
SEYCHELLES	MAURITIUS	NAIROBI	HARARE
.....	.....	.....	.....
.....22.224.....	.....223222.....	.....1112356.....	.....1223463.....
.....34223455.....	.....35344453.....	.....253234573.....	.....6434457.....
.....131.....11253.	1.4211112412	1.52.....12573	3.3411112422
441.....254	612.....246	643.....257	7341.....256
42.....24	53.....24	54.....24	54.....24
CAPTOWN	LAGOS	ASCENSION I#	DAKAR
.....	.....	.....	.....
.....2233.....	.....2.24684.	.....2112486.	.....31134781
.....454344.....	11.552235781	.....54335784	51.353234688
.....1.4311123.	77442..12476	.....31..2478	874431..1378
5611.....224	8741.....257	4.....157	7742.....146
54.....24	54.....24	53.....24	542.....24
LAS PALMAS	StH SHETLAND	FALKLAND I#	R DE JANEIRO
.....	.....	.....	.....
.....32122573	.....121.....	.....12431.	.....2122572
61.576666899	.....13562.	.....134567.	3.....4344589
975654334589	123..1112463	.....141.111247.	83..11111368
886321111368	6641.....146	5642.....145	772.....36
+53.....35	542.....24	542.....4	542.....3
BUENOS AIRES	LIMA	BOGOTA	BARBADOS
.....	.....	.....	.....
.....12.....	.....1.....	.....	.....
.....123573	.....111254	.....111144	.....2111154
61..2334579	71.121333357	71..3333247	71.114332358
861..1112258	863331111.25	86332211..14	86332211..26
7741.....26	77421.....2	67421.....2	77421.....3
542.....3	442.....	342.....	442.....
JAMAICA	BERMUDA	NEW YORK	MEXICO
.....	.....	.....	.....
.....111.33	.....1111.23	.....2	.....12
71..2332236	71..4332257	61..3332246	51..232224
7631.211..13	7631221..24	66311211..23	4641..111..1
5742.....1	57421.....2	46421.....1	1642.....
242.....	24.....	24.....	3.....
MONTREAL	DENVER	LOS ANGELES	VANCOUVER
.....	.....	.....	.....
.....2	.....	.....	.....
51..3333246	311..122223	3111..23222	21211.12222
664122111123	355211111.11	24531.112..1	235421112111
36421.....1	14421.....	2421.....	2421.....
.....3	.....	.....	.....

The provisional mean sunspot number for March 1986 issued by the Sunspot Index Data Centre, Brussels, was 15.7. The maximum daily sunspot number was 38 on 7 March, and the minimum was 0 on 14, 16-19 and 31 March. The predicted smoothed sunspot numbers for June, July, August and September are respectively: (classical method) 8, 7, 6 and 5; (SIDC adjusted values) 0, 0, 0, 0 (-9).

## SWL

Bob Treacher, BRS 32525\*

### SWL hamfest

At short notice I managed to arrange a small gathering in honour of Stan Porter, ORS45992/7Q7-001, while he was holidaying in G-land. Present were Mick Toms, BRS31976, Graeme Caselton, G6CSY (ex BRS44984), David Hunter, BRS86646, my xyl BRS62088 and myself. Stan gave a fine description of his life in Malawi supplemented by 100 colour photographs. His QTH is an arm's length from the lapping waters of Lake Malawi; he is 45 miles from 7Q7LW, and several hundred from John Lord, 7Q7-002; and he has no tv timebase noise—the nearest tv is many miles away. The only drawback appears to be the abundant wildlife! Stan brought his two latest logbooks for us to peruse, and it was interesting to note the Pacific and Far East openings on 7MHz, and to see how much African dx really is active on 3.5MHz. An enjoyable time was had by all.

### LF Challenge 1986 results

Perseverance paid dividends for Andy Smith, BRS50134; second in last year's challenge, he took first place this year. I managed a respectable score for once, followed by Dick Stanbridge and Robert Small, with David Whitaker and Mike Hudson sharing fifth place. Apart from the extra points for 1.8MHz loggings, 7MHz proved the determining factor this year. Many found the band noisy; others, with better antennas found the band quiet, but Andy Smith and Dick Stanbridge reaped the rewards for close monitoring of the band. In terms of countries heard, the overall number was much the same as for 1985, with 1.8MHz providing a few more this year.

7MHz gave some good dx, with BV, FB8X, KH2, KL7, T32, VK9L, VR6, 5R8 and 3Y (Antarctica) in many logs. All the Russian republics except Franz Josef were logged. Little from the Pacific was logged—the band just was not good enough this year.

3.5MHz provided 157 countries, including A7, BV, CE0Z, JT, KH0, KL7, CY0, VK9L, VR6 (thanks again to G3OKQ), ZD9, ZL8 and South Orkney. On this band, the stations with the better antennas pulled in the better dx, but there was so much dx on offer, especially from the Caribbean and the Near East, that the totals on the band were all high.

On 1.8MHz, 81 countries were heard. Quite a few goodies on cw and not so much on ssb was the order of the band for January. Thirty-four dx countries were logged: CE, CO, CT3, EA8, EA9, HH, HK0, JY, W, LU, OA, OX, PY, TG, TI, UA9, UD6, UF6, UG6, UH8, UJ8, UL7, UM8, VE, VK, VU, YV, ZF1, ZL, 4U1UN, 4X4, 5N2, 5T5 and 7X2. Compare that with last year's list to see how conditions to the Caribbean and South America were down on 1985.

With ONL383 obviously putting his spare time in January to other activities, it is good to see the winning score coming from nearer home; even if Andy lives in GU. Conditions overall were not so good as in previous years, but everyone enjoyed the challenge, helping to boost several all-time countries scores. This year, the ZL2AAG net did not provide the goods—some mornings even ZL2AAG could not be heard in G-land. Hopefully, things will be back to normal for the 1987 event. Thanks to those who entered, slightly down on 1985, but still a good response. I hope for an increased entry next year: two ways to ensure that you catch the really good dx next year is to improve your antenna and buy an alarm clock.

Posn	Station	7MHz	3.5MHz	1.8MHz	Total points
1	BRS50134	218	234	460	914
2	BRS32525	167	220	470	857
3	BRS31879	217	171	325	713
4	BRS8841	183	243	285	711
5	BRS25429	92	237	375	704
6	BRS87259	132	192	380	704
7	A Miller	109	209	295	613
8	BRS87156	104	155	175	434
9	BRS31976	38	109	285	432
10	ONL5810	90	158	175	423
11	ONL6945	54	85	130	269
12	ONL383	93	83	45	221
13	BRS62088	29	39	35	103
Total No of countries heard during January		149	157	81	—

### Here and there

The White Rose RS is sponsoring some 28MHz activity periods during the summer; look for the rules soon. There is likely to be a special award for the best swl entry.

\*93 Elbank Road, Eltham, London SE9 1QJ.



## FINAL UHF/VHF TABLE SCORES 1985

Station	QTH loc	70MHz		144MHz		432MHz		Total
		Squares	DXCC	Squares	DXCC	Squares	DXCC	
BRS52543	IO83	22	6	96	23	52	18	217
BRS25429	IO93	0	0	91	21	61	15	188
BRS31976	JO01	7	2	105	27	0	0	141
BRS32525	JO01	0	0	88	24	13	4	129
FE8957	JN15	0	0	69	18	13	3	103
G6WDP/P	IN69	0	0	33	6	0	0	39
BRS62088	JO01	0	0	23	11	2	1	37

NOTE: The 1986 table will appear for the first time next month.

## 1986 HF COUNTRIES TABLE (Up-dates and new entries only)

Station	DXCC	28	21	14	7	3-5	1-8	Total
BRS32525	164	7	46	91	114	116	55	439
BRS1066	142	1	64	108	99	64	60	396
BRS87156	161	6	81	102	75	102	29	395
BRS87259	132	0	46	70	78	102	48	344
BRS50134	—	0	0	0	102	110	58	270
ORS88201	—	0	22	34	55	84	25	220
BRS20249	97	2	19	63	47	52	11	194
F11ATZ	—	12	62	6	9	21	9	119

## The mailbag—vhf

Into June, I hope we will all be extolling the virtues of some fb Es openings. In the meantime, nothing much had stirred at vhf. Dave Whitaker had received a QSL from OE5OLL for a report on his auroral signals in February. EA1NU confirmed XD square for square No 144 on 144MHz, while OY9JD (WV11b) provided a new country. On 432MHz OK1KHI/P gave Dave country No 18 and square No 69.

Michel Monteil, F11ATZ, reported activity as very low in southern France with only five squares and 2 countries heard this year at the time of his letter. He too was looking forward to some Es activity, and it will be useful for us to compare his loggings with ours. At my QTH we have antennas for 144 and 432MHz at a competitive height, and have already recorded our best G-dx on 432MHz, logging G1DOX (YO) on 432MHz under flat conditions.

## The mailbag—hf

The month under review takes in the CQ WPX Contest when many special prefixes were aired. To help locate the stations, the following may be of some assistance: EH = EA, TE (OA), 3G (CE), ZY, ZZ (PY), AZ, L4 (LU), DX (DU), VQ3 (5H3) and J40 (SV9). In general, the hf bands seem to have been quite poor, but early April on 14MHz provided some useful Pacific dx early in the day in the shape of T32AB, VK0SJ, KX6AO and FK8FI, and Far Eastern dx courtesy of OK1XC/JT, BY4AOM, V85GA and XX9AN. On 1-8MHz W and VE were still on, often at around 0415 for those keen on dxing at that time of the morning. Robert Andrews, BRS36797, mentioned much European activity at around 2200. At the other end of the spectrum, 28MHz had provided a little, being too early in the year for sporadic-E and way at the bottom of the sunspot cycle for openings to exotic parts. However, Michel, F11ATZ, mentioned several openings to pull in D68WS, J28DN, XT2BR and TZ6FS, together with LU, PY and CX stations just before the band closes. Michel has 12 countries to date on the band.

Changing tack, I have details of the Worked Active Bruges Amateur Stations Award. It is available to listeners too. No QSLs are required. Just hear 12, 24 or 36 ONs in Bruges to qualify. On vhf each station counts two points. Clubstation ON6BR counts double points.

Award manager is ON4AYL, PO Box 24, 9990 Maldegem, Belgium. The price is 10 iles. According to the list your scribe has, there are 100 ONs active from Bruges!

Brad Bradbury, BRS1066, had got into the nineties on 1-8MHz thanks to VQ9QA. Will he be next to the magic three figures? As for Russian oblasts, Brad stands at 147 this year but is only nine short of the maximum all-time, standing at 175. Dave Burt, BRS85613, had a card from SP6PZZ, completed by SP0272WR—a Polish swl. In Poland, swls can operate from club stations—obviously SP0272WR was the operator when Dave heard SP6PZZ in QSO. Colin Watson, BRS46598, sent in a dx report for 14MHz and 3-5MHz. The best dx being FM5WD, J6LB and a 9L1 on 3-5MHz. Tony Blackburn, BRS87156, had been trying hard to improve his UBA score for the year. His score of 58,000 might be bettered by others, but at least he is flying the G flag. No, Tony, AZ6ETB, was not on South Orkneys!; and L8LWA could possibly have been UL8LWA. Tony was disappointed that there was no swl lecture at the NEC this year. I was asked if I wanted to give another talk but declined. However, Dave Whitaker and I do have plans for a joint venture at the 1987 NEC. Details will be given once they've been formulated and agreed with everyone.

Malcolm Harrington, BRS20249, was pleased with YC0SY on 7MHz ssb, and DX9C and KB6HEL/DU9 on 14MHz; delighted with PY0FI on 21MHz ssb and 9M8EN on 14MHz ssb for two all-time new countries; but

disappointed not to be able to share in the "party" for 7Q7-001 due to domestic difficulties. Robert Small, BRS8841, heard C2ILD and ZK3RR at the spring equinox on 14MHz. Unusual prefixes heard by Robert included XQ6CFX (CE), 7J3AAC (JA), TU2FI/6W1 and TR0A. On the QSL front both Robert and Dave Whitaker reported returns from IT9AZS for S90AS and 5V7AS. Also noted from various sources: K3UOC/PJ5, KS0C/KH2, FG0MV/FS7 and W0RLX/HC8. XT2BR gave Dave Whitaker his 233rd confirmation on 3-5MHz; while on 1-8MHz KD7HH and W0GZD confirmed Wyoming and North Dakota. Lastly, a quick plug for the White Rose 28MHz Activity Days. By the time this reaches you, there will be three dates left—29 June, 27 July and 31 August. Full details from WRARS, PO Box 73, Leeds LS1 5AR.

# SATELLITES

Bob Phillips, G4IQQ\*

## RS satellites

It has been reliably reported that RS1 has been transmitting again on 29.401kHz due to the fact that it has been in full sunlight.

RS10 is apparently performing quite well and awaiting launch, which was anticipated for the end of May. The fate of RS9 is a little less certain. It has apparently exhibited several problems during testing, and the likelihood of both satellites being launched together now seems low.

Both RS5 and RS7 are continuing to operate well, having survived a long period of eclipses during May. In fact a further eclipse season began during the last week of May which will continue until early August for the two satellites.

## JAS-1

During recent weeks a great deal more information has been made available on the detailed characteristics of the satellite which is still on schedule for launch in August 1986. The linear transponder (mode JA) will have an output of 1W p.e.p., and an up-link eirp of around 100W will be required.

The appropriate frequencies are as follows:

Up-link passband.....	145.9 to 146.0MHz
Down-link passband.....	435.8 to 435.9MHz
Beacon frequency.....	435.795MHz
Translation frequency.....	581.8MHz

Since the transponder produces frequency inversion, it is recommended that lsb be used on the up-link, giving usb on the down-link. The 100mW beacon should produce a very good signal for monitoring the health of the satellite.

The digital store and forward transponder (mode JD) will provide one down-link channel and four up-link channels. Transmission will be in accordance with the well-established AX.25 Version 2 protocol which is already used by an increasing number of terrestrial stations for packet radio operation. The data transfer rate for both up-link and down-link will be 1,200bit/s. The reason for four up-link channels is that these will be used in a pure random access mode (ALOHA) and there is a significant probability of collision between different transmissions. It has been estimated that four channels should provide roughly equal capacity in both directions of the link. As for mode JA, a ground station eirp of about 100W will be required to access the transponder. The channel frequencies are as follows:

Up-link	channel 1.....	145.85MHz
	channel 2.....	145.87MHz
	channel 3.....	145.89MHz
	channel 4.....	145.910MHz
Down-link	channel .....	435.910MHz

As there is an overlap between the frequencies of the transponders, it is unlikely that they would be operated simultaneously.

It is worth noting that the on-board memory has a capacity of some 1-5Mbytes provided through 48 nmos 256k dynamic r.a.ms. A considerable amount of this capacity will be used for error detection/correction purposes.

Telemetry will be available in two forms. The analogue system has 12 telemetry channels and 33 status flags, whereas the digital system supports 29 channels and 33 status flags. Transmission of the analogue system data will be on the 435-795MHz beacon, and the digital system data will either be on the same frequency or the JD down-link channel.

Ground station requirements will be similar to those for Oscar 8 mode

\*Transvaal Cottage, New Barn Road, Swanley, Kent BR8 7PW.



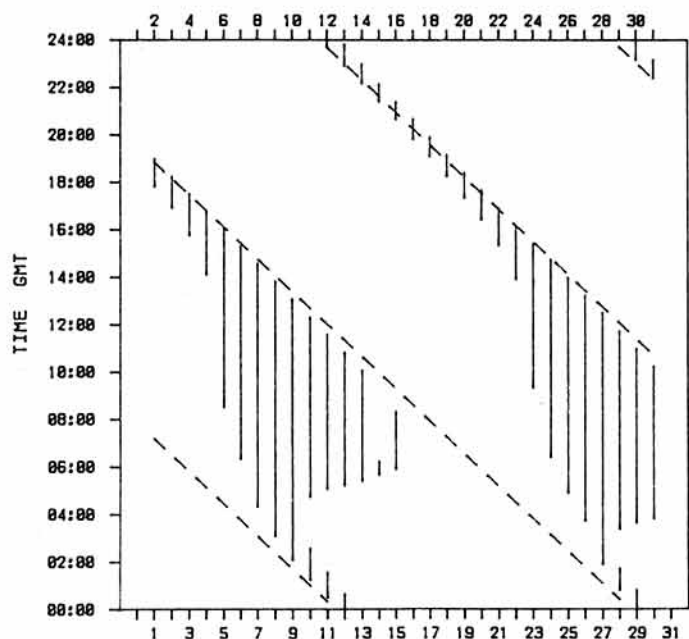


Fig 1 OSCAR 10 VISIBILITY (London area) - JUNE 1986

———— satellite in view ———— perigee (MA=0)

J operation; ie for linear operation a 10W ssb transmitter and 10dBi antenna would be needed on the up-link, and a 435MHz receiver with a good preamplifier with a 15dBi antenna for the down-link. For mode JD operation fm transmission will be required in addition to the above. A special interface will be required between the output of the AX.25 terminal node controller and the input to the transmitter to give the necessary Manchester encoding to the transmitted signal. Details of this interface board have been promised prior to launch of the satellite.

A check on the performance of your 435MHz system can readily be carried out by listening for the Uosat beacons on 435.025MHz or the Oscar 10 Mode L beacon on 436.04MHz.

### Oscar 10

The third anniversary of the launch of Oscar 10 occurs on 16 June. Since the angle between the satellite and the sun is quite good at this time, it should be possible to maintain the spacecraft antennas in an optimum direction to the earth; in other words operating conditions should be quite good. The now familiar figure showing the period of visibility of the satellite indicates very useful orbits from 5 to 11 June and again from the 23rd to the end of the month. The maximum elevation to the satellite during these two periods is around 35°, but this value is only obtained for up to the last hour of each orbit. It is clear from the figure that the satellite will be visible for several hours before and after apogee for approximately half the days of June—a sure sign that things are improving for the northern hemisphere.

### Phase 3C

Much of the final integration of the satellite sub-systems has now been carried out and no major problems are evident. While the official launch date for the satellite remains in late August, there is a growing feeling that a further delay to the end of the year is likely. This delay is no fault of the Phase 3 team, but is simply a consequence of the earlier launch difficulties.

### Other news

The recent agm of Amsat-UK attracted only a small gathering in London, but the organization reported a very healthy outlook. In particular, funds have now increased to some £30,000 and it is anticipated that some progress will be made on the funding of construction projects in the future. The committee is essentially unchanged, with Dr Arthur Gee, G2UK, chairman, and Ron Broadbent, G3AAJ, as secretary/treasurer; members of the committee are G3RWL, G3YJO, G4CUO, G8UVE and G4IQQ.

Preparations for the Amsat-UK/University of Surrey colloquium on amateur satellites are well in hand for 5/6 July. Speakers have been booked and there will be a number of trade stands displaying satellite related hardware (and probably software). Details of the event and booking arrangements may be obtained from G3AAJ at: Amsat-UK, London E12 5EQ (please enclose an sae).

## QRP

by Rev George Dobbs, G3RJV\*

### Two examples of amateur radio enterprise

The casual observer of our hobby today might just conclude that we are a dull lot. Amateur radio seems, by and large, a "user hobby"; people buying predictable equipment and using it in predictable ways with predictable results. There are, however, examples in every area of the hobby of people who take it upon themselves to do a useful piece of work, or try something to expand their knowledge and experience through the hobby. In a complex and expensive technological world, it is still possible for amateurs to do something interesting. Two examples of "something interesting" have come to my attention recently, both involving the work of "average" radio amateurs and neither involved the spending of much money.

#### (1) Czech-UK low-power radio tests

Over the weekend of 1/2 February, G8PG and OK1DKW organized a series of tests using low-power amateur radio transmitters between Czech and UK stations. The object was to enable a group of Czech operators to test their QRP equipment over the path to the UK on a number of frequencies. What follows is culled from a report received from G8PG.

OK1DKW provided a time/frequency schedule for operation on the 1.8, 3.5, 7, 10, 14 and 28MHz bands: G8PG had two teams of experienced QRP operators, one in England and one in Scotland (with GM3OXX as leader) who operated to the schedule. UK team members were G3BFR, G3DNF, G3XJS, G4EBO, G4FAI, G4JFN, G8PG, GM3KPD, GM3OXX, GM3RKO, GM4HBG and GM4YLN.

Radio conditions were fairly good considering the low sunspot activity. Skip on 21MHz did not become short enough to allow contact (the path is only open a few days per month on this band), but the other hf bands were quite good. More than 45 contacts were made between the two countries, using powers between 1 and 4W rf output. One surprise was the 10MHz band, which provided more contacts than any other (over 20); the next most successful band was 14MHz. 7MHz only provided a few contacts and 3.5MHz slightly more. No contacts were reported on 1.8MHz. OK1DXK, OK2BMA, OK1DAV and OK2BMA had the greatest success.

Apart from the outstanding performance of the 10MHz band, the most surprising result was the difference between the path to southern and northern parts of the UK. All but six of the contacts were made by stations located south of a line drawn from the River Mersey to the east coast of the UK (approximately 53°N). The one English station north of this line, G3DNF, made three contacts, but the stations in Scotland only made three contacts, four of them not making contact at all; the four included GM3OXX and GM4HBG, two of the best operators in that country. G8PG suggests that this is probably due to the difference in latitude. If one takes 50°N as the average latitude for the Czech station, English stations worked were between approximately 51° and 53°N. Observations over a number of years show a lot of evidence that on such E-W paths, the further north one of the stations is, the more difficult it becomes to make contact between them.

The test proved to be a considerable success and may, with amendments, be repeated next year. Although most of the radio amateurs taking part were experienced operators of low power stations, none of them had above average antennas and many used home-built stations.

#### (2) A northeast "build-it" group

There are indications that the number of radio amateurs building their own equipment is on the increase, although many amateurs appear not to know how or where to begin as constructors. Recently a group of radio amateurs in Darlington decided to get some construction going in their town. Rod, G4MIJ, together with Tom, G3GUV, and Ian, G4VJR, gathered together a local QRP equipment construction group. Their definition of "What is amateur radio? ... self-improving friendly communication within the reach of all" was the starting point for the enterprise.

Their aim was to help old and new radio operators to get on the air with homemade low-powered equipment for a very small outlay and provide encouragement and support. A 144MHz net on Sunday mornings provided the main get-together, projects were arranged on a "build a board a month" basis. Circuits were provided by G4MIJ, and a meeting once a month in a Darlington pub gave a chance to display what had been built and pick up components for the next stage. A call on S20 or the telephone brought help for those stuck or short of the odd component.

\*St Aiden's Vicarage, 498 Manchester Road, Rochdale, Lancs OL11 3HE.

Components were obtained in bulk from radio rallies and scrap equipment on the basis of "use what is at hand—modify if needs must and scrounge when desperate". All the group contributed something: from tobacco tins to a Wensleydale cheese—not suitable for rf use but acceptable with beer at group meetings. Items were sometimes distributed to the more rural members by putting them on the local bus. The project began in the autumn of 1985 with a 3.5MHz vfo cw transmitter, and rf probe and an rf power meter.

The group only advertised itself by word of mouth on 144MHz, and began with about a dozen local amateurs but grew to over 20 members. It has spread further afield, with participants as far away as East Anglia and even one Czech member. The work began with a 144MHz talk on pcb making. Some members forged ahead and by the end of the year a few 3.5MHz rigs were on the air; others followed. Work a QRP Darlington station on 3.5MHz and the chances are that it will be a rig built by one of the group and that the QSL card will be accompanied by a batch of circuit diagrams. A few Class B licensees have joined the group, and G3GUV began slow morse lessons on 144MHz to help them towards the Class A licence and eventual operation with their hf band equipment.

The construction group now meets fortnightly in a local community centre and has an ever-increasing range of projects for members. They can choose from a variable psu, a QRP swr meter, an atu and an electronic keyer. The graduates of the 3.5MHz rig are planning a more sophisticated vfo transmitter or transceiver for the 10MHz band. The group also plan a "passing out parade" in the form of a short contest on 3.5MHz, probably in July. Some of the members will be using a complete homebrew station "from mains to sky". Home-construction is certainly alive and well in the northeast. The enterprise of this little group shows what can be done, simply and without a lot of expense, to breathe real life into the hobby. Other construction groups do exist and I would like to know of any which start-up. The G QRP Club would be happy to supply information and circuits.

### QRP Summer Ramble 1986

Follow the successful QRP Winter Sports, the G QRP Club has announced a new QRP activity event for the summer. The QRP Summer Ramble runs from the Saturday before International QRP Day, 17 June, until the Sunday after, ie 14–22 June. Any radio amateurs running a power of 3W of rf output or less are invited to be active around the QRP calling frequencies (3,560, 7,030, 10,160, 14,060, 21,060 and 28,060kHz) on all bands that are open during those dates. This is **not** a contest, just a fun event to work as many two-way QRP contacts as possible. Listen for, or call, "CQ QRP". There are no specified exchanges of number or information, although it is useful to swap power level information and G QRP Club members usually swap their club numbers. G8PG invites brief logs and comments within 30 days of the event.

If you have never tried QRP operation before, this is the time to do it. International QRP Day on 17 June of each year is an attempt to invite all amateurs to try using reduced power for at least one day a year. So everyone is invited to take 3W of rf, or less, onto their favourite bands on that day. □

## MICROWAVES

Mike Dixon, G3PFR\*

### Operating news

Details of the Square Bashers Expedition Group were available at the Microwave Committee stand at the NEC Convention. For those interested who either didn't get to the convention or who didn't pick up details, here they are.

The expedition is to two rare squares in Scotland, and the team will consist of: GW3NYY, GW4LXO, GW4TTU, G4VXE, G4FRE, G8TFI and GW8TVX. From 2 to 8 August they intend to activate ZR (IO97) square using the callsign GB3ZR, and activity will be mainly tropo with a limited number of ms skeds available. For skeds please contact G4VXE, QTHR.

From 9 to 16 August activity will be from YS (IO88) square, hopefully with the callsign GB3YS. From this location activity will be mainly ms, via the August Perseids, though the team is keen to work any stations who can

hear them on tropo. For skeds please contact GW4LXO, QTHR.

Operation will be on *all* bands 70MHz to 24GHz inclusive, power and modes being dependent on the band in use. These were not specified at the time of writing, but with certain well-known microwave operators involved there is likely to be some good equipment for each of the bands.

The team points out that the dates might vary slightly, dependent on road and weather conditions.

My apologies to Alan, G8BJG, for some incorrect award details given in the April *Microwaves*: it really is incredible how undetected errors creep into the text, however carefully proof-read! His entries should read:

Distance Award (99) on 1.3GHz, G8BJG and not G8BGJ.

5 Squares Award (59) was on 10GHz, not 1.3GHz.

5 Squares Award (60) on 1.3GHz, again had a transposed callsign.

Distance Award on 10GHz was not numbered and was, in fact, number 78.

Alan also asked me to thank all those people who, as a result of the publicity given here and by the GB3NWK group's display at the VHF Convention, sent donations to assist in the running and maintenance of the two beacons. Further donations will of course be welcome! I feel sure that generosity of this nature will assist not only this group but others also, remembering that the beacon service is voluntary and that microwave beacons probably require rather more maintenance than their lower-frequency counterparts.

Jack, G5UM (microwave awards manager) has received a claim from John, G4BYV (Norfolk) for 15 squares confirmed on 3.4GHz, thus "topping-up" his original claim made in 1983. John's equipment consists of interdigital mixers on both receive and transmit, with 1.5W from a YD1060 pa. The receiver uses two preamps of the G3WDG design, described in this column about three years ago. His 2m dish at 70ft is fed by the well-known DL7QY feed. Jack mentioned that the only other operator to receive a "sticker" on his basic certificate is fellow East-Anglian, G4FRE.

A welcome letter from Geoff, G8AAP (formerly GW8AAP) was prompted, he says, by mention of his callsign in April *Microwaves*. His new location is on the south side of Horncastle in Lincolnshire and he said, wryly, "... you must know how a move can inhibit amateur radio activity. I still don't have a shack but have been beavering away on the kitchen table in order to activate AN (JO03) square at every opportunity—/P on 1.3, 2.3 and 3.4GHz. I have only to dust-off my 1.3GHz gear: on 2.3GHz, I have 0.5W from my LMW Electronics transmitter board, and am trying to finish off an amplifier kindly loaned to me by G6ADE, which should give 8–10W into a 4ft dish. Hopefully it should be ready for the May contest at the latest." On 3.4GHz he has an interdigital converter working well (I can vouch for the fact that this design does work well and is easy to construct and align, two samples of which were on show at the NEC). His oscillator source is a modified Microwave Modules with switchable 93.75 and 94.055MHz crystals to yield injection for both his 2.3 and 3.4GHz converters. Geoff uses a 70MHz i.f., a slightly unusual choice but one with a number of advantages over the more standard 144MHz, not the least of which is that "it is free from 26dBW signal breakthrough".

Incidentally, while thinking of /P activity, I was pleased to see at the NEC, that Jaybeam have re-introduced the 15 over 15 slot-fed 1.3GHz antenna. This is a robust little antenna and, while not as "gainy" as its other rivals, it is very compact and well constructed and is eminently suitable for lightweight portable use. It is also in use on at least two of the UK 1.3GHz beacons (GB3NWK and GB3CLE), thus proving its robustness under the rigours of long exposure to the elements.

From Frederick, G6FK, came the report that, until the end of March, activity on 1.3GHz has been low. In early April his comment was: "In the last few evenings several new 1.3GHz signals have made an appearance for the first time." He mentioned Ron, G1AEF (Wolverhampton), Chris, G3ZDM (Manchester), and Stan, G4LU (Oswestry), in addition to the stations mentioned last month. Phil, GW1CCJ, is operational from Colwyn Bay at weekends and Eric, G8EVK (Warrington), "appeared one evening with a 9 + 20 signal, only to disappear with transverter trouble". It is nice to hear of the steadily increasing numbers having a go at this fascinating band and, in the same vein, it is also good news to hear of rising interest in 2.3GHz. In the Wolverhampton area Frederick mentioned five stations fully active. Meanwhile his skeds with G14CXH and GM4YPZ continue with relatively little success at the moment, even using the strict "one minute receive, one minute transmit" technique advocated by Ian, G3SEK (*Microwaves* November 1984), which is to be recommended on difficult paths.

My apologies for a somewhat curtailed column this month. Not due to lack of contributions, but to some family problems which have intruded into the production schedule. Hopefully things will be back to more-or-less normal next month and I will be able to report more fully on "doings" on the various bands, together with some IARU news and reports. □

\*"Woodstock", Gaze Bank, Norley, Warrington, Cheshire WA6 8LL.



# COMPUTING

John Morris, GM4ANB\*

## Analysing callsigns

Given that the score for a contact often depends on the location—and hence callsign—of the QSO partner, and that multipliers are often based on countries or prefixes worked, any hf contest scoring program is going to have to mess around with callsigns to some extent.

Program 1 contains a utility subroutine for this purpose. It takes a callsign, decides whether it is valid, and returns information about it.

Before describing the program, let us take a look at the way amateur callsigns are constructed. (The information about callsigns and variants is taken from the third edition of the *Amateur Radio Operating Manual*.)

Every licensed amateur station has a callsign consisting of a prefix followed (unless you happen to be a member of the Jordanian royal family) by one to three serial letters. The prefix consists of a country code followed by a single digit. The country code can be a single letter ("G"), two letters ("GM"), a letter followed by a digit ("Y2"), or a digit followed by a letter ("5B").

For maybe 99 per cent of all stations, that is the complete callsign. However, some stations, especially during contests, have various appendages to the callsign. The most common are the "/A", "/P" and "/M" suffixes. In Program 1 these are called "operation variants".

Stations operating away from home, for example using a reciprocal licence, often use their own callsigns with the prefix used by the country of operation tacked onto the front or back. For example, a USA station operating in the UK might use "G4/W3XO", while a Briton in the USA could appear as "GM4ANB/W6". In the program these additions are called "location variants".

The subroutine starting at line 1000 in Program 1 analyses a callsign following these rules. When the subroutine is called, the callsign to be checked must be in C\$. On exit, variable EF should be examined. If it is zero then the callsign appears to be valid, at least structurally. Otherwise its value indicates the type of fault found in the callsign, and the subroutine at line 1500 can be called to give an appropriate error message. The errors that are detected can be seen from the PRINT messages in lines 1520 to 1580.

For structurally valid callsigns the following information is returned:

- PS — Prefix part of the callsign, including the digit (for example "GM4" or "G3"). This is of use when the multiplier depends on the number of prefixes worked.
- SS — Serial letters of the callsign ("ANB"). Occasionally contest scores are based on the number of regions of a particular country worked, which can sometimes be found by further analysis of the serial letters.
- VS — Operation variant, if any. It can be "A", "P" or "M". Note that the leading "/" is not included. This can be used when the number of points is greater for a portable station than a fixed.
- FS — Location variant, if any. If this is present the program is going to have trouble deciding which prefix it should use, and the user will probably have to be asked to help.

The subroutine starts by making sure that the callsign is at least four characters long, and contains only letters, digits and slashes. Any lower case letters are translated to upper case. A maximum of two "/" characters are allowed (lines 1010 to 1070). The callsign is left in M\$.

If the callsign contains a "/", lines 1080 to 1140 look to see if it is used for "/A", "/P" or "/M". If so, the operation variant is removed from M\$ and put into VS.

If there is still a "/" left in the callsign at this stage, it is assumed that a location variant is being used. The callsign is therefore split into two components. The longer part is assumed to be the main callsign, and is left in M\$. The shorter part is put into FS for return to the main program (lines 1150 to 1190).

Ideally we should at this stage analyse FS, and make sure that it is a valid location variant, such as "G4" or "W3". Unfortunately, looking through the more exotic callsigns reported in G3FKM's column over recent months, there is a distinct lack of consistency between different administrations in what they tack on to the callsigns of foreign amateurs operating in their countries. Therefore the program assumes that anything that appears as a location variant is valid, and leaves it to the user to make a final decision.

## Program 1

```
100 PRINT: INPUT "Callsign": C$: PRINT: GOSUB 1000
110 IF EF<>0 THEN GOSUB 1500: GOTO 100
120 PRINT "    Callsign = ": C$
130 PRINT "    Prefix = ": P$
140 PRINT "    Serial letters = ": S$
150 IF F$<>"" THEN PRINT "Location variant = ": F$
160 IF V$<>"" THEN PRINT "Operation variant = ": V$
170 GOTO 100
1800 M$="": P$="": S$="": F$="": NS=0: S1=0: S2=0
1010 IF LEN(C$)<4 THEN EF=3: RETURN
1020 EF=0: FOR J=1 TO LEN(C$): T$=MID$(C$,J,1)
1030 IF T$="/" THEN NS=NS+1: S1=S2: S2=J: GOTO 1060
1040 IF T$="a" AND T$="z" THEN T$=CHR$(ASC(T$)-32)
1050 IF (T$="0" OR T$="9") AND (T$="A" OR T$="Z") THEN EF=7
1060 M$=M$+T$: NEXT J: IF NS>2 THEN EF=1
1070 IF EF<>0 THEN RETURN
1080 C$=M$: IF NS=0 GOTO 1190
1090 T$=MID$(M$,S2+1): IF T$="" THEN EF=6: RETURN
1100 T=0: FOR J=1 TO 3: IF T$=MID$(M$,J,1) THEN T=J
1110 NEXT J
1120 IF T=0 GOTO 1140
1130 V$=MID$(M$,T,1): M$=LEFT$(M$,S2-1): NS=NS-1: S2=S1
1140 IF NS=1 THEN EF=5: RETURN
1150 IF NS=0 GOTO 1190
1160 F$=LEFT$(M$,S2-1): M$=MID$(M$,S2+1)
1170 IF LEN(F$)>LEN(M$) THEN T$=F$: M$=F$: F$=T$
1180 IF LEN(F$)=0 OR LEN(M$)=0 THEN EF=6: RETURN
1190 T$=M$: GOSUB 1400: IF T(2 OR T=7 OR T=3 THEN EF=2: RETURN
1200 J=3: IF T=5 THEN J=2
1210 P$=LEFT$(M$,J): S$=MID$(M$,J+1)
1220 T$=S$+"AA": GOSUB 1400: IF T(7 OR LEN(S$)>3 THEN EF=4
1230 RETURN
1400 T=0: FOR J=1 TO 3: U$=MID$(T$,J,1)
1410 T=T*2: IF (U$="A" AND U$="Z") THEN T=T+1
1420 NEXT J: RETURN
1500 PRINT "Sorry - I can't handle '": C$: " - ":
1510 ON EF GOTO 1520,1530,1540,1550,1560,1570,1580
1520 PRINT "Too many '/' characters": RETURN
1530 PRINT "Illegal prefix format": RETURN
1540 PRINT "Too short": RETURN
1550 PRINT "Serial letters invalid": RETURN
1560 PRINT "Unrecognised operation variant": RETURN
1570 PRINT "Null section in callsign": RETURN
1580 PRINT "Contains illegal characters": RETURN
```

At line 1190 all "/" additions will have been stripped off, and just the main callsign itself will be left in M\$. This must now be examined to make sure that it is structurally valid, consisting of a prefix and a suffix. The prefix can be checked by looking at the "shape" of the first three callsign characters, in terms of whether they are letters or digits. Only the following patterns are valid (L means letter, D means digit):

- LDL ... Single letter country code, digit, start of serial letters (G3S ...).
- LDD ... Letter and digit country code (Y22 ...).
- DLD ... Digit and letter country code (5B4 ...).
- LLD ... Two letter country code (PA0 ...).

A convenient way to see if the first three characters conform to one of these patterns is to encode them as a binary number, using 0 for a digit and 1 for a letter. This will give a single number in the range 0 to 7, which is easier to handle than three separate characters.

The utility subroutine at line 1400 does this, returning the coded pattern in T. It is called in line 1190, and the returned value checked to make sure that it corresponds to one of the acceptable patterns. The value also lets us decide whether the prefix has two ("G8") or three ("GM4") characters, and so to pull it out of the main callsign (line 1210) into P\$.

The rest of the callsign must be the serial letters, which are put into S\$. This must be three characters or less long, and all letters. Line 1220 performs these final checks before the subroutine returns.

The subroutine will correctly analyse the vast majority of callsigns in use on the amateur bands, but there are some that it will not handle. It will not detect callsigns that are structurally correct but not actually allocated, such as GZ4ANB—that is a subject for another month. It will reject as invalid some callsigns which are heard, such as JY1 or GBIIARU. There is not much the computer can do about these, as they do not conform to normal callsign conventions. It will pass without comment strange location variants, such as GM4ANB/FRED, so long as the main part of the callsign is valid.

Any main program that uses the subroutine should be aware of these limitations and, in case of doubt, ask the user for help. In general, if EF is zero and FS is null then it will be safe to assume that the callsign is good, at least structurally. Otherwise the program should admit its inadequacy, and ask the user to help out by specifying the prefix that should be used. To paraphrase a saying which has been doing the rounds in computer circles, computers can only be artificially intelligent; it is up to their users to be really intelligent!

\*6A Morlich Grove, Dalgety Bay, Near Dunfermline, Fife KY11 5UX.



# DATA COMMS

Ian Wade, G3NRW\*

LAST MONTH I defined a number of rty transmit/receive configurations (designated a-h), in readiness for the detailed product survey this month. In the first draft of this month's column I prepared a full table of features for each product, but the finished offering would have required at least three full pages, so I have had to cut the suit according to the cloth and resort to a more general narrative approach instead.

Table 1 lists the products in the survey, grouped by computer type, and shows the price range for the software and interface hardware for each, together with the transmit/receive configuration codes (a-h), and the method of controlling the ptt line for transmit/receive changeover. Some packages can be connected up in different ways; in these cases more than one price range and configuration are shown. Also, some suppliers do not offer interface hardware, but provide an interface circuit diagram instead; these are shown as "CCT" in the table. Table 2 lists the product suppliers. Note that none of these are large companies with limitless postal budgets, so please remember to enclose an s.a.e. when writing to them.

## RTTY package features

As mentioned above, there is not enough room to list every feature of every product, so instead I will summarize the features common to most of them (plus some of the exceptions), and will also point out some of the features which are possibly not what they seem.

**PTT control for transmit/receive changeover.** Probably the best means of controlling the ptt line is via an isolating relay (designated RLA in Table 1), particularly if you are using an old valve radio where the ptt line could rise to 50V or more in the key-up condition, and could carry a high current on key-down—this would soon see off a BC108 controlling the ptt line! So if the interface uses a transistor to control ptt, be sure to measure the open-circuit voltage and closed-circuit current of the radio's ptt line to make sure that they fall well within the maximum ratings of the transistor (+20V and 100mA for the BC108/9). If not, you will have to use the transistor to switch an external relay, which in turn controls the ptt line.

Some of the packages have no means of controlling the ptt line automatically. This is no problem if you are using an ssb radio with vox (when sending rty, the audio tones will activate the vox circuit and turn on the transmitter), but if you are using an fm box without vox you will have to arrange to switch the ptt line manually. No great problem with bread-and-butter rty QSOs, which tend to be fairly leisurely affairs, but could be a nuisance in contest operation.

**Common software features.** All of the packages handle Baudot rty at 45·45 and 50bit/s, and most offer other speeds as well, although 75bit/s is the only other speed likely to be of interest. Some packages also handle ascii rty, but there is very little ascii traffic on the air, so this is probably not much use. Several packages also handle cw, and one multi-purpose offering (from Technical Software [11]) even receives amtor and sstv as well! And if you have a CBM-64 or CBM-128 and want to receive and transmit in just about every data mode available (including AX.25 packet), then the PK-64 package from ICS [6] will be worth looking at.

All but one of the packages operate in split-screen mode, whereby different parts of the screen are dedicated to received text, transmitted text and status information. A very desirable feature, allowing you to see clearly what is happening at any time. (The one exception is the Nascom package—I'll leave you to look up who supplies that!). A few points to watch out for with some packages: (a) you cannot type a reply message when you are receiving; (b) you cannot correct typing errors before transmitting, except by retyping the whole buffer; (c) you can lock up the keyboard and everything else if you type too quickly, causing lost characters on receive—one supplier has even programmed his package to run slightly faster than the nominal 45·45 or 50bit/s rate, to compensate for the time lost when the keyboard is locked up on each keystroke!

**Line lengths.** A golden rule for rty program writers is that a line of transmitted text must not be allowed to exceed 69 characters in length. Otherwise teleprinter operators get very upset when characters overprint at the end of a line. Three of the suppliers were originally unaware of this rule.

\*7 Daubeney Close, Harlington, Dunstable, Bedfordshire:LU5 6NF.

Table 1. RTTY packages

Computer/package	Supplier	Price range		Configuration		
		1: Under £10	2: £10-£20	TX	RX	PTT
		3: £20-£50	4: £50 +			
		Software	Interface			
Acorn Atom BMKRTTY for Atom	[3]	2	3	c	g	CCT
BBC RTTY/CW Transceiver	[11]	3	1/2	b/c	f/g	BC109
RX-4 Multimode RX	[11]	3	1/2	—	f/g	—
G3WHO RTTY	[5]	1/2	—	b/c	g	—
CBM-16 Microcom 16	[9]	2	CCT	b	g	(VOX)
CBM plus 4 Microcom + 4	[9]	2	CCT	b	g	(VOX)
CBM-64 SWL-Text	[6]	4	—	c	g	—
MBA-TOR	[6]	4	—	c	g	TTL
PK-64	[6]	4	—	c	g	?
RTTY/CW Transceiver	[11]	3	1/2	b/c	f/g	BC109
RX-4 Multimode RX	[11]	3	1/2	—	f/g	—
Microcom 64	[9]	2	CCT	b	g	(VOX)
BMKRTTY for CBM	[3]	2	2/3	b/c	g	CCT
CBM-128 BMKRTTY for CBM	[3]	2	2/3	b/c	g	CCT
Microcom 128	[9]	2	CCT	b	g	(VOX)
Color Genie DFT/CG	[8]	2	3	b	g	(VOX)
Dragon 32/64 BMKRTTY for Dragon	[3]	2/3	2/3	d	e/h	RLA
Nascom-1/2 Nascom RTTY V7	[12]	1	CCT	c	g	CCT
Spectrum 48k RTTY-9	[4]	1	1	d	h	BC108
RTTY Version 3.0	[2]	1	2	b	g	RLA
Spectrum RTTY	[7]	1	1/2	b	f	RLA
RX-4 Multimode RX	[11]	3	1/2	—	f/g	—
G1FTU RTTY	[10]	2	-1/2	a/b	e/f	(VOX)
Spectrum 16k RTTY-7	[4]	1	1	d	h	BC108
Tandy Color BMKRTTY Tandy Color	[3]	2/3	2/3	d	e/g	RLA
TRS-80 16k Level 2 CT600	[1]	—	3/4	c	g	RLA
DFT/VG	[8]	2	4	c	g	RLA
VIC-20 RTTY/CW Transceiver	[11]	3	1/2	b/c	f/g	BC109
RX-4 Multimode RX	[11]	3	1/2	—	f/g	—
BMKRTTY for VIC-20	[3]	2	3	c	g	CCT
MBA-TOR	[6]	4	—	c	g	TTL
Video Genie CT600	[1]	—	3/4	c	g	RLA
DFT/VG	[8]	2	4	c	g	RLA
ZX-81 RTTY-3	[4]	1	1	d	h	BC108
Any ASCII terminal AMT-2	[6]	—	4	c	g	2N3904

Table 2. RTTY package suppliers

- [1] Ace Telecoms, 1 Lacey Avenue, Old Coulsdon, Surrey CR3 1LQ.
- [2] Binary Star Technology, 6 Waveney Terrace, Haverhill, Suffolk CB9 8DZ.
- [3] Grosvenor Software, 2 Beacon Close, Seaford, E Sussex BN25 2JZ.
- [4] G4IDE Micro Systems, 79 South Parade, Boston, Lincs PE21 7PN.
- [5] Peter Harris, G3WHO, 10 Appleby Close, Gt Alne, Alcester, Warks B49 6HJ.
- [6] ICS Electronics Ltd, PO Box 2, Arundel, West-Sussex BN18 0NX.
- [7] JEP Electronics, New Road Complex, Kidderminster, Worcs DY10 1AL.
- [8] Martin Products, 7 Naim Street, Jarrold, Tyne & Wear NE32 4HX.
- [9] Moray Micro Computing, Enzie Slackhead, Buckle, Moray AB5 2BR.
- [10] Pearsons Computing, 42 Chesterfield Rd, Barborough, Chesterfield, Derbys S43 4TT.
- [11] Technical Software, Fron, Upper Llandwrog, Caernarvon, Gwynedd LL54 7RF.
- [12] Ian Wade, G3NRW, 7 Daubeney Close, Harlington, Dunstable, Beds LU5 6NF.

Two of them have since declared that future versions of their software will be modified to conform. The third says that the advice in the operating instructions to remember to give a carriage-return command regularly is sufficient; try telling that to the teleprinter man suffering from the dreaded black blob at the end of each line!

**Printer and disc support.** Several suppliers claim that their packages will support a printer, and possibly also a disc (or microdrive) to save and retrieve message text. While this turns out to be true, be aware that in almost all cases it is not possible to use the printer or disc at the same time as holding an rty QSO. In other words, rty operations have to cease completely when you wish to use the printer or disc. Not a great problem if you are aware of it, but it does bring up the general question that should be asked of any computer supplier, amateur or professional: "Can it do all of these interesting things at the same time?" *Caveat emptor.* More about rty software features next month. In the meantime, another question: what do you think about the rty package you are using? Good or bad, easy to use, room for improvement? Please let me know.

# Contest News

## Affiliated Societies Team Contest 1986 results

Another record year for AFS. 459 individual logs (1985, 415; 1984, 375), 121 club teams (1984, 91; 1985, 115) and a total checked score of 421,131 points (1985, 383,413).

Thorough adjudication took an average six per cent off every claimed score. Only 72 logs lost no points at all. The 110 unmarked duplicate QSOs for which points had been incorrectly claimed was down on last year's 121, but entrants who still fail to fully check for unmarked duplicates will find their score severely dented.

The second most common loss of points is for incorrect call signs logged. On average some six per cent of the call signs logged were incorrect. With a high percentage of active stations sending in a log, the majority of QSOs in every log is fully cross-checkable.

Stations that use /A or /P during the contest are reminded that once they have decided to use such a call, they should send the full call for every QSO. Similarly stations working "I" calls should make sure to log the whole call. Valuable points are lost for what are otherwise good QSOs.

AFS is a club contest where team participation is the key. The HF Contests Committee is pleased to note the increase in entries, but a recurring comment from club secretaries is the problem of getting a full team together.

The HFCC does not plan to change any of the rules of what has proved to be one of the most popular contests in the RSGB's hf calendar. However, in order to encourage newer cw operators to take the plunge and participate in AFS, it is being proposed that for the 1987 AFS a small part of the band (say, 3.575 to 3.590kHz) be identified as a "QRS corral" where not only slower operators will find other QRS stations, but also where QRQ entrants can make QSOs they might not otherwise make, if they send a bit slower.

This is not intended in any way to detract from the QRQ rough and tumble of the rest of the band during AFS, but is to encourage more members who might otherwise be shied off by the QRQ CW, to take part. The idea of a "QRS corral" may make it easier for club secretaries to encourage newer operators to take part and add valuable points to the team score. Contact any HFCC member to let him know your views on the proposed "QRS corral".

The adjudication team (G3KKQ, G3SXW, G3TXF, G4BUO and BRS20249) once again had the unenviable task of fully checking every entry in all the logs of each member of the leading clubs. The claimed scores of Leicester Poly A and Three As A were within less than one per cent of each other. After fine tooth-combing both sets of logs, Three As A came out the winners. The first four places on individual claimed scores differed by only seven QSOs. After fully checking each log, GMCCO just pipped G3SJJ to the post, pursued closely by GW3YDX and G3SSO.

If every club can convince just one more member to take the plunge and have a go at AFS next year, we'll make 500 in 1987. CU there!

G3TXF

Posn	Society	Team Points	Stations contributing to score			
52	Conwy Valley A	3,660	GW3JI	GW3MDK	GW4PVU	GW3GWX
53	RNARS Liverpool A	3,530	G3JZI	G3SGO	G4LKM	G40KL
54	South Hampshire	3,441	G3GFG	G3JZV	G3CNO	G4KNX
55	Worthing	3,430	G3LOI	G4SLE	G4GPX	G4KHM
56	Cheltenham	3,321	G4PDO	G4UAF	G3BCC	
57	Shefford	3,224	G3DOT	G4YRF	G3WRJ	G3YLA
58	Hornsea	3,167	G4ODP	G4MWE	G4IGY	G3TLI
59	Buxton	3,157	G3HGH	G4RHB	G4XOI	G0AVE
60	Sutton & Cheam	3,030	G3DNJ	G3LCH	G4EOI	G4CMU
61	BBC Ariel	2,964	G3AYC	G3TDL	G3CIK	G3BBC
62	Macclesfield A	2,927	G3LDT	G3MKR	G0AMU	G0DMU
63	RNARS London B	2,907	G3AQM	G4CJY	G4PSA/A	G8IB
64	Forfar	2,895	GM3ZXE	GM40AQ	GM4JCM	GM4BAG
65	Eden Valley	2,817	G3JYP	G4AFU	G4WKG	
66	Clifton	2,697	G3JYK	G3DIC	G4RFC	G4TJE
67	RNARS Rosyth	2,610	GM3HUN	GM3UM	GM4FGD	G4GVJ
68	Plymouth	2,604	G3ULN	G4HTD	G4FJZ	G4KXZ
69	RNARS Nottingham	2,504	G3TTH	G8AV/A	G4UOH	G4MOM
70	RAFARS Locking	2,384	G3ICH	G2FIX	G3GNS	G3YRM
71	Three As B	2,209	G4FAM			
72	Aberdeen	1,804	GM3UU	GM3HGA	GM0CIT	GM4BKV
73	Farnborough B	1,794	G4BJQ	G4JFN/P	G4U2K	GM3KPD
74	Halifax B	1,751	G4DNB	G4JJC	G3ONO	G0BXO
75	Three As Cymru	1,740	GW3WVG			
76	Axe Vale Dorset	1,690	G3HAL	G8CA		
77	Colchester B	1,677	G4KTI	G4HKC	G3FIJ	G0AWZ
78	RNARS Yeovilton	1,630	G4KJD	G4MZL		
79	South Manchester	1,521	G4HON	G4TFU	G3HZM	G3ZDM
80	Grimby B	1,510	G4PYD	G4YTO	G4CFO	
81	Ainsdale	1,510	G4KKG	G4OOT	G4YVY	
82	Bromsgrove	1,494	G4UIW	G4IVJ	G3RBL	G4MBW
83	Verulam C	1,484	G4WKJ	G0AMG	G4GOU	G2PA
84	Stockport C	1,464	G4ECI/A	G0BVZ	G4SYC	G0ASI
85	Torbay B	1,454	G4EDG	G3KZJ	G0CED	G3SNU
86	Cornish	1,380	G4ODV	G4TSH		
87	RNARS Swansea	1,324	GW4HDB	GW40DN	GW4KJV	
88	IBA Crawley Court B	1,280	G4E2C	G4IBA		
89	RNARS Birmingham B	1,260	G4MSR	G4KLO		
90	RNARS Copenhagen	1,260	OZ3ON	OZ4CB	OZ5IN	OZ1FJB
91	Kingston	1,211	G3IMK	G4LJI		
92	RNARS Plymouth	1,210	G4KXZ	G3VNG/A		
93	Cheshunt	1,170	G3TIK	G3WFM	G4TIO	G4UJL
94	RNARS Lowestoft	1,170	G4KDL			
95	Guildford	1,054	G3ZDD	G3YXX		
96	Norfolk B	1,010	G4RCI	G0BGD		
97	Stevenage	920	G3OVT	G4ISO		
98	RNARS Belfast	880	G3ITNK	G3GTR		
99	South Birmingham	840	G4EYD	G4FCO		
100	Surrey Radio B	811	G0BKD	G3EUE	G4FYF	
101	Edware B	780	G3ZDJ			
102	RNARS Bristol	750	G3JBA			
103	Helensburgh	701	GM4GIF	GM4HEL		
104	Halifax C	627	G0CVC	G4XUC	G4XYS	G4RAW
105	RNARS Portsmouth B	621	G4LGD	G4ZUY		G4VOB
106	White Rose B	580	G4FKS	G40AT		
107	Hastings B	574	G3CMM	G0AKY		
108	Lincoln Short Wave	570	G3ZDW			
109	Gloucester B	510	G4XQC			
110	Yeovil B	510	G3KSK	G4JBH		
111	Chiltern B	470	G0ACL			
112	Preston B	467	G4OTN			
113	Conwy Valley B	397	GW0BCR	GW4VWV	GW3ON	
114	RNARS Liverpool B	397	G4PTN	G4HWK		
115	West Kent B	367	G4BIA			
116	Scunthorpe B	354	G4NFX			
117	Macclesfield B	210	G4XTO			
118	Tyneside B	140	G4MRT			
119	Hereford B	97	G4OJP			
120	Verulam D	80	G4PVB			
121	RNARS Harrogate	70	G3FBP			

Check Logs: G3BPM G4BCY G4BUE G4PKE

INDIVIDUAL SCORES				INDIVIDUAL SCORES			
Posn	Call sign	Score	Society/Team	Posn	Call sign	Score	Society/Team
1	G4MCC	2,749	Marple	31	G3XVF	2,130	Norfolk A
2	G3SJJ	2,732	Leicester Poly A	32	G4ALE	2,110	Addiscombe
3	GW3YDX	2,686	Marple	33	G4BCA	2,092	Leicester Poly A
4	G3SSO	2,675	Govt Communications	34	G3NKS	2,070	Govt Communications
5	G3PEK	2,657	Stockport A	35	G3VER/A	2,060	Verulam A
6	G3OAY	2,619	Leicester Poly A	36	G3SJJ	2,010	Addiscombe
7	G4MBC	2,530	Mid-Beds	37	G3SDC	1,996	Leicester Poly A
8	G4CNY	2,450	Hereford A	38	G3GRO	1,990	Crawley
9	G3FCB	2,444	Three As A	39	G3WYK	1,950	Maldenhead
10	G3NOM	2,417	Stockport A	40	G3PDL	1,940	Scunthorpe A
11	G3OLB	2,410	Farnborough A	41	G4FPH	1,930	Leicester Poly B
12	G3SXW	2,409	Three As A	42	G4MUL/A	1,930	Marple
13	G3UFY	2,340	Addiscombe	43	G4E0F	1,847	Leicester Poly B
14	G3KDB	2,320	Lichfield	44	G3HCT	1,827	Lichfield
15	G3POI	2,320	East Barnet	45	G3JFK	1,820	Crawley
16	G4GRI	2,320	Mid-Beds	46	G3XWZ	1,820	Newark
17	G4BUE	2,300	Three As A	47	G3XYC	1,820	Leicester Poly B
18	G3RTE	2,280	East Barnet	48	G4HVC	1,807	Newark
19	G3MXJ	2,271	Three As A	49	G3LRS	1,790	Leicester Radio
20	G3YEC	2,270	RNARS Medway	50	G3UJV	1,790	Verulam A
21	G4OBK	2,260	Stockport A	51	G4CPC	1,790	Lichfield
22	G3PSM	2,240	White Rose A	52	G3RFS	1,777	East Barnet
23	G3TFX	2,225	Three As A	53	G5LP	1,770	Mid-Beds
24	G4FAM	2,209	Three As B	54	G3KAF	1,760	Stockport A
25	G3NKC	2,180	Lichfield	55	GW3WVG	1,740	Three As Cymru
26	G3WBP	2,170	East Barnet	56	G3KKQ	1,730	Echelford
27	G3ORY	2,164	Leicester Poly A	57	G3ROZ	1,730	Addiscombe
28	G0CMM	2,157	Marple	58	G4ARI	1,700	Leicester Poly B
29	G3LNS	2,150	Lichfield	59	GM3YOR	1,700	Glenrothes
	G4JKS	2,150	Verulam A				

Posn	Callign	Score	Society/Team	Posn	Callign	Score	Society/Team	Posn	Callign	Score	Society/Team	Posn	Callign	Score	Society/Team
61	GM4T00	1,690	West of Scotland	173	G3IC	990	RAFARS Locking	285	G3CNO	630	South Hampshire	373	GOANG	357	Verulam C
62	G3TBK	1,670	Newark		G4MWE	990	Hornsea		G4CJY	630	NRARS London B		G4NFX	354	Scunthorpe B
	G3HOH	1,660	Buxton		GM3HUN	990	NRARS Rosyth		G4IGY	630	Hornsea	374	G0CED	354	Torbay B
63	G3GSP	1,660	Thames Valley	176	G5MY	980	Leicester Poly D		G4ZXY	627	Halifax A		GW40DN	354	NRARS Swansea
	G4IUZ	1,660	Edgware A		G3MCX	980	Surrey Radio A	289	G4BJQ	627	Farnborough B	377	G4SSH	350	NRARS Stockton
66	G3YVR	1,654	Crawley	178	G3AZI	970	Preston A		G4GPX	620	Worthing		G4SYC	350	Stockport C
67	G4PDD	1,640	Cheltenham		G3ZMA	970	Gloucester A	290	G4OKL	620	NRARS Liverpool A	379	G4MQM	347	NRARS Nottingham
	G3JEO	1,630	Thames Valley	180	G3KXT	960	Surrey Radio A		G4JCM	617	Forfar		G4XOI	347	Buxton
68	G3NJA/P	1,630	Torbay A		G4KKZ	960	NRARS Plymouth	292	G4FFW	610	Stockport B	381	GM4FGD	340	NRARS Rosyth
70	G3LCS	1,627	NRARS London A	182	GM3ZXE	954	Forfar		G4KTI	610	Colchester B	382	G4IVJ	337	Bromsgrove
71	G3RIR	1,600	Leicester Poly B	183	G4SIE	950	Tyneside A	293	G3TNK	610	NRARS Belfast		G0BKO	337	Halifax B
72	G3OGY	1,590	IBA Crawley Court A	184	G4HZF	940	Grimsby A		G4GGV	607	Maidenhead	384	G4VVU	330	Verulam C
	G3JFF	1,580	NRARS Portsmouth A		G3LCH	930	Sutton & Cheam	296	G4GSC	607	Echellford		G3EAO	327	Echellford
	G3RXP	1,580	Grimsby A	185	G4TNI	930	NRARS Birmingham A		G3GMM	600	Stockport B	385	GM4BKV	327	Aberdeen B
75	G4DUS	1,570	Verulam A		G0CLP	930	Leicester Poly D	298	G4NKK	600	South Hampshire		G3WFM	320	Cheshunt
76	G3VVI	1,560	Addiscombe	188	G4INI	924	NRARS Portsmouth A		G3AIK	580	Yeovil A	387	G4PNB	320	Farnborough B
77	G4BOU	1,550	Verulam A		G3SFG	920	Southgate	300	G4KLQ	580	NRARS Birmingham B	389	G3EUE	317	Surrey Radio B
78	G3ASR	1,530	Edgware A	189	G4ODV	920	Cornish		G4ZIV	580	NRARS Portsmouth B		G0BKO	317	Surrey Radio B
79	G3RWL	1,520	Southgate		G3VTY	917	White Rose A	303	G3DIC	570	Clifton	391	G4YTO	310	Grimsby B
80	G3BDD	1,510	Hastings A	191	G4DVC	917	Norfolk A		G3ZOW	570	Lincoln Short Wave		G4JSN	300	Hereford A
81	G3SJV	1,480	Hastings A		GM4EJI	917	Glenrothes	305	GM4ZRR/A	560	Aberdeen A	392	GM3KPD	300	NRARS Rosyth
	G3ZOA	1,480	Newark	194	G4HTD	914	Plymouth		G3MKR	550	Macclesfield A	394	G0DCG	297	Clifton
83	G4DJX	1,450	Verulam B	195	G4IZB	910	Farnborough A	306	G3ZDD	540	Guildford		G3ONQ	280	Halifax B
84	G3WSC	1,440	Crawley		G3AIO	900	West Kent A		G4KOT	540	Tyneside A	395	G3ZDM	280	South Manchester
85	G4DBL	1,427	IBA Crawley Court A	196	G4RHB	900	Buxton	307	G4ECI/A	530	Stockport C	397	G3OZY	277	NRARS Medway
86	G3JNB	1,414	Thames Valley		G3AWR	900	NRARS Stockton		G3IVX	520	NRARS Liverpool A		G3RBL	270	Bromsgrove
	G3BZU	1,410	NRARS Portsmouth A	199	G4OYC	897	Torbay A	310	G3ONN	520	NRARS Copenhagen	398	G4RFC	270	Clifton
87	G4ILW	1,410	Tyneside A		G3IFB	890	Govt Communications		G0AMU	517	Macclesfield A		G4WCP	270	Hastings A
88	G4FAS	1,400	Stockport A	200	G3LDT	890	Macclesfield A		G3YXX	514	Guildford		G3GTR	270	NRARS Belfast
90	G4RKK	1,397	Norfolk A		GM4LCP	890	West of Scotland	312	G8TB	514	Surrey Radio A		G3SNU	250	Torbay B
91	G3UEN	1,392	NRARS Stockton	203	G4OTV	887	West Kent A	313	G4HCK	510	Colchester B	402	G3VNG/A	250	NRARS Plymouth
	G3BFP	1,390	Surrey Radio A	204	G3KAU	880	Crawley		G4TJE	510	Clifton		G4TUO	250	NRARS Medway
92	G4EVP	1,390	NRARS Birmingham A	205	G3WRJ	870	Sheffield	315	G4XOK	510	Gloucester B		G0BGD	250	Norfolk B
94	G3CCZ	1,380	Colchester A		G3SGO	860	NRARS Liverpool A		GM4GIF	510	Helensburgh	406	G4LIW	247	Halifax B
	G3JVP	1,370	Eden Valley	206	G8CA	860	Axe Vale Dorset		GM4PVU	510	Conwy Valley A	407	G4GOU	240	Verulam C
	G3LIK	1,370	NRARS Portsmouth A	208	G4HON	857	South Manchester	320	G3AUB	500	Macclesfield A		G4MBW	240	Bromsgrove
95	G3YAJ	1,370	Colchester A		G3ATK	850	Yeovil A		GM3HGA	500	Aberdeen B	409	G0ANZ	237	Colchester B
	G4CZB	1,370	Leicester Poly C		G3HTI	850	Grimsby A	322	G4DNB	497	Halifax B	410	G3FJF	230	Colchester B
99	G3SHY	1,350	Edgware A		G3TZM	850	NRARS Birmingham A		G3TVI	494	South Hampshire		G3GDT	230	BBC Ariel
100	G4HMS	1,340	NRARS London A	209	G3ZTD	850	West Kent A	324	G4EOI	490	Sutton & Cheam	412	G4AZF	227	Farnborough B
101	G3FCW	1,330	White Rose A		G4UIP	850	Tyneside A		GM4BAG	490	Forfar		G4UZZ	220	Farnborough B
102	G4VYV	1,327	Leicester Poly C		G4UJO	850	NRARS London A	326	G8IB	487	NRARS London B	413	G0BGN	220	Buxton
103	G4UAZ	1,321	Cheltenham		GM4HOB	850	NRARS Swansea	327	GM0CIT	477	Aberdeen B		G4TFU	217	South Manchester
	G4OGB	1,310	Scunthorpe A		G3JZI	840	NRARS Liverpool A		G3CIK	470	BBC Ariel	415	G4WKG	217	Eden Valley
	G6LX	1,310	Surrey Radio A	216	G3WRQ	840	Hereford A	328	G4EYD	470	South Birmingham		G3YRM	210	RAFARS Locking
106	G4WFR	1,301	Colchester A		GM3VEY	840	Aberdeen A		G0ACL	470	Chiltern B	417	G4XTD	210	Macclesfield B
107	G3GC	1,300	Yeovil A	219	GM4OAO	834	Forfar		G0DMU	470	Macclesfield A		G4CMU	200	Sutton & Cheam
108	G3SVL	1,280	Hastings A		G3HAL	830	Axe Vale Dorset	332	G4OTN	467	Preston B	419	G4HSD	200	Sutton & Cheam
109	G3AIV	1,270	Thames Valley		G4IBA	830	IBA Crawley Court B	333	G4TSH	460	Cornish		G0CVC	200	Halifax C
	G4ISK	1,260	Farnborough A		G4SDX	830	Halifax A	334	G4LON	457	Chiltern A	422	G0AKY	194	Hastings B
	G4KGG	1,260	Leicester Poly C	223	G4ITP	827	Leicester Radio		G3LVW	450	Maidenhead	423	GM4HEL	191	Helensburgh
	G4RKG	1,260	Chiltern A		G4DIX	820	West Kent A		G4E2C	450	IBA Crawley Court B	424	G2PA	190	Verulam C
	G4UZN	1,260	White Rose A	224	G4KGG	820	Ainsdale		G4MZL	450	NRARS Yeovilton	425	G4FFY	177	Surrey Radio B
114	G4EBK	1,244	Grimsby A	226	G2FIF	817	RAFARS Locking	335	G4OOR	450	Leicester Poly D	426	G0ASI	174	Stockport C
	G3ZWH	1,240	East Barnet		G3DOT	810	Sheffield		GM3UUU	450	Aberdeen B		G4KXZ	170	Plymouth
115	G4ODC	1,240	Norfolk A	227	G3ZRF	810	Reigate		G4EDG	440	Glenrothes	427	G4OAT	170	White Rose B
	G3WKS	1,230	West Kent A		G4SOP	810	Verulam B	341	G4LEX	440	Gloucester A		GM4GVJ	170	NRARS Rosyth
117	G4AFU	1,230	Eden Valley	231	GM3JUM	810	NRARS Rosyth		G4HVK	437	NRARS Liverpool B		G0ZIN	170	NRARS Copenhagen
	G4VNR	1,230	Chiltern A	232	G4PYD	800	Grimsby B	343	G4UHW	430	NRARS Nottingham	431	GM3H2M	167	South Manchester
	G3ZVW	1,220	Southgate	233	G4RYF	794	Sheffield	344	G4UUB	430	NRARS Copenhagen		GW0BCR	167	Conwy Valley B
120	G4HZV	1,220	Farnborough A	234	G4WLG	790	Verulam B	346	G3WVP	420	NRARS Medway	433	G4ISQ	160	Stevenage
	G3DNJ	1,210	Sutton & Cheam		G4YYR	790	Gloucester A		G3KXF	410	Worthing		G3H2B	160	Tyneside A
122	G3RSD	1,210	Grimsby A	236	G3ZDJ	780	Edgware B	347	G3KZJ	410	Torbay B	435	G4XUK	150	Echellford
	G4FFD	1,210	Hereford A	237	G4ZMH/A	777	Scunthorpe A		G4FKS	410	White Rose B		G4MRT	140	Tyneside B
	G3PJS/A	1,200	Humberston		G3CQR	770	Yeovil A	351	G0BVZ	410	Stockport C	437	G4RAW	140	Halifax C
125	G3VPI	1,200	Humberston	238	G4AAS	770	Hereford A		G3VCT	400	Maidenhead		G0ZIF	140	NRARS Copenhagen
	GM4H/A	1,200	Halifax A		G4OCU	770	Scunthorpe A		G4CFO	400	Grimsby B	440	G4LJI	137	Kingston
128	G3AYC	1,190	BBC Ariel	241	G3LOP	764	Thames Valley	352	G4GLC	400	Leicester Poly D	441	G4JBH	130	Yeovil B
	G4FRN	1,190	NRARS London A	242	G3OVT	760	Stevenage		G4JFN/P	400	Farnborough B	442	GW3QN	120	Conwy Valley B
130	G4KJD	1,180	NRARS Yeovilton		G4RCI	760	Norfolk B		G4PXA	400	NRARS London B		GW4KVJ	120	NRARS Swansea
	G4KRS	1,180	Leicester Poly C	244	G3HQX	757	IBA Crawley Court A		G4FJZ	390	Plymouth	444	G4XYS	110	Halifax C
132	G4KDL	1,170	NRARS Lowestoft	245	G3JBA	750	NRARS Bristol	357	G4JJC	390	Halifax B		GW4VWV	110	Conwy Valley B
	G4UML	1,170	Stockport B		G3AOM	740	NRARS London B		G4WNA	390	NRARS Stockton	446	G4KKO	100	Plymouth
134	G3MCK	1,167	Echellford	246	G3LHJ	740	Torbay A	360	G3TLI	387	Hornsea		G4TIO	100	Cheshunt
	G4ODP	1,160	Hornsea		G4GVR	740	Norfolk A		G3CMN	380	Hastings B	448	G4QJP	97	Hereford B
135	G4UMS	1,160	Edgware A		GM3MDK	740	Conwy Valley A	361	G3KSK	380	Yeovil B	449	G4TZM	90	Colchester B
	GM4SID	1,160	Aberdeen A	250	G3WGXW	730	IBA Crawley Court A		GM3ZSP	380	Glenrothes	450	G4PVB	80	Verulam D
138	G4PIO	1,150	Colchester A		GM4V/A	730	Conwy Valley A	364	G4DBU	377	Preston A	451	G3FBP	70	NRARS Harrogate
	G4RNF	1,140	Preston A		G3YPG/A	727	Reigate		G3TOF	370	Leicester Radio	452	G0BWP	50	Shefford
139	G4XEN	1,140	Leicester Poly D	253	GM3DZB	727	Aberdeen A	365	G4FCO	370	South Birmingham		GM0CPQ	50	Aberdeen B
141	G3TIR	1,130	Torbay A		G3JZV	720	South Hampshire		G4GX	370	Humberston	454	G4LGD	41	NRARS Portsmouth B
142	G4KRG	1,124	Stockport B	255	G4LZB	720	Colchester A	368	G3GNS	367	RAFARS Locking	455	G4UNL	40	Cheshunt
	G3JTG	1,120	Govt Communications	257	G3TDL	714	BBC Ariel		G4BIA	367	West Kent B	456	G4YVY	30	Ainsdale
143	G4PTX	1,120	NRARS Birmingham A		G3TIK	710	Cheshunt		G4WKJ	367	Verulam C	458	G0AVE	30	Buxton
145	GM3UO/A	1,110	Marple	258	G4RPW	710	Preston A	371	G3BBC	360	BBC Ariel		G4VOB	27	Halifax C
146	G3COQ	1,100	Govt Communications		G4SLE	710	Worthing		G3BCC	360	Cheltenham	459	G4PTN	-40	NRARS Liverpool B
147	G4OOS	1,090	Leicester Radio	261	G4WZV	702	Scunthorpe A								
148	GM4FDM	1,087	West of Scotland	262	G3YLA	700	Sheffield								
	G3COJ	1,080	Chiltern A	263	G4LKM	690	NRARS Liverpool A								
	G4CIB	1,080	Gloucester A	264	G4FCH	687	NRARS Stockton								
	G4PIE	1,080	Chiltern A		G3BEC	680	Yeovil A								
152	G3IMK	1,074	Kingston		G4MSR	680	NRARS Birmingham B								
153	G0AKC	1,070	Leicester Poly C	265	GM4CKM	680	West of Scotland								
	G3TWG	1,060	Maidenhead		GM4OBD	680	Aberdeen A								
154	G4GLL	1,060	Halifax A		G3YVF	670	Hastings A								
	GM3PFO	1,060	Glenrothes	269	G3LHM	660	IBA Crawley Court A								
	G2UG	1,050	Halifax A		G4GYP	660	Southgate								
	G3JKY	1,050	Clifton		G4OOT	660	Ainsdale								



## DF Qualifying Event—South Manchester

Date: 13 July 1986.

Map: OS Sheet 118, 1:50,000 series, The Potteries.

Assembly: 1300bst for start at 1320bst.

Location: Lay-by on A534, approximately 1km ENE of Crewe station, ngr 721553.

Competitors requiring tea should notify Mr J Armitage, 57 Newgate Drive, Sale, Cheshire; tel 061 962 4633 (home) not later than 6 July 1986.

## DF Qualifying Event—Mid-Thames

Date: 3 August 1986.

Map: OS Sheet 186, 1:50,000 series, Aldershot and Guildford.

Assembly: 1300bst for start at 1320bst.

Location: Chawton Park Woods Picnic Area, ngr 672361.

Competitors requiring tea should notify Mr C Plummer, 27A Thorn Lane, Four Marks, Nr Alton, Hants; tel 07356 71055 ext 137 (business), 0420 62839 (home) not later than 27 July 1986.

## First 1-8MHz Contest 1986 results

The contest conditions must have been quite the worst that entrants have had to endure for many years; it must be something of a record for the HF Contests Committee to receive so many comments in agreement that conditions were terrible. Even though the conditions were so bad it is pleasing to note a slight improvement in the number of logs received from the British Isles. The overseas entry was very much reduced.

The adjudicator is amazed that some entrants still persist in sending entries on home-made log sheets and cover sheets; one of these years we shall refuse to accept entries that do not comply with the rules!

G3KDB

BRITISH ISLES SECTION					
Posn	Callsign	Points	Posn	Callsign	Points
1	G4BWP	749	30	G3JJI	285
2	G3ZEM	675	31	G3DDT	274
3	G3MXJ	662	32	G3BPM	272
4	G4GIR	643	33	G3OLU	244
5	G3SJJ	617	34	G4BUO	239
6	G3TXX	612	35	G2HLU	210
7	G4WQN	597	36	G3ILO	200
8	G4OBK	584	37	G4ECI	191
9	G3OLB	554	38	G3GMM	183
10	G4FAM	548	39	G3ZRP	180
11	G3PDL	502	40	G3AWR	147
12	G3SXW	496	41	G3ZRZ	144
13	G3YEC	483	42	GM3YOR	135
14	G3VYI	452	43	G3FVW	128
15	G3RXP	450	44	G4EBK	119
16	G3SWC	445	45	GM3UM	73
17	G5MY	429	46	G3KSH	56
18	G3SWH	420	47	G8QZ	48
19	G4BYG	420			
20	G4ODV	402			
21	G4ELZ	379			
22	G3MCX	364			
23	G4RCG	362			
24	G3NKC/A	360			
25	G3PSM	351			
26	G4OGB	351			
27	G4KHC	343			
28	G4WYG	295			
29	G2MJ	287			

\*First-time entrant

\*\*Senior citizen

Check log: G2CIL

### SWL SECTION

British Isles

BRS1066

354

### OVERSEAS

UC2-006-43

59

OVERSEAS SECTION					
Posn	Callsign	Points	Posn	Callsign	Points
1	HB9AGA	275	7	OK1FA	100
2	OK1DRU	159	8	OK1BNS	93
3	OZ1W	144	9	OK1DVK	83
4	DF6NJ	139	10	UR2RDJ	75
5	DK9NH	113	11	F8TM	72
6	OK1DRO	110	12	DL1SN	48

## 10GHz Cumulative Contest 1985 results

It is gratifying to see that this contest continues to be well supported, with a welcome revival of interest from the south coast. The lack of UK entries to the narrowband section is rather disappointing though, considering that the idea of separate sections came from an active UK group of 10GHz operators! The narrowband section was saved by the DL/OE entries! No major comments were received concerning the rules this year.

Congratulations to GW3PPF and G3PHO in the wideband section and DJ4YJ and DF7VX (the other operators in this section were not active for three or more events). In addition GW3PPF will be awarded the Alpha Cup.

G3WDG

WIDEBAND SECTION					
Posn	Callsign	Points	QSOs	Best dx	Km
1	GW3PPF/P	2,634	29	G3PFR/P	128
2	G3PHO/P	2,013	27	G4UQI/P	148
3	DJ4YJ/P	1,830	13	DC5RP	79
4	G4UQI/P	1,303	16	G3PHO/P	148
5	G6IRJ/P	1,101	23	G4ISM/P	119
6	G8GVX/P	1,065	27	F8WNP/P	176
7	G3FYX/P	1,061	26	GW3PPF/P	93
8	G4LFS/P	1,039	17	G0BTA/P	102
9	G3OXI/P	1,020	18	GW3VER/P	82
10	G8UDT/P	1,016	25	F6DCK/P	151
11	G2DSP/P	941	25	F8WNP/P	171
12	G3NKL/P	895	15	G3FNO/P	154
13	G4ETU/P	748	21	F8WNP/P	171
14	G8BJG/P	674	21	F6DCK/P	136
15	G4EML/P	639	27	G3IW/P	67
16	GW1GHZ/P	612	9	G4UQI/P	143
17	OE2BM/I	557	5	DF9SU/P	129
18	G3XWZ/P	544	18	G4HZ/P	48

Posn	Callsign	Points	QSOs	Best dx	Km	QTH
19	DJ6XV/P	531	15	DC0GG/P	32	31
20	DL4BBU/P	496	13	DC0GG/P	77	31
21	OE2GKM/2	491	5	DF9RJ/P	147	67
22	G3JMB/P	471	15	G3IW/P	72	90
23	G3LYP/P	466	14	GW3PPF/P	95	92
24	G1IMY/P	398	17	G6IGM/P	45	93
25	DC0GG/P	336	10	DL4BBU/P	77	31
26	G4EFT	272	12	G6NVC	65	00
27	DL5YAG/P	210	4	DB8QO/P	81	31
28	G6MEN/P	127	2	GW3PFR/P	85	83
29	DC8JA/P	112	4	DL4BBU/P	44	31
30	DJ8UQ/P	37	3	DB8QO/P	15	31
31	G1MPW/P	24	3	G4EML/P	12	90

NARROWBAND SECTION						
Posn	Callsign	Points	QSOs	Best dx	Km	QTH
1	DJ4YJ/P	1,742	15	DL8RAH/P	245	69, 57
2	DL8RAH/P	903	6	DJ4YJ/P	245	69
3	OE2GKM/2	755	6	DJ4YJ/P	184	67
4	DF6IY/P	542	3	DK5IE/P	186	48
5	DC6GS	490	6	DJ4YJ/P	220	68
6	DF6IL/P	486	3	DK5IE/P	186	48
7	DC6GV/P	479	6	DJ4YJ/P	220	68
8	DK5IE/P	425	3	DF6IY/P	186	40
9	DC4UI/P	372	3	DF6IY/P	186	40
10	OE2BM/2	351	5	DL8RAH/P	153	67
11	DC9XO	324	2	DF9LN	179	42
12	DF6W/P	288	4	DF6IY/P	114	39
13	DF7VX	284	7	DC9XO	124	41
14	DC8NV	247	2	DL8RAH/P	161	58
15	DF6W/P	187	4	DL3NQ	67	39
16	DK0NA	56	5	DF2CA/A	18	50

Check log from G2DHV received with thanks

## Microwave Cumulative Contest 1985 results

Once again the number of entries to this contest was rather small, but at least there were some entries for 5-7GHz this year. Activity on 24GHz seemed down compared to last year despite the improved licensing conditions. 24GHz has been designated as the "prime" band for 1986, and we are hoping that this may encourage more activity.

G3WDG

3-4GHz BAND						
Posn	Callsign	Points	QSOs	Best dx	Km	QTH
1	G4FRE/P	464	3	PA0EZ	257	JO02
2	{GW3PPF/P	90	1	G3FYX/P	90	IO82
	{G3FYX/P	90	1	GW3PPF/P	90	IO82

5-7GHz BAND						
Posn	Callsign	Points	QSOs	Best dx	Km	QTH
1	{G3FYX/P	45	1	GW3PPF/P	90	IO81
	{GW3PPF/P	45	1	G3FYX/P	90	IO82

24GHz BAND						
Posn	Callsign	Points	QSOs	Best dx	Km	QTH
1	G3NKL/P	88	1	G3FNO/P	44	IO83
2	G3FYX/P	18	1	G8MWR/P	18	IO81

## February 144MHz CW Contest results

This contest was held under very poor conditions that caused most entrants to operate from home. They were described by G4WET/A, the winner, as very flat, very windy and very cold—obviously an appropriate callsign! Scottish stations found the contest hard going, not only because of the weather but because of G stations failing to look to the north. Thus GM4YXI did well to come third.

The Maidenhead locator system again came in for criticism, although the volume of complaint seems to be falling. G4RGK suggests that the field (ie JO etc) could be dropped, quoting the following example as tedious for a cw contest "JO00". Alternative comment in favour of Maidenhead includes the view of G4OUT who suggests that more information should be exchanged by contest stations to slow down the QSO/h rate, and that the longer Maidenhead locator is a step in the right direction. Some people misunderstood the rule "QTH information need not be exchanged," either deleting both *locator* and *location* or sending the *location* only. The intention of the rule, clearly understood by the vast majority, was for *locator* (Maidenhead system) to be exchanged.

Overall there was a worthwhile entry and the event was enjoyed in spite of poor conditions. G4WET/A and G4WFR receive certificates. Check logs were received with thanks from G0CLP, GZWS and G3YSC.

G3FZL

Posn	Callsign	Points	QSOs	QTH	Best dx	Km
1	G4WET/A	728	89	IO82XC	DL2OM	693
2	G4WFR	718	84	JO01OV	DH8NAA	594
3	GM4YXI	684	66	IO84XK	F6FLB	545
4	G4VXE/A	657	84	IO81UQ	DH8NAA	823
5	G4GFX	625	79	IO82UC	DL2OM	711
6	G4NUT	569	93	IO82PC	DH8NAA	726
7	G4RGK	550	84	IO81ON	DL2OM	600
8	G4NOK	544	84	IO83FO	DF7DJ	655
9	G4OBK/A	487	65	IO83OP	F6FLB	451
10	G4ARI	474	84	IO82IQ	GM4YPZ	467
11	G4XEN	471	69	IO82QT	LX2BG	553
12	G4SFI	454	48	JO02QT	DF7DJ	452
13	G3LTF	444	54	JO01BS	E15FK	595
14	G3VIP	380	46	IO83XN	DL0WU	556
15	G4OTV/A	378	60	IO81FC	GM4YXI	493
16	G4KZY/P	330	57	IO80WX	E15FK	455
17	G4NBS	327	59	JO02AF	GM4YXI	370
18	G4UJS	310	52	IO83RB	ON6NH	605
19	G4IXT/A	285	64	IO81VR	E15FK	573

Posn	Callsign	Points	QSOs	QTH	Best dx	Km
20	G4EZA	265	49	JO01KU	G3TIR	380
21	G4MWS	229	47	IO83WG	GM4YLZ	395
22	G4XUV/A	212	36	IO83RF	F6FLB	392
23	G4OUT	211	42	IO92BT	G0BUK	273
24	GM4RTN	192	25	IO86BD	G4XEN	474
25	G0CDA	148	25	IO83RJ	F6FLB	403
26	G4WUB	144	31	IO81RJ	PA3OYJ	479
27	GM0BFS	136	18	IO86CC	G5UM	470
28	G4XPE	131	33	IO92GN	GM4YXI	260
29	G5UM	128	30	IO92MP	GM4RTN	430
30	G4WQY	69	20	IO91WA	G4ARI	195
31	G4WGE	80	20	IO91QF	PA3EBT	461
32	GW4VX	53	14	IO81JP	G4NBS	225
33	G2DHY	34	14	JO01BK	G4GFX	185

## 1,296/2,320MHz Contest rules

0900-1500gmt 24 August 1986

The general rules published in the "Operating Guide" supplement, *Rad Com* January 1986, will apply. There will be two sections, section F for fixed stations, and section O for all other stations. Entrants should complete a multi-band summary sheet (4422) as well as cover sheets for each band. Fixed stations must use the same call sign on both bands. Scoring will be at one point/km on both bands, and crossband contacts will count for half points.

All entries and check logs to: VHF Contests Committee, c/o C J Easton, G8TFI, Highlands, Townsend, Nympsfield, Glos.

## 144MHz Trophy and SWL Contest rules

1400-1400gmt 6/7 September 1986

The general rules published in the "Operating Guide" supplement, *Rad Com* January 1986, will apply. There will be three sections, section S for single-operator stations, section M for multi-operator stations, and an swl section. The Thorogood Trophy will be awarded to the winner of the single-operator section, and the Mitchell-Milling Trophy to the leading multi-operator entrant. Certificates will be awarded to the leading stations in each RSGB zone, and entrants should include their zonal code (see p17, *Rad Com*, January 1986) on the cover sheet. If you wish to enter the concurrent IARU contest, please complete an extra cover sheet (427), and score contacts using both the radial ring system and one point/km.

All entries and check logs to: VHF Contests Committee, c/o D A Yorke, G4JLG, 40 Edge Fold Road, Worsley, Manchester M28 4QF.

## Contests Calendar

1 Jan-31 Dec	UBA SWL (Rules in December SWL News)
May-Sept	Microwave Cumulatives (Rules in March issue)
May-Sept	10GHz Cumulatives (Rules in March issue)
1 June	432MHz Trophy and SWL (Rules in April issue)
7, 8 June	HF NFD (Rules in February issue)
15 June	DF Qualifying Event, Northampton (Details in this issue)
21, 22 June	All Asian DX (Rules in June HF)
28, 29 June	Summer 1.8MHz (Rules in May issue)
29 June	DF Qualifying Event, Dartford Heath (Details in this issue)
5, 6 July	VHF NFD and SWL (Rules in April issue)
5, 6 July	BATC Summer Fun (Details G6IQM)
12, 13 July	HF SWL (Rules in May issue)
12, 13 July	IARU HF Championship (Rules in June HF)
13 July	DF Qualifying Event, South Manchester (Details in June issue)
19, 20 July	Colombian Independence (Rules in June HF)
20 July	Low Power FD
26 July	144MHz Low Power and SWL
27 July	432MHz Low Power and SWL
3 August	DF Qualifying Event, Mid-Thames
3 August	Hopscotch
17 August	DF Qualifying Event, Coventry
24 August	1,296/2,320MHz
31 August	Ropoco 2
6, 7 September	144MHz Trophy and SWL
6, 7 September	IARU Region 1 SSB FD (Rules in May issue)
7 September	DF Qualifying Event, Slade
13, 14 September	BATC International (Details G6IQM)
21 September	70MHz Trophy and SWL
21 September	DF National Final, Salisbury
4, 5 October	432MHz-24GHz
7 October	432MHz Cumulative
12 October	21/28MHz SSB (Rules in May issue)
15 October	1,296/2,320MHz Cumulative
19 October	21MHz CW
23 October	432MHz Cumulative
26 October	70MHz Fixed
26 October	DF Treble Night Event, Mid-Thames
31 October	1,296/2,320MHz Cumulative
1, 2 November	144MHz CW
8 November	432MHz Cumulative
8, 9 November	Second 1.8MHz
16 November	1,296/2,320MHz Cumulative
24 November	432MHz Cumulative
2 December	1,296/2,320MHz Cumulative
7 December	144MHz Fixed and AFS
10 December	432MHz Cumulative
14 December	70MHz CW
18 December	1,296/2,320MHz Cumulative

## 3-5MHz Hopscotch Contest rules

The first Hopscotch, last year, was well supported, and entrants unanimously asked for a repeat, so here it is! The rules are unchanged, and please note that contravention of Rule 4 means disqualification. Please send your log to help with adjudication (after checking for duplicates) and do include any comments.

- 1. Eligibility.** Open to RSGB members, single-operator only.
- 2. Where and when.** 3.520-3.570kHz, cw only, 1300-1600gmt Sunday 3 August 1986.
- 3. Exchange and scoring.** Send RST, serial number starting from 001, county code and name. Score 10 points per contact. Only contacts between UK stations count.
- 4. QSY rule.** The station soliciting calls (by CQ, QRZ etc) may make only one contact on that frequency—he must then QSY at least 3kHz before making any other contact.
- 5. Logs.** Sheets (preferably HFC1) to be headed: date/gmt; call sign of station worked; RST/serial sent; RST/serial received; county code received; name received; points. Cover sheet to show county code and name sent. Logs to be postmarked not later than 18 August and posted to: HF Contest Committee, Roger Western, G3SXW, PO Box 73, Lichfield, Staffs WS13 6UJ, accompanied by the declaration: "I declare that this station was operated strictly in accordance with the rules and spirit of the contest and agree that decisions of the RSGB shall be final."
- 6. Certificates.** The winner and runner-up will receive certificates of merit.

## IARU Region 1 VHF/UHF/SHF Contest rules

**1. Eligible entrants.** All licensed amateurs in IARU Region 1 can participate in the contests. Multi-band entries from UK groups competing in the IARU Region 1 UHF/SHF Contest, working from a single location and using one call sign on each band, will be accepted for the "all other stations" section of the contest. The contest entry should show which single call sign should be used in the overall tabulation of the results. Contestants must operate within the letter and spirit of the contest and at no greater power than permitted in the ordinary licences of their country. Stations operating under special high power licences do so *hors concours* and cannot be placed in the contest proper.

**2. Contest sections.** The contest will comprise two sections for each band:

1. Single-operator station, operated by the owner of the licence (no club stations).
2. All other stations.

**3. Dates of contests**

**VHF contest:** The contest will take place during the weekend of 6 and 7 September 1986 on the 144MHz band.

**UHF/SHF contest:** The contest will take place during the weekend of 4 and 5 October 1986 on all bands from 432MHz to 24GHz.

**4. Duration of contest.** The contest will commence at 1400gmt on the Saturday, and end at 1400gmt on the Sunday.

**5. Contacts.** Each station can be worked only once on each band, whether it is fixed, portable or mobile. If a station is worked again during the same contest, only one contact will count for points, but any duplicate contact should be logged without claim for points and clearly marked as duplicate. Contacts made via active repeaters, translators, eme or meteor scatter do not count for points. Any telephony contacts made with stations generating in the cw (A1A) sub-bands shall not count for points.

**6. Type of emission.** Contacts may be made on A1A, R3E, J3E or F3E. F2A may be used above 1GHz. Only one transmitter may be used on each band at any time.

**7. Contest exchanges.** Code number exchanges during each contact shall consist of the RS or RST report, followed by a serial number commencing at 001 for the first contact on each band, and increasing by one for each successive contact on this band. This must immediately be followed by the locator of the sending station (eg 59 003 JO22PB).

**8. Scoring.** Points will be scored on the basis of 1 point per kilometre. The final claimed score must be shown on the first sheet.

**9. Entries.** Entries should be sent to the RSGB VHF Contests Committee, c/o the adjudicator for the RSGB contest on the same date. Separate cover sheets (Form 427) should be completed for the RSGB and IARU events, but common log sheets may be used with both radial ring and points per kilometre scoring shown.

**10. Awards.** The winner of each section will receive a certificate. The entrants compete for the following challenge trophies:

**VHF contest:** (a) The IARU Region 1 VHF Trophy for the winner of the single-operator 144MHz section. (b) The PZK Trophy for the winner of the all other stations 144MHz section.

**UHF/SHF contest:** (a) The Vittoria Alata Cup 1, for the winner of the single-operator 432MHz section. (b) The Vittoria Alata Cup 2, for the winner of the all other stations 432MHz section.

**Overall winner:** An overall winner of the IARU Region 1 UHF/SHF Contest will be declared. For this competition the scores of entrants will be combined using the following multipliers:

432MHz	× 1
1,296MHz	× 5
2,320MHz	× 10
Higher bands	× 20

The entrant with the highest score will be awarded the IARU Region 1 Medal.

## IARU Region 1 VHF/UHF/SHF Listeners Contest rules

The IARU Region 1 VHF/UHF/SHF Contest rules should be used, with the following differences.

- 1. Eligible entrants.** All listeners in Region 1 may take part. Licensed amateurs are not eligible to enter.
- 2. Contest sections.** (a) There will be one section in the September 144MHz contest. (b) There will be one section for each band from 432MHz to 24GHz in the October contest.



**5. Reporting.** Any station may be logged only once on each band, whether it is fixed, portable, or mobile. CQ or test calls will not count for points and should not be logged. Stations heard via active repeaters, translators, eme or meteor scatter do not count for points. The call sign of the station contacted by the station heard may only appear five times, or if there are more than 100 QSOs logged, only once in every 20 logged contacts.

**8. Scoring.** Points will be scored on the basis of one point per kilometre between the listener and the station heard.

## Low Power Field Day 1986 rules

Please note changes in rules 3 and 4 and clarification to rule 6.

- The general rules for RSGB hf contests, as published in the "Operating Guide" supplement, *Rad Com* January 1986, will apply.
- Date and time.** 0900-1200gmt and 1300-1600gmt, Sunday 20 July 1986.
- Sections.** (a) 10W rf output maximum. (b) 3W rf output maximum. RSGB members resident in the British Isles. Single- or multi-operator.
- Frequencies.** CW, 3-510-3-560kHz and 7-010-7-040kHz. (IARU Region 1 contest-preferred segments). **Note:** contacts may be made on both bands during each session.
- Exchange.** RST plus serial number, starting at 001 and continuing through both sessions, together with location (defined by a place name) and county code (as shown in the "Operating Guide", *Rad Com* January 1986).
- Scoring.** Portable or mobile stations, 15 points; fixed stations, five points. A station may be worked on each band. **Note:** stations outside the UK may be contacted.
- Documentation.** Standard RSGB hf contest log sheets (HFC1 Rev79) should be used with column (5) headed "Location and county code received". Duplicates must be clearly marked without claim for points. Unmarked duplicates will be penalized at the rate of 10 times number of points claimed; logs containing more than five unmarked duplicates, for which points have been claimed, would normally result in disqualification. Entries must include a completed hf contest summary sheet (latest issue HFC2 Rev80) and/or a standard RSGB declaration signed by the operator responsible for the entry.
- Special conditions**
  - Power.** The power for all parts of the station must be derived from dry batteries, accumulators, or "natural" sources (eg solar cells or wind-driven generators). The practice of float charging batteries from petrol, gas or diesel driven generators is not permitted.
  - Equipment.** Entrants using equipment capable of running more power than the specified output power for the section entered must specify how the power limit was adhered to.
  - Antennas.** The maximum height must not exceed 35ft (10.66m) above ground level.
- Address for entries.** Logs should be sent to: HF Contests Committee, c/o J C Burbanks, G3SJJ, Southlands, 16 Cotgrave Road, Plumtree, Nottingham NG12 5NX, and postmarked no later than 5 August 1986.
- Awards.** (a) The Houston-Fergus Trophy will be awarded to the leading

station in section (a). (b) Certificates of merit will be sent to the first three stations in each section. (c) A certificate of merit will be awarded to the fixed station, irrespective of power, who gives most points to portable stations, and who submits a check-log.

## 144MHz Low Power and SWL Contest rules

1500-2300gmt 26 July 1986

The general rules published in the "Operating Guide" supplement, *Rad Com* January 1986, will apply. There will be three sections, section F for fixed stations, section O for all other transmitting stations, and an swl section.

A multiplier system will be used in this contest. Contacts should be scored using the radial ring system, and the final score multiplied by the total number of counties and countries worked. Where more than one station is worked in a particular Scottish region, additional multipliers can be claimed for each contact, up to a maximum of three multipliers per region. County code letters shown in the "Operating Guide" supplement, or the full county name, should be included in the contest exchange and recorded in column vi (QTH received) in the log. Each new multiplier claimed must be clearly marked in the log and listed with the QSO serial number on a separate multiplier check list.

All entries and check logs to: VHF Contests Committee, c/o D J Robinson, G4FRE, 15 Ferry Lane, Felixstowe, Suffolk IP11 8UR.

## 432MHz Low Power and SWL Contest rules

0900-1500gmt 27 July 1986

The general rules published in the "Operating Guide" supplement, *Rad Com* January 1986, will apply. There will be three sections, section F for fixed stations, section O for all other transmitting stations, and an swl section.

A multiplier system will be used in this contest. Contacts should be scored using the radial ring system, and the final score multiplied by the total number of counties and countries worked. Where more than one station is worked in a particular Scottish region additional multipliers can be claimed for each contact, up to a maximum of three multipliers per region. County code letters shown in the "Operating Guide" supplement, or the full county name, should be included in the contest exchange and recorded in column vi (QTH received) in the log. Each new multiplier claimed must be clearly marked in the log and listed with the QSO serial number on a separate multiplier check list.

All entries and check logs to: VHF Contests Committee, c/o G M C Stone, G3FZL, 11 Liphook Crescent, Forst Hill, London SE23 3BN.

## December 144MHz Fixed and AFS Contest

In the results published in the April *Radio Communication*, G0BXO/A was listed as being disqualified. This should have read G0BXC/A. The adjudicator wishes to apologise to G0BXO for this error.

# 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 again in July 1986.

RSGB affiliated organizations are requested to report all programmes and new items to their regional representatives regularly. Information for inclusion in the August issue should reach them by 3 June and for the September issue by 4 July.

Club programmes are given on order of date, subject, time and place of meeting. All call signs 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.

**REGION 1—RR B Donn, G3XSN, 7 Thurne Way, Liverpool L25 4SQ. Tel 051-722 3644.**

**Barnoldswick (Rolls-Royce ARC)—4 June ("RTTY", T P Athewes). 8pm. Rolls-Royce Sports & Social Club, Barnoldswick. Sec G4ILG, tel 0282 812288.**

**Barrow-in-Furness (South Lakeland ARS)—5, 19 June (Club meetings). 8pm. Norweb Sports & Social Club, rear of Ormsgill Hotel, Barrow-in-Furness. Sec G6LKB, tel 0229 54982.**

**Bury (BRS)—10 June (TBA), 8 July (Junk sale). 8pm. The Mosses Youth & Community Centre, Cecil St, Bury. Details G0CUK, tel Bolton 706191.**

**Chester (C&DRS)—3 June (Committee meeting), 10 June (Surplus equipment sale), 17 June (Barbecue, bring your own steaks etc), 24 June ("Cellular radio", GW1ATZ). Main meetings 8pm, Morse classes before main meeting at 7.15pm.**

**Chester Rugby Union Football Club, Hare Lane, Vicars Cross, Chester. Details G6IFA, tel 336639.**  
**Fylde (FARS)—3 June (Top band foxhunt), 17 June (A PM on the foxhunt). 7.45pm. The Kite Club, Blackpool Airport. Sec G8GG, tel 725717.**  
**Isle of Man (I-of-M ARS)—28/29 June (GD4IOM will be operational at Peel Castle, St Patrick's Isle, for Heritage Year Celebrations. Separate island for Island WAB Islands Award). Sec GD4GWQ, tel 0624 22295.**

**Liverpool (L&DARS)—2 June (Preparations for HF NFD), 10 June (Foxhunt, Barry and Lynn to be foxes), 17 June ("Marine radio", G3LNG), 24 June (G4KKK reviews new equipment). 8pm. The Churchill Conservative Club, Church Rd, Waverley, Liverpool 15. Sec G1EXJ, tel 051-728 8811.**

**Macclesfield (M&DRS)—3 June ("Contest operating", Warrington & DARS), 10 June (Quiz night). The Fernain Club, Oxford Rd, Macclesfield. Sec G1NUS, tel 0625 24534.**

**Morecambe (MBARS)—2 June (Morse class), 9 June ("Slow scan tv", G0AUF), 16 June (Morse class), 23 June (Talk on Raynet), 30 June (Morse class), 7 July (Night on the air, hf rig). 7.30pm. Lunside Engineering Co, Mill Lane, Halton, Nr Lancaster. details G3PER, tel 0524 52659.**

**Sale (South Manchester RC)—6 June (Preparations for hf field day, plus video lecture), 13 June ("144MHz antenna tests", G4JLG), 20 June (Midsummer dt), 27 June ("The video format", M Perkin), 4 July (Preparations for VHF FD). 8pm. Sale Moor Community Centre, Norris Rd, Sale, Sec G3WFT, tel 061-973 1837.**

**Thornton Cleveleys (TCARS)—2 June (HF FD preparations), 9 June (Informal, club on the air), 16 June (Component sale), 23 June (Informal/club on air), 30 June ("Weather satellite reception", G4EZM and G4FWM), 7 July (Informal/club on air). 7.45pm. 1st Norbreck Scout HQ, Carr Rd, off Fleetwood Rd, Bispham, Blackpool. Details**



Cyril Hartshorne, swl president of the Burton-on-Trent & DRS receiving an 81st birthday cake from the Lady Mayoress of Burton-on-Trent. Cyril has played a prominent part in his local society for many years, and continues to take part in df contests using home-made equipment



G4BFH, tel 0253 853554. NB new morse classes, Ian G3ZRZ.

**Warrington (WARC)**—Details from Sec, G0CBN, tel 0925 814005.

**Wirral (WARS)**—4 June ("Regulated power supplies", G3UZU), 18 June (Sale of surplus equipment), 8pm. Clubroom, Ivy Farm, Arrow Park. Sec G3VEB.

**Wirral (W&DARC)**—11 June (Practice of hunt), 25 June (Film night: Troposcatter communication in the oil industry and amateur satellite operation), 9 July (Annual barbecue), 8pm. Irby Cricket Club, Mill Hill Rd, Irby. Details G6CGJ, tel 051-677 7376.

**Woodford (RATEC)**—2 June ("Basic computing", G8XVX), 8pm. British Legion Club, Moor Lane, Woodford, Nr Bramhall, Cheshire. Details G4SFU, tel 061-485 3912.

My thanks to Macclesfield & DRS for their hospitality on my recent visit. My wife and I would also like to thank the Leyland Hundred ARG and The Isle of Man radio amateurs for their kindness and hospitality during our recent visits.

There is a vacancy for an area representative on the Isle of Man. I have already received three nominations for the post. Any other nominations should be addressed to me (with five sponsors and an acceptance by the nominee) no later than 18 June. The candidates will be listed in the August edition of *Radio Communication*. Proxy votes to me. The election will be held at the Howsdrake Hotel, Harbour Rd, Onchan, Isle of Man on Monday 8 September. Do not send nominations to the RSGB. RRI

**REGION 2—RR P R Sheppard, G4EJP, 9 Elvington Crescent, Leconfield, Beverley, N Humberside HU17 7LX. Tel 0401 50397.**

**Halifax (H&DARS, G2UG)**—17 June (RTTY working demonstration, G4MIW). The Running Man PH. Details G0DLM, tel 0422 202306.

*Apologies to H&DARS for callign errors which occurred in the caption to the photograph on page 284 of the April issue. The four members shown were, l to r: G3XBG, G4DNB, G3ONQ and G3FDC.*

**Hull (H&DARS, G3AMW)**—6 June (Construction project), 4 July (NFD preparation). The Clubroom, Walton St. Details G0DMP, tel 0482 862149.

**Keighley (KARS RS84851)**—10 June (Informal meeting), 24 June (Antennas talk), 8pm. Victoria Hotel. Details G1IGH, tel 0274 496222.

**Leconfield (RCT ARS, G4GGD)**—5 June (Noggin and natter night), 12 June (Closed), 19 June (NFD summary), 26 June (Noggin and natter night). Normandy Barracks. Details G4SMB, tel 0401 50397.

**North Wakefield (NWRC, G4NOK)**—5 June (Visit to Spen Valley club junk sale), 12 June (On the air), 19 June (Foxhunt and barbecue), 26 June (Monthly meeting), 3 July (Natter night). White Horse PH. Details G4RCH, tel 0532 536633.

**Spen Valley (SVARS, G3SVC)**—5 June (Surplus sale), 19 June (Foxhunt V N Wakefield club), 3 July (Swindon cup), 8pm. The Old Bank WMC. Details G4PHR, tel 0924 499397.

**Todmorden (T&DARS, G4WYT)**—2 June (Car rally for G4HYH trophy), 16 June ("Radio reminiscences", G3JWN), 7 July (Chat night). The Queen Hotel. Details G1GZB, tel 070681 7572.

**UK FM Group (Northern)**—1 June (Monthly meeting), 6 July (Monthly meeting). The Royal Hotel, Barnsley. Details G4UNA.

**Wakefield (W&DARS, G3WRS)**—10 June (DF Foxhunt). Ossett Community Centre. Details G8PBE, tel 0924 378727.

**Wawne (Wawne Raynet Group, G4UWE)**—2 June (Monthly contest at EPO cell), 8 June (EPO exercise at Wawne and Bridlington), 15 June (Lorry driver of the year—radio support), 16 June (Monthly Raynet group meeting and training). EP Section, Meaux Road. Details G4EJP, tel 0401 50397.

**REGION 3—RR G Ross, G8MWR, 81 Ringwood Highway, Coventry CV2 2GT. Tel 0203 616941**

**Aldridge (Barr Beacon ARC)**—9 June (Informal meeting), 23 June (Natter night), 7.30pm. Barr Beacon Community School, Old Hall Lane, Aldridge. Sec G1OBA, tel 021-353 6233.

**Birmingham (Midlands ARS)**—17 June ("Micro-waves", G8MWR). Unit 5, Henstead House, Henstead St, (off Bromsgrove St). Sec G8BHE, tel 021-422 9787.

**Bromsgrove (BARS)**—10 June (Surprise lecture), 24 June (Informal night), 8pm. Hundred House, Stourbridge Rd, Bromsgrove. Sec G4LVK.

**Coventry (CARS)**—6 June ("Nuclear power"), 13 June (Night on the air), 20 June ("RTTY and amtor on a computer", G3VHO), 27 June (Equipment testing night), 8pm. Scout HQ, 121 St Nicholas St, Radford, Coventry. Sec G4JDO, tel 73999.

**Dudley (DARC)**—23 June ("Halley's Comet", D Harris), 7.45pm. Allied Centre, Greenman Alley, Tower St, Dudley. Sec G4NRA, tel 0384 278300.

**Halesowen (MEB RC)**—10 June ("British Telecom", G4JBB), 24 June (General meeting), 8pm. MEB Social Club, Mucklow Hill, Halesowen. Sec G4RWH, tel 021-747 8784.

**Redditch (RARC)**—12 June (Morse practice), 8pm. WRVS Centre, Ludlow Rd, Redditch. Sec G3EVT, tel 0789 762041.

**Stafford (SARS)**—3 June ("TVI", G4GKZ), 10 June (Natter night), 14 June (Canal boat trip), 17 June (Night on the air), 8.30pm. Coach and Horses, Pasturefields, Staffs. Sec G6DAT, tel 08894 2453.

**Stratford upon Avon (SuAARC)**—9 June (Royal signals and radar), 23 June ("Computer aided pcb design", G0CHO), 7.30pm. Baptist Church, Payton St, Stratford-upon-Avon. Sec G8OVC, tel 750584.

**Sutton Coldfield (SCRS)**—23 June (Bring and buy sale), 7.30pm. Public Library, Sainsbury Centre, Sutton Coldfield. Sec G4MFN, tel Tamworth 282360.

**Warley (Sandwell ARC)**—30 June ("The Burma railway", G3BA), 7.30pm. Club Premises, Broadway, Oldbury, Warley. Sec G4UMY, tel 021-422 1554.

**Warwick (Sandwell ARC)**—10 June (DF hunt), 24 June ("Chassis bashing", G8HJS), 8pm. St John HQ, Emscote Rd, Warwick. Sec G6VHI.

**Worcester (WARC)**—2 June ("WABC awards", G3IKR), 8pm. Oddfellows Club, New St, Worcester. Sec G4RBD, 14 Oakleigh Heath, Hallow, Worcester.

**REGION 4—RR M Shadlow, G3SZJ, 19 Portreath Drive, Darley Abbey DE3 2BJ. Tel Derby (0332) 556875.**

**Bolsover (BARS)**—4 June (Committee meeting), 11 June (Natter night), 18 June (Second of hunt), 25 June (Video night). The Angel Hotel, Bolsover, Sec G1GNC.

**Derby (DADARS)**—4 June (Junk sale), 11 June ("Have rig will travel", G3BHT), 18 June (Technical topics), 25 June (Barbecue at Drum Hill), 119 Green Lane, Derby. Sec G3KQF.

**Derby (NHARG)**—8 June (Elvaston Castle Rally), 20 June (Mobile atv), 27 June (Treasure hunt), 8pm. Nunsfield House, Boulton Lane, Alvaston, Derby. Sec G4PZY.

**Glossop (GADARG)**—26 June (Meeting at Dinting Railway Centre), 8pm. Nags Head, Charlestown Rd, Glossop. Sec G4GNQ.



Steve Hart, G3VMW, receiving the Leeds Amateur Radio Trophy from Hazel Beaumont (xyl of Tom Beaumont, G4DVZ, who donated it) for his winning entry of a 30A psu in the White Rose ARS Construction Contest on 5 March

**Leicester (LRS)**—2 June (NFD arrangements), 9 June (Committee/activity night), 16 June ("Repeater hardware", G4MQS), 23 June (NFD post mortem), 30 June (VHF NFD arrangements), 7.30pm. Gilroes Cottage, Groby Rd, Leicester. Sec G4PDZ, tel 871086.

**Lincoln (LSWC)**—1 June (Committee meeting), 4 June (Activity night), 11 June (Moonbounce), 18 June (Activity night), 25 June (Junk sale), 8pm. City Engineers Club, Waterside South. Sec G4STO, tel Gainsborough 788356.

**Nottingham (ARCON)**—5 June (144MHz foxhunt), 12 June ("QRP operation/construction", G4JAE), 19 June (432MHz foxhunt), 26 June (Summer junk sale). Sherwood Community Association, Woodthorpe House, Mansfield Rd, Sherwood, Nottingham. Sec G4PJZ tel Nottingham 624764.

**Newark (WADARC)**—NB change of sec, G1SCF tel Southwell 814541.

**Workshop (WARS)**—3 June (Visit from Scunthorpe club), 17 June (Mystery lecture night, G3MGX), 7.30pm. The Maltins, Gateford Rd, Workshop. Sec G4ZUN, tel 486614.

**REGION 5—RR J S Allen, G3DOT, 77 Rosslyn Crescent, Luton LU3 2AT. Tel 0582 508515 or at work on 0582 21151.**

**Bedford (B&DARC)**—5 June (Design and construction of df antennas), 19 June (TV weatherman Jim Bacon, G3YLA, will talk on weather forecasting and uhf, vhf propagation). NB this talk is still subject to confirmation and the date may have to be swapped with 5 June, 8pm. Allen's Club, Hurst Grove, Queenspark, Bedford. Details G4JTI or G4VHF.

**Dunstable (DDRC)**—6 June ("Wire antennas", G3WLM), 20 June ("The scene of the crime", G8XTW), 8pm. Room 3, Chews House, High St South, Dunstable, Beds. Details G6EES.

**Leighton Buzzard (LLRC)**—2 June (Talk by member of Dunstable Downs club), 7 June ("Morse telegraphy", G4FAL). Room A64, Vandyke Community Centre, Vandyke Rd, Leighton Buzzard. Sec D Jones, tel 0908 649238. NB club now meet on first Monday of each month.

**March (MADRAS)**—3 June (Committee meeting), 10 June (Club night), 17 June (DF hunt), 24 June (Visit to Peterborough Post Office), 1 July (Club night), 7.30pm. Room 7, Neale-Wade Education Centre, Station Rd, March, Cambridgeshire. NB new sec, G3PWK.

**Milton Keynes (MK&DARS)**—(Lecture: "British Standards Institute on tv"). 7.30pm. The Meeting Place, Hodge Lea, Milton Keynes. Sec G3ZPA, tel 501310.

**Northampton (NRC)**—5 June (Bring and buy, local clubs invited), 8 June (Alveston Rally—the club will have a stand), 19 June (Mobile df hunt), 8pm. Kingsthorpe Community Centre, Northampton. Sec G4YJP.

**REGION 6—RR F S G Rose\*, G2DRT, 84 Cock Lane, High Wycombe, Bucks HA3 7EA. Tel Penn (049481) 4240.**

\* Acting until post is filled.

**Burnham Beeches (BBRC)**—2 June (Foxhunt), 16 June (Microphones), 7 July (Natter night), 8pm. Haymill Youth and Community Centre, 112 Burnham Lane, Slough. Sec G6EIL. Following March agm the new officers of the club are: Chairman, G4XDU; treasurer, G6LYN; secretary, G6EIL.

**Newbury (NADARS)**—10 June ("Intermodulation, phase noise and dynamic range", G3RZP), 8 July ("Satellite operation", talk and demonstration by member of Amsat UK). Newbury College. Sec G3VOW, tel 43048.

**REGION 7—RR R Sykes, G3NFV, 16 The Ridgeway, Fetcham, Leatherhead, Surrey KT22 9AZ. Tel 0372 372587.**

**Biggin Hill (BHARC)**—17 June ("Moonbounce"), 7.30pm. Downe Village Hall, Downe, Kent. Sec G0AMP, tel 0689 57848.

**Coulsdon (CATS)**—9 June (Open evening), 26 June (RAE/morse help night), 8pm. St Swithuns Church Hall, Grovelands Rd, Purley, Surrey. Sec G6HC, tel 01-684 0610.

**Cray Valley (CVRS)**—19 June (144MHz foxhunt), 8pm. Progress Hall, Admiral Seymour Rd, Eltham SE9. Details G3TAA.

**Croydon (SRCC)**—2 June (Test instruments), 8pm. TS Terra Nova, 34 The Waldrons, South Croydon, Surrey. Sec G8IYS tel 01-657 0454.

**Dorking (D & DRS)**—10 June (Informal, the Star and Garter), 24 June ("Amateur tv", G6YPN). 8pm. Ashcombe School, Dorking. Sec G3AEZ, tel 030677 236.

**Redhill (RATS)**—17 June (Surplus sale). 8pm. Constitutional and Conservative Club, Warwick Rd, Redhill. Sec G8JXV.

**Sutton and Cheam (S & CRS)**—20 June (Inter-club quiz). 8pm. Downs Lawn Tennis Club, Holland Ave, Cheam, Surrey. Sec G4BOV.

**Wimbledon (W & DRS)**—13 June (Construction contest), 27 June ("Space exploration of the solar system"). 8pm. St John Ambulance HQ, 124 Kingston Rd, Wimbledon SW19. Sec G3DWW, tel 01-540 2180.

#### REGION 8—RR M Elliott, G4VEC, 20 Haysel, Sittingbourne, Kent ME10 4QE Tel 0795 70132

**Chichester (CARC)**—3, 17 June (Club night), 1 July (Annual summer social evening at Goodwood). 7.30pm. North Lodge Bar, County Hall, Chichester. Sec G4GHG, tel 789587. NB 1-6 June special event station, G2NM.

**Crawley (CARC)**—25 June ("Meteosat", G4TVC). 8pm. Crawley Leisure Centre, Haslett Ave, Crawley. Sec G4IQM, tel 882641.

**Dartford (DDFC)**—3 June (Prehunt meeting), 8 June (Club night), 15, 29 June (RSGB hunt), 1 July (Prehunt meeting). Prehunt meetings after 9pm. Horse and Groom, Leyton Cross, Dartford Heath. Sec G8DYF, tel Greenhithe 844467.

**Dover (South East Kent (YMCA, ARC))**—4 June (Natter night), 11 June (Topband foxhunt for members). 7.30pm. 18 June (Natter night), 25 June (Setting up portable equipment), 2 July (Natter night). 8pm. Dover YMCA, Godwynhurst, Leyburne Rd, Dover. Details J Dobson, tel 211638.

#### REGION 9—RR A H Hammett, Rosehill, Ladock, Truro, Cornwall TR2 4PQ. Tel 0726-882 758.

**Axe Vale (AVRC)**—6 June ("Racal Vodafone"—a talk). 7.30pm. The Cavalier, West St, Axminster. Sec G3VW, tel Lyme Regis 5282.

**Plymouth (PARC)**—2 June ("BBC engineering", R Terry and R Melhuish), 16 June (Natter night). 7.30pm. Plymouth Albion RFC, Beacon Park, Plymouth. Sec G4SCA, tel 0752-337 980.

**Redruth (Cornish RAC)**—5 June ("Down in the Mouth", a light-hearted talk on dental mechanics, G4STB), 9 June (Computer section visits Cornwall Technical College for hands on experience of networking), 16 June (Constructors' evening). 7.30pm. Church Hall, Treleigh, Redruth. NB the club will not meet at the above address on 9 June. Sec G4USB, tel Falmouth 40367.

**Saltash (S&DRC)**—6, 20 June (Details tba). 7.30pm. Burraton Tote H Hall, Saltash. Sec G0AKH, tel 3277.

**Torbay (TARS)**—27 June ("Winemaking", G0BAJ). 7.30pm. ECC Social Club, Ringslade Rd, Highweek, Newton Abbot. Sec G1EUA, tel Teignmouth 78554.

NB the club is running a special event station GB4PP (Paignton Parish) on 28 June.

#### REGION 10—E J Case\*, GW4HWR, 2 Abbey Close, Tythiwi, Taffswell, Mid-Glam. CF4 7RS. Tel 0222 810368.

\* Acting until post is filled.

**Abergavenny (A&NHARC)**—5 June (Video/talk). 7.30pm. Pen-Y-Fal Hospital, Abergavenny. Sec GW4XQH, tel 0873 4655. Morse classes each week with Bert.

#### REGION 13—RR A J Scott, 2 Manderston Grove, Duns, Berwickshire TD11 3PP. Tel 0361 83221.

**Border (BARS, GM0BRS)**—6 June (Video evening), 20 June (Contest logging/scoring), 4 July (VHF NFD site preparation), 7.30pm. Tweed View Hotel, Berwick on Tweed. Sec GM1IRN, tel 0289 82491.

**Dunfermline (DRS, GM3IDS)**—5 June (RSGB video), 20 June (Visit to Museum of Communications, Edinburgh), 19 June (28MHz/144MHz activity night), 26 June (Business meeting). 8pm. Outh Wireless Station, Knockhill. Sec GM1OIN, tel 0383 414283. Club net, Mondays 2100-221. Morse net Sundays 2030 144-725.

**Galashiels (G&DARS, GM4YEQ)**—Wednesdays, 7.30pm. Focus Youth Centre. 24 August (Planning for the "Open Day"). Details GM0AMB, tel 0896 55569.

**Lothians (LRS, GM3HAM)**—11 June (AGM), 25 June (Forward planning). 7.30pm. Harwell House Hotel, Ettrick Rd, Edinburgh. Sec GM4YPL, tel 0506 890179. Top band df hunt arranged for August. Details from sec. Look out for GB0CG, special event station for 1986 Commonwealth Games, Edinburgh. Active from 24 July-2 August. Details from GM4HWO on 031-332 5502.

#### REGION 14—RR T G Wylie, GM4FDM, 3 Kings Crescent, Elderslie, Strathclyde PA5 9AB. Tel Johnstone (0505) 227.

**Ayr (AARG)**—20 June (Summer chat evening and hf field day post mortem). The Community Leisure Centre, 24 Wellington Sq, Ayr. Details GM3THI.

**Motherwell (MLARS)**—15 June (Wrangholm Hall open day and annual birthday of MLARS. Doors open 10.30am. Details GM4UXX), 27 June (AGM).

**Note to all secretaries**—please notify changes of secretary after agm and programme for 1986/7 session as soon as possible. For inclusion in September magazine, I need information by June.

Sunday 13 April saw the region 14 workshop/clinic which was held at the club premises of Motherwell ARS. Four excellent lectures took place and the event was well attended. Speakers were: GM4IHJ on satellites; GM3HAT on hf antennas; GM3OXX on QRP and homebrew; and GM4NUN and GM4HCO on computing and amateur radio. GM8BZX manned an RSGB information and book stall. Talk-in was provided by members of MLARS to whose committee I would like to extend my thanks. RR14

#### REGION 17—RR T Emery, Wilverley, Old Lyndhurst Road, Cadnam, Southampton SO4 2NL. Tel 0703 812435.

**Amateur Radio and Computer Club (AMRAC)**—6 June ("CW tracking systems", G6TJT, and a live demonstration of satellite tv by G6HHH). 8pm. NB change of venue: Botley Grange Hotel, Botley, Hants. Sec G1NIM, tel 0705 381062.

**Basingstoke (BARC)**—2 June (Planning for VHF NFD). Forest Ring Community Centre, Sycamore Way, Basingstoke. Sec G4WIZ, tel Tadley 5185.

**Bournemouth (BARS)**—6 June ("65 years of amateur radio", G6NA), 20 June (Visit by council members and general manager of RSGB). 7.30pm. Kinross Community Centre, Kinross, Bournemouth. Sec G4EKE, tel 0202 877945.

**Fareham (F&DARS)**—4 June ("The G6NZ lecture", G6NZ), 18 June ("Basic digital techniques", G4ITG), 11, 25 June (Natter nights). 7.30pm. Portchester Community Centre, Portchester, Hants. Sec G4ITG, tel 234904.

**Guernsey (GARS)**—6 June ("Packet switched networks", GU4EON), 7, 8 June (HF NFD, Le Coudre Mill), 20 June (Competition for GARS Field Events Trophy). 8pm. The Lodge, La Corbinerie, Oberlands, St Martins, Guernsey. Sec GU1PMY, tel 0481 26392.

**Hordean (H&DARC)**—5 June ("Special test equipment", G3RLE). 7.30 for 8pm. Murchison Hall, London Rd, Hordean. PRO G4BEQ. 1986 is the 10th anniversary of the club with special award.

**Liphook (Three Counties ARC)**—7 June (Special event at Lurgashall Fete), 11 June ("Cellular radio", G8TDW), 25 June (Computer night), 28 June (Summer barbecue). 8pm. The Railway Hotel, Liphook Sec G0BTU, tel Petersfield 66489.

**Portsmouth (Marconi EARS)**—Anniversary of Marconi's early experiments. For one week from 8 June the club will operate special event station GB4OH, from Osborne House, and GB0IOW at the Needles, IOW. Films, animated displays etc. Details G3FWE, tel Cosham 373099.



GI3USS presenting the GI2KR Trophy to Emma Tonney, GI4XYF. Arthur Irwin, GI5TK with his certificate commemorating 50 years as a licensed radio amateur. L to R: GI3USS, zone Council member; GI6ATZ, area representative; GI4XYF, GI3HXV, Region 15 representative; and GI5TK. Photo: "Belfast Telegraph"

**Eastbourne (Southdown ARS)**—2 June ("Batteries", B Sparkes, Exide), 7 July (SARS barbecue, Hailsham Observatory). Chasely Home, South Cliff, Eastbourne. Details G4XNL, tel 638653. Tuesday nights various courses, Friday nights "Chat night". Hailsham Leisure Centre, Vicarage Lane, Hailsham, 7.30 for 8pm.

**Edenbridge (EARS)**—11 June (Contest operating, Brighton Contest Group), 9 July (Field day contest). Scout Hut, High St, Edenbridge. Details G8VCH, tel East Grinstead 24748.

**Gillingham (Bredhurst R&TS)**—12 June ("VHF/UHF dxing", G4DCV). 8pm. Parkwood Community Centre, Parkwood Green, Rainham, Gillingham. NB new sec G0AMZ, tel Medway 376991.

**Hastings (HERC)**—18 June (Medical electronics). 7.45pm. West Hill Community Centre. Details G4NVQ, tel 420608. Various activities other nights, Ashdown Farm Community Centre.

**Herne Bay (East Kent RS)**—5 June (TBA). 7.30pm. Cabin Youth Centre, Kings Rd, Herne Bay. Tel 0227 262042.

**Horsham (HARC)**—5 June (Not yet confirmed), 3 July (HF antennas and feed systems). 7.30pm. Guide HQ, Denne Rd, Horsham. NB new sec G0EJL, tel 64275.

**Maldstone (MYMCAARS)**—13 June ("10GHz fm", Ken Willis), 20 June (CW and RAE). 8pm. YMCA Sports Centre, Melrose Close, Cripples St, Maldstone. Details G4AXD, tel 0622 29462.

**Tunbridge Wells (West Kent ARS)**—7, 8 June (HF field day weekend). 8pm. Adult Education Centre Annex, Quarry Rd, Tunbridge Wells. Details G4KIU, tel 33586.

**Cardiff (CRSGBG)**—9 June (Third lecture in the antenna series, "Multi-element antennas", H Kempson). 7.30pm. Pantmawr Hotel, Tyla Teg Pantmawr Estate, Whitchurch, Cardiff. Sec GW0CUM, tel Cowbridge 3212.

**Rhondda (RARC)**—12 June (Meeting/natter), 26 June (Tape-slide lecture), 10 July (Natter night). 7.30pm. National Union of Mineworkers' Club, Tonypandy Sec GW4BUZ, tel Tonypandy 0443 432542.

#### REGION 11—RR B H Green, GW2FLZ, 1 Clwyd Court, Tan-y-Bryn Road, Colwyn Bay, Clwyd LL28 4AH. Tel 0492 49288.

**Colwyn Bay (Conwy Valley ARC, GW6TM)**—12 June (AGM), 10 July (Club visit, venue tba). 8pm. Greens Lawns Hotel, Bay View Rd, Colwyn Bay. Sec GW4VWV, tel 0492 636376.

**Deeside (Allyn & DARS)**—9 June (Talk by a representative from Jodrell Bank), 16 June (Talk by GW3UO), 23 June (Outdoor treasure hunt), 30 June (TBA), 7 July (Meeting). 8pm. Shotton Social Club, Shotton Lane, Deeside. Sec GW1ILZ.

**Porthmadog (P & DARC)**—19 June ("Transistor biasing", GW3UTI), 17 July (Foxhunt). 8pm. The Harbour Cafe, Ffestiniog Railway, Porthmadog. Sec GW1EGQ, tel 0766 2684.

**Rhyl (R & DARC, GW4ARC)**—2 June (DF hunt planning), 8 June (DF hunt), 16 June (Activity night), 7 July (RSGB video). 7.30pm. 2nd Rhyl Scout HQ, Vale Rd, Rhyl. Sec GW8OYT, tel 0745 37284.





The Verulam ARC's 1986 G3PAO Memorial Lecture was delivered by Peter Chadwick, G3RZP, who is seen here with some of those present. L to r: G3JKS, G4WLG, G0DCU, G0CNR, G3RZP, G4DUS, G3OSS and G3UFB. Photo: G3PZF

**Southampton (SARS)**—4 June (Natter night), 18 June (AGM). 7.30pm. Millbrook Community School, Green Lane, Southampton. Sec G4VKB.  
**UK FM Southern Repeater Holding Group (GB3SN)**—18 June (Junk sale). 8pm. Chineham House, Shakespeare Rd, off Popley Way, Basingstoke. Details J Steele, tel Fleet 3311.  
**Weymouth (SDARC)**—NB new sec, G1AHK. 7.30pm. Army Bridging Camp, Wyke Regis.  
**Winchester (WARC)**—20 June ("Spectrum", G4CFY). 7.30pm. NB change of venue and day; third Friday in each month, Durngate House, Winchester. Sec G4ZNO, tel 0703 772191.

Club secretaries and pros in Region 17 are asked to note that apart from the January and July issues of *Radio Communication*, your club will NOT appear in "Club News" unless you have something to report. This space-saving procedure has been in effect since 1981. RR17

**REGION 18**—RR Ian Gibbs, G4GWB, 61 The Gables, Widdrington, Morpeth NE61 5QZ. Tel 0670 790090.

**Consett (Derwentside ARS, G4PFFQ)**—9 June (Natter night and morse and RAE tuition), 16 June ("Homebrew printed circuits", G1GAD), 23 June (Natter night and morse and RAE tuition), 30 June ("Power meters"). Consett Association FB Club,

Belle Vue Park, Consett. Sec G3KMG, tel 0207 504198.

**Great Lumley (R&ES, G4EUZ)**—RAE classes now in progress. Meetings Wednesday evenings, Community Centre, Great Lumley. Sec G4MSF, tel 091 4693955.

**REGION 19**—RR R J C Broadbent, G3AAJ, 94 Herongate Road, Wanstead Park, London E12 5EQ. Tel 01-989 6741.

**Cheshunt (CDARC)**—4 June (NFD arrangements), 11 June (Natter), 18 June (TBA), 25 June (Natter). 7.45 for 8pm. Church Rooms, Church Lane, Wormley, Herts, Secs G4VMR and G4VSL, tel 0920-84250 evenings. Morse classes are also held. Club net frequency 144-535MHz 2000h to 2100h, call G4MGC.

**Chiswick (ABCARC)**—17 June ("Trends in receiver design"). 7.30pm. Chiswick Town Hall, High Rd, Chiswick, London W4. Sec G3GEH, tel 01-992 3778.

**Edgware (E&DRS)**—12 June (TBA), 26 June (Informal VHF field day briefing). 8pm. Watling Community Centre, 145 Orange Hill Rd, Burnt Oak, Edgware. Details G4RMD, tel Hatfield 64342. Edgware 80M net on 3-775 at 0915 on 29 June.

**Harrow (RSH)**—6 June (Chairman's lecture), 13 June (Activity night), 20 June (Film show: "Let's build a satellite"), 27 June (Activity night). The

Roxeth Room, Harrow Arts Centre, High Rd, Harrow Weald, Middlesex. Pub. Off, tel Rickmansworth 779942. Talk-in on GB3HR. Details G8XBZ, tel Rickmansworth 779942.

**Havering (HDARC)**—4 June (Informal), 7 June (HF NFD), 8 June (HF NFD), 11 June (Pre-contest briefing and Xtal set Comp), 18 June (Louis Varney, G5RV. Entrance by ticket only), 25 June ("Meteor scatter", Ken Willis, G8VR). 8pm. Fairkites Arts Centre, Billet Lane, Hornchurch, Essex. Sec G0BOI.

**St Albans (Verulam ARC)**—10 June (Activity evening), 24 June (DTI interference forum. This will be led by Raymond Brooks). 7.45 for 8pm. RAFA HQ, New Kent Rd, St Albans. Details G Wimpenny, 30 Faircross Way, St Albans, tel 52003. Publicity G4DUS, tel 0923 720616.

**Welwyn (WHARC)**—2 June (Informal and workshop night), 16 June (DF loops). This new club meets on first and third Mondays of each month, 8pm, the 9th WGC Scouts HQ, Knightsfield, Welwyn Garden City, Herts. Morse classes on Thursdays. Details G0AII, tel 0707 326138.

As can be seen, very few reports from secs again this month. Even so I had to ring around to find out from two of them. It is my opinion that with "Club News" being on GB2RS, this feature of *Radio Communication* is no longer required. RR19

**REGION 20**—N F O'Brien, G3LP, 26 Southfield Road, Gloucester GL4 9UD.

\* Acting until post is filled.

**Bristol (RSGBG)**—23 June ("Receiving wx satellite pictures", Rev J Brown). 7.30pm. Small Lecture Theatre, Bristol University. Details G4SQQ, tel 0272 508451, or G4ROX, tel 0272 513573. NB 29th Longleat Mobile Rally on 29 June.

**Bristol (South Bristol ARC)**—4 June ("Modifying cb radios for 28MHz", G4TRN), 11 June (HF activity night, G1HFJ), 18 June (Preparation for Longleat raffle, G3XED). 7.30pm. Whitchurch Folk House, East Dundry Rd, Whitchurch, Bristol BS14 0LN. Details, G4RZY, tel Whitchurch 834282.

**Gloucester (GARS)**—4 June (Final details for NFD), 11, 18, 25 June (Natter nights), 2 July ("Amfor and packet radio", G3WHO). 7.30pm. St John Ambulance HQ, Heathville Rd, Gloucester. Details G6AWT. RAE and morse classes every Wednesday, 7pm.

**Stroud (SARS)**—11, 25 June (Meeting nights). 8pm. Nelson School, Stratford Rd, Stroud. Details G0DZM, tel Nailsworth 2773. Regular morse classes. Club station G4SRS operational.

**Weston-super-Mare (WSMRS)**—9 June (illustrated talk by T Griggs on his overseas journeys). Rugby Club, Weston-super-Mare. Details G1DJW, tel 514429. NB members are reminded that instead of the usual gathering on 14 July, the annual df hunt will be held. Please participate.

**Yeovil (YARC)**—12 June ("Phase", G3MYM), 19 June ("Anomalous types of hf propagation", G3MYM), 26 June (Natter night), 3 July ("Daytime propagation on 3-5MHz", G3MYM). 7.30pm. The Recreation Centre, Chilton Grove, Yeovil. Sec G3GC, tel 0935 75533.

Note—clubs not listed above have not sent copy to the RR. RR20

## THE AMATEUR RADIO INSURANCE SCHEME

Recommended by R.S.G.B. and exclusive to Members

### Outstanding 5 year Record

ARIS the original proven insurance for radio amateurs.  
 No premium increase for 4 years and no change in the wind!  
 Claims settled promptly and fairly.  
 Secure with major insurance company backing—Cornhill Insurance Group.  
 Friendly, reliable and efficient service.  
 Personal equipment list printed for each member—with up-dates.

### Value for Money

Full "All Risks", "New for Old" protection.  
**Scheme 1** for mobile and portable cover as well as at home.  
**Scheme 2** for base stations.  
 Both Schemes include special free extensions to meet the need of Amateurs e.g. cover whilst at rallies, Club meetings etc. and holidays.  
 Home computers fully covered too.  
 Optional Liability insurance up to £1m.

### Continually Improving Cover

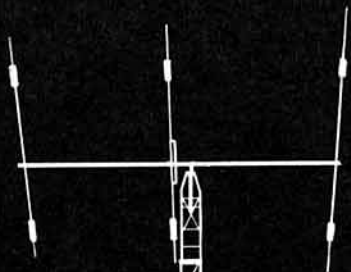
As more people continue to join ARIS the broader base means cover can be improved.  
 E.G. The most recent improvements—FREE OF CHARGE.  
 "Get you home" cover. Immediate cover as you purchase more equipment.  
 "Inflation protection." Automatic 10% insured value increase to help meet claims in full.

For full leaflet phone or write to Sarah at ARIS, 19 Quarry Street, Guildford, Surrey, GU1 3UY. 0483 33771

Also available: Special policies for RSGB Affiliated Clubs and Societies



# Versatower: The professionals' choice!



A range of telescopic towers in static and mobile models from 7.5 to 36 metres with tilt-over facility enabling all maintenance to be at ground level.

Designed in accordance with CP3 Chapter V, part 2: 1972 for a minimum wind speed of 85 mph in conditions of maximum exposure and specified by professionals world-wide where hostile environments demand the ultimate in design, quality and reliability.

P40 Standard series  
£503.00 inc. VAT (ex-works)  
P60 Standard series  
£611.00 inc. VAT (ex-works)



Strumec Versatower Limited,  
Portland House, Coppice Side,  
Brownhills, Walsall, West Midlands  
WS8 7EX, England.  
Telephone (0543) 374321  
Telex: 335243 SEL G.

Main agent:  
South Midlands Communications Ltd.  
SM House, Rumbidge Street,  
Totton, Southampton,  
Hants SO4 4DP  
Tel. (0703) 867333

Ask for details of  
our NEW 'E'  
Series Masts—  
Developed to  
give a low line  
(22ft) mounting  
height.

## ANTENNES TONNA (F9FT)

YOUR NUMBER ONE CHOICE FOR  
6m, 2m, 70, 24 and 23cm ANTENNAS



We are pleased to introduce a new range of antennas (suffix N below). The dipoles have been redesigned and now include a fully sealed 'N' connector—absolutely NO matching or tuning required. Also a new 1296MHz 55 element long Yagi. Send for full details . . . ces sont magnifiques!

50MHz	5 element	£37.87(a)	Power Splitters complete with 'N' plugs
20505			29202 2 way 144MHz £37.46(b)
144MHz			29402 4 way 144MHz £43.00(b)
20104	4 element	£15.82(a)	29270 2 way 435MHz £35.59(c)
20808N	4 element crossed	£34.78(a)	29470 4 way 435MHz £41.01(b)
20809N	9 element fixed	£25.62(a)	29224 2 way 1250MHz £30.46(c)
20089N	9 element portable	£27.92(a)	29424 4 way 1250MHz £32.18(c)
20818N	9 element crossed	£41.03(a)	29223 2 way 1296MHz £30.46(c)
20813N	13 element portable	£39.57(a)	29423 4 way 1296MHz £32.18(c)
20817N	17 element	£47.83(a)	Portable aluminium telescopic masts
435MHz			50422 4 x 1m 3.7 metres £21.64(a)
20909N	9 element	£22.31(a)	50432 3 x 2m 5.7 metres £25.21(a)
20919N	19 element	£28.75(a)	50442 4 x 2m 7.7 metres £38.16(a)
20438	19 element crossed	£36.01(a)	Galvanised steel telescopic masts
20921N	21 element 432MHz	£38.12(a)	50223 2 x 3m 5.9 metres £31.75(a)
20922N	21 element ATV	£38.12(a)	50233 3 x 3m 8.8 metres £57.10(a)
144/435MHz			50243 4 x 3 11.7 metres £91.98(a)
20199	98/19 element Oscar	£36.01(a)	50523 5 x 3m 14.6 metres £124.44(a)
1250MHz			Stacking frame kits for 4 antennas
20624	23 element	£27.72(b)	20014 20809 or 20818 £41.01(a)
20648	4 x 23 element— power splitter— stacking frame	£144.74(a)	20044 20919 or 20921/22 £29.75(a)
1296MHz or 1269MHz Oscar Uplink			20016 20623/24 horiz £17.79(b)
20623	23 element	£27.72(b)	20017 20623/24 vert £14.39(b)
20696	4 x 23 element— power splitter— stacking frame	£144.74(b)	Andrew Helix LDF4-50A coaxial cable
20655	55 element	£44.75(a)	Attenuation per 100ft. 144MHz-0.8dB. 435MHz-1.6dB. 1296MHz-2.9dB. £4.00 per metre (a) 'N' type connectors for LDF-4-50 male or female 14.90 (postage 60p)

All antennas supplied complete with mast clamps for up to 50mm masts.

Rotators—coaxial cables—connectors  
All prices include VAT. Carriage extra

FOR FULL SPECIFICATIONS OF OUR RANGE OF ANTENNAS SEND 40p FOR OUR CATALOGUE.

PLEASE ADD CARRIAGE AS SHOWN. (a) £4.00, (b) £2.20, (c) £1.20. MAINLAND ONLY.  
Cash with order. ACCESS, VISA CARDS—telephone your card number for immediate despatch. CALLERS WELCOME, BUT BY TELEPHONE APPOINTMENT ONLY, PLEASE.



UK DISTRIBUTOR

**RANDAM ELECTRONICS (R)**



12 Conduit Road, Abingdon, Oxon OX14 1DB. Tel: (0235) 23080 (24 Hours)

## RTTY/C.W.

### IMPROVE YOUR COMPUTER DECODING

Our Terminal Unit is designed to improve the computer decoding of both RTTY and C.W. signals. It contains a number of active, narrow band filters together with automatic level control.

Feed the audio input from your receiver extension speaker socket.

OUTPUTS AVAILABLE:—AUDIO . . . TTL . . . OCL

MINIMUM INPUT FOR CORRECT OPERATION . . . 9mV

170Hz & 850Hz Shifts included.

REVERSE TONE SWITCH, TUNING METER & MUCH MORE

Requires 12 to 16 volts at 160mA SUPPLY

£45.00 inc.

S.A.E. for Full details.

SEE LAST MONTHS AD. FOR FULL LIST OF SOFTWARE AVAILABLE

## J.B.P. ELECTRONICS LTD.

New Road Complex, New Road, Kidderminster, DY10 1AL  
Tel: (0562) 753893

## MANUFACTURERS SURPLUS STOCKS

Electronic Components, Test Gear, Radiotelephones, Computers, Photographic and Video Equipment. All at knockout prices. Export and Trade Enquiries welcome. Catalogues available from:

**B. Bamber Electronics, 5 Station Road, Littleport, Cambs.**  
Phone: Ely: (0353) 860185

**ALTRON**

**CHOICE OF PROFESSIONALS**  
**COMPACT LATTICE TOWERS and**  
**SLIMLINE TUBULAR MASTS**  
 TELESCOPIC—TILT OVER, FIXED—MOBILE FROM 6m UP TO 36m

Suitable for a wide range of civil and military applications such as:

**RADIO COMMUNICATION**  
**SURVEILLANCE & CCTV**  
**METEOROLOGICAL MONITORING**  
**AMATEUR RADIO**  
**AERO & MARINE NAV AIDS**  
**FLOODLIGHTING, ETC.**

Purpose designed using 4.5m and 3m section modules for low retracted heights and cost effective shipment. Engineered to B.S.I. Standards and hot dip galvanized to BS729 for protection. Wind loads are based on B.S.C.P.3, Chap V, PT2, 1972 for wind speeds up to 100 mph/160 kph.

**RELIABILITY QUALITY KNOW HOW**

WE DESIGN, WE MAKE,  
WE SELL DIRECT

PRICES RANGE  
FROM £253.00 incl.  
VAT. & UK  
DELIVERY  
SAE FOR MORE  
DETAILS, PLEASE

**Allweld Engineering**  
 Factory 6, 232 Selsdon Road,  
 South Croydon, Surrey, CR2 6PL, G.B.  
 Tel: 01-680 2995 (24 hr) 01-681 6734.

Access  
 BARCLAYCARD  
 VISA

## KW TEN-TEC "ARGOSY II"

100 Watts SSB/CW

Mobile, Portable or Home Station



OTHER KW-TEN TEC WINNERS

THE CORSAIR II 200 WATTS SSB/CW

THE CENTURY 22 CW only transceiver

The original KW TRAP DIPOLE and TRAPS, 8 ATUs,  
 KW BALUN, and antennas

PURCHASE BY HP, ACCESS OR VISA

Write or phone for details

**KW TEN-TEC LTD**

Vanguard Works, Jenkins Dale

Chatham, Kent ME4 5RT

Tel: (0634) 815173

## GUIDE TO FACSIMILE STATIONS

(6th edition)

128 pages with numerous figures £10 or DM 30. ISBN 3-924509-66-2

The reception of meteorological transmissions by radio amateurs is now approved by most national telecommunication administrations. One field of these transmissions by satellites and stations from all over the world are the facsimile broadcasts of meteorological charts, which are of vital interest for eg navigation at sea and international aviation. Following the request of a number of long-time users of my various manuals, I decided to resume the publication of my former FAX Frequency List, now including a lot of new items.

The numerical frequency list covers 346 frequencies—from VLF to UHF—of FAX stations which have been monitored in 1985 and 1986. Frequency, call sign, name of the station, ITU country/geographical symbol, technical parameters of the emission, and details, are listed. All frequencies have been measured exact to the nearest 100 Hz.

The alphabetical call sign list covers 223 call signs, with name of the station, ITU country/geographical symbol, and corresponding frequency (-ies).

Additional chapters cover

- ★ Alphabetical list of detailed schedules to the minute of 94 FAX stations on 340 frequencies, including Bracknell programmes 1 and 2, and Northwood.
- ★ Comprehensive list of equipment on the market for both FAX and meteorological satellite reception, with photos and manufacturer's addresses.
- ★ Detailed explanation of the technique used for the transmission of FAX pictures.
- ★ Regulations on technical characteristics of FAX equipment, including all CCITT and WMO standard test charts.
- ★ Comprehensive list of both geostationary and polar-orbiting meteorological satellites, with full technical data. Detailed explanation of APT PREDICT and FANAS polar-orbiting satellite position data codes.
- ★ Radio amateur FAX activities.
- ★ 201 abbreviations.
- ★ 50 station addresses in 35 countries.
- ★ 50 sample charts and their interpretation.

Further publications available are Guide to Utility Stations and the Supplement Service thereto, Radioteletype Code Manual, Air and Meteo Code Manual, etc. Write for detailed catalogue of publications on commercial telecommunication on shortwave. All manuals are offset printed and softbound in the handy 17 x 24 cm format, and of course written in English.

The price includes airmail postage to anywhere in the world. Payment can be by cheques, cash, or International Money Orders. Postal Giro Account: Stuttgart 2093 75-709. Dealer inquiries welcome—discount rates and pro forma invoices on request. Please order from:

**Klingenfuss Publications, Hagenloher Str. 14, D-7400 Tuebingen,  
 Fed. Rep. Germany. Tel: 01049 7071 62830**



**REG WARD & CO LTD**  
**AXMINSTER, DEVON**



**South West's largest Amateur Radio dealer**

**Official agent for YAESU, TRIO, ICOM FDK**

- \* Complete range stocked
- \* Full demonstration facilities
- \* Mail/telephone orders
- \* Access/Instant credit/Barclaycard
- \* Wood & Douglas Kits

**Ancillary Equipment by:** AKD, AOR, Adonis, Bencher, BNOS, CapCo, Datong, Daiwa, Drae, Hansen, Himound, JIL, Kenpro, Microwave Modules, muTek, SEM, Shure, Tokyo Hypower, Tono, Toyo, Welz, Wood & Douglas.

**Aerials by:** G-Whip, Hygain, Jaybeam, MET, Mini Products, Revco, TET, Tonna.



APPROVED  
 Reg  
 G2BSW  
 DEALER

**1 Western Parade, Axminster,  
 Devon EX13 5NY. Tel: (0297) 34918**

Rodney  
 G6LUJ



Open Tues-Sat 9.00-5.30. Closed Mon.

## FARNBOROUGH COMMUNICATIONS

97 OSBORNE ROAD, NORTH CAMP

FARNBOROUGH, HANTS



\*YAESU\*FDK\*ICOM\*



**Stockist of Drae psu's, Jaybeam and Cue Dee  
 Antennas, Microwave Modules, Oskerblick  
 SWR, CDE, RSGB publications, quality cables,  
 our own TVI filters, Welz, Bencher, Mirage amps.**

Open Monday to Saturday 10am-6pm

ACCESS + H.P. Available + BARCLAYCARD

Telephone: Farnborough (0252) 518009

APPROVED  
**TRIO**  
DEALER

# STEPHENS-JAMES LIMITED

47 Warrington Road, Leigh WN7 3AE (0942) 676790



TRIO TS930S  
HF Transceiver

TS830S	£898.00	PS430	£139.00	AT930	£176.87	TR2600E	£299.00
AT230	£170.65	TS130S	£633.00	TS440S	£950.00	TS530SP	£779.79
SP230	£51.43	R2000	£518.73	TS780	£1061.28	TR9130	£544.73
VFO230	£292.00	HS5	£29.39	TW4000A	£588.34	SW200A	£92.67
TS430S	£750.00	TS711E	£770.74	TM201A	£296.09	TS930S	£1395.00
TM21E	£189.30	TL120	£195.29	TM401A	£350.91	TH41E	£220.95
R600	£323.78	SP120	£30.74	TR3500	£270.00	TS811E	£895.00
SW100A	£42.95	SW100B	£42.95	VC10	£139.00	TS940S	£1795.00

FULL RANGE OF TRIO ACCESSORIES STOCKED



TRIO R2000

General Coverage Receiver

The only official stockist of Trio equipment in the North West

## STATION ACCESSORIES (inc post)

SWR50 Twin SWR meter	£20.50
DL150 150W Dummy Load	£18.50
Heavy Duty magnetic mount	£17.25
Pair high power antenna traps	£3.95
Heavy Duty dipole centrepiece	£28.00
LF30A Low Pass Filter	£27.75
VHF Wavemeter	£41.00
WELZ SP5M swr/power	£79.00
WELZ SP350 swr/power	£99.00
CN630 swr/pwr	£178.00
CN419 Antenna tuner	£260.00
CN518 Antenna tuner	£54.00
CN410M 3-5-150MHz swr	£58.00
CN460M 140-500MHz swr	£7.50
HP4A High Pass Filter	£54.50
AT100 SWL ATU	£18.50
HK608 Morse key	£42.00
Lightweight Antenna Rotator	£16.57
MK704 Twin Paddle	£199.00
Daiva 30 Amp Power Supply	£10.50
CN620A 1-8-150MHz SWR/Power Meter	£21.00
Pair 7, 1MHz Antenna Traps	£15.50
HS50B 1:1 Balun	£12.00
Mag Mount—SO239	£92.00
Gutter mount load	£17.50
Daiva 12 Amp Power Supply	£16.25
Full size G5RV antenna	£26.50
Half size G5RV antenna	
80-10 Trap Dipole Kit	

Stockist for Jaybeam, Tonna, Datong, Yaesu, G-Whips, Mic Modules, Belcom, Daiva, Kenpro, AKD, TET, JRC.

Full range of aluminium tubing, lashing kits, clamps for the caller

## AR2002 SCANNING RECEIVER

Updated version of the best selling scanning receiver the AR2001. Frequency range 25 to 550MHz plus new band 800 to 1300MHz. Improved keyboard. Front panel knob for frequency stepping. LED "S" Meter. Socket for RS232 interface unit. Specifications as the AR2001. PRICE £435.00



TS430S HF Transceiver

## ANTENNAS

Jaybeam VR3 Vertical	£55.78
Jaybeam TB1 Dipole	£83.38
Jaybeam TB2 Tribander	£155.25
Jaybeam TB3 Tribander	£238.00
Mini Products HQ-1 Minibeam	£199.00
Jaybeam C5/2M Co-linear	£86.00
DCP5 10-80m Vertical	£149.00
GPV-5 2m Co-linear	£47.36
GPV-7 70cm Co-linear	£37.50

Our secondhand stock is one of the largest in the North. Updated daily. Send SAE.

FULL RANGE OF PUBLICATIONS IN STOCK RSGB, ARRL, ETC.

## THREE NEW MODELS FROM TRIO

TR 751E 2M Multimode—25 Watts or 5 Watt Output Smaller and lighter than the TR9130

TR-2550E 2M FM 45 Watt Transceiver—23 Memory Channels

TS-440S HF Transceiver—INPUT 250 Watts · SSB-CW-FM 100 Watts FM · Two VFO's · 100 Memory Channels. Optional AT440 ATU can be fitted internally heavyduty PS50 Power Supply.

J.R.C. NRD525 General Coverage Receiver available shortly.

## TM 211E/411E FM VHF/UHF mobile transceivers

By taking the popular TM201A and TM401A and adding DCS and a tiltable front panel, TRIO have produced higher specification transceivers. Even easier to fit in tight locations, the TM211E and TM411E are transceivers designed to cope with today's crowded bands.

TM211E . . . £398.00 inc VAT

TM411E . . . £466.00 inc VAT

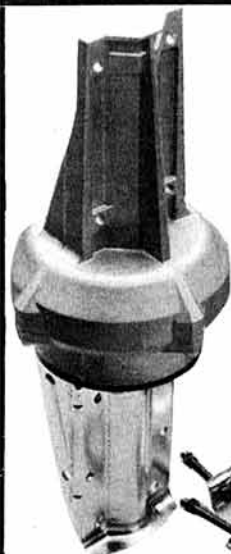


# North London Communications



## ROTATORS

## STANDARD C111 2 WATT HANDHELD



AR1002 Fully Automatic Antenna Rotator ONLY £42.50 inc VAT (P&P £2.50)

## SPECIFICATIONS

Input Voltage: AC 100 10 120V/200 10 240V (Switchable) 50/60 Hz 55VA Max  
Driver Voltage: AC 24V  
Rotation: 360° plus 15° with Mechanical stop  
360° Rotation Time: 50 Hz - 70 seconds, 60 Hz - 58 seconds  
Rotation Torque: 400 kg-cm Min  
Stationary Braking Torque: 1,000 kg-cm Min  
Mast Size: 22 10 40 mm Diameter  
Vertical Load: 50 kg Max  
Connection Cable: 3 conductors/0.5mm² (# 20)



KR400C  
KR600C

AR2002 ONLY £82.50 inc VAT (P&P £3.00)

New Heavy Duty Fully Automatic Antenna Rotator

## SPECIFICATIONS

Input Voltage: AC 100 10 120V/200 10 240V (Switchable) 50/60 Hz 55VA Max  
Driver Voltage: AC 24V  
Rotation: 360° plus 15° with Mechanical stop  
360° Rotation Time: 50 Hz - 60 seconds  
60 Hz - 50 seconds  
Rotation Torque 450 kg-cm Min  
Stationary Braking Torque: 2,500 kg-cm Min  
Mast Size: 38-50 mm Diameter  
Vertical Load: 250 kg Max  
Connection Cable: 3 conductors/0.5mm² (# 20)

Also Available

£132.50 inc VAT (p + p £5.50)  
£189.50 inc VAT (p + p £5.50)

ONLY £189.00 inc. VAT (P&P £2.50)

## ACCESSORIES

CMP111 Speaker/Microphone £23.50 inc VAT

CHP111 Headset/Boom Mic with PTT

£22.50 inc VAT

CMA111 DC Charger Adaptor (Switchable

£32.50 inc VAT

CAD111 DC Charger Unit £8.50 inc VAT

CSA111 Base Charger £45.00 inc VAT

CNB111 Nicad Pack (For 25 Watt + Output)

£35.00 inc VAT

C10/120 Wall Charger £8.50 inc VAT

CMB111 Mobile Mount Clip £7.00 inc VAT

CNT111 CTCSS Tone Squelch Unit

£30.00 inc VAT

CLC111 Carrying Case £6.00 inc VAT

Spare Helical £7.95 inc VAT

211 West Hendon Broadway, London NW9 7DE.

Tel No: 01-202 3638

Telex: 298765 UNIQUE G

and

(Formerly Lee Electronics)

400 Edgeware Road, London W2.

Tel No: 01-723 5521

Telex 298765 UNIQUE G



Normally 24hr despatch but please allow 7 days for delivery

Mail order + Retail  
All prices are inclusive of VAT and are correct at time of going to press

Northern Agents: Joe Bell G4PMY  
Unit 3, Thomas Street, Crewe,  
Tel No: 0270 582849



# LOOK OUT FOR OUR JULY ISSUE

It's a **CONSTRUCTORS' SPECIAL**

INCLUDING REVIEWS OF THE  
**C.M. Howes DC/RX Receiver** **Cirkit 50MHz Transverter**  
**and Ferranti DVM Kit**

**Two New Series** **Kit Construction - It's Easy**  
**Getting Started - 1. Your Workshop**

*Practical*

# Wireless

*The Radio Magazine*

ON SALE  
5 JUNE

## RADIO SHACK

FOR  
EVERYTHING  
IN

## AMATEUR RADIO

R L DRAKE RECEIVERS AND ACCESSORIES (Limited Stock Available)

R-7A	0.1-30MHz HF Digital Receiver, SSB/CW/AM	1595.00
SL-300	300Hz CW Filter for R-7 & TR-7	69.00
SL-4000	4000Hz AM Filter for R-7 & TR-7	69.00
SL-1000	1000Hz RTTY Filter as above	69.00
NR-7A	Noise Blanker for R-7 receiver	73.60
RP-700	Receiver Protector from lightning and static	79.35
RR-3	Marine Reserve & General Coverage Receiver	2070.00
R-4245	High Spec 0.1-30MHz Commercial receiver	2852.00
C-7011	Table Top Cabinet for RR-3 & R-4245	184.00
<b>ACCESSORIES FOR R-4C RECEIVER</b>		
FL-250	250Hz CW Filter	59.95
FL-500	500Hz CW Filter	59.95
FL-4000	4000Hz AM Filter	59.95
FL-6000	6000Hz AM Filter	59.95
CRYSTALS	Accessory Crystals for R-4 & T-4X Series	10.35
<b>DRAKE SATELLITE TV RECEIVERS</b>		
ESR-240	Earth Station Receiver with I.R. Remote Control	1035.00
ESR-324	Earth Station Receiver	695.00
ESR-2220	Commercial Rack Mount Single Conversion RCVR	1127.00
LNA-2573	85 Degree Low Noise Amplifier	695.00
<b>ACCESSORIES FOR TRANSCEIVERS</b>		
RV-7	Remote VFO for TR-7 & 7A	172.50
MMK-7	Mobile Mount for TR-7	69.00
CW-75	Electronic CW Keyer	79.35
FA-7	Fan for TR-7, PS-7, DL-1000	87.40
AUX-7	Auxiliary Range board for TR-7	29.90
RRM-7	Range Receive Modules for AUX-7	46.00
NB-7	Noise Blanker for TR-7	10.35
IS-48	R-7/TR-7 Interface Cable	99.95
SP-75	Speech Processor	34.50
NB-5	Plug in Noise Blanker for TR-5	14.95
PS-75	Power Supply for TR-5 & TR-7	87.40
TV-42LP	100 Watt Low Pass Filter	14.95
WH-7	HF VSWR/Wattmeter 20/200/24W Ranges	69.00
1525	Tone Encoder Microphone	24.95
7073	Hand Microphone for TR-5 & TR-7	29.90
977	Astatic Desk Microphone for TR-5 & TR-7	49.95
S-230	R/A Mic Plugs for TR-4 & T-4X	3.45
<b>GENERAL</b>		
LA-7	600 Ohm Balanced Line Amplifier	46.00
CS-7	5-Way Remote Antenna Switch	149.50
SD-240	240-120V Auto Transformer 500W 2 US Sockets	27.60
AK-75	Multiband Antenna	46.00
8202	Auto Scale Digital Multimeter	69.00
DC-PC	SPR 4 DC Power Cord	3.80
Manuals	Operator Manuals, available for most models	10.00

The above items cannot be replaced when present stocks are sold

<b>ROCKWELL COLLINS</b>		
KWM-380	HF Amateur Band Transceiver	3438.50
MM-280	Hand held Microphone	73.50
MM-281	Noise Cancelling Hand Microphone	103.45
AC-3801	Noise Blanker	396.75
AC-3802	Speech Processor	396.75
AC-3803	Control Interface	275.95
AC-3804	WARC/MARS Coverage Kit	91.25
AC-3810	500Hz CW Filter	205.25
AC-3811	250Hz CW Filter	205.25
AC-3812	1.7kHz RTTY Filter	205.25
AC-3813	6.0kHz AM Filter	191.75
AC-2801	Rack Mount	255.00
AC-2808	Blower Kit	449.65
AC-2821	DC Power Cable	95.00
AC-2828	Microphone Foot Switch	68.75
AC-2830	Lightweight Headphones	66.00
CS-7	Communications Quality Headphones	99.95
OM-769	Spare Operators Manual	8.95
SM-770	Service Manual	51.75
New KWM-380 Transceivers can never be repeated at this price when existing stocks are sold		
<b>SCANNING RECEIVERS</b>		
AR-2002	ADR 16 Ch. 25-550MHz, 800-1300MHz	398.00
BC-150FB	Bearcat 10 Channel, 66-68, 138-174, 420-512MHz	159.95
BC-200FB	Bearcat 16 Channel, Scan & Search, Freq. as above	199.95
BC-24	2 Band and 4 Channel Hand held thinscan	87.40
BC-46	4 Band & Channel Hand held thinscan	99.95
FRG-9600	Yaesu All Mode 60 905MHz Scanner	449.00
PRO-30	16 Ch. Hand held as above + aircraft band	239.95
PRO-2003	50 Ch +10 FM Broadcast, freq. as PRO-30	299.95
TM-56	2M Amateur Band Scanner	79.00
TM-56B	VHF Marine Band Scanner	79.00
<b>SCANNER ANTENNAS</b>		
TELSCAN	Indoor/Outdoor 65-600MHz Antenna	19.95 C
TELSCAN-Z	as above, 12dB Amplified with auto attenuator	49.95 C
<b>DATONG PRODUCTS</b>		
PC1	Gen. Cov. Con.	137.40 (1.50)
VLF	Very low frequency conv.	29.90 (1.50)
FL2	Multi-mode audio filter	89.70 (1.50)
FL3	Audio filter for receivers	129.00 (1.50)
ASP/B	r.t. speech clipper for Trio	82.80 (1.50)
ASP/A	r.f. speech clipper for Yaesu	82.80 (1.50)
ASP	As above with 8 pin conn	89.70 (1.50)
D75	Manual RF speech clipper	56.35 (1.50)
D70	Morse Tutor	56.35 (1.50)
MK	Keyboard Morse sender	137.40 (1.50)
RFA	RF switched pre-amp	33.90 (1.50)
AD270 MPU	Active dipole with mains p.s.u.	51.75 (1.50)
AD370 MPU	Active dipole with mains p.s.u.	69.00 (1.50)

MPU	Mains power unit	6.90 (1.50)
DC144/28	2m converter	39.67 (1.50)
PTS1	Tone squelch unit	46.00 (1.50)
ANF	Automatic notch filter	67.85 (1.50)
SRB2	Auto Woodpecker blanker	86.25 (1.50)
<b>HF ANTENNAS</b>		
HUSTLER		
4-BTV	10-40m 4 Band Trap Vertical	149.85
5-BTV	10-80m 5 Band Trap Vertical	189.95
3-TBA	3 Element 10/15 & 20m Beam Antenna, 14' 8" boom, 10m Base Vertical Ground Plane	379.50
27-TDX	10m Switchable Dual Polarity Beam/Quad antenna	59.80
AVANTI	10m On glass mobile antenna, 22 inches high	79.35
AV-200	3.5 to 30MHz Portable Tape Dipole Antenna	19.55
<b>HY-GAIN</b>		
18-TD	15m 3 Element Beam, 26' Boom, 24.5' Longest Element	230.00
153-BA	10m 3 Element Beam 8' Boom, 17' Longest Element	135.00
103-BA	20m 4 Element Beam, 26' Boom 36.5' Longest Element	99.00
204-BA	20m 5 Element Beam, 34' Boom 36.5' Longest Element	420.00
205-BA	10, 15 & 20m Trap Vertical	SOLD
12-AVO	10-40m Trap Vertical	78.95
14-RMQ	Roof Mount Kit for Vertical Antennas	106.00
413	10m 8' Stainless Steel Whip, Mobile Flush Body Mount for above Whip	39.90
BDBM		14.95
JAYBEAM		13.80
TB-1	Triband Rotary Dipole	83.38
TB-2	Triband 2 Element Beam	156.25
<b>DATONG</b>		
AD-270	Indoor Active Receiving Antenna	47.15
AD-370	Outdoor Active Receiving Antenna	64.40
MPU	Power Supply for above antennas	6.90
G4MH	G4MH Minibeam 2 El. Triband Antenna	88.50
G4MH-B	Kit for above less aluminum tubing	67.50
ARCHER	75' Long Wire Kit + 50' Feed in with insulators	10.99
All Band		
<b>USED BARGAINS</b>		
HY-GAIN		
TH3MK3	3 El. Triband Beam, 14' Boom, Stainless Hardware, Superb Condition	250.00
<b>MINI PRODUCTS</b>		
HQ-1	2 El. Triband Mini Beam	85.00

STOCKISTS OF TRIO, YAESU & ICOM

CARRIAGE EXTRA



## RADIO SHACK LTD

(Just around the corner from West Hampstead Station on the Jubilee Line)

Giro Account No. 588 7151 Telephone 01-624 7174

188 BROADHURST GARDENS,  
LONDON NW6 3AY



# PHOTO ACOUSTICS LTD. TEL: 0908 610625

## 58 HIGH STREET, NEWPORT PAGNELL, BUCKS, MK16 8AQ

# MAIL ORDER



HF TRANSCEIVERS £ (p&p) 70cm TRANSCEIVERS cont. £ (p&p) AERIALS cont. £ (p&p)

### Trio

TS440S	NEW Amateur band transceiver/General coverage RX	950.00	(—)
TS440S	9 Band TX General Cov RX	1795.00	(—)
TS930S	9 Band TX General Cov RX	1395.00	(—)
TS830S	160-10m Transceiver 9 Bands	898.00	(—)
AT230	All Band ATU/Power Meter	170.65	(2.00)
SP230	External Speaker Unit	51.43	(1.50)
TS530SP	160m-10m Transceiver	779.79	(—)
TS430S	160m-10m Transceiver	750.00	(—)
PS430	Matching Power Supply	139.01	(3.00)
SP430	Matching speaker	39.50	(1.50)
MB430	Mobile Mounting Bracket	12.56	(1.50)
FM430	FM Board for TS430	45.00	(1.50)
SP120	Base Station External Speaker	33.33	(1.50)
MC50	Dual Impedance Desk Microphone	39.56	(1.50)
MC35S	Dist Microphone 50K ohm IMP	18.65	(1.00)
LF30A	HF Low Pass Filter 1kW	27.70	(1.00)
TR930	2m FM Mobile	365.60	(—)
TR930	2m Multimode	544.73	(—)
TM201A	2m 25W Mobile	296.09	(—)
TM401A	7cms FM 12W	350.91	(—)
TH21E	2m Mini-Handhelds	189.30	(—)
TH41E	70cm Mini-Handhelds	220.95	(—)
TM21E	2m FM Mobiles	398.00	(—)
TM41E	70cm FM Mobiles	466.18	(—)
TS71E	2m Base Stations	770.74	(—)
TS81E	70cm Base Stations	895.00	(—)
TR3600	70cm Handheld	324.36	(—)
TR2600	New 2m FM Synthesised Handheld	299.00	(—)
ST2	Base Stand	65.11	(1.50)
SC4	Soft Case	16.95	(1.00)
SMC25	Speaker Mike	19.78	(1.00)
PB25	Spare Battery Pack	32.20	(1.00)
MS1	Mobile Stand	38.41	(1.00)
R600	Gen. Cov. Receiver	323.78	(—)
R2000	Synthesised 200kHz-30MHz Receiver	518.73	(—)
HS5	Deluxe Headphones	29.39	(1.00)
SP40	Mobile External Speaker	18.08	(1.00)
TL922	160/10M 2kW Linear	1265.00	(7.00)
TS780	2m/70cm M/M Transceiver	1061.20	(5.00)
TS670	6, 10, 15, 40M 10W M/M Transceiver	774.13	(5.00)
TR9300	6M M/M Transceiver	499.00	(5.00)
SPECIAL OFFER			
TM4000A	2m/70cm mobile ONLY	398.00	(3.00)
NEW			
TM751E	2m Multimode with DCL (mobile)	P.O.A.	(3.00)

### Linear Amps

MICROWAVE MODULES			
MML144/30-LS	inc preamp (1/3W i/p)	94.30	(2.00)
MML144/50-S	inc preamp, switchable	106.95	(2.00)
MML144/100-S	inc preamp (10W i/p)	149.95	(2.50)
MML144/100-HS	inc preamp (25W i/p)	159.95	(2.50)
MML144/100-LS	inc preamp (1/3W i/p)	169.95	(2.50)
MML144/200S	inc preamp (3/10/25 i/p)	334.65	(2.50)
MML432/30L	inc preamp (1/3W i/p)	169.05	(2.00)
MML432/50	inc preamp (10W i/p)	149.50	(2.00)
MML432/100	linear (10W i/p)	334.65	(2.50)
B.N.O.S.			
LPM 144-1-100	2m, 1W in, 100W out, preamp	197.50	(2.50)
LPM 144-3-100	2m, 3W in, 100W out, preamp	197.50	(2.50)
LPM 144-10-100	2m, 10W in, 100W out, preamp	175.00	(2.50)
LPM 144-25-160	2m, 25W in, 160W out, preamp	255.00	(2.50)
LPM 144-3-180	2m, 3W in, 180W out, preamp	295.00	(2.50)
LPM 144-10-180	2m, 10W in, 180W out, preamp	295.00	(2.50)
LP 144-3-50	2m, 3W in, 50W out, preamp	125.00	(2.50)
LP 144-10-50	2m, 10W in, 50W out, preamp	125.00	(2.50)
LPM 432-1-50	70cm, 1W in, 50W out, preamp	235.00	(2.50)
LPM 432-3-50	70cm, 3W in, 50W out, preamp	235.00	(2.50)
LPM 432-10-50	70cm, 10W in, 50W out, preamp	195.00	(2.50)
LPM 432-10-100	70cm, 10W in, 100W out, preamp	335.00	(2.50)

### SWR/PWR Meters

WELZ			
SP10X	1.8-150MHz PWR/SWR	34.00	(1.50)
SP122	1.8-60MHz PWR/SWR/PEP	75.00	(1.50)
SP220	1.8-200MHz PWR/SWR/PEP	59.00	(1.50)
SP225	1.8-200MHz PWR/SWR/PEP	99.95	(1.50)
SP420	140-525MHz PWR/SWR/PEP	69.00	(1.50)
SP425	140-525MHz PWR/SWR/PEP	99.95	(1.50)
SP825	140-525MHz PWR/SWR/PEP	149.00	(1.50)

#### NEW RANGE OF WELZ METERS NOW AVAILABLE

DAWA Power and SWR METERS			
CN410M	3.5-150 MHz mobile cross needle meter	53.30	(1.50)
CN460M	140-150MHz mobile cross needle meter	57.75	(1.50)
CN630	140-150MHz mobile cross pointer meter up to 200W	108.90	(2.50)
NS448	900-1300MHz swr/power meter 5/20W	78.00	(2.50)

TRD Power and SWR METERS			
SW100A	SWR/power meter 1.8-150MHz	42.95	(2.50)
SW100B	SWR/power meter 140-450MHz	42.95	(2.50)
SW200A	SWR/power/PEP meter 1.8-150MHz	92.70	(2.50)
SW200B	SWR/power/PEP meter 140-450MHz	92.70	(2.50)
SW2000	SWR/power/PEP meter 1.8-54MHz up to 2kW	99.00	(2.50)
SWC1	Optional coupler for SW200 1.8-150MHz	25.50	(1.50)

### SWC2

	140-450MHz	25.50	(1.50)
<b>VHF Receivers</b>			
AOR2002	VHF/UHF continuous coverage scanner	435.00	(3.00)
FRG9600	60-905MHz scanning receiver	465.00	(3.00)
HX2000E	Handheld VHF/UHF scanner	269.00	(3.00)
R537S	Handheld Airband receiver	64.90	(2.50)
R532	Mobile/Base/Portable Airband receiver	209.80	(3.00)

### Icom Products

IC751A	HF Transceiver	1399.00	(—)
IC745	HF Transceiver	989.00	(—)
IC735	New HF Transceiver	899.00	(—)
PS15	P.S. Unit	149.50	(4.00)
PS30	Systems p.s.u. 25A	343.85	(—)
IC2900	Base microphone for 751/745	519.00	(—)
IC271H	2m 25W M/Mode Base Stn.	779.00	(—)
IC271E	100W version of above	979.00	(—)
IC27E	25W FM mobile	399.00	(—)
IC27E	25W 70cm FM mobile	595.00	(—)
IC8U1	B/U Supply for 25/45/290	31.05	(1.00)
ICR71	General Coverage Receiver	789.00	(—)
ICD2E	2m H/Held	299.00	(—)
IC2E	2m H/Held	199.00	(—)
ML1	2m 10W Linear	79.35	(2.00)
IC4E	70cm H/Held	285.00	(—)
ICP4E	70cm handheld	299.00	(—)
BC35	Base Charger	67.85	(1.00)
HM9	Speaker mic	20.70	(1.00)
LC3	Carry Case	6.90	(1.00)
ICG3P	Std Battery Pack	28.75	(1.00)
BPS	High Power Battery Pack	22.40	(1.00)
CP1	Car Charging Lead	6.90	(1.00)
DC1	12v Adaptor	17.25	(1.00)
R7000	VHF/UHF Scanning Receiver	899.00	(—)
IC3200	2m/70cm Mobile Transceiver	529.00	(—)

### SPECIAL OFFER

IC505	50MHz multimode 10W ONLY	349.00	(3.00)
-------	--------------------------	--------	--------

### Mutek Products

SLNA 50	50MHz Switched preamp	44.90	(1.50)
SLNA 144a	144MHz Low noise switched preamp	38.95	(1.50)
SLNA 145ab	Preamp intended for 290	29.90	(1.50)
GLNA 432e	70cm Mast head preamp	149.90	(2.50)
RPCB 144ub	Front end FT221/225	79.90	(1.50)
RPCB 251ub	Front end IC251/211	84.90	(1.50)
BBBA 500u	20-500MHz Preamp	34.90	(1.50)
GBA 144e	2m Mast head preamp	149.90	(2.50)
SBLA 144e	2m Mast head preamp	89.90	(2.50)
RPCB 271ub	Front end for IC271	89.90	(1.50)
TUVF 230c	2m-FM Transverter	334.90	(5.00)
LBPF 144v	Bandpass Filter	22.40	(1.50)
LBPF 432u	Bandpass Filter	22.40	(1.50)
TUVF 50c	5m Transverter	159.90	(2.50)
GLNA 433e	70cm Pre-amp	79.90	(2.50)
TUVF 144a	2m Transverter	239.90	(2.50)

### CW/RTTY Equipment

BENCHER			
BY1	Squeeze Key, Black base	67.42	(2.00)
BY2	Squeeze Key, Chrome base	76.97	(2.00)
HI-MOUND MORSE KEYS			
HK708	Straight key	18.10	(2.50)
HK702	Deluxe version of above on Marble Base	34.50	(3.00)
HK706	Straight key	19.50	(2.50)
HK707	Straight key	18.50	(2.50)
MK704	Squeeze paddle	17.50	(2.50)
MK705	Squeeze paddle on Marble Base	27.90	(3.00)

### RTTY-EQUIPMENT

AMT-2	Terminal Unit RTTY/AMTOR/ASCII/CW	245.00	(3.00)
AMT-2/CBM64	Software for the above for the Commodore 64	51.75	(2.50)
AMT-2/VIC20	Software for the above for the Commodore VIC 20	51.75	(2.50)
AMT-2/BBC B	Software for the above for the BBC B	44.85	(2.50)
CWR 610E	RTTY/CW/ASCII Decoder	216.45	(3.00)

### KEYERS & ACCESSORIES

Star Master Key	Electronic Keyer	54.70	(3.00)
NEW Star	Masterkey electronics CMOS memory keyer	95.00	(3.00)
TRX3	Morse Oscillator	11.70	(1.50)
Drae	Morse Tutor	52.00	(3.00)

### Yaesu

FT1	HF Transceiver	P.O.A.	(—)
FT980	HF Transceiver	1759.00	(—)
SP980	Speaker	86.09	(2.00)
FT757GX	HF Transceiver	79.00	(—)
FT757	Auto A.T.U.	318.00	(2.00)
FP757HD	Heavy Duty PSU	199.00	(2.00)
FP757GX	Switched Mode PSU	199.00	(2.00)
FT290	2m M/Mode Port/Transceiver	369.00	(—)
FT290	With Mutek front end fitted	399.00	(—)
FT690	5M M/Mode Portable Transceiver	299.00	(—)
FL2010	Linear Amplifier	79.00	(1.00)
MMB11	Mobile Bracket	33.00	(1.00)

NC11	Charger	10.00	(1.00)
CSC1	Carrying Case	6.50	(1.00)
YHA15	2m Helical	7.50	(1.00)
YHA44D	70cm i-wave	10.95	(1.00)
YMA9	Speaker Mike	19.00	(1.00)
MMB15	Mobile Bracket	14.55	(1.00)
FT203R	NEW 2m H/Held/C/W FN83	225.00	(—)
FT209R	NEW 2m H/Held/C/W FN83	265.00	(—)
FT703R	70cm H/Held	255.00	(—)
FT709R	70cm H/Held	285.00	(—)
FT270R	2m 25W F.M.	359.00	(—)
FT270RH	2m 45W F.M.	399.00	(—)
FT2700R	2m/70cm/25W/25W	499.00	(—)
FRG 9600	60-905MHz Scanning RX	465.00	(—)
MMB10	Mobile Bracket	8.50	(1.00)
NC9C	Charger	9.60	(1.00)
PA3	Car Adaptor/Charger	18.00	(1.00)
FN82	Spare Battery Pack	25.00	(1.00)
YMA24A	Speaker Mike	27.00	(1.00)
FT726R	2m Base Station	899.00	(—)
430/726	70cm Module for above	255.00	(2.50)
FRG8800	HF Receiver	575.00	(—)
FRV8800	Converter 118-175 for above	90.00	(1.50)
FR17700RX	A.T.U.	49.85	(1.50)
MD188	Hand 600 8pin mic	17.50	(1.00)
MD188	Desk 600 8pin mic	75.00	(1.00)
MF1A3B	Boom mobile mic	23.00	(1.00)
VH77	Lightweight phones	17.50	(1.00)
VH55	Padded phones	17.50	(1.00)
YH1	L/weight Mobile H/set-Boom mic	17.00	(1.00)
SB1	PTT Switch Box 208/708	18.50	(1.00)
SB2	PTT Switch Box 290/790	16.00	(1.00)
SB10	PTT Switch Box 270/2700	18.50	(1.00)
OTR24D	World Time Clock	39.00	(1.00)
FF501DX	Low Pass Filter	33.00	(1.00)

### Power Supplies

DRAE			BNOS		
4 amp	40.50	(2.00)	6 amp	69.00	(2.50)
6 amp	63.00	(2.50)	12 amp	115.00	(3.00)
12 amp	86.50	(3.00)	25 amp	169.00	(4.00)
24 amp	125.00	(4.00)	40 amp	345.00	(4.00)

### Aerial Rotators

KR400	Med/H Duty	119.00	(2.50)
KR500	6 core Elevation	139.95	(2.50)
KR400RC	6 core Medium Duty	149.95	(2.50)
KR600RC	5 core Heavy Duty	199.00	(2.50)
Yamato	Lightweight VHF rotator	42.95	(3.00)
Unison	Lightweight VHF rotator similar to Hirschmann	42.95	(3.00)

### Switches

Sigma	2 way S0239	14.49	(1.00)
Sigma	2 way 'n' SxTs	19.95	(1.00)
Welz	2 way S0239	23.95	(1.00)
Welz	2 way 'n' SxTs	43.95	(1.00)
Drae	3 way S0239	15.40	(1.00)
Drae	3 way 'n' SxTs	19.90	(1.00)

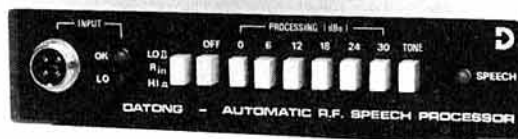
### Aerials

Jaybeam	TB3 HF 3 element Tribander Beam	230.00	(10.00)
Jaybeam	TB2 HF 2 element Tribander Beam	155.25	(10.00)
Jaybeam	TB1 HF Tribander rotary Dipole	83.37	(10.00)
Jaybeam	VR3 HF Vertical Tribander	55.77	(10.00)
(Full range of Jaybeam VHF and UHF aerials available, please ring for details)			

<b>Tonna</b>	5 element 50MHz	<b>37.90</b>	<b>(5.00)</b>
Tonna	9 element fixed 'N' socket 144MHz	<b>25.65</b>	<b>(5.00)</b>
Tonna	2 x 9 element 'N' socket 144MHz	<b>41.05</b>	<b>(5.00)</b>
Tonna	9 element portable 144MHz	<b>21.05</b>	<b>(5.00)</b>
Tonna	13 element portable 144MHz	<b>32.67</b>	<b>(5.00)</b>
Tonna	17 element 'N' socket 144MHz	<b>47.85</b>	<b>(5.00)</b>
Tonna	9 element 435MHz 'N' socket	<b>22.35</b>	<b>(5.00)</b>
Tonna	9 element 435MHz 'N' socket	<b>28.75</b>	<b>(5.00)</b>
Tonna	2 x 19 element 435MHz	<b>36.00</b>	<b>(5.00)</b>
Tonna	21 element 432MHz 'N' socket	<b>38.15</b>	<b>(5.00)</b>
Tonna	21 element 438MHz ATV	<b>38.15</b>	<b>(5.00)</b>
Tonna	23 element 1250MHz	<b>27.75</b>	<b>(3.00)</b>
Tonna	23 element 1296/1268MHz	<b>27.75</b>	<b>(3.00)</b>
Tonna	23 element 1A 1296/1268MHz	<b>27.75</b>	<b>(3.00)</b>

# Attention FT757, FT77 and FT707 owners ...

**A RECOMMENDATION FROM G3LLI**



Modern solid state rigs designed to have a **CLEAN** output can not be 'flat topped' by screaming into the mic. But a vast increase in average output can be obtained without objectionable distortion by using the **DATONG AUTOMATIC R.F. SPEECH PROCESSOR** — gives push button selection of up to 30db of clipping. **CALL IN AND LISTEN TO THE TAPE WE MADE WITH 2 FT757s and S1 signals** — certainly with my voice the Datong is more effective than any legal linear. Datong auto RF speech processor, £82.80 p.p. Ready wired for **FT757, FT707 or FT77**. With connecting lead — (no mic plug to solder!).

**HEAR THE TAPE. (OR BUY THE PROCESSOR) AT:**



**AMATEUR ELECTRONICS/HOLDINGS,**  
45 Johnston Street, Blackburn BB2 1EF.  
(0254) 59595.

**AMATEUR ELECTRONICS LTD.,**  
504 Alum Rock Road, Alum Rock,  
Birmingham B8 3HX.  
021-327-1497/6313.

## BRAND NEW COMPONENTS BY RETURN OF POST

VAT Inclusive Postage 20p (Free over £5). List Free

**HIGH STABILITY MINIATURE FILM RESISTORS 5% Tolerance**  
1W E24 Series 0-51R — 10MO 1p (75p/100 one value) 0-125W E12 Series 10R to 1M8.2p  
0-5W E24 Series 1R0 to 10MO 1p 1-0W E12 Series 10R to 10MO. 5p  
1W metal film 10R to 1MO. 5% E12 series 2p 1% E24 series 3p  
**Mullard or equivalent 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**  
0-01, -015, -022, -033, -047, -068 4p 0-1 5p 0-15 & 0-22 6p  
0-33 & 0-47 8p 0-68 (250V, 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 25p  
4-7/50 5p 22/50 6p 100/16 7p 220/16 8p 470/25 11p 1000/40 35p  
**TAG ENDED CANS: 5000/30V £1.00 4700/16 25p, 4700/25V axial 70p.**  
**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 4-7/16 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 12p BC547/8/9 8p BC212L 10p BFY50/51/52 20p BFX38 25p  
BC147/8/9 10p BC557/58/9 8p BCY70 15p 2N2926 7p BSX19/20 15p  
BC157/8/9 10p BC182L 184L 10p BF195/7 10p 2N3055 50p BD135/6 25p  
8 pin i.c.s. 741 20p 555 22p 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 8p  
**Zener Diodes E24 series 400mW. 3V3 to 33V to 33V 8p. 1 watt 3V9 to 33V 12p.**  
**LEDs Red, Green, Yellow 3 & 5mm, 10p. 8mm, 35p. Grommets 3 & 5mm, 2p**  
**Fuses 20mm glass 100mA to 5A. Q Blow 5p. A/Surge 8p. Holders 5p. (p.c. or chassis)**  
**High speed p.c.b. drills 0-8, 1-0, 1-3, 1-5, & 2mm 25p. 12V Drilling machines £6.50**  
**The C.R. Supply co. 127 Chesterfield Rd, Sheffield S8 0RN. Tel: 557771**

## 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**. See for list. \*Phone for assistance re types suitable for your equipment. USA and Jap manufacture of popular types available.

**DON'T DELAY PHONE TODAY 045 75 6114, G4AZM**

Wilson, Peel Cottage, Lees Road, Mossley, Tameside, Manchester

# RAEDEK ELECTRONICS

SERVICING THE TELECOMMUNICATIONS AND ELECTRONICS INDUSTRIES

102 PRIORY ROAD  
HALL GREEN  
BIRMINGHAM  
ENGLAND B28 0TB  
Tel: 021-474 6000

## VALVES

Large selection of Valves available besides types listed. A few of the most popular types are given:

AH211A	37-50	ECC90	1-25	E280	1-60	4CX250B	48-00	6LE6C	5-00
AH2511	90-00	ECC32	3-25	E281	1-50	5AR4	2-10	12A6	1-50
AH2532	31-50	ECC81	1-60	E290	1-50	6AH6	2-30	12AU6	1-70
BT5	52-50	ECC82	1-60	GZ34	2-10	6AL5W	1-80	12AX7A	1-90
BT5B	52-50	ECC83	1-60	K765	9-00	6BA6	1-50	12BA6	1-90
BT17	142-00	EF80	1-70	K777	8-75	6CB6A	1-80	12BY7A	2-70
BT17A	130-00	EF85	3-00	K788	24-95	6JB6A	4-20	6146A/B	9-00
BT95	125-00	EF86	2-30	QV03-10	5-30	6JE6C	6-25	6350A	4-95
C3J	30-00	EF89	2-30	QV03-12	7-00	6JS6C	6-25	6550A	7-25
C3JA	30-00	EL34	3-90	OAZ	7-00	6KD6	5-90	7044	6-00
E88CC	3-90	EL36	2-30	2C39A	39-90				
E90CC	7-50	EL84	1-60	2C39WA	42-00				
EB91	1-35	EL86	2-10	2D21	2-00				
EB931	1-10	EL89	7-70	3-400Z	78-00				
EBF89	1-35	EN32	16-25	3-500Z	85-00				

Complete range of  
EIMAC Tubes and  
Accessories

## TRANSISTORS

Probably the largest range of RF power and small Signal Transistors available in the UK. A small selection is given below:

## SERVICE AIDS

Contact Cleaner £1-00  
Freeze It Aerosol £1-25  
Heatsink Compound £1-50  
Silicone Grease £1-50  
Large range of soldering  
irons and spares — POA

MRF237	3-50	MRF901	2-75	2N5944	7-85	2SC1972	9-50
MRF238	11-90	2N3375	10-90	2N5945	10-10	2SC2053	0-80
MRF240	20-70	2N3553	1-60	2N5946	10-80	2SC2237	6-00
MRF245	33-00	2N3632	12-95	2N6080	6-85	2SC2287	9-60
MRF247	33-30	2N3733	12-95	2N6081	8-40	2SC2290	24-00
MRF458A	10-15	2N3866	1-20	2N6082	10-50	SD1013	9-75
MRF450	10-50	2N4427	1-40	2N6083	11-20	SD1019stud	
MRF450A	13-50	2N5090	10-90	2N6084	12-00		23-19
MRF454	21-25	2N5109	1-95	2SC1729	12-50	SD1127	3-10
MRF454A	17-25	2N5160	3-00	2SC1945	3-45	SD1134-1	2-25
MRF455	16-50	2N5589	7-60	2SC1946A	16-00	SD1136	11-90
MRF475	2-30	2N5590	7-90	2SC1947	8-50	SD1143	9-40
MRF476	2-15	2N5591	9-50	2SC1969	1-80	SD1219	14-70
MRF648	27-00	2N5643	11-85	2SC1970	1-40	SD1272	10-95
MRF648	32-70	2N5913	2-50	2SC1971	3-50	SD1278	13-75

## TERMS

Prices correct at time of going to press. Please add £1.00 P&P and VAT @ 15% to all orders in the UK.

Export enquiries welcome

# J. BIRKETT

25 THE STRAIT, LINCOLN. Tel: 20767

**TOKO MECHANICAL FILTERS** Type MFH71T 455kHz BW MKHz @ 95p. **AVX MULTILAYER CERAMIC AXIAL CAPACITORS** Sub-Min 1000p.f. 100VW @ 25p Doz. **LARGE FIXED TRANSMITTING TYPE CAPACITORS** Plessey Type 35, 120p.f. 10Kv.w. @ £1.15. 250p.f. 10K v.w. @ £1.50. Type 35, 28 45p.f. 10K v.w. @ £1.15. **TRANSMITTING VARIABLES** 30 + 30p.f. @ £2.60. 300p.f. @ £6.30. **SIDE BAND CRYSTAL FILTER** Type 014DG 10-7MHz BW + 3-75kHz @ £3.95. **ITT CRYSTAL FILTER** 10-7MHz BW2-4kHz @ £5.95. **ITT CRYSTAL FILTER** 10-7MHz BW ± 7-5kHz @ £2.95. **HF POWER TRANSISTOR** BLV60R With Data @ £7.50. **FETS** J304 @ 6 for £1, J230 @ 5 for 60p, 2N3819 @ 20p each. **VMOs POWER VN10KN @ 50p, WM211 @ 40p, VN10LM @ 40p, GECALLOY RINGS** For L.F. Suppression Int. Dia. 15mm, Ext. Dia. 28mm @ 38p. **14 PIN DIL OP-AMPS** 710, 741, 747, All @ 20p each. **144MHz WAVEMETER KIT** With Instructions @ £4.60. **TELEPHONE CARBON MIKE INSERTS** 25p, 5 for £1. **TAG ENDED ELECTROLYTICS** 16 + 16uf 350v.w. @ 35p, 16 + 16uf 450v.w. @ 45p, 32 + 32uf 350v.w. @ 45p, 50 + 50uf 450v.w. @ 75p. **CRYSTALS** HC18U 5-998MHz, 15-9744MHz, 36MHz, 66-986MHz, HC25U 6-075MHz, 26-583MHz, 53-675MHz All @ £1 each. **VARIABLE POWER SUPPLY KIT** 6 to 22volt 1 amp. Consisting of Transformer, 5K Pot, Regulator Board With LM317 And Instructions @ £4.95 P.P. £1.50. **DISC CERAMICS** 500v.w. 2-2p.f., 6-8p.f., 100p.f., 220p.f., 560p.f., 680p.f. 1500p.f. All @ 5p each.

**WOOD AND DOUGLAS KITS AVAILABLE BY POST AND FOR CALLERS. ACCESS AND BARCLAY CARDS ACCEPTED. P.P. 60p UNDER £5 OVER FREE.**



# JAYCEE ELECTRONIC JOHN GM30PW

20 Woodside Way, Glenrothes, Fife KY7 5DF

Phone 0592 756962

Open 5 days — Tues-Sat 9am-5pm

Out of Hours Service (0333) 29232

Quality secondhand equipment in stock  
**FULL RANGE OF TRIO and YAESU goodies.**

Jaybeam — Microwave Modules — L.A.R.

RSGB books — Daiwa — Welz — TET — BNOS

Agent — D. GREY (G8TFL), 7 CEMETERY LOANING,

BERWICK-ON-TWEED. Tel. (0289) 307116

# COMMODORE 64/128 C16/+4

\* TURBO-LOG (64 128 C16 and PLUS 4) \*

Ultimate log check program with a search speed of over 2400 call signs per second, and auto entry of the date, time, band and frequency.

\* MICROCOM (64/128 C16 and PLUS 4) \*

cw/rtty transmit/receive program featuring saveable buffers, split screen, and cw id etc. Easy to build simple interface details.

\* S.A.E. FOR FULL DETAILS \*

MORAY MICRO COMPUTING (Dept. RCM)

Enzie Slackhead, Buckie, Moray AB5 2BR. Tel: 0542 7384



# AMATEUR RADIO AND ELECTRONICS

## HOBBY FAIR



## To be held at **Wembley** Conference Centre

**Saturday 5th & Sunday 6th, July, 1986.**

*EXCELLENT CATERING & BAR FACILITIES AVAILABLE ALL DAY.*

**The first two day fair to be held in the  
SOUTH OF ENGLAND.**

**A Major new event in the amateur radio  
calendar**

**There will be a host of special interest  
groups • Star Prize Raffles • Tombolas  
Bring & Buy and lots lots more.**

**Over 200 retail & manufacturers stands  
from all over BRITAIN.**

ADMISSIONS: ADULTS £2.00

O.A.P'S & CHILDREN £1.00

UNDER 5's FREE

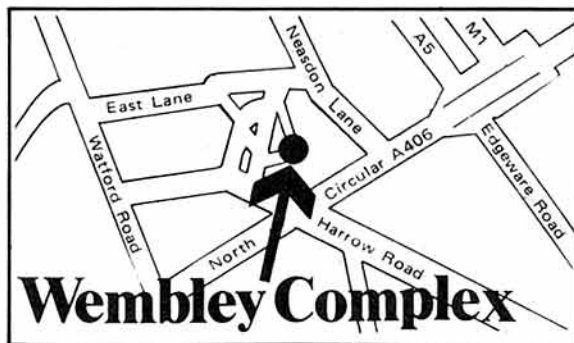
FAMILY TICKET £4.50

OPENING TIMES:

SATURDAY 10.30 - 6p.m.

SUNDAY 10a.m. - 4.30p.m.

Minutes from the M1 and M4 and  
well sign posted.



ORGANISERS: AMATEUR RADIO PROMOTIONS LTD., WOODTHORPE HOUSE, CLAPGATE LANE,  
BIRMINGHAM B32 3BU. Telephone: 021 - 421 5516.

# R. WITHERS COMMUNICATIONS LTD. 584 HAGLEY ROAD WEST, OLDBURY, QUINTON, B68 0BS BIRMINGHAM.

FINE PRODUCTS MODIFIED BY—THE RADIO  
COMMUNICATIONS  
SPECIALISTS



WE MAKE THE FINEST EVEN BETTER!

●●EX-STOCK●●



FRG-9600 MKII-RWC

PRICES HELD WHILST STOCKS  
LAST!



FT-757 GX-RWC

Please send large SAE for catalogues & price lists. Over 600 regular stock items.  
ICOM. YAESU. KENWOOD. FDK. Etc. Instant credit for licences and SWLs. Ask for  
our famous bi-weekly used list and RAYCOMS product catalogue or call us today for  
special offers.

## WE'VE DONE IT ANGUS!



We have extended and improved  
this fine receiver. Coverage now  
60-950 MHz. For a limited period  
only we offer the mod. "Free of  
Charge" at normal retail price,  
or existing owners send RX and  
£27.50 inc VAT (£31.67) and  
we'll fit and test it for you.

Again we improve a fine HF  
transceiver by fitting the FAST  
TUNE FACILITY. The mod is  
F.O.C at normal retail price, or  
send your rig carriage paid and  
payment of £34.50 and we'll fit it  
for you.

## REVCO RS2000E-RWC

Now you can join the scanning

£259

£225

Ex  
Stock!



AM-PM CLOCK.  
RX VERY  
SENSITIVE

RS 2000E Modified to give continuous  
tuning from 60-179 & 380-520MHz. AM-FM.  
Superb sensitivity. 12VDC + 240VAC. Built  
in P.S.U. or send your RX + £20. inc VAT  
and we'll fit for you. While stocks last!

## 10 MTR FM. RIGS + KITS.

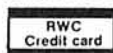


Still very popular.  
The FBX-RWC  
Sanyo LC7136-7  
mod board converts most CB  
radios @ £23.50 inc p+p LCL/DNT  
kit + instructions @ £14.95 inc. p+p.  
Modified radios from £79.00 + pp.  
CYBERNET 3000 e.g. (Ford 505) NEW!

ALL ITEMS EX-STOCK AT TIME OF GOING TO PRESS  
WE DO NOT ADVERTISE PRODUCTS THAT ARE NOT  
NORMAL STOCK ITEMS OR WE CANNOT SUPPLY.

Tel: 021 421 8201 (24hr answerphone)

Telex: 334303 G TXAGWM



APPROVED  
TRIO  
DEALER

## WARD ELECTRONICS

APPROVED  
TRIO  
DEALER

Choose from the  
Comprehensive Range  
of TRIO quality  
Communications Equipment



TS440S

HF Transceiver with Gen. Cov.  
Receiver.  
All modes included.

### ANTENNAS BY:

MET ★ 2m  
★ 70cm  
Tiger ★ 6m  
Hokushin  
Ralcomm  
★ G5RV  
★ W3DZZ  
★ Traps

Coax Cable  
Twin Feeder

Scarab  
Radio Software and Hardware  
CBM • BBC • AMSTRAD

G3LIV  
RTTY and SSTV

Dewsbury  
Pocom Codereaders  
Star Masterkeys

ICS • AMTOR  
Packet  
RTTY • CW

Daiwa Quality Products  
VHF Linears  
Power Supplies

R532 Synthesised  
Airband Scanner £209

AR2001 Scanner £435

**WARD ELECTRONICS**  
422 BROMFORD LANE, WARD END  
BIRMINGHAM B8 2RX Tel: 021-328 6070  
CLOSED MONDAY

• KEYS • ROTATORS • SWR METERS • PSUs • ANTENNAS • RSGB BOOKS •

### BINARY STAR TECHNOLOGY AMATEUR RADIO SOFTWARE

**SATELLITE TRACKING ON THE COMMODORE 64 AND 128** This superb program  
tracks all of the following: (May be altered by the user) RS 5, 7, 8, 9, 10; OSCAR 9, 10,  
11; NOAA 8, 9; JAS 1; SPACE SHUTTLE; MOON Available on disk only 12.95  
**CW TRANSCIBE ON THE CBM64 OR VIC-20** (8k +) Speed 5 to 50WPM (99WPM on  
CBM64). Full transcribe using a simple interface. Programmable stores for station details  
etc. Type-ahead on transmit. Cassette 5.95 Interface kit 14.95  
**MORSE TUTOR FOR THE BBC/CBM64/48k SPECTRUM** (Speed from 5 to about 30  
WPM)—Novice to beyond the test. Morse keyboard, random letters/figures, punctuation,  
plain language. SENDING TUTOR FEATURE: Decodes morse from a key plugged into a  
joystick port. EPROM (BBC ONLY) 11.95 Cassette 5.95  
**RTTY TRANSCIBE VERSION 3 (FOR THE 48k SPECTRUM ONLY)** Baud rates 45/50/  
75/110—simple interface. 8 memories (may be saved to tape) Split-screen, type-ahead  
keyboard buffer. Auto PTT control. Tuning indicator LED. Cassette 7.95 Microdrive 9.95  
Interface kit inc. edge-connector, pcb, relay and all other components 14.95

Ready-built add 5.00

SAE FOR MORE DETAILS OF SOFTWARE FOR BBC/ELECTRON/SPECTRUM/ZX-81/  
CBM-64/VIC-20. Prices inc post & packing.

Cheques payable to **BINARY STAR TECHNOLOGY**

Orders to: DEPT REC8, 6 Waveney Terrace, Haverhill, SUFFOLK CB9 8DZ



### HATELY ANTENNA TECHNOLOGY

1 Kenfield Place, Aberdeen AB1 7UW, Scotland

GM3HAT

DIPOLE OF DELIGHT

CAPLANE

SKYWARE®

**SKYWARE®** Recently accepted at the Trade Marks Registry after the customary long delay associated  
with the meticulous statutory procedures. The Law doesn't allow us to register **DIPOLE OF DELIGHT** but this  
is unnecessary since more and more amateurs know the term and accept that it describes antennas having  
excellent noise rejection and low VSWR.

**Peter Styles G4PXX** of Huntingdon writes after using a DD 7/14/21/28L since July 1984 "You are quite  
right in your assumption about less trouble with 'shack' general noise. I run two Type 444 Post Office  
teleprinters, one 45.5 and one 50 bauds, and also a much up-dated ZX 81 with EPROM's for casual  
listening on 20 metres. The audio signal is fed to my scope (a Heathkit SB 160) and the signal display is  
very sharp indeed. So sharp that I can clearly see lone reversals etc. with no problem!" "I had tried  
a number of aerial systems before buying my big DD from you in July 1984 but now find it so easy to use,  
particularly when tuning the segment of the 20 metres band that I operate, that I will not go back to any  
other system. I can tell you that the DD has my wholehearted support and I can, and often do, recommend  
it to many of my friends."

Details and Delivery Times send SAE. Prices as quoted in any ad since Oct 1985

Proprietor: **Maurice C Hately, MSc, MIEE, Chartered Electrical Engineer (GM3HAT)**

# GAREX THE SCANNER SPECIALISTS

## J.I.L. SX-200-N - THE SUPERIOR SCANNER

- \* The choice of the professionals
- \* AM + FM all bands
- \* Wide coverage: 26-88, 108-180, 380-514MHz
- \* 16 memories \* Positive action keyboard
- \* Proven reliability \* 12v DC & 230v AC
- \* S-meter & 96-108MHz converter available

£325

## REVCO RS-2000-E - THE VERSATILE SCANNER

- \* 70 memories \* AM + FM all bands
- \* Covers: 60-180MHz (no gap), 380-520MHz
- \* Search & store of active channels
- \* All the usual search & scan functions
- \* 12v DC & 230v AC operation
- \* Counts activity of selected channel

£259

S-meter now available

## J.I.L. SX-400 - THE PROFESSIONAL SCANNER

- \* Designed for easy plug-in expansion
- \* Basic coverage 26-520MHz (no gaps)
- \* AM + FM (manual, automatic or programmable)
- \* Computer interfacing for limitless memory, remote control & data logging
- \* Switchable channel spacing & I.F. bandwidths
- \* I.F. output terminals (10.7MHz & 455KHz)
- \* Specifications set by the professionals

£625

## ACCESSORIES FOR SX400:

- Regulated mains adaptor for SX-400 ..... £29.50
- SX232 (RS232 interface) Built-in "logging mode" ..... £224.25

## RF CONVERTERS (may also suit other receivers)

- RF8014 (800MHz-1.4GHz) I.F. output 300-500MHz..... £225.00
- RF5080 (500-800MHz) I.F. output 200-300MHz..... £225.00
- RF1030 (100KHz-30MHz) with CW & SSB..... £299.00
- ACB300 (Auto antenna control box)..... £115.00

## REGENCY HX2000 - THE HANDHELD SCANNER

- \* Covers: 60-90, 118-175, 406-496MHz
- \* AM + FM all bands \* 5, 10, 12 1/2 KHz steps
- \* All the usual scan & search functions
- \* 20 memories. Nicads, charger, flexiwhip antenna

£269

## REGENCY MX7000 - WIDE RANGE SCANNER

- \* 25-550MHz & 800MHz-1.3GHz
- \* WFM, NFM & AM all bands \* Superb sensitivity
- \* 20 memories \* 12 VDC operation

£399.00

## COMING SOON:

- REGENCY MX8000: spec. as MX7000, but new keyboard, LED S-meter & up/down step control knob

£POA

## \* REVCONC \*

A superb quality 16 element, all British made VHF/UHF broadband fixed station aerial from Revco. Ideally suited to all scanners and other VHF/UHF Receivers  
Covers 50-500MHz PRICE £29.95 inc

## ASK FOR OUR LIST OF SECONDHAND SCANNER BARGAINS

## \* RADAC \*

- NEW broadband VHF/UHF receiving AND transmitting antenna: Rx coverage 25-500MHz; Tx range according to model.
- MODEL 2045 100-480MHz, with options 25-100MHz..... £69.95
- MODEL 2046 Amateur bands: 28/50/70/145/430MHz..... £69.95

Other versions to customer specification.

- PRE-AMPLIFIERS \* REVCO PA2 in-line Masthead pre-amp, gain approx 18dB over the range 20-700MHz, with useful gain from 10-1,000MHz. Includes mains psu:..... £49.95

- \* MUTEK BBBA500u pre-amp 20-500MHz, 9dB gain with low noise factor (3dB max) for use at Rx input, requires 12VDC... £35.50

- DC/DC TRANSISTORISED INVERTERS 12V input, 400V 200mA rectified and fully smoothed output ..... £9.50

This unit is a chassis section cut from used R/T equipment, tidied, fully wired & tested. Free-standing but no luxuries like cabinet. 24v version - same price. SAE for details.

We have in stock a very large range of spare parts for PYE RADIOTELEPHONES. Models include Olympic, Westminster, Whitehall, Europa, Mascots and PF70 Series. Parts also available for Cambridge, Vanguard etc. etc. SAE FOR FREE EXTENSIVE LIST



## MAIN DISTRIBUTOR OF REVCO PRODUCTS

PRICES INCLUDE UK P&P and 15% VAT  
Goods normally despatched by return



Phone now for details of our interest free credit

**GAREX ELECTRONICS**  
7 NORVIC ROAD, MARSWORTH, TRING,  
HERTS, HP23 4LS

Phone 0296 668684. Callers by appointment only

# DATONG

## 17 EXAMPLES OF 'STATE OF THE ART DESIGN'

The following list shows most of our products. Please phone or write for a free catalogue and free data on product(s) which interest you. It takes only a phone call with your Access or Barclaycard number to speed any product on its way to you. Normally we despatch the same day. Or if you prefer you can obtain our "amateur" products from your local dealer.

All prices include delivery (UK only) and VAT at 15%. Independent reviews shown in brackets.

## AUDIO FILTERS

**SRB2** Automatic Woodpecker Blanker as seen on a well-known TV science programme. (SWM Sept. 83, Ham Radio Feb. 84, World Radio TV Handbook 84) **£86.25**

**ANF** Advanced stand-alone automatic whistle removal filter for SSB, plus CW filter. (SWM July 83, Ham Radio Oct. 83, R&EW July 83) **£67.85**

**FL2** SSB/CW/RTTY Variable audio filter. (Rad Com, Aug. 80) **£89.70**

**FL3** SSB/CW/RTTY audio filter (as in FL2) plus automatic whistle remover. **£129.37**

**FL2/A** Fully assembled PCB module with hardware and instructions to convert FL2 to FL3. **£39.67**

## RF SPEECH PROCESSORS

**ASP** The fully automatic definitive RF Speech Processor ("73" July 81) **£82.80** **RFC/M** Original Datong Speech Clipper Module **£29.90**

## MORSE EQUIPMENT

**D70** The "go-anywhere" Morse Tutor. The PP3 battery supplied should last you until the exam! **£56.35**

## RADIO DIRECTION FINDER

This system turns any NBFM rig into a radio direction finder which really works. It is currently in use from HF to UHF by Government Departments, professionals of all kinds, and amateur "Wally Hunters". (Rad. Com. Jan. 84, Citizens Band Jan. 83).

**DF + DFA2** Display unit with magmount antenna combiner. Just add four quarter wave whips and your receiver. (Antennas also available). **£373.75**

## MINIATURE ACTIVE RECEIVING ANTENNAS

You don't need unsightly rambling antennas for HF reception. Be discrete like the professionals and use a Datong active Antenna. Your neighbours will definitely approve. And so will you when you hear the DX!

**AD370** Complete active dipole receiving antenna. Covers 100kHz to 100 MHz. Weather-sealed for outdoor mounting. With mains power unit. (Rad. Com. June 82) **£69.00**

**AD270** Indoor version of AD370 **£51.75**

## RF CONVERTERS AND AMPLIFIERS

Other companies also make converters and preamps. When you choose check the "fine print" first. You can trust Datong to "do it right".

**VLF** Receiver 0 to 500kHz on your 28 to 28.5MHz receiver. **£34.90**

**PC1** Get "no-compromise" reception from 50kHz to 30MHz on your existing 2-metre all-mode. (Rad. Com. April 82) **£137.42**

**DC144/28** Receive 2-metres on your 28MHz receiver. Again it is the "fine print" performance which makes this the best of its type. (SWM Aug. 82, Rad. Com. April 82) **£39.67**

**RFA 5** to 200MHz low noise preamplifier. Why be bound to one band per preamp? (Ham Radio Nov. 83) **£36.00**

## SELECTIVE CALLING EQUIPMENT

**PTS** Sixty four channel tone squelch system for fitting to any FM or AM rig. Excellent performance on noisy channels. One needed per rig. **£45.99**

**CODECALL** 4096 channel Selcall for any FM, AM, or SSB rig. No internal connections needed. One needed per rig. (R&EW June 82) **£38.90**

## PROFESSIONAL PRODUCTS

**DATEST 2** Automatic in-circuit tester for transistors, FETs, SCRs and triacs. Complete with test probes **£51.75**

**DF2** Microprocessor controlled direction finding system. **POA**  
POA = PRICE ON APPLICATION

## DATONG ELECTRONICS LIMITED

### ORDER FORM

Your Name ..... Call Sign .....

Address ..... Tel .....

Town ..... Post Code .....

City ..... Enclose CHEQUE/POSTAL ORDER No. ....

Please send me the following ..... for £ .....

Model Qty Unit Price Unit Total

Please debit my VISA/ACCESS account.

Card No .....

**Total £**

Prices include Post, Packing and VAT (U.K.)

Despatch within 72 hours. Any delay will be notified to you immediately.

**SEND TO** - Dept H.R. Spence Mills, Mill Lane, Bramley, Leeds LS13 3HE, England Tel (0532) 552461



# QUARTZ CRYSTALS

**QuartzLab** MARKETING LTD  
P.O. Box 19 Erith Kent DA8 1LH

Telephone: 01-318 4419

24Hr Ansafone:

Dartford (0322) 330830

Telex: 8813271 GECOMS-G  
(Attention QUARTSLAB)

ALL PRICES ARE EX VAT PLEASE ADD 15%

## STOCK CRYSTALS

CRYSTALS FOR 2 METRES  
HC25 £2.15 FOR ONE CRYSTAL, £1.96 WHEN 2 OR MORE PURCHASED  
HC6 £2.15 FOR ONE CRYSTAL, £2.05 WHEN 2 OR MORE PURCHASED

### TX CRYSTALS

HC6/U 4 & 8MHz 30PF  
HC25/U 12MHz 30 & 40PF  
HC25/U 18MHz 25 & 20PF  
HC25

### RX CRYSTALS

44MHz SERIES RES  
44MHz SERIES RES  
14/15 MHz 20 & 30PF  
SCANNER XTLS (NOT SR9)

4 METRE CRYSTALS FOR 70.26 IN HC6/U AT £2.40 each  
TX 8.78250 RX 29.78000  
%70CM CRYSTALS £5.00/pr or £2.50 each  
For Pse PFI PFI2 & PFI70 series Wood & Douglas and FOX MULTI U11  
SUB (433.2) SU20 R80 R82 R84 R85 R86 R87 R88 R89 R90 R91 R92 R93 R94 R95  
ALSO FOR MULTI U11 ONLY SU16 SU18  
CONVERTER CRYSTALS IN CH18/U AT £2.85 each  
22.000, 38.666, 42.000, 86.000, 101.000, 101.500, 105.666, 116.000  
FREQUENCY STANDARDS £2.75 each  
HC6/U 1000kHz 3.50MHz 5.00MHz 10.00MHz 10.700MHz  
HC18/U 1000kHz 7.00MHz 10.70MHz 48.00MHz 100.00MHz  
Also HC6/U 455kHz £3.25 each  
TONEBURST, I.F. & MPU CRYSTALS IN HC18 £2.25 each  
7.168MHz (For 1750 Hz Tone), 10.245 (for 10.7 I.F.)  
3.2768 4.000 5.0688 10.2400 14.3180 15.00000  
YAESU CRYSTALS for FT101's FT901 & etc £4.00 each  
Many available ex stock (A list is available on request please send S.A.E.)

Full list available on request, please send SAE

## MADE TO ORDER CRYSTALS

FUNDAMENTALS	PRICE	OVERTONES	PRICE
FREQUENCY RANGE		FREQUENCY RANGE	
5 TO 50kHz	£21.00	3rd OVT 21.00 TO 65.00MHz	£4.56
50 TO 150kHz	£11.00	5th OVT 60.00 TO 110.00MHz	£5.10
150 TO 500kHz	£7.80	5th OVT 110.00 TO 125.00MHz	£7.40
160 TO 599kHz	£11.90	7th OVT 125.00 TO 175.00MHz	£10.00
1 TO 1.5MHz	£10.75		
1.5 TO 2.0 MHz	£5.10	DELIVERY	
2.0 TO 5.0MHz	£4.75	2.0 TO 175.0MHz 2 to 3 weeks	
6 TO 21MHz	£4.55	5 TO 999.9kHz 6 to 8 weeks	
21 TO 25MHz	£6.50	1 TO 1.499MHz 3 to 4 weeks	

Unless otherwise requested fundamentals will be supplied for 30pf load capacitance and overtones for series resonant operation.

HOLDERS:—PLEASE SPECIFY WHEN ORDERING—also HC25/U supplied for XTLS above 3MHz

HC13/U 6-200kHz HC6/U & HC33/U 170kHz-175MHz HC18/U & HC25/U 2-175MHz  
DISCOUNTS: Price on application for 10 + units to same frequency/spec. or bulk purchases of mixed frequencies. We supply FREE xtals for use in UK repeaters.

COMMERCIAL CRYSTALS: available on fast delivery and at competitive prices.

Please send for list starting interests

EMERGENCY SERVICE for XTALS 1 to 125MHz. Add the surcharge for each XTAL. Days refer to working days. 4 days + £12. 6 days + £7. 8 days + £5. 13 days + £3. CRYSTALS SOCKETS HC25 £2.20 ea. HC6 £2.25 ea. MINIMUM ORDER CHARGE £1.50 unless ordered with crystals

TERMS: Cash with order post inc. to UK & Ireland. Cheques & PO's to QSL LTD

A stamped addressed envelope with ALL enquiries please.

## ALYNTRONICS

AUTHORISED  
**ICOM**  
DEALER



IC 751 — The latest H.F. transceiver from Icom



FT 757GX — the complete H.F. transceiver — with general coverage on receive!



IC 271 — Icom's v.h.f. multimode base station



FT 726R — Yaesu's v.h.f. & u.h.f. multimode base station



Approved stockists for all of the following companies:  
ICOM — YAESU — K.D.K. — TONNA — DATONG — MICROWAVE  
MODULES — WELTZ — SHURE — HANSEN — KENPRO — C.D.E.  
— DAIWA — TONO — HY-GAIN — A.E.A. — A.K.D. — T.A.L. —  
I.C.S. — TASCO — G. WHIP — HI-MOUND — S.M.C. ANTENNAS  
— WESTERN ANTENNAS

Always in stock, a large selection of plugs and sockets. Antenna mounting hardware  
— R.F. cables (H-100, URM 43, 67 and 76, 300! Ribbon) plus 5, 6 and 8 core rotator cable

**129 Chillingham Road, Newcastle-upon-Tyne**  
Tel: 091-276 1002  
Mail Orders Welcome  
Open Tues-Fri 10 am to 6 pm  
Saturday 10 am to 5 pm



## QUARTZ CRYSTALS IN 24 HOURS

ANY FREQUENCY 2 TO 50 MHz FOR £6.00 inc (C.W.O. only)

### STILL THE FASTEST SERVICE EVER!

Orders received before 10 am are completed and posted the **SAME DAY**. (State frequency and holder style). Close-tolerance crystals 1 to 110 MHz also available on 2/3 week delivery or **5 WORKING DAYS** on emergency. Our sales office welcomes your telephoned enquiries.

**McKnight Crystal Company Limited**  
Hardley Industrial Estate, Hythe, Southampton SO4 6ZY  
Telephone: 0703 848961 Telex: 47506 Crystl G.

## AMATEUR ELECTRONICS UK

G6XBH  
G1RAS  
G8UUS

**R.A.S. (Nottingham)**  
Radio Amateur Supplies  
Tel: 0602 280267



### Visit your Local Emporium

Large selection of New/Used Equipment on Show

#### AGENTS FOR:

F.D.K.  
AZDEN  
ICOM  
YAESU  
VODAFONE &  
CELLNET

#### ACCESSORIES:

Welz Range  
Microwave Modules  
Adonis Mics  
Mutek Pre-Amps  
Barenco Mast Supports

DRAE products  
BNOS Linears and  
PSUs

**AERIALS:** Tonna, Halbar, New Diamond Range of Mobile Whips  
Jaybeam and Tiger Antennas

JUST GIVE US A RING

Monday: CLOSED Tuesday-Saturday: 10am to 5pm

**3 Farndon Green, Wollaton Park, Nottingham**  
Off Ring Rd, between A52 (Derby Road) & A609 (Ilkeston Road)

## LOSING DX?

**ANTENNA FAULT?** Not getting out? Poor reports? Check FAST with an **Antenna Noise Bridge**, MEASURE resonance 1-160MHz and radiation resistance 2-1000 ohms, SIMPLY adjust the bridge for a null, no 10 second limit nor confusion with harmonics, ALSO use for phasing lines, RF resistance and hence Q of loading coils, preamplifier matching or use as a noise generator, **£22.40**. Get answers, MORE DX.

**LINEAR OKAY?** Check with a **Two Tone Oscillator, £17.90**.

Each **fun-to-build kit** (ready-made to order) includes **ALL parts**, case, printed circuit, pre-wound coils, instructions, postage, etc (Europe same, Giro 21-923-4000) and list of other kits.

### CAMBRIDGE KITS

45 (RF) Old School Lane, Milton, Cambridge

## SSTV - RTTY - AMTOR - CW

The **RX-4** Multimode receive program now features  
SSTV 8, 16, 32 sec frames. Keyboard grey scale adjustment.  
RTTY 4 baud rates, any shift.

RTTY and AMTOR selectable unshift-on-space. Tones directly displayed on a tuning scale for really easy and accurate tuning.

CW selectable software filters and controllable autotrack to 250 wpm.

All text and pictures can be stored, recalled, saved and printed.

Spectrum needs no hardware. **BBC-B, CBM64, VIC20** use the same interface as our RTTY and CW transceiver program, see below.

Tape £25, disc £27 (BBC: state 40 or 80 track).

### RTTY and CW TRANSCIVE

Split screen, type ahead, 26 large saveable memories, auto CR/LF, CW to 250 wpm, QSO review and more.

For **BBC-B, CBM64, VIC20**. Tape £20, disc £22. Interface kit £5, ready-made with all connections £20 (state rig if transceiver).

Both these programs can use a T.U. on CW and RTTY instead.

Great Morse Tutor, Logbook, Locator, RAE Maths programs, too.

More detail about everything in previous adverts.



### technical software

Fron, Upper Llandwrog, Caernarfon, Gwynedd LL54 7RF. Tel 0286 881886



# M<sub>M</sub>M A COOL 100

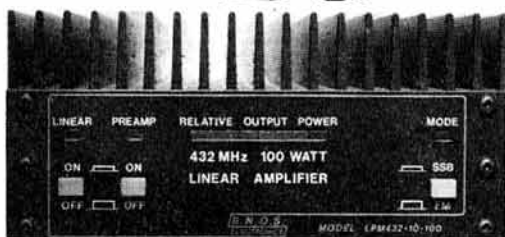
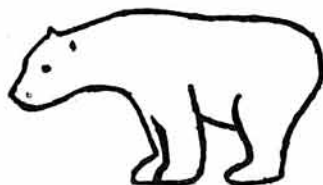
For some time now, a large number of satisfied BNOS customers have been asking for a Linear Amplifier that gives a true 100 Watts on 70cms. 'Just like my two metre one' they say.

Now BNOS design engineers have developed a 100 Watt RMS Linear Amplifier that is more than worthy of its BNOS label.

These are now 3W, 10W and 25W input versions available in the form that has made their predecessors so popular. The LPM incorporates the usual BNOS Bargraph, Powermeter, the switchable GaAsFET low-noise pre-amp and our unique overdrive protection circuit.

The pre-amplifier really pulls in the DX whilst the highly efficient final stage ensures that you are one of the biggest signals around—continuously.

In fact, the only thing it will not do is heat your shack!



L432-3-100	£295.00	LPM432-3-100	£335.00
L432-10-100	£295.00	LPM432-10-100	£335.00
L432-25-100	£255.00	LPM432-25-100	£295.00
L432-1-50	£195.00	LPM432-1-50	£235.00
L432-3-50	£195.00	LPM432-3-50	£235.00
L432-10-50	£155.00	LPM432-10-50	£195.00

<b>FREQUENCY RANGE</b>	430 to 440 MHz
<b>OUTPUT POWER</b>	100W RMS $\pm 0.5$ dB
<b>INPUT POWER*</b>	3W, 10W & 25W
<b>POWER REQUIREMENTS</b>	13.8V, 20A
<b>PRE-AMP GAIN</b>	Typically 12dB
<b>PRE-AMP NOISE FACTOR</b>	Better than 1 dB
*DEPENDENT ON MODEL	

**B.N.O.S**  
ELECTRONICS

Please note new address  
and telephone number

B.N.O.S. ELECTRONICS LTD, DEPT RC, MILL LANE, STEBBING, DUNMOW, ESSEX CM6 3SL. TEL (0371 86) 681



Brenda

**A.R.E.**

**Communications Ltd.**

6 Royal Parade, Hanger Lane, Ealing, London  
W5A 1ET, England Telephone: 01-997 4476  
Telex: 946240 (CW EASY G) Ref: 19005275



Bernie

For all types of communication equipment  
for professional purposes

PMR • Cellular Communication Receivers • Scanning Receivers  
HF Transceivers • UHF & VHF Equipment • RTTY Terminal Units

Tait • Philips • Maxon • Icom • Yaesu  
Motorola • National Panasonic • Mobira

Also, we buy for CASH all types of second hand  
communication equipment

**Phone: 01-997 4476**

## The range

TVHF 230c	Very high performance 2m to all 9hf band transverter
TVVF 50c	Very high performance 2m to 6m transverter
TVVF 50a	Very high performance 10m to 6m transverter
TVVF 144a	Ultra high performance 10m to 2m transverter
SLNA 50s	Rf switched 6m preamplifier
SLNA 144s	Rf switched 2m preamplifier
SLNA 145sb	Optimised preamplifier for the FT290R
GMFA 144e	Ultra high performance 144MHz environmentally cased masthead preamplifier
GLNA 432e	Masthead mounting 430-440MHz high performance GaAsfet preamplifier 0.9dB typical noise figure 250W through power. Supplied with ATCS 500 sequencer controller
GLNA 433e	Masthead mounting 430-440MHz high performance GaAsfet preamplifier, Rf switching, 50W through power, 1dB noise figure
BLNA 432e	Sub-miniature 70cm preamplifier, 1.3dB typical noise figure. Requires external filtering
BBBA 500u	High dynamic range 20-500MHz preamplifier. Ideal for scanners

£

299.90
209.90
249.90
249.90
49.90
41.95
31.90
129.95
159.90
89.90
14.90
34.90

RPCB 144ub
RPCB 251ub
RPCB 271ub
LBPF 50u
LBPF 144u
LBPF 432u
XBPF 700ub
ATCS 500
VFAT 206

Complete replacement front-end for FT221 and FT225
Complete replacement front-end for IC211 and IC251
Complete replacement front-end for IC271 (e and h)
50-54MHz two pole two zero bandpass filter 100W thro' power
Low-loss 144-148MHz two-pole bandpass filter 0.3dB typical insertion loss. 120W through power
Low-loss 430-440MHz two-pole bandpass filter 0.3dB insertion loss. 100W through power
Microstripline bandpass tvf filter
Sequencer controller
25W 6dB attenuator for use with 2m i.f. transverters

£

84.90
89.90
94.90
29.90
24.90
24.90
4.40
34.90
22.40

### Carriage/postage rates

GMFA 144e, GLNA 432e, GLNA 433e	3.00
All transverters	5.65
All other products above	1.85

ALL PRICES INCLUDE VAT AT 15%

E&OE

# muTek limited —the rf technology company

Dept. RC, Bradworthy, Holsworthy, Devon EX22 7TU (040 924) 543



# CUE DEE

## THE PROFESSIONAL ANTENNA AT AN AMATEUR PRICE!

## 5 YEAR GUARANTEE

## HF-VHF-UHF ANTENNAS TOWERS AND ACCESSORIES

Dealer inquiries welcome

Distribution Europe

**Classic International Communications**

Postbus 1020 6040 KA Roermond Netherlands

### COPPERFOIL TAPE

Copperfoil Tape is thin pure copper tape backed by a special hi-tack acrylic adhesive formulated to withstand high temperatures, making it ideal for soldered connections. Suitable for many low voltage projects, proto-type circuits, printed circuit repairs etc. Available in 3 widths on 33 metre rolls. 4mm @ £2.95, 6mm @ £3.95 and 8mm @ £4.25. Also Copperfoil Sheet useful for component shielding in 305mm squares @ £2.50.

**COPPERFOIL ENTERPRISES**

Post and packing on all orders 75p.  
141 LYNTHURST DRIVE  
HORNCHURCH, ESSEX RM11 1JP  
Telephone: HORNCHURCH 56697

## AH ELECTRONICS (G8AQN)

151a BILTON ROAD, RUGBY CV22 7AS  
Tel: Rugby (0788) 76473

**ADVANCE E2 SIGNAL GENERATORS** 100KHz to 100MHz v/good cond £40.00. **TF144H/4 MARCONI** signal generators 10KHz to 72MHz £85.00, a few need repair £35.00 with manuals. **R&S POLYSCOPE** swob 2, sweep generator up to 1200MHz ex cond working but one channel noisy, with handbook (sensible offers). **PMR ANTENNA'S**—7 ele Yagi 145-155MHz 75ohm (Jaybeam) unused £10.00. **UHF 460MHz** 11 ele Yagi unused £12.00. **86MHz** sleeve dipoles, unused £15.00. Mobile 1/2 wave antenna's cut for 81MHz, can be cut for up to 170MHz £2.50 ea. *Please note all above items must be collected by arrangement.*

145-155MHz 75ohm (Jaybeam) unused £10.00. **UHF 460MHz** 11 ele Yagi unused £12.00. **86MHz** sleeve dipoles, unused £15.00. Mobile 1/2 wave antenna's cut for 81MHz, can be cut for up to 170MHz £2.50 ea.

*Please note all above items must be collected by arrangement.*

**SERVICE MANUALS**—for TEKTRONIX 'SCOPES and plug-ins, plus others send for list. **PFI POCKETPHONE** receivers untested with circuit £3.50. **BOLT-IN FEEDTHROUGH CAPS** 1000pf 500v 2ba thread 50p each, 10 for £4.50. **SOLDER-IN FEEDTHROUGH CAPS** 1000pf 500v 3mm dia 10 for 50p. **SOLDER-IN FEEDTHROUGH INSULATORS** 4mm dia 100 for 75p. **OXLEY PTFE** feedthrough ins 3-5mm dia 6p each, 10 for 50p. 240pf and 500pf bolt-on anode blocking caps 5Kv wkg ideal VHF/UHF valve linear's, £2.50 ea. 'N' plugs 50 ohm right-angle type ex-equip good cond £1.50. **MAGNETIC DEVICES** type 354 aerial 12v relays OK up to 200MHz @ 75 Watts s.p.c.o. £1.75 ea, 2 for £3.00. 2-25pf 10mm dia film trimmers (special offer) 10p ea, 50 for £2.50, 100 for £4.00. Mullard 1-10pf film trimmer 7mm sq 15p ea, 10-80pf compression trimmer P.C. mount OK RF up to 50 Watts 25p. 10-7MHz **SSB CRYSTAL FILTERS** (less carrier xtals) £12.00. 10-7MHz SSB crystal filter LSB only, £6.00 both with data sheet. 2-3v 25Ah **CYCLON BATTERIES** unused list price over £18.00 our price only £5.00 ea, buy six to make nice 13-8v pack £25.00 post up to 2 off plus £2.00 over 2 post paid. **CERAMIC TRIMMERS** 10mm dia 10-40pf tag ends sp offer 10p ea, 15 for £1.00. 2GHz **TUNNEL DIODES** SF04-163 £1.00 ea, 4 for £3.00. 3SK97 gasfet £2.20, 3SK81 mosfet 85p, BFR84 mosfet 50p, RF POWER—2N5070 24v 25 Watt SSB 30MHz. £5.00. PT4236A 1 Watt 175MHz 12v TO39 case 75p. PT4555 25 Watt @ 144MHz 6db gain 12v £6.00. PT4236C 35 Watt 88MHz 12v 7db gain OK 50MHz £6.00. PT4577 UHF power approx 2 Watt 70cms no info so £1.50 ea. PT 4236B 11 Watt 88MHz 10db gain 12v £4.00. FX1115 beads 10 for 20p.

Many bargains for callers to our shop including loads of test equipment PCBs mixed bags of compts etc plus a complete range of YAESU MUSEN products. Opening times 9.30am to 5.30pm lunch 1.00 to 2.30pm.

# UPPINGTON

COMMUNICATION ELECTRONICS  
G2BAR HAM BAND AERIALS

Gamma Matched Yagi Arrays

	2EI	3EI	4EI	6EI
6M	£18.50	£ 22.00	£25.50	£42.00
10M	£56.00	£ 66.70		
15M	£68.00	£ 80.50		
20M	£88.50	£103.50		

These Antennas are made in BRISTOL.  
Please send for leaflet.

AMATEUR ELECTRONICS UK

12/14 PENNYWELL ROAD, BRISTOL BS5 0TJ

Telephone: Bristol (0272) 557732/558578



# ICS

## At last! AX.25 Packet Radio at an Affordable Price



PK-64



PK-80

From A.E.A. Inc. in America comes an exciting breakthrough in Packet Radio price and flexibility! The PK-80 has an RS232 interface and inbuilt packet radio modem. It is fully equivalent to the TAPR TNC2 Packet Controller and implements the AX.25 2.0 protocol. It includes hardware HDLC for full duplex operation and comes completely wired and tested and guaranteed for one year. The PK-64 operates with Commodore 64, 128 or SX64 computers and gives AX.25 version 2.0 Packet Radio, AMTOR, RTTY, CW and ASCII transceiver all in one package.

Exceptionally user friendly, this hardware/software package gives split screen operation and endless operator help features. This has got to be the most comprehensive amateur radio software package ever written! The V.H.F. Packet Radio modem comes as standard; the H.F. modem and tuning indicator is a user fitable option.

PK-80 £239 inc. VAT p & p £4.00  
PK-64 £239 inc. VAT p & p £2.50  
HFM-64 modem £100 inc. VAT p & p £1.00

# ICS

ICS Electronics Ltd.  
PO Box 2  
Arundel  
West Sussex BN18 0NX  
Telephone: 024 365 590



Please send SAE for further details  
12 months parts +labour warranty  
Dealers throughout UK  
Prices may vary with  
exchange rate  
Callers by appointment

## Bredhurst electronics

BREDHURST ELECTRONICS LTD  
HIGH ST, HANDCROSS, W. SX.  
(0444) 400786 RH17 6BW



MAIL ORDER  
AND RETAIL

**SITUATED AT SOUTHERN END OF M23—EASY ACCESS TO M25 AND SOUTH LONDON**

**POWER SUPPLIES, LINEARS, PREAMPS, ROTATORS, MORSE EQUIPMENT, DUMMY LOADS, SPEECH PROCESSOR**

HF RECEIVERS			(C&P)	2M TRANSCEIVERS			(P&P)	STATION ACCESSORIES			(C&P)
Icom	IC R71	£789.00		Trio	TH 21E Handheld	£189.00		Drae VHF wavemeter	£27.50	(1.50)	
Trio	R2000	£518.00		Trio	TR 2600E Handheld	£299.00		AKD VHF wavemeter	£24.95	(1.50)	
Trio	VC10 VHF Converter	£139.00	(2.00)	Trio	TM 201A 25W FM mobile	£296.00		Yaesu FF501DX low pass filter 30MHz 1kW	£33.00	(2.00)	
Yaesu	FRG 8800	£575.00		Trio	TR 9130 25W Multimode	£544.00		Trio LF 30A low pass filter 30MHz 1kW	£27.70	(2.00)	
Yaesu	FRV 8800 VHF Converter	£90.00	(2.00)	Trio	TS 711E Base station	£770.00		Adonis AM 303G desk mic with pre-amp	£41.00	(2.00)	
				Trio	TW 4000A 2M/70cm FM mobile	£398.00		Adonis AM 503G desk mic with compression	£53.95	(2.00)	
				Yaesu	FT 290R Portable multimode	£369.00		SMC Polar-phaser II	£49.00	(2.50)	
HF TRANSCEIVERS				Yaesu	FT 203R + FNB3 Handheld	£225.00					
Trio	TS 940S	£1795.00		Yaesu	FT 209RH + FNB3 Handheld	£275.00					
Trio	TS 930S	£1395.00		Yaesu	FT 270RH 45W FM mobile	£399.00					
Trio	TS 430S	£750.00		Yaesu	FT 2700R 2M/70cm FM mobile	£499.00					
Trio	TS 440S	£950.00		Yaesu	FT 726R Base station (70cm optional)	£899.00					
Trio	TS 830S	£898.00		Icom	IC 2E Handheld	£199.00					
Trio	TS 530SP	£779.00		Icom	IC 02E Handheld	£299.00					
Yaesu	FT 980	£1759.00		Icom	IC 27C 25W mobile	£399.00					
Yaesu	FT 757GX	£879.00		Icom	IC 271E Base station	£779.00					
Icom	IC 745	£989.00		Icom	IC 3200E 2M/70cm FM mobile	£529.00					
Icom	IC 735	£899.00									
VHF SCANNING RECEIVERS				70cm TRANSCEIVERS							
Icom	IC R7000	£899.00		Trio	TH 41E Handheld	£220.00					
Yaesu	FRG 9600	£465.00		Trio	TR 3600E Handheld	£324.00					
AOR	AR 2002	£435.00		Trio	TM 401A 12W mobile	£350.00					
Signal	R532 "Airband"	£209.00		Trio	TS 811E Base station	£895.00					
				Yaesu	FT 703R + FNB3 Handheld	£255.00					
				Yaesu	FT 709R + FNB3 Handheld	£285.00					
				Yaesu	70cm module for FT 726R	£309.00					
				Icom	IC 4E Handheld	£285.00					
				Icom	IC 04E Handheld	£299.00					
				Icom	IC 471E Base station	£889.00					
VHF HANDHELD RECEIVERS				OTHER BANDS							
FDK	ATC 720 "Airband"	£189.00	(2.50)	Yaesu	FT 690R 6M portable	£289.00					
FDK	RX 40 141-179 MHz FM	£159.00	(2.00)	Yaesu	6M module for FT 726R	£228.00					
Signal	R537S "Airband"	£64.89	(2.00)	Yaesu	21/24/28 HF module for FT726R	£249.00					
				Icom	IC 1271E 1.2 GHz	£1099.00					
ANTENNA TUNER UNITS											
Yaesu	FRT 7700 Short wave listening	£53.50	(2.00)								
Yaesu	FC 757AT	£318.00									
Trio	AT 230	£170.00	(2.50)								
Trio	AT 250 auto	£314.00									
Daiva	CNW 518 High power	£258.00									

**BASE ANTENNAS, MOBILE ANTENNAS, ACTIVE ANTENNAS TRANSVERTERS, CONVERTERS, SPEAKERS, MICROPHONES**

**GOODS NORMALLY DESPATCHED WITHIN 24 HRS. — PRICES CORRECT AT TIME OF GOING TO PRESS — E&OE**



# USED AMATEUR EQUIPMENT?

**I Buy, Sell & Exchange!**

**SELLING?** WE HAVE VARIOUS METHODS OF ASSISTING YOU TO SELL YOUR USED EQUIPMENT!!

- We Will buy it from you! FOR CASH! Our offers are rarely beaten!! Phone Dave, G4TNY now, and see for yourself!!
- If our cash offer cannot tempt you, ask for full details about our NEW SELLING SERVICE!! We will undertake to sell your gear at an agreed market value, on a commission basis!! Are you prepared to stand by the condition and integrity of your used gear? Want to sell as quickly as possible, at the best price? PHONE US!!
- Whether you sell to us, or via our commission sales service, our computer generated lists of used gear are available free on receipt of an SAE, to any enquirer, that means today! NO MORE WAITING MONTHS FOR THE SMALL ADS TO APPEAR!!

**BUYING?** DUE TO THE OFFERS YOU SEE ABOVE, WE HAVE THE BEST SELECTION OF TOP QUALITY USED EQUIPMENT AVAILABLE, AT THE MOST COMPETITIVE PRICES!!

All our used equipment is fully tested by ourselves, whether sold by us, or on behalf of a fellow amateur, and warranted on the same basis. No matter what your requirement from the largest item to the smallest in Amateur Radio, you can save money by buying from our stock of TOP QUALITY Used Equipment. Phone us now!

Phone G4TNY, anytime between 9am and 7pm, Monday to Saturday, or send SAE for lists! Personal callers by appointment only, Please.

**PHONE (040 24) 57722**

MAIL ORDER

PART EXCHANGE

**G4TNY AMATEUR  
RADIO**

132, Albany Road, Hornchurch, Essex RM12 4AQ

## CRYSTAL PRICE REDUCTIONS!

### FREQUENCY STANDARD:

HIGH STAB. 1.0MHz £8.03; 4.0MHz, 5.0MHz, 10.0MHz £1.69  
NORMAL STAB. 1.0MHz £3.46; 2.0MHz, 3.0MHz £1.69; 4.0MHz to 20.0MHz £0.69  
MARKERS: 100KHz £5.43; 200KHz, 455KHz £3.46; 10.7MHz £0.69; 48.0MHz £0.83  
CONVERTER: 10.24MHz, 10.245MHz, 38.666MHz £0.60; 116.0MHz £2.31; 22.0MHz £2.80  
MPU & TONEBURST: All common frequencies in stock from £0.69 to £3.46  
MISCELLANEOUS: 3.57954MHz, 3.6864MHz, 8.9985MHz, 9.0015MHz, 10.13764MHz, 14.218MHz, 14.31818MHz £0.69

Pre-aged commercial spec. crystals made to order in 3-4 weeks from £5.55

BATC spec. crystals made to order  
Single and multiway crystal sockets from £0.05  
£5.00 minimum order charge, all prices ex VAT inc p&p  
See next months advertisement for our comprehensive range of filters

IQD Limited, North Street, Crewkerne, Somerset TA18 7AR England  
Telephone: (0450) 74433 Telex: 46283

FREQUENCY CONTROL

IQD

## CLASSIFIED ADVERTISEMENTS

Classified advertisements 35p per word (VAT included), minimum £5.60  
Box Number £2.00 extra to wordage or minimum.

Semi-display 1/8 page 2 1/4" x 3 1/2" (57 x 91mm) £87.00  
3/32 page 1 1/2" x 3 1/2" (42 x 91mm) £67.00 } + 15% VAT  
1/16 page 1" x 3 1/2" (26 x 91mm) £47.00

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: M. J. HAWKINS G3ZNI, RSGB Advertisements,  
PO Box 599, Cobham, Surrey KT11 2QE.

Cheques should be made payable to RSGB.

Members' Ads must be sent to "Members' Ads," RSGB Hq.

## FOR SALE

QSL CARDS printed to your own specification on white or coloured gloss card. Send S.A.E. for sample pack to: The Caswell Press, 11 Barons Way, Woodhatch, Reigate, Surrey.

AMIDON TOROIDAL CORES, ferrite rings for TVI filters, ferrite beads. Send SAE for data and prices. SMC (TMP Electronics), Unit 27, Pinfold Works, Pinfold Lane, Buckley, Clwyd.

QSL & LISTENER CARDS. Quality printing on coloured and white gloss card at competitive prices. SAE for samples. S. M. Tatham, "Woodside", Orchard Way, Fontwell, Arundel, West Sussex.

G5RV TYPE AERIALS. Half-size £13.50, Full-size £15.50. New Hard Drawn Copper Aerial Wire, 140ft 14swg £7.90; 50 metres 16 swg £6.90. Enamelled soft copper wire 10 metres 12swg £3.50; 50 metres PVC covered Aerial wire £4.20. Ceramic Egg insulators, 40p. Guy rope, 4mm Polypropylene, 50 metres £3.95; 4mm Nylon 50 metres £6.90. 1Kw 1:1 Baluns £13.00. All items post paid. S.M. Tatham G3RSY, 1, Orchard Way, Fontwell, Arundel, West Sussex.

PERSONALISED QSL CARDS. 1000 £15.00; 5000 £50.00. 5000 gloss in two colours £70.00. Send SAE for samples. [DIY QSL's/SWL's—state which!!—100 mixed designs/colours, £2.50. C.W.O.] Q/Cards, 89 Derwent Street, Blackhill, Consett DH8 8LT.

50m (165ft) AERIAL WIRE. Strong PVC covered copper only, £4.40 inc postage. W. H. Westlake, Clawton, Holsworthy, Devon.

QSL CARDS. Gloss or tinted cards. SAE for samples to Twrog Press, Penybont, Gellidan, Blaenau Ffestiniog, Gwynedd.

ALL THE FAMOUS MOSLEY ANTENNAE. TA33Jr, Mustang, Atlas, V-3Jr, TD-3Jr Beams, Verticals, etc. Also spares available only direct from us. Send £1 for our Handbook showing all Antennae. Mosley Electronics, 196 Norwich Road, New Costessey, Norwich NR5 0EX.

G4TJB QSL CARDS. Personal and standard designs. SAE samples. 100 matt colour DIY £2.50, gloss £3.50. Logbooks £2.20 (mobile £1.20). Buro envelopes £1.00 (20), letterheads A5 £7.00 (100), A4 £11.00. G. C. Patterson, 10 Rowton Drive, Sulton Coldfield, Birmingham B74 2AG.

WAVEGUIDE, FLANGES & DISHES. All standard sizes and alloys (new material only) from stock. Special sizes to order. Call Earth Stations, 01-228 7876, 22 Howie Street, London SW11 4AR.

QSL CARDS. Try me for quality and price. SAE for samples. A. W. Bailey (G3YNI), Brean Down Press, Wick Lane, Lymington, Somerset.

HIGH CLASS QSL CARDS. Keen prices. SAE for samples and prices to J. S. Coates, Dept RC, 57 Worrall Street, Morley, Leeds LS27 0PJ.

G2VF D.I.Y. LOOP ANTENNAS Long, Medium or Short Wave. SAE details. Rylands, 39 Parkside Avenue, Southampton SO1 9AF.

"RAYNET" YELLOW REFLECTIVE TABARDS with "RAYNET" front and rear similar to Police and Ambulance, etc. Also "RAYNET CONTROLLER", 2 sizes. Medium, £8.00; Large, £8.50 inc p&p. Details Mike Watson G8CPH. Ipswich (0473) 831448.

QSL CARDS from £10.00 per 1000. Logbooks £2.30. Samples 20p. Springwood Print, Springfield Avenue, Honley, Huddersfield.

TRAP DIPOLES, TRAPS for beams, verticals or wire aerials. Baluns. Data sheets 24p SAE. Aerial guide £1. (039 86) 215. G2DYM, Uplowman, Devon EX16 7PH.

4CX/2C39A BERYLLIUM COPPER ANODE fingering, £4.00 per ft. CWO to V. Gordon, 44 Valon Road, Arborfield, Reading, Berks RG2 9LT. Tel. (0734) 760179.

G.W.M. RADIO LTD. 40/42 Portland Road, Worthing, Sussex. Tel. (0903) 34897. Radio Telephone Pye W15U UHF Westminster. Sets only, £35.00; or with control gear, £50.00. Ideal to mod to 70cm. Pye BC5 charger for one pair PF.1's, £12.00. Pye BC4 charger to take 12 red/yellow batts. for PF.1 etc, £12.00. Prices include p&p.

SERVICE MANUALS. Amateur, Television, Audio, Video, Vintage, Test, etc. SAE enquiries: Mauritron (RC), 8 Cherrytree Road, Chinnor, Oxon. OX9 4QY.

A.K.D. TVI FILTERS—with 55dB rejection notch tuned to the Ham band of your choice. As supplied to the DTI. £6.95 incl. Post/Packing. Telecomms, 189 London Road, North End, Portsmouth PO2 9AE. (0705) 662145.

DX QSL CARDS Display your best cards in our clear plastic hanging wallets. Holds 20 large size cards. Pack of 3, £2.40. Viola Plastics, 36 Croft Road, Hastings, Sussex.

QUICK FIT CLIP-ON feeder spreaders. 3" pack of 25, £5.00. 6" pack of 20, £8.00. Ideal also for folded wire dipoles. Viola Plastics, 36 Croft Road, Hastings, Sussex.

QSL CARDS printed at competitive prices. SAE for details. Delta Cards, 62 Newark Lane, Ripley, Surrey.

ICOM HANDHELD OWNERS MRZ Desk Top base station PSU, incorporating charging system for BP3 battery packs. Designed for ICOM Portables—2E/4E/02E/04E/H2/H6. Features—Overvolts protection—Overcurrent shutdown.

Remember MRZ for Icom; Yaesu equipment. MRZ Communications Ltd, 248 Uttoxeter Road, Longton, Stoke on Trent, ST3 5QL. (0782) 619658 (24Hrs)

G3LL's JUNE SALE. Original NEC valves FT101E etc. Full set (£47) £32 p.p. Set GE6146B + NEC12BY7A FT1012D etc. (£38) £31 p.p. ditto FT102 (£51) £43 p.p. (Deduct £4 if USA 12BY7A required). Black Star 600MHz counters (£146) £139 p.p.

Yaesu, J Beam etc. Good deals, personal callers. Holdings Amateur Electronics 45, Johnston St., Blackburn (0254) 59595 Access/B Card.

## RSGB AMATEUR RADIO INSURANCE SCHEME

"ALL RISKS" INSURANCE for portable/mobile/base station amateur radio and ancillary equipment. A service for RSGB members only. Also public liability and equipment insurance for affiliated clubs and societies. Details and leaflets from Nick Gibson, Amateur Radio Insurance Services Ltd, 19 Quarry Street, Guildford, Surrey. Tel: 0483 33771.

## COMPUTER SOFTWARE/HARDWARE

**SSTV RECEIVE FOR DRAGON AND TANDY** Color by G4BMK. Crisp pictures and fine grey scale detail achieved by software only. Graphics printer support. Tape £11.65 Cartridge upgrade (to 3 programs max.) £17.15. Also for Dragon, TRS80C: RTTY AMTOR and CW transceiver. Greyline and MUF/LUF predictor. For CBM64: RTTY, CW transceiver. RTTY for VIC20, ATOM. Grosvenor Software (G4BMK), 2 Beacon Close, Seaford, Sussex. (0323) 893378

**AMSTRAD MORSE TEST.** Find out if you're up to taking the H.O. Morse Test. Sending and receiving Numbers and Plain language. Each part of the Test can be taken separately or Morse Test Proper. Various speeds. Sending practice. Variable Sidetone frequency. Cassette £7.50 inc. Morse Tutor and QSO Index as May Radcom. Yeovil Electronic Developments, 44, St. Mary's Crescent, Yeovil, Somerset BA21 5RR

**AMPROM** Transfers files over amateur radio, error-free. For BBC B or B+. SAE for details. CTP Software, 107A Shackleton Lane, London E8 2EB.

**ATTENTION BBC-B USERS!!**—the advanced GW4WRD RTTY Program. Main features are: —40 column colour display, split screen, typeahead and text pages with editing, QSO review, printer toggle, callsign capture, variable speed, transceiver control... and more. Tape £12, Disk £14.50 (specify 40 or 80 track) or SAE for details. Ham-Tel, "Rock Hill", Llanarthne, Carmarthen, Dyfed SA32 8LJ. (Include callsign).

## HOLIDAY ACCOMMODATION

**FLYING FROM GATWICK?** Stay with G4MGU. Mill Lodge Guest House. 4 minutes from airport. Transport available. Telephone (0293) 771170.

**PEACE/QUIET SELF-CATERING chalets.** (£15-£120). Central touring, omni for DXing. GOATS shack. 'Chylean', Tintagel, Cornwall PL34 0HH. (0840) 212262.

**SOUTH DEVON HOLIDAY:** Farmborough House, Chudleigh, Newton Abbot, Devon, TQ13 0DR. Tel: (0626) 853258. In own 10 acres near Dartmoor. Opportunities: painting, Yoga, etc. Well equipped radio shack (G4YXC), metal/woodworking facilities. Vegetarian wholefood. Non-smoking. SAE please: Mrs Sophie Edwards.

**STOP PRESS! FAIRMOUNT NOW LICENSED.** Enjoy our wonderful meals, and good wines, in the peace and tranquility of Fairmount House Hotel. Ensuite bedrooms, all warm, comfortable and with tea-making facilities. Dogs welcome too. Special family holidays. From £18 BBEM. Also meet G6GR, licensed 64 years, use the rigs if you are licensed and try the new Tono communications-terminal computer. Tel (0803) 605446. Fairmount House Hotel, Herbert Road, Chelston, Torquay.

**TORQUAY S/C FLATS.** Couple until 23rd May £47.00, 13th June £55.00. Inclusive linen, TV. Take that break now. (0803) 607333. G4NOA.

## MISCELLANEOUS

**COURSE FOR CITY & GUILDS,** Radio Amateurs Examination. Pass this important examination and obtain your licence, with an RRC Home Study Course. For details of this and other courses (GCE, Career and professional examinations, etc) write or phone—THE RAPID RESULTS COLLEGE, Dept JT10, Tuition House, London SW19 4DS. Tel: 01-947 7272 (9am-5pm) or use our 24hr Recordacall service 01-946 1102 quoting JT10.

**HEATHKIT.** UK spares and service centre. Cedar Electronics, Unit 12, Station Drive, Bredon, Tewkesbury, Glos. Telephone (0684) 73127.

**A BETTER DEAL INSURANCE** for all Radio Amateurs. Complete cover for all radio equipment. Other types of insurance also available. Contact Charles Elliott, Hertfordshire Insurance Services, 41 Longfield Avenue, N.W.7. 2EH 01 203 2286.

**PATENTS TRADE MARKS and DESIGN**—Booklets on request. Kings Patent Agency Ltd, Established 1866, (B.T. King MIMech, E.J.B. King, regd. Patents Agents)—146a Queen Victoria Street, London EC4V 5AT. Tel: 01-248 6161. Telex 883805.

**REPAIRS** amateur equipment. All bands, all types inc tone demodulators. Fast turnaround, quotes by phone. W.T.S. Electronics, 5-9 Portland Road, Luton, Beds. Tel 24hrs (0582) 458375

## SITUATIONS WANTED

**EMPLOYMENT REQUIRED** by young man, 20, electronics/electrical, willing to learn. Anything, anywhere considered. write: D. Jackson Esq, 49 Yoden Road, Peterlee, Co Durham.



**W.H. WESTLAKE**  
**CLAWTON, HOLSWORTHY, DEVON. (0409) 253758**

- 1 H100 50 ohm Low Loss COAX 80p per m 50m - 10% 100m - 20% (p 5p p/m)
- 2 50Ω Double screened UR76—5mm dia 25p per m (post 3p p/m)
- 3 UR67 10.3mm Low Loss 50 ohm 60p per m (p 6p p/m)
- 4 UR76 50 ohm stranded conductor Coax 23p per m (p 3p p/m)
- 5 POPES RG58C/U with NC PVC 23p per m (p 3p p/m)
- 6 Mini Coax RG174/U 50 ohm 25p per m (p 1p p/m)
- 7 UR70 6mm 75 ohm Coax 23p per m (p 3p p/m)
- 8 UR57 10.5mm low loss 75 ohm COAX 60p per m (p 6p p/m)
- 9 75 ohm Double Screened 8mm 75 ohm Coax 35p per m (p 4p p/m)
- 10 Low Loss UHF TV Coax 75 ohm 20p per m (p 3p p/m)
- 11 75 ohm Twin Feeder 18p per m (p 2p p/m)
- 12 NEW! RG62AU 95Ω 7mm dia Coax 50p per m (p 5p p/m)
- 13 BOFA GMP6 Slotted 300 ohm Feeder 25p per m (p 3p p/m)
- 14 Strong PVC covered Aerial Wire 6p per m (p 2½p p/m)
- 15 14 SWG Copper HD Aerial Wire 20p per m (p 2½p p/m)
- 16 500m Mixed equipment Wire on Reels £1(p 1.40)
- 17 50 ohm BNC plugs for UR67/H100 £3.60 each
- 18 50 ohm N Plugs for H100/UR67/213 £2.50 each
- 19 50 ohm N line Sockets H100/UR67/213 £2.30 each
- 20 50 ohm N Chassis Sockets £1.80 each
- 21 50 ohm N Plugs for UR43/76 2.50 each

Post on plugs, 50p per order

# CHAMPION EMPLOYMENT

## OUTSTANDING OPPORTUNITY! TURN YOUR HOBBY INTO A REWARDING CAREER

Based in Oxfordshire our client is a highly successful international company specialising in the design and development of diagnostic medical research systems.

The Worldwide demand for their products has necessitated the need to recruit

## 2 ELECTRONIC ENGINEERS WITH PROVEN DEMONSTRABLE DIAGNOSTIC ABILITY

This challenging position would suit someone with the following talents and background.

- \* Experience of machine code programming OR
- \* Active radio enthusiast (not black box operator).
- \* Up-to-date knowledge of general electronics and new technology.
- \* The ability and commitment to gain detailed understanding of the specialist diagnostic equipment produced by the company.
- \* Suitable qualifications C & G or HNC in electronics, radio or communications.
- \* Available to travel in UK and abroad.

The excellent remuneration package includes: Relocation expenses, CPS, free BUPA and a five-figure salary.

**FOR FURTHER INFORMATION ABOUT THIS AND MANY OTHER INTERESTING TECHNICAL VACANCIES PLEASE TELEPHONE LINDA BEVIERE ON 0235 35011, OR ALTERNATIVELY SEND YOUR CURRICULUM VITAE TO: CHAMPION EMPLOYMENT LTD, 63 STERT STREET, ABINGDON, OXFORDSHIRE. OX14 3JZ.**

## INDEX TO ADVERTISERS

A. J. H. Electronics.....	452	Lowe Electronics .....	378/81
Allweld Engineering.....	442		
Alyntronic.....	450	McKnight Crystal Co Ltd.....	450
Amateur Electronics Ltd.....	386/7 & 446	Microwave Modules Ltd.....	IBC
Amateur Radio Insurance (ARIS).....	440	Moray Micro Computing.....	446
Amateur Radio Promotions.....	447	Mutek Limited.....	452
Amcomm/ARE.....	IFC		
ARE Communications Ltd.....	390 & 451	North London Comms.....	443
B. Bamber Electronics.....	441	Photo Acoustics Ltd.....	445
Binary Star Technology.....	448	Practical Wireless.....	444
J. Birkett.....	446		
BNOS Electronics.....	451	QuartsLab Marketing Ltd.....	450
Bredhurst Electronics.....	453		
Cambridge Kits.....	450	R.A.S. (Nottingham).....	450
Champion Employment.....	455	Radio Shack.....	444
Copperfoil Enterprises.....	452	Raedeck Electronics.....	446
CR Supply.....	446	Random Electronics.....	441
Cue Dee Antennas.....	452	RSGB Books.....	388
Datong Electronics.....	449	South Midland Comms.....	392/4
		Stephens-James.....	443
Farnborough Communications.....	442	Strumech Versatower Ltd.....	441
G4TNY Amateur Radio.....	454	Technical Software.....	450
Garex Electronics.....	449	Thanet Electronics.....	382/5
Hately Antenna Technology.....	448	Uppington Tele-Radio.....	452
ICS Electronics Ltd.....	391 & 453	Reg Ward Co Ltd.....	442
IQD Limited.....	389 & 454	Ward Electronics.....	448
		Waters & Stanton.....	395
Jaycee Electronics.....	446	W. Westlake.....	455
J.E.P. Electronics.....	441	C. Wilson.....	446
		R. Withers Communications Ltd.....	448
Klingenfuss Publications.....	442	Yaesu Musen.....	OB
KW Ten-Tec Ltd.....	442		



# RSGB MAIL-ORDER PRICE LIST

	Non-members' price	Members' price		Non-members' price	Members' price
<b>RSGB books</b>			<b>Other publications</b>		
<i>A Guide to Amateur Radio</i> (19th edn)	£4.14	£3.52	<i>All About Cubical Quad Antennas</i> (RPI)	£7.73	£6.57
<i>Amateur Radio Operating Manual</i> (3rd edn)	£6.52	£5.54	<i>Amateur Single Sideband</i> (Ham Radio)	£6.04	£5.13
<i>Amateur Radio Software</i>	£8.69	£7.39	<i>Amateur Television Handbook</i> (revised) (BATC)	£3.25	£2.76
<i>How to Pass the Radio Amateurs' Examination</i>	£3.62	£3.08	<i>Antenna Compendium Vol 1</i> (ARRL)	£10.29	£8.75
<i>Morse Code for Radio Amateurs</i>	£1.75	£1.49	<i>ARRL Antenna Book</i> (ARRL)	£11.29	£9.60
<i>RSGB Amateur Radio Call Book 1986</i>	£5.75	£4.89	<i>AX25 Amateur Packet Radio Link-layer Protocol</i> (ARRL)	£5.68	£4.83
<i>Radio Amateurs' Examination Manual</i> (11th edn)	£4.07	£3.46	<i>Basic Radio Electronics</i> (Wiley)	£17.71	£15.05
<i>Radio Communication Handbook Vol 2</i> (hb)	£8.96	£7.62	<i>Beam Antenna Handbook</i> (RPI)	£8.22	£6.99
<i>Radio Communication Handbook Vol 1 &amp; 2</i> (pb)	£14.10	£11.99	<i>Better Short Wave Reception</i> (RPI)	£7.57	£6.43
<i>Radio Data Reference Book</i> (5th edn)	£9.13	£7.76	<i>Care and Feeding of (Varian) Power Grid Tubes</i> (ARRL)	£11.07	£9.41
<i>Raynet Manual</i> (1984 edn)	£2.95	£2.51	<i>CMOS Cookbook</i> (Sams)	£14.47	£12.30
<i>Teleprinter Handbook</i> (2nd edn)	£7.67	£6.52	<i>Complete DX'er</i> (ARRL)	£8.60	£7.31
<i>Television Interference Manual</i> (2nd edn)	£2.45	£2.08	<i>*Complete Shortwave Listener's Handbook</i> (Tab)	£13.53	£11.50
<i>Test Equipment for the Radio Amateur</i>	£6.79	£5.77	<i>Design of VMOs Circuits with experiments</i> (Sams)	£7.99	£6.99
<i>VHF/UHF Manual</i> (4th edn)	£11.20	£9.52	<i>DX Edge</i> (hf propagation Aid)	£15.65	£13.30
<i>World at Their Fingertips</i>	£8.21	£6.98	<i>FM and Repeaters for the Radio Amateur</i> (ARRL)	£4.75	£4.04
<b>RSGB logbooks</b>			<i>Fourth ARRL Amateur Radio Computer Networking Conference</i>	£11.16	£9.49
<i>Amateur Radio Logbook</i>	£2.93	£2.49	<i>G-QRP Club Circuit Book</i>	£5.00	£4.25
<i>Mobile Logbook</i>	£1.30	£1.11	<i>Guide to Oscar Operation</i> (Amsat-UK)	£1.97	£1.67
<i>Receiving Station Logbook</i>	£3.04	£2.58	<i>Joy of QRP</i> (Adrian Weiss, WORSF)	£9.40	£7.99
<b>RSGB maps, charts and lists</b>			<i>Linear Op-Amp Handbook</i> (Carr)	£12.93	£10.99
<i>HF Awards List and Countries List</i>	51p	43p	<i>Oscar 10 Handbook</i> (Amsat-UK)	£3.87	£3.29
<i>Great Circle DX Map</i> (wall)	£2.57	£2.18	<i>Radio Amateurs' Antenna Handbook</i> (RPI)	£8.72	£7.41
<i>IARU Region 1 Beacon List</i>	42p	36p	<i>Radio Amateur Callbook Foreign Listings 1986</i> (ARCI)	£19.43	£16.52
<i>Locator Map of Europe</i> (wall)	£2.07	£1.76	<i>Radio Amateur Callbook North American Listings 1986</i> (ARCI)	£19.98	£16.98
<i>Locator Map of Europe</i> (card for desk)	75p	64p	<i>Radio Amateurs' Handbook 1986</i> (ARRL)	£18.12	£15.40
<i>Locator Map of Western Europe</i> (wall)	£3.24	£2.75	<i>Radio Communication Receivers</i> (Tab)	£17.43	£14.82
<i>Meteor scatter data sheets</i>	£3.72	£3.16	<i>Radio Frequency Interference</i> (ARRL)	£4.63	£3.94
<i>Smith Charts, pad of 25</i> (Chartwell D7510)	£2.35	£2.00	<i>RTTY the Easy Way</i> (BARTG)	£4.69	£3.99
<i>UK Beacon List</i>	42p	36p	<i>Satellite Experimenters' Handbook</i> (ARRL)	£11.19	£9.51
<i>UK Repeater List</i>	53p	45p	<i>Secrets of Ham Radio DXing</i> (Tab)	£8.78	£7.46
<i>World Prefix Map in full colour</i> (wall)	£2.68	£2.28	<i>Semiconductor Data Book</i> (Newnes)	£8.80	£7.48
<b>RSGB members' sundries (members only)</b>			<i>Shortwave Listeners' Antenna Handbook</i>	£17.54	£14.91
<i>RSGB badge car sticker</i>	—	53p	<i>Simple Low-cost Wire Antennas</i> (RPI)	£10.55	£8.97
<i>RSGB belt (real leather)</i>	—	£7.57	<i>Towards the Radio Amateurs' Examination</i> (Stam)	£4.77	£4.05
<i>RSGB tie (coffee, maroon, green or blue—please state)</i>	—	£3.20	<i>Towers International Transistor Selector</i>	£15.46	£13.14
<i>RSGB callsign cap</i>	—	£4.98	<i>*Towers Op-Amp Selector</i> (Foulsham)	£10.51	£8.93
<i>RSGB logo rubber stamp</i>	—	£3.16	<i>TV for Amateurs</i> (BATC)	£2.45	£2.08
<i>RSGB station callsign plaque</i> (Five weeks' delivery)	—	£12.31	<i>UHF Compendium Parts 1 and 2</i> (Weiner)	£16.50	£14.03
<i>RSGB teeshirts</i> (medium, large ex large—please state)	—	£4.90	<i>Understanding Amateur Radio</i> (ARRL)	£5.20	£4.42
<i>Standard callsign lapel badge</i> (Five weeks' delivery)	—	£2.21	<i>Weekend Projects for the Radio Amateur</i> (ARRL)	£5.45	£4.63
<i>De-luxe callsign lapel badge</i> (Five weeks' delivery)	—	£3.18	<i>World Atlas</i> (ARCI)	£3.72	£3.16
<i>Standard lapel badge</i> (RSGB emblem, pin fitting)	—	60p	<i>World Radio TV Handbook 1986</i> (Billboard)	£17.99	£15.29
<i>Mini lapel badge</i> (RSGB emblem, pin fitting)	—	72p	<i>*99 Test Equipment Projects You Can Build</i>	£10.75	£9.14
<i>Members' headed notepaper</i> (50 sheets) quarto	—	£1.20			
<i>Members' headed notepaper</i> (50 sheets) octavo	—	76p			
<b>Miscellaneous</b>			<b>RSGB kits and components</b>		
<i>Car sticker "Amateur radio" (two colours)</i>	78p	66p	<i>RSGB Morseman</i> (Rad Com December 1984)		
<i>Car sticker "I'm on the air with amateur radio" (four colours)</i>	89p	76p	<i>Kit 2</i> (27C16 eprom, pcb, artwork)	£15.32	£11.49
<i>Car sticker "I'm monitoring -5 are you?" (two colours)</i>	78p	66p	<i>Kit 3</i> (Led display and holder, battery holder, potentiometers, knobs and knob covers, case, front panel)	£38.24	£32.50
<i>Radio Communication back issues</i>	£1.40	£1.19	<i>D70008C microprocessor for Morseman</i>	£10.63	£9.04
<i>Radio Communication bound volume, 1983</i>	£17.90	£15.22	<i>Ferrite ring for interference suppression</i> (Pack of two) (Neosid)	£2.99	£2.54
<i>Radio Communication bound volume, 1984</i>	£17.90	£15.22			
<i>Radio Communication bound volume, 1985</i>	£17.90	£15.22			
<i>Radio Communication Easibinder</i>	£7.90	£6.72			
<i>RSGB coffee mug</i> (plastic)	£2.16	£1.84			
<i>RSGB hf contest log sheets</i> (100)	£3.69	£3.14			
<i>RSGB vhf contest log sheets</i> (100)	£3.69	£3.14			

## ORDERING INFORMATION

**NON-MEMBERS.** Use left-hand price columns. Note that members' sundries are only available to members of RSGB.

**MEMBERS.** Use right-hand price columns. It is essential that you quote your call sign or BRS number so that you can be recognised as a member.

**PRICES.** These include postage, packing and VAT where applicable, and are subject to change without notice. For airmail despatch, please ask for price before ordering. Goods are obtainable, less p & p, at RSGB headquarters between 10am and 4pm, Monday to Friday.

**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". Our Giro account number is 5335256. Please write your name and address clearly on the order, and allow up to 28 days for delivery.

ORDER FROM: RSGB Publications (Sales), Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JW

(Raynet supplies should be obtained from Mrs J. Balestrini, Merrivale, Willow Walk, Culverstone, Gravesend, Kent)

## MORSE INSTRUCTION AID

RSGB morse instruction tape (to 5wpm)	£4.80	£4.08
---------------------------------------	-------	-------

## MAGAZINE SUBSCRIPTIONS

QST (including ARRL membership). One year	£33.39	£28.38
Two years	£63.53	£54.00
Three years	£95.02	£80.77
By air via KLM (to W Europe only) one year	£47.45	£40.33
Ham Radio Magazine, one year, by air	£34.69	£29.49

## NEWSLETTER SUBSCRIPTIONS

*Microwave Newsletter, VHF Newsletter, DX Newsletter.* For details contact the membership services department at RSGB headquarters.

\*Items marked with an asterisk may not be available immediately; please telephone before ordering to confirm availability.

# RSGB News Bulletin

## CLASS B MORSE

### - now a permanent feature

"Amateur radio Class B licensees can now use Morse code permanently."

Following the successful completion of the experiment allowing Class B Amateur Radio licensees to practice the use of Morse code, the Department of Trade and Industry has confirmed, following consultations with the Radio Society of Great Britain (RSGB), that the concession is now a permanent feature of the licence. The experiment restricted Morse operation to the station address but this condition no longer applies.

"At the end of last year when the new frequency band at 50 MHz was allocated to the amateur service, the Department took the opportunity to thoroughly revise the definition of the amateur licences. This revision had the effect of removing Footnote A to the licence (which restricts the use of Morse) and takes into account the completion of the experiment by varying the terms of the Class B licence to allow Morse code to be used.

"In confirming that the use of Morse code is now a permanent feature of the Class B licence, the Department reminds Class B licensees that their use of Morse must be restricted to the bands for which they are licensed above 144 MHz. To minimise inconvenience to other band users it is recommended that Class B Morse operation should be in accordance with the RSGB guidelines. These are available on request from RSGB"

End of message. In passing, it's worth noting that on behalf of the DTI we issued over 6,000 letters of variation during the one-year currency of the experiment.

As forecast in last month's Bulletin, the Department of Trade and Industry came up with a press release about the use of Morse by Class B licensees early in May. Entitled "Amateur radio Class B licensees can now use Morse code permanently", the text of it is shown on the left.

This seems like a good time to run through the guidelines which relate to the use of Morse code by Class B licensees. There are three main intentions behind this new licence condition;

- \* to confer the ability to practice sending and receiving of Morse in preparation for the amateur Morse test
- \* to demonstrate the advantages of Morse in overcoming language barriers
- \* to allow Class B licensees to gain experience in using Morse under real operating conditions

In connection with those, there are four basic rules agreed between the Society and the DTI;

1. When using Morse code, the licence still requires you to identify your transmissions using telephony in the usual way because your Morse cannot be guaranteed to be readable.
2. It follows from this that in order to comply with the commonly accepted principles of efficient use of the radio spectrum (bandplans), you should not operate in the parts of the bands reserved exclusively for Morse operation. This is particularly important in the case of the Morse segments of the 144 and 430 MHz bands, which

are in regular use internationally for weak-signal CW operation and experimentation.

3. When using the channelised parts of the bands, on-off keying of an audio tone is recommended (i.e. A2A, A2B, F2A, F2B).

4. In the multimode segments, any of the common keying methods can be used, i.e. on-off keying of the carrier (A1A, A1B), frequency-shift keying (F2A, F2B) or keying of modulating tones (A2A, A2B, F2A, F2B).

Let's take a closer look at these and see what they mean in practice. The first question is "What frequency should I operate on?", and it seems to us that the vast majority of Class B Morse operation took place in the 144 MHz band. Because of this, all the comments which follow relate to 144 MHz - if you're using any other band, make the necessary mental transposition.

When the initial experiment began in April 1985, the Society suggested that the best part of the band to use would be the all-mode section - i.e. between 144.500 and 144.845 MHz. No calling frequencies were suggested since we didn't feel they were appropriate. First of all - if for some reason you insist on not operating in the all-mode section - please, whatever you do, AVOID those parts of the band used for specialist "weak-signal" modes such as EME (Earth-Moon-Earth) and MS (meteor scatter). This means portions of the 144 MHz band some 20 kHz wide centred on 144.200 and 144.400 MHz. Frequencies in this part of the band may sound quiet and unused, but it's a safe bet that someone

somewhere is listening into the noise for weak MS or EME signals. They've probably spent a fortune on good gear and alienated the neighbours with big antenna arrays, so please give them a sporting chance of working the rare ones and give those bits of the band a big miss.

Remember that as a Class B licensee, you're still obliged to identify your transmissions using voice telephony so you also should give a wide berth to the part of the band dedicated to CW use. In the case of 144 MHz this is 144.000 to 144.150 MHz.

If you're using SSB voice telephony along with your CW practice, the best place to operate is in the all-mode section. Many people up and down the country have used frequencies around 144.155 MHz to call CQ for Morse practice, which is fine, but a quick QSY to the all-modes section should take place when you've established contact. Having said that, in areas where the 144 MHz band is highly populated - such as around London and in parts of the south-east - it can occasionally be difficult to find a clear frequency in the all-modes section. If this is the case, and you're using SSB voice telephony to identify your transmissions, we suggest you use frequencies between about 144.420 and 144.500 MHz. As we said above, be sure to avoid frequencies close to 144.400 MHz.

This part of 144 MHz is usually less heavily used than frequencies lower down the band. However, when there's either a major opening or a large-scale contest it gets as busy as the rest of the "DX" end of 144 MHz. Under those circumstances it would be best to stick to the all-modes section.

If you're using an FM rig for your CW practice - i.e. if you're using FM telephony to identify and keying the rig with an audio tone to produce CW - you should operate either in the all-mode section of the band or, providing that activity isn't too high, in the FM simplex section. Wherever you decide to go, please don't operate in this mode below 144.500 MHz or you'll cause a lot of problems for other users.

On the right you'll see the bandplan for the 144 and 430 MHz bands - you might like to cut it out and stick it on the wall of the shack if you're in any doubt about where each segment of the band is.

Next month, getting on the air with CW - we answer your questions.

## The RSGB Morse Test Service

As this edition of the Bulletin went to press, the Society was between two distinct phases of the work necessary to get the new service fully functional. The interim measure of providing Morse tests at rallies was extremely popular, and the nine rallies on the list were all fully booked in less than a month. A number of candidates have already received results slips from tests taken at rallies.

The full scheme is, of course, based on each county, designated island or Scottish region having its own team of volunteer examiners. Last month we mentioned that we'd had a good response from many parts of the country from people offering their services as examiners. We're pleased to say that Mr Neville Ianson, GW3GDO, has now been appointed Chief Morse Examiner by the Society; Neville is also qualified to examine the examiners, as it were, and he's already tested a number of applicants. By 1 June 1986, centres should have been set up in the following counties; West Midlands,

Buckinghamshire, Cornwall, Devon, Dorset, Avon, Berkshire, Clwyd, Mid-Glamorgan, Lincolnshire, Leicestershire, and Gwynedd. In Scotland, Strathclyde and Grampian regions should have centres set up by 1 June.

The situation is obviously dynamic, and probably another batch of centres will have been set up by the time you read this. Headquarters has the up-to-date information, and it'd also be a good move to listen to GB2RS and the Headline News Service. Best of all is the RSGB Databox, if you can access it - all you need is a home computer, a low-cost modem and a telephone line to Potters Bar (0707) 52242 for instant access to the very latest news from HQ. LATE FLASH - Databox pages are likely to be available by July or August on National Prestel as well as the direct dial-up.

If you want a Morse test at one of these new centres, just write to Morse Tests (RR) at RSGB Headquarters.

UK 144MHz band plan

144.000	144.000 to 144.025	Mountbatten CW activity
CW only	144.025 to 144.150	Mountbatten CW activity
144.150	144.150 to 144.250	Used for GB2RS and other Morse practice
SSB and cw only	144.250 to 144.300	Used for Morse practice
144.300	144.300 to 144.400	SSB activity
144.400	144.400 to 144.500	SSB activity
144.500	144.500 to 144.600	SSB activity
All modes non-channelized	144.600 to 144.700	SSB activity
144.700	144.700 to 144.800	SSB activity
144.800	144.800 to 144.900	SSB activity
144.900	144.900 to 145.000	SSB activity
145.000	145.000 to 145.100	SSB activity
145.100	145.100 to 145.200	SSB activity
145.200	145.200 to 145.300	SSB activity
145.300	145.300 to 145.400	SSB activity
145.400	145.400 to 145.500	SSB activity
145.500	145.500 to 145.600	SSB activity
145.600	145.600 to 145.700	SSB activity
145.700	145.700 to 145.800	SSB activity
145.800	145.800 to 145.900	SSB activity
145.900	145.900 to 146.000	SSB activity
146.000	146.000 to 146.100	SSB activity

UK 430-440MHz band plan

430.000	NB 431-432MHz not available within 100km of Charing Cross, London	
432.000	432.000 to 432.025	Mountbatten CW centre of activity
CW only	432.025	Mountbatten CW centre of activity
432.150	432.200	SSB centre of activity
SSB and cw only	432.350	Midnight talk back
432.500	432.600	RTTY activity
All modes non-channelized	432.600 + 432.875	RTTY activity (the data transmission calling frequency)
432.800	432.700	RTTY activity (the data transmission calling frequency)
Beacons		
433.000	433.000-440.000	RTTY activity (the data transmission calling frequency)
FM repeater outputs in UK only	433.025-433.050 433.050-433.075 433.075-433.100 433.100-433.125 433.125-433.150 433.150-433.175 433.175-433.200 433.200-433.225 433.225-433.250 433.250-433.275 433.275-433.300 433.300-433.325 433.325-433.350 433.350-433.375 433.375-433.400 433.400-433.425 433.425-433.450 433.450-433.475 433.475-433.500 433.500-433.525 433.525-433.550 433.550-433.575 433.575-433.600 433.600-433.625 433.625-433.650 433.650-433.675 433.675-433.700 433.700-433.725 433.725-433.750 433.750-433.775 433.775-433.800 433.800-433.825 433.825-433.850 433.850-433.875 433.875-433.900 433.900-433.925 433.925-433.950 433.950-433.975 433.975-434.000	RTTY activity (the data transmission calling frequency)
433.400	433.400-433.425 433.425-433.450 433.450-433.475 433.475-433.500 433.500-433.525 433.525-433.550 433.550-433.575 433.575-433.600 433.600-433.625 433.625-433.650 433.650-433.675 433.675-433.700 433.700-433.725 433.725-433.750 433.750-433.775 433.775-433.800 433.800-433.825 433.825-433.850 433.850-433.875 433.875-433.900 433.900-433.925 433.925-433.950 433.950-433.975 433.975-434.000	RTTY activity (the data transmission calling frequency)
434.600	434.600-434.625 434.625-434.650 434.650-434.675 434.675-434.700 434.700-434.725 434.725-434.750 434.750-434.775 434.775-434.800 434.800-434.825 434.825-434.850 434.850-434.875 434.875-434.900 434.900-434.925 434.925-434.950 434.950-434.975 434.975-435.000	RTTY activity (the data transmission calling frequency)
FM repeater inputs in UK only	434.600-434.625 434.625-434.650 434.650-434.675 434.675-434.700 434.700-434.725 434.725-434.750 434.750-434.775 434.775-434.800 434.800-434.825 434.825-434.850 434.850-434.875 434.875-434.900 434.900-434.925 434.925-434.950 434.950-434.975 434.975-435.000	RTTY activity (the data transmission calling frequency)
435.000	434.440	RTTY activity (the data transmission calling frequency)
440.000	440.000-440.025 440.025-440.050 440.050-440.075 440.075-440.100 440.100-440.125 440.125-440.150 440.150-440.175 440.175-440.200 440.200-440.225 440.225-440.250 440.250-440.275 440.275-440.300 440.300-440.325 440.325-440.350 440.350-440.375 440.375-440.400 440.400-440.425 440.425-440.450 440.450-440.475 440.475-440.500 440.500-440.525 440.525-440.550 440.550-440.575 440.575-440.600 440.600-440.625 440.625-440.650 440.650-440.675 440.675-440.700 440.700-440.725 440.725-440.750 440.750-440.775 440.775-440.800 440.800-440.825 440.825-440.850 440.850-440.875 440.875-440.900 440.900-440.925 440.925-440.950 440.950-440.975 440.975-441.000	RTTY activity (the data transmission calling frequency)

Notes on UK 144MHz and 430MHz band plans

Many questions have been put up to the 144MHz band plan. The following are the answers to the most common questions.

The band plan and frequency allocation is based on the following assumptions:

- 1. The band plan is based on the following assumptions:
- 2. The band plan is based on the following assumptions:
- 3. The band plan is based on the following assumptions:
- 4. The band plan is based on the following assumptions:
- 5. The band plan is based on the following assumptions:
- 6. The band plan is based on the following assumptions:
- 7. The band plan is based on the following assumptions:
- 8. The band plan is based on the following assumptions:
- 9. The band plan is based on the following assumptions:
- 10. The band plan is based on the following assumptions:
- 11. The band plan is based on the following assumptions:
- 12. The band plan is based on the following assumptions:
- 13. The band plan is based on the following assumptions:
- 14. The band plan is based on the following assumptions:
- 15. The band plan is based on the following assumptions:
- 16. The band plan is based on the following assumptions:
- 17. The band plan is based on the following assumptions:
- 18. The band plan is based on the following assumptions:
- 19. The band plan is based on the following assumptions:
- 20. The band plan is based on the following assumptions:
- 21. The band plan is based on the following assumptions:
- 22. The band plan is based on the following assumptions:
- 23. The band plan is based on the following assumptions:
- 24. The band plan is based on the following assumptions:
- 25. The band plan is based on the following assumptions:
- 26. The band plan is based on the following assumptions:
- 27. The band plan is based on the following assumptions:
- 28. The band plan is based on the following assumptions:
- 29. The band plan is based on the following assumptions:
- 30. The band plan is based on the following assumptions:
- 31. The band plan is based on the following assumptions:
- 32. The band plan is based on the following assumptions:
- 33. The band plan is based on the following assumptions:
- 34. The band plan is based on the following assumptions:
- 35. The band plan is based on the following assumptions:
- 36. The band plan is based on the following assumptions:
- 37. The band plan is based on the following assumptions:
- 38. The band plan is based on the following assumptions:
- 39. The band plan is based on the following assumptions:
- 40. The band plan is based on the following assumptions:
- 41. The band plan is based on the following assumptions:
- 42. The band plan is based on the following assumptions:
- 43. The band plan is based on the following assumptions:
- 44. The band plan is based on the following assumptions:
- 45. The band plan is based on the following assumptions:
- 46. The band plan is based on the following assumptions:
- 47. The band plan is based on the following assumptions:
- 48. The band plan is based on the following assumptions:
- 49. The band plan is based on the following assumptions:
- 50. The band plan is based on the following assumptions:
- 51. The band plan is based on the following assumptions:
- 52. The band plan is based on the following assumptions:
- 53. The band plan is based on the following assumptions:
- 54. The band plan is based on the following assumptions:
- 55. The band plan is based on the following assumptions:
- 56. The band plan is based on the following assumptions:
- 57. The band plan is based on the following assumptions:
- 58. The band plan is based on the following assumptions:
- 59. The band plan is based on the following assumptions:
- 60. The band plan is based on the following assumptions:
- 61. The band plan is based on the following assumptions:
- 62. The band plan is based on the following assumptions:
- 63. The band plan is based on the following assumptions:
- 64. The band plan is based on the following assumptions:
- 65. The band plan is based on the following assumptions:
- 66. The band plan is based on the following assumptions:
- 67. The band plan is based on the following assumptions:
- 68. The band plan is based on the following assumptions:
- 69. The band plan is based on the following assumptions:
- 70. The band plan is based on the following assumptions:
- 71. The band plan is based on the following assumptions:
- 72. The band plan is based on the following assumptions:
- 73. The band plan is based on the following assumptions:
- 74. The band plan is based on the following assumptions:
- 75. The band plan is based on the following assumptions:
- 76. The band plan is based on the following assumptions:
- 77. The band plan is based on the following assumptions:
- 78. The band plan is based on the following assumptions:
- 79. The band plan is based on the following assumptions:
- 80. The band plan is based on the following assumptions:
- 81. The band plan is based on the following assumptions:
- 82. The band plan is based on the following assumptions:
- 83. The band plan is based on the following assumptions:
- 84. The band plan is based on the following assumptions:
- 85. The band plan is based on the following assumptions:
- 86. The band plan is based on the following assumptions:
- 87. The band plan is based on the following assumptions:
- 88. The band plan is based on the following assumptions:
- 89. The band plan is based on the following assumptions:
- 90. The band plan is based on the following assumptions:
- 91. The band plan is based on the following assumptions:
- 92. The band plan is based on the following assumptions:
- 93. The band plan is based on the following assumptions:
- 94. The band plan is based on the following assumptions:
- 95. The band plan is based on the following assumptions:
- 96. The band plan is based on the following assumptions:
- 97. The band plan is based on the following assumptions:
- 98. The band plan is based on the following assumptions:
- 99. The band plan is based on the following assumptions:
- 100. The band plan is based on the following assumptions:
- 101. The band plan is based on the following assumptions:
- 102. The band plan is based on the following assumptions:
- 103. The band plan is based on the following assumptions:
- 104. The band plan is based on the following assumptions:
- 105. The band plan is based on the following assumptions:
- 106. The band plan is based on the following assumptions:
- 107. The band plan is based on the following assumptions:
- 108. The band plan is based on the following assumptions:
- 109. The band plan is based on the following assumptions:
- 110. The band plan is based on the following assumptions:
- 111. The band plan is based on the following assumptions:
- 112. The band plan is based on the following assumptions:
- 113. The band plan is based on the following assumptions:
- 114. The band plan is based on the following assumptions:
- 115. The band plan is based on the following assumptions:
- 116. The band plan is based on the following assumptions:
- 117. The band plan is based on the following assumptions:
- 118. The band plan is based on the following assumptions:
- 119. The band plan is based on the following assumptions:
- 120. The band plan is based on the following assumptions:
- 121. The band plan is based on the following assumptions:
- 122. The band plan is based on the following assumptions:
- 123. The band plan is based on the following assumptions:
- 124. The band plan is based on the following assumptions:
- 125. The band plan is based on the following assumptions:
- 126. The band plan is based on the following assumptions:
- 127. The band plan is based on the following assumptions:
- 128. The band plan is based on the following assumptions:
- 129. The band plan is based on the following assumptions:
- 130. The band plan is based on the following assumptions:
- 131. The band plan is based on the following assumptions:
- 132. The band plan is based on the following assumptions:
- 133. The band plan is based on the following assumptions:
- 134. The band plan is based on the following assumptions:
- 135. The band plan is based on the following assumptions:
- 136. The band plan is based on the following assumptions:
- 137. The band plan is based on the following assumptions:
- 138. The band plan is based on the following assumptions:
- 139. The band plan is based on the following assumptions:
- 140. The band plan is based on the following assumptions:
- 141. The band plan is based on the following assumptions:
- 142. The band plan is based on the following assumptions:
- 143. The band plan is based on the following assumptions:
- 144. The band plan is based on the following assumptions:
- 145. The band plan is based on the following assumptions:
- 146. The band plan is based on the following assumptions:
- 147. The band plan is based on the following assumptions:
- 148. The band plan is based on the following assumptions:
- 149. The band plan is based on the following assumptions:
- 150. The band plan is based on the following assumptions:
- 151. The band plan is based on the following assumptions:
- 152. The band plan is based on the following assumptions:
- 153. The band plan is based on the following assumptions:
- 154. The band plan is based on the following assumptions:
- 155. The band plan is based on the following assumptions:
- 156. The band plan is based on the following assumptions:
- 157. The band plan is based on the following assumptions:
- 158. The band plan is based on the following assumptions:
- 159. The band plan is based on the following assumptions:
- 160. The band plan is based on the following assumptions:
- 161. The band plan is based on the following assumptions:
- 162. The band plan is based on the following assumptions:
- 163. The band plan is based on the following assumptions:
- 164. The band plan is based on the following assumptions:
- 165. The band plan is based on the following assumptions:
- 166. The band plan is based on the following assumptions:
- 167. The band plan is based on the following assumptions:
- 168. The band plan is based on the following assumptions:
- 169. The band plan is based on the following assumptions:
- 170. The band plan is based on the following assumptions:
- 171. The band plan is based on the following assumptions:
- 172. The band plan is based on the following assumptions:
- 173. The band plan is based on the following assumptions:
- 174. The band plan is based on the following assumptions:
- 175. The band plan is based on the following assumptions:
- 176. The band plan is based on the following assumptions:
- 177. The band plan is based on the following assumptions:
- 178. The band plan is based on the following assumptions:
- 179. The band plan is based on the following assumptions:
- 180. The band plan is based on the following assumptions:
- 181. The band plan is based on the following assumptions:
- 182. The band plan is based on the following assumptions:
- 183. The band plan is based on the following assumptions:
- 184. The band plan is based on the following assumptions:
- 185. The band plan is based on the following assumptions:
- 186. The band plan is based on the following assumptions:
- 187. The band plan is based on the following assumptions:
- 188. The band plan is based on the following assumptions:
- 189. The band plan is based on the following assumptions:
- 190. The band plan is based on the following assumptions:
- 191. The band plan is based on the following assumptions:
- 192. The band plan is based on the following assumptions:
- 193. The band plan is based on the following assumptions:
- 194. The band plan is based on the following assumptions:
- 195. The band plan is based on the following assumptions:
- 196. The band plan is based on the following assumptions:
- 197. The band plan is based on the following assumptions:
- 198. The band plan is based on the following assumptions:
- 199. The band plan is based on the following assumptions:
- 200. The band plan is based on the following assumptions:
- 201. The band plan is based on the following assumptions:
- 202. The band plan is based on the following assumptions:
- 203. The band plan is based on the following assumptions:
- 204. The band plan is based on the following assumptions:
- 205. The band plan is based on the following assumptions:
- 206. The band plan is based on the following assumptions:
- 207. The band plan is based on the following assumptions:
- 208. The band plan is based on the following assumptions:
- 209. The band plan is based on the following assumptions:
- 210. The band plan is based on the following assumptions:
- 211. The band plan is based on the following assumptions:
- 212. The band plan is based on the following assumptions:
- 213. The band plan is based on the following assumptions:
- 214. The band plan is based on the following assumptions:
- 215. The band plan is based on the following assumptions:
- 216. The band plan is based on the following assumptions:
- 217. The band plan is based on the following assumptions:
- 218. The band plan is based on the following assumptions:
- 219. The band plan is based on the following assumptions:
- 220. The band plan is based on the following assumptions:
- 221. The band plan is based on the following assumptions:
- 222. The band plan is based on the following assumptions:
- 223. The band plan is based on the following assumptions:
- 224. The band plan is based on the following assumptions:
- 225. The band plan is based on the following assumptions:
- 226. The band plan is based on the following assumptions:
- 227. The band plan is based on the following assumptions:
- 228. The band plan is based on the following assumptions:
- 229. The band plan is based on the following assumptions:
- 230. The band plan is based on the following assumptions:
- 231. The band plan is based on the following assumptions:
- 232. The band plan is based on the following assumptions:
- 233. The band plan is based on the following assumptions:
- 234. The band plan is based on the following assumptions:
- 235. The band plan is based on the following assumptions:
- 236. The band plan is based on the following assumptions:
- 237. The band plan is based on the following assumptions:
- 238. The band plan is based on the following assumptions:
- 239. The band plan is based on the following assumptions:
- 240. The band plan is based on the following assumptions:
- 241. The band plan is based on the following assumptions:
- 242. The band plan is based on the following assumptions:
- 243. The band plan is based on the following assumptions:
- 244. The band plan is based on the following assumptions:
- 245. The band plan is based on the following assumptions:
- 246. The band plan is based on the following assumptions:
- 247. The band plan is based on the following assumptions:
- 248. The band plan is based on the following assumptions:
- 249. The band plan is based on the following assumptions:
- 250. The band plan is based on the following assumptions:
- 251. The band plan is based on the following assumptions:
- 252. The band plan is based on the following assumptions:
- 253. The band plan is based on the following assumptions:
- 254. The band plan is based on the following assumptions:
- 255. The band plan is based on the following assumptions:
- 256. The band plan is based on the following assumptions:
- 257. The band plan is based on the following assumptions:
- 258. The band plan is based on the following assumptions:
- 259. The band plan is based on the following assumptions:
- 260. The band plan is based on the following assumptions:
- 261. The band plan is based on the following assumptions:
- 262. The band plan is based on the following assumptions:
- 263. The band plan is based on the following assumptions:
- 264. The band plan is based on the following assumptions:
- 265. The band plan is based on the following assumptions:
- 266. The band plan is based on the following assumptions:
- 267. The band plan is based on the following assumptions:
- 268. The band plan is based on the following assumptions:
- 269. The band plan is based on the following assumptions:
- 270. The band plan is based on the following assumptions:
- 271. The band plan is based on the following assumptions:
- 272. The band plan is based on the following assumptions:
- 273. The band plan is based on the following assumptions:
- 274. The band plan is based on the following assumptions:
- 275. The band plan is based on the following assumptions:
- 276. The band plan is based on the following assumptions:
- 277. The band plan is based on the following assumptions:
- 278. The band plan is based on the following assumptions:
- 279. The band plan is based on the following assumptions:
- 280. The band plan is based on the following assumptions:
- 281. The band plan is based on the following assumptions:
- 282. The band plan is based on the following assumptions:
- 283. The band plan is based on the following assumptions:
- 284. The band plan is based on the following assumptions:
- 285. The band plan is based on the following assumptions:
- 286. The band plan is based on the following assumptions:
- 287. The band plan is based on the following assumptions:
- 288. The band plan is based on the following assumptions:
- 289. The band plan is based on the following assumptions:
- 290. The band plan is based on the following assumptions:
- 291. The band plan is based on the following assumptions:
- 292. The band plan is based on the following assumptions:
- 293. The band plan is based on the following assumptions:
- 294. The band plan is based on the following assumptions:
- 295. The band plan is based on the following assumptions:
- 296. The band plan is based on the following assumptions:
- 297. The band plan is based on the following assumptions:
- 298. The band plan is based on the following assumptions:
- 299. The band plan is based on the following assumptions:
- 300. The band plan is based on the following assumptions:
- 301. The band plan is based on the following assumptions:
- 302. The band plan is based on the following assumptions:
- 303. The band plan is based on the following assumptions:
- 304. The band plan is based on the following assumptions:
- 305. The band plan is based on the following assumptions:
- 306. The band plan is based on the following assumptions:
- 307. The band plan is based on the following assumptions:
- 308. The band plan is based on the following assumptions:
- 309. The band plan is based on the following assumptions:
- 310. The band plan is based on the following assumptions:
- 311. The band plan is based on the following assumptions:
- 312. The band plan is based on the following assumptions:
- 313. The band plan is based on the following assumptions:
- 314. The band plan is based on the following assumptions:
- 315. The band plan is based on the following assumptions:
- 316. The band plan is based on the following assumptions:
- 317. The band plan is based on the following assumptions:
- 318. The band plan is based on the following assumptions:
- 319. The band plan is based on the following assumptions:
- 320. The band plan is based on the following assumptions:
- 321. The band plan is based on the following assumptions:
- 322. The band plan is based on the following assumptions:
- 323. The band plan is based on the following assumptions:
- 324. The band plan is based on the following assumptions:
- 325. The band plan is based on the following assumptions:
- 326. The band plan is based on the following assumptions:
- 327. The band plan is based on the following assumptions:
- 328. The band plan is based on the following assumptions:
- 329. The band plan is based on the following assumptions:
- 330. The band plan is based on the following assumptions:
- 331. The band plan is based on the following assumptions:
- 332. The band plan is based on the following assumptions:
- 333. The band plan is based on the following assumptions:
- 334. The band plan is based on the following assumptions:
- 335. The band plan is based on the following assumptions:
- 336. The band plan is based on the following assumptions:
- 337. The band plan is based on the following assumptions:
- 338. The band plan is based on the following assumptions:
- 339. The band plan is based on the following assumptions:
- 340. The band plan is based on the following assumptions:
- 341. The band plan is based on the following assumptions:
- 342. The band plan is based on the following assumptions:
- 343. The band plan is based on the following assumptions:
- 344. The band plan is based on the following assumptions:
- 345. The band plan is based on the following assumptions:
- 346. The band plan is based on the following assumptions:
- 347. The band plan is based on the following assumptions:
- 348. The band plan is based on the following assumptions:
- 349. The band plan is based on the following assumptions:
- 350. The band plan is based on the following assumptions:
- 351. The band plan is based on the following assumptions:
- 352. The band plan is based on the following assumptions:
- 353. The band plan is based on the following assumptions:
- 354. The band plan is based on the following assumptions:
- 355. The band plan is based on the following assumptions:
- 356. The band plan is based on the following assumptions:
- 357. The band plan is based on the following assumptions:
- 358. The band plan is based on the following assumptions:
- 359. The band plan is based on the following assumptions:
- 360. The band plan is based on the following assumptions:
- 361. The band plan is based on the following assumptions:
- 362. The band plan is based on the following assumptions:
- 363. The band plan is based on the following assumptions:
- 364. The band plan is based on the following assumptions:
- 365. The band plan is based on the following assumptions:
- 366. The band plan is based on the following assumptions:
- 367. The band plan is based on the following assumptions:
- 368. The band plan is based on the following assumptions:
- 369. The band plan is based on the following assumptions:
- 370. The band plan is based on the following assumptions:
- 371. The band plan is based on the following assumptions:
- 372. The band plan is based on the following assumptions:
- 373. The band plan is based on the following assumptions:
- 374. The band plan is based on the following assumptions:
- 375. The band plan is based on the following assumptions:
- 376. The band plan is based on the following assumptions:
- 377. The band plan is based on the following assumptions:
- 378. The band plan is based on the following assumptions:
- 379. The band plan is based on the following assumptions:
- 380. The band plan is based on the following assumptions:
- 381. The band plan is based on the following assumptions:
- 382. The band plan is based on the following assumptions:
- 383. The band plan is based on the following assumptions:
- 384. The band plan is based on the following assumptions:
- 385. The band plan is based on the following assumptions:
- 386. The band plan is based on the following assumptions:
- 387. The band plan is based on the following assumptions:
- 388. The band plan is based on the following assumptions:
- 389. The band plan is based on the following assumptions:
- 390. The band plan is based on the following assumptions:
- 391. The band plan is based on the following assumptions:
- 392. The band plan is based on the following assumptions:
- 393. The band plan is based on the following assumptions:
- 394. The band plan is based on the following assumptions:
- 395. The band plan is based on the following assumptions:
- 396. The band plan is based on the following assumptions:
- 397. The band plan is based on the following assumptions:
- 398. The band plan is based on the following assumptions:
- 399. The band plan is based on the following assumptions:
- 400. The band plan is based on the following assumptions:
- 401. The band plan is based on the following assumptions:
- 402. The band plan is based on the following assumptions:
- 403. The band plan is based on the following assumptions:
- 404. The band plan is based on the following assumptions:
- 405. The band plan is based on the following assumptions:
- 406. The band plan is based on the following assumptions:
- 407. The band plan is based on the following assumptions:
- 408. The band plan is based on the following assumptions:
- 409. The band plan is based on the following assumptions:
- 410. The band plan is based on the following assumptions:
- 411. The band plan is based on the following assumptions:
- 412. The band plan is based on the following assumptions:
- 413. The band plan is based on the following assumptions:
- 414. The band plan is based on the following assumptions:
- 415. The band plan is based on the following assumptions:
- 416. The band plan is based on the following assumptions:
- 417. The band plan is based on the following assumptions:
- 418. The band plan is based on the following assumptions:
- 419. The band plan is based on the following assumptions:
- 420. The band plan is based on the following assumptions:
- 421. The band plan is based on the following assumptions:
- 422. The band plan is based on the following assumptions:
- 423. The band plan is based on the following assumptions:
- 424. The band plan is based on the following assumptions:
- 425. The band plan is based on the following assumptions:
- 426. The band plan is based on the following assumptions:
- 427. The band plan is based on the following assumptions:
- 428. The band plan is based on the following assumptions:
- 429. The band plan is based on the following assumptions:
- 430. The band plan is based on the following assumptions:
- 431. The band plan is based on the following assumptions:
- 432. The band plan is based on the following assumptions:
- 433. The band plan is based on the following assumptions:
- 434. The band plan is based on the following assumptions:
- 435. The band plan is based on the following assumptions:
- 436. The band plan is based on the following assumptions:
- 437. The band plan is based on the following assumptions:
- 438. The band plan is based on the following assumptions:
- 439. The band plan is based on the following assumptions:
- 440. The band plan is based on the following assumptions:
- 441. The band plan is based on the following assumptions:
- 442. The band plan is based on the following assumptions:
- 443. The band plan is based on the following assumptions:
- 444. The band plan is based on the following assumptions:
- 445. The band plan is based on the following assumptions:
- 446. The band plan is based on the following assumptions:
- 447. The band plan is based on the following assumptions:
- 448. The band plan is based on the following assumptions:
- 449. The band plan is based on the following assumptions:
- 450. The band plan is based on the following assumptions:
- 451. The band plan is based on the following assumptions:
- 452. The band plan is based on the following assumptions:
- 453. The band plan is based on the following assumptions:
- 454. The band plan is based on the following assumptions:
- 455. The band plan is based on the following assumptions:
- 456. The band plan is based on the following assumptions:
- 457. The band plan is based on the following assumptions:
- 458. The band plan is based on the following assumptions:
- 459. The band plan is based on the following assumptions:
- 460. The band plan is based on the following assumptions:
- 461. The band plan is based on the following assumptions:
- 462. The band plan is based on the following assumptions:
- 463. The band plan is based on the following assumptions:
- 464. The band plan is based on the following assumptions:
- 465. The band plan is based on the following assumptions:
- 466. The band plan is based on the following assumptions:
- 467. The band plan is based on the following assumptions:
- 468. The band plan is based on the following assumptions:
- 469. The band plan is based on the following assumptions:
- 470. The band plan is based on the following assumptions:
- 471. The band plan is based on the following assumptions:
- 472. The band plan is based on the following assumptions:
- 473. The band plan is based on the following assumptions:
- 474. The band plan is based on the following assumptions:
- 475. The band plan is based on the following assumptions:
- 476. The band plan is based on the following assumptions:
- 477. The band plan is based on the following assumptions:
- 478. The band plan is based on the following assumptions:
- 479. The band plan is based on the following assumptions:
- 480. The band plan is based on the following assumptions:
- 481. The band plan is based on the following assumptions:
- 482. The band plan is based on the following assumptions:
- 483. The band plan is based on the following assumptions:
- 484. The band plan is based on the following assumptions:
- 485. The band plan is based on the following assumptions:
- 486. The band plan is based on the following assumptions:
- 487. The band plan is based on the following assumptions:
- 488. The band plan is based on the following assumptions:
- 489. The band plan is based on the following assumptions:
- 490. The band plan is based on the following assumptions:
- 491. The band plan is based on the following assumptions:
- 492. The band plan is based on the following assumptions:
- 493. The band plan is based on the following assumptions:
- 494. The band plan is based on the following assumptions:
- 495. The band plan is based on the following assumptions:
- 496. The band plan is based on the following assumptions:
- 497. The band plan is based on the following assumptions:
- 498. The band plan is based on the following assumptions:
- 499. The band plan is based on the following assumptions:
- 500. The band plan is based on the following assumptions:
- 501. The band plan is based on the following assumptions:
- 502. The band plan is based on the following assumptions:
- 503. The band plan is based on the following assumptions:
- 504. The band plan is based on the following assumptions:
- 505. The band plan is based on the following assumptions:
- 506. The band plan is based on the following assumptions:
- 507. The band plan is based on the following assumptions:
- 508. The band plan is based on the following assumptions:
- 509. The band plan is based on the following assumptions:
- 510. The band plan is based on the following assumptions:
- 511. The band plan is based on the following assumptions:
- 512. The band plan is based on the following assumptions:
- 513. The band plan is based on the following assumptions:
- 514. The band plan is based on the following assumptions:
- 515. The band plan is based on the following assumptions:
- 516. The band plan is based on the following assumptions:
- 517. The band plan is based on the following assumptions:
- 518. The band plan is based on the following assumptions:
- 519. The band plan is based on the following assumptions:
- 520. The band plan is based on the following assumptions:
- 521. The band plan is based on the following assumptions:
- 522. The band plan is based on the following assumptions:
- 523. The band plan is based on the following assumptions:
- 524. The band plan is based on the following assumptions:
- 525. The band plan is based on the following assumptions:
- 526. The band plan is based on the following assumptions:
- 527. The band plan is based on the following assumptions:
- 528. The band plan is based on the following assumptions:
- 529. The band plan is





## The RIS and amateur radio - continued

You'll remember that in the April 1986 edition of Radio Communication we published a long news story on some rather surprising new Radio Investigation Service policies applying to radio amateurs - the Editorial was also devoted to the same topic.

Amongst the correspondence we received as a result was the following, from the DTI - unfortunately too late for the May edition of the Bulletin;

"The April editorial raises an important issue - the relationship between amateurs and the Department of Trade and Industry. I should like to offer your readers a few comments on this topic because I would not want them to feel that the fundamental relationship had been changed in any way.

"The facts, I think, speak for themselves and let me quote just two examples. In recent months you have seen the Department's initiative, in the face of some concern from European neighbours, with the 50 MHz allocation for radio amateurs. Other administrations have since followed the Department's firm lead. On Morse testing we responded to claims (sic) for change and the introduction of competition will allow the RSGB itself to offer a much cheaper test at greater availability for the benefit of the customer.

"It is true that new procedures have been introduced to enable the RIS to deal more effectively with enforcement. These procedures which affect all users of radio, not just the amateurs, were publicly announced in Parliament last year, and the benefits are already being felt throughout the radio world, including the amateur community (for example in the initiative taken against the South London repeater - where the Society itself has often pressed for more action).

"Just as there is an irresponsible minority who cause problems for other amateurs, so there is a small minority (sometimes perhaps the same people) who through their thoughtless actions make life quite unbearable for their luckless neighbours. The Department has a responsibility to ensure that its licences are not used or abused in such a way as to destroy the quality of life of the public at large and I am sure that the radio amateur community generally would want us to take action against those who besmirch the good name of the hobby. A few recent problems have arisen (and it is essential to keep a sense of perspective because there are only a few) and the Department has had to deal with them. At the same time these problems have highlighted the fact that there is no agreed policy on this issue between the Department and the RSGB; such an agreed policy seems desirable and, following a meeting with the Society on 20 February and other informal discussions, we are working with the Society to try to formulate an agreed policy".

"M V Coolican, 22 April 1986"

## Agreed, but....

The Society quite agrees with the DTI that "...quality of life" is important, but that statement cuts both ways; the radio amateur is just as entitled to it as the person who watches television, listens to the radio, uses VCRs, hi-fi, music centres, baby alarms, automatic teamakers, clock radios, compact disc players, cassette recorders and all the thousand and one other items of domestic electrical or electronic equipment which suffer from breakthrough. They suffer because they're all too often designed without any thought for RF immunity. By far the fairest and most equitable way to ensure the quality of everyone's life in this area is to enact legislation which solves EMC problems at their source - the design stage of domestic electronic equipment.

Equally, the pirate who uses foul language on an amateur repeater certainly "...besmirches the good name of the hobby" - but we don't feel that the same applies to the amateur whose transmissions disrupt next doors' hi-fi because the amplifier input circuitry is badly designed. There's an important distinction.

We are working very hard and very closely with the Department to try and find solutions to EMC problems. We remain convinced that potent and powerful legislation relating to standards of manufacture and immunity of domestic electronic entertainment equipment is the only long-term solution.



## RadCom moving house

As of 1 July 1986 the editorial department of Radio Communication will move from its offices at Chelmsford to RSGB Headquarters at Potters Bar. We've been wanting to carry out this move for some time, with two main reasons in mind - one is the saving of money which ought to be possible and the other is the wish to put the magazine in better day-to-day contact with all the things going on at Headquarters. There'll be some staff changes as well, with more Headquarters people becoming involved in the magazine side of things and more resources being put in to make it even better. Watch this space for more details later.

## Senior Citizen

### Membership requirements

Council has set two requirements for those members who wish to take advantage of the reduced senior citizen membership rate. In order to qualify, members must be over the age of 65 and have been a member for the five years immediately preceding the date of application.

## DATABOX/PRESTEL

Don't forget that the RSGB Databox will be available in a month or two on National Prestel as well as the direct dial-up - number is Potters Bar (0707) 52242.

## 50 MHz SPECIAL EVENT STATIONS

It's probably pure coincidence but we seem to have had lots of queries recently on whether or not special-event stations can use the 50 MHz band. The short answer is no - reason is that the special-event licence is regarded as an extension to clause 1(1)(ii) of the amateur radio licence, which refers to "temporary premises", for a period of 28 days.

For the moment the restrictions relating to 50 MHz operation rule out this type of use, and so the 50 MHz band cannot be used by special-event stations.

## Standing orders don't always

The DTI has informed us that there have recently been two cases where banks have failed to make standing order payments on behalf of amateur radio licensees properly - with the inevitable tedious consequences. All licensees are hereby invited to check the arrangements applying to their standing orders which relate to licence fees. While we're on this point, it's worth mentioning that all cheques and postal orders in respect of amateur licence fees must now be payable to the Post Office.

## QSL Bureau news

The QSL Bureau will be closed for the entire month of August. Cards must NOT be sent to the Wimbledon address during the month.

Those with callsigns in the G4VAA-VZZ series should take pity on their poor QSL sub-manager, Roger Powell, G4VAA. He's currently holding the enormous total of 3,271 cards for no less than 212 amateurs with callsigns in this series, and he's sent a list of 29 who each have more than 30 cards waiting for them. Help Roger find his lounge again - if your callsign is in the G4VAA-G4VZZ series and you're even slightly active on the air, please let him have at least one nice large stamped addressed envelope. His address is 11 North Park, Fakenham, Norfolk NR21 9RG.

## AMSAT-UK Colloquium

AMSAT-UK is holding a Colloquium at the University of Surrey on 5-6 July 1986. The event is open to any RSGB member as well as members of AMSAT and is intended to provide insight into all aspects of amateur satellite operation. More info is available from Ron Broadbent, G3AAJ, AMSAT-UK, London E12 5EQ or 01-989 6741 - please enclose SAE if writing.

## Vive l'entente cordiale

Would you like your son or daughter to go to La Belle France during August this year? RSGB member Bernard Falmet, FE9WK, is looking for a British amateur radio family who would like to accommodate his 15-year old daughter during August, in exchange for their offspring of the same age. Write to him at Les Heures Claires, Quartier des Plaines, 13760 Saint Cannat, France.

## Questions at the AGM....

The next Annual Meeting of the Society, which will incorporate the "Annual General Meeting" and a Society "Open Meeting", is scheduled for 6 December 1986. Members of the Society who wish formally to raise questions at the AGM are referred to page viii of the September 1985 edition of the "Bulletin" under the heading of Members' Resolutions. With reference to this item, the dates applicable to the 1986 AGM are "1. Via Council 22 August 1986" and "2(a). By exercising their rights under the Companies Act as soon as possible prior to the Council Meeting on 25 October 1986". For those members who do not have access to the September 1985 Bulletin, a copy of the leaflet "The Annual Meeting of the Society" is available from Ms Heather Norman, Assistant to the General Manager at RSGB Headquarters.



## RAYNET REPRESENTATION

Because of the resignations of G Cluer, G4AVV, R Jeffries, G4KAR and C Trotman, GW4YKL, there are now vacancies for representatives in RAYNET Zones 5, 6 and 8. Zone 5 consists of Greater London. Zone 6 contains Berkshire, Buckinghamshire, East Sussex, Hampshire, Isle of Wight, Kent, Oxfordshire, Surrey and West Sussex. Zone 8 consists of Clwyd, Dyfed, Gwent, Gwynedd, Mid-Glamorgan, Powys, South Glamorgan and West Glamorgan.

RAYNET members resident in these Zones may forward nominations for their respective zonal representatives to "The Secretary (RAYNET)" at RSGB Headquarters. Nominations should be supported by five RAYNET members who are currently registered within the Zone, and they must be received no later than 5.15pm on Monday 30 June 1986. They should be accompanied by a declaration that the nominee is a) normally resident within the Zone b) is a currently registered RAYNET member c) is a member of RSGB and d) is willing to serve if elected.

The period of appointment is normally three years. Where more than one valid nomination is received by the due date, an election will be held during the month of September 1986.

# P.S.

*Lowe Electronics will be displaying Trio equipment at the Post House, Ipswich Road, Norwich on Sunday 22 June 1986 between 2.00 and 4.30pm - there will allegedly be free coffee and biscuits for the first 50 arrivals. Talk-in via G8LOW/P on S22.*

*Lee Adams, G4RKV, would like to hear from any amateurs and SWLs who are currently participating in Martial Arts - he's considering an association for the joint promotion of both hobbies. Contact him QTHR.*

*The first-ever amateur radio festival in Turkey will take place between 2 and 6 July at the Aegean holiday resort of Cesme, some 80 miles south-west of Izmir. The event is apparently under the auspices of TGM, the Turkish PTT, and all amateurs will be welcome.*

*Advance notice that the 1986 RAIBC Picnic will be held at Broadlands, Romsey, Hants, on Sunday 20 July. All members, supporters, families and friends welcome - contact John Compton, G4COM, for more info on Southampton (0703) 693017.*



# Members' Ads

## PAGES

### FOR SALE.....

TEN-TEC OMNI-D, 1.8kHz & 500Hz filters, 280 psu, WARC kit (not installed), Shure 444, orig packing, FB for AMTOR ARO, £550. Owner updating to Corsair. G4LWA, QTHR, tel: 0494-31755 (or Prestel).

SMART ENCLOSURE, need one? Have 2off RS2000 empty cases c/w front panel controls etc, vgc, £15. Chas Mackinnon, G4BLMA, QTHR, tel: 0224-641695, evenings or 704844, daytime.

TRIO TS430S, c/w FM, MC-60 desk mic & orig packing E565 or will accept FT77, FT707 or similar solid state tcvr in p/exch. GOCOR, NOT QTHR, tel: Nottingham 725719.

TOWER, triangular 30' in 4x7' sections for large HF beams, £150. Video time/date generator, £100. Time elapsed video recorder B/W RCA, £50. Video switchers, camera controls. Ring for info. Infra red lights, VHS recorder spares. G3XUH, QTHR, tel: 0772-36063.

IC730 plus homebrew psu, immac, £425. Teletype RS232, 110 baud, stand, punch & reader with free superboard computer, £30 ono, buyer collects. G3ZVC board with MD108 & XF9B, offers? David, G8NEY, NOT QTHR Corsham Wilts, tel: 0225-810138.

THSDX Mk II Hygain 5-ele beam, brand new, still in manufacturer's sealed boxes, £500, save £150 on emporium price. G0AWD, tel: 01-647 6735.

RTTY TERMINAL UNIT, BARTG ST5 type c/w Transtel dot-matrix printer & paper, wired for BBC micro, £100. TV camera, Ikegami CTC5000 with 25mm 1:1.4 macro lens, £100. Jaybeam 4-ele Yagi, £18. ASCII keyboard, £10. Dave, G43WIL, QTHR, tel: 0292-79217

ST5 RTTY TERMINAL UNIT, £70. 2off Creed 444 teleprinters, 45 & 50 baud, perfect working order, £25 ea (buyer to collect Creeds) or all 3 items £100 incl switch unit. G4NTY, QTHR, tel: 061-790 7673, after 6pm.

VERTICAL ANTENNA DX6V, 80-10m, 3 months old, £90. Vertical 14AVT, 40-10m, £50. HF mini-beam 2-ele 20/15/10m TETHB23M, £100. G4SSX, QTHR, tel: Ruislip 30627.

FT708R 70cm handheld with FNB2, NC9C, PA3, YM16, MMB, £140. W&D 70FM10PA 1W/10W FM amp matches FT708, £35. 2m Sentinel 50W linear, £45. Datong PC1 gen/cov cvtr HF on 2m rig, £80. All post paid. G3MEW, QTHR, tel: Portsmouth 820315.

FT1012D latest Mk3 model, all-band with FM, CW filter, fan, mic, £550. FC902 atu to match, £100. SP901 spkr to match, £25. All immac condx. G3SKN, tel: Stockton 614596.

Mutek BBAS00U scanner amplifier, latest model with plugs, £25. Telscan scanner antenna with intrg amplifier, mpu plus 10m UR43 cable, £37.50. R J Newey, 1 Barlow Close, Oldbury, Warley, West Mids, tel: 021-544 4185, after 6pm.

YAESU FT757GX, MH1-B8 fist scan/mic, YM38 desk scan/mic, FRB757 linear switching relay, tech manual, £560 ono. FP757HD, £130. Both ex condx. C4UDD (getting married!) QTHR, tel: 051-260 8594.

HF5V plus radial kit, 5-band HF antenna, £45. Tonna 9-ele, 2m, £12. Both used but gwo. G4UEN, QTHR, Southampton 433837.

YAESU FT1012D, used for listening only, incl fan & mic, mint condx, orig packing, £450 ono. Bob, G6ZOU, tel: 0843-225881, afternoons & evenings.

YAESU FRG7700 communications RX c/w FRT7700 atu, FRV7700 VHF cvtr 'E' range, £250. Heil HM5 mic,

£40. Welz SP400 pwr/swr meter VHF/UHF, £50. IC2E handheld TCVR, £120. G4MVS, QTHR, tel: 01-644 8249

ICOM 505 3-10W 5m SSB CW TCVR, new condx, mic, warranty, £275. 5-ele Tonna, 6m, used month, £28. Also Trio 670 Quad band 6m TCVR BC board FM voice synth, new, £725. G3YFQ, QTHR, tel: 0923-41461.

TRIO R600 RX, gc, offers around £200. WANTED: Icom IC202S. G4IYA, QTHR, tel: Sittingbourne 21207, evenings & weekends.

ICOM 240, £125. 2off Sony C6 video recorders, £150 each, carriage extra. WANTED: Dot-matrix printer with graphics, near letter quality print with RS232 interface. AM low-band Westminster W15AM or similar. C8JTJ, QTHR, tel: Newton Abbot 68187.

ICOM 735 unmarked, as new, complete, £699. Belix 20A psu, 13.8V, ex-equipment, foldback etc, contains large transformer & lots of 2N3055s, £45 WANTED: 70cm synth handheld & Icom 202. GOCVZ, tel: Peterborough 222588.

TRIO TR9130 2m multimode TCVR c/w system base, boxed, in mint condx, £425 ono. Microwave Modules 144/50S linear, £60 ono. Daiwa CN460M cross needle swr/pwr meter, boxed, £35 ono. Marc, G6KZF, tel: Derby 676091.

COSSOR model 1035 oscilloscope, vgc, £25, buyer collect. WANTED: Ex-services man-pack TCVR's WS-18, WS-46, WS-48, WS-68, SCR-536, AN/PRC series etc. Also wanted any units or accessories of US Aircraft Command sets SCR-274 or AN/ARC-5. G4WXX, QTHR.

TRIANGULAR, steel, free-standing mast, 52' in 3 sections c/w 4' walk around at top, ex condx, never used, £250 ono. G2DCA, tel: Hungarton 310, after 6pm.

TA31 JR, 3-band rotary dipole c/w suitable rotator 2 years old, buyer inspects & collects, £35. G3ZNF, QTHR, tel: 0509-502432.

TRIO 2400, 2m handheld, spare nicads, leather case chgr 1/4 wave & rubber duck antennas, gc, with orig packing & instruction manual, £140. G6UEG, QTHR, tel: Ware (0920) 2307

TRIO TS780 dual bander, all mode, 1st class condx, very little use, giving up VHF/UHF, £700 ovno. G0BMV, QTHR, tel: 0892-44794, evenings.

YAESU FT401 HF TCVR, high power (400W), CW filter (600Hz), ideal first rig, put a QRO signal on the HF bands for only £225. G4CTU, QTHR, tel: Kidderminster 3966.

ASR 33 on stand, 230V, vgc, £70 collect. G4BCQ, QTHR, tel: Workson 772610, evenings.

KENWOOD TR7950 2m FM incl extras, £200, sold unused by frustrated RAE entrant. Fraser, QTH Hastings, tel: 0424-754919.

AT 1,250' ASL - THE ULTIMATE QTH - is now for sale again after being withdrawn from the market due to circumstances beyond our control. Lovely detached cottage, no neighbours but easily accessible, stone built, slate roof, FCH, low rates, 3 bedroom plus extra loft bedroom, kitchen, long hall, main living room having exposed beams etc, colossal views, good sized lawns & gardens, greenhouse, large vegetable plot, fruit trees. 40' commercial mast plus all aerials included in sale. Ideal for retirement or for family wanting peaceful life in an ideal environment. £26,500. Write to Rick, Tany-Graig, Bryn Rhyd Yr Arian, Llanfair TH, Abergele, C1wyd, LL22 8TP (encl stamped addressed envelope please) or tel: 074 577 673.

KENWOOD TR2500 2m FM plus base chgr, spkr/mic, case & extras, £200. Sold as unused by frustrated RAE entrant. Fraser, tel: Hastings 754919.

VALVES: 300+ war surplus & pre-war, free to anyone interested in taking the lot. Should be collected or would deliver under certain circumstances. G4PEZ, QTHR, tel: 0507-602379.

TRIO TS120V TCVR, gc, no mods, £275 or will p/exch for FT1012D cash difference. Jack, G4YNZ, QTHR (Cornwall), tel: 0726-73647.

ICOM IC290H, all mode TCVR, 144MHz 1-25W, mint condx, very little used, boxed, manuals, mobile brackets etc, £320 ono. Frank, G4UVR, QTHR, tel: 0704-25964.

WHITE STICK OPERATOR selling Kenwood TR9130, vgc, £350. Datong FL3, vgc, £100. Graham, GOCBD, tel: 0663-44118.

DRAKE R4, vgc, extra bands incl 160m, £170. Ten-Tec Century 21 HF CW TCVR, full QSK. Modified for optional full QSK using an ext RX, vgc, £150. Manuals for both, packing extra, G4ILW, QTHR, tel: Tyneside (091)-487 2661.

FT290R, muTek + case, £260. FL2010 linear, £39. LPM144-3-100 linear, never used, £135. T3-170L pwr/swr meter, £11. MMB11 mobile mount, £10. SB2/YH1 PTT sw/headset, £15. 2off 8-ele Yagi c/w phasing harness, £23. 10' CRP tube, £15. 3off 18" guy stakes, £6 lot. MET144/5 5-ele portable beam, used twice, £13. All boxed with manuals & instructions, less than 6 months use. Also Cobra 148GTD, suitable 10m, £70. Zetagi MM27 matcher, £3. V2 2-way coax switch, £3. Midland swr/pwr meter, £3. Nentone 5A psu, £5. Tarren 3A psu, £5. Pioneer T55 extn/spkr, £3. Magnount, £5. Gutter mount, £2. Chris, G1LJF, tel: Ringwood 474492, 6pm to 8pm.

PANAFLEX MV1200 FAX MACHINE c/w data sheets, inspect & collect, £150. G4AKD, tel: 0954-211189.

70cm LINEAR AMP, Microwave Modules MML432-25-100, 100W o/p, £150. 23cm tvtr MMT1296/144, £150. G3WHK, QTHR, tel: 01-330 5795, after 6pm.

HYGAIN TH3 rotary beam, £75, buyer collects. Eddystone EC10, £50. G3KJV, QTHR, tel: Leeds 675618.

DATONG SPEECH PROCESSOR, cased with controls & sockets, £30. MM435/600 ATV cvtr, £15. VHF sig/ger 100/150MHz, £15. Modified 1155, £15. Class 2 wavemeter, manls, £15. Transformer for Heathkit psu HM100/101, £15. KT66PR, £10. QOV03-20A, £10. C4BPW, QTHR, tel: 0283-813395.

FRG7 COMMS RX, mint condx, no mods, manual, £125. Yaesu desk mic MD-18B, given as present & never used, still boxed, £50. G4VYM, NOT QTHR, tel: Southampton 550444, after 5pm.

FT227RB 2m FM, 10W c/w scanner & mobile mount, £155 ono. G4IKK, NOT QTHR, tel: 0252-703496, (North West).

SOLIDISK 128k sideways RAM for BBC B never used, £100. 5.25" discs, £10 for 10. MMT144/432R tvtr, £110 or will swap for small 70cm handheld. Trio 3200 70cm portable, £75. All postage at cost. Julian, G6LOH, Highview, Culworth, OX17 2AX, tel: 029576 8152.

BROTHER EP22 printer/typewriter with lead for BBC, £65. 5.25" disc drive, double sided, IBM compatible, needs attn, £25. Computer board containing 2x280 cpu, 3xP10, 1xCTC, 1xDART, 2 serial interfaces etc, £8. Chris, tel: Bedford 851129.

LENCOM TOP-RAND TCVR, £90. Trio 2200CX. VB2200, £95. 70cm TV MTV435TX MMC435 receive cvtr, muTek pre-amp, Hitachi HV405 camera, JB48 multibeam, 2off monitors, £220. HFSR trap vertical, £60. G4RKO, QTHR, tel: 0604-712865, evenings.

TRIO TS700 2m multimode TCVR, ex condx, £220. MM 144-432S tvtr, £99. Also SK610A socket, ideal for single tube 4CX series amp on 432MHz, new & boxed, £15. 2off new N-type plugs for 1.25" helix supplied with 50 ohm & 75 ohm centre pins, £15. MM 1296-144MHz cvtr, early type, £15. New 4CX350A, £25. SM70 432-144MHz high noise! cvtr, £6. Reason for all sales; going totally homebrew on 1296MHz. GJ8SBT, tel: 0534-42258, after 6pm.



SILENT KEY SALE: JRC NRDS15 RX with matching spkr, mint condx, manual, frequency range 100kHz-30MHz, must sell, £550 ono. Mrs Jeffery, tel: Billericay (Essex) 52485, evenings & weekends.

ULTRASONIC blood flow detector, prototype battery portable instrument for listening to foetal heartbeat & other blood flow, uses 2MHz ultrasound at a few milliwatts, £47.50. David Houghton, tel: 0232-642942 extn 368, work hours.

TR10 SP120 spkrs, 2off, £10 ea. Handheld airband RX, tuneable plus 3 xtal ch, R517, £25. G6JXA, Morden (Surrey), tel: 01-648 0028, evenings and weekends.

DATONG D70 Morse tutor, as new, 6 months old, £35. John, G6Z11, QTH Birmingham, tel: 021-360 7290.

H01 MINI BEAM, covers 20/15/10/6m, perfect condx, £65 cash & carry or £70 delivered (made-up) within 5 miles of Ruislip. G1DES, QTHR, tel: Ruislip 33118.

TR10 R1000 gen/cov RX, vgc, no mods, instruction manual & orig packing, £195. Tingley, tel: 044086-475.

TR9000 2m multimode, mint condx, £325. H/B 2m PA/pre-amp 10/50W, £35. TR8400 10W 70cm FM TCVR, £180. MML432/50 linear/pre-amp, £75. AR88 gen/cov RX, £45. 2x No.19 sets, £25. WANTED: HF multimode TCVR, tvtr's etc. G8GHU, QTHR, tel: Weymouth 789022.

3.7GHz LN/cvtr, 43dB IF 750MHz, £185. Indoor demodulator base band video sound, £105. Alum dish 1.9m, £125. Drake TR7 with psu, immac, one owner, £695. G3AQX, QTHR, tel: 0773-832943.

EXECUTIVE QTH, English Lakes, 350' asl, superb views, converted barn, 3-beds, lounge, study, sep dining/rm, fitted kitchen, bath, 2wc, c/h, d/glaz, carpeted, garage, ground, heated swimming pool, 10m masts, RV £220, £63,500. Barnes, tel: 0229-85669.

MICROWAVE MODULES MMT144/28R tvtr, £160. Yaesu FRC965 Jap version of FRC9600, £270. 2m 5/8 over 5/8 colinear, new, £22. Sleuth & Murom ROMs, complete & boxed for Beeb micro, £18 ea. G6JUI, tel: Reading 507137.

TAYLOR METER model 100A, 100000 opv dc 5000 opv ac perfect working order, £40. Also Avo universal bridge c/w manual, perfect working order, £40. BC221 c/w cards & mains supply, £65. All top class condx. G3YAO, QTHR.

MM4000 RTTY, £130. PET 2001 computer/IEEE controller, integral vdu & keyboard, £100. Textronix storage scope 849, 1A2 VHF dual-amp, £180. CEC Prestel/Videotext editing terminal c/w full serial keyboard, £20. Bantex mag/mount, £4. G-whip coils, £3 ea. G8AYN, tel: 04555-57790.

70cm LINEAR + psu, 180W o/p, 4CX250B, £250. TR7800 2m FM mobile, 14 mms, 5W/25W, £150. FTV107R c/w 2m/4m module, easy conversion for 6m, suits most HF rigs, £200. 4m 7-ele ZL, £15. WANTED: 2m mobile, handheld, HF mini-beam, active filter Datong or Daiwa. Nox, tel: Reading 596485.

WRASSW SC-1 SSTV/FAX TCVR, ex condx, £400. Video printer, Mitsubishi 256x256 resolution, 16 grey levels, £430 incl 4 rolls of thermal paper, vgc. Pair £800. Dennis, G4KCU, QTHR, tel: 0246 418436.

VIC 20 computer plus 16k RAM, cassette, RTTY/CW send/receive on EPROM, £55. Mobile bracket and fixing kit for FT707, £12. Digital frequency meter, £35. SP901 extn/spkr, £12. R Middleton, 49 Wolseley Road, Stafford, ST16 3XW.

6m MITSUBISHI P/Amp ic, linear, 50-54MHz, 0.2W 1/p 17W o/p at 12.5V. Size 1"x3"x0.5", new, £35. Also have 144-148MHz versions. Mike, tel: 0392-833286.

DRAKE 2C RX with noise blanker, calibrator, HB, gc, £100. Aerial/mast 27'-31' collapses to 5', ex WD, £20. HWB ORP TX + HB, vgc, £100. M810S varactor multiplier, 2m-23cm, £10. Shaw, G4CAS, QTHR, tel: Swindon 750130.

YAESU FT75GX, FC75AT, FP75HD, bought new, used for receive only, £900 ono, night split. Yaesu FT726, 2m/70cm/satellite, bought new, perfect condx, £950 ono. Exch FT7200RH dual-band. 70cm 48-ele multibeam, discone antenna, £20 ea. G6WIL, QTHR, tel: 01-520 6020, anytime.

ANTENNA ROTATOR, Yamato YS-10-1, unused, £30. ICS software & RS232 interface for Commodore 64 and AMT-1 (version 1.07 cost £55), £25. 5-ele 2m Yagi, £5. Buyer collects or carriage extra. George, G6VS QTHR, tel: 051-480 6603.

TR10 TR2400 handheld with new nicads, chgr, two antennas, £100. TVV50A tvtr, muTek 6m, as new, incl leads, £180 ono. 2m Tonna beam, damaged so free! G4VVO, QTHR, tel: Braintree 42702.

PRO2003 VHF/UHF SCANNER RX, base or mobile, receives 2m & 70cm amateur bands, aircraft, marine broadcast, PMR etc, over 20,000 frequencies between 68-512MHz, 60ch programmable memory, as new in orig box with instructions, £150. GOAQS, tel: 061-339 9116.

YAESU/SOMMERKAMP linear FL2277Z, 160m-10m, 1200W pep, new. Yaesu FV901R tvtr, 6m/2m/70cm, perfect. WANTED: FT757 TCVR or 102 or similar, BBC micro, disc, printer and all programs for RTTY/CW/AMTOR etc. Barber, tel: Scarisbrick 880345.

TR10 TR2300 c/w nicads, chgr, mic, soft case, telescopic, 3A psu, all in vgc, no mods, new HF forces sale, £120 ovno the lot. Mike, G4HNB, tel: 061-653 8535.

TR10 9130, £350. 9-ele Tonna portable antenna, £14 Microwave Modules MML144/30LS, £55. GOCTE, tel: 01-688 4563.

SSB FILTERS XF9B 8998.45, SE1 QC1246 5.2MHz, both new, £10 ea. Transformer 1500-0-1500V @ 250mA, £10 KWM2 valves 6AZ8's, 6BN8's, AR88 valves & knobs. WANTED: 8MHz xtals HC25U for FT221R. Also FRG7, must be mint, no mods. G3ESB, QTHR, tel: 0332-671536.

SOMMERKAMP TS280FM 2m TCVR, 10W/1W, 80ch incl mobile mount & manual, vgc, £100. Consider part/exch for 144MHz linear. G4MTC, QTHR, tel: 043471-2642.

HILMAST WTM/2/12, 57', electric winch, psu, £550. Daiwa DR7500R rotator, £100. TH3JR, balun, RG8/U, £50. 2m 12-ele ZL, RG8/U, £20. SB200 linear, £150. Pocketfone 70, RB14, chgr, spare nicad, £45. AR22R rotator, requires slight attn, £20. G04HPN, NOT QTHR (West Yorks), tel: 0624-823903.

ICOM IC-745, 6 months use, perfect working order c/w FM mode, IC-SM6 desk/mic, IC-HM12 hand/mic plus IC-PS15 mains psu, complete HF stn, £750. G0DDO, QTHR, tel: Norwich 46236.

1550' ASL STONE COTTAGE, facing south, beautiful views, ideal VHF/UHF site, good roof but needs completely refurbishing, has electric/water, located Cleve Hill Shropshire. For sale at £15,500. Please send SAE to Morgan, 123 Laleham Road, London SE6 for full details.

CP4 HF VERTICAL for 10/15/20/40m, gc and ideal for small garden, £50. 22"x2" masting in 2-sections c/w jointing sleeve & guy clamp, £20. 18" stand-off brackets, unused, £10. G40YH, QTHR, tel: 0206-841444.

ICOM IC-701 HF TCVR, plus IC-701PS mains psu, vgc, £450 ono. Jaybeam 2m 6-ele quad + rotator, £59. Breml psu, 3A, £10. Unused chimney mount kit, £8. G1DDF, QTHR (NW London), tel: 01-429 0381.

LOGAN WEEKEND 400L ORGAN, 2x44 note keyboard, 13 pedals, 12 rhythms, variable voices & effects, walking bass and arpeggio, Leslie spkr, drum roll etc, ex condx, £425 ono. G1LUC, tel: 0203-450476.

TR10 TH201A 2m mobile TCVR, used twice only and perfect, boxed but surplus to requirements, £220 ono. Ashmore, QTH Beds, tel: 0582-606983.

FT101Z EXT VFO, £65 ono. Also Black Star Meteor 1000 frequency counter, unwanted gift, as new, boxed c/w manual, leads, psu, £175 ono or exch WHY? G1LUC, tel: 0203-450476.

150W 2m TONO LINEAR, hardly used & under guarantee £100. 30A Alinco 13V psu, vgc, £80. AR40 rotator, £50. 6-ele Bill Yagi, unused, £8. Richard Hill, tel: 0532-4982 (ask for room 8-40) or 01-747 1506.

2m RX with W&D 70cm cvtr, £20 ono ea. G6MCJ, NOT QTHR, tel: St Austell 64616.

FT290R, £200. G4YTY, QTHR, tel: 051-355 2751.

TR10 430S, PS430 psu, incl FM/AM/SSB filters, gen/cov transmit, mint condx, £770 ono. TH21E with spare nicad, £175 ono. New house forces sale. Paul, G4AMZ, NOT QTHR, 1 Murray Close, The Larches Macclesfield, Cheshire, tel: 061-439 9911 and leave message.

CIRKIT DFM & PRESCALER kits, unopened, cost, £75 accept £50. ZX81 16k, £15. Computer cassette player, unused, £10. Yaesu Y0100 monitorscope kit, allows to use with RX if's of 9MHz. WANTED: National company original manuals & ZX80. Varkalis tel: St Albans 39333.

FDK MULTI 725X, FM TCVR, 1-25W, as new, £160. G1DQM, QTHR, tel: Bedford 711904.

YAESU FT101Z, 9-band HF TCVR in ex condx, very little use, with mic & manual, £425 ono. G8NTD, QTHR, tel: Leicester RG4523, after 6pm.

BBC B, fitted ECONET, £220. Microvitec 14" colour monitor (model 1431), £145. 12" B&W monitor, £35. GRC & Video Genie (TRS80), software/hardware,

BBC & Video Genie (TRS80) software/hardware, SSAE for lists, RAM's, PROM's & digital ic's, enquire, TE318 teleprinter, free! A1, G4CVZ, QTHR, tel: 051-220 5470.

STRUMECH 30' MINI-TOWER, no ground post, AR40 rotator fitted, KS065 bearing, 9' aluminium pole, PBMI4 2m antenna, all vgc, £150 the lot, buyer collects. G8KJA, QTHR, tel: 0904-708704.

FT290R, muTek, nicads, chgr, never used mobile, £260. WANTED: FT203 or similar. Exch with cash difference. G1CEI, QTHR, tel: 0256-781540, after 7pm.

REDUNDANT: TS700G, int pre-amp, CW sidetone, vgc, £220. KLM 160W 2m linear, ex condx, £160. 1kW bandpass filter, £30. New & boxed 9-ele Tonna, £17 FDX401, 550W TCVR, 10-160m, revalued p/a, needs neutralising, spare valves, £140. CL110 HF 110W linear, £55. ST5 TU, professionally built, £60. G4FUT, QTHR, tel: Sunderland 236968, after 6pm.

TR10/KENWOOD R1000 RX, immac condx, £229. Icom ICB1050, 10FM, 40ch, modified p/a, 6w o/p, £25. Answercall UK500 radio/alarms telephone, amazingly versatile auto-dial, voice synthesiser alarm and memory phone, radio sensors, BT approved immac, £130. G4UCV, Kent, tel: 0732-823662.

SILENT KEY SALE: Complete 2m stn, FDK Multi 700EX, Dactron PH-5000 wavemeter, pwr/swr meter, Ringo Ranger, £250 ono. G0ESA, tel: 0535-606598.

MORSE TUTOR, Drae, vgc, £25. G1RRL, QTHR, tel: 0533-856421.

YAESU FRC9600, vgc, c/w psu, £375. Dave, tel: Selby 618943.

FT101E, £350. MMT144/28 tvtr, £85. 12AVO trap vertical, £45. 14-ele Parabeam, £30. Sinclair 48k Spectrum, Interface 1, microdrive, Alphacom printer, £160. All ono. Dave, G4DPZ, QTHR, tel: 0621-57175.

TET 2-ELE MINI-BEAM, tri-bander, never used, £100. Cushcraft 7-ele VHF Yagi, £12. Rotator for VHF beam, £20. All as new. G4WGR, QTHR, tel: 061-320 6941.

KW204 TX, KW202 RX, vgc with manuals & orig packing, £250. G4LMO, QTHR, tel: Upminster 23310.

FV101Z ext vfo, mint, £90. AR40 rotator control unit, £15 ono. Both carriage extra. G2DAF MK2 TX and heavy duty psu, TX needs minor attn, offers? Unused pair CEC 6146A, spares for G2DAF, £15. G3UZZ, QTHR, tel: 0395-273090.

TET 4-ELE tri-bander, model HB34D, 16' boom, superb performer, £250. G4SGV, QTHR, tel: Redditch 45304.

LAFAYETTE RX model HA-350, as new, offers? Member deceased. Tel: Alton 62618 for details.

TR10 AT230, £80 + p/p. EC10 Mk2 with manual, £50 + p/p. G3NOH, QTHR, tel: 01-997 4756.

YAESU FL2100Z linear amp, 9-bands, unused, £450. G3LLE, QTHR, tel: 0742-482847.

SHACK CLEARANCE: Yaesu FP-80A psu for FT290/790, £30. Alinco 2m 25W, FM/SSB linear amp, £25. C-whip HF mobile antenna, £25. 2off 10m antennas, one mag mount, one gutter mount, £15 ea. G0DPT, QTHR, tel: 01-529 4657.

10m FM, Icom ICB1050 SWM mod, squelch mods, xtal filter, £25. KLB1100X 10m linear, 50W, pwr/meter, £40. DXTV, mono Bush, converted bands I, III, IV and V, pos/neg vision, continental sound/vision, £23. G4UGV, tel: Fairseat (Kent) 823662.

FT290 with nicads, carrying case, chgr and Alinco 30W linear, all first class condx, 290 has internal muTek pre-amp, bargain price £295 the lot G3DPR, QTHR, tel: Kemble (028577) 514.

MARCONI CR300, working order, £45. Also G E Bradley elect multimeter CT471, gc, £35. Avo 8 multimeter, £40. G10CQ, QTHR Dorset, tel: Lytchett Minster 622051.

YAESU FT-ONE, gc, recently overhauled, full set of CW filters, QSK, gen/cov RX, £995 ono. G3VMW, QTHR, tel: 0937-844510.

FT707 + FC767 HF TCVR + atu, leads etc, no mods, vgc, £360. G8WTM, QTHR, tel: 0245-466915.

MARCONI sig/gen, AM/FM, 68-470MHz, £40. Burndept blue solid-pack batteries, 3 for £10. Pye black 15V multi/chgr with 3 batteries, suitable for PF70 PFS etc, £35. Dragon 32 with all info plus RTTY/CW cartridge, as new, £80. All plus carriage. G1DRR, QTHR, tel: 0302-835280.

SOTA SCL144PS linear amp, built-in psu, 10W i/p 100W o/p, brand new, unwanted gift, rrp £172.50 will take £110 for quick sale. G4WGA, QTHR,

tel: 0978-358480.

REDIFON TCVR, GR345 c/w atu, handset, synth 2-12MHz, USB/AM CW/SSB, 12W pep o/p, int psu 13.8V, ideal coastal yacht, ext rough, int ex condx, collection preferred, info SAE. G3GYE, QTHR

TRIO JR599CS RX, £100. Sony ICF2001 gen/cov portable, with manual, £70. G4BPY, QTHR, tel: 0922-413193.

COMM PRINTER 1520, brand new, £60 ono. Old model C2N, £12 ono. Has anyone got a 9" Pye colour TV model 1201 or Philips model 1120, need to know how to use the buttons - have no book. G3JUL, QTHR, tel: 01-749 1454.

YAESU FRG7700, gen/cov RX, vgc, untouched, £210. Mizuho MX-2 2m SSB/CW handheld TCVR with mains psu & handset, £40. Cheeta 32k RAM extn for 16k Spectrum, £15. G0DOL, NOT QTHR, tel: 0388-834270.

PYE WESTMINSTER with controls, £10. WANTED: 7216C counter chip, G4CLF board, FT7B, valve HF TCVR faulty & cheap for renovation. G4ILA, QTHR, tel: Lymn 2388.

DRESSLER 2m LINEAR, D200, £500. Dressler 70cm linear, D70, £550. Both less than 20hrs use. G3AGT, QTHR, tel: 0823-76349.

YAESU FT290R, £250. AMT-2 TU plus CBM64 EPROM software, £175. Joystick vfa plus Joystick atu, £35. Oskerblick swr/pwr meter 3.5-144, £10. Chas, tel: 01-764 6767.

HQ1 MINI-QUAD, c/w Hi-Q balun, £80 ono. G4HKY, QTHR, tel: Huddersfield 0484-862773.

MUTEK FT221/5 BOARD, never used, rarely taken out of box, £60. All new valves: 2off DX553 (Amperex) military spec 4CX350A c/w data, £40 ea. 2off 4CX250B £20 ea. G6ELH, QTHR, tel: Watford 30254.

FDK MULTI 700EX, mint condx, £150 ono. FT290 mutek front-end, nicads, chgr, case, boxed as new, plus MM 25W amp/pre-amp, £255 ono. FRG7700/FR7700 mint, £300 ono. Buyer inspects & collects or carriage extra. G4EFE, QTHR, tel: 0734-419833.

ND1 HC1400 TCVR, 144MHz FM 800ch, 25W, c/w mag/mount, £85. Junkers key, £20 ono. Vintage detector valve, bright emitter, circa 1922, offers please. Scott Taggart ST100 c/w bright emitters, offers? CW35S3, 3 Gilestone Cottages, Talybont-on-Usk, Brecon, LD3 7UX.

TRIO 9000, multimode vgc, c/w service manual accs, boxed, £300. Microwave Modules cvtr's 23cm-2m, £75; 70cm-10m, £25. Creed 444 t/priener c/w 45/50 baud gears, £35. PAC RTTY TU, £40. All complete working. G4PFF, QTHR (Cams), tel: 07677-7792.

YAESU FT-ONE, HF TCVR, many extras fitted. Yaesu FC902 atu. Yaesu FTV901R tvtr, 70cm-2m. SP102 spkr complete matching line. Boxed & unused, cost £2,348, will sell for £1,850. Campbell, tel: 0743-791510, after 6pm.

BURNDEPT BE471, 70cm 3ch handheld, xtalled RB11/RB0 plus one spare, c/w chgr & 3off nicad packs, £75 plus p&p or exch 2m handheld. GOCUO, QTHR, tel: 091-410 7884.

FT200 TCVR, psu, mic, all leads, handbook, orig packing, vgc, sole owner. KW E-Zee Match. Yaesu FF501DX low-pass filter HP4A TVI filter, all at £260. G3MDZ, tel: Carlisle 29039.

YAESU FT101ZD Mk3, FM, £475. Trio TH21E handheld, £145. Icom 505, brand new in box, £350. Hammarlund H0180, mint with handbook, £160. Grundig 3600 multiband radio, £170. Eddystone 1400 ships' reserve RX, £150. G4EMG, tel: 01-534 3460, evening or 01-553 7308, daytime.

MICROWAVE MODULES 432/100 linear amp, £200. BN05 LPM144-10-180 linear amp, £220. BN05 psu 12V @ 40A £245. Teac A450 cassette deck, £70. G8XU, tel: Billerica 3019, after 7pm.

CAN ANYONE USE a Bell & Howell standard 8mm movie camera model 315, zoom lens, reflex with case? Any offer. Want key with brass & glass cover. Sephton, 16 Bloemfontein Avenue, Shepherds Bush, London W12 7BL, tel: 01-749 1454.

YAESU FT200, FP200, spare valves & manual, KW E-zee Match & KW swr meter, £190 ono. Buyer collects. G4YZS, QTHR, tel: Leicester 719261.

HEATHKIT SW717 RX, £60. WANTED: Yaesu FRG7700 RX. Wood, tel: Clochen 378.

TS700 2m MULTIMODE, base stn TCVR, 10W, 240/12V operation, vgc, c/w mic & vox unit, £230 ono or might take HF RX in p/exch. G0EGR, NOT QTHR, tel: Bournemouth 302698.

SWAP 48k SPECTRUM computer, as new, little used, with books, tuition tape, masterfile & RTTY/CW RX program + TU for 70cm/2m handheld, must be in

gc. Paul, G4RVM, QTHR, tel: Lincoln 37751.

YAESU FT203 handheld, mint condx with FNB3, £150. Spare FNB3 nicad, NC9C chgr, YH2 headset, £40. Complete, £180 incl MMB21. SSTV spacemark SSM1, £50. 70cm Multi U11 TCVR, faulty hence £75. Buyer collects or delivery arranged Midlands. G4IUT, tel: 0952-79792.

YAESU FT102, fitted AM/FM, never used HF. Also modified FTV107R with fitted 2m module c/w MD18B desk/mic. All new condx & boxed, £700 ono. G6XXH, QTHR, tel: Portsmouth 695696.

FT101ZD Mk3, fitted FM c/w mic, fan, manual & orig packing, very recently serviced, good allround condx, £495. G4XW1, NOT QTHR, tel: 0474 82-3797.

YAESU FT757GX, F757AT, FP757HD, MD1 base/mic, MC1 hand/mic, all in mint condx, instruction manuals plus orig packing, £950 ovno. G0ATZ, QTHR, tel: Bishops Cleeve 724162.

KENWOOD TS820S, VF0820, spkr, manuals, ex condx, £465. KW108 monitor scope, £90. Kenwood TS530SP, manual, mic, as new, £565. Katsumi electronic keyer, £35. Admiralty No 7681, key, £25. Mic's, boxed, Shure 401A Hi, Trio MC35S Hi-Z, £10 ea. FP707, £90. G4ERU, QTHR, tel: 0202-510400.

FT708, handheld TCVR, ex condx, c/w spkr/mic, battery but no chgr, £135. CW3RER, QTHR, tel: 04465-3482.

TRIO TH201A 2m TCVR, up/down spkr/mic, mobile mount, Hi/Lo pwr switch 25W/5W, memory scan & programmable band-scan, priority alert scan, bought new July 1985, £230. CW8TKM, QTHR, tel: 0267 85-649.

FRDX500, FLDX500 matched pair amateur band RX/TX, FM board, 2m + 4m cvtr's fitted, all leads, mic etc, TX requires attn hence, £175. G1AJN, NOT QTHR tel: 01-639 8409.

SILENT KEY SALE: FRG7700 & FRT7700 c/w instruction manual, ex condx, £250 ono. G40IB, tel: Cheadle 752489.

MML144/100-S 2m linear with pre-amp, as new, £100. G4ATGF, tel: Swansea A03526.

70CM MODULE 430/726 for FT726R, 4 months old, £230. 2m/70cm colinear SMC 70N2V, £20. G1PLN, tel: Alsager 6149.

SHARP MZ80K plus Epson RX80F/T, interface, desk, software & some stationery, (desk has filtered psu), £350 ovno no split. Terry, G6MJL, tel: 0268-557443, evenings.

FDK700EX 2m FM, 0-25W c/w mic & bracket, manual etc, boxed as new, £140. G1GPC, tel: Harlow 26647.

TRIO 9F59DS gen/cov RX, 550kHz-30MHz, vgc, £30. Also Lafayette HAS00 double superhet RX, gc, 3.5MHz-30MHz, £20. Both c/w manuals plus few spare valves. Buyer collects please. G3MVD, QTHR, tel: 0229-66411.

HEWLETT-PACKARD spectrum analyser 851B/8551B c/w orig manuals, buyer checks, approves, collects, offers please. G2HBQ, QTHR, tel: Fittleworth 626.

BEL THUNDERBIRD Hy-gain tri-bander beam, buyer dismantles & collects, £150 ono. Fennell, tel: 0406-362501.

DUAL-BAND MAGMOUNT ANTENNA £1,350! Comes c/w FREE white Vauxhall Cavalier 1.6GL, W reg, ex condx, long MOT, taxed. Nelson, tel: 01-794 9200.

ICOM IC211E c/w keypad, £320. AOR AR240 with chgr & helical, £120 ono. Burndept UHF base stn BE454, £75. Microwave Modules MMD050/500 frequency counter, £69. G8ALO, tel: 021-353 7867.

DATONG AD370 outdoor active antenna with MPU and coax, £45. Adams, tel: 01876 20770.

ICOM IC251E 144MHz MULTIMODE with mutek front-end, absolutely immaculate, £495 ono. M128/144 and M128/430 MHz tvtr's with psu, metering, plugs straight in to Icom 701/720 series, offers? Jaybeam PBM18, boxed, never used, £20. G4FRX, QTHR, tel: 01-794 9200.

MM4001/KB RTTY/ASCII terminal for transmit and receive at 45/50/75/110 baud, in ex condx, c/w keyboard, able to transmit new & old tones, £155. G4ASUF, QTHR, tel: 08678-2246.

RACAL MA79 TX DRIVE unit, superb, £250. Racal TA940 linear amp, superb, £200. Racal RA117F, as new, £400. 3000V 1A psu, £50. Part-built HF linear, £50. Westell, tel: 0254 87-3305.

FT757GX TCVR, little used, vgc, £650 ono. FDK Multi-750XX, all mode 2m TCVR, £250. G4XAK, QTHR, tel: 061-336 6514.

FT290R, mutek, nicads, case, mobile/mount, MET antenna, ex condx, £250 ono. G1NHI, tel: Farndon 270233.

PYE WESTMINSTER W15FM for spares/conversion c/w bracket and spkr/mic's, well used condx but serviceable, £10 plus postage. Datong PC1 gen/cov cvtr, good results with any 2m RX, gc, £90 ono plus postage. G1WBE, tel: 0443-423295.

FT480R complete, £275. Daiwa 8A psu for FT480, £45 2m 5/8 base stn colinear, £10. 2m whip plus mag/mount, £7.50. Cased 2m LPF, £2. 2m halo, £1.50. Gutter/mount, £1.50. Heathkit SB620 scanalyser with spares, £55. Trio DM801 dip-meter, £65. Solid-state HF/VHF sig/gen, £60. 70cm tripler, £18. 70cm 5/8 whip, £5. 70cm in-line power probes, £10. Avo meter, £35. SWR bridge, £5. Equipment fan, £2. Telescopic mast, £9.50. Commercial RTTY modem, £45. Buyer collects or pays carriage. Lawrence, tel: 0935-813097, weekends only.

YAESU FT980 HF TCVR, all modes, gen/cov RX, keyer etc, £960. 2m multimode or colour video camera considered for p/exch. G4NJU, QTHR, tel: 0908-78277, after 6pm.

TV CAMERA, Sharp XC-30 c/w mains adaptor and extn leads for VTR use, mint condx. T C Gage, G1MPJ, QTHR, tel: High Wycombe 881842, anytime.

IC260E, boxed with scanner/mic. Tono 10/100W 2m linear with receive pre-amp, £300. Buyer pays carriage. G4MAO, NOT QTHR, 46 Bernwood Road, Headington, Oxford, OX3 9LQ.

FOR BBC B: Raven 20k shadow RAM c/w utilities, £35. Altair sideways ROM board c/w 16k battery backed RAM, £25. 48k Sharp MZ80K c/w Centronics printer interface, inbuilt monitor, cassette, £90. G6JXW, QTHR, tel: Overstrand (026378) 488.

KENWOOD R600 gen/cov RX, mint condx, £200. G6YMR, QTHR, tel: 0235-814861.

VERSATOWER 60', base mounted with head unit, heavy duty rotator and control box, 9' aluminium tube, 2" dia. Burns wave meter. BC221 meter calibration charts. £350 ono. A H Ryall, G8FOR, Drayton Lodge, Dunston, Stafford, tel: 078 571-4606.

KW2000A TCVR plus psu and handbook, one owner, vgc, what offers? G3LCX, tel: Harlow 34018.

HIRSCHMAN ROTATOR, little used, £25. Desk/mic, Turner expander, good for DXing, £25. Amtec 200 swl atu, £10. All plus postage. WANTED: PS30, TS130S etc. G4YRR, QTHR, tel: 0782-395017.

GOLD SOVEREIGN in 9ct scroll top mount c/w 24" curb link chain, value at £250. Offered in exch for 2m handheld with nicads, chgr etc. G1GPC, tel: Harlow 26647.

YAESU FV101B ext vfo, mint, £50. Pye W15FM 6ch Westminster, 50Hz, mint, £55. Pye FM10B 6ch Cambridge, xtalled 2m, £30. Pye AM25T 1ch. Vanguard 2m FM, £15. Pye PF1 RX, £5. Codar T28 RX, £5. Len, G6COK, tel: 021-747 4570.

FT101 very nice condx, improved front-end, recently serviced and aligned, 240/12V operation, SSB/AM/CW 600Hz, 7-bands, fan, £250. No offers. 240V 1.5KVA portable petrol generator, ideal NFD, £220. Keith, G0CCB, QTHR, tel: 0322-70073.

G3ZVC/PLESSEY/G4CLF TCVR, completely populated pcb incl 8-pole xtal filter with data, £24. Datong D70 Morse tutor, £34. 5-ele 2m Yagi, £4. G4RVD, QTHR, tel: Walton-on-Thames 241467.

SHACK CLEARANCE: Icom 701 HF TCVR with spkr/psu. Yaesu 2m multimode, FT480R plus psu. Microwave Module Morse-talker. Belcom 2m handheld. Brother EP22 printer/typewriter. Swiss made HB9CV IE Yagi. Multiband HF dipole. SWR/field strength meter. Heavy duty coax. All gc, any offers for the lot? Buyer collects. G8XKR, QTHR, tel: Walsall 649756, evenings and weekends only.

WIRELESS SET No 19 Mk2, No 19 psu (2off, one in orig waxed sealed packing), Russian/English legends, no connectors. Wavemeter Class D No 2, complete. All items stored, good extn appearance, working condx unknown, offers?, G3XHC, QTHR, tel: Dartmouth 3621, evenings.

THE RSCG IS SELLING ITS MICROGRAPHICS HEADLINER c/w 7 typeface discs, spare tape cartridges and full instructions. Ideal for magazine work, handbills, newsletters etc. Bought new last year for £685, still in ex condx, £425 ovno complete. Contact Chris Drake at RSCG Headquarters for full details. Tel: 0707-59015, 10am-4pm, Monday-Friday.



# WANTED.....

TR10 TS930S. Must be late model & in mint condx, serial no. please. Roger, G3NLY, tel: 05436-72762.

FT790 & any MMB11 mounts, please write. FOR SALE: 18 Murphy MR806 low-band AM sets, 10 have 00V0-20a £5 ea. 10 without main valve. All have harness & control box with mic, £2 ea. Collect. Bryant, G1JUF, 22 Highfield Park, Stockport, SK4 3HD.

FT225RD, 2m multimode TCVR. FT726R, multimode tri-bander. If reasonable price. Johnston, tel: 0394-460474.

FAX MACHINE, suitable for weather pictures or info relating to same. FOR SALE: Eddystone EC10 Mk2, excellent condx, £60. G4AYV, QTHR.

4CX250's, bases, chimneys, new, two of each. Winnard, tel: Canworthy Water (056 681) 493.

YAESU FC902 atu to match existing equipment. Please send details of price & condx. GW4LKE, QTHR

SUNDERLAND & CATALINA flying boat radio equipment. Aerial switch unit type-J (10F/126). Aerial loop type-1, 3 or 4 (10B/8478). Panel type 192. Also TX T1154, G14CZW, 9 Tarmon Brae, Enniskillen, N.Ireland, tel: 0365-24500.

FT200, FP200, must be vgc with no mods, good price paid for right model. G4YKT, 1 Tees Road, Guisborough, tel: 0287-33241.

FRG7 or FRG7000 communication RX. Details to Philip Monk, Kilgetty Pharmacy, Kilgetty, Dyfed, SA68 0UE or tel: 0834-812234.

CASH WAITING for Trio 120S or 130S, PS30, AT120, VF0120, SP120, mic, complete stn, must be in mint condx & in perfect working order with manuals etc. G6JOE, QTHR, tel: 0704-28500.

QUALITY HAND KEY for deserving radio club. Junkers, Marconi etc. Tyneside ARS, QTHR or G4ILW, tel: (091)-487 2661.

URGENTLY REQUIRED, Yaesu FL101 TX, must be in mint condx with manual. Also 40' tower, telescopic or sections. Trio AT200 atu or similar. Allan, G3GXR, QTHR, tel: Standish 424822.

WIRELESS SENDER No76 with supply unit rectifier No14 & psu No18. Also R109A/B. Any cables etc for WS(CDN) No29, particularly connector psu to 'B' set. Taylor, G3UCT, 1 Harewarren Close, Wilton, Salisbury, Wilts, SP2 0LY, tel: 0722-744133.

CCT OR MANUAL for Heath HW100 & FDX560, payment as required. Have for disposal R1155, Marconi Atlanta, CR300, CT316 scope, CT53 sig/gen plus other WW2 items. Exch or buy VHF marine R/T, condx unimportant, Cain, 18 Oaky Balks, Alnwick, tel: 602487.

ICOM IC451E UHF TCVR, must be in gc, cash waiting. Also require IC402 UHF portable. G6DBX, QTHR, tel: 04446-48767.

URGENT: Ten-Tec Omni Argonaut etc or similar rig with full QSK, must be solid state non-synthesised (not Japanese), would consider CW only, cash waiting. G4WZD, 37 New Street, St Neots, Cambs, tel: 0480-217026.

EXCHANGE 53" Cessna flying model, Fuji engine, Samwa radio control, Sullivan starter, all unused except for testing, value £350 for HF TCVR, any make considered. Peter Sharpe, 3 Chiltern Avenue, Poulton-le-Fylde, Lancs, FY6 7DY, tel: 0253-882368

W2AU 50 ohm - 50 ohm, 1:1 balun. G2DF, tel: Warrington 31034.

TV502: This is a 2m tvtr to match my Trio TS520. Can anybody help? G8TYO, QTHR, tel: Hastings 446805, evenings or weekends.

HY-GAIN EX14 tri-bander. Hardman, tel: Blackburn 673184, 9am-4pm.

REDIFON CRYSTAL OVEN A4260 edn A or C. Knapp, G3NMJ, QTHR, tel: Bexhill 215556.

HEATH RA-1 RXs. Marconi Mercury 1017 RX. Codar Z50/S power unit. Pye/Philips per RX with ac pu. Eddystone Raymart plug-in coils & bases. Price & condx to Marris, 35 Kingswood House, Farnham Road, Slough, Berks SL2 1DA.

HF TCVR, 12V solid state, about 100W o/p with gen/cov RX hopefully, CW/SSB/AM also atu. Please give details to Chris Whitaker, 4 The Crest, Goffs Oak, Waltham Cross, Herts EN7 5NP, or tel: Cuffley (0707) 874494, evenings/weekends.

MOSELEY 3-ELE TA33JNR tri-band Yagi or 2-ele tri-band cubical quad for HF. Yaesu FL2100Z linear amp for fair price. Essex or near counties. G4VVO, QTHR, tel: Braintree 42702, evenings.

FT290R with muTek front-end, nicads, chgr, etc. Tarr, tel: 0704-38584.

YAESU Y0901P multiscopes with bandscope, FTV901R tvtr fitted 2m, prefer mod for use with FT102 but not essential. Ian, G4WZQ, QTHR, tel: Canterbury 65968, Tues/Wed/Thurs only or Herne Bay 374318, weekends.

HF LINEAR AMP, Trio TL922, Drake L4B, Heath SB220 or similar. Chris Pedder, G3VBL, QTHR, tel: 0772-612289.

PYE POCKETPHONE TX, PFSUH, PF2UH, gc, as used with Pye Pocketphone night-call. Davies, G2FXA, 19 California Close, Stockton-on-Tees, Cleveland, TS18 1PO, tel: 0642-603595.

HF LINEAR, FL2100Z, Dexton MLA2500 or Clipperton models. Also Icom IC240 2m mobile. All must be gc. G3TKN, QTHR, tel: Waterlooville, 265101.

HF LINEAR, 600W min, valve or solid state, consider home-brew TV PL519S or even ex 11m gear eg Galaxy or similar, must be cheap, non-working or part-built considered. G4TKP, QTHR, tel: Derby 383442.

HANDHELD 2m or 70cm TCVR, IC2E, FT207, TH-21E etc or xtalld, reasonably priced in gwo, age and appearance secondary. Cash & carriage. G4YSS, QTHR

appearance secondary. Cash & carriage. G4YSS, QTHR tel: 0723-863137, evenings & weekends.

PAIR 813 VALVES, price & condx please, G2A1Q QTHR.

PYE WHITEHALL control head, no silly prices please Also Burndepp BE600, UHF hand portable. G1DOR, QTHR, tel: 0302-835280.

TR10 830S, vgc, cash, will collect within reasonable distance. Burton, tel: 0642-476127.

RACAL COLLECTOR REQUIRES: MA945 chgr, PRM4090 or TRA967 VHF TCVR, MA985/6 control units, any encryption/security items, need be complete externally only. Also wanted CRT-3 "Gibson Girl" large orange distress TX. Sayers, 120 Birmingham Road, Redditch, Worcs, B79 6EP.

FOUR METRE TCVR, MX4 in gc. GW4HBK, QTHR, tel: Blackwood (0495) 228516.

NORTH STAR HORIZON COMPUTER service manual or any information. Beehive 150 vdu terminal cct diagrams. G6XJU, QTHR, tel: 0625-611650.

EX-RAF MORSE KEY in brown bakelite case, state price. G3JMR, QTHR, tel: 0922-30119.

FM BOARD PB2218 for FT101ZD series 3, must be in mint condx. G6HLD, QTHR, tel: 01-993 1722.

2m MULTIMODE, will swap for complete darkroom outfit, possible cash adjustment. G1LDV, NOT QTHR, tel: 0858-67472.

CAN YOU HELP? to rebuild my collection of "Dinky" and "Spot-on" model vehicles after having had numerous items stolen on two occasions. Individual models or collections wanted (even damaged ones for repair). Cliff, G3YOC, QTHR, tel: 0289-308912, evenings or 0289-307263, daytime.

BC175 FREQUENCY METER, any condx, G8AEN, QTHR, tel: 0204-887428.

YAESU FR101D RX, digital, gwo, will pay good money for clean rig. Also looking for FRG7 digital, vgc. RX's must be digital. G4VYU, tel: Ettrick Valley 62259, after 6pm.

DRAKE ATU MN2000 and matching L4B linear. May accept 2DAF using 813 tubes for rebuild into Drake cabinets. Prefer separate psu. G3RUG, tel: 061-491 3814.

COMMODORE PET software, send for list of my programmes for swaps. K Williams, 3 Llugwy Road, Kimmel Bay, Ryhl, Clwyd, LL18 5LD.

COLLINS KWM2A MANUALS. School club needs data/articles/mods/manuals for fault-finding and improving an old KWM2A station recently acquired. Can you help? G4RSC, QTHR, tel: Reading 61406 or G4KWL, QTHR, tel: Reading 871330.

ICOM IC451E UHF TCVR, urgently required, must be in gc. Also required ICSP2 extrn/spkrs for IC251E and IC451E. Cash waiting. G6DBX, QTHR, tel: 04446-48767.

## CONDITIONS OF ACCEPTANCE

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 citizens' band equipment will not be accepted. Refunds will be sent for any advertisement which are rejected for any reason.

**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.

**RATES:** The current rate for Members' Ads is £2.30 (incl VAT) for 40 words or less. An additional cost of £2.30 is incurred for every additional 40 words or less. Each advertisement must be accompanied by the correct remittance, either as a cheque or

postal order made payable to 'Radio Society of Great Britain'. When writing out advertisements, please ensure that you do not enter more than one word in each 'box' on the form. It is advisable to read some of the advertisements contained on these pages and familiarise yourself with the house style. Equipment type numbers, telephone numbers and certain abbreviations will count as one word. It may be necessary to edit certain advertisements in order for them to comply with the conditions of acceptance.

The following abbreviations are in common use for Members' Ads:-  
TX - Transmitter RX - Receiver  
TCVR - Transceiver  
TVTR - Transverter CVTR - Converter  
gen/cov - general coverage  
sig/gen - signal generator  
vgc - very good condition  
gc - good condition  
ex - excellent condx - condition  
c/w - complete with

Post to: MEMBERS' ADS, RSGB, LAMBDA HOUSE, CRANBORNE ROAD, POTTERS BAR, HERTFORDSHIRE, EN6 3JW.  
DO NOT POST TO THE ADVERTISING OFFICER





# MICROWAVE MODULES LTD

**NEW**

## WE'VE GOT TO HAND IT TO YOU!

**NEW**



This is the new 50MHz Transverter that everyone is after. With a full 25 watts output and a choice of I.F.'s it will complement the best amateur shack. If you run a two metre transceiver or even an HF one, then there is no problem. The two I.F.'s available are 144MHz and 28MHz and the output is from 50-54MHz. Full specs. will be published in our next advert—but priced at £245.00 this is the connoisseur's choice of getting on to six metres. If you would like to see this superb new product visit your local retailer.

### SEE OUR STAND AT YOUR LOCAL RALLY

REST THOSE WEARY FEET! TEA AND SCONES AVAILABLE WITH EVERY 50/144 PURCHASED.

### U.K. RETAIL PRICE LIST – EFFECTIVE JANUARY 1986

#### TRANSVERTERS

		Total inc. VAT	Post Rate
MMT144/28	2m Linear Transverter, 10W o/p	129.95	B
MMT144/28-R	2m Linear Transverter, 25W o/p	236.90	B
MMT50/144	6m Linear Transverter, 25W o/p	245.00	B
MMT432/28-S	70cm Linear Transverter	195.50	B
MMT1296/144-G	23cm Linear Transverter	258.75	D
MMX1268/144	1268MHz Transmit Up-Converter	195.50	D

#### LINEARS

MML28/100-S	10m 100W Linear, 10W input	129.95	C
MML144/30-LS	2m 30W Linear, 1 or 3W input	94.30	B
MML144/50-S	2m 50W Linear, 10W input	106.95	B
MML144/100-S	2m 100W Linear, 10W input	149.95	C
MML144/100-HS	2m 100W Linear, 25W input	159.85	C
MML144/100-LS	2m 100W Linear, 1 or 3W input	169.95	C
MML144/200-S	2m 200W Linear, 3, 10, 25W input	334.65	D
MML432/30-L	70cm 30W Linear, 1 or 3W input	169.05	C
MML432/50	70cm 50W Linear, 10W input	149.50	C
MML432/100	70cm 100W Linear, 10W input	334.65	D

#### MICROPROCESSOR PRODUCTS

MM2001	RTTY to TV Converter	189.00	B
MM4001-KB	RTTY Transceiver with keyboard	299.00	D
MMS1	The Morsetalker	115.00	B
MMS2	Advanced Morse Trainer	169.00	B

#### CONVERTERS

		Total inc. VAT	Post Rate
MMC50/28	6m down to 10m Converter	35.65	A
MMC144/28	2m down to 10m Converter	35.65	A
MMC144/28-HP	2m High Performance Converter	47.90	A
MMC432/28-S	70cm down to 10m Converter	39.90	A
MMC432/144-S	70cm down to 2m Converter	39.90	A
MMK1296/144	23cm down to 2m Converter	129.95	B
MMK1691/137.5	1690MHz WX Satellite Converter	145.00	B

#### ATV

MMC435/600	70cm ATV Converter, UHF output	35.65	A
MTV435	70cm ATV 20W Transmitter	197.80	B

#### PREAMPS

MMG144V	2m RF Switched GaAsFET Preamp	37.90	A
MMG1296	23cm GaAsFET Preamplifier	75.00	A
MMG1691	1690MHz GaAsFET Preamp	129.95	B

#### OTHER PRODUCTS

MMD1500P	1500MHz Divide by Ten Prescaler	119.60	A
MMR3/25	3dB 25 Watt Attenuator	19.95	A
MMR7/3	7dB 3 Watt Attenuator	14.50	A
MMR15/10	15dB 10 Watt Attenuator	14.50	A

Postage/Packing Charges: A = 1.84 B = 3.91 C = 4.60 D = 5.98

Please allow 28 days for delivery of goods

This year our sales team will visit most of the mobile rallies. To be sure that they visit your area ring Mick G4EFO on 0403-730767.



WELCOME



## MICROWAVE MODULES Ltd

BROOKFIELD DRIVE, AINTREE, LIVERPOOL L9 7AN, ENGLAND

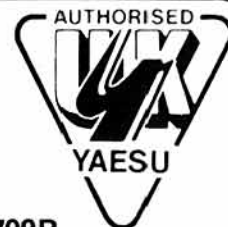
Telephone: 051-523 4011 Telex: 628608 MICRO G

CALLERS ARE WELCOME, PLEASE TELEPHONE FIRST

**HOURS:**  
**MONDAY-FRIDAY**  
**9-12.30, 1-5.00**  
**E. & O. E.**

# YAESU

**THE WORLD'S  
No1  
HANDHELD  
RANGE**



## FT203R/FT703R

The FT203R/FT703R is packaged in a lightweight, high-impact plastic case providing comfort and convenience with high durability. The small size is made possible by using chip components.

Thumbwheel frequency selectors (with 5kHz up button) plus standard repeater shift. Volume and Squelch controls are on the top panel along with jacks for the antenna (BNC), external microphone and earphone. With the optional external YH-2 Headset, the internal VOX system provides voice-actuated transmit/receive switching, for "hands free" operation when mobile or walking. (As FT209R).

Also included is an S/P.O. meter for monitoring of relative power output and signal strength. (As FT209R).

The FTE-2 1750Hz Tone Burst Generator, which is standard, is activated manually by a button on the side of the FT203R. (As FT209R).

A range of slide-on Nicad packs or AA-cell cases provides the optimum power source for your needs (As FT209R).

**144-146MHz**  
- 10kHz (+5kHz)  
Supply: 5-5.13V DC  
IF's: 10-695-0-455Hz  
Selectivity:  $\pm 6$ kHz  
@ -6dB (2:1SF)

**430-440MHz**  
10kHz (+5kHz)  
Supply: 5-5.13V DC  
IF's: 21-6-0-455Hz  
Selectivity:  $\pm 6$ kHz  
@ -6dB (2:1SF)



## FT209R/FT709R

The FT209R/FT709R with two 4-bit CPU's and a lithium backed RAM offers features far beyond anything yet conceived, in a package smaller and lighter than any previous CPU-controlled transceiver.

Ten memory channels allow storage of either standard + / - shifts, or independent Tx and Rx frequencies for any split/repeater shift on any channel, with touch-key reverse or simplex on either frequency. Scanning capabilities include step-programmable full or partial band memory bank priority scanning etc.

Battery life is greatly extended with a programmable Power saver which activates the receiver momentarily at programmable intervals.

Nineteen soft rubber dual function keys provide greater control than ever, yet operation remains easy: the keypad is carefully arranged, colour-coded and most commands are one-touch operations.

Fat 1" LCD digits are complemented by ten memory and nine special function indicators showing status at a glance.

**144-146MHz**  
25/12-5kHz  
Supply: 6-15V DC  
IF's: 10-7-0-455Hz  
Selectivity:  $\pm 7$ -5kHz  
@ -6dB (2:1SF)

**430-440MHz**  
50/25kHz  
Supply: 6-15VDC  
IF's: 21-6-0-455Hz  
Selectivity:  $\pm 15$ kHz  
@ -6dB (2:1SF)

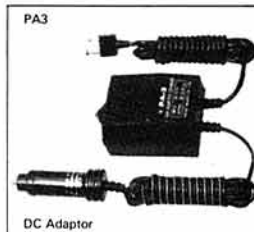
### GENERAL SPECIFICATIONS

Good 50 ohm match to linears and antennas. Frequency modulation (FM-F3-G3E) variable reactance linear modulator

Sensitive, quality 2K ohm condenser MIC.  $\pm 5$ kHz max. dev, 16kHz max. bandwidth. Transmitter spurious output -60dB

Sensitivity: 0-25 $\mu$ V for 12dB Sinad, 1 $\mu$ V for 30dB S/N.  
AF O/P: 450mW into 80ohms @ 10% THD

Large range of accessories available. Supplied with YHA 14A/YHA 44D helical antenna and appropriate soft case



### MODEL, SUPPLIED CELL, POWER OUTPUT (Hi/Low), CASES, DIMENSIONS

FT203R	FT703R	FT209R	FT709R	FT209RH
1-5/0-2W* C/W FBA5 CSC6 65W, 34D, 153H mm	1-5/0-2W* C/W FBA5 CSC6 65W, 34D, 153H mm	1-6/0-2W* C/W FBA5 CSC10 65W, 34D, 168H mm	1-8/0-2W* C/W FBA5 CSC10 65W, 34D, 168H mm	2-3/0-3W* C/W FBA5 CSC10 65W, 34D, 188H mm
2-5/0-3W C/W FNB3 CSC6 65W, 34D, 153H, 482gms	2-5/0-3W C/W FNB3 CSC6 65W, 34D, 153H mm, 480gms	2-7/0-3W C/W FNB3 CSC10 65W, 34D, 168H, 512gms	3-0/0-3W C/W FNB3 CSC10 65W, 34D, 168H mm, 535gms	3-7/0-4W C/W FNB3 CSC10 65W, 34D, 168H mm, 512gms
3-5/0-4W C/W FNB4 CSC7 65W, 34D, 172H, 490gms	3-5/0-4W C/W FNB4 CSC7 65W, 34D, 172H mm, 495gms	3-7/0-4W C/W FNB4 CSC11 65W, 34D, 186H, 520gms	4-0/0-4W C/W FNB4 CSC11 65W, 34D, 186H mm, 520gms	5-0/0-5W C/W FNB4 CSC11 65W, 34D, 186H mm, 520gms

FT203R C/W FBA5 ..... £195.00  
FT203R C/W FNB3 ..... £225.00  
FT203R C/W FNB4 ..... £229.00  
FT703R C/W FBA5 ..... £229.00  
FT703R C/W FNB3 ..... £255.00

FT703R C/W FNB4 ..... £260.00  
FT209R C/W FBA5 ..... £239.00  
FT209R C/W FNB3 ..... £265.00  
FT209R C/W FNB4 ..... £270.00  
FT209RH C/W FBA5 ..... £245.00

FT209RH C/W FNB3 ..... £275.00  
FT209RH C/W FNB4 ..... £279.00  
FT709R C/W FBA5 ..... £255.00  
FT709R C/W FNB3 ..... £285.00  
FT709R C/W FNB4 ..... £290.00



**South Midlands  
Communications Ltd.**  
Rumbridge Street  
Totton, Southampton  
Hants SO4 4DP

**YAESU MUSENS  
ONLY AUTHORISED  
DISTRIBUTORS**

**AMATEUR  
ELECTRONICS AE LIMITED**  
510-512 Alum Rock Road  
Alum Rock  
Birmingham B8 3HX

