RADio COMmunication

April 1986

Peter Hart, G3SJX takes the lid off the muTek TVVF50c

see the Bulletin pages

Journal of the Radio Society of Great Britain

RSGB

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CONTENTS

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

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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 overidden. 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 spearate 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 transmittted 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.
AT400 .. .. .. £125.00 inc VAT carriage £7.00.
PS50 .. .. .. £192.60 inc VAT carriage £7.00.

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TRIO-KENWOOD COMMUNICATIONS

Division of Trio-Kenwood Electronics GmbH
Rembrücker Street 15, D-6056 Heusenstamm, West Germany

vhf/uhf fm transceivers

TW4000A FM VHF/UHF dual band transceiver

To have both 70 centimetres and 2 metres available in one mobile transceiver has been a desire of the VHF/UHF enthusiast for many years. TRIO with the TW4000A have satisfied that need. The transceiver is well known for having an excellent receiver and as those who already own and operate one know, is a delight to use. Compact and producing 25 Watts on both bands, the TW4000A is the enthusiast's natural choice.

TW4000A . . . £580.34 inc VAT, carriage £7.00

TR7930 2 metre FM mobile/base station transceiver

A mobile FM transceiver that also doubles as a piece of shack equipment. Producing 25 Watts and having 21 memories, priority alert, full repeater facilities including reverse repeater, programmable band scan, memory scan and keyboard frequency entry, the TR7930 is ideal for mobile operation using the programmed memories, yet is suitable for shack use with the front panel keyboard.

TR7930 . . . £365.60 inc VAT, carriage £7.00

TM201A and TM401A 2 metre and 70 centimetre mobile FM transceivers

Accepting the fact that there is little space in a modern car for anything other than a radio/cassette unit, TRIO have with the TM201A and TM401A produced the definitive compact transceiver. By removing the speaker and making this separate, TRIO have given you excellent receive audio quality. The TM201A and its 70 centimetre version, the TM401A are ideal for the amateur who wants a high performance rig with ease of operation.

TM201A . . . £296.09 inc VAT, carriage £7.00
TM401A . . . £350.91 inc VAT, carriage £7.00

TM211E and TM411E FM VHF and 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, carriage £7.00
TM411E . . . £466.18 inc VAT, carriage £7.00

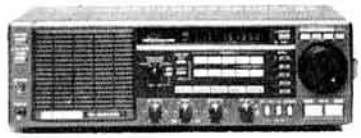
6 metre equipment

TS670	An all mode (FM optional) four band base station transceiver covering 6, 10, 15 and 40 metres. 13.8 volt DC operation/10 watts output. Also available for the TS670 is a general coverage receiver unit covering 500kHz to 30MHz.	
TS670		**£774.13** inc vat, carriage £7.00.
FM430	FM board	**£45.00** inc vat, carriage £1.00
GC10	Receiver board	**£58.75** inc vat, carriage £1.50
TR9300	Simply a 6 metre version of the well known 2 meire TR9130. 10 watts out, 13.8 volt DC operation.	
TR9300		**£590.49** inc vat, carriage £7.00

general coverage receiver

R2000 general coverage receiver

The R2000 general coverage receiver from TRIO covers the frequencies from 150KHz to 30MHz. Modes of operation are AM, USB, LSB, CW and FM. For convenience the R2000 has ten memories, each of which holding frequency and mode information. Memory scan and programmable scan between user designated limits are also included. Provision has been made for an optional internal VHF converter covering from 118 to 174MHz. Operating from either mains or 12V DC the TRIO R2000 is an ideal way to listen to the world.



R2000 . . . £518.73 inc VAT, carriage £7.00
VC10 VHF converter 118 to 174MHz . . . **£139.01** inc VAT, carriage £2.50

station accessories

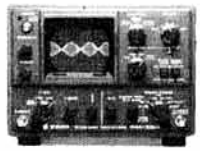
TL922 HF amateur band linear amplifier

The TL922 is a class AB2 grounded grid linear amplifier using two high performance EIMAC 3-500Z tubes. It covers 160 to 10 metres for SSB, CW and RTTY modes of operation. Engineering perfection, those who have seen a TL922 will know what I mean. It is one of the few items of amateur radio equipment which is truly hand built by a specialist engineer.

TL922 inc tubes . . . **£1265.00** inc VAT, carriage £7.00

SM220 station monitor

Based on a wide frequency range oscilloscope, the SM220 station monitor features in combination with a built-in two-tone generator, a wide variety of waveform observing capabilities. The SM220 aids efficient station operation as it monitors transmitted waveforms and it also serves as a sensitive wide frequency range oscilloscope for various adjustments and experiments. When fitted with the optional BS8 panoramic display and connected to one of the following transceivers (TS940, TS830, TS180, TS820 series) signal conditions in the vicinity of the receive frequency can be seen over a 40 or 200KHz range.



SM220 . . . £262.75 inc VAT, carriage £7.00
BS8 . . . £66.11 inc VAT, carriage £1.50

send for the **TRIO** general catalogue

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CN620A. 1·8 to 150MHz cross needle power/SWR meter. Up to 1kW.
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CN630. As above but 140–450MHz. Up to 150 Watts.
£108.99 inc VAT, carr. £2.50

NS448. 900 to 1300MHz power/SWR meter. Up to 20 Watts.
£75.00 inc VAT, carr. £2.50

CNW419. 1·8 to 30MHz general coverage aerial tuning unit.
£177.19 inc VAT, carr. £7.00

CNW919. 2 metre power meter and aerial tuning unit.
£116.54 inc VAT, carr. £3.00

DAIWA rotators . . . . .

The new range of rotators from DAIWA, the MR series, are designed so that additional motors can be added around a central core, each motor increasing the rotators turn and braking capacity. The MR series will accept up to four motors being initially supplied with one. As the number and size of aerials increases, additional motors can be added, and both turning capacity and braking effort increased.

MR750E	Multitorque rotator (round controller).....	**£214.13** inc VAT,
MR750PE	as above but with preset controller.....	**£241.44** inc VAT,
MR300E	Higher speed version with round controller..	**£214.13** inc VAT,
LMC	lower mast clamp.....	**£15.55** inc VAT,
MR750U	additional motor for MR750E/PE.....	**£71.74** inc VAT,
MR300U	additional motor for MR300E.....	**£71.74** inc VAT,

Carriage on rotators £7.00, components £3.00

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

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

Power output from the TM2550B 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 back-lit 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.

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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), BANDWITH 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 NRC525, 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.**

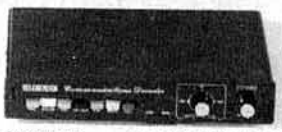
Telereader equipment.....

CWR685E Tx/Rx unit for RTTY/CW/ASCII
£856.51 inc VAT, carr. £7.00

CWR675E RX unit for RTTY/CW/ASCII **£498.57** inc VAT, carr. £7.00

CWR610E Rx unit RTTY/CW/ASCII
£216.41 inc VAT, carr.£3.00

CWR670E Rx unit RTTY/CW/ASCII
£436.01 inc VAT, carr. £7.00



CD660 Rx unit RTTY/CW/ASCII/TOR/AMTOR
£257.19 inc VAT, carr. £3.00

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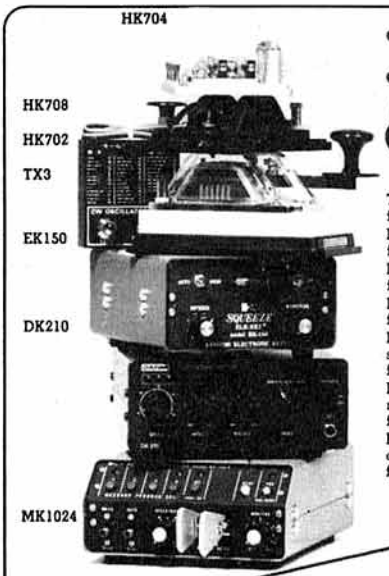

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The Best HF.

The New ICOM HF Flagship.

IC-751A

ICOM are proud to launch their new flagship. The IC-751 was good, the new ICOM IC-751A is even better. With a general coverage receiver 100KHz – 30MHz it is a full featured all-mode solid state transceiver that covers all the WARC bands. The IC-751A has an excellent 105db dynamic range and features pass band tuning, notch filter, adjustable AGC, noise blanker and RIT. A receiver pre-amp provides additional sensitivity when required. On C.W. the electronic keyer is standard and 40 w.p.m. at full break-in is possible. The FL32 500Hz C.W. filter is fitted as is sidetone on receive mode. On SSB the new FL80 2.4KHz high shape factor filter is fitted.

The high reliability transmitter, full 100% duty cycle designed for SSB, CW, AM, FM, RTTY and Amtor, with a high performance speech processor to enhance the IC-751A transmitters operation. With 32 memory channels and twin V.F.O.'s, scanning of frequencies and memory are possible from the transceiver or from the HM12 mic supplied.
The IC-751A is fully compatible with ICOM auto units such as the AT500 automatic antenna tuner and the IC-2KL linear amplifier. Options available: PS35 internal A.C. P.S.U., PS15 external A.C. P.S.U., EX310 voice synthesizer, SM8 and SM10 desk mics and various filter options.

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ICOM

The ICOM Control System

If you have a BBC Micro (Model B) or Commodore 64 or 128, the ICOM control system can control up to four (or more) ICOM radios in the range: IC-751, 735, R71, R7000, 271, 471 and 1271 (and 745 with modification). The help menu shows the available functions.

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

IC-735, The Compact HF Radio

The new ICOM IC-735 is ideal for mobile portable or base station operation. It has a general coverage receiver from 0.1MHz to 30MHz and transmits on all amateur bands from 160m to 10m. SSB, CW, AM and FM modes are included as standard. RTTY and Amtor are also possible. The IC-735 has a built-in receiver attenuator, pre-amp, noise blanker and RIT to enhance receiver performance. A 105dB dynamic range with pass band tuning and a sharp I.F. notch filter for superior reception. The twin VFO's and 12 memories can store mode and frequency. The HM12 scanning mic is supplied. Scanning functions include programme scan, memory scan and frequency scan.
The IC-735 is one of the first H.F. transceivers to use a liquid crystal display which is easily visible under difficult conditions. Controls that require rare adjustment are placed behind the front panel hatch cover but are immediately accessible. Computer remote control is possible via the RS-232 jack. Output power can be adjusted from 10 to 100 watts with 100% duty cycle. A new line of accessories are available, including the AT150 electronic automatic antenna tuner and the PS55 AC power supply. The IC-735 is also compatible with most of ICOM's existing line of HF accessories. See the IC-735 at your authorised ICOM dealer or contact Thanet Electronics Limited.

ICOM

IC-1271E, 1·2GHz Multimode Transceiver

ICOM, a pioneer in 1.2GHz technology are proud to introduce the first full feature 1240 – 1300 MHz base station transceiver. Features include: multimode operation, 32 memories, scanning and 10 watts RF output. The IC-1271E allows you to explore the world of 1.2GHz thanks to a newly developed PLL circuit that covers the entire band, a total of 60MHz, SSB, CW and FM modes may be used anywhere in the band making the IC-1271E ideal for mobile, DX, repeater, satellite or moonbounce operation. The IC-1271E has outstanding receiver sensitivity, the RF amplifiers use a low noise figure and high-gain disc type GaAs FET's for microwave applications. The rugged power amplifier provides 10 Watts which can be adjusted from 1 to 10 Watts. A sophisticated scanning system includes memory scan, programme scan, mode-selective scan and auto-stop feature. Scanning of frequencies and memories is possible from either the transceiver or the HM12 scanning microphone. 32 programmable memories are provided to store the mode and frequency in 32 different channels. All functions including memory channel are shown clearly on a seven digit luminescent dual colour display. The IC-1271E has a dial-lock, noise blanker, RIT, AGC fast or slow and VOX functions. With a powerful 2 Watt audio output the IC-1271E is easily audible even in a noisy environment. The transceiver operates with either a 240V AC (optional) or 12 volt DC power supply.

IC-R71E, General coverage receiver.

The ICOM IC-R71E 100KHz to 30MHz general coverage receiver features keyboard frequency entry and infra-red remote controller (optional) with 32 programmable memory channels, SSB, AM, RTTY, CW and optional FM. Twin VFO's scanning, selectable AGC, noise blanker, pass band tuning and a deep notch filter. With a direct entry keyboard frequencies can be selected by pushing the digit keys in sequence of frequency. The frequency is altered without changing the main tuning control.

Options include FM, voice synthesizer, RC-11 infra-red controller, CK70 DC adaptor for 12 volt operation, mobile mounting bracket, CW filters and a high stability crystal filter.

British TELECOM Cellnet Approved Dealer for Mobile Phone Division

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IC-3200E Dual-band

If you are a newly licensed or just undecided about which band to first operate, then the ICOM IC-3200E is just the answer. This is a dual-band (144-146/430-440MHz) F.M. transceiver ideally suited for the mobile operator. The IC-3200E has a built in duplexer and can operate on one antenna for both VHF and UHF, and with 25 watts of output power on both bands (the low power can be adjusted from 1 to 10 watts) you can never be far from a contact whether simplex or 2m/70cm repeater.
The IC-3200E employs a function key for low priority operations to simplify the front panel and a new LCD display which is easy to read in bright sunlight, 10 memory channels will show operating frequencies simplex or duplex, and four scanning systems memory, band, program and priority scan. Try this exciting set from ICOM the IC-3200E, when only the best will do.
Options include IC-PS45 AC power supply, HS15 mobile boom mic, SP10 external speaker, UT23 speech synthesizer and AH32 dual-band mobile antenna.

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.

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., Barclaycard and Access facility, 24 hour answerphone service.

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.

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

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M150-GSX	2m ¼ / whip	7.35
RSL-435S	70cm ⅝ over ⅜ / whip	28.50
RSM-4M	Mag mount for above	21.00

MICROWAVE MODULES

MML144/30LS	inc preamp (1/3w l/p)	
MML144/50S	inc preamp, switchable	
ML144/100S	inc preamp (10w l/p)	
MML144/100HS	inc preamp (25w l/p)	
MML144/100LS	inc preamp (1/3w l/p)	
MML144/200S	inc preamp (3/10/25 l/p)	
MML432/30L	inc preamp (1/3w l/p)	
MML432/50	inc preamp (10w l/p)	
MML432/100	linear (10w l/p)	

B.N.O.S.

LPM 144-1-100	2m, 1W in, 100W out, preamp
LPM 144-3-100	2m, 3W in, 100W out, preamp
LPM 144-10-100	2m, 10W in, 100W out, preamp
LPM 144-25-160	2m, 25W in, 160W out, preamp
LPM 144-3-180	2m, 3W in, 180W out, preamp
LPM 144-10-180	2m, 10W in, 180W out, preamp
LP 144-3-50	2MN, 50W out, preamp
LP 144-10-50	2M, 10W out, preamp
LPM 432-1-50	70cm, 1W in, 50W out, preamp
LPM 432-3-50	70cm, 3W in, 50W out, preamp
LPM 432-10-50	70cm, 10W in, 50W out, preamp

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HL-82V	85W 2m linear 10W input	144.49
HL-110V	110W 2m linear	199.00
HL-160V	160W 2m linear 10W input	244.52
HL-160V25	160W 2m linear 25W input	209.75

LINEAR UHF

HL-20U	20W 70cm linear	82.90
HL-30U	30W 70cm linear	119.00
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432-19T/ATV	19 Ele	35.60
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432-17T	17 Ele Long	39.20

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144-5	5 Ele	19.55
144-7T	7 Ele	24.15
144-8T	8 Ele Long	31.26
144-14T	14 Ele	46.71
144-19T	19 Ele	55.88
144-6X	6 Ele Crossed	39.75
144-GP	Ground Plane	14.41

4M

70/3	3 Ele	30.12
70/5	5 Ele	45.74

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70cms	2 Way	19.55
	4 Way	23.00
2M	2 Way	25.50
	4 Way	28.75

T.E.T. ANTENNAS

		SRP	Discount Price
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HB15F2T	2 element 15 meter beam	60.66	48.50
HB15M2SP	2 element 15 meter mini beam	69.49	55.59
HB210S	10 element 2 meter beam	47.99	38.40
HB23SP	2 element tri-band beam 10, 15, 20m	172.50	138.00
HB23M	2 element tri-band beam (mini) 10, 15, 20m	169.50	135.90
HB32SP	3 element dual-band beam 10, 15m	168.64	134.99
MLA4	HF band 100p antenna	105.60	84.40
MV3BN	Vertical antenna 10, 15, 20m	45.95	36.79
MV3BHR	Vertical antenna 10, 15, 20m + trapped radials	78.00	67.00
Q7U10S	10 element 430 MHz Yagi	67.90	54.32
SQ007	Double quad 430 MHz	66.99	53.59
SQ10	10 meter quad mono band antenna	97.50	78.00
SQ15	15 meter quad mono band antenna	106.89	85.59
SQ22	Double quad 144 MHz	58.95	47.00
SQY06	Swiss quad/yagi 144 MHz 6 element	45.75	36.60
SQY08	Swiss quad/yagi 144 MHz 8 element	52.74	42.00
SSL218	Double 144 MHz slot Yagi 9 element	144.78	115.89
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AD270-MPU	Active dipole with mains p.s.u.	51.75
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YM1X	3.5-150 MHz 120 Watt SWR/PWR meter	21.49

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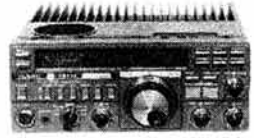

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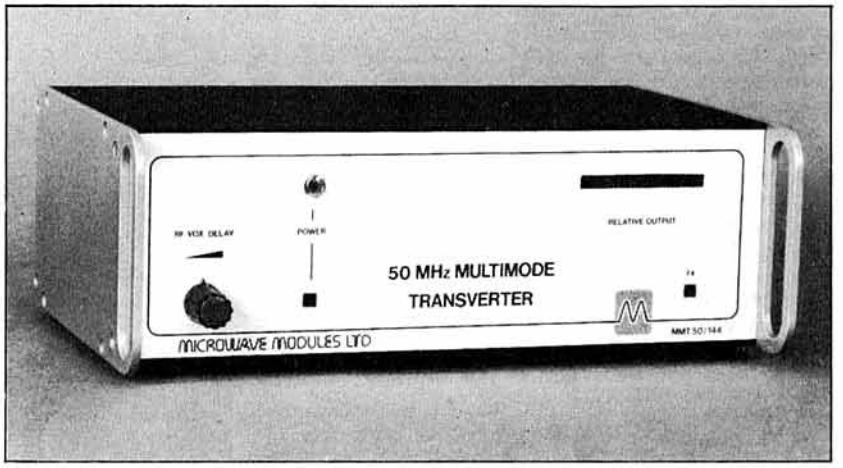

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Reports from U.S.A. on MMT 144/28R

We've managed to find an extract from the March '86 issue of CQ Magazine published in the U.S.A., so lets see what our friends across the water are saying about the 144/28R.

"receive performance is excellent, a very noticeable improvement over just about anything else I've used on two meters....Such outstanding receive performance is the result of careful gain distribution and high-level balanced mixer stage....sub-microvolt signals simply "jump" out of the noise and are easily readable....my own two meter repeater on 146.805 located here at my home QTH and running 150 watts carrier power to an antenna system less than 10 feet from my "main" two meter yagi system, did not even seem to desense the receive section of this transverter. This was amazing....In all, the MMT144/28R is an excellent product which would make a fine addition to any VHF'ers shack"

extracts by Steve WB2WIK from March '86 QC Magazine—thanks to both.

Well that seems a glowing testimonial—lets see what they have to say about our new 50MHz transverter when it reaches their shores!

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MMS1	The Morsetalker	115.00	B
MMS2	Advanced Morse Trainer	169.00	B
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MMT144/28-R	2m Linear Transverter, 25W o/p	236.90	B
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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	
MMK1296/144	23cm down to 2m Converter	129.95	B
MMK1691/137·5	1690MHz WX Satellite Converter	145.00	B
MMG144V	2m RF Switched GaAsFET Preamp	37.90	A
MMG1296	23cm GaAsFET Preamplifier	75.00	A
MMG1691	1690MHz GaAsFET Preamp	129.95	B
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
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FT209R NEW 2m Held/C/W FNB3	
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NC9C Charger	
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FT726R 2m Base Station	
430/726 70cm Module for above	
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IC290E 10w M/Mode Mobile	
IC271E 2m 25w M/Mode Base Stn	
IC271H 100W version of above	
IC25H 2m 45w FM	
IC27E 25W FM mobile	
IC45E 70c 10w FM	
IC47E 25w 70cm FM mobile	
ICBU1 B/U Supply for 25/45/290	
ICR70 General Coverage Receiver	
ICR71 General Coverage Receiver	
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IC2E 2m H/Held	
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EMOTO — all models POA

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ADVANCED MICRO CONTROL

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.

LCD DISPLAY

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.

PROGRAMMABLE SYNTHESIZER

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.

TEN MEMORY CHANNELS

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 halting (FM mode) when the channel is clear or busy, as desired. Memory backup is provided by a built-in lithium cell.

DUAL VFO SYSTEM

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.

CONVENIENT FEATURES

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 : 0.25μ 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 × 150W × 195D mm
1.3kg (without cells)

Current consumption: 70mA receive
800mA Tx (2.5 W RF FM)

Power requirements:
8 × C size dry cells
8 × 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
Synthesiser steps:
SSB/CW/AM : 100Hz/1kHz.
FM : 10/20kHz
Sensitivity (better than):
SSB/CW/AM : 0·5μV for 20dBS/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 (+ & –)

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FT703R	70cm Thumbwheel	from £229.00
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FT209R/709R

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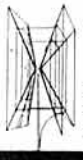

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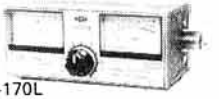

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(Clwyd, Gwynedd)
Region 12 M R Hobson, GM8KPH, tel 0796 2140
(Grampian, Highland, Island Authorities, Tayside)
Region 13 A J Scott, GM8BDX
(Borders, Fife, Lothian)
Region 14 T G Wylie, GM4FDM, tel 0505 22749
(Central, Dumfries & Galloway, Strathclyde)
Region 15 R R Parsons, GI3HXV, 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 Claytonsmith, 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

THE AMATEUR AND THE GOVERNMENT

There has been a recent change in policy on the part of the Radio Investigation Service of the Department of Trade & Industry, which could have a significant impact on many radio amateurs in the UK. This change relates to the amateur/neighbour breakthrough situation, and has been prompted by the further withdrawal of services from the domestic scene by the field staff of the RIS.

Since late January a number of members have reported receiving a new standard letter from their local RIS office when breakthrough has been reported in their vicinity. The letter assumes that the amateur is involved and suggests ways in which emc (electromagnetic compatibility) problems can be solved. However, it concludes by saying: "... let me know within the next month if you have resolved the problem ... to your neighbour's satisfaction. If this is not the case, the RIS will visit you to inspect your station and determine what action should be taken. In certain circumstances the Department may need to consider varying your licence". The amateur's neighbour also receives a copy of this letter.

There is clearly little incentive for the unco-operative neighbour to assist, since as there is a veiled threat to the amateur that his/her licence may be varied, the neighbour could be forgiven for believing that the amateur is at fault. A licence variation is likely to be a permanent restriction, either in operating times or a reduction in power. The Society believes that this approach is very heavy-handed and that if the RIS follows this course of action, it could lead to an illegal exercise of the powers of the Secretary of State to vary a licence.

After the Society had complained to the DTI (in a letter dated 24 January 1986) about this policy, the DTI (in a letter dated 27 January 1986) sent the Society a copy of the policy document which had already been sent to the RIS field staff. The DTI letter contained phrases such as "new guidelines", "we would welcome an early meeting to discuss them", "of course we shall be more than happy to consider any alterations you may think desirable", and "we believe they strike a fair balance". We seriously wondered why, on the one hand, the RIS wanted to meet the Society to "consider happily" any alterations the Society thought to be desirable but, on the other hand, had gone ahead and issued the new guidelines to their field staff prior to any consultation process.

The Society did call for a meeting with the DTI. This meeting was scheduled for 20 February, prior to which a number of internal RSGB meetings took place to co-ordinate and brief all the Society officers who would be involved in handling this situation. The main thrust of this work has to-date been dealt with by HQ staff together with the chairmen of the Society's EMC and Licensing Advisory committees. Other committees are involved to a lesser extent.

At the meeting with the DTI on 20 February the Society expressed the view that the new RIS guidelines were hopelessly out of touch with reality; we therefore offered to draft a new policy document for the RIS to consider. This course of action would not be unprecedented; it is similar to the situation which arose in 1982, following the publication by the DTI of a new and manifestly

(Continued overleaf)

EDITORIAL—continued

unworkable schedule to the amateur licence—which also was not the subject of consultation with the Society. DTI staff at the meeting would not agree to the Society's request to scrap the new RIS guidelines, although they did offer the Society a revision of the standard letter to amateurs, together with a new letter intended for the amateurs' neighbours. Although these new drafts are something of an improvement, the Society is, as we went to press, considering its position and is also preparing detailed comments on the RIS guidelines.

Although this editorial is intended as an overview of the situation which has just developed, it is worth considering some of the wider aspects of the problem.

Firstly, the Radio Investigation (Interference) Service itself. This service was transferred from British Telecom to the DTI in 1984 under the terms of the Telecommunications Act 1984. Unfortunately, the DTI decided, against the best advice of the Society, to cut-back drastically on the service as a means of saving money. The cut-backs took the form of a deliberate withdrawal from the day-to-day business of the resolution of domestic problems: the remaining staff were left to deal mainly with the enforcement aspects of spectrum abuse. Although the Society took part in—and is on record as asking for the results of—the RIS review (see this month's *RSGB News Bulletin*), we were informed that this "internal review document" was not available to us. As such, the Society has not been in a position to assess the extent in which the RIS staff were likely to be able to act as mediators in the amateur/neighbour situation. However, when the Society complained again that it had not, in its view, been properly consulted or advised on RIS changes at the meeting with the DTI on 20 February, a copy of the RIS review document was passed across the table to us. Better late than never!

Secondly, there is the question of immunity standards for domestic entertainment equipment. No immunity standards are imposed on UK manufacturers at present, but the British Standards Institute has recently produced a standard, BS905, which offers some limited protection. However, BS905, is now not going to be introduced because an international organization called CENELEC is working on a similar standard of immunity which is likely to be introduced by the EEC in one or two years' time. If the EEC does adopt the CENELEC standard, the UK apparently has to adopt it regardless of any previously-existing UK standard which might have been either better or worse than the CENELEC one. Common standards in the EEC are introduced to prevent unfair competition—never mind, it seems, that the introduction of such standards in one country might be unfair to radio amateurs or other transmitter users.

The new CENELEC standard defines immunity in terms of a television or radio receiver being able to operate without noticeable breakthrough occurring in the presence of a radio transmitter which produces a field strength of 1·8V/m (approx) at the receiver site. In terms of a typical UK urban environment, 1·8V/m is not a very high standard of protection. If this standard was to be used as a means of apportioning blame, as the DTI seem to believe it should be, most users of radio transmitters would be likely to run foul of it. Later, other electrical equipment may well fall within the scope of CENELEC.

The Society considers the standard to be arbitrary, and cannot accept that the operation of an amateur station should be determined by reference to this arbitrary standard.

The Society is currently exploring every aspect of this situation with a view to finding a sensible solution. However, even at this early fact-finding stage, one thing is very clear: this is emphatically a time for all members to lend their utmost support to the Society's work, and for UK radio amateurs who are not members to join **now**. Attaining a proper solution to this matter may well involve litigation, costing a great deal of money. Even if this proves unnecessary we are still likely to need to draw on resources which were earmarked for other things—with the inevitable knock-on effects.

Finally, all members are asked to inform the Society immediately if they receive a letter from the RIS, in particular ones threatening to vary a licence. The letter should be copied and sent by first-class post to: "The Secretary—RIS" at RSGB HQ.

David Evans, G3OUF

Amateur Radio News

Publication date of *Radio Communication*

In dealing with queries from members concerning late delivery of *Radio Communication* over the past two months, it has become obvious that a considerable number of members do not know the official publication date of the magazine. Many seem to believe that this is the first day of the month of issue, when it is of course the first Friday of the month—as published on the title page.

In the case of the February and March issues, the first Friday was the 7th of the month, with the result that those members were even more aggrieved when their copies were "delivered late" by the Post Office. For the record, the February issue was posted on 5 February, and the March issue on 3 March, but deliveries by the Post Office were, as usual, widely spread.

Members will recall that we asked for delivery reports on the November 1985 issue, and our belated thanks are extended to the 633 members who responded. It had been intended to publish the results of this sample survey in the February issue, but this was delayed by the editor's spell in hospital in December.

From the two per cent sample of UK members who contributed to this survey, the following table gives the number, and percentage who received their copies between 1 and 22 days after the issue was posted on 29 October:

Days	No	%	Days	No	%
1	10	1·5	10	3	0·5
2	53	8	11	2	0·3
3	95	15	13	2	0·3
4	214	34	14	4	0·6
6	157	25	18	1	0·1
7	57	9	20	1	0·1
8	22	3	22	1	0·1
9	11	1·7			

The distance between the Maidstone, Kent, posting office and the destination of individual copies bore no relationship to the number of days taken to deliver them. In fact, some of the worse-served were those living in Kent! This delivery pattern is similar to that revealed in a wider survey carried out in September 1979.

In order yet again to take up this unsatisfactory delivery service with the Post Office, UK members are receiving a questionnaire card with this issue which all are asked to complete and return so that a much wider survey of delivery patterns can be made.

Large-user postcode for HQ

A large-user postocde has been issued to RSGB HQ; this is EN6 3JE. Members are asked to use this postcode when writing to HQ.

Stolen equipment

From the QTH of G4LUA: Kenwood TS770E, serial No 1020604; Icom IC260E, serial No 10504406; Microwave Modules MMT1296/144 transverter; Bird 43 power meter with 1,000W 100-250MHz and 10W 400-1,000MHz inserts; home-built 144MHz linear amplifier containing 2 × 4CX250B valves in grey box; Kenwood SP70 extension speaker, serial No 0010059. Information to G4LUA, QTHR.

On 28 February 1986, from a motor vehicle in the Scarborough/Whitby area: Yaesu FT290R, serial No 1/060686, and Sharp car radio/cassette model No RG5900E. Information to police, tel 0723 363333, or G4APA, QTHR.

RAF Civilian Wireless Reserve Net

The monthly net for ex-members of the above has been transferred to the RAFARS frequency of about 3,710kHz. The net takes place on the first Monday of every month ssb at 10am.

Sid Hall, G3BR—controller

Wirral ARS jubilee

The Wirral Amateur Radio Society will celebrate its golden jubilee with a dinner/dance to be held at Heswall on Saturday 10 May 1986, at 7 for 7.30pm. Details and tickets are obtainable from G2AMV QTHR.

VHF COMMITTEE VACANCIES

The RSGB VHF Committee wishes to fill two vacancies for full members, and one for a corresponding member which currently exist in the committee.

Post 1.
To carry out an extensive and detailed investigation into the possibilities for a move from 25kHz to 12·5kHz channel spacing for fm and repeaters in the 144MHz band. With overcrowding on the 144MHz fm channels in some parts of the country now reaching very high levels, the VHF Committee wishes to investigate fully the possibilities and problems involved in a move towards 12·5kHz channel spacing. The study will comprise three parts:
(i) A technical investigation into co-channel and adjacent channel performance of 25kHz and 12·5kHz spacing equipment, concluding in an estimate of the increased capacity expected from a move to 12·5kHz spacing.
(ii) A survey of currently-used equipment on the 144MHz band to identify the proportion of equipment which can work at 12·5kHz spacing, and the proportion which cannot, through design of its transmitter or receiver, be modified for 12·5kHz spacing. The review shall include a full list of modifications required for a number of popular equipments and the costs to the amateur of modification.
(iii) An outline plan of how a move to 12·5kHz channel spacing could be achieved, including the changing of all repeaters. This plan should highlight expected problems (such as interference between 25kHz and 12·5kHz equipment), and how they can be minimized by frequency planning.

Post 2. Exhibitions manager
The VHF Committee currently organizes the National VHF Convention at Sandown Park, is closely associated with the Midlands VHF Convention in Telford, and also participates in the RSGB National Amateur Radio Convention at Birmingham's NEC. At all these events the committee sets up and mans a display stand featuring some chosen aspect of vhf/uhf (in 1985 this was the 432MHz band, in 1986 the 50MHz band). To relieve loading on other members of the committee, an exhibitions manager is required to:
(i) organize the committee display stand at all events—this will include liaising with the event organizers to ensure the stand is built as required, and is provided with the required tables/chairs etc;
(ii) organize the manning of the stand at all events—attendance by the manager himself at all events is mandatory;
(iii) at the Sandown Convention, to liaise with other participating committees and RSGB staff to ensure that the combined stand is built as required by all parties—in addition, to be responsible for lecture room signposting etc.

Post 3. Syledis research
The Syledis system is a radiolocation system operating in the 430MHz region, primarily by the oil exploration business. Permanent chains are established on North Sea coasts, in the English Channel, and in other areas. Interference to amateur operation in the 432MHz band is, in some cases, quite severe. The VHF Committee wishes to recruit someone, preferably with knowledge of the Syledis System, to investigate the technical parameters of the system, and to advise the committee of ways of minimizing interference both to and from the system.

The successful applicants for posts 1 and 2 will become full members of the VHF Committee, and for post 3 will become a corresponding member. Since the committee deals with a large number of far-ranging matters, applicants should ideally be interested in many aspects of vhf/uhf, and be prepared to offer their views on fields outside their normal duties.

The committee meets about eight times a year, normally in London on Saturday afternoons. Members are entitled to claim out-of-pocket expenses, but are otherwise unpaid. Corresponding members will normally only attend meetings by prior agreement of the chairman. Applications should be made, in writing, to the chairman of the VHF Committee, Malcolm Appleby, G3ZNU, "Willowbank", Chapel Road, Otley, Ipswich IP6 9NX. Applicants should include a brief cv, highlighting their interests in vhf/uhf, and also state what other qualities they could bring to the post.

THE OLDEST LOCAL RADIO CLUB

The Derby & District Amateur Radio Society (incorporating Derby Wireless Club 1911) is celebrating its 75th anniversary throughout 1986.

The esteem in which the Society is held by the city of Derby is possibly best expressed by the fact that the Mayor of the city hosted a reception in the Council House at Derby on 8 January 1986, when permission was also granted for an amateur radio station to be set up in the council chamber, thus enabling the club chairman Richard Buckby, G3VGW, to establish prearranged radio contacts with the twin cities of Osnabrück in Germany, Angers in France and Haarlem in Holland.

There have also been stations on the air from the clubroom at 119 Green Lane, Derby, on four weekends to date, and a series of special event stations are planned from a variety of locations within the city throughout the year, all using the special callsigns GB2ERD, GB3ERD and GB4ERD.

There is a special Anniversary Award available in the form of a commemorative certificate, issued in conjunction with the city council. To obtain the award, stations in the UK are required to contact one of the special event stations and **four** other stations in Derby; amateurs outside the UK have to work one of the special event stations and **two** other stations in Derby.

All contacts must be made during 1986. Claims, with a copy of log details certified by two other radio amateurs, and a 9 by 6in sae plus 75p (UK) or five ircs (outside UK) should be sent to the anniversary organiser: Ken Griffin, G4HDP, 97 Woodlands Road, Allestree, Derby DE3 2HH. Special QSL cards are to be issued for contacts with the special calls, and claims should be sent via the QSL Bureau or to G4HDP at the address above.

The Mayor and Mayoress of Derby, Councillor and Mrs Harry Matthews are shown the GB3ERD station to D&DARS chairman Richard Buckby, G3VGW (l), and hon treasurer Martin Shardlow, G3SZJ

RAYNET SYMPOSIUM

Strathspey Hotel Aviemore

3 May 1986

Open to all radio amateurs interested in emergency communications

THEME:
Co-ordination and Communication

1000	Coffee
1030	"Co-ordination", Geoff Griffiths, G3STG, chairman, Raynet Committee
1145	"Coastguard co-ordination and communication", Mr Haward, district controller, HM Coastguard
1245	Lunch
1400	"Communication and co-ordination on the Cairngorm Mountain Rescue Team", John Allen, deputy leader, CGMRT
1500	Open forum, Raynet and user services
1600	Coffee, followed by informal chat

Why not make a Bank Holiday weekend of it. Facilities for all the family at the Aviemore Centre.

Further details from GM3RFA, tel Fort William (0393) 3833.

Communications & Electronics Museum now has charitable status

Charitable status has now been granted to the Communications & Electronics Museum Trust, which incorporates the Winbolt Collection and the Wireless Museum on the Isle of Wight. The museum was featured on page 163 *Rad Com* March 1986. The curator is G3KPO, tel Ryde (0983) 67665.

BATC RALLY/SHOW

Post-House Hotel Crick, Nr Rugby

4 May 1986

The annual amateur tv show

Full lecture programme

Seminar on amateur tv repeaters conducted by Graham Shirville, G3VZV. Paul Elliott, G4MQS, BATC Committee member and special projects manager of the RSGB Repeater Management Group will attend.

BATC biennial meeting at 4.30pm.
Trade stands. Members' stands.

Details of rally from G4PDZ, tel Leicester (0533) 553293 (shop hours) or 0533 871086 (evenings).

Details of seminar from G3VZV, tel 0525 210011. BATC information from G8CJS, tel 0532 670115.

Special rates for overnight accommodation. Tel 0788 822101 for bookings (indicate you are attending the show, and book early).

Special Event Stations

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

1986, GB4MTR
GB4MTR will be operated during 1986 on the 70MHz band by 13 different stations each in a different county. The callsign will be operated from the station of G4ENB between 26 March and 22 April.

Volunteers to run these stations are required, particularly from the north of England. An award will be available. For further details contact G4WND or G4SEU.

1-28 April, GB4SJC
Celebrates the 150th anniversary of St James Church, Brightlingsea, on 3·5, 7, 14, 21 and 144MHz fm. Station will transmit in cw, ssb, rtty on hf, and will be particularly looking for contacts with stations having associations with the Cinque Port Liberty and all religious denominations.

5 April, GB4JAG
Celebrates the 30th anniversary of the founding of Jaguar Drivers Club in 1956, at Silverstone Motor Racing Circuit, Northants. Station operated by Milton Keynes & DARS and Area 44 of JDC. Activity on hf 144MHz ssb. Special QSL cards, reports from swls acknowledged. Details G6RSC, tel Milton Keynes 510087.

5-13 April, GB4WAB
Celebrates the 50th anniversary of Cannock Chase ARS. Operation on all bands. Special QSL cards and award. Details G0BXN, tel 0543 77558.

16-17 April, GB2IPA
Celebrates the 30th annual convention of the International Police Association to be held in Jersey this year. In addition to five points for the Sherlock Holmes and other IPA awards, it will also be a rare chance to work the parish of St John. Transmission on 14, 7 and 3·5MHz. Also 144MHz, conditions permitting. Details GJ4TXB.

8-11 May, GB2WAF
Meopham Parish RC will be operating from the tower of the ancient parish church of St George, Wrotham, Kent during the 3rd Wrotham Arts Festival. Activity will be on hf and vhf amateur bands. Details G4XNU and G1KEY, tel 0732 822541.

10, 11 May, GB4HSC
Operated by Dudley ARC from Himley Hall, Dudley, in connection with sponsored sail by Himley Sailing Club, in aid of the RNLI. Transmission on all modes, rtty, hf, vhf, and Fast Scan tv. Details G4NRA, tel 0384 278300.

10-17 May, GB4LI
Six members of the Nene Valley RC will activate GB4LI from the Old Lighthouse, Lundi Island (WABSS14). Operation on all hf bands; limited facilities for 144MHz and 432MHz. Special QSL cards. Details G4NWZ.

23-26 May GB4IOS, GB8IOS
Cornish radio amateurs operating in aid of the RNLI from the Island of Great Ganilly. Looking in particular for sponsors. Operation on 3, 7, 14, 144, 430MHz and as many other bands as is possible. Details G4ZUI, tel 0209 860572.

June, GB4OH, GB0IOW
GB4OH will be operational fom 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, Widley, nr Purbrook, Hants.

7 June, GB4LAD
Station run during Luton and Dunstable's 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.

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, 24 July, GB2WAD
Celebrates the Annual Great Western 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.

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 Pilning Railway Station. Operational 10am-6pm on hf, 144 and 432MHz. Details G1DJW, tel 0934 514429.

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.

Mobile Rallies Calendar

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

13 April
Lough Erne ARC Rally, Killyherlein Hotel, near Enniskillen. Opens 1pm. Talk-in on S22 and SU8. Details from GI4CZW, 9 Tanmon Brae, Enniskillen, NI, tel 0365 24500.

20 April
East Cleveland ARC 4th Bring & Buy and Mini Rally, Leisure Centre, Marske-by-the-Sea, Cleveland. 11am-4pm. Talk-in on S22. Free car park and admission. Details G1GMF, tel 0642 474769.

27 April
Scunthorpe RC's Radio Rendezvous, Hobbies Centre, Grange Farm, Franklin Crescent, Scunthorpe. Open 11am. Talk-in on 144 and 432MHz. Special event station, GB2HRR. Details G6OSA, tel 0427 873827, evenings.

4 May
3rd Anglo-Scottish Rally, Tait Hall, Kelso. Ideally situated for G/GM/GI (GW also welcome!). 11am to 5pm. Talk-in on S22. Details GM4UIB or GM3VLB, tel 0573 24654 or 0573 24664.

5 May
Mid-Cheshire ARS Rally, Winsford Civic Hall. Open 11am. Talk-in on S22. Details D Card, 7 Glebe Green, Winsford, Cheshire, tel 0606 594719.

11 May
Drayton Manor Rally, Drayton Manor Park, nr Tamworth, Staffs (on A4091 one mile south of A5/A4091 junction). Open 11am to 5pm. Talk-in on 144 and 432MHz, G3MAR/A. Details G8BHE, tel 021-422 9787 or G8GAZ, tel 021-357 1924.

11 May
Swindon Rally, Oakfield School, Marlowe Ave, Swindon, Wilts. Open 10am. Talk-in on S22 and SU8/GB3TD. Morse tests, refreshments. Details G8SFM, tel 066689 307.

18 May
Cambridge & DARC Rally and Boot Sale, Coleridge Community College, Radegund Road. Open 10.30am (disabled 10am)-5pm. Talk-in on S22, G2XV. Admission 50p, children 25p. Free car park. Car boot pitches £4 advance booking, £5 on day. Details G4TRO, tel 0223 353664.

18 May 1986
29th Northern Mobile Rally, Great Yorkshire Showground, Harrogate. Details G3CQQ, tel 0943 602118.

25 May
Plymouth Mobile Rally, Plymstock Comprehensive School, Plymouth. Open 10am-5pm. Talk-in on S22. Details G0BNT, tel 0752 777777.

25 May
10th Annual East Suffolk Wireless Revival, Civil Service Sports Ground, Bucklesham, nr Ipswich. Open 10am. Free parking. Admission 80p. Details J Toothill, tel Ipswich 44047. Stand space from Colin Ranson, G8LBS, 100 Stone Lodge Lane West, Beacon Hill, Chantry, Ipswich.

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
28th Longleat Amateur Radio Mobile Rally, Longleat Park, Warminster. Preliminary enquiries to 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. Morse tests available. 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 G1IOO, 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.
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 G4OJN.
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–5pm. Free car parking. Food in the adjacent Tropicana Restaurant. Bar until 3pm. Details G4PNW.
19 October
South Bristol ARC present the Second Bristol Radio Rally at Hartcliffe Youth Centre, Hareclive 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 G1IOO, tel 0204 24104 evenings.
14 December
Leeds & DARS Annual Christmas Rally, Pudsey Civic Centre, Dawsons 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 April
RSGB National Amateur Radio Convention, National Exhibition Centre, Birmingham.
5, 6 July
Wembley '86 Amateur Radio & Electronics Hobby Fair, Wembley Conference Centre, London.
20 July
RAIBC Picnic, Broadlands, Romsey, Hants. Talk-in on S22. Details G4COM, tel 0703 693017.
28 September
RSGB HF Convention, Belfry Hotel and Conference Centre, just outside Oxford on the M40.

OBITUARIES

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

H F M Baker, G2LD
Bill Baker died in January aged 81. He first obtained his licence in July 1933. A captain in the Royal Artillery (Territorial Army) at the outbreak of the Second World War, he was on the training staff of the Radar School at Watchet. His major contribution to the war effort was his overall responsibility for the installation of the radar defences in Gibraltar. Of all his very varied interests, amateur radio reigned supreme and his enormous collection of QSL cards is ample testimony to his long and expert involvement with his favourite hobby.

Mr T Beaumont, G6HB
Tom Beaumont died on 27 January. During his service in India in the early 'thirties, he was licensed as VU2FP, and was one of a chain of "empire link stations" which supplied the RSGB with regular news of BERU member societies. As a captain in the Royal Signals during the Second World War, he was a member of the Special Communication Unit. His interest was primarily in cw operating and he had been a member of FOC for many years.

Mr P Charlton, G3IQP
Phil Charlton died in November, a long-time member of the RSGB and active up to the day of his death. In recent years he mainly confined his operation to scheduled contacts with old friends on the hf bands in the UK and the East Coast of the USA.

Mr T Clarke, G4BZW
Tom Clarke died recently, aged 60. Well-known locally on topband and a much respected tutor at Shelburne Youth Centre and De Beavoir Adult Centre, he served in the Royal Navy and with the London Fire Brigade until retirement. He had recently been a smiling, helpful assistant at Radio Shack.

Mr B Crawford, GM1FCZ
Mr Crawford died on 25 January. He derived a great deal of enjoyment and pleasure from amateur radio, and through it made a lot of good friends.

Mr E Hewitt, G3GMU
Ernie Hewitt, who died on 8 December, was a keen cw operator on the hf bands. he was also interested in rtty and had built much of his equipment himself. He will be sadly missed for his quiet friendly manner by all who knew him both on and off the air.

Mr J Holden, GM3SF
Jack Holden died on 12 December. He had been an amateur since 1936 and had stations in South Africa and Rhodesia, before coming home in 1965.

Mr G Kelly, G4BPS
Gordon Kelly died on 12 December aged 42. He was a member of the Society from 1973 and an active member of the WAB group. He held the callsign ZB2CM for a number of years and also operated ZB2A as a member of the RAF Gibraltar ARC.

Mr J C Northcott, G8SZK
John Northcott died on 21 October aged 76. A radio enthusiast from the days of Scott Taggart, John passed the RAE on his first attempt, at the age of 70, and enjoyed several years of amateur radio. He was jointly responsible for reopening the now very active Arborfield ARC (G3IHH).

Mr J Paxton, BRS26295
Jack Paxton who died on 24 January aged 67, was a very keen swl. He took and passed the RAE in December 1985.

Mr T Rutherford, GM3BXV
Tom Rutherford died on 23 January aged 74. His first RAF posting during the Second World War was to Pitreavie in Fife, where he became involved in the receiving and transmission of the signals which led to the sinking of the battleship "Bismarck". He also served three years in North Africa maintaining hf high-power ground stations in the company of the "desert rats". He was a past chairman of Moray Firth ARS, a member of Aberdeen ARS, and an active and friendly hf and vhf operator.

Mr K Soulsby, G1CGB
Mr Soulsby died on 18 January. Although he was a member of the RSGB and RAIBC for only a short time, he had made many friends.

Mr J Tickner, G3KGL
Joe Tickner died on 16 January. He was an active member of the RAIBC and a keen cw and QRP operator.

Miss B Tomlinson, G4NSR
Brenda Tomlinson died on 3 February aged 54. A member of the North Cheshire RC, her interest in radio knew no bounds—every new development in radio and general electronics attracted her attention. Raynet received her vigorous loyalty. Being fully qualified in first aid she frequently manned Red Cross posts at radio rallies and other public functions. Other outdoor events have benefited from her operation of portable radio at control points. Her voice will be remembered, particularly on the local 144MHz channel 9 Net.

Mr B R Warson, G4KSI
Bob Warson died on 20 December aged 36. He had been an enthusiastic radio amateur and a member of the RSGB for some years. He was latterly also very interested in microcomputer operation. He was a founder member and treasurer of the Itchen Valley ARC.

Mr J D Wheatley, BRS53921
Mr Wheatley died on 31 January after a long illness. He was secretary/treasurer of the North Cambridge Repeater Group and an active member of RAIBC.

Also:
Mr P J Allen, G4WOM, on 29 January.
Mr J R H Booth, GW6FVE.
Mr R H G Briggs, RS86593, on 27 January.
Mr A G Cross, G4FPL.
Mr T L Davies, G1ICZ, on 22 December.
Mr B Dean, RS40014 on 14 December.
Mr H Doyle, RS88250, on 12 December.
Mr D R Dryden, G3BKQ, on 2 February.
Mr G E R Eddowes OBE, G8IDP, on 27 December.
Mr J A Edwards, RS5749, on 30 December.
Mr A Hawley, G4XTP ex G6XTP, on 9 January.
Mr J M Jeannon, G4XAC, on 7 December.
Mr G McIsaac, RS88241, in December.
Mr M L Morris, RS31550.
Mr D Raper, G1DNS.
Mr D G Roberts, G3OOR, on 12 December.
Mr F A Rosser, G3YMQ, on 19 December.
Mr W Turton, G6BNF, on 30 October.
Mr B J Wallace, G4HJZ.

TRIBUTES AND AWARDS

Geoff Watts, BRS3129, Holder of the Founders Trophy for 1986.

In 1962 Geoff launched the *DX News Sheet*, a weekly publication for hf operators and swls, and for nearly 20 years compiled, edited, printed and distributed it from his home in Norwich. During that time he sent out nearly a million copies to readers around the world.

In 1964 he launched the Islands on the Air (IOTA) awards programme, a continuing venture believed by many to be the toughest challenge on the hf bands.

Geoff was honoured by USA operators in 1977 when he became the first swl elected to the CQ DX Hall of Fame. He continues to take a keen interest in the hf bands and to publish his world-famous, totally comprehensive list of countries, zones and prefixes.

Both *DX News Sheet* and IOTA are now RSGB services. Contact RSGB HQ for *DXNS* subscription information, and G3KMA for IOTA details.

Geoff Watts at home

Eric Trebilcock, BERS185, special award.

Eric has entered the Receiving Section of the BERU/Commonwealth Contest every year since 1934. He has always been highly placed and has won the section on 10 separate occasions. In recognition of this outstanding achievement, the HF Contests Committee suggested to Council that he be given a special plaque to mark his efforts over 50 years.

Council approved the award with great pleasure and it was presented to him on behalf of the President by the chairman of the HFCC, Ron Glaisher, G6LX, during a recent visit to his home in Melbourne, Australia. Eric has every intention of entering the 1986 event; long may he continue to support RSGB receiving contests.

Eric Trebilcock

Don McLean, G3NOF, current holder of the Rotab Trophy.

An RSGB member for 42 years, Don was licensed in 1959 and has now worked 312 countries from the current DXCC list (343 all-time). He monitors the hf bands daily, keeping records of propagation conditions, band openings, and countries heard. Don was a founder member of the Yeovil Amateur Radio Club in 1946 and still plays an active role on the club committee; taking a special interest in newcomers to the hobby.

Don McLean in his shack

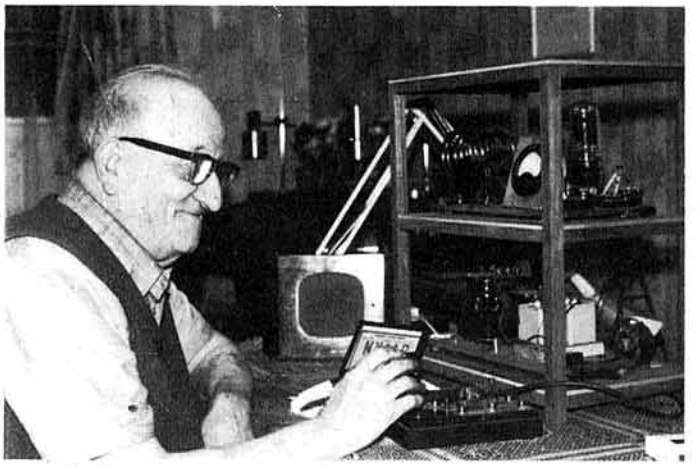
ACROSS THE GENERATIONS OF AMATEUR RADIO

Reg Baker, G6QN, was an army brasspounder in the first world war and obtained his first amateur licence in 1922.

Now 87 and a white stick operator, he prefers the simpler things in life and so has blown the dust off the one-valve transmitter he used to work NY1AB on 7MHz in 1932. The revamped rig (see photo below) boasts a PX25, replacing the original Triotron ZD2, and a mains power supply, but the morse key is pure 1898 vintage. The companion receiver is a second world war Eddystone 358X.

G6QN's distinctive brand of morse may be heard on 7,010kHz and his cheery voice on the Wimbledon & DARS 144MHz net at 9pm on Monday evenings.

Mark Burleigh, aged 20 months, son of Dave, G4WIX, is seen in the photograph below resolving a strong ssb signal on 14MHz on his father's TS830S. Dave says: "It's nice to catch 'em young if you can".



Members' Mailbag

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.

50MHz REACTIONS

Sir—After the announcement of the 50MHz amateur allocation, I was quite surprised to hear the grumblings of some of my fellow amateurs! It seems that there are those who view the decision of the DTI to allocate the band to Class A licence holders as a decision made by the RSGB! It would also seem, again from listening to the amateur 144MHz band, that all Class A licence holders urged the DTI to exclude Class B licensees from access to the band. It has also been my misfortune and displeasure to hear some amateurs remark that they no longer wish to communicate with any holder of a Class A licence. I am maddened to hear such comments from so called "old hands" as they can only do the Class A/B relationship harm.

I got up off my backside and, because I wanted to use the high frequency part of the radio spectrum, took the time and effort to learn morse. I found it a quite easy and pleasurable exercise to learn, and the whole process, from start to passing the test, took just over two months. My young lady also took the time to learn morse; again, no trouble in gaining a pass. Why, oh why, if you do not like it, do you not do something about it. I would like to make it quite quite clear that I have nothing against Class B licence holders, only those that feel there is an almost racial or religious difference of some sort between us. I feel sure that those sort of views are unwelcomed by both classes of amateur enthusiast and all short wave listeners on our bands.

P J Morris, G4SFI

Sir—It was with disappointment, but ultimately no surprise, that I learnt of the decision not to allow Class B amateurs access to the 50MHz band. While appreciating the fact that the DTI was at least prepared to state its case, I find it very difficult to accept some of its reasoning.

The *Radio Communication* article states "... shall not cause interference ..." and so DTI chose "... not to be influenced ... in particular by RR 2735 ...". This implies some connection between passing the morse test and not causing interference. Perhaps they could have explained what on earth the connection might be.

While accepting that restricting numbers is likely to reduce the risks of interference, I would suggest that there are equally simple ways of doing this, other than the inevitable Class A/B split. For example, a length of time-licensed qualification, which would probably reduce the risks of interference even further.

Finally, taken in a professional context, considering something in a "positive way" (Mr Maxwell's letter) means "yes". However, the possibility of a European licence (which is news to me and a lot of others) will no doubt provide an argument for continuing to ignore Radio Regulation 2735.

R Czajkowski, BSc, G6ATW

First of all it should be stressed that the Society views the making of a 50MHz allocation to Class A licensees available on a 24h basis as of 1 February as the latest step in the 50MHz experiment; our long-term aim is that the band should be available to all UK amateurs. As a matter of fact the Society suggested various alternative ways in which the DTI could limit the number of amateurs operational on the new band but these were rejected.

Sir—Congratulations and a big "Thank You" to the RSGB for all their hard work and perseverance in the allocation on 50MHz. However, why did they apparently "push their luck" in trying to allocate this band to Class B licensees, when the schedule to our licence states that the latter class shall not be permitted to operate on frequencies below 144MHz?

If Class B licensees are to be granted 50MHz, then why not grant them 70MHz also? If they are then given access to 70MHz, why not access to 28MHz, to 24MHz, to 21MHz, to 18MHz, to 14MHz, to 10MHz ... etc?

Finally, the morse test could be abolished and we could revert to just one class of licence. Then the RAE could be done away with, and an amateur licence could be issued to anyone who could pay £10 or so over a Post Office counter!

Please, RSGB, if we are going to have standards then try to maintain them, not lower them.

B W N Harris, G3GTF

Mr Harris seems to be referring to an old licence. As of WARC 1979 the frequency limit below which a morse test would be required was changed from 144 to 30MHz, and it was on that change that the Society has requested that Class B licensees have access to the 50MHz band—on the basis of its being a reasonable expectation—if it is fully released to the amateur service. At present, however, it is available to Class A licensees on an experimental basis. The status of the 70MHz band is unusual, since it is allocated on a secondary basis to the amateur service in the UK; although the Society has attempted to make this band available to Class B licensees, the primary user, the Ministry of Defence, is not prepared to permit this.

Sir—May I congratulate and thank the RSGB officials responsible for the acquisition of yet another new amateur band in the shape of 50MHz. The band plan published in *Rad Com* January 1986 gives rise to some misgivings, however, and I would like to comment, as follows.

Is it necessary to allocate 80kHz of the 50·000 to 50·100MHz band (cw segment) to beacons? 50MHz will no doubt be a popular cw band, and severe problems are likely to be caused to the reception of beacon signals on an active cw band. Furthermore, the presence of GB3NHQ on 50·050MHz precludes the use of this frequency for cw calling, to line up with 144 and 432MHz. While realizing that little can be done about foreign beacons, I would suggest that UK beacons could be resited in the sub-band of 50·080 to 50·100MHz.

My second comment concerns the "all-mode" segment and future Class B occupancy. "All modes" will in practice mean, without a doubt, channellized fm. With a mere 100kHz allocated between 50·400 and 50·500MHz, it is clear that 25kHz channelling is a non-starter. I would like to make a strong plea for 10kHz channelling on this band, since:

(*a*) Spectrum usage is economized;

(*b*) available commercial equipment, eg FT690R, is based on 10kHz steps; and

(*c*) transverting from 29·6MHz fm is made possible.

Even with 10 10kHz channels between 50·400 and 50·500MHz, the eventual influx of Class B licensees will create overcrowding, and 50·310 to 50·490MHz would possibly be needed for fm, leaving 50·100 to 50·300MHz for ssb and other narrowband modes.

Brian Jenkinson, G3JHC

RSGB SLOW MORSE BROADCASTS

Sir—As a B licensee, may I express on behalf of numerous radio amateurs, sincere thanks and gratitude to those who, on behalf of the RSGB, transmit slow morse broadcasts regularly, providing and maintaining their own equipment, and give their wisdom and encouragement to enable B licensees to attain proficiency and take the morse test. In addition, they have given invaluable assistance to B licensees who possess the Variation Certificate to transmit and receive cw over the air, thus confirming the widsom of the RSGB in all they are attempting to do in this direction. For this also we thank them.

In the London area, I and others enjoy slow morse broadcasts every evening of the week, and on four mornings during the week for those who are on shift work and unable to listen in the evenings. We are extremely fortunate, and while it may be unwise to single out anyone, may I, on behalf of other B licensees, express our thanks and gratitude to G4ZPD, G4VBL, G4YMK, G4BFJ, G4WVX and G4YFO who run the slow morse broadcasts in the London area.

Finally, *please* let us have an up-to-date schedule of slow morse broadcasts as soon as possible, for to B licence holders this information is of the utmost value, and in addition it will encourage many B licensees to profit by listening to the slow morse broadcasts and undoubtedly help them to appreciate the great value of cw.

T H Marshall, G1LOH

Your wish is our command—see this month's RSGB News Bulletin.

DEALER SERVICE

Sir—People these days complain at the "drop of a hat", but seem to give little credit when it is due—so I feel you may like to know that Microwave Modules Ltd certainly have given me outstanding service. My MM144/100S, purchased in March 1983, gave off a nasty smell on 15 December, so I sent it to them on 16 December 1st Class post, cost £2.97. I phoned them on the 17th and 18th—not received, and again on the 20th—they had got it, repaired it and sent it back, and I received it on the 21st, with an acknowledgement of receipt post card dated the 18th. So far, no bill received or was enclosed.

Some time ago the same sort of service was given by Thanet, Herne Bay, for the IC25IE, but I got a bill from them as it was just out of warranty, which I suppose was fair enough, though unexpected.

Prior to the 144/100S I had a 144/40S (No preamp, an old model) which MM repaired two or three times foc.

I think this is first-class service by any standard and should be acknowledged as such, unless of course anyone can suggest otherwise. By and large, radio amateurs get a good deal these days from the trade, and they can shop around for the best deal.

Many thanks also to the RSGB.

D K Egan, GW4XKE

"A DX TRAILER"—GM0BZF

Sir—I like the design of this trailer, published in your February issue, but sorry to say it will not comply with the Road Traffic Acts if it is taken on a road. As it has no road springs, the trailer can only travel from one field across a road to another field *(a short distance)*; the rubber mountings will not comply with the Acts. It is required to have stop lights, signal lights and a "T" on the tailgate. Every item on the trailer must be fixed down tight while travelling. I suggest Mr Reid avoids any trouble with the law by checking it with the local police.

R Wallis, RS86700

THEY ALWAYS HAVE A WORD FOR IT

Sir—Now that all electro-magnetic units and many others besides are called after famous scientists, I have been trying to find out about some of the lesser-known men whose names we use. Two pioneers continue to elude me: both are French.

Who was the Monsieur Eddy after whom the "courants d'Eddy" or Eddy current are named? And who was Monsieur Emile Barre from whose name is derived the unit of barometric pressure, the millibar?

Fred Ness, GD3ESV

THE G4BWE CW MEMORY MK2

STEVE PRICE, G4BWE*

Steve, who obtained his amateur radio licence in 1973 at the age of 18, does not work in the electronics industry, and has no plans at present to give up his daytime job as a civil servant employed within the DHSS.

Apart from an abiding interest in all aspects of electronics and telecommunications, he also enjoys foreign travel, music, photography, the occasional pint of real ale, and consumes copious amounts of Indian food.

MY ORIGINAL cw memory design (*Rad Com* September 1979, pp 826–7) utilized a single N-channel static ram type 2102, giving a total memory capacity of 1,024 bits (commonly abbreviated to 1k). The memory enabled the cw operator to store short messages, such as CQ calls, which could then be replayed for automatic transmission and repeated indefinitely, as required. A special feature of the Mk1 circuit that is retained in the new design was the use of an asynchronous, free running clock oscillator. This makes it possible to employ any type of key, straight or "bug" in conjunction with the memory, the only proviso being that the clock oscillator is run at a frequency high enough to ensure that approximately four memory locations are used to store each dot. This minimizes distortion of the morse timing, so that the dot, dash and space durations remain subjectively correct.

Since 1979, semiconductor manufacturers have produced static rams offering far greater storage capacity than the 2102, and it is now also possible to obtain cmos memory chips, which feature very low standby power consumption, at reasonable prices. The Mk2 cw memory employs a 16k cmos ram, type HM6116 (obtainable, at the time of writing, for less than £4) which contains no less than 16,384 storage cells, all within a compact, 24 pin dil package! The full 16k available is far more than that required to hold a typical CQ call or routine message. The memory area is therefore segmented into four separate 4k (4,096 bit) blocks, that are selected using a front-panel switch. In consequence, it is possible to retain four entirely different messages, any one of which may be amended or replaced independently of the other three. The standby power consumption of the HM6116LP (the version of the HM6116 that I employ) is only 20μW which, assuming a supply rail of 5V, equates to a maximum current drain of just 4μA.

Advantage has been taken of this remarkable specification by incorporating a rechargeable battery to provide standby power. The memory may therefore be disconnected from its psu for long periods (at least a few weeks) without corruption or loss of data occurring.

*458 Soundwell Road, Kingswood, Bristol BS15 1JU.

Design background

In the manufacture of semiconductor devices it is the volume of production that primarily determines retail price. It's hardly surprising, therefore, that the cheapest static ram chips are those fabricated in very large quantities to act as support devices in microprocessor systems—the ubiquitous home-computer being an obvious example of a micro-based product where unit cost is a critical factor. Microprocessors handle data in the form of bytes. Bytes are digital "words", consisting of either eight or 16 binary digits (bits). This explains why a microprocessor chip will normally be provided with at least eight separate data pins, thereby enabling all the bits that constitute an individual byte to be simultaneously presented to, or extracted from, the micro. The necessity to deal with bytes, which are shifted around microprocessor systems on parallel data buses comprising eight or 16 lines, has led, inevitably, to the development of rams that are also provided with multiple data pins and can therefore store whole bytes, or at least large segments of bytes, within a particular memory location.

The HM6116 is specifically designed to store eight-bit bytes, and to facilitate this it has eight separate I/O pins (see Fig 1).

I/O signifies "data in/out" and indicates that each I/O pin functions as an input during the write cycle (when data is fed into the memory) and as an output during the read cycle (when previously stored data is fetched from the memory). The HM6116 also has 11 address pins (labelled A0 to A10) that enable any one of 2,048 memory locations to be accessed using the appropriate binary number. For instance, if address pins A3, A6 and A9

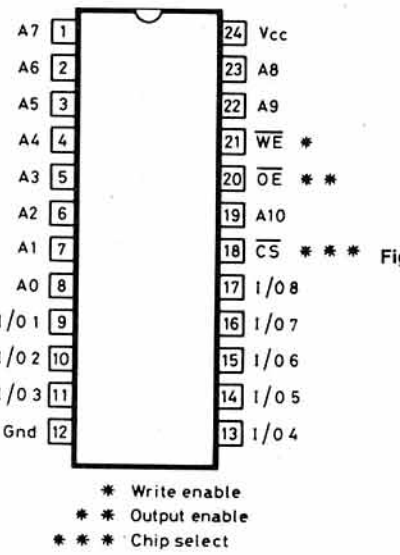


Fig 1. HM6116 outline showing the pin connections

are connected to +5V (logic 1) and the other address pins are grounded (logic 0) the binary address code 01001001000, or 584 in decimal is produced. Within this 584th location it is possible to store a single eight-bit byte—perhaps 01101001 (105 in decimal). The 16k capacity of the HM6116 is therefore said to be organized as 2k × 8 bits.

Unfortunately, morse code does not consist of eight-bit bytes! It is merely a simple, serial code containing successive marks and spaces that are variable in length. Within a digital system the marks (key-down periods) may be converted to logic-level 1 (usually +5V), whereas the spaces (key-up periods) are defined as logic 0 (0V).

At first sight there appears to be little difficulty in utilizing the full capacity of the HM6116 to store morse. The obvious solution, one might think, would be to store a separate message via each I/O pin, thus providing a useful 2k capacity in each message "compartment", and the facility to hold concurrently in memory up to eight different messages. The folly of this proposal is illustrated with the help of Fig 2. The address pins of a fictitious 1k × 2-bit ram are coupled to the outputs of a multiple stage binary counter, which in turn is driven by a free-running clock oscillator, so that all memory locations are sequentially addressed in strict order, starting from zero and finishing at 1,024. Closing S2 will ground the memories $\overline{WE}$ (write enable) pin and also couple the input line to the pole of S1.

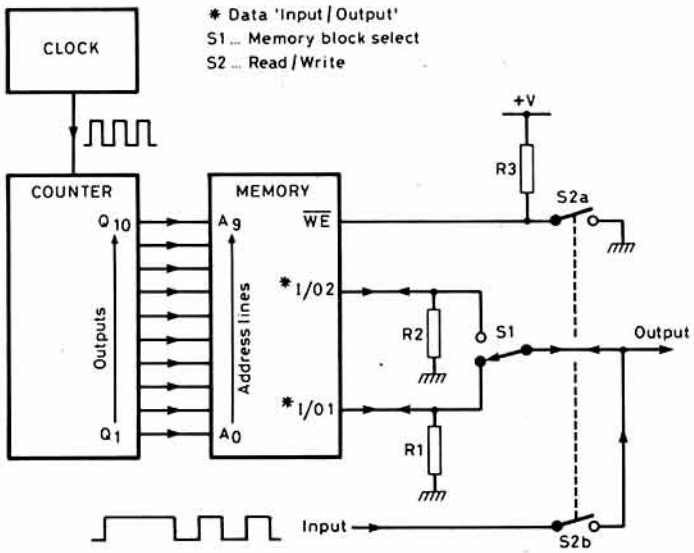


Fig 2. This scheme for a two-message cw memory is doomed to failure!

We can now load the memory with morse by selecting I/O1 using S1 and then running the address counter (for the sake of simplicity the counter start and reset circuitry has been omitted from Fig 2). Once a message has been written into I/O1 it will be possible to replay the stored morse by opening S2, which puts the memory into read mode, and then re-running the address counter. So far so good!

Imagine that we now wish to load another message into the memory. The process described above is merely repeated, but this time S1 is set to select the second data pin, I/O2. Storing and then retrieving the morse loaded into I/O2 will pose no difficulty, but a disaster occurs when we attempt to once again replay the first message loaded via I/O1. The result is a stupefying silence. This is because I/O1 was grounded by the "tie-down" resistor, R1, while we recorded the second message into I/O2. In consequence, logic 0 will have been written into every memory cell coupled to I/O1, thus completely obliterating the first message. It must be emphasized that disconnecting R1, and thereby allowing I/O1 to "float", will not improve matters, as any potential appearing on an I/O pin during the write cycle will corrupt previously stored data.

Clearly, if we are to harness the full capacity of a ram featuring multiple I/O pins it will be necessary to convert the morse into parallel data, ie bytes, and by doing so utilize all of the I/O pins simultaneously. Fig 3 illustrates how this may be achieved. Incoming morse is clocked through a serial to parallel converter so that the logic levels present during eight segments of a short time-frame are latched, in correct order, onto eight separate data lines. On completion of the eight-bit serial-to-parallel conversion the memory address counter is incremented by one count. Assuming that the $\overline{WE}$ pin is held low, this results in the data presented to I/O pins 1 to 8 being written into the appropriate memory location. The process is now repeated in order to convert the next eight samples into a further byte, and so on.

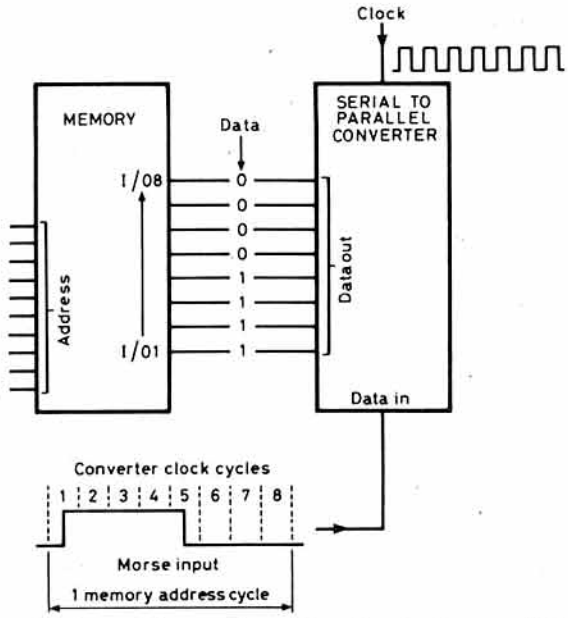


Fig 3. The serial to parallel converter enables storage of morse within a multiple I/O ram

During the memory read operation, there will be a requirement for parallel-to-serial conversion so that the morse may be returned to its original form for correct playback. The functions of serial-to-parallel and, conversely, parallel-to-serial conversion may both be implemented using a single LSI chip known as a uart (universal asynchronous receiver transmitter). Most home-computers contain a uart, which forms part of the cassette interface that enables bytes of data to be stored, in serial form, on one track of ordinary magnetic sound tape. Unfortunately, the commonly-available uarts are rather cumbersome 40-pin beasts, featuring a wide range of facilities that are simply not required in the present application. Therefore, a cheaper, but nonetheless straightforward alternative was developed.

Fig 4 shows, in skeleton form, the solution adopted. The CD4051 is described, in the National Semiconductor cmos databook [1] as a "single eight-channel analogue multiplexer/demultiplexer". In essence, the CD4051 consists of a single-pole eight-way switch, its pole position being determined by a binary code presented to three control pins (labelled A, B and C). The eight internal switches are logic-controlled signal gates which have an important advantage when compared to standard CD4000 logic gates in that they are bi-directional. Although fully capable of passing analogue signals, these gates are quite at home when used to transfer logic levels. The eight input/output pins are connected directly to the memory I/O pins, as shown. The first three outputs of the address counter (Q1–Q3) are employed to drive the CD4051 control pins. When writing morse into the memory the switch-pole is momentarily connected to each of the input/output pins in turn. Between each data line and ground is a small tantalum capacitor. An individual capacitor will be either charged to logic level 1, or

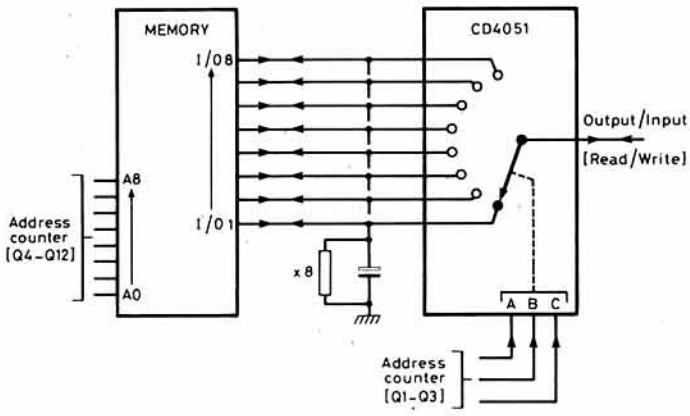


Fig 4. An efficient and low-cost serial-to-parallel/parallel-to-serial converter based around a single CD4051 device

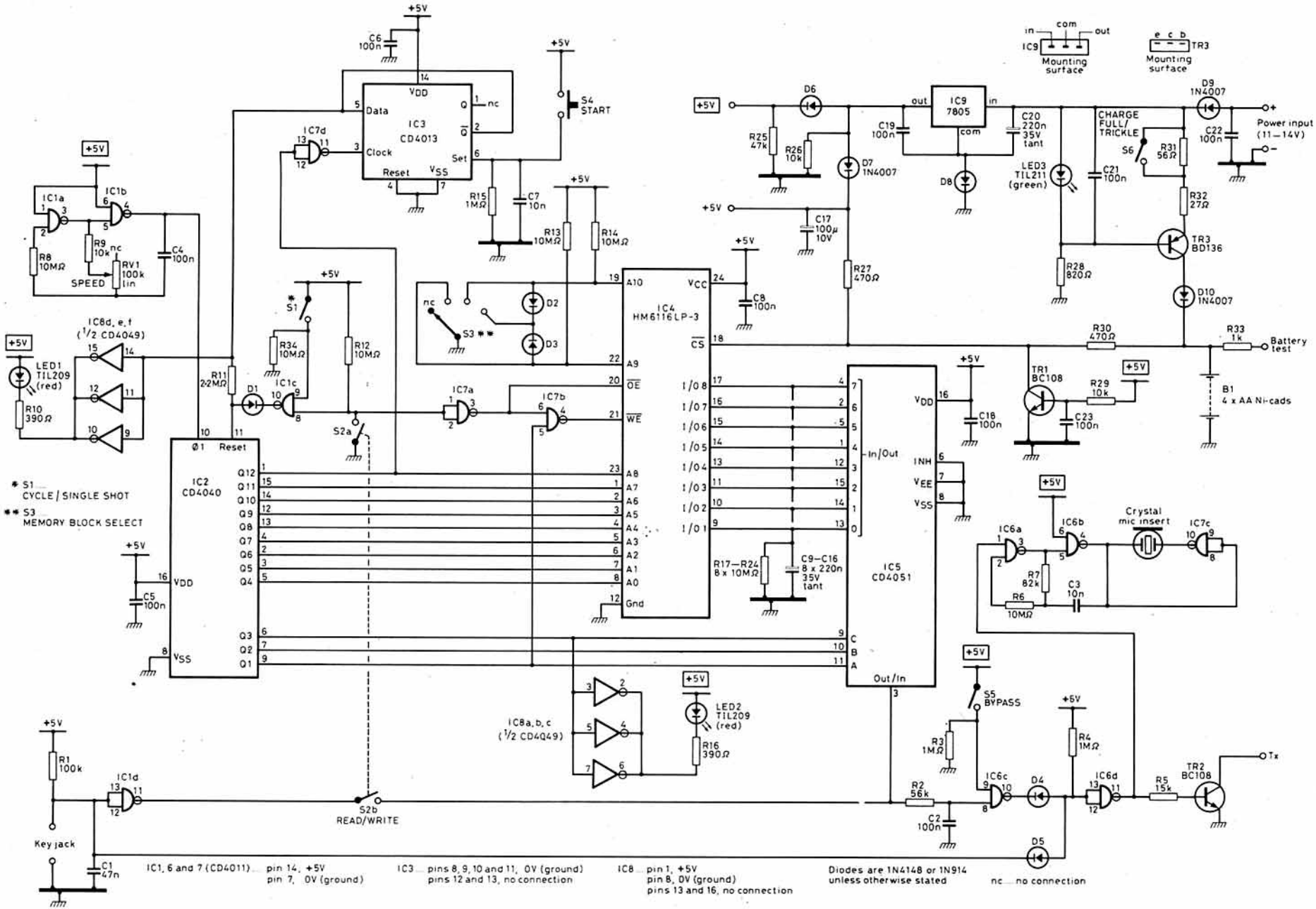


Fig 5. The full circuit diagram of the cw memory

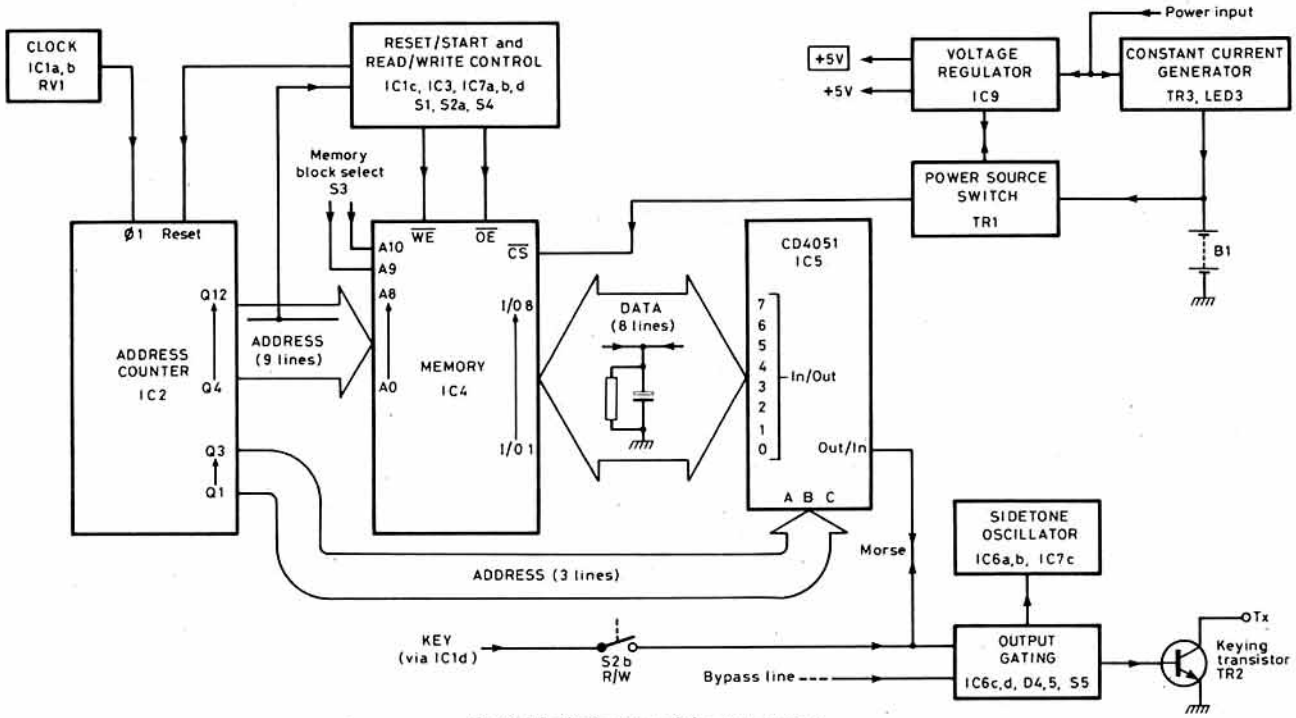


Fig 6. Block diagram of the cw memory

discharged (logic 0), depending on whether the key is down or up when the relevant data line is coupled to the switch-pole. The capacitors serve as rudimentary data latches, ensuring that the logic levels present during each segment of the time frame are memorized. After eight address counts, the Q4 output of the address counter will change state and the "latched" data will be written into the appropriate memory location as a single eight-bit byte. The capacitors have a value of 220nF, and the tie-down resistor connected in parallel with each tantalum is 10MΩ. The resultant time constant of 2·2s provides a more than adequate memory period.

Because the CD4051 contains bi-directional switches, the circuit of Fig 4 works automatically as a parallel-to-serial converter while the memory contents are being read. The capacitors perform no useful function during the read operation, but as their presence is not harmful they can be left permanently in circuit.

The full circuit

Fig 5 shows the complete circuit diagram of the Mk2 cw memory, while Fig 6 illustrates the system in block form. Firstly, it will be noticed that there are two separate +5V rails. The rail labelled with a surrounding box is only present while the memory is actually in operation, and becomes, in effect, a ground connection during standby periods (more about this later).

IC1a and b form a clock oscillator with frequency determining components C4, R9 and RV1. The clock rate is variable over an 11:1 range, controlled from the front panel by RV1.

The clock drives IC2, a 12-stage ripple carry binary counter. Outputs Q1 to Q3 feed the control pins of the CD4051 (IC5), as discussed previously. The remaining counter outputs (Q4 to Q12) provide address for the ram, IC4. Under control of S3, the network comprising R13, R14, D2 and D3 generates the four possible binary codes (00, 01, 10, 11) to be presented to the final two ram address pins A9 and A10. IC2 outputs Q4 to Q12 feed the address pins A0 to A8 and thereby generate an address sequence of 512 counts. As each memory location stores a byte consisting of eight bits, the resultant capacity is:

$$512 \times 8 = 4{,}096 \text{ bits (4k)}$$

We already know that the HM6116 has a total capacity of 16,384 bits (16k). The function of S3 is to define which one of the four possible 4k blocks a particular message will occupy—hence the term "memory block select".

IC3 and IC7d are employed to reset IC2 at the end of the address count. The counter will then be held in the reset state until the sequence is re-initiated by momentary depression of S4 ("start"). S1 ("cycle/single shot") allows the counter reset circuitry to be disabled so that the address system runs continuously (cycle mode). This facility makes it possible to repeat CQ calls indefinitely, ie without having to press S4 at the end of each call. The connection between pin 8 of IC1c and the junction of S2a, R12 ensures that irrespective of S1's setting, the memory cannot possibly operate in cycle mode during the write operation, ie when messages are being recorded. The reset state is indicated by illumination of LED1 (although this does not apply in cycle mode) and also by the fact that LED2 (clock rate indicator) stops flashing. Provided the clock frequency is set high enough to ensure that LED2 flashes at approximately dot rate (this, of course, is a variable and depends on the sending speed chosen), accurate recording of the morse is ensured.

Closing S2 puts the ram into write mode via IC7a and b. The gating provided by IC7b, which has one input (pin 5) connected to the Q1 output of IC2, ensures that the $\overline{WE}$ pin of IC4 is held high during all address transitions. This satisfies an important requirement for correct operation of the HM6116.

IC1d is a keying inverter which produces a logic 1 output at pin 11 on key-down. S2b will be closed during write periods, thus allowing morse to be input to pin 3 of IC5 (pin 3 is the CD4051 switch-pole explained earlier). IC6c, d, D4 and D5 provide output gating to drive the keying transistor, TR2. Morse being read out of the ram is converted into serial form by IC5 and appears at pin 3. C2 and R2 form an integrator with a time constant of 5·6ms. This network serves to suppress any short glitches generated by the discharging of capacitors C9 to C16. Opening S5 (bypass) inhibits IC6c, thus preventing the memory contents from reaching the output. While S5 is open, "real-time" sending can be accomplished via the bypass line formed by the connection between the input of IC1d and D5.

IC6a and b comprise the sidetone oscillator which drives a crystal microphone insert or similar high-impedance transducer. A bridge output configuration is realized using IC7c as an inverter. This arrangement increases the sidetone volume by doubling the voltage swing across the insert. Increasing the value of R7 will lower the sidetone pitch, and vice-versa.

The power supply section incorporates one +5V regulator (IC9), a constant current generator (TR3) and a switching stage (TR1). IC9 provides two +5V outputs. The rail developed via D6, which is labelled with a surrounding box for identification, depends entirely on IC9 for its existence, and so, whenever the external power source is disconnected or simply switched off, the potential at the junction of D6 and R25 drops to 0V. The second, and main, +5V rail is routed to decoupling capacitor C17 via D7. IC9, however, is only responsible for generating this supply rail when the external power source is active. TR1 will be switched hard on while the external supply is present, so causing the junction of R27 and R30 to be held at a potential very close to 0V. This has the effect of isolating the standby battery (B1) from the main supply rail so that the memory functions entirely from the output of IC9.

TR3 works in conjunction with LED3 as a constant-current generator to provide a charging facility for B1. Closing S6 increases TR3's collector current to approximately 45mA, whereas with S6 open the current

generated is 15mA. As R30 diverts around 10mA of the current sourced by TR3, the net charging rate supplied to B1 is either 35mA (full-charge) or 5mA (trickle-charge), depending on the setting of S6. B1 is formed by a series connection of four readily-available AA size nicads, which, when fully charged, provide a potential of almost exactly 5V.

If the external supply is absent, TR1 will be switched off and the standby battery supplies a very small quiescent current to the main supply rail via the series combination of R27 and R30. Note that the HM6116 chip select pin is also controlled by TR1.

It is the forward voltage drop of approximately 1·9V appearing across LED3 which provides a reference for the constant-current generator. Nevertheless, LED3 may be mounted on the front panel so that it will also provide an indication of the power supply status.

Operation

The cw memory provides the facilities already outlined by functioning in two distinct modes:

(1) Standby

Switching off, or disconnecting, the external dc supply, automatically forces the internal circuitry into a state of rest. Because the +5V rail developed via D6 is no longer present, pins 1 and 6 of IC1 are held at 0V and so the clock is prevented from oscillating. The sidetone oscillator is similarly inhibited by virtue of the connection to pin 6 of IC6b. There will be no supply available for LED1 and 2 because the anodes of these devices are at 0V also.

The circuitry is far from dead, however, as TR1 will be switched off, thereby allowing B1 to supply the main +5V rail via R27 and R30. The ram chip select pin is held at +5V, and so the current consumption of IC4 drops to no more than a few microamps. It is obviously a prerequisite for data retention that IC4 remains powered-up. Less obvious is the need to supply the other ICs. However, because various pins of IC4 (eg the address pins) are connected directly to other devices, it is desirable to maintain defined logic levels throughout the system. The alternative would be to isolate every ic except IC4 from the supply rail and rely on high value tie-down resistors connected between most pins of IC4 and 0V (ground). Clearly, this approach would add to the complexity of the design, and such action is quite unnecessary when one considers the extremely low quiescent current consumption of the CD4000 support devices. Furthermore, retaining a supply to IC2 (the address counter) ensures that momentary interruption of the external supply will not cause erratic jumps in the address count.

The high value of 10MΩ specified for R12, 13, 14 and 34 guarantees that the standby current drain will remain acceptably low, irrespective of the settings of switches S1, 2 and 3 (although it is a good idea to leave S2 in the read position). While the memory is in standby mode it will not be possible to either record or playback morse, and almost the sole function of B1 is to facilitate static data retention. Nevertheless, because IC1 and IC6 remain operational, TR2 continues to function and so keying of the transmitter via the memory key jack is still possible. One should be aware, however, that during key-down the drain through R1 and, more importantly, the base current of TR2, causes the standby consumption to rise by a few hundred microamps. This, in turn, produces a potential difference of about 400mV across the series combination R27, R30. As a result, the main supply rail may drop to something near 4·5V. Such a reduction will not, under normal circumstances, affect the ability of IC4 to preserve data, but it is obviously prudent to keep B1 in a healthy state of charge.

(2) Read/write

Firstly, energizing the memory from an external dc supply of between 11 and 14V allows the constant-current generator to recharge B1 via D10. Assuming that the nicads are initially discharged, it will be necessary to charge them for about 16h at 35mA (ie with S6 closed) before putting the memory into service. Thereafter, B1 will automatically receive a top-up charge each time the memory is used. If it is feared that the battery may be overcharged due to prolonged operation of the memory during contests, or very frequent use, S6 may be opened, thereby reducing the charge current to a mere 5mA. R33 is connected to a test socket and provides a facility to check the battery voltage using a multimeter switched to its 10V dc range. Providing that the meter has a sensitivity of at least 10kΩ/V, the drop across R33, which is incorporated to protect against short circuits, will be insignificant.

With an external supply present, the clock oscillator will run continuously. In order to record morse, the memory must initially be put into the reset state. This condition is indicated by illumination of LED1 and the absence of any flickering from LED2. Resetting the memory merely involves letting the address counter run, with S1 open (single-shot) until it is automatically reset by the action of IC3 and IC7d. The memory block to be employed for storing the message is now selected using S3, and RV1 is adjusted to suit the sending speed and message length. Up until this point, S2 should normally be left in the "safe", open position (read) in order to avoid inadvertently wiping previously-stored messages that the operator may wish to retain. The penultimate action, therefore, is to close S2 (write), which prepares the memory for recording. Finally, and just prior to the commencement of sending, S4 (start) is momentarily depressed in order to release the address counter from the reset state. LED1 is immediately extinguished and LED2 will start to flicker, indicating that the address sequence has begun.

The playback of messages is simplicity itself and merely involves the appropriate setting of S3 (ie to select the required message), with S2 open (read). If the memory is in the reset state—S1 having been opened (single shot)—it will also be necessary to depress S4 (start). Continuous repetition of CQ calls is possible with S1 closed (cycle), but otherwise S4 can be employed to initiate a single repeat of any message following the automatic reset which occurs when S1 is open.

Opening S5 will effectively bypass the memory so that the transmitter can be keyed live from a key plugged into the memory key jack. It is also possible to mix live and recorded morse by leaving S5 closed. A possible technique, which I admit will probably require a measure of practice on the operator's part, involves preparing recordings of standard messages with gaps left to facilitate the live insertion of appropriate variables (eg the time of day, other operator's name etc).

Setting RV1 at minimum resistance produces the highest clock rate and the memory will cycle in approximately 12s. Rotating RV1 to the other extreme should lengthen the cycle time to around 130s. Although it is quite practicable to record messages of 2min duration using the slowest clock rate, the sending speed should be restricted to no more than about 12wpm, thus avoiding noticeable timing errors on replay.

As with other cw memory systems, the replay speed may be adjusted at will—allowing, for instance, a message recorded at 15wpm to be

Components list

R1	100kΩ
R2	56kΩ
R3, 4, 15	1MΩ
R5	15kΩ
R6, 8, 12, 13, 14, 17, 18, 19, 20, 21, 22, 23, 24, 34	10MΩ
R7	82kΩ
R9, 26, 29	10kΩ
R10, 16	390Ω
R11	2·2MΩ
R25	47kΩ
R27, 30	470Ω
R28	820Ω
R31	56Ω
R32	27Ω
R33	1kΩ
All resistors are 0·33W, 5% tolerance, carbon or metal film types	
RV1	100kΩ linear
C1	47nF ceramic
C2, 4, 5, 6, 8, 18, 19, 21, 22, 23	100nF ceramic
C3, 7	10nF ceramic
C9, 10, 11, 12, 13, 14, 15, 16, 20	220nF tantalum electrolytic 35V
C17	100μF electrolytic 10V
IC1, 6, 7	CD4011
IC2	CD4040
IC3	CD4013
IC4	HM6116LP or HM6116P (see text)
IC5	CD4051
IC8	CD4049
IC9	7805
TR1, 2	BC108
TR3	BD136
D1, 2, 3, 4, 5, 6, 8	1N4148 or 1N914
D7, 9, 10	1N4007
LED1, 2	TIL209 (red)
LED3	TIL211 (green)
S1, 5, 6	Toggle spst
S2	Toggle dpst
S3	SP four-way rotary
S4	SP push to make (momentary)
B1	4 × AA size nickel cadmium cells

Miscellaneous

Crystal microphone insert (see text). Sockets for key, power and battery test, dil ic sockets (4 × 14 pin, 3 × 16 pin, 1 × 24 pin). Control knobs (for RV1 and S3). Four cell holder for nicads (if required). Veroboard. Cable. Mounting/fixing sundries. Case (see text).

Suppliers

Capacitors, resistors and switches obtainable from: Electrovalue Ltd, 28 St Judes Road, Englefield Green, Egham, Surrey TW20 0HB. Semiconductors obtainable from: Technomatic Ltd, 17 Burnley Road, London NW10 1ED.

transmitted at 25 or even 40wpm, if desired. The contents of a particular memory block may be changed by simply recording a new message over the top of the previous one.

Construction

My prototype is housed in a screened case of commercial manufacture fabricated from aluminium and steel. Quite obviously, if the memory is to be operated in close proximity to a high-power transceiver, the choice of a metal enclosure is mandatory, as strong rf fields must be prevented from inducing stray currents into the circuitry. The various decoupling capacitors (mainly 100nF ceramic types) contribute to the units rf immunity, but it is impossible to guarantee that these measures will prove entirely adequate in all situations. Individual constructors may therefore find it necessary to incorporate additional decoupling and/or filtering elements in order to cure specific problems. If, for instance, it is suspected that the power cable which couples the memory to its external psu is acting as an antenna and thereby providing a path for rf energy to enter the memory, there are a number of remedies that can be tried: First, the use of screened, rather than flat twin-cable, may prove effective. Also, ferrite beads can be threaded onto the internal flying leads which connect to the memory power socket. Alternatively, it is possible to fabricate rf chokes by winding a few turns of thin wire around small ferrite toroids. The cable used for the keying lines should definitely be of a screened, coaxial type, and good ground continuity must be maintained between the memory, psu and transceiver. This requirement extends, of course, to the memories casing, which must also be connected to ground (0V).

Apart from items which are affixed to either the front or rear panel (ie sockets, switches, leds and the potentiometer RV1) all components excepting B1 and the sidetone sounder may be mounted on Veroboard. It is strongly recommended that sockets are provided for the dil ics as this can assist greatly in fault-tracing and analysis. IC9 and TR3 should be bolted to small heatsinks, as these components dissipate significant power. The AA size nicads which comprise B1 may be housed in a standard four-cell holder. Alternatively, cells having solder-tag connections could be used. If the microphone insert employed as sidetone sounder has a metal outer casing, this must be insulated from ground.

Individual component types and ratings are detailed in the components list, and there should be no difficulty in obtaining any of the parts specified. There are two main versions of the HM6116 cmos ram available, suffixed "P" and "LP" respectively. the HM6116LP is recommended because this device features the lowest standby dissipation (20μW, corresponding to a current drain of only 4μA). An HM6116P may, however, be employed providing that the constructor is willing to tolerate a higher standby dissipation of around 100μW. The ram I purchased has the figure three appended to the type number (ie it is marked HM6116LP-3) and this indicates a maximum access time of 150ns. As even the slowest version of the HM6116 (type-4) boasts a 200ns access time, this parameter may be ignored completely, even by members of FOC, when obtaining a ram for the cw memory!

Refinements and modifications

As explained earlier, it is necessary to allow the address counter (IC2) to cycle until reset is indicated by illumination of LED1 before morse can be recorded. If the clock rate is set at maximum this process will take no longer than 12s. However, should such a delay be considered unacceptable, it is possible to modify the clock oscillator by inclusion of a push-to-break switch and a 1nF capacitor (see Fig 7). Momentary depression of the switch takes C4 out of circuit, and the clock frequency is increased by a factor of 100. Even with RV1 set for the slowest clock rate, reset will occur in less than 2s.

Although a crystal microphone insert will suffice as the sidetone sounder, these transducers do not produce a particularly pleasant tone, and due to the increasing use of electret microphone capsules they are becoming somewhat rare. An alternative is to employ a miniature moving-coil

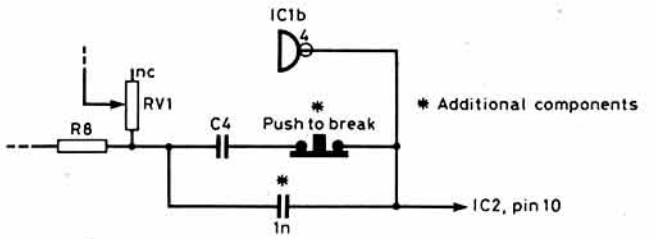


Fig 7. A modification allowing the clock oscillator frequency to be increased momentarily by a factor of 100

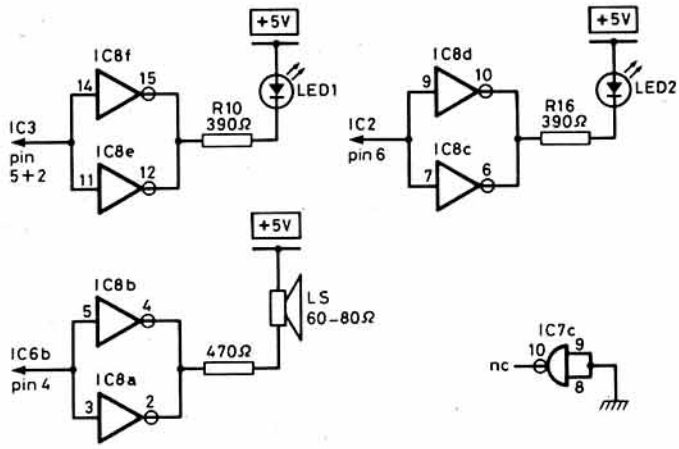


Fig 8. A miniature moving coil loudspeaker may be employed as sidetone sounder using this modification

loudspeaker of the type found in pocket radios. Unfortunately, it is not possible to drive a loudspeaker directly from the sidetone oscillator and so a simple buffer stage must be provided. Fig 8 shows a suitable modification, based around IC8. The number of paralleled gates used to drive LED1 and LED2 is reduced from three per l.e.d (shown in Fig 6) to two, thus leaving two of the six gates contained within IC8 available for use as the loudspeaker buffer. Constructors should note the inclusion of a current-limiting resistor (470Ω) in series with the loudspeaker, which draws its voice-coil current from the "boxed" +5V supply—thus ensuring that the loudspeaker cannot consume power during standby periods. IC7c will no longer be required and its inputs must be tied down, as shown. A loudspeaker of lower than 60Ω impedance may be employed, but the sidetone volume will be reduced.

Although using the memory in conjunction with an external mains power supply unit producing around 13·8V dc output (an item which forms an integral part of most present-day amateur stations) represents a practical and cost-effective approach, there is nothing to prevent a mains power supply being built into the memory itself. The additional circuitry required is shown in Fig 9. The reverse polarity protection diode (D9 in Fig 6) may be omitted from mains powered versions of the memory.

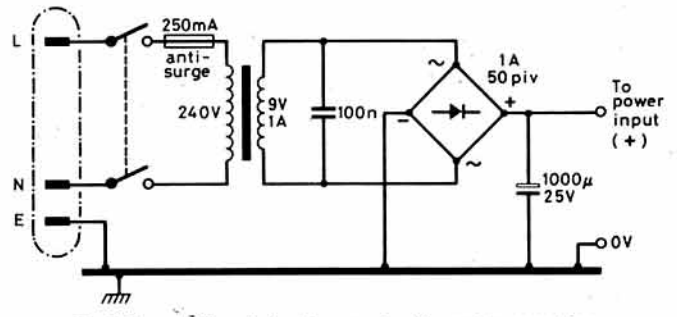


Fig 9. The additional circuitry required for mains operation

TR2 will key the majority of current transceivers direct, ie without the need for a relay. However, there is nothing to prevent TR2 being used to drive a miniature reed relay, if desired. One end of the relay coil should be connected to the collector of TR2, and the other end to either the boxed +5V supply (cathode of D6) or, if the relay has a higher voltage coil, to the positive power supply input. The usual back emf protection diode must be wired across the relay coil (ie diode anode to TR2 collector) but constructors should note that some encapsulated relays (eg the RS dil reeds) have an internal diode already provided. It will not be possible to key the transmitter while the memory is in standby mode if a relay is incorporated. Other alternatives include the use of a vmos device for TR2 or, where it is thought necessary, a transistor of higher voltage rating than the BC108. The constructor will no doubt be aware of the keying requirements for his or her rig, but it is always advisable to check the specification of any other, less familiar, transceiver before connecting the memory.

References

[1] *CMOS Databook*, published by the National Semiconductor Corporation. □

A LINEAR AMPLIFIER UNIT FOR THE HF BAND TRANSCEIVER

Lorin Knight, MIEE, G2DXK*

(Part 2)

Printed-circuit boards

All of these are made from single-sided copper-clad glass-fibre board. Recommendations for making boards were given in the original transceiver article (*Rad Com* August 1984).

Fig 20 shows the etching pattern for the transmitter drive module PCB1, and Fig 21 shows how the components are mounted. After winding T101 it is advisable to check that the insulation on the wire has not been damaged, ie that the resistance between each winding and the other, and of each to the ferrite bead, is not less that 10MΩ. After having confirmed that this is so, it is advisable to run a few drops of polystyrene cement into the bead to prevent the wires moving about. C108 is soldered to the tags on the trimmer capacitor C107, and the leads then taken through and soldered to the underside of the pcb.

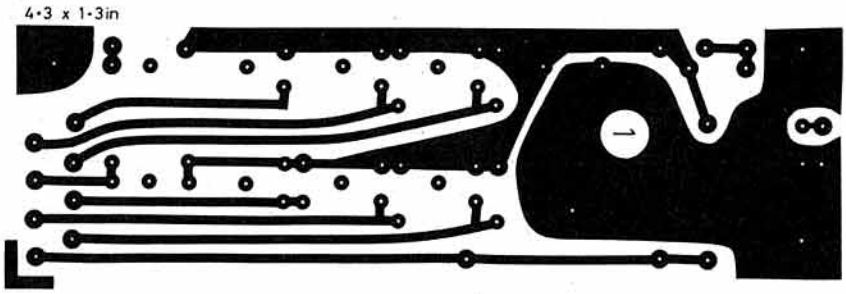


Fig 20. Etching pattern for transmitter drive module PCB1

The coils L1 to L8 are wound as indicated in Table 1, and the windings are held in place with polystyrene cement. A 0·218in drill is used for the mounting holes, but these need to have small indentations filed into them before the coils can be fitted. Araldite is used to cement the coils to the board.

Fig 22 gives the etching pattern for the ht pcb PCB2, and Fig 23 gives the assembly details. The transistor TR201 is mounted with its wires coming up through the board from the coppered side, the transistor being positioned so that it matches up with the fixing hole in the chassis. The two capacitors C203 and C204 are mounted one above the other.

Figs 24 and 25 give details of the 12V supply module PCB3. The voltage regulator IC301 has its wires coming upwards through the fixing holes and it will be bolted to the chassis.

Figs 26 and 27 give details of the meter-shunt module PCB4. The position of the two mounting holes may have to be changed to suit the particular meter being used.

Figs 28 and 29 give details of the fuse panel PCB5. This board is mounted on two brackets as shown in Fig 30.

Figs 31 and 32 give details of the receiver preamplifier board PCB6. T601 and T602 are wound as indicated in Fig 4, and, after an ohmmeter check to confirm that there has been no insulation damage, should receive a few drops of polystyrene cement.

Fig 33 gives details of the little board PCB7, which holds the heater dropper resistor.

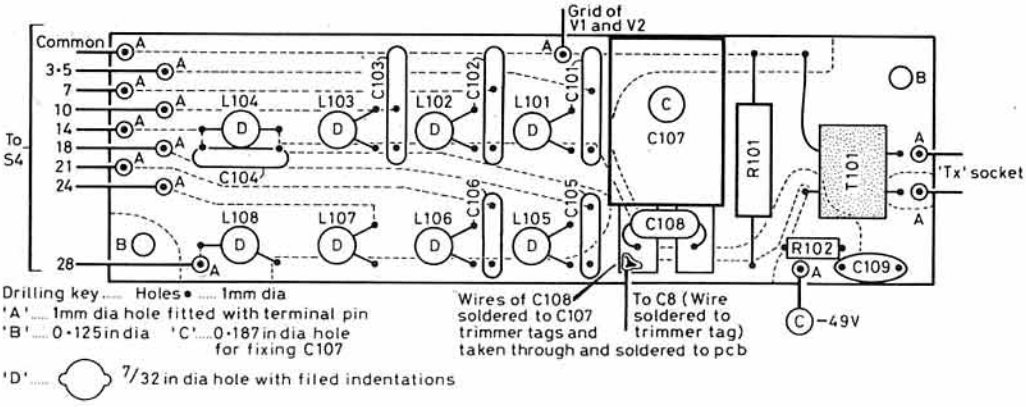


Fig 21. Drilling and assembly of PCB1

*123 Baldock Road, Letchworth, Herts SG6 2EQ.

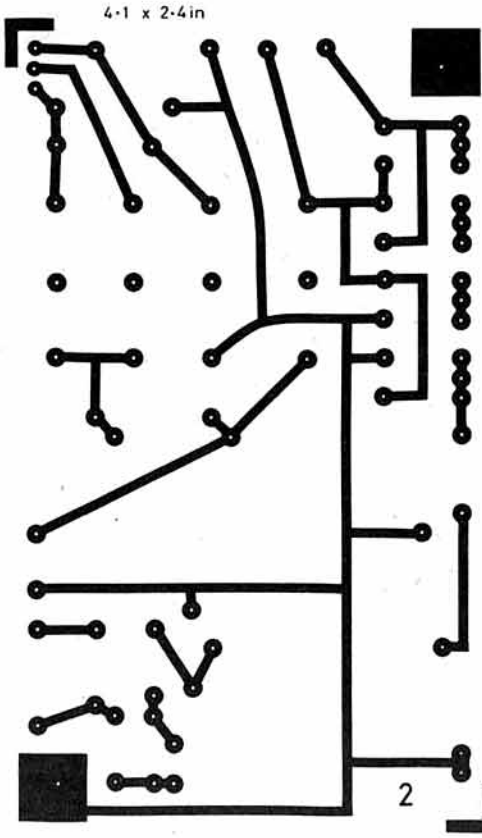


Fig 22. Etching pattern for ht module PCB2

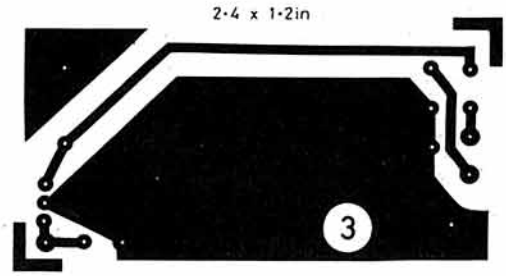


Fig 24. Etching pattern for 12V supply module PCB3

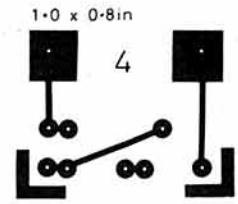


Fig 26. Etching pattern for meter shunt module PCB4

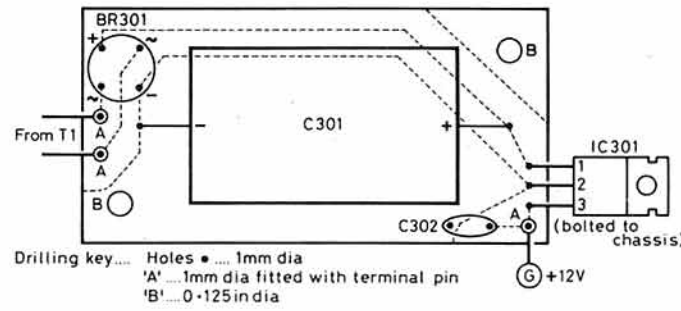


Fig 25. Drilling and assembly of PCB3

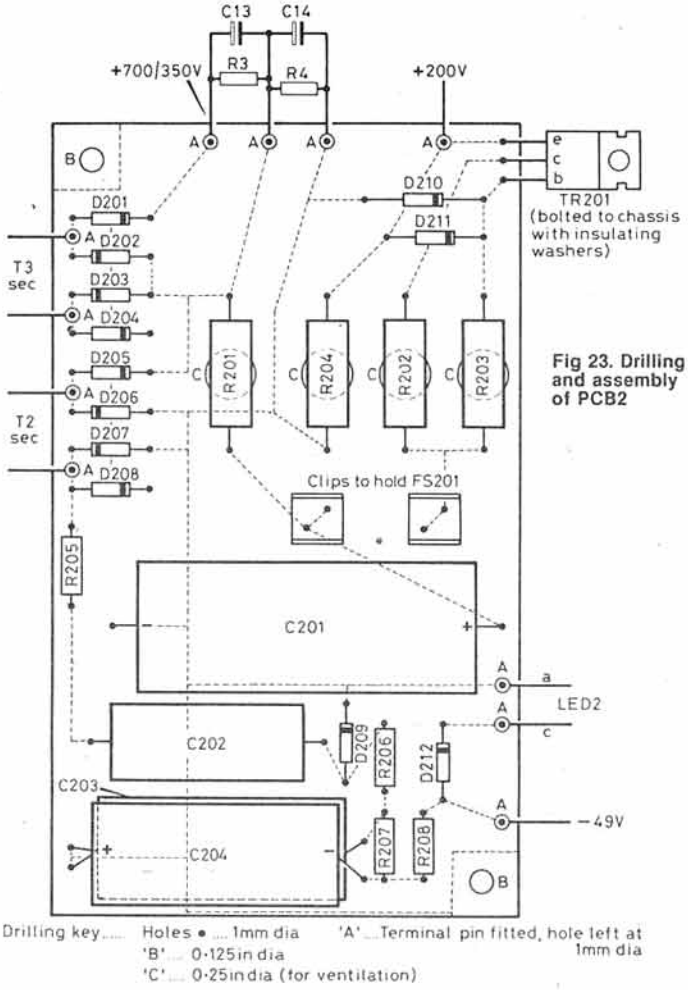


Fig 23. Drilling and assembly of PCB2

Wiring and commissioning the power supplies

It is recommended that the wiring and commissioning starts with the power supplies. Thus PCB2, PCB3, PCB5 and PCB7 should be fitted and all the power supply wiring done, including that to LED2. At this stage, however, nothing should be connected to the outputs, except that the 12·6V supply can be wired up to the valve holders. The heater decoupling capacitors C3 and C6 should be soldered directly from the valveholder pins to adjacent earth tags.

Note that TR201 on PCB2 needs to be clamped to the chassis using a set of insulating washers. No such washers are required for bolting IC301 (on PCB3) to the chassis.

In my prototype the 12V supply to the transceiver unit is taken via an insulated screened lead, which leaves the linear amplifier unit through the grommet at the back and then plugged into the power socket on the transceiver unit. It would be possible, if the constructor so desired, to take the 12V supply via the two six-way DIN connectors.

Because the electrolytic capacitors C13 and C14 will probably have been lying on the shelf for a long time, it is advisable not to bring them up to full voltage too suddenly at first. Thus for the initial test of the ht supply, it is recommended that a 1W resistor of around 1kΩ be soldered across the contacts of the ht on/off switch S2. With the ht switched to LOW and OFF, switch on the mains. The ht at the positive tag of C13 will then rise to around 300V. Let it stand there for 1min or so and then switch the ht to HIGH. The ht will then rise to around 600V. After letting it stand there for 1min or so, switch the ht to ON (ie shorting out the 1kΩ resistor), which will bring the ht up to around 780V. (Later, when the valves are fitted, this voltage will fall to around 670–730V, depending on the current being taken.)

Check that there is +200V at the output of the 200V supply, −49V at the output of the bias supply, and +12V at the output of PCB3.

Don't forget to remove the 1kΩ resistor after the above tests!

Warning

Whenever working with lid and base removed and the mains connected, it is important to remember that there are high voltages present and to exercise the necessary vigilance. Some of the danger can be removed by covering PCB5, S1, S2, S3 and the input connections to PCB2 with a piece of card, 7 by 6in, held in place with masking tape.

Furthermore it should always be remembered that the ht reservoir capacitors C13 and C14 will not discharge immediately on switching off. To be on the safe side, it is advisable not to touch the ht—or the valve anodes—for 2min or so.

Wiring and commissioning the linear amplifier

The linear amplifier can now be wired up, starting with the valveholders. All the earth connections to the valves should be taken direct to solder tags under the fixing nuts of the valveholders. The screen decoupling capacitors C4 and C5 should be connected direct from the valveholder to adjacent earth tags.

PCB1 should now be fitted and connected up. Ideally the connections to the TX PREAMP socket should be made with 50Ω coaxial cable, but a simple twisted pair has been found to be quite adequate.

The connection from C8 to PCB1 needs a special mention. Underneath the valveholders, and centrally between them, there should be a grommetted hole. Wedge or cement into this grommet a 4in length of rigid insulated wire which has had the insulation stripped away for 0·19in at each end (see Fig 8). A suitable wire can be extracted from a scrap piece of 2·5mm² house-wiring cable. One end of the wire is connected to the non-earthed tag of the compression trimmer C107 on PCB1. C8 is strung between the other end of the wire and the rear stator connection on the TUNE capacitor C9. Also connected to this stator connection is the "start" end of L1. If the wire from L1 is bared, the capacitors C7 and C10 can be soldered directly to this wire rather than have to go all the way to C9.

The other end of C7, together with chokes RFC3 and RFC4, are soldered to the lug at the end of RFC2. RFC3 and RFC4 are fixed directly to the anode clips.

The front stator of the TUNE capacitor C9 is connected to an earth tag just above the capacitor (hole "d" in Fig 12). C11 is taken direct from the switch to the LOAD capacitor C12, where it is soldered direct to the corner of the frame. RFC1 is connected to the two standoff insulators on the back panel. The decoupling capacitors C1 and C2 are earthed to the solder tags at the base of the standoffs.

The output from the pi network is taken via 50Ω coaxial cable. The inner conductor is connected to the lower rear stator terminal on C12, and the outer to an earth tag bolted to the chassis (hole "f" in Fig 13). The cable is run along inside the flange on the aluminium screen and taken through the grommet at the rear. As a temporary measure it should be taken direct to the ANTENNA socket, but later, when the antenna changeover module has been fitted, it will have to go to that.

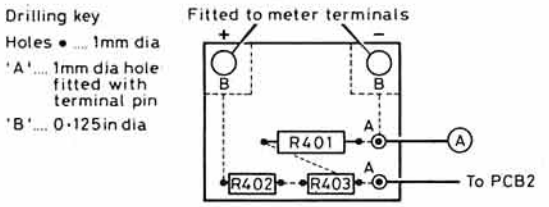


Fig 27. Drilling and assembly of PCB4

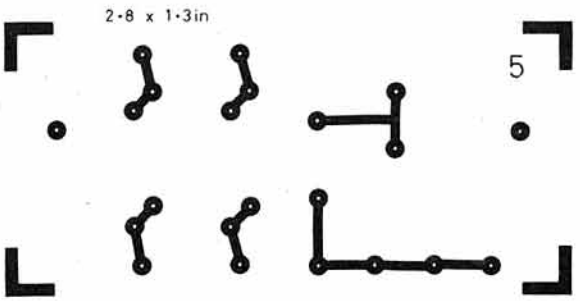


Fig 28. Etching pattern for fuse panel, PCB5

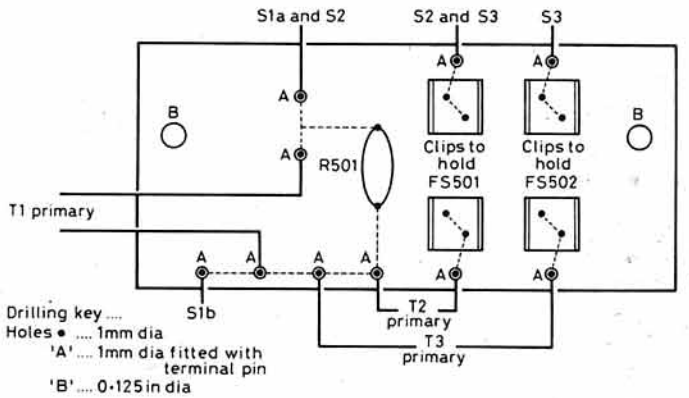


Fig 29. Drilling and assembly of PCB5

Testing of the linear amplifier can now begin. The essential items which will be required for testing are:

(a) A 50Ω dummy load capable of withstanding at least 25W.

(b) An swr meter or some other device which will give a rough indication of the power going into the dummy load.

(c) A meter capable of reading around 0–10V rf.

The initial testing should be done with the ht switched off. First check that there is 6·3V ac (±0·2V or so) across each valve heater.

Connect the output of the transceiver to the TX PREAMP socket on the linear amplifier unit. Set the DRIVE switch to the appropriate band. Switch the transceiver to CW, clamp the key down and turn the TX OUTPUT control to give an output of about 2V. Clip the rf voltmeter lead to the insulation of the wire going to the valve grids (so as to minimize the loading of the meter on the tuned circuit) and tune the appropriate coil on PCB1 for maximum meter reading. Repeat for the other bands.

Neutralizing the internal anode-to-grid capacitance of the valves should be done next. This can be done on any frequency band, but for an optimum balance it is probably preferable to choose a middle-frequency band such as 7 or 14MHz.

The rf voltmeter is connected to the junction of the two anode chokes R3 and R4, and, with an rf input applied to the linear, but still with no ht applied to the valves, the TUNE and LOAD capacitors are tuned for maximum reading. The compression trimmer C107 is then tuned for minimum meter reading.

The ht can now be switched on and, with no rf input and the ht switch at HIGH, a check made that the valves take a total anode current of around 50mA (17μA on the scale if it has not been re-drawn). Should it be more like 70mA (23μA) it will be advisable to increase the bias voltage by adding a low voltage zener in series with the 47V one. The screen current should be low and thus LED1 should only be very dimly illuminated.

Tuning up the linear amplifier

A continuous tone will be required for tuning up the linear amplifier. The easiest way of obtaining this is to switch to CW and hold down the key but, if available, a two-tone oscillator could be fed into the microphone socket.

With the TX OUTPUT control on the transceiver initially turned up just a little way, adjust the TUNE and LOAD controls for maximum rf into the dummy load. It should be noted that when the LOAD capacitor is set to a higher capacitance than that which gives maximum output, the valves are not fully loaded and the screen current (as indicated by LED2) is considerably higher. In fact the desirable setting is with the capacitor set slightly to the other side of the maximum output position.

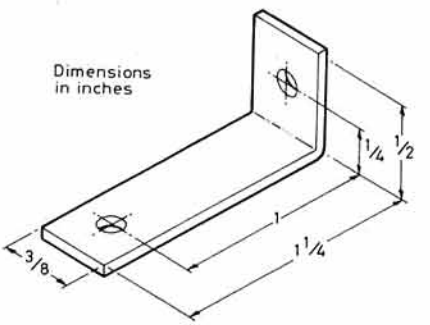


Fig 30. Brackets for fixing fuse panel PCB5. Material: 18swg aluminium or as available. Holes are 6BA clearance

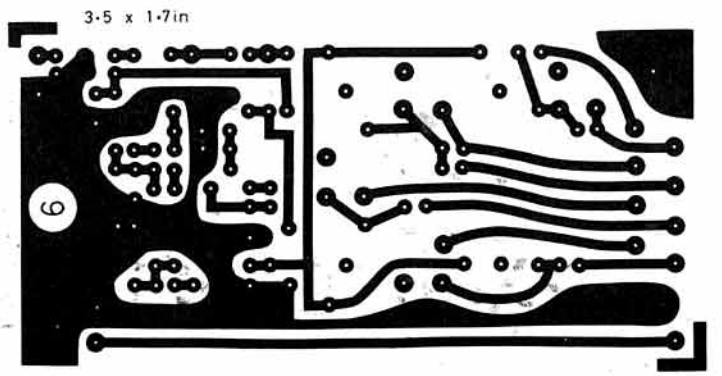


Fig 31. Etching pattern for receiver preamplifier module PCB6

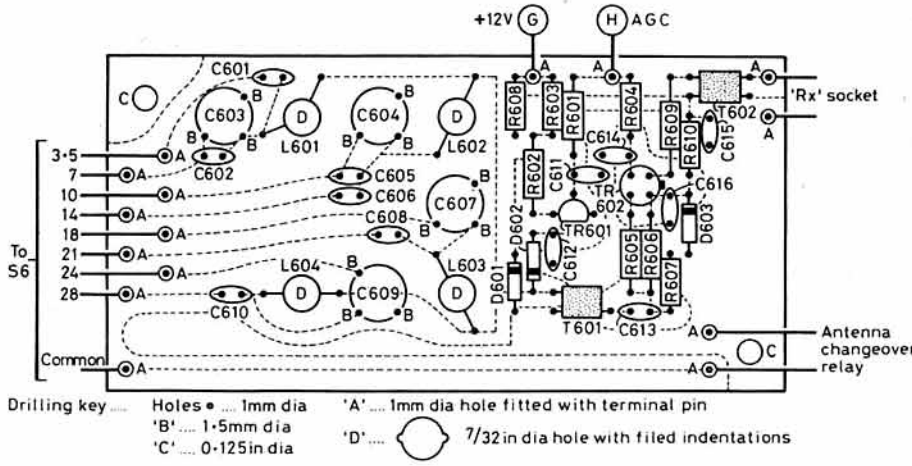


Fig 32. Drilling and assembly of PCB6

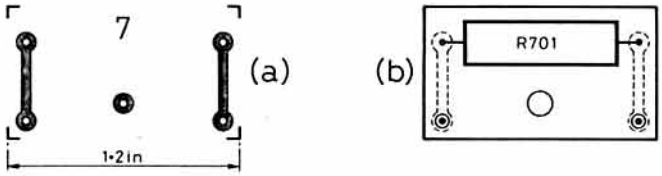


Fig 33. Board (PCB7) for mounting heater dropper resistor. (a) Etching. (b) Assembly

Thus in order to avoid overheating in the valves (and possible resultant damage), as well as undesirable waveform distortion, it is advised that:
(a) After the LOAD control setting for maximum output has been found, the control is turned slightly anticlockwise (ie to a slightly lower capacitance).
(b) The drive to the valves is kept below the point at which grid current occurs (shown by a brightening of LED2). Driving beyond this point will also give increased screen current and increased distortion.
(c) Full drive should not be applied to the valves if no output load is connected. This will also give high screen current.

The screen current can be monitored at all times by observing LED1. When operating at full power with a single continuous tone, the total screen current for both valves should ideally be around 12mA, but it should never be greatly in excess of this figure. In order to obtain some idea of what a current of 12mA means in terms of the brightness of LED1 relative to that of LED2, a check can be made by putting a voltmeter across R202 on the power supply board. A reading of 40V will correspond to a screen current of 12mA. The total anode current, when the linear is fully driven with a single steady tone, will be around 220mA (or 75μA if the meter scale has not been redrawn).

Commissioning the receiver preamplifier

Having commissioned the power supply and the linear amplifier itself, the remaining tasks within the linear amplifier unit consist of (*a*) fitting the antenna changeover (A) board (PCB14) from the transceiver unit, (*b*) fitting the receiver preamplifier PCB6, and (*c*) wiring them up.

Then, in the transceiver unit, the output of the transmitter preamplifier needs to be connected directly to the TX socket, and the RX socket needs to be connected to the antenna changeover (B) board (PCB13). The DIN socket also needs to be connected up; pin 3 to the agc line, pin 1 to the c/o relay energizing line (L), and pin 2 to earth.

A lead will have to be made up to interconnect the DIN socket on the transceiver with that on the linear amplifier. The use of a four- or five-way screened lead will leave some capacity for possible additional connections later.

With the two units fully interconnected, the receiver can be tested with its preamplifier. (Connect it to a real antenna now: otherwise the results will be disappointing!) On each band the appropriate tuned circuit on the preamplifier should be tuned for maximum gain. Where two bands share one coil, the coil should be peaked-up first on the band which has a fixed capacitor, and the preset capacitor used for peaking up on the other band.

Modifications to include 1·8MHz

The modifications needed to extend the operation of the linear amplifier unit to include 1·8MHz will be described on the assumption that this is to be provided in addition to all the other bands. Suitable simplifications can be made by the constructor if he does not want an all-band capability.

The most important differences concern the pi network at the output of the linear amplifier, the revised circuit being shown in Fig 34. The output switch S5 needs to have a third wafer, and the additional components L2 and C17 are required. L2 is wound on a 0·625in diameter former, which is 1·25in long and fitted with reasonably stiff leadout wires so that the coil can be suspended in the wiring.

Adapting the pi network to cater for 1·8MHz introduces some problems because, ideally, C1 and C2 need to have a very large capacitance swing. In order to accommodate the existing capacitors, the working Q of the circuit is arranged to be around eight instead of the more desirable value of 12. This allows C1, with suitable padding capacitance added, to cover the range 1·8 to 2MHz, with just a tiny amount to spare.

(Continued on page 261)

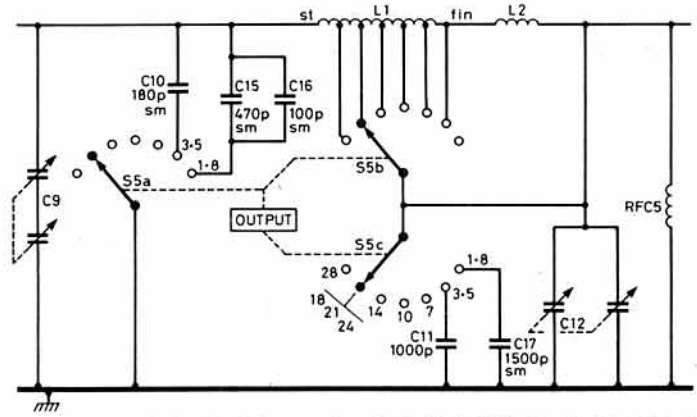


Fig 34. Revised circuit of pi-network to include 1·8MHz band. C15, 470pF; C16, 100pF; C17, 1500pF (all silvered mica). L2, 30t 28swg enamelled wire closewound on 0·625in diameter former. S5 needs an additional wafer. Other components unchanged

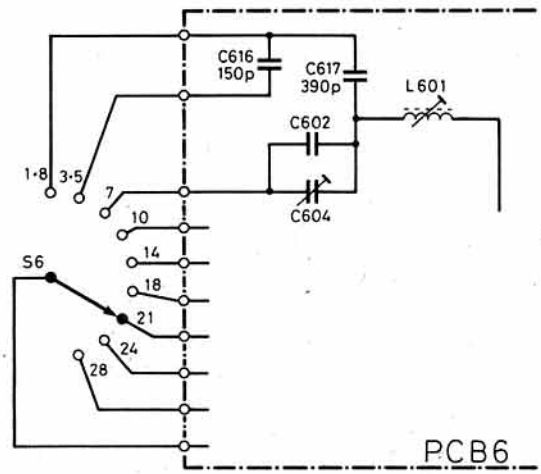


Fig 35. Modifications to receiver preamplifier switching to include 1·8MHz. C616, 150pF; C617, 390pF (both sub-min ceramic plate). Other components unchanged

A 50MHz RECEIVE/TRANSMIT CONVERTER

D S Jones, GW3XYW*

IN PREPARATION for the release of the 50MHz band, together with the increased availability of commercial equipment, I decided to design a receive/transmit unit for 50MHz. If a receive-only converter is required, the units have been constructed in such a way that the transmit section can be added at a later date. No originality is claimed for the circuits [1, 2]. They are reliable and I have used them many times on different bands throughout the past 15 years.

The various units are constructed on a single-sided pcb which should not be etched. Make the anchor points by drilling 0·052in holes and inserting metal pins. Where the pins need to be insulated, remove the copper by lightly countersinking with a larger drill (0·125in). If the pins are earth points, then they should be soldered in place. Combinations of single-sided, double-sided, earthed and insulated anchor points on which to mount the components are thus produced. Solder the feedthrough capacitors directly to the earthplane. This method of construction is clean, easy and suitable for rf, up to vhf, and, if a mistake is made, the hole can be soldered over and a new one drilled. To obtain the correct internal diameter, wind the self-supporting coils on twist drills. Screens (of tinplate or pcb) should be mounted as shown in Figs 1 and 3. A substantial heatsink should be mounted on a spacer in good thermal contact with the 2N6082 output transistor.

Alignment is simple and follows normal practice. A gdo is very useful for setting up approximate resonance, although if this is attempted with the fet stages, the drains must be disconnected, or the power applied, otherwise satisfactory "dips" will not be observed.

The 22MHz crystal mixes with the 50MHz input to produce sum and difference frequencies at 72 and 28MHz. It is the latter frequency which is tuned and selected by LC circuits. The reverse applies on transmit mixing. Any instability encountered around the rf amplifier stage can be eliminated by connecting a 6·8kΩ 0·25W resistor across the T2 primary.

A series resonant trap (Ct and Lt) for 44MHz is included in the transmit amplifier chain—this helps to suppress any spurious output from the crystal oscillator second harmonic. It is recommended that the three finished panels are mounted either in separate boxes or in a single box with screens.

For the initial tune-up, a supply voltage of 12V is adequate, but in order to realize full power output the supply may be increased to 13·5V. An input of approximately 1mW is

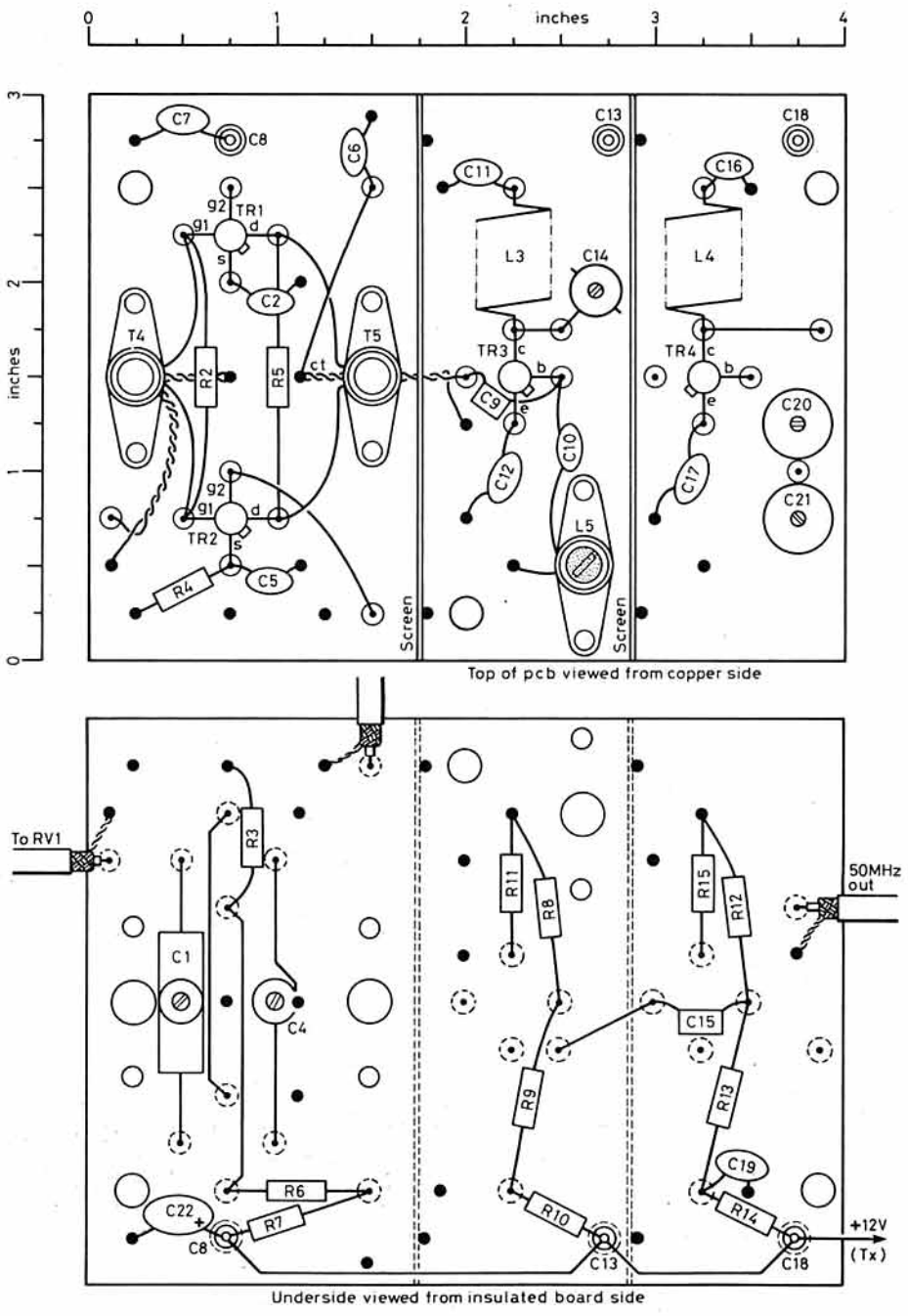


Fig 1. Transmit mixer/amplifier component layout

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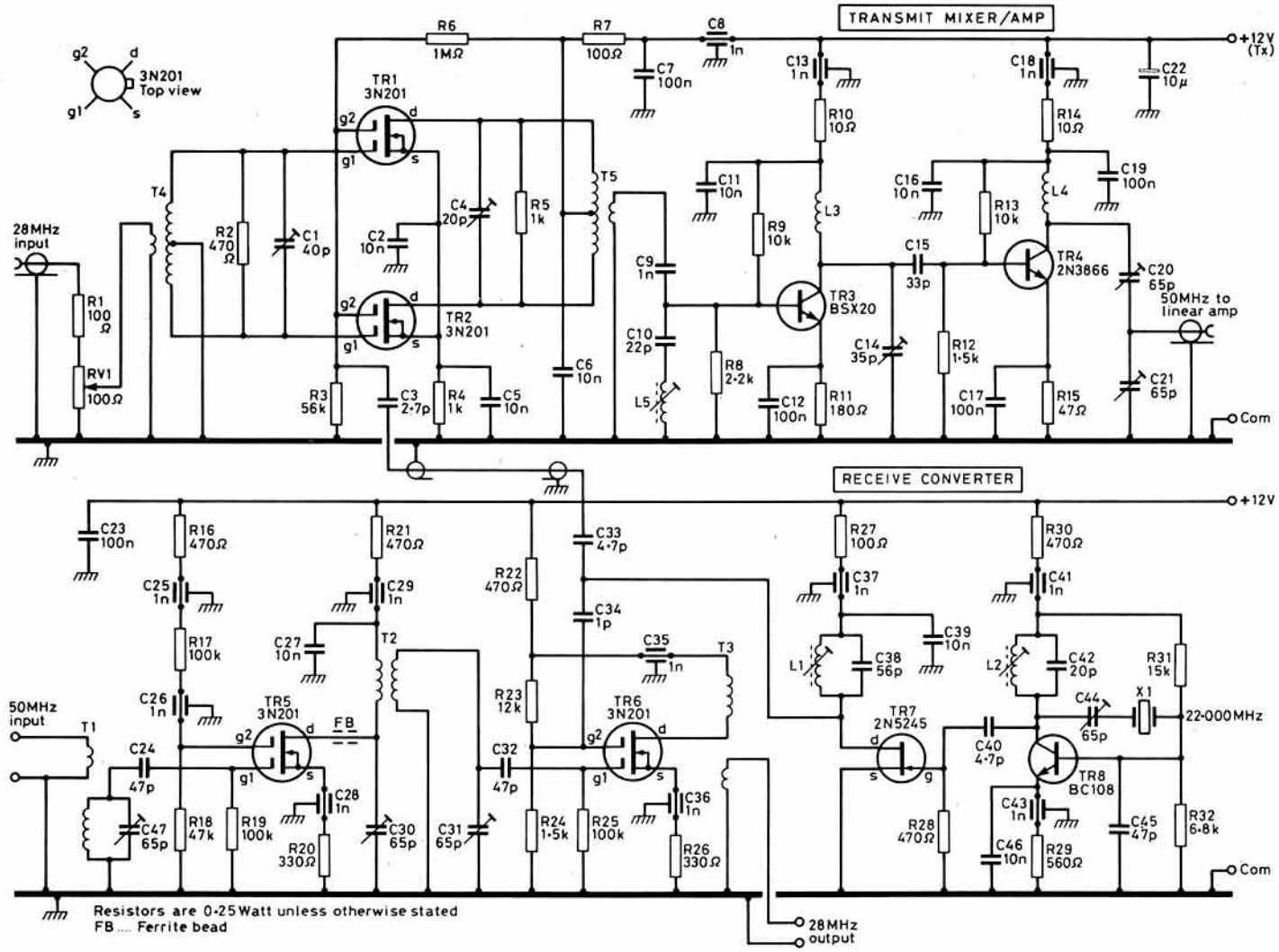

Fig 2. Transmit mixer/amplifier and receive converter circuit diagram

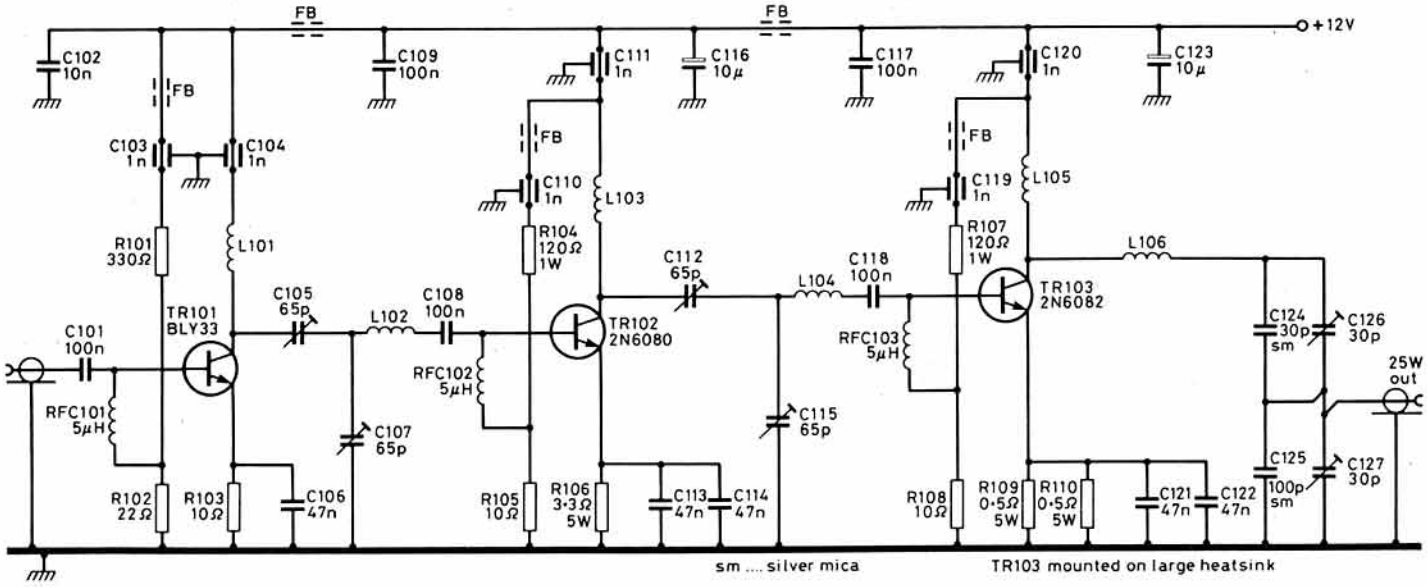

Fig 3. Linear amplifier circuit diagram

required for full output. Therefore, if the converter is to be used with a transceiver, a suitable attenuator should be included in the circuit.

References

[1] "Dual-gate fet converters for two and four metres", C W Westwood, G3VFD. *Rad Com* October 1969.

[2] "A 70MHz transistorized transmit/receive converter", D F Harvey, G3XBY, and C S Gare, G3WOS. *Rad Com* February 1977.

Components list

Transmit mixer/amp and receive converter

R1, 7, 25	100Ω
R2, 16, 21, 22, 28, 30	470Ω
R3	56kΩ
R4, 5	1kΩ
R6	1MΩ
R8	2·2kΩ
R9, 13	10kΩ
R10, 14	10Ω
R11	180Ω
R12, 24	1·5kΩ
R15	47Ω
R17, 19, 25	100kΩ
R18	47kΩ
R20, 26	330Ω
R23	12kΩ
R29	560Ω
R31	15kΩ
R32	6·8kΩ
RV1	100Ω
C1	40pF
C2, 5, 6, 11, 16, 18, 27, 39, 46	10nF
C3	2·7pF
C4	10pF
C7, 12, 17, 19, 23, 24	100nF
C8, 9, 13, 25, 26, 28, 29, 35, 36, 37, 41, 43	1nF
C10	22pF
C14	35pF trimmer
C15	33pF
C20, 21, 30, 31, 44	65pF trimmer
C22	10μF
C33, 40	4·7pF
C34	1pF
C38	56pF
C42	20pF
TR1, 2, 5, 6	3N201
TR3	BSX20
TR4	2N3866
TR7	2N5245
TR8	BC108

T1	Primary 2t 20swg 0·5in id enam copper Secondary 7t 20swg 0·5in id enam copper	
T2	Primary 7t 20swg 0·5in id enam copper Secondary 7t 20swg 0·5in id enam copper	
T3	Primary 25t 32swg enam Secondary 2t 26swg pvc covered	Wound on 0·25in former with iron-dust core
T4	Primary 2t 28swg pvc covered Secondary 8t + 8t 32swg enam	Wound on 0·25in former—no core
T5	Primary 4t + 4t 26swg enam Secondary 2t 28swg pvc covered	Wound on 0·25in former—no core
L1	12t 24swg enam wound on 0·25in former with iron-dust core	
L2	20t 26swg enam wound on 0·25in former with iron-dust core	
L3	7t 20swg 0·375in enam copper	
L4	7t 20swg 0·375in id enam copper	
L5	9t 24swg enam wound on 0·25in former with iron-dust core	

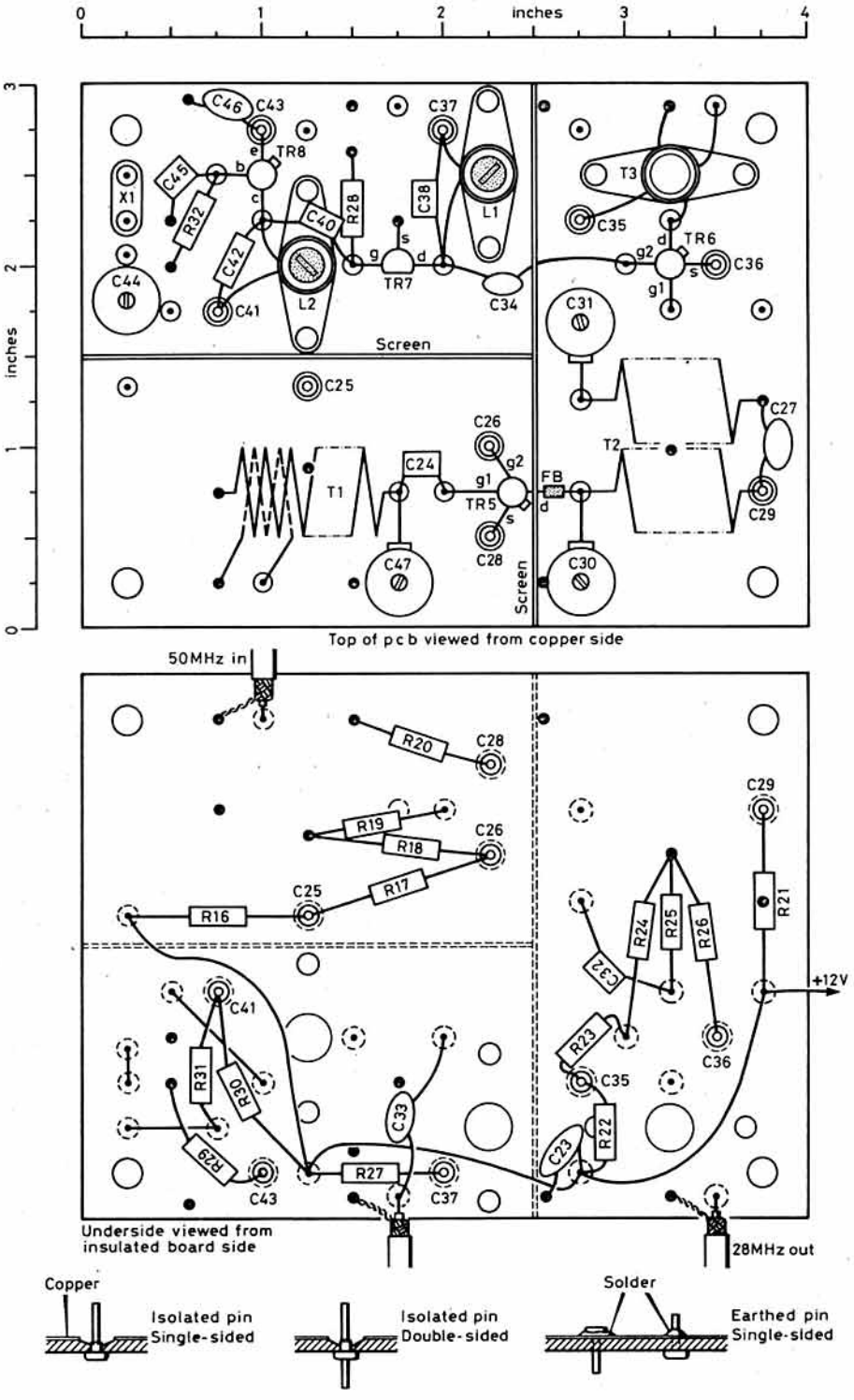

Fig 4. Receive board component layout

LINEAR AMPLIFIER

R101	330Ω
R102	22Ω
R103, 105, 108	10Ω
R104, 107	120Ω 1W
R106	3·3Ω 5W
R109, 110	0·5Ω 5W
C101, 108, 109, 117, 118	100nF
C102	10nF
C103, 104, 110, 111, 119, 120	1nF

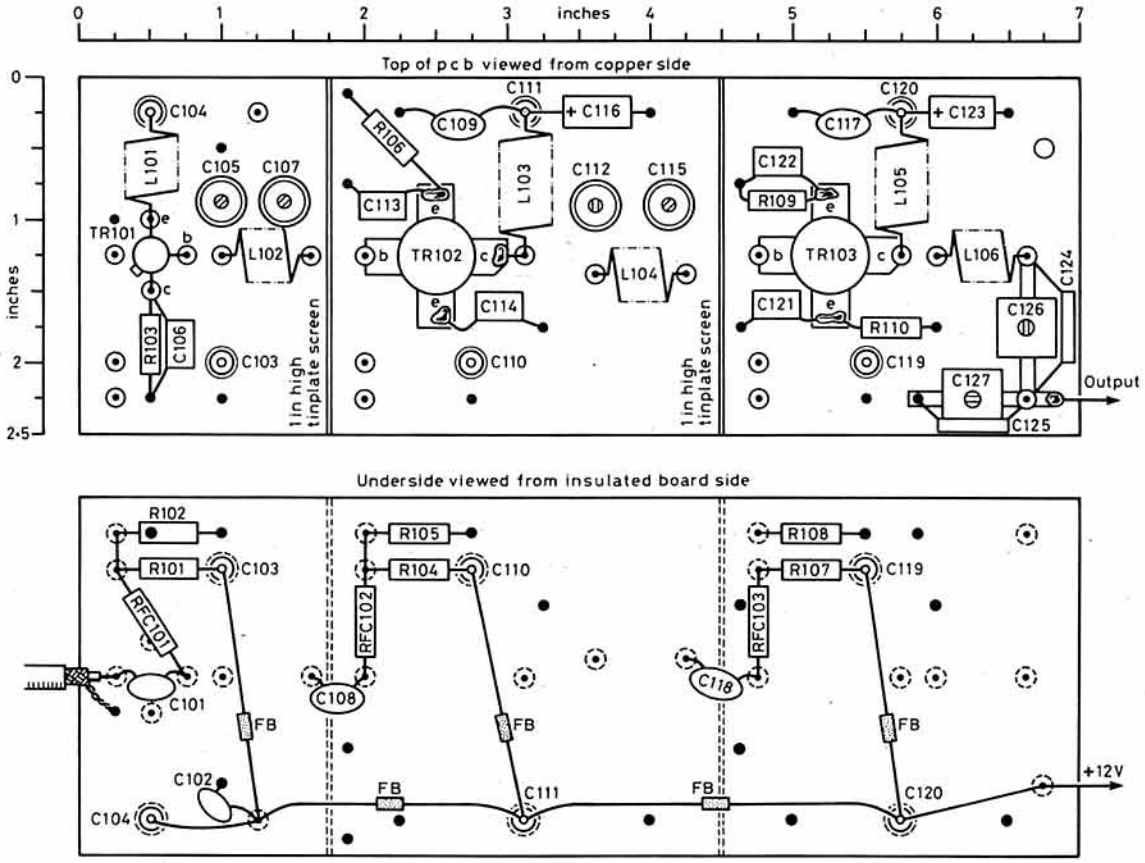

Fig 5. Linear amplifier component layout

C105, 107, 112, 115	65pF trimmer	**L101**	7t 18swg 0·375in id	
C106, 113, 114, 121, 122	47nF	**L102**	5t 18swg 0·375in id	
		L103	7t 18swg 0·375in id	
C116, 123	10μF	**L104**	3t 18swg 0·375in id	tinned copper
C124	30pF sm	**L105**	8t 18swg 0·375in id	
C126, 127	30pF trimmer	**L106**	7t 16swg 0·375in id	
TR101	BLY33	**RFC101, 102, 103**	5μh vhf choke R S Stock No 238-255	
TR102	2N6080	**PCB** (single-sided)	Pins R S Stock No 433-624	
TR103	2N6082	**PCB** (double-sided)	Pins R S Stock No 433-630	
		Twist drill bits	1·3mm (0·052in) R S Stock No 549-195	

□

A LINEAR AMPLIFIER UNIT FOR THE HF BAND TRANSCEIVER

(Continued from page 257)

Because of the limited capacitance range of C1, it may be necessary to adjust the inductance of L2 in order to ensure full coverage from 1·8 to 2MHz. Thus the constructor is advised initially to put a few extra turns on L2 and remove turns as found necessary.

The range of the LOAD capacitor C2 is also restricted. However, the precise loading setting is not so important on 1·8MHz, where the linear will not be working at its maximum power capability, and the consequences of this restriction will not be important, provided that the transmitter is working into an essentially resistive 50Ω load.

Fig 35 shows the changes required to the receiver preamplifier switching. When S6 is switched to 1·8MHz, L601 has a series capacitance of 390pF (C617). When the switch is at 3·5MHz, L601 has a series capacitance of 108pF (C616 and C617 in series). L601 is tuned for maximum gain in the centre of the 3·5MHz band and C603 is tuned for maximum gain in the centre of the 7MHz band. On the 1·8MHz band the circuit should then be on tune.

At the input of the linear amplifier no tuned circuit is necessary for 1·8MHz. The DRIVE switch merely needs to have an extra blank position, which leaves R101 unshunted.

On 1·8MHz the linear amplifier must be kept below its maximum output capability in order to meet the licensing regulations. To assist in this, the ht switch should be kept in the LOW position.

Operation of the linear amplifier

With the ht switch in the OFF position, the DRIVE and OUTPUT switches should be set to the required band. If the antenna does not look like approximately 50Ω at the shack end of the downlead, an antenna tuning unit will be essential. Even if the antenna does look like 50Ω, an atu is still useful to provide a little extra attenuation to out-of-band signals.

If an atu is used, it is recommended that the linear first be tuned up with a dummy load. Then, after connecting the linear up to the atu, the latter can be adjusted for minimum swr, and any final adjustments done using the TUNE and LOAD controls.

Throughout the tune-up procedure care should be taken, as outlined earlier, to avoid excess screen current. The valves will tolerate a great deal of mishandling but it is not advisable to tempt providence too far!

When operating, the peak level of the signal will be stabilized by the alc circuitry in the transceiver unit. Thus, once the TX OUTPUT control has been set to the required position, the p.e.p of the output will be maintained at a constant level.

When operating ssb, the average anode current will be considerably less than with a continuous single tone of the same p.e.p.

Enhancements to the transceiver

This concludes the description of the linear amplifier unit. Next month a complementry article will describe some enhancements which can be made to the transceiver unit itself. □

Technical Topics

by Pat Hawker, G3VA

THIS MONTH we range back and forth across the years of experimental amateur radio. From spark to smd, via valves. For it all began, at least in the UK, with the passing of the original Wireless Telegraphy Act, 1904. How easy it was at first: "It was only necessary to advise the Postmaster General of the intention to erect a wireless station (transmitting or receiving) and to fill in a form giving particulars of such installation, when an inspector would be sent to visit the station and a permit for its use would be handed to the owner. Later, one guinea began to be charged".

No RAE, no morse test, no being tied down to specific frequency bands. Little more than a morse key, earphones, a hefty spark, a crystal detector and lots of wire! But no wonder that the Wireless Society of London (forerunner of the RSGB) was soon alarmed at the number of complaints of interference with commercial and Government stations due to the use of "excessive powers and untuned aerials, by irresponsible experimenters". Regulations and morse tests came in the early 'twenties, RAE in the late 'forties. It seems we could not do without them.

First this month, an apology. Reading the page proofs of the March *TT* I panicked and decided I had inadvertently switched round two diagrams. The editor promptly made the correction and passed the issue for press. A day later I realised that the diagrams had been correct in the first place—so you got them with the wrong captions. What was shown in Fig 6(a) as a conventional active doubly-balanced fet mixer was in fact Ed Oxner's new mixer configuration. Fig 8 showed the conventional circuit. My apologies! Who would be a columnist!

Costs of reliability

There is little doubt that many UK amateurs resent the fact that the prices charged for imported Japanese equipment by "authorized dealers" tend to be significantly higher than those charged for identical models in some other countries and by non-authorized dealers who import indirectly. In *TT* January 1984, p45, Kjell Ström, SM6CPI, the Yaesu Musen representative for Europe, explained that Japanese firms "encourage their agents to carry the necessary spare parts and to take care of customers long after the final cheque has been cashed". He felt that the emphasis on quality assurance and initial "burn-in" procedures at the factories meant the probability of failure of each individual component to be microscopic . . . "Because it would not make economic sense for manufacturers to seek out the few remaining potential failures, they expect these to be taken care of in the after-sales service, performed and paid for by the authorized agents . . . Buying from an authorized agent is a form of insurance".

Cynics could interprete this as meaning that while manufacturers do their reasonable best to make their rigs reliable they accept that inevitably a small number of less-than-perfect rigs will leave the factories and end up in our shacks, with the retail price geared to covering the cost of putting these right.

This is a commercially understandable policy, by no means unique to amateur radio equipment. But for customers it can give rise to some justifiable misgivings. For example, equipment that has to be sent back to the dealer once, or even twice, needs to be dealt with promptly and effectively or the unlucky purchaser is bound to feel aggrieved. There is the even more insidious problem that few of us have the full range of laboratory test equipment to determine whether or not equipments meet their design specification.

The *QST* account of the reviewer's difficulties and delays in obtaining a fully effective Icom 751 (*TT* January 1986, p34) highlighted this problem and has encouraged some *TT* readers to unfold their own horror stories. Meanwhile *Members Mailbag* continues to keep the Trio/Kenwood pot boiling.

Owen Kemp, G4TLK, for example, lists some of his experiences with well-respected Yaesu equipment:

FRG7700: display driver ic failed after two months' use.

FT77: intermittent operation over the first three months caused by a dry solder joint.

FT757: various faults in both transmit and receive modes over a period of 18 months, cured only by replacement of the rf board.

G4TLK is a professional electronics technician and recognizes how perverse equipment can be. But he feels that faults could be eliminated in production by more rigid use of quality assurance procedures and less dependence on "after sales service" by authorized agents.

His place of employment has an effective three-day "burn-in" procedure which accelerates the ageing of components by operating them at an elevated temperature. This removes "infant mortality" and spotlights unduly temperature-sensitive components. Following this burn-in, each instrument is checked twice, once by a technician manually and then by an automated test system that avoids human error. Further checks are carried out independently by the quality assurance department, then finally by a standards inspector. This is very different, he suggests, from the simple batch testing usually considered sufficient for price-sensitive consumer electronics.

My own feeling is that we cannot have it both ways. Although the prices asked these days for amateur black boxes appear to be very high by historic standards, they are in fact very reasonable, indeed low, in comparison with the cost of British, European and American professional communications equipment. The Japanese cram a lot of facilities into their transceivers, largely because a few years ago they discovered a lack of demand for simpler "economy" models. Complexity implies less reliability without rigid quality assurance. But rigid quality assurance inevitably costs the customer a great deal of money. Few amateurs would be able to afford to buy equipment made to "mil-spec" and BS9000 standards, unless satisfied with extremely "simple" equipments. As long as amateurs go on demanding "all-singing, all-dancing" models they must necessarily accept that a proportion of equipments will require after-sales service and need careful "in-shack" checking out to the best of one's ability.

What the amateur has the right to demand is that if he pays the "insurance premium" of buying from an authorized dealer, he should receive courteous, prompt and effective after-sales service and, if necessary, prompt replacement of "rogue" models that never seem to be quite right. On the other hand, dealers are fully entitled to charge an "economic" fee for servicing equipments bought elsewhere—labour costs can be very high—though they may not do their reputation any good by simply refusing altogether to service models bought overseas.

The greatest difficulty that arises from complex equipment made to retail at budget cost is how the purchaser can ensure that his model is really up to spec. For example, the initial problem uncovered by N1FB in the ARRL laboratory on IC751, serial number 1114, was that an i.f. section was out of alignment. In some circumstances, in the absence of test equipment, slight misalignment of one or two stages could pass unnoticed for a considerable period of time.

SMD and homebrew

On several occasions attention has been drawn in *TT* to the increasing use of tiny surface-mounted devices and related forms of hybrid microelectronics in virtually all branches of electronics, including amateur radio equipment. SMDs have made very rapid progress in Japan; rather slower progress in the USA and Europe, where equipment manufacturers point to the problems of reflow soldering tiny leaded and leadless surface-mounted boards with components on both sides, techniques on which most manufacturers of mass-produced equipment are only just beginning to get a grip. Then there is the cost of installing new highly-automated production equipment in an era when so much of the consumer market has been captured by Japanese industry. A single smd assembly line consisting of machines for surface-mount placement, soldering, testing and repair can cost around a quarter of a million pounds. On the other hand, the technology offers both manufacturers and customers significant advan-

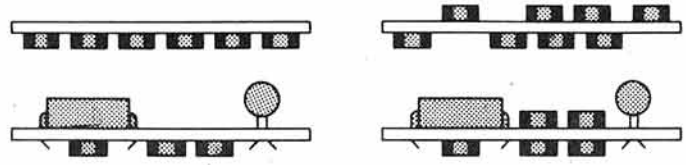

Fig 1. Surface-mounted components can be mounted on or below the printed circuit boards

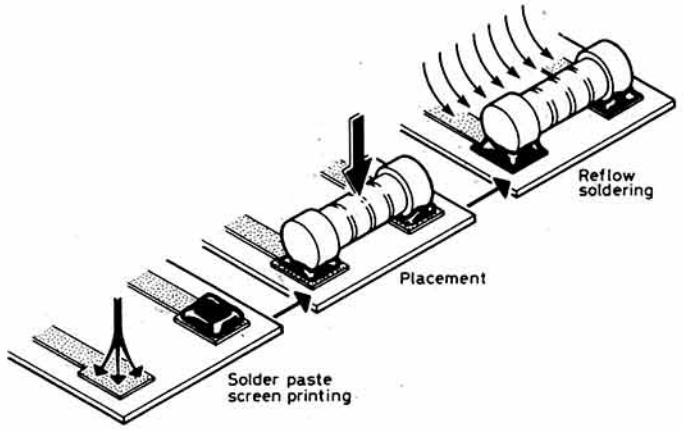

Fig 2. A standard procedure for fixing surface-mounted components on the upper side of printed circuit boards, using solder paste screen printing

tages: increased interconnection density, smaller pcb area, better and more consistent performance, and reduced manufacturing costs once the necessary production equipment has been installed (see "What's holding back surface mounting" *Electronics* 10 February 1986, pp25–29).

One result, both in the USA and Europe, has been the growth of specialized sub-contracting firms that undertake the design, production and testing of smd boards for the main manufacturers.

Recently I received a letter from Rex Waygood, technical director of Surface Electronics, a UK firm in Poole, Dorset, that specializes in miniaturization and surface mount production technology, thick-film hybrid circuits and the like.

He takes me to task for having suggested on various occasions that smd could represent a further blow to home-servicing and home-construction. Rather, he suggests, it offers amateurs a new set of challenges. He writes:

"Surface mount components are now available to the home-constructor, although I admit not as readily available as conventional components.

"To remove failed components, greater use has to be made of such devices as desoldering braid; solder suckers, other than expensive motorized versions, are of little use. (The outer braid from discarded coaxial cable can form an effective desoldering braid—*G3VA*.)

"For assembly, tweezers, a pot of RMA flux, a small soldering iron and a bench magnifier are really all that are necessary.

"In order to make the joints look more professional, a grill pan and a hot air paint stripper can be used to reflow the solder!

"The major difficulty with surface-mount assemblies is to design the pads and solder mask to produce a high first-time yield and a highly reliable joint for mass production. This is not a problem for the radio amateur, as his requirement is normally for a one-off board, therefore rework time is not significant.

"The major challenge to the home-constructor using sma comes in the manufacture of the board. The smaller pad sizes, pitches of 50-thou, 0·8mm and even 25-thou, and inevitably smaller tracks, 10-thou to 8-thou, will be a challenge. However, pcb manufacturers are using 0·5oz copper laminate to improve their own yields at these finer track widths. This will filter down to the amateurs. Also it will be found that, for several reasons, the board design will be double-sided.

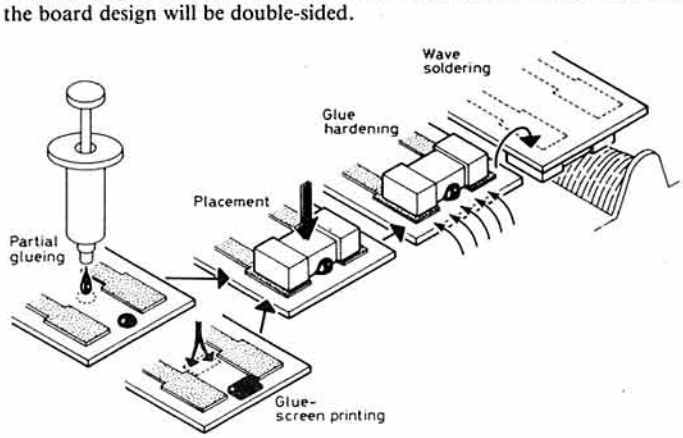

Fig 3. An alternative mounting procedure whereby glue is used to hold the component to the board during flow soldering, making subsequent removal of components rather tricky as it is easy to damage the board

"I accept the fact that it will be a brave amateur who applies a paint stripper to his newly-purchased surface-mount cmos micro, but no braver than the amateur with his first valve, first transistor, first fet, first gasfet or first micro!

"I am convinced that amateurs can and will rise to the challenges offered by sma and will come to exploit the size, cost and performance benefits offered."

A long and detailed article, "Surface mounted components—the quiet revolution" (*Electronics Australia*, July 1985) ended by discussing briefly their use by hobbyists:

"All the foregoing seems to indicate that electronics is progressing to the point where hobbyists will no longer be able to be involved because the components are just too small to handle. This is not necessarily the case. While chip capacitors and resistors are exceedingly small and difficult to handle, the larger packages are quite practical for use by hobbyists. Indeed, *Electronics Australia* has presently under development a circuit design using a surface mounting microprocessor."

One of the practical snags, it seems to me, will be identifying component values etc should they ever get mixed together. The situation for the ic packages, however, seems a little more hopeful, though I guess it will need those "hands-free" binocular magnifiers described in *TT* February 1983, p134 and May 1983, p428. It's a challenge we shall need to accept, though personally I still like components that are big and identifiable and carry their value with them, and can withstand lots of volts and/or milliamps. But who am I to stand in the way of "progress"?

Don't fuse the neutral

In the February *TT*, Chris Trayner, G4OKW, commented on the safety hazard represented by the practice of connecting fuses in both the phase ("live" or "line") and neutral leads of mains equipment connected to three-pin mains sockets. Twin mains fuses were once common practice and can still be found occasionally, particularly in equipment for use on mainland Europe etc.

However, he was puzzled at not being able to trace a definitive reference to double fusing in the IEE Wiring Regulations or BS415. A number of readers have pointed out that in fact the IEE Wiring Regulations do cover this practice in relation to advice never to fuse earthed neutral conductors.

Brian Castle, G4DYF, refers to Paragraph 13.12 of the current IEE Wiring Regulations (15th edition with May 1984 amendments):

"No fuse, or circuit breaker other than a limited circuit breaker, shall be inserted in an earthed neutral conductor, and any limited circuit breaker in an earthed neutral conductor shall be arranged to break also all the related phase conductors."

David Rolle, GM3GRG, writes: I think Appendix 5 of the IEE regulations may cover this point:

"If the circuit has one pole earthed, the socket outlet is of the type that will accept only two-pole-and-earth contact plugs with single-pole fusing on the live pole. . . ." and

"If the circuit has neither pole earthed (eg a circuit supplied from a double-wound transformer having the mid-point of its secondary winding earthed) the socket outlet is of the type that will accept only two-pole-and-earth contacts plugs with double-pole fusing. . . ."

I can see that there could be a degree of confusion in the use of the term "earthed neutral conductor" in referring to the mains supply "neutral" since, as previously mentioned in *TT*, this lead must never be "earthed" by users, as a potential often exists between "neutral" and "earth". Nevertheless it should be appreciated that the neutral *is* earthed at an earlier point in the system, so that a supply taken from either a two-pole "lighting" bayonet socket or from a three-pin socket has, in effect, "an earthed neutral conductor". As pointed out above, the output from a double-wound transformer will not inherently be earthed and can require double-pole fusing.

GM3GRG also pointed out that it is worth considering the comments in the 1986 edition of the ARRL *Radio Amateurs Handbook*, Chapter 37 "Assembling a station". Although the American public supply sustem is not the same as ours, the comments underline the care necessary in diy electrical work. In the USA, apart from safety aspects such work can give rise to insurance problems. The ARRL notes:

"In some areas this work must be performed by a licensed electrician. You may need a special building permit for the work, and even if you are allowed to do the work yourself, you might have to get a licensed electrician to inspect the work."

Presumably this applies to the installation of permanent wiring, rather than to the connection of equipment fed from an already installed domestic socket; but, as has been stressed many times in *TT*, anything connected to 240V ac mains needs to be treated with caution and a recognition of the safety and fire hazards that can arise.

GM3GRG concludes with a couple of extracts from the old, 14th edition of the IEE Wiring Regulations: F8 "Every plug containing a fuse shall be non-reversible and so designed and arranged that no fuse can be connected in an earthed conductor." F5: "In circuits in which one pole is earthed at the source of supply, every socket outlet and plug shall be of the non-reversible type, with provision for earthing. This requirement does not apply to extra low voltage circuits or to the special low-voltage circuits referred to in Regulation F7." (Since writing these notes, further letters putting a rather different view have been received. More next month.)

Valves—not just nostalgia!

The suggestion by KH6B of "Project 6L6" (*TT* February, p107), to mark the 50th anniversary of this once extremely popular valve and to encourage a degree of home-construction, has brought forth some nostalgic memories.

But is it just a nostalgic fad? Or are there still valid grounds for suggesting that those old valves can still play a valuable role in providing the means whereby simple, low-cost but effective cw-only transmitters can be built on the kitchen table? Unlike smd technology, there was little fear that an untimely sneeze would blow the equipment off the bench and leave you with the problem of trying to work out which component is which!

John Roscoe, G4QK, recalls the 6AG7, so useful as a doubler or driver, the pre-war RK39, the powerful wartime PT15 (used in the T1154). He strongly recommends the glass version of the 6L6; the metal version, apart from its inferior rf performance, tended to give off a nasty smell when it got really hot. He points out that an EF80 can furnish all the drive needed for a 6L6G.

Richard Q Marris, G2BZQ, makes no bones about still preferring valves to solidstate: "I use valves, as much as possible, for the simple reason that I *like* them—not that I have anything against transistors or those who use them. Similarly I use cw because I *like* it—I have a perfectly good 100W ssb transceiver but I seldom use it because it bores me. I have several of the old Codar AT5 transmitters and use these on 3·5MHz cw, deliberately under-running them at 10W input to preserve them. With a box of 7MHz crystals, a load of valves and a 'junk box' I am planning a low-power transmitter with a single 6V6 (the useful little brother of the 6L6). The old handbooks give plenty of advice and dodges on how to eliminate chirp from single-valve crystal-controlled transmitters. I enjoyed using valves in the old days. I enjoy using them now."

Coping with the 4CX-series

In retrospect, the rf power valves available to amateurs from 1936–9 onwards, including the 807 and 813 beam tetrodes, 808, T20, T55, 35T power triodes were ideally suited to home-construction, being both rugged —in that they would withstand considerable abuse—and reasonably docile once the art of parasitic-oscillation suppression and/or neutralization had been assimilated.

Post-war valves were designed to provide greater gain and efficiency at higher frequencies, and improved cathodes were of high perveance (in other words, permitted much larger transient peaks of emission). The introduction of ceramic instead of glass for valve envelopes increased mechanical strength, allowed smaller physical size for a given power dissipation, and enabled valves to operate at higher ambient temperature; more effective de-gassing during manufacture permitted greater emission for pulse operation. Nevertheless it must be admitted that high-perveance, high-gain valves require more care be taken in ensuring correct operating conditions if self-destruction is to be avoided. There is still much to be said for using the older style glass 813 for hf operation. And why leave those 807s in the junk box?

For high power at vhf/uhf, the 4CX-series has established a virtually unrivalled position. But it is important to realize that these valves, although rugged and capable of extremely good linearity, are "like no other" and require careful study of the data sheets, particularly in respect of close control of the screen volts if they are to approach the linearity of which they are capable. In *TT* December 1985, John Nelson, G4FRX, with long experience of these powerful beasts, drew attention to the value of metal oxide varistors to prevent damage, particularly to the built-in screen bypass capacitors in the costly SK620 bases, from the flashovers that are all too common with these radial-beam high-gain tetrodes.

Several letters have been received on the use of 4CX-series valves, including comments from John Fournier, DC0HW, ex-G8LRH, and G D Eddowes, G3NOH, together with further comments from G4FRX. While these correspondents do not agree in some respects on why and how problems such as flashover arise so often with these valves, I have endeavoured to sort through three long letters to find common ground on some of the operating precautions that should be taken to achieve good performance over a long lifetime, without the non-linear splatter that too often occurs.

G4FRX emphasizes that the inter-electrode spacing is extremely small in order to achieve good performance up to 500MHz, but that this is not the primary reason for flashovers, which he suggests can arise from at least four causes. Then again, in some respects, the 4CX-series resemble the older form of screen-grid tetrode: *all* radial-beam tetrodes display screen-grid secondary emission under some operating conditions of drive and anode and screen voltages. He writes: "All 4CX250Bs can be expected to source screen current under certain common conditions of drive and loading. For example, a correctly-loaded and driven 4CX250B with 2kV on its anode and 350V on its screen can be expected to source about 5mA of screen current when driven to 250mA anode current.

Varian-Eimac point out in their application notes that the single-tone screen current can be used to establish correct loading. Their data sheet shows that under several commonly-encountered operating conditions the screen current can be expected to be negative. This is due to a form of "secondary emission", though not quite in its classical form. Every 4CX250B pa, G4FRX stresses, should have a meter (preferably of off-zero type) in the screen circuit for tuning and loading purposes.

Light or no loading of a 4CX250B frequently leads to flashovers, as explained by G4FRX in *Short Wave Magazine* in considerable detail in a series of articles about five years ago.

There is no doubt that the screen-grid power supply for this series of valves needs careful design, preferably with shunt regulators and capable of sourcing and sinking at least 40mA for negligible change in the screen voltage. High-voltage transistors and improved regulators with higher loop gain are proving an important advance on the older valve regulators. DC0HW and G4FRX are in agreement about the vital importance of adequate cooling, with the blower "over" rather than "under" dimensioned.

G4FRX stresses that the correct heater supply is 6·0V ± 5 per cent, *not* 6·3V. He also mentions that loss of heater emission is uncommon and that these valves are more often pulled from professional sockets due to a degree of softness that increases secondary emission etc. Difficulties can thus be experienced with "ex-equipment" valves although, in view of the high initial cost, this is a common route for amateurs to take.

Control circuits for the 4CX250B

In a separate contribution, G D Eddowes, G3NOH (Flat 1, 47 The Avenue, Ealing, London W13 8JR) suggests some requirements in designing the control circuits for high-power 4CX250B amplifiers. He writes: "The 4CX250 type of valve can be expensive to buy new; the popular alternative is to obtain the 'used' version, and when a couple of gooduns are eventually found, the relieved owner obviously wants to take good care of them. Taking good care includes correct switch-on procedure and adequate cooling of the value. The circuits described achieve both of these requirements.

"The sequence of events I use when switching on is:

(*a*) Blower on.
(*b*) Heaters on, 10s later.
(*c*) Bias supplies on soon after or at the same time as the heaters.
(*d*) Anode volts on about 2min after the blower, and
(*e*) Screen volts on about 2min and 30s after the blower.

"Fig 4 shows a suitable delay to use for the switch-on sequence. Capacitor C1 is charged through R1 until the potential at pins 1 and 2 of the ic is high enough to produce a logic 0 at pins 3, 5 and 6. A logic 1 is then present at the base of the transistor, TR1, and the relay is made, thus making the particular circuit. Table 1 gives suitable values of C1 and R1 for the timings required.

"Another important contribution to the lifespan of the valve is to keep the blower running for at least 3min after switch-off, and this is achieved by the circuit of Fig 5. A separate 12V supply is needed, the mains supply of which is taken from the same mains supply that feeds the blower. On switch-off, C2 is charged and is supplying a logic 1 to pins 8 and 9 of the ic and, going through the logic a 1 is on the base of TR2 and the relay is

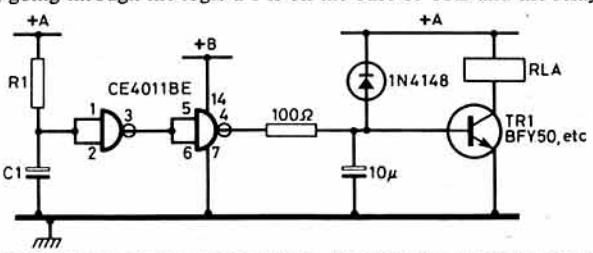

Fig 4. Delay logic for switch-on operations. Note that the supply for the ic is positive. For suggested component values for R and C, see Table 1

Table 1. Switch-on and switch-off delay

Delay	C1 and C2	R1 and R2
10s	4·7μF	2·2MΩ
2min	100μF	1·5MΩ
2min 30s	100μF	1·8MΩ
3min	100μF	2·2MΩ

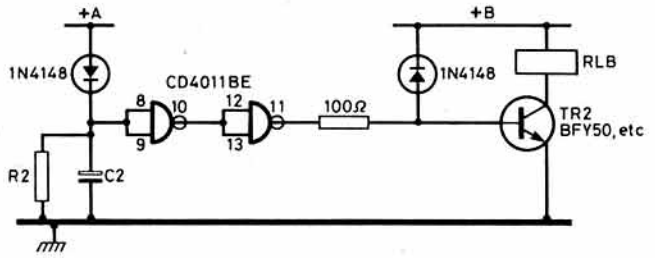

Fig 5. Delay logic for switching-off. Positive A supply is the general 12V line. Positive B supply must be maintained after switch-off and can be derived from the mains supply that feeds the fan. R2 and C2 component values are in Table 1

made. When the potential on pins 8 and 9 has dropped because of R1, the logic at the base of TR2 will be a 0 and the relay will break, thus disconnecting the blower.

"A snag I have come across is when the blower inductance is high and the relay contacts do not have much of a gap; the result is a chattering relay and burnt-out contacts! This is due to the spark inducing volts into the transformer that supplies the dc volts for the relay and charging up the smoothing capacitor. The answer is to keep the value of the smoothing to about 22μF, but this produces a side effect: not enough coulombs in the dc supply to keep C2 going. My 5min delay ended up with no R2 and a capacitor value of 220μF.

"As far as protection for the valve in the event of anode volts being lost, I have found that a 50mA quick-blow fuse in the screen supply is adequate. There are circuits around that detect the presence of anode volts, but I have never found one to be necessary. (G4FRX disagrees, he would not trust a 50mA fuse).

"The mains supply switching is shown in Fig 6. The neutral is not switched, but if the live connector is fused and the polarity is correct it will be safe. If switching of the neutral is required there are four-pole mains switches available.

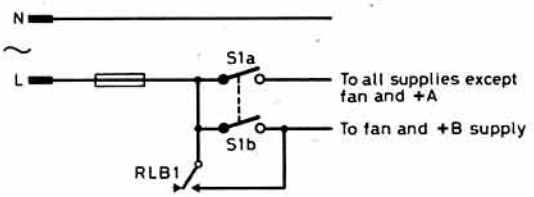

Fig 6. Arrangement of mains supplies

"The relays I use are 700Ω, and I have a limited number available but without bases."

G4FRX is a little uneasy about G3NOH's switch-on sequence. Eimac suggest that no other supplies should be applied until 1min after the heaters are turned on (although it seems unlikely that anything untoward could occur from earlier application of the bias supplies as in the G3NOH procedure). But the point he stresses is that the screen grid should always be tied to earth or to 300V and *never* allowed to float with anode volts applied, as this will almost certainly lead to flashovers etc. He adds that Eimac no longer recommend keeping the blower running 3min after switching off the heater.

Getting on 50MHz

Whatever one may feel about the desirability of encouraging more home-building or improvization of equipment, it is equally important that full use should be made of all our valuable frequency allocations. There is little doubt, for example, that, particularly in sunspot minimum years and after dark in maximum years, 28MHz is terribly under-used and vulnerable to take-over bids. More converted cb rigs, in the hands of licensed amateurs, could help us to retain the present width of the band!

It has been said that the reason why 70MHz has never attracted the level of activity justified by its useful propagation characteristics is because, being virtually a UK-only allocation, it has never been a target for Japanese firms. This is not the situation on 50MHz. Not only are there plenty of transceivers available from the major manufacturers (including many at power levels that need to be fed to inefficient antennas through high-loss feeders if they are to meet the current power restrictions) but also 50MHz is within the frequency band used by military vehicles, including tank sets.

The commercial models include 10W and 85W transceivers, 2·5W handhelds etc, such as Icom 551 (10W), 551-D (85W), Trio TS-660 (10W), TS670 (10W), Yaesu FT680R (10W), FT726R (10W), FT690R (2·5W) etc. There are also transverters such as the Microwave Modules unit (144 to 50MHz) and Yaesu FTV700 (28 to 50MHz). Crystal-controlled receiver converters include the Microwave Modules MMC 50 to 28MHz for use with an hf communications receiver.

On the military side, the older Plessey units such as C42, B47 and PRC261 can get you on the band, though receiver sensitivity may need to be improved by a front-end or masthead preamplifier.

The vhf radio sets in operational use by Nato forces all cover 50MHz, though the tuning steps tend to be 50kHz or higher and bandwidth is a nominal 25kHz.

The following are some still operational models:

SEM-25	26·05	to 69·95MHz	in 50kHz steps
RT-68	38	to 54·8MHz	in 100kHz steps
VRC353	30	to 76MHz	in 25kHz steps
ANP524	30	to 75MHz	in 50kHz steps
RT3600	26	to 69·95MHz	in 50kHz steps
SEM-35	33	to 76MHz	in 50kHz steps
VRC-65	30	to 75·95MHz	in 50kHz steps
VRC-12	30	to 75·95MHz	in 50kHz steps

Some of the broadband masthead tv amplifiers, such as the Labgear CM8065 (42 to 800MHz), can be used to increase sensitivity, though it goes against the grain to draw attention to untuned vhf/uhf amplifiers which, in their customary application, make tv sets and vcr machines horribly susceptible to rfi due to overload from 70, 144, 430 or even 28MHz amateur transmitters.

The stringent erp restriction on UK operation suggests that for optimum performance it would be good strategy to use a non-gain omni-directional transmitting antenna (eg a "turnstile" arrangement of horizontally-polarized dipoles) *plus* a high-gain multi-element receiving antenna. Remember that even if separate antennas are used it will usually be necessary to protect the receiver or preamplifier front-end transistors.

Short backfire antennas

Many years ago in *TT* and *ART*, I drew attention to the backfire vhf/uhf antennas originally developed about 1960 by H W Ehrenspeck.

The basic principle was to mount a multi-element Yagi looking in the opposite direction to the target area, with the signal directed into a large plane reflector screen with a rim (rather like a large saucepan lid).

The theory was that the signals would be reflected back through the Yagi array so that the elements would, in effect, act twice. Attempts by amateurs to achieve similar results were not altogether successful.

However, one form of this antenna, known as a short backfire antenna (sba) dispensed with the line of Yagi director elements and comprised simply the large back "saucepan-lid" reflector plate (about 2λ diameter), the small front disc reflector (0·4λ diameter), plus the dipole. In this form, the backfire antenna has become well known among professional designers. The overall length of the structure was only about 0·5λ, and the structure

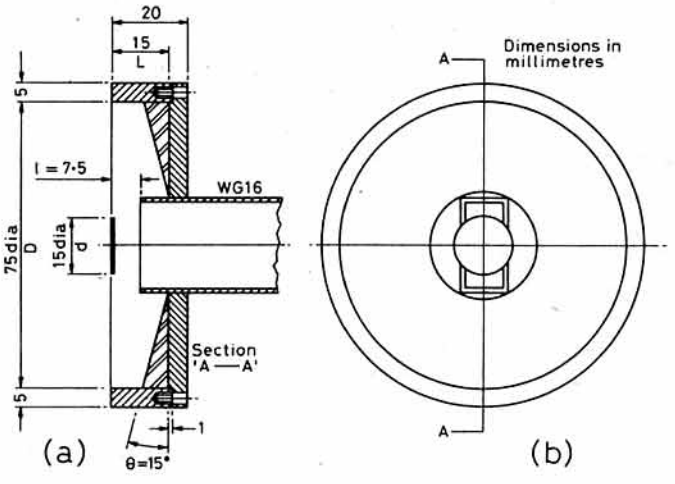

Fig 7. Mechanical details of the 10GHz rectangular waveguide (WG16)—excited short-back antenna with a conical rim

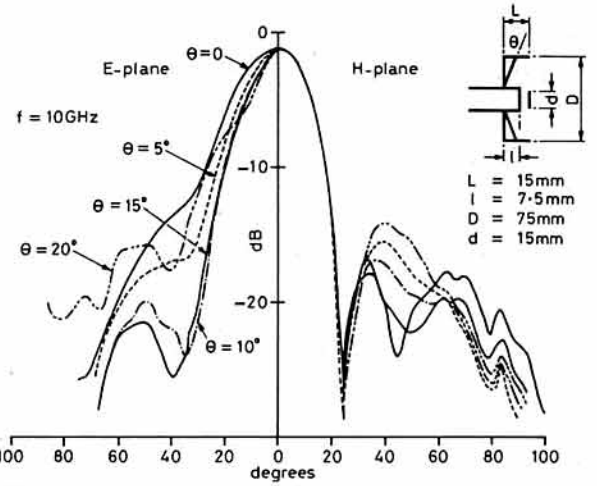

Fig 8. Measured E- and H-plane radiation patterns with conical main rim reflectors of slant angles (θ) of 0, 5, 10, 15 and 20°. 10 or 15° provides optimum pattern

was not unlike a Cassegrain parabolic-reflector antenna but without the production difficulties of the parabolic shape. It was claimed that an sba could give up to 15dBi gain, equivalent to a much longer Yagi of over 20 elements.

More recently various improvements to the basic sba have been reported both at vhf/uhf (L-band) and at 10GHz (X-band). It was found (*IEEE Trans* AP-31, pp644-6) that significantly improved bandwidth could be obtained by replacing the large plane reflector by a curved surface. Later it was reported by M S Leong and P S Kooi (National University of Singapore) in *Electronics Letters*, Vol 20, No 18, 30 August 1984, pp749-51, that a conical main reflector can lead to a compact antenna having a directive gain of 16·7 to 18·3dB, sidelobe level below 13·8dB, and input vswr better than 2·5 over a 20 per cent bandwidth. The experimental model (Figs 7, 8) was, in this case, a waveguide-excited sba covering 9 to 11GHz, and thus suitable for the amateur 10GHz band. At this frequency the beamwidth and sidelobe level of the antenna was optimum at 10GHz when the slant angle of the conical surface is around 10-15°. Construction is simplified by the fact that the main reflector is a separate unit as a plane surface, with the conical surface in the form of an attachment to this main reflector plate. The sub-reflector disc is positioned by means of a thin low-permittivity plastic support. At lower frequencies the same basic technique could presumably be used with a coaxial fed dipole element rather than wave guide excited.

Antenna basics

At virtually any frequency, hf to microwave, physical size is important, and it becomes difficult to use short elements, particularly in close-spaced arrays. As pointed out recently by Clifford H Freeman (Hazeltine Corporation) in "Wideband matching of a small disk-loaded monopole" (*IEEE Trans* AP-33, No 10, October 1985) electrically small antennas pose a major problem with respect to their electrical performance. He writes: "These types of antenna have radiation resistances which decrease rapidly with size. As a consequence, tuning and matching become very difficult to compute. With these concepts in mind, the antenna efficiency deteriorates and performance parameters, such as bandwidth, tend to decrease to unacceptable levels. Therefore, designing compact antennas which are efficient in spite of their electrical size is a very difficult task."

For microwave antennas, physical size is less a problem than the need for mechanical precision. For this reason alone, an antenna having a large effective bandwidth, relatively straightforward mechanics, and without the difficult doubly-curved parabolic shape, should prove attractive. The parabolic dish has many good points, including the potential of very high gain. The Yagi array gives excellent gain in relation to its size, but is frequency sensitive and by no means fool-proof in practice. With care, stacked Yagis can give even higher gain, though one should not expect that, for example, four stacked similar arrays will give more than some 5dB extra gain, and often less, rather than the theoretical 6dB.

There is, indeed, often so great a difference between free-space theory and practice when it comes to questions of antenna characteristics, that many amateurs have come to rely on commercial designs even though this is still no guarantee that their performance will meet fully the claims made for them. It is a pity that no matter how logical technically, the 50MHz power limits have been based on effective radiated power (erp), an entity that none of us can measure directly. I have for many years argued that even professional broadcasters are stretching credibility to the limit by listing transmitter powers in terms of kilowatts erp or emrp (effective monopole radiated power) to three places of decimals. The answer I am usually given is that this is the figure that comes out of the computer based on the requisite coverage area!

Loops and dipoles

A short note in January *TT* (p 35) commented on loop and dipole antennas from a *QST* article by J L Dietrich, WA0RDX. This has prompted Les Moxon, G6XN, to comment as follows, as he feels that readers could have been misled into attempting to put up some enormous loops as soon as the weather turned more spring-like.

"It is good to come across some recognition at last for the fact that 14MHz (1λ) quad loops work well on 21MHz. Unfortunately the claims made for larger loops generally based on computer studies appear to go well beyond the no-penalty multiband operation of loops featured hitherto.

"On theoretical grounds, as well as practical experience over many years covering this particular area, I find there is no substance in the suggestion that larger loops provide appreciably more gain or smaller loops less gain, nor is there any validity in the comparison, in this respect, with dipoles—though these do not show any significant gain variation with size either. The reference to a 3λ/2 dipole is presumably a misprint for 3λ/4, in which case the gain is 0·6dB over a λ/2 dipole, or 1dB over a very short dipole.

"What appears to have been overlooked is the strong vertically-polarized signal in the plane of the loop which results when the loop size is increased. For a 3λ/2 loop, ignoring ground effects, we have the following field strength ratios:

$$\frac{\text{vertical in plane of loop}}{\text{horizontal at right angles}} = \begin{matrix} 0{\cdot}79 \text{ (square loop)} \\ 0{\cdot}61 \text{ (delta loop)} \end{matrix}$$

"This does not help with the QRM situation, but fortunately there is less energy wasted in the unwanted mode than these figures might suggest, since it is produced by an "8JK-pair" having a gain of 3 to 4dB. On this basis the losses due to the unwanted mode come to 1·17dB and 0·67dB respectively, and these must be deducted from the 'stacking gain' obtained by considering the loops as a pair of dipoles having the appropriate spacing. Another small correction arises because the length (or width) of the antenna affects the width of the forward lobe; this is the 'short dipole' effect mentioned above about which there is little published information. I have derived some very rough estimates by finding the centres of gravity of the current distribution of each half of the radiator and then treating it as a colinear pair having very close spacing. This can be done by using the mutual impedance data available in the handbooks. This gives a somewhat too low figure in the case of a λ/2 dipole (0·25 instead of 0·4dB) but this is to be expected in view of the unsymmetrical nature of a λ/4 current distribution, and the extra weight which should be given to contributions from near the ends. On this basis I feel that the method is basically sound and the other corrections unlikely to be in error by more than 0·1dB. This results in Table 2.

Table 2. Dipole and loop performance

Type of element	Stacking gain (dB)	Unwanted mode loss (dB)	"Length" correction (dB)	Gain (dB) dBd	dBi
λ/2 dipole	—		0		2·15
λ/4 dipole, end-loaded*	—	Up to 0·2	−0·25	−0·45	1·7
1λ square loop	1·12	Very small	−0·32	0·8	2·95
3λ/2 square loop	2·5	1·17	−0·1	1·25	3·4
3λ delta loop	0·75	0·67	0	0·08	2·23
3λ/4 delta loop	0	0 (approx)	−0·25	−0·25	1·9

*eg, bent ends as in VK2ABQ antenna.
Note: Stacking gain for the 3λ/2 square loop assumes equal currents in the "dipoles". The actual ratio is 0·67 but it is very difficult to allow for this. The true gain figure could be as low as 3dBi.

"Note that the differences are in the main trivial, and single-element gain figures tend to disappear in the case of arrays, in line with normal stacking principles. In practice one is much better off with the *smaller* loops, since one can prevent sides or lower portions from radiating by arranging that current nodes occur in their centres. This increases the effective height, which may often be increased still further by taking advantage of smaller size and lower windage.

"Returning to the January *TT*, I am quite happy with Table 1, less so with Fig 3 in view of the misleading conclusions which appear to have been drawn from it. It may be no more than a coincidence that the gain for 3λ/2 *exactly* equals the stacking gain for dipoles spaced by the width of a 3λ/2 square loop, and it may be that the circular shape does provide extra gain equal to the 'mode loss'. Application of my square-counting methods to circular loops is extremely laborious and I have not attempted it." □

NEWS & VIEWS

HF

*John Allaway, G3FKM**

THE MOVE by the New Zealand national society, NZART, to draw attention to the very real damage which ill-conceived dxpeditions and operation from countries where amateur radio is not really welcome can do to the amateur service has apparently not received universal understanding or acclaim. I would be the first to admit to having enjoyed the competitive element involved in working dx and acquiring certificates. However, I wonder whether exercises like the ill-fated expedition to the Paracel Is a few years ago really did win any friends for amateur radio.

From time to time, stations claiming to be in Bangladesh appear on the bands. The president of BARL, the official Bangladesh national radio society, is in London at the time of writing and is able to confirm that no such activity is authorized. Even if the user of a callsign with an S2 prefix (or suffix) is where he claims to be, would the unlicensed activity convince the government of that country that radio amateurs are responsible and law-abiding people? A similar situation arises in Mozambique, where it has also been confirmed that amateur radio is not permitted and, in fact, has not been since 1978.

The ARRL dx programme administrators most certainly realize the danger and insist on proper documentation before allowing credit for contact with this kind of station. Would readers not agree?

The lack of activity on the WARC bands is noted by many. No doubt the current restrictions on 18 and 24MHz and propagation make these of rather limited interest. However, 10MHz is capable of producing nice dx contacts for long periods daily and is well worth a try. G3YY, one of the regular users of the band, asks for more activity there, with special emphasis on using the upper part of the band as well as the small area above the lower limit.

DX news

DXpress notes that there is now a dx information net on 14,212kHz between 1400 and 1530 every Saturday, and SV1PL and EA6MR are in charge.

VQ9QM is to be found on most days between 14,020 and 14,025kHz from 1500 onwards. FT8XB has now left Kerguelen Is, and it is thought that there is no amateur in this year's relief team. F6AGP is now in Adelie Land with the callsign FT8YA, and will remain there for the rest of 1986. The crew at DP0GVN was also changed in February, and DJ6TN and DG5SL returned home—DJ4SO, who acted as their QSL manager, ended his service on 1 March. The new operators are DF9LX and DL3OAY and they hope to be very active—their QSL manager is DL2NF. The station is located at Atka Bay in the Antarctic.

L to r: Lloyd Colvin, W6KG, Iris Colvin, W6QL, Julius Lieberman, ZS6AF, visiting ZS6AF's station late in 1985. Iris and Lloyd made 6,500 QSOs with 143 countries when operating as W6KG/ZS from the Johannesburg Radio Centre of the SARL

*10 Knightlow Road, Birmingham B17 8QB.

D68CF has been worked on 14MHz ssb and is F6EUF. 4S7PVR, who owns a guest house in Sri Lanka and who allows operation from his station by visiting amateurs, is having some equipment problems. However, more information on accommodation is available from P V P Pereira, 84 Templars Road, Mt Lavinia, Sri Lanka.

ON7IP/ST2 will be on the air for about a year. *DX News Sheet* says that hand-written QSL cards have been received from ST4BCB who operated at the end of 1985 and who was located at Beida in W Sudan. DJ1US/ST3 appears to have been a pirate, as DJ1US is at present a ship's radio officer. 6T1YP and 6T2MG have been active on 14MHz ssb and are Sudanese nationals, the former possibly operating from the Palace of Youth & Culture in Omdurman.

In spite of the recent unrest in Uganda, DG3MAT has been visiting 5X5GK and operating from there. He is hoping to obtain his own call. DXers may be interested to learn that ZD9BV is often active around 2200 on 3,793kHz. Stations recently heard from Tanzania include 5H3CE, who has been worked on 7,075kHz around 1900, and 5H3ZR and 5H3BH who have been on 14MHz ssb (below 14,200kHz) a little earlier.

ZX0ECF, the Brazilian station on the S Shetland Is, has been reported by *DX-NL* to have had strong signals on 3·5MHz ssb around 0600. CE9AM is in the same area and has been on between 2300 and 0100 on 14,205–14,210kHz. From S Georgia VP8LB has been reported at 0230 on 7,010kHz and asking for QSLs via an LU station—this callsign does not appear in the *Callbook*.

VR6JR made around 12,000 QSOs before leaving Pitcairn Is on 23 January. There is a new operator on the island, Irma Christian, VR6IC, who is expected to be active mostly on cw. FW4AF keeps a schedule daily at 0815 near 14,285kHz with F8RV, G4VHB or QSL manager F6IJV. His callsign has been changed from FW8 to conform with the new French system.

KS6DV/KH1 will remain on Canton Is until January 1987. There is the possibility that he may have access to the log periodic antenna used previously by the military and more recently by T31AT. ZL8OY will be on Kermadec for the rest of 1986.

The Tokyo University ARC was due to be on the air from Chichijima (Ogasawara Is) from 27 March to 3 April and may have left by now. Callsigns were to be JA1YWX/JD1 and JA1ZLO/JD1, and they hoped for many contacts through Oscar 10. New Chinese stations include BY4RN, who is on 14MHz and is located in Nanjing, and BY8AC who has been worked on 14MHz cw and is in Chengdu. According to the *DX Family Newsletter*, BY5RF seems to be the most active at the time of writing. The station is mostly operated by a yl Ruan from the Youth Palace in Fuzhou, and she is on the air most days from 0030 to 0330, and again between 0630 and 0900 mostly in the 14,150–14,180kHz area or on 14,240kHz.

XU1SS has become active again, mostly on Thursdays and at week-ends around 1200 near 14,150kHz, and some 7MHz operation is expected soon. BV0DA was formerly XW8BP, and JH1ARJ is able to help with QSL requests—the demand so far has caused him to have more cards printed. New Taiwan stations are BV5HA and BV6IA.

According to HS1AMH, club stations will become active in Thailand soon, and permits for individual stations shortly afterwards. HS0A is permanently installed and ready to operate.

JY9RL is reported to be active on 7MHz cw after 2200, and also on 3,799kHz from midnight. OD5LX is now only active on 21MHz cw, using a groundplane antenna which has been damaged by military activity. There seems to be a group of Turkish stations to be found near 3,600kHz at about 2000—participants include TA1E and TA2D.

Jack, HB9TL, will be PJ4/HB9TL from Bonaire between 11 and 25 April, and from Aruba as P4/HB9TL between 26 April and 3 May. He prefers 14,027, 14,143, 14,194, 14,204, 21,027, 21,194 and 21,275kHz. PY7PO/PY0F will remain on Fernando de Noronha for the remainder of 1986. CE0ZIJ has been working into Europe at 0900 on 3,780kHz, and *DX News Sheet* also says that CE0GYS and CE0GYT are licensed on Easter Is and are the sons of CE0ERY.

Geir, JW5VAA, will remain on Bear Is until next month. JW5E is the club station on Svalbard and may be found near 14,200kHz between 1700 and 1900 on Tuesdays before the club's weekly meeting.

The new French prefixes FA and FB are now being issued—the former for vhf only. TV6BFI will be on the air until 30 June and celebrates the bicentenary of the birth of Marc Seguin, a noted engineer; it is located in Annonay, France.

Those who worked OY7ML may find that they contacted a pirate. Martin was not on the air on 7 February at 1600 as he was at work. He is not home on working days before 1800, and suspects that the person using his call may be in the Balkans.

Jacky, F6GXB, who has been associated with a number of expeditions, handles QSLs for F6GXB/TK, FB8WI, FB8XAB, FB8ZQ, FO8IK, FO8KP, J28CE, TT8AQ, TT8CW and YJ8GX. He now lives in Japan and

The visit to BY1PK in Beijing by VS6s BQ, CI, CT, and W2NSD. Back row (L to r): Huang Yong Lian, Deputy Secretary of Foreign Affairs, CSA; Wang Xun, deputy secretary-general, CRSA; Tong Xiao Yuong, manager of BY1PK. Front row: Bob Frost, VS6BQ; Roger Clark, VS6CL; Phil Weaver, VS6CT; and Wayne Green, W2NSD.

his address will be found in "QTH Corner". He cannot obtain a Japanese licence.

ZL1AMO was due to begin operations from Tonga at the end of February as A35EA, then go to West Samoa as 5W1CW, where he was to be joined by ZL1BQD to proceed to the Tokelau Is where they hope to operate as ZK3RW and ZK3RR respectively until 19 April. Ron will do most of the cw operating and Ray (ZL1BQD) most of the ssb. All bands 3·5 to 28MHz will be covered.

Overseas news

Andy Porter, G0BZW, is now in Nairobi and on the air on 14MHz most Saturday and Sunday mornings as 5Z4EV, and trying to penetrate the eastern European aluminium curtain to work back into the UK—a task he finds quite difficult.

W3HNK, who acts as QSL manager for 225 stations, has recently been out of action due to sustaining a broken arm. Anyone waiting for a QSL from him is asked to be patient!

"Heard Island Odyssey", by Kirsti Smith, VK9NL, is a most interesting account of the 1983 expedition to Heard Is which took place in face of great difficulties. A copy may be obtained by air-mail by sending US $14.45 to HIDI-Y, PO Box 90, Norfolk Is, 2899 Australia. Purchase of the book helps the expeditioners to recoup a little of the very large amount of money which they spent on the trip.

Osten Magnusson, SM5DQC, has compiled a list of VS9 stations which contains the calls of some 80 VS9s, and he invites anyone to send £1, US $2, or four ircs, to him at PO Box 110, S-59900 Odeshog, Sweden, for a copy.

Ray Baldwin, G3WZ, operated from a bungalow in the sugar fields of Barbados for three weeks recently, having taken his FT901D and the driven element of a TB3 beam with him. Conditions were poor but the weekend of the magnetic disturbance resulted in good long-path openings to VK and ZL. Ray noted the ineffectiveness of those making long calls under poor conditions. Thirty-six UK stations were worked from 8P9AQ, out of a total of about 570 QSOs with 71 countries. QSL cards are being printed, but Ray says that the long job of writing them is not helped by the knowledge that about half do not really want them, and it is a mystery why some elbow into pile-ups of those who want a card. Finally he wonders what hf conditions were to be like at 25 and 50 days after the aurora, and says that dxpeditions are possible most easily if you can avoid hotels, but that luggage weights are a bar unless money is no object!

General items

The reciprocal licensing agreement between Japan and the FR of Germany will come into effect on 1 May.

REF has notified a new address for its QSL bureau following the recent society reorganization. This is now: REF QSL, BP 273, 81209 Mazamet Codex, France. In metropolitan France Class A licensees will use the prefix FA and are allowed 20W of phone on 144MHz. Class B use FB and 144MHz phone plus 7,020–7,040, 14,050–14,100, 21,050–21,150, 28,000–28,100 and 144,050–144,090kHz cw. Both classes are available at age 13. Those who are at least 16 are Class C (as Class A but with 100W input) and use the FC prefix, Class D have phone and cw on all bands and the FD prefix. After holding an FD licence for three years the Class D may become Class E and have 250W on all bands with an FE or F prefix. Radio clubs now use FF. In TK, FG, FH, FK, FM, FO, FP, FR, FY and FT the numbers 1 to 5 signify Classes A to E respectively.

1986 28MHz COUNTRIES TABLE

G4XAH—14	G4MUW—8
G3XQU—13	G3XBM—6 (QRP)
G4OBK—12	5B4DN—2
G4JBR—12	G4YWG—1

From 28 February telephony operation in the segment 7,075–7,100kHz by General, Advanced, and Extra Class licensees is allowed by stations in Hawaii, Alaska, Navassa Is, US Virgin Is, Puerto Rico, Desecheo Is, and US bases in Antarctica.

5Z4FB (formerly G3CAT) has read the final paragraph on page 950 of December 1985 *MOTA* concerning topband with trepidation. He points out that the allocation in Kenya is confined to the segment 1,830–1,850kHz and that this includes all modes.

SSTV

Very little activity is reported to this column, but G1BSN draws attention to a very nice contact made between G4HCK and VK2ADE on 25 January using a BBC micro, a fast-to-slow-scan interface and Robot monitor. The contact lasted more than half an hour and signals were S5–7 throughout. Both stations would be interested in other sstv QSOs on Saturday mornings, and are invariably monitoring the sstv frequency segment (14,225–14,235kHz).

Welcome . . .

. . . to the following new members from outside the UK who joined the Society during January: DA2QJ, DH2NAF, EI1DH, EI5FD, EI8EM, F9LP, LX1GH, SM3ALR, VE1QN, VK5IK, WA2NCT, W6NA, YC0BCA, 4X4FL, and listeners I Tough (ZC4), D Blofield (A6), E McKenna and W Polion (EI), J Quinn (W6), and A Toto (I). Apologies to Rudolf van Straten, PA0UHF, who was accidentally listed as an unlicensed new member in *MOTA* under this heading last October.

Awards

The IARU Region 3 Award

The requirements for this award were modified at the recent Region 3 Conference. It is issued to those who have contacted the requisite number of countries since 5 April 1982. The basic award requires seven countries, and Silver Star and Gold Star endorsements are available for 15 and 20 respectively. An updated list of qualifying countries is: Japan, Australia, New Zealand, Korea, Philippines, Hong Kong, Thailand, Papua New Guinea, Fiji, Singapore, India, Indonesia, Malaysia, Sri Lanka, Tonga, W Samoa, Solomon Is, and new additions Brunei, US Possessions in the Pacific (KH2, KH0, KH8, KH9, KH1), Pitcairn Is, and Chagos. Only FO8 QSOs count for French Polynesia. QSLs are not required but applicants should send a certified list of log extracts plus NZ $1 (or NZ $2 for airmail) to NZART Awards Manager, ZL2GX, 152 Lytton Rd, Gisborne, New Zealand.

AMRAC Data Award

This is being sponsored by the Amateur Radio & Computer Club and is available to those who have made QSOs on rtty, amtor, or packet radio. All QSOs must have been made since 1 February 1986. There are four classes: Class 1 requires 100 points; Class 2, 75; Class 3, 50; and Class 4, 25. It is necessary to include contact with 20, 15, 10 or 5 AMRAC members respectively. Send a list of claimed contacts, certified by two other licensed amateurs, together with £0.85 to Richard Hill, 157 Highbury Grove, Cosham, Hants. There will be some special AMRAC stations, and QSOs with these will count as two points. Note that a station may only be worked once for credit.

St George's Day Award

Issued by the Wisbech & District R&E Club. HF applicants need to contact either of the special stations GB0SGD or GB4SGD (which will be on the air between 20 April and 17 May). In addition UK applicants need eight QSOs with England during that period, Europeans need five G QSOs, and others three G QSOs. Listeners may also apply. Send log details to Dave Wilkinson, G4KHF, "Leon", Lutton Gowts, Long Sutton, Spalding, Lincs PE12 9LQ, accompanied by £1.50, six ircs (from Europe) or eight ircs or US $3 from elsewhere.

G3GIQ (l) with Spyros, 5B4MF (aged 17) in his penthouse shack—from which the horizon is visible in all directions

QTH CORNER

BV6IA	PO Box 738, Tainan, Taiwan.
BY5RF	Box 209, Fuzhou, PR of China.
C53EZ	via EA5BEX, Jose Antonio 31, La Nucia, Alicante, Spain.
ex-F6GXB	Jacky Calvo, 5-10-5 Shimomeguro, Meguro, Tokyo 153, Japan.
DL4HAD/ST2	T Dreyer, Haakestr 87a, D-2100 Hamburg 90, FR Germany.
TA1KA	PO Box 109, Istanbul, Turkey.
TA2G	Box 14, Emek, Ankara, Turkey.
VE3CPU/VP2M	VE3CPU, 5 Romko Ct, St. Catherines, Ont, L2R 4JI, Canada.
VQ9QM	W4QM, 928 Trinidad, Cocoa Beach, Fla, 32931, USA.
W6QL/Z2	Yasme Foundation, Box 2025, Castro Valley, Cal, 94546, USA.
ZK3RR } **ZK3RW**	via ZL1AMO, R Wright, 28 Chorley Av, Massey Henderson, Aukland 8, New Zealand.
3V8PS	via I1FOU, Via Novara 62, I-28024 Gozzano, Italy.
JG1FVZ/5N0	JF1SEK, H Takahashi, 438-76, Tsutsumidai, Noda, Chiba 277, Japan.
5V7AS	Dr S Alescio, Via G Lamasa 67, I-90019 Trabia, Sicily, Italy.
8P9AF	VE3LGI, 40 Murney St, Belleville, Ont, K8P 3N7, Canada.
8P9AQ	R Baldwin, G3WZ, 1 Meadow Ct, Whiteparish, Salisbury, Wilts SP5 2SE.

Worked All LA Award

New rules for this award are now in operation. QSOs with LA and LB stations since 1 January 1950 are required—applicants outside OZ, OH, SM and LA need confirmation from each of the 19 counties. QSOs with JW and JX may be made and may substitute for counties W, X, or Y. Any bands/modes may be used and band/mode endorsements are available. The counties are: A = Oslo; B = Ostfold; C = Akershus; D = Hedmark; E = Oppland; F = Buskerud; G = Vestfold; H = Telemark; I = Aust-Agder; K = Vest-Agder; L = Rogakand; R = Hordaland; S = Sogn og Fjordane; T = More og Romsdal; U = Sor-Trondelag; V = Nord Trondelag; W = Nordland; X = Troms; Y = Finnmark. Send QSLs or detailed list of claimed QSLs certified by an officer of a national society, plus N Kr 20 or 10 ircs to: NRRL Award Manager, Erik Jahnsen, LA7AJ, Kaupangruta 21, N-3250 Larvik, Norway.

The 10th Asian Games Award

This is being issued by the Korean Amateur Radio League to mark the 10th Asian Games which will take place in Seoul, between 20 September and 5 October this year. Applicants for the dx class award need to make contact with (or have confirmed reception reports from) 10 countries participating in the games, one of which must be Korea. These are: A4, A5, A6, A7, A9, BY, DU, EP, HM, HS, HZ, JA, JT, JY, OD, S2, V8, VS6, VU, XV, XW, XZ, YA, YB, YI, YK, 4S, 4W, 7O, 8Q, 9K, 9M, 9V and HL. The special station HL86AG will be on the air during the event, and QSLs from this station will count as five participating countries. For the Class HL Award, 10 Korean stations must be heard/worked and for this HL86AG counts as five. A certified list of QSLs plus US $4 or 10 ircs should be sent to reach KARL, CPO Box 162, Seoul 100, Korea, no later than 20 September 1987. Extra prizes, such as special stamps or Asian games mascots, will be issued to award winners.

Contests

Apologies to G3VMY whose score was overlooked in the table of results of the CQ WW DX Content (CW) 1984. He scored 9,548 points on 14MHz in the QRP section and was the only UK entry in that category. He has also pointed out that in the 1985 ARRL DX Contest (CW) G3ZFC, G3XWZ and he were actually in the section reserved for stations running less than 10W output.

In the results of the 1985 SP DX Contest, G3ESF scored 27,720 points and G4OKN 7,476 in the multi-band section, and G3XWZ 3,528 points on 3·5MHz. GM3MHG scored 12,872 points and GM8SQ 5,400, also in the multiband category.

Helvetia Contest

1300 26 April to 1300 27 April

CW and ssb. 1·8–28MHz (but no ssb on 1·8MHz). Mixed mode only, single- and multi-operator, and listener categories. Exchange RS/T plus serial QSO number (from 001). Swiss stations will send two letters which denote their canton. Each QSO counts three points, and a station may be worked once per band only. The multiplier is one for each canton worked on each band. Use separate log sheets for each band, and please note that stations with more than one per cent of duplicates incur automatic disqualification. Enclose summary sheet listing the number of QSOs and cantons worked on each band, entry category, and entrant's name, callsign and QTH. Enclose a signed declaration that all rules and regulations have been observed, and post by 31 May to Walter Schmutz, Gantrischweg 1, CH-3114 Oberwichtrach, Switzerland. There are 26 cantons, and their abbreviations are: AG, AI, AR, BE, BL, BS, FR, GE, GL, GR, JU, LU, NE, NW, OW, SG, SH, SO, SZ, TG, TI, UR, VD, VS, ZG and ZH.

Peace to the World Contest

2100 10 May to 2100 11 May

Phone and cw, 3·5 to 28MHz, and satellites RS and Oscar with downlinks on 28MHz from 144MHz (which count as an additional band). Activity must take place within the following segments: (cw) 3,505–3,600kHz, 7,005–7,100kHz, 14,010–14,100kHz, 21,010–21,160kHz and 28,010–28,200kHz; (ssb) 3,600–3,650kHz, 7,040–7,100kHz, 14,150–14,350kHz, 21,200–21,450kHz and 28,400–29,100kHz. Exchange RS/T and serial QSO number (from 001), USSR stations send oblast number. Each QSO within one's own continent counts one point, outside it three. There are single-operator single- and multi-band, multi-operator all-band single transmitter (includes club entries), and listener categories. A station may be worked once per band only. The multiplier is the number of "R-150-S" countries worked on each band (note: QSOs with own country count for multiplier credit only). Send entries by 1 July to CQ-M Contest Committee, PO Box 88, Moscow, USSR. In the 1985 event UK scores were as follows: (3·5MHz) G3ZRH 3,190, G3CCZ 1,444; (14MHz) G4VCO 4,862, G6NK 4,368, G4YMB 1,422, G4FDC 1,106; (21MHz) G4RRK 5,208; (multi-band) G3ESF 71,500, G4XKR 34,371, G3TXF 21,090, G4XTM 15,211, G4UOL 14,762, G4XRX 13,392, G4OKN 11,194, G4UVB 7,866, G4IJW 5,680, G3ICG 4,625, G4OTU 3,976, G4WSX 3,624, G4SDZ 3,572, G3SYA 3,392, G3WBM/A 3,286, G3URA 2,940, G4UWW 1,298, G3OCA 1,010, G3SJX 940, G3TEK 645, G3IRM 570, and G0AZR 380 points. In the multi-operator section, G3VZT scored 173,313, G3XEP 173,160 and G6OI/A 24,780 points, and RS87156 scored 474 in the listener contest.

John Bazley, G3HCT, visited Botswana during November and made many QSOs using a 101E and three-element Yagi beam as A25/G3HCT

Around the bands

G8KG perhaps expresses the frustration of most of us when he writes: "Just a line to keep the story alive—but there's very little to say". He continues: "The average of the daily 2,800MHz solar flux observations for 1985 was 75sfu as compared with 203 in 1981. In fact the monthly average first dropped below 80sfu in September 1984 and has subsequently fluctuated above and below 75, the overall trend being flat for 17 months and this flatness extending to the daily figures with only a single day during the period having a value above 100sfu. This behaviour provides few clues as to what happens next!"

There was an intense aurora during the weekend of 8–9 February and this was accompanied by much inter-European activity on 28MHz. At the same time G3KSH reports that 1·8MHz virtually closed down and that for several hours even inter-G contacts were difficult. The hf bands took several days to recover.

Many thanks to those who sent in logs this month. They included G2HKU, G3YY, G5LP, GM3CSM, G3s GVV, IGW, KSH, GW3NNF, G3s PJT, RZP, UKH, YRM, G4EHQ, GW4KGR, G4s LRS, MUW, OBK, UOL, UYR, UZN, XAH, G0AQT, and RSs 10906 and 84869.

Calls listed in italics were of stations using A1A.

1·8MHz. 0000 KA1PE, W3YOZ. **0200** EA2JS, T77C. **0500** J3/K4LTA, TI2CCC, YN1SI, YV2CB. **0600** *EA6KZ*, K5NA, *OH0XX, T77C, ZB2EO, 9H3EP.* **0700** *CT3BZ*, K5UR, *VP2VA*, W0EJ. **1700** *OH0XX.* **2000** *UG6GAW, W2FJ, K3ND.* **2300** *RT5UY/UJ, 4U1ITU.*

3·5MHz. 0000 *3V8PS*, 5B4GA, *YU3KI/5N0.* **0100** *K5s MA, ZD, 4X4NJ.* **0200** CN2AO, J88AC, W1–5, 8, 9. **0300** OE5JTL/YK. **0400** TA1E. **0700** *PT7AQ*, TF5TP, *ZL1TH.* **0800** CE1HBI, VE3ICR/VP2. **1800** JW0A, LX1RQ. **1900** TL8CK, VKs 2AVA, 7AE. **2000.** EA9RM, HB0LL, TZ2XN, *4U1ITU.* **2100** C56/G4IUF, JY9RL, *3A2GL.* **2200** *CT3/W2ZZ*, TA1D, W1, 2, VE3, *3V8PS*, 7P6ITF (?). **2300** C31OF, HH7PV, J89RL, 5V7AS.

7MHz. 0000 *3V8PS.* **0100** *WA4CTA/KP2.* **0200** *5V7AS.* **0700** J37AH, ZL1BZ. **0800** *JA, VI3XB, ZL2NP, 9Y4GR.* **0900** CE0HLK, HC2NMY, DL1UF/TI2, VK5BC. **1000** *K4EWD.* **1400** *ZC4JV.* **1500** *KA7T, UH8EC.* **1600** YB4QZ. **1700** *JAs.* **1800** *OH0PA, VU2TTC.* **1900** *C56/G4IUF.* **2100** *P4/KQ2M, PY6OD, ZC4EE.* **2200** *3V8PS.* **2300** *WA4CTA/KP2, PA0VDV/PJ2, PZ1DV, VK6LK, YU3KI/5N0.*

10MHz. 0700 *ZM2AGY.* **0800** *JAs 1IFP, 2HZT, SV5SW, VK2, VK3, ZL1BXZ.* **0900** *VK2, VK3, 9H3AK.* **1000** *FG5AM, W2GDV, W3TLV.* **1100** *VK5BJF.* **1200** *C30LBY.* **1500** *W2–W5.* **1700** *3A0GB, 4X4XB.* **2000** *C6ABA, FG5s AM, XC, SV0AH, 9H1IF.* **2100** *W2, 4, 8, 9, VE3JPW.*

14MHz. 0700 NY6M/KH2, T30AT, *TA2J*, 5V7AS. **0800** BY5RA, D44BC, FW8AF, HL1IDJ, JR2FOE/JD1, VS6CT, YJ8DL, *ZL1HV, ZL2BKI,* **0900** AH2BE, *BV2DA*, FK8FI, HZ1TA, JAs, TZ6FS, V85GA, VK9NI, VP8BGO, VS6AU, ZLs, *3V8PS, 5Z4JK.* **1000** *JT0XC*, JY9VQ, VP8NX, VU2REC. **1100** AP2ZA, P29AR, VS6TQ, YI1BGD, ZB2IH. **1200** VP5GT. **1300** *PA0VDV/PJ2, VK6RU,* V85GA. **1400** J28EL, *VQ9QM.* **1500** JY5DL, K7NGM (Utah), RZ1OWA, OE7RKH/YK, 3B8FP. **1600** CY0SAB, J34HN, NL7G, VP2MW, VQ9RB, W6–W7, XE2WI, 5R8AL, 8Q7CG. **1700** UA1OT, VK0DJ. **1800** A25/W6KG, S83H, S79CW, DL4HAD/ST2, TR8SA, VE3ICR/VP2M, W6QL/Z2, 5H3CE, 5V7AS. **1900** C53EK, FY5YE, J34LTA, JW5E, VP8BGO, V47K, 6T2BA, 8P9AE. **2000** KC4AAC, VQ9QP/M, 3B6BD. **2100** VP2EC. **2200** FM5BK. **2300** VP8ML.

21MHz. 0800 VK, **0900** VK, YC0FDW. **1000** WA7CQE/DV2, EL2A/OD5, TA2G, VU2GRS. **1100** *CT3/W2ZZ*, EL2AY, S79CW, VKs 6VB, *8HA*, YC3DI, YU3KI/5N0. *9J2BO.* **1200** A4XRS, D68AM, J28DS, OD5YU, VK9XJ, VE3ICR/VP2M, 9K25JF. **1300** *3B8DB.* **1400** *K2LE/V4*, VE3CPU/VP2M, 3D6BT. **1500** FG5CH, *FM5CT*, HC5KA, *PA0VDV/PJ2*, Z2, ZS, 5N9GM. **1600** NP4P, NP4Z, PJ2HB, ZD7CW, 6T2MG. **1700** CE4BNC, CX, HH2MC, *J3/K4LTA*, LU, PY, ZP, 9Y4GR. **1900** VP8VK.

28MHz. 1100 4Z4ZW. **1600** 9Y4s BA, CK. **1700** EA8AJS. **1800** UA1FZL.

The following are thanked for news items extracted: *DX'press* (PA0GAM), *CQ Magazine* (W1WY), *DXNL* (DL3RK), *Long Island DX Bulletin* (W2IYX), *DX News Sheet* (G4DYO), the *Ex-G Radio Club Bulletin* (GI3OEN/W6), *Long Skip* (VE3IPR), *Lynx DX Group Bulletin* (EA2JGO, and *The DX Family News Letter* (JH1KRC).

Please send all items for **June** issue to **to reach G3FKM by 24 April.** □

HF f-layer propagation predictions for April 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 .	.....	.....11..	.....
14 MHz .	...35555663.	...36656785.	....4434475.
10 MHz .	..3555556883	212755556894	...466556893
7 MHz .	655322223588	877532233689	655643333688
3.5 MHz .	+42.....25+	++42.....3++	+++3.....3++

KEY TO TIMES GMT	ICELAND	OSAKA	HONGKONG
000001111122	.....	.....	.....
024680246802	.....	.....	.....
.....	.....222233.	...13332....	...13433321.
.....	...145556783	...13212224.	....2212356.
.....	422543333577	....1...1351	1363
.....	+++3.....245	.....2.	.....4.

BANGKOK	SINGAPORE	NEW DELHI	TEHERAN
.....	.....	.....	.....
.....111....	....11111...	....11111...	...1121221..
...22434....	...23444562.	..122344521.	..243344673.
.....212233.	....1212367.	1.1..1123553	2131.1123685
1.....1364	1.....1375	41.....1377	741.....1378
.....43	44	2.....45	+.....4+

COLOMBO	BAHRAIN	CYPRUS	ADEN
.....	.....	.....	.....
...11212....	...1122231..	...2333344..	...1234452..
..1223444...	..1333446731	1.2666667872	1.1322356711
.11..1123133	4231..123686	656433335798	6231...23667
21.....1368	841.....1378	974111112578	851.....1378
3.....4+	+2.....4+	+5.....25+	+3.....4+

SUVA/S	SUVA/L	WELLINGTON/S	WELLINGTON/L
.....	.....	.....	.....
.....	.....1.	.....	.....
....1122.31.	...31....15.	....21121...	...1.....3.
...22212252.	...52111.431	...33212243.	.1142.....42
...21...131.	..121....31.	..121...132.	..131....22.
.....	.....	.....	.....

SYDNEY/S	SYDNEY/L	PERTH	HONOLULU
.....	.....	.....	.....
.....	.....	...112.....	.....
...444..131.	....1.....13	..13543.....	.....131.
..133211355.	1..131....53	1.1132111351	....221.231.
...11...1351	...11....141	1.....1375	..121....1..
.....2.	.....	43	.....

SEYCHELLES	MAURITIUS	NAIROBI	HARARE
.....	.....111...	.....1221..	.....2332..
...1234454..	...1235564..	...1235665..	....2367771.
1.1323456861	...433446861	1..422346871	1..533346871
6331..123687	6.31.1113687	6332...13687	63331..13687
851.....1378	841.....1378	873.....1378	8841....1368
+2.....4+	+2.....4+	+5.....4+	++2.....4+

CAPETOWN	LAGOS	ASCENSION Is	DAKAR
.....244...	.....1343..	.....133..	.....123..
....236783..	....2257882.	....2235784.	....1135684.
...4544467..	...35323688.	64334791	54334691
431521113652	45.52...3586	25..31..1486	142331..1486
8852.....367	7842.....368	78211....268	78631....158
++3.....4+	5+3.....3+	++3.....35	++3.....25

LAS PALMAS	Sth SHETLAND	FALKLAND Is	R DE JANEIRO
.....1..	.....1...	.....12..	.....12..
....2223364.	.....34641.	.....24574.	.....123464.
...276666892	3446761	4445672	4433572
443654334688	232222113456	212322112356	2323221..257
897521111368	78631....235	87631....125	88631.....28
++52.....4+	5+3.....2	++4.....2	++4.....5

BUENOS AIRES	LIMA	BOGOTA	BARBADOS
.....1..	.....	.....	.....
.....113464.	.....1123.	.....122.	.....1..123.
.....5443562	332343	1332243	4322354
332312111246	41112111..14	41..1211..14	4111121...26
88631.....15	77531.....2	76521.....2	87531.....3
++4.....2	4+4.....	4+4.....	++4.....

JAMAICA	BERMUDA	NEW YORK	MEXICO
.....	.....	.....	.....
.....12.	.....12.	.....1.	.....1.
.....332233	3332354	1222343	132222
4....111..14	4....211.125	3....2111124	2.....111..2
66321.....1	76321.....2	54211.....2	2321.....
3+4.....	4+4.....	2+3.....	.43.....

MONTREAL	DENVER	LOS ANGELES	VANCOUVER
.....	.....	.....	.....
.....1.	.....	.....	.....
.....1222343	11121	11111	11
3....2111134	1.....112112	1.....12111	12112
54211.....2	2221.....	1121.....	1122.....
2+3.....	.23.....	..3.....	..3.....

The provisional mean sunspot number for January 1986 issued by the Sunspot Index Data Centre, Brussels, was 2·3. The maximum daily sunspot number was 14 on 14 January, and the minimum was 0 on 1–12 and 17–29 January. The predicted smoothed sunspot numbers for April, May, June and July are respectively: (classical method) 8, 7, 6 and 5; (SIDC adjusted values) 0, 0, 0, 0.

SWL

*Bob Treacher, BRS 32525**

Aurora and meteor scatter

I cannot recall the last time that aurora was mentioned in this column, but, on 8 February, 144MHz experienced the best auroral conditions for years. The event will be reported in full in *VHF/UHF*, but as that will mainly cover cw activity, I will mention three ssb reports. Mick Toms, BRS31976, noticed the event first at 1346 from his Essex QTH. Between then and 0017 he logged 50 stations, including GM4YXI (YO), F6ETI (YH), GW1JOS (XN), GM0BPT (YP), GI4WVN (XO), GM3WML (XQ), GM4SUF (XR), GM0BQM/P (YP) and OE5OLL (GI). Most stations were logged with the beam at 15°. Dave Whitaker, BRS25429, in North Yorkshire fared as well; he logged 33 squares during the event. Best dx included OE5ECM (GI), SM1LPU (JO97), OZ1HJP (GP), GJ6TMM (YJ), GM6TKS (WS), OK2KZR (IJ). Stations local to Dave who stayed on cw reported QSOs to UQ, UP, OY, LA, HA, SP and IT9. Martin Parry, BRS52543, heard GM4ZUK (YR) on 70MHz and PE1GBT (DN), DC7 UT (GM), F6ETZ (ZH) and F5ZO (AI). On 432MHz G4LOJ was heard. As a result of this event, the hf bands took a battering. All six bands were void of any signals for a time on the following morning.

Turning to meteor scatter, Mick Toms provided his report of the Quadrantids shower at the beginning of January. I6WJB, SM7RTA, UR2RHF, OK3CPY, DL7MST, OE3JPC, OK1YA and I0LBK were heard during good bursts. I will start the annual vhf table as soon as we have had a little bit of summer and the antennas go up at my QTH!

A mixed mailbag

Nick Bainbridge, BRS32388, was pleased to receive one of the special awards issued by the operators of GB0HFC (Shetland Hamefarin 1985) for the best swl report received. He was delighted with this unexpected gesture of amateur goodwill.

Back to the thorny subject of QSL techniques, just when I thought everyone had been educated in the 60's and don'ts! G4MWP sent a QSL from a Dutch swl reporting on a "QSO" G4MWP had with an EA5 on 28MHz. His log shows no 28MHz QSOs on the day in question. However, the main point was that G4MWP's report from the SWL was R1S1, which is totally worthless as a report and also calls into question whether the swl actually heard anything. Keep reports accurate, honest and sensible.

Secondly, G3HCT remarked about the number of listener reports he received for his A25 operation. He will QSL all worthwhile reports, but two received will not receive replies; one failed to give the RST, while the other did not provide any information on the stations being worked. To send a listener report without giving an RS/RST report is also worthless and a waste of time. We have laboured long on the rule of quoting as many stations worked as possible in reports. Please, take a pride in sending your cards. The extra time and care taken is bound to pay dividends.

Bev West, BRS86845, and Mike Kerry, BRS87240, both passed the December RAE, but both will continue their hf listening. They were both delighted with their QSL returns in 1985, and spoke highly of the work the QSL Bureau does. We all echo that sentiment!

Dave Burt, BRS85613, reported two more direct QSLs from J28EI and ZD7CW.

William Caithness, ARS86724, wrote for the first time from the Orkney Isles. His equipment consists of a Yaesu FRG7700-line with an hf vertical and a long wire for the lower frequency bands. As a newcomer, some of the abbreviations used in the column proved baffling. QTHR means that the address given in the RSGB *Call Book* is correct, CQWW is a major contest sponsored by *CQ magazine*, DXCC is an award for having confirmations (QSLs) from 100 different countries. The swl equivalent is DXLCA, and NZART is the New Zealand national society. If other swls have the same problems, let me know and we will run an occasional glossary of terms, when space permits.

HF news

Malcolm Harrington, BRS20249, blamed diy for sporadic activity, but useful additions in the shape of TA1E and 8P9AF on 3·5MHz and KA2ATM/TF on 7MHz went into the log; AP2ZA was about the best on 14MHz. Brad Bradbury, BRS1066, added KP2J and TF1PS on 1·8MHz, while 7MHz accounted for P4/KQ2M, JT0XC, VP2M/VE3ICR and

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5V7AS. As at 13 February, Brad had logged 131 Russian Oblasts this year. Robert Small, BRS8841, reported an interesting month, with 100 countries logged on 3·5MHz during January—the fifth to report that feat this year; the LF Challenge results will give a fuller picture of conditions. The 3·5MHz band had provided four new countries, 4U1UN, S90AS, VK9LM and P29JS, and 7MHz came up with 5R8AL and 7P8CI. On 14MHz DL1UF/TI2 and BY1QH were the best on offer, while 5H3CE/A (Zanzibar Is), A25/W6KG and VY1CC/VP2M were the pick. On the QSL front, NA6T/KH4, XX9XX, HC8X and BV2DA were the best.

HF Challenge results

The total number of logs for the 1985 HF Challenges which coincided with the CQ WW Contests produced 22 logs, a slight increase on 1984 and one fewer than in 1983. Conditions for the ssb leg were extremely good, with an A-index number of five for both days. The cw leg was not so fortunate, but the bands were in better than average shape. Jean-Jacques Yerganian, ONL383, remarkably kept up his winning sequence, but his ssb winning margin was considerably lower this time. It was somewhat disappointing that only two entries were received for the cw leg, although both entries showed much hard work on the part of the entrants.

Surprisingly, the number of countries heard on 28, 21 and 14MHz in the ssb leg were all up on 1984, while 7MHz was well down on the previous year, with 3·5 and 1·8MHz producing similar scores to 1984. On 28MHz, 43 dx countries were heard, including CE0Z, FR5, J28, TL8, VK9X, 3B8, 4S7 and 9U5. The 21MHz band boasted 137 countries, including 86 dx; the best were BY, HS, KH2, P29, 8Q7, 9N1 and 9X5. On 14MHz, 139 countries were heard, with 86 dx countries logged. Nothing too startling here, but BY, FK8, VK9X and 9M2 were the pick. Moving to the lower frequency bands, 7MHz produced only 89 countries compared to 113 in 1984; 42 dx countries were heard, and most excitement centred on HC8X, several KL7s, VR6JR and 3D6DX. Conditions on 3·5MHz were only average: BT1BK and HS0A were logged by several listeners, but exceptional dx was at a minimum, with little heard from the Far East; HC8X was also heard on this band, with J8, VP2E and ZF2 the pick of the Caribbean. The 1·8MHz band showed 14 dx countries, including PJ7, VP2E, VP2V, VP9, YV, ZL2BT and ZL3GQ (giving a number of entrants their first ZL on the band), YV and K7NJ/4X. A total of 170 DXCC countries was logged on all bands during the ssb event.

Turning to the cw leg, a true resumé of conditions is not possible with just two logs, but several factors came to light: ZS1CT and ZS3/W6QL were the only dx stations heard on 28MHz; 21MHz produced some good openings to the Far East and Africa, KH6XX, BY8AA and HS0A were active, and 14MHz dx included NH6J/KH0, CH1PJ/VE8, CY0SAB and DX1N. On the lower frequency bands Jean-Jacques found 77 countries, including 40 outside Europe on 7MHz. DX was audible throughout the day on 7MHz, with HL9CW 569 at 1332, NH6J/KH0 589 at 1356, BY4AA 569 at 1359 and KH6XX 569 at 1412. HS0A was 579 at 1501. These loggings certainly proved the high spots of both events. CY0SAB and VS6DO seemed about the best on offer on 3·5MHz, while 1·8MHz produced the now expected dx, of which FM5WD, VK6HD and UM8MM were the pick.

Both events seem to have had the desired effect of giving much enjoyment, a few new countries, a greater knowledge of band conditions, while improving contest operating technique. This is now a regular event, and I look forward to an increased entry to all sections of this year's challenges.

Posn	Station	28 Pts	28 DXCC	21 Pts	21 DXCC	14 Pts	14 DXCC	7 Pts	7 DXCC	3·5 Pts	3·5 DXCC	1·8 Pts	1·8 DXCC	Total points
	SSB MULTI-BAND													
1	ONL383	108	50	264	116	183	91	259	74	160	56	143	36	472,491
2	A. Miller	83	45	204	92	194	94	233	70	165	57	146	37	404,875
3	ONL5810	105	53	184	86	152	78	173	58	150	51	116	27	310,640
4	BRS8841	80	38	173	79	137	67	213	63	137	49	140	35	291,280
5	BRS32525	44	26	140	68	130	70	177	57	174	57	199	43	277,344
6	BRS87259	8	8	87	49	113	61	73	29	109	38	71	19	94,044
7	ONL6945	18	12	54	24	51	21	107	34	21	10	48	16	34,983
8	BRS45205	0	0	59	33	68	42	29	13	32	16	15	5	22,127
9	ONL2565	11	7	79	37	46	28	5	1	0	0	0	0	10,293
10	BRS87894	0	0	15	7	54	34	41	19	13	5	6	2	8,643
11	BRS31976	0	0	0	0	0	0	0	0	64	26	99	26	8,476
12	ONL4333	0	0	60	32	37	23	0	0	0	0	0	0	5,335
13	BRS87725	0	0	21	15	43	29	0	0	24	9	0	0	4,664
	SSB SINGLE-BAND													
	BRS25429	0	0	0	0	0	0	0	0	0	0	212	45	9,540
	A. Miller	0	0	0	0	0	0	233	70	0	0	0	0	16,310
	ONL3975	0	0	0	0	221	108	0	0	0	0	0	0	23,868
	BRS87259	0	0	0	0	113	61	0	0	0	0	0	0	6,893
	ONL2403	0	0	0	0	104	65	0	0	0	0	0	0	6,760
	BRS62088	0	0	0	0	94	58	0	0	0	0	0	0	5,452
	BRS52543	0	0	175	85	0	0	0	0	0	0	0	0	14,875
	Total countries heard during challenge		79		137		139		90		79		52	

Posn	Station	28 Pts	28 DXCC	21 Pts	21 DXCC	14 Pts	14 DXCC	7 Pts	7 DXCC	3·5 Pts	3·5 DXCC	1·8 Pts	1·8 DXCC	Total points
	CW MULTI-BAND													
1	ONL383	7	3	188	84	146	72	272	77	174	57	258	51	359,480
2	BRS8841	7	3	113	47	63	35	185	52	105	39	160	37	134,839

Newcomers

First-time welcomes go to Melvyn Dunn, RS86500, and K Lister, BRS88371. Melvyn has amassed QSLs from 70 countries. A reminder that RSGB HQ has copies of a nine-band DXCC countries list. BRS88371 has an FRG7000 receiver and has been listening for only six months.

Finale

News, views and table scores for the hf table should reach me no later than Monday 14 April, with late copy by Tuesday 22 April. □

COMPUTING

*John Morris, GM4ANB**

Radial ring scoring

Have you read the vhf/uhf contest rules in January's *Rad Com?* If you have gone through them carefully you may have noticed a slight change in the radial ring scoring. If, like most contestants, you use a computer for contest scoring you should make sure that the program obeys the amended rules.

Before this year the rule was that 0 to 50km scored one point, 50 to 100km three points, and so on. The rule now (No 9, page i, "Operating Guide" supplement *Rad Com* January 1986) is that 0 to 50km scores one, 51 to 100km three, and so forth.

Look through your program and identify the part that converts from distance to radial ring score. Some commonly used expressions are:

```
1 + 2 * INT((DX-0·5)/50)
1 + 2 * INT(DX/50·001)
1 + 2 * INT(DX/50)
```

To set the correct scores, change the program to use an expression along these lines:

```
1 + 2 * INT(ABS(DX-1)/50)
```

where DX is the distance, in kilometres.

Subtracting one from the distance moves the three point boundary out to 51km, as the rules now state. The "ABS" ensures that distances of less than 1km have a positive score.

Spherical direction finding

In February's issue I gave G3RUH's method for finding the points of intersection of two bearings using a vector cross product. Since that issue went to bed I have received a number of algorithms for solving the same problem using only standard spherical geometry formulas.

Judged on the basis of brevity and neatness—and getting the right answers—the best version came from G4WIZ. Honourable mentions also go to G4DXJ, G8EWX and G4HZA.

G4WIZ's method comes in the form of a subroutine (Program 1). On entry N1, E1, B1 should be the latitude north, longitude east, and bearing of the unknown position for station 1. N2, E2 and B2 are the corresponding values for station 2. On exit the two possible locations are given by N3, E3 and N4, E4. All angles are in radians. Add a main program to suit.

Several correspondents said that they enjoyed the challenge of a non-trivial programming puzzle over the Christmas hiatus, so I will try to find something equally taxing for this year. Any suggestions?

Mixed locator conversions

Program 2 is a utility which will automatically convert either a QTH locator or a "Maidenhead" locator.

Once again the interest is in the subroutine, which can be plumbed into your own programs. Line 10 sets up the array and constants used in the conversion, and needs only be executed once per program run. The subroutine itself starts at line 1000. It takes a locator in Q$ and returns the latitude and longitude in N and E. They are both in degrees, so remember to convert to radians if you are going to use them for distance calculation. Variable EF is the error flag. It is set to one if the given locator is illegal under both systems.

The type of locator is determined according to its length, in lines 1020 and 1110. The error checking sequence (lines 1070 to 1100) is common to both types, so saving a bit of typing. Separate bits of arithmetic for the two locator types then give the final conversion.

I have long been fascinated by programs which not only do data conversion, but also detect what sort of data has been entered, without

Program 1

```
100 SE = SIN(E2-E1): CE = COS(E2-E1)
110 S1 = SIN(N1): C1 = COS(N1): S2 = SIN(N2): C2 = COS(N2)
120 CP = S1*S2 + C1*C2*CE: X = C1*C2*SE
130 Y = S2 - S1*CP: B3 = ATN(X/Y): IF Y<0 THEN B3 = B3+PI
140 Y = S1 - S2*CP: B4 = ATN(X/Y): IF Y<0 THEN B4 = B4+PI
150 E3 = ATN(SE/(SIN(B2)/SIN(B1)*SIN(B1-B3)/SIN(B4+B2)+CE))
160 N3 = ATN((S1*COS(E3)+COS(B1)*SIN(E3)/SIN(B1))/C1)
170 E3 = E1 + E3: IF E3<-PI THEN E3 = E3 + 2*PI
180 N4 = -N3: E4 = E3 + PI: IF E4>PI THEN E4 = E4-2*PI
190 RETURN
```

*6A Morlich Grove, Dalgety Bay, Near Dunfermline, Fife KY11 5UX.

Program 2

```
  10 DIM C(6):P$="12221000121":CI=ASC("I"):C0=ASC("0")
  20 INPUT "Locator"; Q$: GOSUB 1000
  30 IF EF THEN PRINT "Illegal": GOTO 20
  40 PRINT "Lat "; N; "  Long "; E: GOTO 20
1000 EF=1: QL=LEN(Q$): IF QL<5 OR QL>6 THEN RETURN
1010 FOR J=1 TO QL: C(J)=ASC(MID$(Q$,J,1)): NEXT
1020 IF QL=6 THEN L$="AA00AA": H$="RR99XX": GOTO 1070
1030 L$="AA00A": H$="ZZ79J": C(4)=C(4)-1
1040 IF C(4)<C0 THEN C(4)=C(4)+10: C(3)=C(3)-1
1050 IF C(5)=CI THEN RETURN
1060 IF C(5)<CI THEN C(5)=C(5)+1
1070 FOR J=1 TO QL
1080 L=ASC(MID$(L$,J,1)): H=ASC(MID$(H$,J,1))
1090 IF C(J)<L OR C(J)>H THEN RETURN
1100 C(J)=C(J)-L: NEXT: EF=0
1110 IF QL=5 GOTO 1150
1120 E=C(1)*20 + C(3)*2 + C(5)/12 + 1/24 - 180
1130 N=C(2)*10 + C(4)   + C(6)/24 + 1/48 - 90
1140 RETURN
1150 E=C(1)*2 + C(4)/5 + VAL(MID$(P$,C(5),1))/15 + 1/30
1160 N=C(2) - C(3)/8 + VAL(MID$(P$,C(5)+2,1))/24 + 43/48
1170 N=N+40: IF E>42 THEN E=E-52
1180 RETURN
```

having to be told. After all, a human can look at a grid reference and decide whether it is a locator, an ngr or whatever, so why shouldn't the computer?

Plugging in national grid references to Program 2 is relatively easy. If you would like to try it, the rule is that the first two characters are always letters, and the rest digits. The grid reference must then be converted to latitude and longitude, as shown in February's *Computing*.

Program register

Have you written any amateur radio programs which you think deserve wider circulation? I certainly receive lots of listings through the post, but many of these, although quite excellent, are just too long to fit into this column.

To get those programs moving round the country I have established an experimental "Program Exchange Register". This is a centralized list of who has what, and how to get hold of copies.

The rules are as follows:

1. To add a program to the register send a brief description (preferably on a postcard) of it to me. Do not send tapes or listings!

2. The description should include:

(a) program function;

(b) the computer on which it runs, including any special hardware needed; and

(c) instructions on how to get a copy.

3. Programs can be distributed on tape, disc (specify size, format, density, number of sides etc), or electronically, at the choice of the author.

4. The submissions will be collated to produce a list of who has what. The list will be updated as new submissions are received, and copies will be available on receipt of an sae.

5. To get a copy of a program the procedure will be as follows:

(a) Where an exchange of media (disc, tape) is necessary, the person requiring the program should send a blank tape or disc to the program's author, together with suitably addressed and stamped packaging for its return.

(b) In the case of an electronic exchange, follow the instructions given in the register.

6. All programs remain copyright of their original authors. In submitting a program to the register the author is assumed to be giving permission for its non-commercial use by individual radio amateurs.

7. Inclusion of a program on the register does not imply that it has been tried or tested by anyone other than the author.

8. The register is primarily intended to facilitate exchange of programs between amateurs. However, commercially distributed software may also be included, at the discretion of the registrar. Companies wishing their products to be listed should send the information described above, together with details of price etc.

The register is now open for submissions. If few entries are received by the beginning of June the project will be scrapped! If enough entries are received the first edition of the register will be available during the late summer; details will be given in August's *Computing*.

Oddbits

The SARUG newsletter often contains novel programming ideas, and the January 1986 issue contains a program for an amateur radio computer application which I do not recall ever having seen before.

It works in conjunction with a vlf receiver, tuned to the 60kHz MSF time signal transmitter at Rugby. It decodes, in software, the time signal, and displays it on the screen. Facilities for fine tuning the signal are also provided.

The program, by G4IDE, is written in Z80 machine code, and is specific to the Spectrum. It should be possible to adapt the method to other computers, but additional hardware interfacing will probably be needed.

Also from SARUG comes news of a couple of programs for the QL by GM4IHJ; "QL WOTSON", an hf propagation predictor, and "QL SATS", a 34 satellite predictor covering all present and some planned satellites. Each costs £3 plus a blank microdrive cartridge plus return postage. For details send an sae to G4INP, QTHR.

Another new product is a suite of software for the Spectrum to decode the Uosat-1 and Uosat-2 transmissions, without use of any special interfaces. Details from G4IDE, 79 South Parade, Boston, Lincs PE21 7PN. □

SATELLITES

Bob Phillips, G4IQQ*

THE LAST FEW months have been relatively quiet for amateur satellite operators but the remainder of the year holds considerable promise for the ever growing following. The successful launch of the Ariane rocket in mid-February after last year's disaster, has restored confidence in the vehicle. Similarly, the launch of the new Soviet space station at around the same time, gives hope of new launch opportunities for amateur payloads in the future.

Uosat

Both satellites are continuing to behave very well in spite of an increasing number of problems associated with the command station, which is now five years old and in need of a major overhaul. New equipment and computer software will be installed over the coming months and this should lead to increased reliability, as well as operating flexibility for the command station.

Oscar 10

It is too early yet to notice any significant change in availability of the satellite, but the latitude at which apogee occurs has now started its gradual movement back towards the northern hemisphere. The visibility chart Fig 1, shows that there are two periods during the month when the satellite will be in view for reasonable durations. On the 11th the satellite is visible for almost the entire orbit and reaches its maximum elevation of around 28 degrees at 18:10hr (MA245). Similar conditions exist for the following four days but with the elevation angle falling to 17 degrees on the 15th. The last three days of the month also provide extended access with elevation angles up to around 30 degrees.

RS satellites

In spite of high expectations, the launch of RS9 and 10 had not taken place by the end of February. It was however being reported, at that time, that the first manned flight to the new space station was likely to take with it the Iskra 4 satellite. The middle of March was thought to be a possible date.

Other news

Tests on the phase 3C satellite continue with thermal-vacuum testing due for the end of March at the Martin-Marietta facilities in Colorado. These tests are designed to simulate the full space environment and to show up any potential fault situations on the ground where corrective action is possible. Launch date is likely to be in September assuming no further unforeseen delays in the Ariane programme.

The agm of Amsat-UK will take place at London House (opposite the old RSGB headquarters) on Saturday 12 April starting at 1.30pm. After the formal business of the meeting is completed, it is planned to hold a question and answer session on matters relating to amateur satellite operation.

Another important event for the calendar is the first colloquium to be held in this country, dedicated to the subject of amateur satellites. Organized by Amsat-UK in conjunction with the University of Surrey, the event will be held on the weekend of 5/6 July 1986 at the university. Full details of the event are not available at the time of writing but more

*Transvaal Cottage, New Barn Road, Swanley, Kent BR8 7PW.

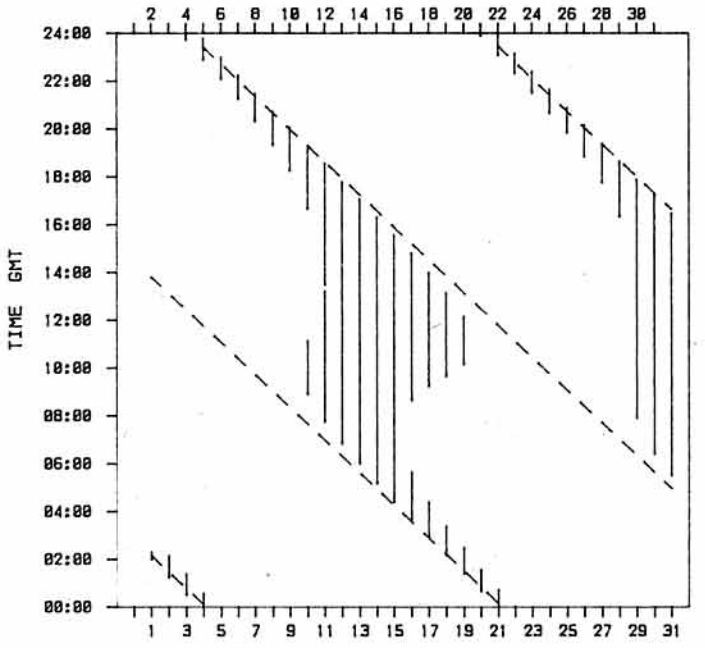

Fig 1 OSCAR 10 VISIBILITY (London area) - APRIL 1986

information may be obtained from Amsat's secretary, G3AAJ, at Amsat-UK, London E12 5EQ, with the usual sae.

Last year I referred to activity in the USA where stations with simple equipment were enabled to operate through Oscar 10 by means of gateway stations, which provided the necessary up-link and down-link to the satellite. Consideration to similar operations is being given in the UK by Dave Rowan, G4CUO, and John, G4ZHG. The aim would be to give vhf operators an insight into satellite operation without the need to obtain any new equipment nor to have any other knowledge of the subject. The project is called ASVAR (Amateur Satellite Via Amateur Radio) and is based on the use of a 145MHz fm link from the user to the satellite gateway station. The gateway would convert signals from fm to ssb for the up-link, and ssb to fm for the return. A number of outstanding issues have yet to be resolved but it will be interesting to see if other groups take up the idea. □

MICROWAVES

*Mike Dixon, G3PFR**

Operating news

As is often the case in the wintertime, there has been little operating news to report. The extremely dry and very cold (by UK standards) weather has neither been productive of "lifts" nor of operating other than a little "fireside" (fixed) activity. This weather should have been eminently suitable for operation on the higher bands such as 24 and 47GHz, for there are significant water/water vapour losses on both bands and, indeed, the current world record on 47GHz was facilitated by two Swiss amateurs (HB9MIN/P and HB9AMH/P) operating under the extremely dry conditions brought about by sub-zero temperatures in the Alps. The month of February has done its best to emulate these conditions, but I don't know whether anyone in the UK has taken advantage of this. Incidentally, the Swiss achievement has earned the two operators the Marconi Award, the third time in succession that the award has gone overseas! We, in the UK, should be looking to our laurels!

Frederick, G6FK, has reported continuing success on the regular skeds between G3KFD (Wolverhampton) and G6LEU (Nr TRURO) on both 1·3 and 2·3GHz, and that both are attempting skeds with G1DOX (Barrow-in-Furness). The latter skeds have not, so far, yielded results. Signals generally during January and February are reported to have been weak, although signals between G6FK and GI4CXH "are now showing results again, with signals out of the noise on at least two out of every five occasions, despite the varying weather conditions of the last two months". G14CXH is running tests with G6LEU and, as Frederick puts it, "sooner or later path conditions will support signal exchanges". Other bits of news are: G4JY (Kinver, Stourbridge) is converting his two-stage 2C39 pa to water cooling, while G4CBW is doing a similar exercise on his 2·3GHz pa: GW8AAP, formerly of Prestatyn, is now resident near Lincoln and is expected to be QRV from his new location before too long: GW3CCF (near Mold) is operative on 1·3GHz during the day and in the evenings, and is building for 2·3GHz: Russ is also operative on 10GHz (wb) from home (I worked him from a local high spot some time ago, with Russ' gear pointing out through a bedroom window!).

*"Woodstock", Gaze Bank, Norley, Warrington, Cheshire WA6 8LL.

Communications '86—on 5·7GHz?

There seems to be quite a large amount of ex-commercial equipment available, built in WG14 and centred on 6GHz. This should be very easily adaptable to 5·7GHz, and the items around on the amateur market include post-type filters, detectors/mixers, circulators, isolators, many varieties of WG14 "bits" and twts. Addresses for such items were published in the February issue of the *Microwave Newsletter*. A 5·7GHz version of 'JVL mixer and 'DEK multiplier was published in the *Newsletter* (October 1981 and elsewhere) and it is known that this design is capable of much more output than the corresponding 10GHz version; it is also less critical to align than its higher frequency counterpart. It is hoped that the availability of such "hardware" at amateur prices will encourage an upsurge of activity on 5·7GHz. Unfortunately beacons are not, at the moment, licensable on this band. As indicated last month, I will be pleased to report any activity, but especially that concerning the "middle" bands such as 3·4 and 5·7GHz where there seems to be little activity compared with 1·3 and 10GHz. The latter comprises most of the news received, although there are increasing signs of improving activity on both 2·3 and 24GHz.

Recent awards

Jack, G5UM (microwave awards manager), has listed a number of awards made in January and is looking forward to issuing many more as seasonal activity increases in the spring.

Callsign	Award (No)	Band	Callsign	Award (No)	Band
G8HPD	Distance (98)	1·3GHz	G8HPD	15 Squares (31)	1·3GHz
G8BGJ	Distance (99)	1·3GHz	GW3CCF	25 Squares (20)	1·3GHz
G4NBS	5 Squares (58)	1·3GHz	G6DER	30 Squares (?)	1·3GHz
G8BJG/P	5 Squares (59)	1·3GHz	G3XDY	50 Squares (4)	1·3GHz
G8BGJ	5 Squares (60)	1·3GHz	G3XDY	Distance (15)	2·3GHz
G6ETA	5 Squares (61)	1·3GHz	G8BJG/P	Distance (?)	10GHz
G4NBS	10 Squares (50)	1·3GHz			

From here and there

Ken, G8VR, my "opposite number" on vhf/uhf, sent a brief note indicating that he has moved to a new QTH in Kent, half a mile from the sea and with a sea take-off for about 250° of the compass. In this situation he is about to launch forth on 1·3GHz with, initially, an MM transverter, longish feeder, masthead preamp and solidstate pa. He said: "The ultimate aim is eme with a dish, but much to do and infinitely more to learn about this band before that is a reality . . . I reckon back-yard eme on 23 or 13cm is the future for us all. It certainly appeals to me!". My view is that Ken, with a clear sea take-off in many directions, will be very surprised by the results he will get! He sent along some details of antenna measurements on 1·3GHz made at the 1985 Dayton "Hamvention" in the USA. They are shown in the table below:

Operator	Antenna	Measured gain (dBd)
W1JR	19·8λ 55-el F9FT	18·45
W1JR	15·8λ 45-el loop Yagi	17·8
VE3BFM	"Colagi"	14·0
NE8I	7·24λ 28-el modified "RSGB"	12·7
VE3BFM	1·14λ 21-el "Colagi"	8·1
WA8OGS	Dipole and 0·165 square reflector	6·8
K0DAS	1·48λ 2 × 3lb coffee cans	5·7

Microwave Committee Business

Main concerns discussed at the January meeting of the committee were how to progress and stimulate narrowband activity on all bands, but especially (since the RSGB has a special responsibility for the band) at 10GHz. It was also agreed that encouragement should be given for more operators to become active on 24GHz, initially with simple wb gear and then possibly with phase-locked equipment. Means of achieving these ends were discussed, and will be published when ideas have been finalized.

It was noted that there are several inexpensive solidstate devices appearing on the market which are of potentially great interest to the microwave operator. G4DDK is exploring such devices, and some so-far

examined include hybrid circuits for 1·3GHz (0·5W in for 20W out), 2·5GHz divide-by-four prescalers, wideband (up to about 2GHz) "modamps" for use, for instance, as prescaler preamplifiers, and some most interesting-looking phase-lock chips with output in the 1 to 1·5GHz region. Details of some of these devices have appeared in the *Newsletter*, and it is hoped to be able to give further details as investigation proceeds.

There was full and detailed discussion of the papers submitted by other national societies prior to the Vienna IARU conference of vhf/microwave managers. This is regarded as an important run-up to the main triennial conference in 1987.

Components service

As mentioned last month, this service is in full operation and the majority of components are available "off the shelf" for immediate delivery. By the end of March it is hoped that the range of chip capacitors will have been extended and that there will be two values of chip resistor (51 and 100Ω) available. If the demands for chip resistors of other values is sufficient, then the range of values can be extended. Other "surface mount" components will be considered as more constructors turn to pcb designs at the lower-band frequencies. If successful and reproducible pcb designs for the higher bands start to appear, then special chip components capable of extended frequency performance will be needed. The committee would still like to hear from members what their needs are; even if it is not feasible or practicable to stock some types of components, we may be able to help by advising on likely sources. Readers are reminded that the main objective of the service is to supply parts which are not easily accessible from other commercial sources, or whose "small order" price is too high for the individual to deal with the supplier. □

DATA COMMS

*Ian Wade, G3NRW**

THE FIFTH EDITION of BARTG's *RTTY The Easy Way* booklet is now available. It is 50 per cent larger than before, with new material on the 444 teleprinter and the Amtor Mk 2 controller, plus, for the first time, a section on rtty software for computers. There is also full constructional information on the ST5 terminal unit and supporting control logic. More details from Peter Adams, G6LZB, 464 Whippendell Road, Watford, Herts WD1 7PT.

Neill Taylor, G4HLX, recently sent me details of his "SUDD" program, which decodes Uosat 1200 bps ascii data with a ZX Spectrum, requiring only a simple 145MHz receiver and no special interface hardware. Telemetry frames are fully decoded, and the data may be saved on tape or microdrive. One can also monitor messages being sent in the digital communications experiment on Uosat 2/Oscar 11.

It seems that AX.25 packet is gaining a hold in the southwest of England. Geoff Watts, G8BCH, is now chairman of the newly-formed "South West AX.25 Group" (SWAX25), with aims to promote packet and to support the installation of digipeaters. Details from G8BCH, G3VPF or G8IMB. At the opposite end of the country, the Norwich AX.25 group, comprising G8QR, G0DEE, G3LDI and G3PMQ, are all very active on 3·5, 14 and 144MHz. G3LDI has a 14MHz monobander atop a 100ft tower, and must be one of the first people to WAC on packet. The group holds a packet net at 1130 on Sunday mornings on 3·6MHz ± QRM, and all AX.25 stations are welcome to join in. The number of AX.25 users throughout the UK in general is growing rapidly, and I maintain a list, updated monthly, of the callsigns, names, locations and tncs used by all known active stations. Drop me an sae for a copy.

Nils Tolleshaug, LA5DI, says that the LA Packet Radio Group (LAPRG) was formed in August last year, and one of their first tasks was to order 20 TNC-2 terminal node controllers, which are now in operation. A digipeater, LA5PR, is operational in Skien, with a link to SK4NI in Karlstad, Sweden. They are now planning digipeaters in Oslo and Kongsvinger to establish a full link on 145·225MHz. For local QSOs they use 144·650 and 144·675MHz. LA6OCA, LA4LN and LA1K (the club station at the Technical University of Trondheim) are active on 14MHz.

Ger Rys, PA0RYS, reports that the Dutch Amateur Packet Group (DAPR) now has about 30 active members, mostly in the west of Holland, with virtually all local traffic on 432·675MHz ("2m is like a swimming pool!" says Ger). PE0MAR in the Hook of Holland regularly beams to the UK, and is particularly interested in setting up a link across the water.

*7 Daubeney Close, Harlington, Dunstable, Bedfordshire LU5 6NF.

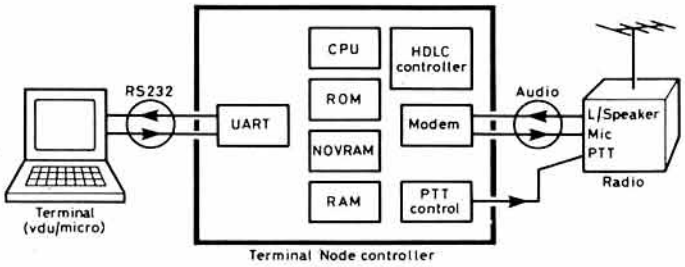

Fig 1. An AX.25 packet radio station, using a terminal node controller

Colin Richards, 9M2CR, is now active on packet from Malaysia. Using a TNC-2, he has had QSOs on 14MHz with JA5TX, YB1BG, YB0AQT, VK2BVS, JA3AUQ and JH1QDB. These last two stations have also successfully connected via 9M2CR; not bad for a 12,000km round trip in poor sunspot conditions. To check the frequencies of the tnc tones, Colin says that in the absence of a signal generator or frequency counter, the following method works: take a violin, preferably one owned since the age of seven, tune it to "A" (440Hz) using a pitch pipe as reference, then hit high "C" on the "E" string (2,100Hz). Finally, tune the tnc tone generator for zero beat! Now that's what I call the spirit of amateur radio!

Lastly, if you would like to see packet in action, yours truly will be giving live demonstrations of AX.25 on 5/6 April at the RSGB National Convention in Birmingham. Unlike last year's presentations, the emphasis this time will be more on the practicalities of setting up and running a packet station, rather than on the theory. See you there?

Setting up an AX.25 packet station

Referring back to the packet primers in the last two issues, it will be clear that a lot of things happen when packet frames are sent and received (such as flag and frame check sequence processing, callsign checking, digipeater control, bit stuffing to prevent unwanted flags, plus a multitude of other tasks to do with error detection and recovery). All of this must be done in real-time, and while it is possible to do it by software in a single micro, the more usual approach is to use a terminal node controller (tnc), which sits between the micro and the radio (Fig 1). This way, the micro is not burdened with cpu-hungry bit-processing, and has only to handle small amounts of data at its leisure. This leaves the micro free to run much more interesting software, such as a disc operating system, bulletin board, printer and so on, without overloading.

Table 1 lists most of the tncs available today—the numbers in square brackets refer to the suppliers, with addresses in Table 2. (Also listed is a software-only system to run on a Z80-based TRS-80 [9]; the only special hardware required here is a modem). The tncs which first set the world on fire were the TNC-1 and TNC-2, both designed by the Tucson Amateur Packet Radio (TAPR) group in the USA. Several of the other tncs listed in Table 1 are clones of these very successful designs.

In the TNC-1 (Fig 1), the cpu is a 6809, and the tnc code is contained in 32k of eprom. The novram (non-volatile ram) is a kind of eeprom, and is used to contain semi-permanent data, such as the user's callsign, frame size parameters and various software timer constants. This data remains in the novram even when the power is off, and is immediately available when the tnc is switched on again. Communication with the terminal, which may be anything from a dumb vdu to a fully fledged micro, is in ascii via the uart. The HDLC (high-level data link controller) chip does the hard work of assembling and disassembling packet frames, automatically handling flag

Table 1. AX.25 terminal node controller kits and assembled units

TNC	Supplier	Terminal/micro	Power	TNC CPU	Remarks	Approx price a=assembled, k=kit, d=disk
HD-4040	[4]	Ascii	AC	6809	TNC-1 clone	$249 (k)
Communicator	[6]	Ascii	12V dc	6803	Many features	$219 (a)
MFJ-1270	[7]	Ascii	12V dc	Z80	TNC-2 clone	? (a)
PKT-1	[1, 5]	Ascii	12V dc	6809	TNC-1 clone	$499 (a)
PK-1	[3, 10]	Ascii, baudot	12V dc	Z80		$165 (a)
PK-1L	[3]	Ascii, baudot	12V dc	Z80	Needs only 25mA	$210 (a)
PK-64 (Pakratt)	[1, 5]	Commodore C-64/C-128	12V dc	?	Also cw, ascii, baudot and amtor	$219 (a)
PK-80	[1, 5]	Ascii	12V dc	Z80	TNC-2 clone	$219 (a)
Richcraft	[9]	TRS-80	—	—	Software system	$29 (d)
TNC-1	—	Ascii	AC	6809	No longer made	$240 (k)
TNC-2	—	Ascii	12V dc	Z80	No longer made	$185 (k)
TNC-200	[8]	Ascii	12V dc	Z80	TNC-2 clone	$154 (k)
TNC-2A	[3]	Ascii	12V dc	Z80	TNC-2 clone	$155 (k)

Table 2. AX.25 terminal node controller suppliers

[1] AEA, PO Box C-2160, Lynnwood, WA 98036, USA.
[2] Applied Digital Technology, 2056 E Sutter Place, Oxnard, CA 93033, USA.
[3] GLB Electronics, 151 Commerce Parkway, Buffalo, NY 14224, USA.
[4] Heath Company, Benton Harbour, MI 49022, USA.
[5] ICS Electronics Ltd, PO Box 2, Arundel, West Sussex BN18 0NX, England.
[6] Kantronics, 1202 East 23rd Street, Lawrence, KS 66046, USA.
[7] MFJ Enterprises, PO Box 494, Mississippi State, MS 39762, USA.
[8] PacComm, 4040 W Kennedy Blvd, Suite 620, Tampa, FL 33609, USA.
[9] Richcraft Engineering, 1 Wahmeda Ind Park, Chautauqua, NY 14722, USA.
[10] Vomek, 11 The Dell, Stevenage, Herts SG1 1PH, England.

Table 3. On-air AX.25 packet conventions

Bands	Mode	Tones (NRZI)	Speed	Popular frequencies
VHF	F2D	1,200/2,200Hz	1,200bps	144·675MHz
HF	F1D	200Hz shift	300bps	14·103, 3·598kHz

insertion and detection, bit stuffing and fcs computation. The modem can be set up to handle a wide range of tones, and Table 3 shows the tones in common use today, plus the corresponding speeds and on-air frequencies.

Communication between the tnc and the radio is at audio levels, using the microphone input and loudspeaker/headphone output of the radio, plus a ptt line. As mentioned last month, virtually any radio can be used. Transmit/receive changeover time is not at all critical (unlike Amtor), so it does not matter, for example, if you are using an old fm black box with a synthesizer lock-up time as long as 100ms when switching between transmit and receive—you simply set the tnc timer constants accordingly.

The other tncs shown in Table 1 perform essentially the same functions as the TNC-1, the differences between them being in the ratio of hardware to software (generally speaking, the cheaper ones do more by software) and in ease of use—some tncs are very friendly and well documented, whereas others are less flexible and somewhat light on the paperwork. As usual, probably the best advice before you part with your money is to contact the suppliers for detailed information, and then to talk to people already using the equipment you have your eye on. Current estimates put the number of tncs worldwide at around 10,000—most of these are in the USA, with probably about 1,000 in Europe (mostly in West Germany). □

VHF/UHF

*Ken Willis, G8VR**

BY ITS SHEER SIZE and intensity, the big February aurora, coming so soon after the release of 50MHz facilities, will surely take its place in vhf/uhf history. At this low-point of the solar cycle, any aurora which penetrates to the south is welcome; this one went right down to the Mediterranean, embracing almost the entire northern hemisphere at one time or another. So many reports have been received that it is not possible to detail them all, but everything received will go to the Propagation Studies Committee so that a final analysis of this incredible event can be made.

On 4 February, G4ASR (Hereford) observed a significant increase in sun-noise on 144MHz. Next day, John Nelson, G4FRX, was informed that some 23dB of sun-noise was being recorded on 50MHz, and G4ASR was receiving it at S9 on this band. What followed some 48h later was a proton event, described by Joe Reisert, W1JR (Mass), as "one of the greatest auroras ever" in which USA auroral records were broken on all relevant bands. Steve, W2CAP/1 (Cape Cod), said that the highest K and A indices anyone could remember were recorded (Merdon reached 196, Fredericksburg, USA, 208). Others have compared it with the really big auroras of 1982, though some believe that nothing like it has occurred since the 'sixties. The event favoured mid-latitudes, with the north missing out, indicating that the activity was situated further south than normal.

The first auroral signals to be heard in the UK appeared on the afternoon of 7 February. Rod, G0CBO (Margate), was listening on 28MHz at around 3.30pm when the band went wide open for about 10min and he worked Mauritius and Ecuador by what appeared to be auroral-E propagation. Some auroral signals were also heard on the band, and 144MHz was found to be supporting auroral propagation. There was further activity in the evening following the afternoon phase, but the really big event took place on the next afternoon, 8 February, with its own second phase in the late evening lasting until the early hours of Sunday 9 February. Contacts were made on 50, 144 and 432MHz (both cw and ssb), and in particular the 50MHz band showed how useful it is when aurora is present. W1JR believes that some operators even tried to make contact on 1,296MHz via aurora, and he requires further information if this was so. Joe says that many uhf operators are not used to doppler shift, which might have reached 10kHz *one-way* on 1,296MHz in this event (it was as high as 4kHz on 432MHz). Most rits will not cover these sort of shifts, so trying to find a caller after a CQ call would be difficult if a wider search was not felt to be necessary.

It will be best to deal with each band separately in an attempt to summarize the mass of information which has come in.

432MHz

Auroral contacts on this band are not all that common, but Mark Osborne, G4XOL (Merseyside), had no less than 44 cw contacts with DL, PA, F, G, Y24, OZ, SM and ON, all during the afternoon of 8 February. He had further contacts in the second phase but found activity much lower. QTF for most of his contacts was between 40° and 65°, while the use of 10° of elevation helped considerably. Nothing was heard from LA or GM, and only one G (G3LTF) was worked. Mark used 100W to 4 × 21-element Yagis and an MGF 1404 GaAsfet preamp.

Mark's friend John Lovell, G8JHL (Salford), used only ssb on this band, and had nine contacts with D, PA and G, all on a QTF of 55°. He is another who commented on the problems caused by high doppler, plus the fact that his rit covers only 2kHz, so W1JR has a point! John Mills, G6LWT (East Sussex), was one of the stations worked by G8JHL, and he too was surprised at the extent of the doppler shift. G6LWT was using only 40W to 4 × 21-element Tonnas, while G8JHL has a K2RIW amplifier into 4 × 19-element Tonnas and a masthead NE72089. It seems a big antenna is one clue to 432MHz auroral contacts.

On the other side of the Atlantic, W3IY/4 worked W7CNK/5 at a distance of 1,134 miles, while W31P had a contact with WB5LUA at 1,181 miles. The previous USA auroral record was 957 miles. As far south as the state of Georgia, W4GJO is reported to have had many 2 × ssb 432MHz contacts via Au.

144MHz

As would be expected, this band carried most of the traffic during the event, and activity was at a high level during the Saturday, both on cw and sideband. G4ASR worked 18 countries, the best dx being UP2BFR at 1,805km. Ninety-nine contacts were made overall, and twice he was called by a 3A2 station but the contact was not made. This indicates how far south the event extended. Dave commented on the power of cw in an aurora, saying that many Class B operators could be heard working Scottish stations, whereas the real dx was on cw down at the bottom end. Philip Murphy, GI4OMK, worked 16 countries in 52 squares with "most UK squares being available"; his bag included two OEs and SP3MFI (JL). He was hampered by the "insurmountable wall of G and GM stations" calling him—he says they can work him almost any time if they would only beam that way, and during an event such as this he naturally wants to work the longer distances like everyone else. He finds European stations behave admirably by contrast and wait for him to call country by country. How nice to be wanted; try living in southeast England! John Palfrey, G4XEN (Northants), managed 13 countries using cw, but the day was made perfect for him by a first-ever QSO with OH (OH5LK-KP3O) at 1,927km. He also worked several Russians, and later went on to 432MHz to work a further five countries, G, PA, D, GI and SM.

In all, the full list of participating countries mentioned in 144MHz logs is G, GM, GW, GI, GD, GJ, EI, ON, PA, F, D, Y, OE, OK, SP, LA, SM, UP2, UQ2, HG, YU, OZ and OH, 23 in all.

In the USA, KA1ZE (Conn) worked WB0DRL (Kansas) at a distance of 1,348 miles, believed to be the new record, though Europeans have been claiming distances around this figure for some years (previous USA distance was 1,232 miles).

50MHz

Many operators who had come on to this band only a few days earlier, found themselves in the thick of an aurora which provided unexpected opportunities for working dx. For the old-timers on the band, it was to show that there is still much to be learnt about propagation at this frequency.

Roger, G3XBM (Cambridge) had his homebrew rig on the air, giving him just 1W to a dipole 25ft high. He worked G3PFM in Dorset. David, G4RQI (Weymouth), thought his neighbour G3PFM was being optimistic when heard calling CQA, but changed his mind a couple of hours later with GM, GI, EI and 10 new squares under his belt, using about 10W from a Mutek transverter into a four-element Jaybeam. Further north, GM3DOD (Greenock) heard GB3SIX for "the first time ever" and worked 61 stations on cw, including LA9DL, LA9T, LA3TQ and LA1K; LA3TQ was thought to be auroral-E, since T9 reports were exchanged. GW3LDH, anything but a beginner on this band, also got among the LAs and commented on the T9 signal of LA9TQ (beam heading 290°).

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Meanwhile the 50MHz specialists were looking for things more exotic. Both G4GLT and G4BPY were looking on 28MHz for indications of auroral-E, and SM6PU was doing likewise. Late on Saturday evening, Dave copied LA5TEN with pure T9 note and got perfect pictures from Scandinavian tv on 48·25MHz. On 7 February, G4BPY had good copy from South America and the Caribbean on 28MHz when conditions were "phenomenal". Martyn, G3UKV, had a good aurora with 65 contacts with 23 squares which did much to counter his disappointment at not getting an earlier 50MHz permit.

However, the exciting news came from the USA where there was much activity, especially from the east-coast "gang" ever on the look out for UK signals. G4GLT reminded me of what I said in this feature in July 1985; it was "W2CAP/1 has asked me to request 50MHz operators in this country to keep a particular look-out for auroral-E in that part of the spectrum . . . typically an aurora starting in mid-afternoon followed by a second phase between 1030pm and 0030am (local time) will often produce auroral-E signals in this second phase or near its termination". As if to confirm this, USA stations heard beacon GB3SIX, and one W1 station copied "G3Z??" but could not confirm the call. SM6PU heard Lefty, K1TOL, but could not raise him crossband on 28MHz. This is a most important piece of information. It occurred on 9 February at 0050gmt on 50·110MHz. Olaf also heard 85 different UK stations during the event.

Thanks are due to G5KW and G3TCT and others for detailed reports. Joe Reisert, W1JR, wants any information on long hauls on any band during this and any other such event, since he wants to update the record statistics. An exciting time, an exciting band. It should provide much of interest in the future.

Expedition time

Summer must be getting closer, because the first expedition information of the year has arrived. The Isle of Anglesey, XN square (IO73), will be activated between 27 May and 4 June using callsign GB4XN. Bands will be 70, 144, 432MHz and 1·3GHz plus wideband fm on 10GHz and 24GHz. Operation on 50MHz and 2·3GHz is under consideration. Skeds are welcome on 70MHz and 1·3GHz (contact Dave, G4VIX, QTHR, phone 04024 55870, and for 144MHz (contact Ian G4YUZ, QTHR, phone 0992 463478). The period embraces the 1·3GHz and 432MHz trophy contests (31 May–1 June). All other information from John G4ZTR, QTHR.

DL9GS, PO Box 102201, D-4630, Bochum 1, wishes to plan a meteor scatter expedition, and would like information on those squares likely to prove of greatest interest. Drop him a line if you have any views.

Multi-hop sporadic-E

As part of the discussion on whether a 144MHz contact between the USA or Canada and the UK might be possible through multi-hop Es, the question has been asked about coast-to-coast contacts on this band in the USA by this mode. In February G4BWP drew attention to some information in Joe Reisert's columns in *Ham Radio* which suggested that such paths had never been experienced. Now fresh evidence has come from Ray Soifer, W2RS (ex G5DDU), of Glen Rock, New Jersey, a long-time reader of this feature under its various contributors. Ray writes: "It would appear that there has never been a documented case of coast-to-coast 144MHz propagation in North America except by eme. The North American Es record for that band is 3,322km between VE1SPI on St Paul Island in the Canadian Maritimes and K0UDZ, Rapid City, S Dakota on 12 July 1982. The most westerly station ever worked on 144MHz from the east coast was K0WLU/7, Gillette, Wyoming, who made two-way contacts with 34 stations in the NE USA and Canada via Es that same evening at distances up to about 2,750km.

"The propagation mechanism which enabled these contacts almost certainly involved two E-layer reflection points, since the distances covered were too great for a single-hop, and no tropo conditions were evident at the time. What is less clear is whether an intermediate ground reflection was involved (ie double-hop), or whether some sort of chordal propagation existed. My own observations at the time favour the double-hop thesis, since K0WLU/7 and I were each hearing stations in Michigan, roughly equidistant from us. K0WLU later mentioned over the telephone that another opening enabled him to work the Pacific coast after the path had closed between us. Too bad that both openings did not exist simultaneously".

Many thanks to Ray for a fascinating description of these events and the scholarly way in which he presents the facts. There seems to be a good case for pointing those beams towards the USA and Canada during the Es "season" instead of keeping them aimed at countries to the east, especially after an Es event has died down here. What would be best, however—and this is what G4GLT would like to see done on an organized basis—is for some proper tests to be carried out with many stations on both sides of the Atlantic "on watch" at times when Es was most likely. Who will undertake to organize this and perhaps be the "first across" to make some vhf history? Bryn, G4DEZ, reminded me recently of some tests in which, I recall, G4DGU and G3SEK also took part, when some identifiable parts of calls were heard across the pond from a westerly vantage point in the UK, and this is not the first time that snatches of signal have been detected on this long path.

Beacon notes

SM6AFH/SM6EOC report that the Icelandic beacon TF8VHF is now operational on a frequency of 144·930MHz with message format Callsign-Callsign-24s dash-Callsign QTH HP84PA-24s dash. Output is 40W to a six-element Yagi beaming 100° from due north. In the recent big aurora, OY9JD heard it for several hours, and LA6HL can copy it via ms. If anyone hears it and wants to try a direct QSO with Iceland, telephone Martin, TF3XUU, on 354-2-7040 and he will then come up on 144·025 or 144·050MHz, crystal-controlled, using 160W. This applies to hearing it via tropo, Es or aurora, not ms.

UA1ZCL (RC08c) has set up a beacon on 144·390MHz running 200W directed to the south, and it gives excellent ms bursts receivable in southern Sweden according to SM6EOC.

Writing from West Berlin, Friedhelm Lichtenthaler, DL7AJA, reports reception of all three UK 50MHz beacons in location GM47b. On 14 December between 1408 and 1421gmt, he copied GB3NHQ, GB3SIX and GB3RMK at strengths between S3 and S9. GB3NHQ was heard for a longer period, but in the noise. All this was accomplished on an FT690 transceiver with built-in quarter-wave antenna, and, as Friedhelm says, "all indoors".

The USSR magazine *Radio* has published a list of 27 active beacons in the Soviet Union, 22 of them on the 144MHz band and the rest on 432MHz. The 144MHz beacons are all on frequencies between 144·034 and 144·468MHz, with the bulk of them between 144·150 and 144·370MHz, in other words right in the thick of things as far as we in the UK and most of Europe are concerned. On 432MHz the beacons lie between 432·153 and 432·750MHz.

In the recent big auroral event all the UK 50MHz beacons showed up well, although G3XGY commented that "it is perhaps unfortunate that beacons occupy 12 per cent of the whole of the UK (50MHz) band, and 60 per cent of the cw section". In the same event, G4BPY found GB3SIX a better auroral signal than GB3RMK, which surprised him, while GM3DOD heard the west-country beacon for the first time. In Northampton, G4XEN also heard GB3SIX very well, but nothing from GB3RMK; while Martyn, G3UKV (Telford), said that, for him, RMK was not a good auroral indicator, since it went auroral long after other stations and disappeared when signals from LA became audible later.

W1JR reports that several W1 stations on the USA east coast copied GB3SIX during the big aurora. Other 50MHz beacons copied included FY7THF and one in HC2. Joe did not say if the latter were with Au tone or whether some other propagation mechanism was involved. They are very far south.

Meteor master-class

Fortunately there was one good thing to emerge from my confusing the Halley's Comet story (*VHF/UHF* March). It got the astronomers among our readers interested, and now, it seems, we may have one or two of them hooked, so in future we may get from them a somewhat different slant on what goes on out there in the depths of space.

In response to my question in recent issues "How can a meteor reflection be strong yet short?", Alastair McBeath, Northumberland, comments that astronomers, concerned mainly with visual observations, notice that some meteors leave a "persistent glowing wake or train". He estimates that about 10 per cent of sporadic meteors entering the atmosphere exhibit trains. Showers may be "richer or poorer" than this. For example, the Perseids shower is considered a "rich" one with 30 per cent of its meteors being observed in trains, on average.

In determining whether a meteor is trained or not, two factors are important—size and speed. The faster or brighter the meteor, the greater the chance of it being trained. "Brighter" means larger in this context, which tends to mean that only fast-moving bright meteors will exhibit trains. Alastair assumes that meteor reflection of radio waves occurs only from trains, not from discrete meteors, but since "radio meteors" are often much fainter than those visible to the naked eye, it is reasonable to assume that many meteors produce trains which are not observed visually, or at least not by the naked eye.

Referring to the Geminids, Alastair says that observations indicate that

very few meteors in this shower leave trains, despite the fact that they appear very bright; those that do, produce quite short-lived trains. From his own observations in recent years of over 400 shower-meteors, only about six per cent have shown trains, and even the very brightest have rarely shown them lasting for more than 0·5s. In fact 0·25s is much more common. To sum up, Alastair suggests that short strong reflections are characteristic of bright meteors producing short-lived trains—in other words, typical Geminids meteors. So now we know what to expect from this shower. It may pay to push up the cw speed in order to get the maximum information from those short, strong reflections.

Other interesting information from Alastair is that average Geminid meteor velocity is 34km/s, and to compare this with other showers may give clues as to the radio characteristics of different showers. Perseids average velocity is about 59km/s, Orionids 66, Leonids (regarded as having the best trains of any shower as well as the fastest speed) 71, Quadrantids about 42. This means that on the basis of velocity alone, the Quadrantids should produce similar reflections to the Geminids, possibly better. If one considers other factors such as brightness and numbers of meteors, one would expect more reflections overall for the Quadrantids (Quadrantids peak rate being about 1·5 times that of Geminids) but they would be less intense (Quadrantids roughly half a magnitude fainter than Geminids on average), but probably of longer duration.

Commenting on published results for the 1985 Geminids, Alastair says that peak rates appeared higher than normal. In past years the shower has produced about six times the level of sporadic "background" meteors, whereas 1985 rates were about eight times background level. It is also suggested that there was a double peak, with highest visual rates either side of 0000 and 0200gmt, although so far this has not been confirmed. It does, however, suggest that the time of maximum was later than predicted (2000gmt) since the first peak probably occurred at 2330gmt.

Initial results for the Quadrantids in January 1986 show a maximum several hours earlier than predicted (supposed to be 2300gmt, was possibly as early as 1900gmt). Peak rates were about 90/h.

From the postbag

Frank, VE3DQB, who is editor of the Canadian amateur radio magazine, feels that he must raise a point associated with locators, and says that he has always "been dubious about schemes based on latitude and longitude". He observes: "If you have to work them out in the first place, why not use them?". According to Frank, the matter was put in focus by my comments in the December *4–2–70* when I said: "The Americans wanted a system based on 1° by 1° squares". Frank says there is one already, since 75N 150W has only one character more than a Maidenhead locator, but is five times more accurate! Unfortunately (or fortunately according to your tastes) we all know that the real foundation for any locator system these days, whatever the original aims, is the "squares game", so one form or another is bound to survive while operators strive to increase their scores. This is not at all a bad thing, since it maintains interest in vhf/uhf and causes people to optimize their equipment and sharpen up their operating techniques, both being good for our hobby generally.

John Gray, GW6ZUS (of Morriston, Swansea), makes a plea for more simplex fm operation. He says: "Where is everybody—are they licensed listeners, or all working fixed stations through repeaters?" John's location is badly screened between northeast and southwest (the "long way round") yet recently he made contact with G1PKV in Derby (125 miles) using a Slim Jim fed by an FT290R. After the contact, both stations invited others in their area to come in and work the stations on channel, but they were met with a deathly silence. John comments: "There are still fm-only stations looking for contacts on 144MHz". I must say that my own experience in listening to repeaters within my range indicates that they are certainly used a great deal by fixed stations. I am somewhat "renegade" in this respect, since although I accept that repeaters were originally conceived for mobile and handheld operation and the like, there was one period in my life when, living abroad in a flat, my only contact with the radio world was through the local repeater, and much enjoyment was obtained from this. So I have a warm regard for those who cannot aspire to outside antennas and who therefore see their local repeater as a gateway to some radio contacts. If they don't tie up the machine indefinitely, and use proper operating procedures, surely this cannot be a bad thing?

Guy Gervais, F6CJG (Brive), reminds me that the second leg of the 1986 REF moonbounce contest takes place on 19–20 April between 0000 and 2400gmt (that is, for the full 24h). Bands used will be 144, 432, 1,296 and 2,300MHz. If you can get a shot at the moon (on moonrise or moonset if you have no elevation control) you may hear some signals at the cw ends of those bands during this weekend, but please don't start calling those big USA signals unless you are fully equipped for eme, which you certainly won't be if you are conforming with current licence terms.

If it didn't become obvious in the big aurora, you may like to know that 20 Eire stations have received permission to operate in the 50MHz band. The Irish licensing authority is said not to favour a general allocation on this band (the 20 issued are to Class A licensees), and the permits have been granted on non-interference basis in accordance with ITU Regulation 342, and the duration of current permits is 12 months.

Back in January, mention was made of the fact that Paul, G4SXU (Harrogate), worked two EA9s on 144MHz during the big tropo opening the previous October. Paul has written to say that he encountered the two North African stations having a chat, and they thought it was a gag when G4SXU called in, but they then became so excited that their command of English suffered! You'll be thinking that Paul was flattening out everyone around him with that great signal, carrying to EA9. I am pleased to say that he was using just 10W from an unmodified IC-251E into a Jaybeam eight-element crossed-Yagi antenna, with 150f of feeder (*not* heliax), so with feeder loss, about 3·5W to the antenna. In the same event he worked 33 new squares, but as if this were not enough, on 432MHz he worked an LZ in LC square plus enough squares to claim an RSGB award for the band. He heard OY9, too, at S9 but could not get through the pile-up. Mind you, he uses a bit more power on 432MHz, a full 25W into 4 × 20 elements, plus some heliax feeder. You will do wonders for your tvi if you try to emulate Paul. I have always advocated increasing erp by bigger antennas rather than a big linear if you can manage it. On 432MHz the antenna size makes this well worth considering.

The German vhf manager, DJ1XK, has resigned and his successor is Karl Weiner, DJ9HO. It is believed that the resignation was due, at least in part, to decisions reported in last month's *VHF/UHF* which would increase fm channels on 144MHz by putting beacons at the lower end of the band.

Guy Gervais, F6CJG, who is the French vhf manager, was scheduled to propose to the vhf managers meeting in Vienna in March the adoption of the "Polish" (SP6XA) scheme for locators. In this version locator BF21J in "European" format which is JN15AQ in "Maidenhead", would become BFAQ in "Polish". The system would be used, if adopted, for terrestrial contacts within Europe; satellites and eme continuing with the Maidenhead version. Guy plans to be operating from Monaco, signing F6REF/3A2 during the weekend 19/20 April, but mainly there to work eme tuning 144·032 to 0·035MHz.

Facsimile transmissions using BBC micro

The illustration shows an interesting picture transmitted on 144MHz fm, modulated by the output from a BBC micro computer and submitted by Malcolm Fry, G6VHI, of Warwick. A screen dump was sent to G4WAE, G6YGX and G0DKR, all of Coventry, who received good copy. Data is transmitted and received using a standard packet hook-up line between the micro's cassette port and the rig's microphone (input) and audio (output) sockets. So far transmission has been at 300 baud only, and at this rate a pix takes about 10min to transmit, so the pa gets rather hot with constant carrier! 1,200 baud would be more acceptable, Malcolm says, but this might require an interface.

An example of a picture transmitted on 144MHz fm using a BBC micro. ***Photo:*** **G6VHI**

Malcolm has authorized me to send copies of the relevant program to those requiring them. Please send me an sae plus another 30p in stamps to cover photocopying, or write to Malcolm, QTHR. He hopes to publish a full article on these techniques in *Radio Communication* eventually. □

Contest News

70MHz CW Contest December 1985 results

Activity was quite good for this event, although generally poor conditions meant that even the leading stations worked only a fairly low percentage of the available contacts. Despite this, many logs contained the question "where were the GI, GM, GU and GJ stations", and others requested that beams be turned more frequently to the areas where activity is expected to be low.

The leading station, GW4MGR/P, operated by G3UVR on behalf of the Wirral & DARC had a convincing lead over the other portable entry, EI2CA/P, who also features as best dx for many stations.

Congratulations and certificates go to both these stations and to G3UKV as leading fixed station.

G3LCH

Posn	Callsign	Pts	QSOs	Loc	Best dx	Kms	Antenna
1	GW4MGR/P	355	46	IO83JA	G3YYF	348	6E/40/1850
2	EI2CA/P	261	20	IO62US	G4VIX	463	6E/10/2020
3	G3UKV	257	37	IO82RR	EI9BG	409	4E/70/185
4	G3TCT	230	36	IO91TG	EI2CA/P	442	5E/30/350
5	G4VIX	182	33	JO0ICN	EI2CA/P	463	5E/30/100
6	G3TCU	169	29	IO91QE	EI2CA/P	426	7E/32/250
7	G3VIP	138	21	IO93XN	GW4HBK	298	4E/46/20
8	G3XWZ/A	109	22	IO93JD	EI2CA/P	310	IE/220/220
9	G3BPM	103	16	IO80OW	EI2CA/P	315	*/18/195
10	G4WVD/A	100	10	IO70NM	G3TCT	327	3E/20/150
12	GW4HBK	58	8	IO81KP	—	—	3E/36/650
13	G4EYD	57	17	IO92AJ	G3VIP	180	4E/30/500
14	G4FOH	54	10	IO92XI	GW4MGR/P	227	5E/24/30
15	G5UM	44	12	IO92MP	G3TCT	147	3E
16	G8LM	39	11	IO92IL	—	—	IE
17	G2DHV	35	7	JO01BK	GW4MGR/P	280	3E/12/150

Checklogs gratefully acknowledged from G3OIC and G4ZFQ
Antenna information: No of elements/ft above ground/ft asl
*50-500MHz log periodic

144MHz Fixed Station and Affiliated Societies Contest results

The changes made to this contest to include an inter-club element were warmly welcomed, and produced twice as many entries as in previous years. Despite the fact that activity levels were very high, with many stations operating in close physical proximity, there were very few bad signal complaints this year. Perhaps this is because the entrants took some trouble to check their equipment beforehand so that they did not cause other members of their own team any problems.

Conditions were fairly average for the contest, with the leaders making slightly fewer contacts than last year's winners, and with the south and east coast stations making numerous contacts into the continent.

Congratulations go to the zonal certificate winners, and particularly to G4ANT and G0BUK as overall winners of the multi- and single-operator sections, and to the Sheppey Western Contest Group who achieved a commanding lead in the AFS table.

Your comments on changes and improvements to the rules would be welcomed, with the aim of continuing to increase participation in this popular event.

Many stations did not supply details of their zone, and some affiliated societies did not provide the information required in the rules. In some cases teams were composed of stations in different zones, and in these cases the zone for team award purposes has been taken to be that of the normal society meeting place.

Checklogs are gratefully acknowledged from G8XTV, RS25429, DG4BE, G6NSY, PE1HLB, PE1EWR, and G4PSU. Disqualified: G0DDJ, G0CNO, G4XEW, G1NRM, G1LKY, G8VGF, G1LSK, G3PVU, G4STO Rule 2a. G4YFQ, G4KDL, G3KJU, G4YFQ, G1OEU, G8VOJ Rule 2b. G0BXO/A Rule 4b. G6PFN Rule 12b.

G3XDY

SINGLE-OPERATOR SECTION

Posn	Callsign	Zone	Score	QSOs	Posn	Callsign	Zone	Score	QSOs
1	G0BUK	C	3,080	327*	26	G1KDF	A	820	130
2	G3NNG	D	3,023	402*	27	GI1JUS	F	795	64
3	G4DCV	C	2,990	304	28	G8LYB		786	173
4	G4ASR	B	2,987	345*	29	G1ICJ	B	764	137
5	G4WFR	C	2,492	265	30	G0CLP	B	751	177
6	G4LUA	C	2,337	208	31	G6GWZ	B	738	146
7	G1FKN	C	2,098	240	32	G2VJ	B	735	172
8	G4MVR	C	1,814	289	33	GM8FFX	G	697	47*
9	G4SHC	A	1,703	257*	34	G6ZMX	D	679	139
10	G6OYL	A	1,598	263	35	G1DOX	A	673	112
11	G4ZKS	C	1,543	185	36	G2LO	C	651	136
12	G4XEN	B	1,425	205	37	G4TBR	D	650	159
13	G3XBY	B	1,348	244	38	G4DFI	C	649	150
14	G4RWO	A	1,327	169	39	G6HYF	B	648	98
15	G4MWD	C	1,229	254	40	G1OHM	B	615	144
16	G0CDA	A	1,228	200	41	G4JLG	A	607	132
17	G1IBM		1,117	210	42	G8SRL	C	603	156
18	G4YFN	D	986	201	43	G1MUR	A	590	119
19	G4HVC		974	193	44	G3YDY		588	140
20	G8TPR	C	973	199	45	G4ULS	B	583	137
21	G6IAT	B	971	190	46	GM4HAM	G	554	58
22	G4EPA		923	208	47	G1ELY		547	98
23	F6FLB		863	106	48	G0ANZ	C	539	99
24	GI6ATZ	F	854	67*	49	G4GTN		531	134
25	G4HLX	D	827	174	50	G1EUU		528	113
51	G8ZRE	A	525	118	112	G4WFK		224	48
52	G4ZVA	A	524	96	113	G1IPO	D	223	66
53	G0CES	A	518	107	114	G2HIF	D	217	60
54	G0DOT	C	514	70	115	G6NUZ	B	215	41
55	G4ZPL	B	512	119	116	G4MYB	A	204	42
56	G1JVQ		507	124	117	G6MXL	D	203	37
57	G4NTY	A	506	132		G4UDZ	C	203	63
	G1GSB	C	506	66	119	G0CUE	D	198	64
59	G1ICB	C	500	98	120	G6MRP	D	190	59
60	G3NPF	C	493	121	121	G8ATK	C	184	88
61	G6NUM		480	105	122	G6NTN	D	176	50
62	G4NVR	B	477	104	123	G1HXC	B	173	57
63	G1OVE		470	77	124	G6AAU	D	172	57
64	G6ZOE	C	458	60	125	GM4DGT		164	23
65	G1FON	D	455	74	126	G6PCX	A	160	36
66	G8CHW	C	449	151	127	G6MKS		159	47
	G8TWH		449	140	128	G4LJR	C	153	37
68	G6HXU		446	100		G1JWR	C	153	33
69	G8VPE	C	444	52	130	G3BFP		148	53
70	G4RPO		442	118	131	G6AOT	B	140	34
71	G1HYY	C	423	59	132	G1PMH	C	138	41
72	G4YME	D	406	117		G3WFM	C	138	54
73	G3GDU	C	403	96	134	G1RKB		133	97
74	G1LGF	C	385	64	135	G4FRS	D	131	51
75	G1JJA	B	376	115	136	G4MFR	C	128	45
76	G1JME		365	95	137	G4GGV		120	35
	G8ZXC		365	103		G1OOB	D	120	40
78	G4WAY		357	126	139	G1KOA	C	111	31
79	G3IZD	A	355	63	140	G6SKU	B	100	28
80	G3ILO		354	70	141	G8CWB		98	32
81	G4CIB	D	353	83	142	G6YMR	D	91	74
82	G8YGD		345	98	143	G2DHV		88	45
83	G1GNZ	A	320	76	144	G4ELE		85	49
	G4OTV		320	100	145	G6TWF		83	41
85	G3KOH	A	312	70	146	G4SBR	B	77	24
86	G1ISZ	D	311	80	147	G3WQG		72	44
87	G3JMB		310	89	148	G3LP	D	67	27
88	G3LRS		309	72	149	GM3ZBE	G	62	6
89	G6BDV		308	98	150	G1JOC		55	20
90	G3YVR	C	291	83		GM3UU	G	55	15
91	G1OGV	C	290	65	152	G4WXC		53	30
92	G3ORX	D	289	69		G0BAI		53	20
93	G6XRD	C	288	80	154	G6RYL	B	48	38
94	G3TWG		286	91	155	G0COO		47	24
95	G3NSY		282	73		G3VCT		47	24
96	G0AYA		277	91	157	G4NYH	B	46	24
97	G8OMI	B	274	72	158	G6IAE	B	45	45
98	G4BPE		273	64	159	G8XYY		38	17
99	G4JDI		269	87	160	G6TQJ	B	37	19
100	G4NVM	C	266	74	161	G4UOE	C	35	28
101	G4FFY		264	88	162	GM8MBP	G	29	11
	G4WBR		259	72	163	G4IVJ	B	28	22
102	G6AFF	D	259	75	164	G6IRW	A	26	16
	G0AOU	A	259	70		G1OSE	C	26	16
105	G1PDW	C	246	49	166	G4NFZ	C	23	21
106	G1GWS	A	243	55	167	G6LKB	A	20	20
107	G6HLL		242	60	168	G6ACM	D	14	12
108	GW0DLW		238	52	169	G6IFA	A	8	6
109	G4YCA	A	229	76	170	G4XYX	D	6	6
110	G8UYD	B	227	63	171	G6BVU		5	5
	G4EOI	C	227	90					

MULTI-OPERATOR SECTION

Posn	Callsign	Zone	Score	QSOs	Posn	Callsign	Zone	Score	QSOs
1	G4ANT	C	4,723	422*	41	G4IJF	C	632	78
2	G4NXO	B	3,588	404*	42	G3ZMS	C	606	128
3	G4SIV		3,442	336	43	G1AHM	A	603	111
4	G4BWG		3,180	438	44	G8ZKE	B	593	148
5	GD4IOM	A	3,134	288*	45	G6WYL	C	582	106
6	G4ZAP	B	2,940	410	46	G3UOA		568	186
7	G3KFT	D	2,884	400*	47	G1ARL		541	141
8	G4WET	B	2,493	379	48	G6YNL	D	521	145
9	G4NUT	D	2,221	323	49	G0BKD		514	169
10	G4GFX	B	2,136	304	50	G8IUD	C	513	97
11	G4TVI		2,050	220	51	G0AKK	C	493	145
12	G3WOI	D	1,951	303	52	G8IUB		465	121
13	G4UGV		1,682	299	53	G4VXS	C	456	68
14	G4MGR		1,518	265	54	G4MWS		454	125
15	G4RFR	D	1,507	191	55	G1PJI	D	434	63
16	G3PIA	D	1,449	246	56	G1NPP	B	427	108
17	G6BBG	B	1,388	242	57	G3GWB		420	123
18	G3VGG	B	1,307	239	58	G4YTQ	B	399	94
19	G3WHK	C	1,222	246	59	G3CDK	C	388	130
20	G1HHH	C	1,215	184	60	GW1NRS	E	387	106
21	G4TDL	D	1,212	222	61	G6JYB	C	367	77
22	G8KPL	A	1,173	163	62	G3ZTT		349	104
23	G3JKF	C	1,126	214	63	G8OLI		346	124
24	G3GRO	C	1,083	185	64	G8TRS		333	92
25	GW2OP	E	1,078	122*	65	G6YPJ		298	59
26	G4NVA		1,032	203	66	G3SDC		292	125
27	G4XBN	B	966	192	67	G0CWC		264	113
28	G6LMU	C	873	192	68	GW4BRS		260	62
29	G8OMR	C	867	194	69	G4GXP		256	99
30	G4TZM	C	842	147	70	G6EEV	D	213	67
31	G4MRQ	B	813	172	71	GW4ZUL	E	209	73
32	G4DKI	C	737	125	72	G8AZC	C	207	82
33	G4YIR	C	736	127	73	G1LVY		199	68
34	G3TAD	D	727	150	74	G1CNT	A	193	57
35	G6GMW	A	708	112	75	G4XFD		173	59
36	G8DCZ	C	690	139	76	GM0CQV	G	167	21*
37	G4WZO		658	108	77	G6PNB	D	135	39
38	G4LKD	C	657	108	78	G8FKP	D	129	69
39	G4WMC	B	633	179	79	G4WCK	D	108	26
	G8NRP	D	633	150					

OVERALL RESULTS

Posn	Affiliated society	Zone	Score	Callsigns used				
1	Sheppey Western CG	B	13,158	G4NXO	G4ASR	G3KFT	G4GFX	G6BBG *
2	Harwell ARS 'A'	D	6,819	G3NNG	G3PIA	G4HLX	G6ZMX	G8NRP *
3	Colchester RA 'A'	C	6,457	G4WFR	G4ZKS	G4TZM	G4DKI	G4YIR *
4	Hastings E & RC	C	5,516	G0BUK	G1HHH	G1ICB	G1OGV	G4NVM
5	Nene Valley RC	B	4,405	G4XEN	G4XBN	G1ICJ	G6GWZ	G4ZPL
6	Norfolk ARC 'A'	C	4,340	G4LUA	G0DOT	G1GSB	G6ZOE	G4VXS
7	South Lakeland ARS	A	3,847	G4RWO	G8KPL	G1DOX	G3IZD	G3KOH *
8	Crawley ARC	C	3,638	G3JKF	G3GRO	G6LMU	G3YVR	G8AZC
9	Five Bells CG		3,498	G4SIV				
10	Isle of Man ARS CG	A	3,152	GD4IOM				
11	Colchester RA 'B'	C	3,017	G4LKD	G4IJF	G6WYL	G0ANZ	G8IUD
12	Derbyshire Hills CG	B	2,940	G4ZAP				
13	Rugby ATS		2,548	G4EPA	G8LYB	G8TWH	G1LVY	G0COO
14	Cray Valley RS	C	2,508	G4MVR	G4DFI			
15	Triple B CG	B	2,493	G4WET				
16	Horsham ARC	C	2,431	G4MWD	G3NPF	G3GDU	G4LJR	G4MFR
17	South Birmingham RS	B	2,339	G3XBY	G1OHM	G1JJA		
18	North Bucks CG	D	2,244	G4NUT				
19	Mayland & D ARS		2,218	G4TVI				
20	Eastbourne E & ARC	C	2,190	G1FKN				
21	South Manchester RC	A	2,178	G4JLG	G1MUR	G4NTY	G0ADU	G4MYB
22	Newbury & D ARS	D	1,951	G3WOI				
23	Sutton & Cheam RS	C	1,861	G3WHK	G3CDK	G4EOT		
24	West Kent ARS		1,830	G4GTN	G4PRO	G8ZXC	G4OTV	G6TWF
25	Newark & D ARC		1,785	G4HVC	G6NUM	G4BPE		
26	Bracknell ARC	D	1,690	G4TDL	G6AFF	G6AAU	G6ACM	
27	Bromsgrove & D ARC	B	1,654	G3VGG	G1HXC	G6SKU	G4NYH	G4IVJ
28	Harwell ARS 'B'	D	1,558	G6YNL	G4YME	G2HIF	G6MRP	G6YMR
29	Chester & D RS	A	1,551	G8ZRE	G0CES	G1GWS	G4YCA	G6IRW
30	Wirral & D ARC		1,526	G4MGR				
31	Flight Refuelling ARS	D	1,513	G4RFR				
32	Surrey Radio Contact C		1,398	G0BKD	G4WAY	G4FFY	G3BFP	G4ELE
33	Grantham RC		1,310	G1EUU	G1JME	G4WFK	G8CWB	G4WXC
34	Gloucester ARS	D	1,230	G4CIB	G1ISZ	G0CUE	G6EEV	G3LP
35	Farnborough & D RS	D	1,207	G8SRL	G1IPO	G8ATK	G4FRS	G4UOE *
36	Pembroke & D ARC	E	1,154	GW2OP				
37	Skegness & D ARS	B	1,080	G6HYF	G6NUZ	G6AOT	G4SBR	
38	Aberdeen ARC	G	1,034	GM8FFX	GM0COV	GM3ZBE	GM3UU	GM8MBP*
39	Mid Cheshire ARS		975	G3ZTT	G6HXU	G4XFD	G6BVU	
40	Grimsby ARS	B	969	G4NVR	G4YTQ	G6RYL	G6IAE	
41	Brighton & D ARS	C	929	G8OMR				
42	Maidenhead & D ARC		845	G3TWG	G0AYA	G4GGV	G3WOG	G3VCT
43	Bristol ARC	D	750	G3TAD				
44	Thornton Cleveleys RS	A	724	G6GMW				
45	Leicester RS		717	G3LRS	G4JDI	G0BAI	G8XYY	
46	Exmoor RC		701	G4WZO				
47	Univ of Aston RS		659	G3UOA				
48	West Mercia CG	B	633	G4WMC				
49	Mid Sussex ARS	C	614	G3ZMS				
50	King Edwards School RS	B	593	G8ZKE				
51	Edinburgh & D RC	G	554	GM4HAM				
52	Univ of Birmingham ARC		484	G8IUB				
53	Northampton RC		467	G3GWB				
54	Cheshunt & D ARC	C	458	G4UDZ	G3WFM	G1KQA		
55	Macclesfield & D RS		454	G4MWS				
56	Leicester Poly SU CG		450	G3SDC				
57	Norfolk ARC 'B'	C	444	G8VPE				
58	Plymouth Poly RC	D	441	G1PJI				
59	Newport ARS	E	433	GW1NRS				
60	Melton Mowbray ARS	B	427	G1NPP				
61	Tamworth ARS		369	G8TRS				
62	Brunel University ARS		349	G8OLI				
63	Poole RAS	D	331	G6MXL	G4WCK	G4XYX		
64	Kidderminster & D ARS		310	G4GXP				
65	Sandwell ARC		288	G0CWC				
66	Barry College of FE		273	GW4BRS				
67	North Bristol ARC	D	135	G6PNB				

* Certificate winners

432MHz Cumulative Contest results

The 1985 cumulatives saw a return to multi-operator entries with a significant increase in the number of entrants. Only one check-log was received, from PE1EWR, and despite last year's comment no swl logs were sent in. How about some next time?

Once again one session (2) provided the majority of points for those in the right place, with some very good dx including OH0 worked by many in the Midlands and North. Unfortunately the southern and western stations were on the edge of the lift. The fourth session was on a Monday and the extra activity helped considerably towards the score of most stations.

Logs were extremely variable, ranging from near perfect, to one that had to be completely rescored due to an unchecked random computer scorer. The new locator obviously gave some people problems due to unfamiliarity with the system—obvious mistakes being overlooked and a total belief in the computer's output. This and unmarked duplicates lost several people many hard-earned points.

Some comments were received about bad signals, but unless the "offending" stations are advised then they can't be expected to remedy the problem. There is evidence in one case that steps were immediately taken to clear the problem once advised of it. So, if you're certain it isn't your receiver, bring it to their attention; then if nothing is done report it in your logs.

Congratulations and certificates go to G4SIV, for once again being the leading fixed station, G8TFI as runner-up having stayed at home, and to GW4MGR/P for winning the all-other section.

G4NBS

ALL OTHER SECTION

Posn	Callsign/P	Loc	Pts	(DbW) Power	Ant	Best dx	Km	Sessions
1	GW4MGR	83JA	4,124	20	2×19	SM4IVE	1,341	2,4,5
2	G4NVA	93AD	2,730	24	2×21	SM4IAZ	1,256	1,2,4
3	G4JZF	92BN	1,703	16	19	OH0NC	1,577	2,4,5
4	GW8ACG	83JF	1,558	20	46Mbm	DC6WG	869	2,4,5
5	GM8MJV	85IS	595	20	2×21	G8FUO	508	3,4,5
6	G6CSY	01BH	576	7	19	LA3VW	979	1,2,4
7	G6ZKI	91KV	92	10	HB9CV	GW4MGR/P	189	3,5

Disqualified: G0AWP/P and G4YTQ/P—late entries, used as checklog
G3CKR/P—General Rule 19

FIXED SECTION

Posn	Callsign	Loc	Pts	(Dbw) Power	Ant	Best dx	Km	Sessions
1	G4SIV	92TR	2,946	24	2×21	OH0NC	1,487	1,2,4
2	G8TFI	81UQ	2,818	26	16	SM6AFM	1,133	1,2,4
3	G4LOJ	02QN	2,616	26	26elQL	SM4IVE	1,144	2,4,5
4	G8OHM	92AJ	2,107	20	24	OH0NC	1,593	2,4,5
5	G8HHI	91OH	1,277	26	2×21	LA6LCA	1,127	2,4,5
6	G8JJR	93KL	1,185	15	48Mbm	OH0NC	1,474	1,2,5
7	G4ULS	82TI	1,028	17	19	SM6FYU	1,075	2,4,5
8	G6UVZ	94FW	833	17	48Mbm	OK1KEI/P	1,245	1,2,5
9	G4TAW	01BI	701	23	19	SM6CMU	1,019	2,4,5
10	G6IAT	91TV	528	17	24Pbm	OZ6CE	823	1,2,5
11	G1KDF	83NN	402	17	19	F1GXB	580	1,4,5
12	G4YFN	91MK	311	14	19	SM0KCR	1,124	1,2,4
13	G4ZNM	00BS	268	18	2×19	G8JHL	347	1,3,4
14	G8MLO	01CL	238	12	19	GW4MGR/P	288	1,3,4
15	G4IDF	82VE	230	10	11	SM6EAN	1,083	2,4,5
16	G6HXU	83RF	192	8	17	G4CQR	302	3,4,5
17	G6PAD	82XK	139	0	19	G4LOJ	232	2,3,5
18	G6ZKI	92DA	135	10	19	G0AWP/P	185	1,2,4
19	G8UYD	93JD	84	10	6elQ	OZ1EYE	780	1,2,5

21MHz CW Contest 1985 results

A very welcome increase in the number of entries compared with 1984. The first two G places being very closely contested. As to be expected, the N-S path helped to place 9J2BO comfortably at the top of the dx operators. A large number of logs were of a very high standard, which made checking a real pleasure. A few stations did not include a country check list and consequently lost points.

The HF Contests Committee wishes to thank the many stations written to in order to verify contacts, enabling us to separate stations in the listings who otherwise would have tied for 2nd, 3rd or 4th place.

Finally, "thank you" for all the comments and anecdotes included with the logs—they certainly brighten up log checking!

G3HCT

DX CONTESTANTS

Posn	Callsign	Points	Posn	Callsign	Points
1	9J2BO*	9,472	32	OK1TW	912
2	LZ1YE*	6,720	33	UW9WB	888
3	UA4PO*	6,510	34	UA4CK	861
4	UH8EA*	6,240	35	UY5TE	840
5	UA3PDW	5,628	36	IK3DNX	828
6	LZ1KOZ	5,544	37	EA2CR	756
7	RW3DW	5,031	38	YU7SF	651
8	3D6AX*	4,860	39	UT5LF	615
9	YU7RA	4,407	40	UW4CN	528
10	LZ2KCS	4,368	41	YO4KCA	513
11	UJ8JA*	3,828	42	OH2EJ	450
12	LZ1NS	3,498	43	LU3EX*	432
13	G6ZY/EA6*	3,036	44	HI8LC*	420
14	NU4Y*	3,024	45	UB4EWE	396
15	YO9AGI	2,970	46	OH5RZ	360
16	UO500	2,850		G4BWP/VP9	360
17	RB5IA	2,820	48	YO5AAT	324
18	N5JJ	2,343	49	DJ9WH	288
19	UA6ED	2,187	50	OH5JD	270
20	YO8DDP	2,160	51	OH9PN	255
21	K3ZO	1,971	52	RV6AA	252
22	UA3XBB	1,800		6Y5HN*	252
23	UB5LF	1,680	54	HP1XKR*	240
24	UB4CWW	1,596	55	LZ1FJ	210
25	UV3DN	1,458	56	UM8MU	180
26	UP2NK	1,392	57	F6API	144
27	RT5UY	1,290	58	SM0KV/0	132
28	LZ2KAC	1,050	59	DF1EI	72
29	RA4HT/UM*	984		UL7TT	72
30	UT5EH	945	61	OK1KZ	60
31	UA3TAM	944			

*Certificate winners

G CONTESTANTS

Posn	Callsign	Points	Posn	Callsign	Points
1	G3LZQ*	28,392	20	GM4EJI	9,108
2	G4AMT*	28,080	21	G4IUF	8,500
3	G3UFY*	26,718	22	G4KGK	7,410
4	G4OTU	25,137	23	G4XRX	6,220
5	GW3YOR	24,402	24	G3ESF	5,632
6	G3PSM	23,961	25	G2AVR	4,675
7	G2QT	22,950	26	G6NK	4,140
8	G3RTE	22,320	27	G3AWR	4,104
9	G4EOF	19,872	28	G4UZN	3,726
10	G3JKS	19,296	29	G4BUO	3,375
11	G3JYP	19,026	30	G3GMM	2,565
12	G3RVM	18,348		G4OOT	1,776
13	G3APN	15,795	32	G0CLT	1,776
14	G4OBK	14,494	33	G4OTV/P	1,276
15	GW3MBP	14,364	34	G4HZF	940
16	G3CCZ	11,514	35	G4HZV	924
17	G3SWH	11,433	36	G3KSH	850
18	G3YEC	11,044	37	G3ILO	690
19	G4ODV	10,815	38	GW4KVJ	480

G QRP CONTESTANTS

Posn	Callsign	Points
1	G4ELZ/P*	12,426
2	G3WKS*	3,960
3	G3NIJ	3,762
4	G4ETJ	2,850
5	G3VMY	2,223
6	G4WKJ	864
7	G8JR	198

DX QRP CONTESTANTS

Posn	Callsign	Points
1	LZ2VP*	2,805
2	YU1OWW*	1,950
3	EA8BIE*	1,431
4	RB5WW	1,350
5	UA9CR	1,344
6	RB5QZ	1,032
7	UC2WAZ	825
8	UB5ECQ	774
9	EA6VQ	72

DX SWL			G SWL		
Posn	Callsign	Points	Posn	Callsign	Points
1	UB5-073-38*	1,752	1	BRS1066*	11,232
2	UT5-187-1*	1,593	2	BRS52868	6,048
3	UA4-148-481	1,539	**Check logs:** G4FDC, G3KZJ, JW0A,		
4	UB5-077-1143	1,053	UP2FF, ZS6ME, NN3SI, KO4D, RA3VO,		
5	UA4-148-363	792	W1SOX, G3BPM, G4UOL		
6	ONL383	117			

*Certificate winners

RSGB 21/28MHz SSB Contest 1985 results

Entries for this event were down by about 30 per cent on last year. This unfortunate relapse in what has always been a popular contest must be due to the poor conditions experienced worldwide. This year's winner, GW4BLE, would have been in seventh place last year, and he has a 28,000 points cushion between him and second placed G3NAS. Despite the conditions some creditable performances were made on 21MHz. Approximately 400 overseas stations gave points to the British Isles representing 85 prefixes and call areas.

Reference to the table will show that 28MHz was poor in the extreme. From the logs it would appear there were two short periods when some contacts were possible, the first from 1000–1130gmt approximately, and another shorter session around 1600gmt. Only 10 overseas logs have claims for contacts, which proves how low conditions were.

It is noticeable that the GW prefix also figures prominently in the multi-operator section. GW4EZW, with eight operators from the Newport ARS, are clear leaders in the only section with an increased entry (one!) on last year.

The receiving members will see that Bob Treacher, BRS32525, has once again taken the Metcalf Trophy plus the Powditch Receiving Trophy for good measure.

The overseas section was well supported by stations in the USSR. UA6LQ found 276 G stations on 21MHz only, to narrowly beat 9H1EL who did manage a few contacts on 28MHz to boost his multipliers. It is interesting to note that 11 out of the first 15 emanate from the U prefix areas.

Briefly, comment must be made (like last year) about unmarked duplicate contacts. These still cause a tremendous loss in points—10 times the contact value times the multiplier total. It seems unbelievable that a log of less than 100 contacts could contain *three* unmarked duplicate contacts. Before anybody writes to the committee, please note that if you score the final table apparent discrepancies may be found in certain results. This is due to deductions being made for errors or unmarked duplicates.

Finally, check logs were received from G4EZA, G4HZA, RT5UO, UA4LCH and UA6KHN for which the adjudicator expresses his thanks to all.

BRS20249

BRITISH ISLES TRANSMITTING—SINGLE OPERATOR

		21MHz		28MHz		Adjudicated
Posn	Callsign	Contacts	Multipliers	Contacts	Multipliers	score
1	GW4BLE†‡	242	67	27	20	70,209
2	G3NAS*	158	61	23	18	42,344
3	G4EOF*	142	52	14	11	29,232
4	GM4TOQ	117	46	8	6	19,292
5	G4IUF	125	45	2	2	17,860
6	G3VOF	118	46	3	2	17,424
7	GW4UZL	95	37	10	6	13,545
8	G2QT	88	41	12	8	13,230
9	G4OTU	98	34	6	3	11,544
10	G4UCR	76	30	19	13	10,965
11	G4PEL	71	30	13	11	10,332
12	G3WBM/A	80	33	3	3	8,964
13	G3UHU	72	28	11	7	8,715
14	GW4HSH	80	34	1	1	8,470
15	G4OBK	80	30	1	1	7,502
16	G4WEY	74	27	2	2	6,612
17	G3LZQ	60	35	1	1	6,588
18	G3YEC	73	27	2	2	6,525
19	G4XRX	74	28	1	1	6,496
20	GM3UTQ	80	26	0	0	6,240
21	G4AMT	61	23	2	2	4,725
22	G4FJT	64	24	0	0	4,608
23	G0CGG/P	59	24	0	0	4,248
24	G3UKH	46	15	0	0	2,070
25	G4PCI	45	13	1	1	1,932
26	GM3ULG	39	16	0	0	1,872
27	G3MGW	33	17	1	1	1,836
	G3OLU	32	16	2	2	1,836
29	G4ZFE	41	14	0	0	1,708
30	G3WKS	36	14	0	0	1,512
31	G3ZGA	35	13	0	0	1,365
32	G3CCZ	31	14	0	0	1,302
33	G6QQ	27	14	0	0	1,134
34	G4XTM	27	7	0	0	567
35	G4SDZ	21	8	0	0	504
36	G4LZZ	5	3	0	0	45
37	G3ILO	3	3	0	0	27

† Whitworth Trophy winner
‡ Powditch Trophy winner
* Certificate winner

BRITISH TRANSMITTING—MULTI-OPERATOR

		21MHz		28MHz		Adjudicated
Posn	Callsign	Contacts	Multipliers	Contacts	Multipliers	score
1	GW4EZW*	184	60	4	4	35,904
2	G3CSA	163	61	0	0	29,585
3	G3BZU	159	53	11	3	28,448
4	GW4RIB	138	46	10	6	21,424
5	G4NLZ	111	44	4	3	16,215
6	G3EFX/P	109	37	8	3	12,840
7	G6HH	89	34	4	2	10,008
8	G4ATH/A	92	32	0	0	8,832
9	G3MCN	91	28	0	0	7,616
10	G6OI	75	26	2	2	6,468
11	G4GXP	67	26	3	3	6,090
12	G4SVV/P	71	30	7	7	5,328
	G8CA/A	72	22	2	2	5,328
14	G4ORC/A	39	13	1	1	1,680

BRITISH ISLES RECEIVING

		21MHz		28MHz		Adjudicated
Posn	Callsign	Contacts	Multipliers	Contacts	Multipliers	score
1	BRS32525†‡	83	43	7	6	13,132
2	BRS26407*	66	36	7	4	8,640
3	BRS28198*	42	22	5	5	3,780
4	BRS20249	18	13	0	0	702

† Metcalf Trophy winner
‡ Powditch Receiving Trophy winner
* Certificate winner

OVERSEAS TRANSMITTING—MULTI-OPERATOR

		21MHz		28MHz		Adjudicated
Posn	Callsign	Contacts	Multipliers	Contacts	Multipliers	score
1	UZ4WWB*	150	15	0	0	6,735
2	UZ6LWT	53	11	0	0	1,738
3	IK2GSN	35	7	0	0	735
4	UJ9JWI	24	10	0	0	710
5	UM9MWO	8	3	0	0	72

OVERSEAS RECEIVING

		21MHz		28MHz		Adjudicated
Posn	Callsign	Contacts	Multipliers	Contacts	Multipliers	score
1	UA3-157-796*	60	15	0	0	2,700
2	UA3-121-1518*	54	16	0	0	2,592
3	LZ1L73*	32	15	3	3	1,890
4	UA3-170-528	39	11	0	0	1,287
5	UB5-073-2845	36	9	0	0	972
6	UL7-026-586	19	8	0	0	456
7	OH1-111	18	7	0	0	378
8	ONL383	16	7	0	0	336
9	HE9QRZ	20	5	0	0	300
10	UA2-125-894	12	4	0	0	144
11	OK1-20897	9	4	0	0	108
12	UA9-154-4	8	4	0	0	96
13	UA0-124-190	5	3	0	0	45

OVERSEAS TRANSMITTING—SINGLE OPERATOR

		21MHz		28MHz		Adjudicated
Posn	Callsign	Contacts	Multipliers	Contacts	Multipliers	score
1	UA6LQ*	276	22	0	0	18,194
2	9H1EL*	240	19	11	5	18,000
3	UZ4FWO*	264	20	1	1	16,443
4	UA4PO	261	19	0	0	14,877
5	UV6LC	244	24	0	0	13,968
6	RB7GA*	197	23	0	0	13,593
7	9H1GI	235	19	0	0	13,395
8	9J2BO*	224	15	5	4	13,034
9	UH8EA*	207	20	0	0	12,380
10	RW3DW	148	18	0	0	7,992
11	RB5II	162	15	0	0	7,290
12	UA6LLT	109	20	0	0	6,520
13	EA8TE*	120	9	29	5	6,258
14	UW3EQ	129	15	0	0	5,805
15	RB5IA	110	15	0	0	4,950
16	LZ1KBL*	92	16	0	0	4,416
17	YO9HT*	105	14	0	0	4,410
18	LZ1YE	87	16	0	0	4,176
19	RB5OW	82	15	0	0	3,675
20	UA6LMT	105	11	0	0	3,465
21	UA3TN	95	12	0	0	3,420
22	LU6DWA*	83	13	0	0	3,237
23	RB5EG	78	13	0	0	3,042
24	UB4CWW	77	13	0	0	3,003
25	HA8XX*	47	7	20	5	2,412
26	RW4CA	72	11	0	0	2,376
27	YO8DDP	64	12	0	0	2,304
28	UY5TE	76	10	0	0	2,280
29	K2EK*	64	11	0	0	2,112
30	RB5EX	68	10	0	0	2,040
31	ZC4AK*	76	8	0	0	1,808
32	UZ3DXW	61	9	0	0	1,647
33	3D6AK*	58	9	0	0	1,566
34	JG1FVZ/5N25*	52	8	0	0	1,248
35	YO4KAY	41	10	0	0	1,230
36	CX6BBY*	38	7	6	2	1,188
37	IK2AEQ*	42	8	0	0	1,008
38	UB4JB	41	8	0	0	984
	UV3DN	41	8	0	0	984
40	IK2AVH	45	7	0	0	945
41	YU1OWW*	29	8	2	2	930
42	A4XYX*	31	9	0	0	837
43	OK2XA*	30	9	0	0	810
44	ZS6KU*	35	7	0	0	735
45	LZ1BJ	26	9	0	0	702
46	OK1DKS	29	8	0	0	696
47	YU2CRM	2	1	31	6	686
48	IV3ANH	21	8	0	0	504
49	VK6IR*	23	7	0	0	476
50	UA3PB	26	6	0	0	468
51	OK3ZWX	13	6	4	3	450
52	UA9FM	21	7	0	0	441
53	HA4XX	15	6	2	2	408
54	UB4LZJ	20	6	0	0	354
55	OK1KZ	23	5	0	0	345
56	KJ4EX	16	6	0	0	270
57	OK1TW	15	6	0	0	258
58	EA4KK	16	5	0	0	240
	UM8MU	16	5	0	0	240
60	G6ZY/EA6	12	6	0	0	216
61	RB5QZ	11	6	0	0	198
62	K3ZO	14	5	0	0	195
63	UJ8JMM	12	5	0	0	175
64	UA9CR	10	4	0	0	120
65	PA3DJC	7	5	0	0	105
66	UA6XT	6	5	0	0	90
67	PA0KDM	3	3	0	0	27

*Certificate winners

G T Peck Memorial Trophy DF Event

Date. 13 April 1986
Map. OS Sheet 175 1:50,000 series, Reading and Windsor
Assembly. 1300bst for start at 1320bst
Location. Peppard Common NGR 709818

Competitors requiring tea should notify Mr C Boyce, 228 Totteridge Road, High Wycombe, Bucks HP13 7LF (Tel 0494 33647) not later than 6 April 1986.

D F Qualifying Event—Oxford

Date. 27 April 1986
Map. OS Sheet 164 1:50,000 series, Oxford
Assembly. 1300bst for start at 1320bst
Location. Shotover Plain NGR 572059. Please approach from the east.

Competitors requiring tea should notify Mr P Bradley, 60 Weyland Road, Headington, Oxford OX3 8PD (Tel 0865 61808) not later than 20 April 1985.

Details of rules for RSGB Topband DF events may be obtained from: E L Mollart, G6AGE, 17 Spinfield Mount, Marlow, Bucks SL7 2JU.

April 70MHz & SWL Contest rules

0900-1500gmt 20 April 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 other stations, and an swl section. QTH information must be exchanged in accordance with general rule 13.

All entries and check logs to: VHF Contests Committee, c/o G M C Stone, G3FZL, 11 Liphook Crescent, Forest Hill, London SE23 3BN.

1·3GHz Trophy Contest rules

1600-2400gmt 31 May 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 other stations. QTH information need not be exchanged. The VHF Contests Committee Cup will be awarded to the station with the highest overall score in the contest.

All entries and check logs to: VHF Contests Committee, c/o D A Yorke, G4JLG, 40 Edge Fold Road, Worsley, Manchester M28 4QF.

432MHz Trophy and SWL Contest rules

0900-1700gmt 1 June 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 other stations, and an swl section. QTH information need not be exchanged. The 1951 Council Cup will be awarded to the station with the highest overall score in the contest.

All entries and check logs to: VHF Contests Committee, c/o D A Yorke, G4JLG, 40 Edge Fold Road, Worsley, Manchester M28 4QF.

VHF NFD 1986 rules

As an experiment, 2·3GHz is included in this year's VHF NFD, but is combined with 1·3GHz for scoring purposes. Comments on this would be welcomed.

Stations wishing to take part in this year's VHF NFD must register their site by 2 June at the latest, see rule 2. SWL entries will be very welcome and will count towards the VHF Listener's Championship.

The general rules published in the "Operating Guide" supplement, *Rad Com* January 1986 will apply, except as modified by these rules.

1. Duration. 1400gmt 5 July 1986 to 1400gmt 6 July 1986.

2. Site notification. Each group intending to compete must send details of the site to be used to: VHF Contests Committee, c/o J H Quarmby, G3XDY, 12 Chestnut Close, Rushmere St Andrew, Ipswich IP5 7ED, to arrive no later than 2 June 1986. The details required are: the name and address of the person responsible for the entry; the name of the group; the callsigns to be used on each band; the section (open or restricted); the locator and national grid reference of the site; and sufficient access information for an inspector to locate the site (preferably a sketch map). A stamped addressed postcard should be included if confirmation of receipt is required.

3. Bands. Up to four separate stations can be used, operating on the 70,144,432,1,296MHz and 2,320MHz bands. Single-band entries for 144MHz will not be accepted. Only one station can score or give points on each band. On 70MHz stations must use cw only during the period 1400-2200gmt, phone only during the period 0600-1400gmt, and close-down between 2200-0600gmt. The same callsign must be used on 1·3GHz and 2·3GHz, with no simultaneous operation on these two bands.

4. Operators. Any RSGB member or group of members operating from the British Isles (excluding Eire) may enter. Groups operating from the same site may combine their scores subject to rules 3 and 5.

5. Stations. All the stations forming one entry must operate from within a circle of 1km radius centred on the operating position of any of the stations. All equipment, including antennas, must be installed on site not more than 24h before the contest, and the site must not be used by the entrant for transmitting activities during the five days prior to the contest. Only portable accommodation can be used to house the stations. Power for all equipment must be derived from an on-site generator or battery. The public mains supply may not be used.

6. Scoring. Contacts will be scored by the radial-ring system. Scores from the two 70MHz sessions will be added to give the final 70MHz score. Scores on 1·3GHz and 2·3GHz will be added together to give a final microwave score. The overall score will be determined as per general rule 10 using the final 70MHz, 144MHz, 432MHz, and microwave scores.

7. Contest exchanges.

(a) On 70MHz the contest exchange must include the QTH, given in a different form in each session. Serial numbers start from 001 in each session, and one scoring contact can be made with a given station in each session.

(b) On 144, 432, 1,296, and 2,320MHz, QTH information need not be exchanged. One scoring contact can be made with any given station on each band.

(c) Contacts with stations whose callsigns appear on any of the group's cover sheets will not count for points.

8. Sections. There will be two sections:

(R) Restricted section:

(i) The power output on any band must not exceed 25W p.e.p. at the transmitter.

(ii) The height of any antenna must not exceed 10m above ground level.

(iii) Only one antenna per band may be used (eg no stacked, bayed or colinear arrays, or switching between two or more antennas). A slot fed Yagi or Quad antenna is permitted. Dish or Backfire antennas must not exceed 2m diameter.

(O) Open section: as per licence.

9. Inspections. All stations are subject to inspection by members of the VHF Contests Committee or nominated representatives. Should the inspector be unable to locate site due to inadequate or incorrect information, the entry will be disallowed. In the event of a last minute change it is the responsibility of the group to make suitable arrangements for the inspector to find the site. The inspector must be given immediate access to all parts of the site with the right to stay as long as desired, and the ability to return at any time during the contest.

10. Entries.

(a) All entries must be postmarked no later than 28 July 1986.

(b) Entries must be addressed to: VHF Contests Committee, c/o J H Quarmby, G3XDY, 12 Chestnut Close, Rushmere St Andrew, Ipswich IP5 7ED.

11. Awards. The Surrey Trophy will be awarded to the overall winner of the open section, the Arthur Watts Trophy to the overall winner of the restricted section, the Tartan Trophy to the leading Scottish entry, and certificates will be awarded to the winners and runners up on all bands in each section, and to the leading stations in each country.

Contests Calendar

1 Jan-31 Dec	UBA SWL *(Rules in December* SWL News)
1 April	BATC April Fools Fiesta *(Details G6IQM)*
5, 6 April	SP DX *(Rules in March HF)*
6 April	432MHz CW *(Rules in February issue)*
13 April	Ropoco 1 *(Rules in March issue)*
13 April	GT Peck Memorial Trophy DF Event *(Details in this issue)*
20 April	70MHz and SWL *(Rules in April issue)*
20 April	Low Power Fixed *(Rules in February issue)*
26, 27 April	Helvetia *(Rules in April* HF)
27 April	DF Qualifying Event, Oxford *(Details in this issue)*
May-Sept	Microwave Cumulatives *(Rules in March issue)*
May-Sept	10GHz Cumulatives *(Rules in March issue)*
1 May	AGCW-DL QRP/QRP Party *(Rules in March QRP)*
3, 4 May	432MHz-24GHz *(Rules in March issue)*
5 May	BATC Mayday Microwave *(Details G6IQM)*
10, 11 May	Peace to the World *(Rules in April* HF)
17, 18 May	144MHz and SWL *(Rules in March issue)*
18 May	DF Qualifying Event, Chelmsford/Colchester
18 May	Region Round-up *(Rules in March issue)*
31 May	1·3GHz Trophy *(Rules in April 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
28, 29 June	Summer 1·8MHz
29 June	DF Qualifying Event, Dartford Heath
5, 6 July	VHF NFD and SWL *(Rules in April issue)*
5, 6 July	BATC Summer Fun *(Details G6IQM)*
12, 13 July	HF SWL
13 July	DF Qualifying Event, South Manchester
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
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
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
9 November	BATC Autumn Vision (Detials G6 IQM)
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

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 **June** issue should reach them by **12 April** and for the **July** issue by **10 May.**

Club programmes are given in order of date, subject, time and place of meeting. All callsigns of club secretaries and other contacts are QTHR (correct in the current *RSGB Call Book*) unless otherwise stated.

All clubs welcome visitors and would be pleased to hear from potential new members.

REGION 1—RR B Donn, G3XSN, 7 Thurne Way, Liverpool L25 4SQ. Tel 051-722 3644.

Ainsdale (AARC)—8 April (Natter night in lounge), 22 April ("Traction supplies", G4SBE). 8pm. The Carlton Hotel, Lord St, Southport. Sec G4YYV, tel Southport 79825.

Barnoldswick (Rolls-Royce ARC)—2 April (Talk by G3ATH), 7 May (Foxhunt). 8pm. Rolls-Royce Sports & Social Club, Barnoldswick. Sec G4ILG, tel 0282 812288. **NB** The Rally, 3 August 1986, Sports & Social Club. Free entrance and car park.

Barrow (South Lakeland ARS)—3 April (Club night), 17 April ("Musical synthesis", G6YIT). 8pm. Norweb Sports & Social Club, rear of Ormsgill Hotel. Sec G6LKB, tel 0229 54982.

Burnley (B&DARC)—Meetings alternate Mondays, 7pm. The Adult Education Centre, School Lane, Burnley. RAE and morse classes each week. Sec G0BQC, tel 0282 39765.

Bury (BRS)—8 April ("Fibre-optic transmissions", G4KLT). 8pm. The Mosses Youth & Community Centre, Cecil St, Bury. Details G0CUK, tel Bolton 706191.

Chester (C&DRS)—8 April ("Power supplies", G3EON), 15 April ("Oscillators", G3SES), 22 April ("Introduction to microwaves", Mike Dixon, G3PFR), 29 April (Your questions answered). Morse classes, 7.15pm. Main meeting, 8pm. Chester RUFC, Hare Lane, Vicars Cross, Chester. Details G6IFA, tel 336639.

Crewe (South Cheshire ARS)—14 April (Talk on Amsat and Oscar 10). 8pm. **NB** new QTH Crewe LMR Sports Club, Goddard Street, Crewe. Details G1PUV.

Fylde (FARS)—1 April ("Building a simple receiver", G3AEP). 15 April (Informal with morse). 7.45pm. The Kite Club, Blackpool Airport. Sec G8GG, tel 725717.

Liverpool (L&DARS)—1 April (AF 57?), 8 April (CEPO), 15 April (Jim Rennie, G3XCP), 22 April (MM), 29 April (G4GHS talks on his USA trip). 8pm. The Churchill Conservative Club, Church Rd, Liverpool 15. Sec G1EXJ, tel 051-728 8811. The society also holds morse and RAE classes starting 7pm as above.

Macclesfield (M&DRS)—1 April (Shack night), 5/6 April (Coach trip to NEC), 6 April (432MHz CW Contest participation), 8 April (Visit by B Donn, G3XSN, RSGB Region 1 representative), 15 April (Committee meeting and shack night), 20 April (3·5 and 7MHz Low Power Fixed Contest participation), 22 April (Manchester Airport Control Tower tour), 29 April (Talk by G0DMU, tba), 4 May (WAB LF Phone Contest). 8pm. The Fermain Club, Oxford Rd, Macclesfield. Sec G1NUS, tel 0625 24534.

Manchester (Trafford ARC)—17 April ("Valves & antique rigs", Peter Kirsop). 8pm. TS de Trafford, The Sea Cadet Corps, Bradshaw Lane, Stretford, Manchester. **NB** new premises. Sec tel 061-748 9804.

Manchester (West MRC)—Wednesdays, 8pm. Astley & Tyldesley Miners Welfare, Meanley Rd, Gin Pit Village, Astley, Tyldesley, Nr Manchester. **NB** 17 August, Red Rose Rally, Haydock Park Racecourse. 23 November, Mobile Rally, Pembroke Halls, Walkden, Gt Manchester. Details G1IOO or evenings 0204 24104.

Maryport (The Solway RC)—Meetings every Wednesday night at Maryport Educational Settlement, High St, Maryport. Contact G0AFP, tel Cockermouth 826461.

Sale (South Manchester RC)—4 April (Mystery lecture by G8TYY), 11 April ("Antennas", G2JT), 18 April (Homebuilt equipment contest), 28 April ("Using and abusing the 4CX250B", G4FRX), 2 May (Club project courtesy of G4AOU). 8pm. Sale Moor Community Centre, Norris Rd, Sale. Sec G3WFT, tel 061-973 1837.

Skelmersdale (S&DARC)—3 April (Club project), 10 April ("Tech Tips", G6HXL), 17 April (Club project), 24 April ("Tanks a lot", G1OKW). 8pm. The Beacon Park Centre, Dalton Lane, Skelmersdale. Contact G4ZPY, tel 0704 894299.

Southport Raynet (G1SRG)—First Wednesday of each month, 8pm. Carlton Hotel, Lord St, Southport. Group controller G4RQX, tel 25172.

Stockport (SRS)—9 April (TBA), 16 April (Informal), 23 April (Natter night). 8pm. The Magnet Inn, Wellington Rd (A6), Stockport. Sec G4FFW, tel 061-224 7880.

Thornton Cleveleys (TCARS)—7 April (Lowe Electronics—talk and demonstration of equipment), 14 April (Informal/club on air), 21 April ("Legal aspects of amateur radio", G1MET), 28 April (Informal/club on air), 5 May (Bank Holiday —no meeting). 7.45pm. 1st Norbreck Scout HQ, Carr Rd, off Fleetwood Rd, Bispham, Blackpool. Sec G4BFH, tel 0253 853554. New morse classes now running, tutor G3ZRZ.

Warrington (WARC)—1 April (AGM), 8 April ("Raynet/Cares", G8NRF), 15 April ("Amateur tv", G6AWD), 22 April (Annual quiz competition versus Bury ARC with tv and 144MHz links). 7.30pm. Grapenhall Community Centre, Bell House Lane, Warrington. Details G Wood, tel 0925 8420.

Wigan (Douglas Valley ARS)—17 April ("Amateur radio on a shoestring", Rev Dobbs, Admission by ticket only from G4GWG, tel Wigan 211397). 8.30pm. Shevington Conservative Club, Shevington, Wigan. Sec G4XMG.

Wirral (WARS)—2 April ("Principle of prevention and extinguishing fire", G6MRG), 16 April ("Workshop practices", G3PYU), 7 May ("RSGB affairs", Bert Donn, G3XSN, Region 1 representative). 8pm. The Clubroom, Ivy Farm, Arrowe Park. Sec G3VEB.

Wirral (W&DARC)—9 April (Talk on skydiving), 23 April (St George's Day night on the air, with callsign GB2WDC). 8pm. Irby Cricket Club, Mill Hill Rd, Irby. Details G6CGJ, tel 051-677 7376.

This year I have arranged to visit the following clubs: Ratec, Leyland 100, Macclesfield & DRS, Isle of Man ARS, Wirral ARC, Morecambe Bay ARS, Carlisle ARS and Bolton & DARS. *RR1.*

REGION 2—RR P R Sheppard, G4EJP, 9 Elvington Crescent, Leconfield, Beverley, N Humberside HU17 7LX. Tel 0401 50397.

Goole (GR & ES, G8HSG)—4 April (Natter night), 11 April (HF operating evening), 18 April (DF evening), 25 April (Constructors' Trophy evening). 7.30pm. The Pavilion, West Park, Details G6REL.

Halifax (H & DARS, G2UG)—15 April ("Radio in the RNSCC", G4SCC). 7.30pm. The Running Man PH, Pellon Lane. Details G0DLM, tel 0422 202306.

Hull (H & DARS, G3AMW)—4 April ("Basic antenna Pt 2", G3RDM), 11 April (Quiz, round 5 with G0DMP), 18 April ("Technical video", G4VSP), 25 April (Spring used-equipment sale), 2 May (Natter night). The Clubroom, Walton St. **NB** new sec, G0DMP.

Leconfield (RCT ARS, G4GGD)—3 April (Contest equipment review), 10 April (The cw QSO), 17 April (Wine as a hobby), 24 April (The phone QSO), 8 May (Contest working), 7.30pm. Normandy Barracks. **NB** new sec G4SMB, tel 0401 51200. Morse classes each Thursday.

Leeds (L & DARS, G4LAD)—21 April (Life with a guide dog). Yarnbury Rugby Club, Brownberrie Lane. Details G1EBS, tel 0274 665355.

Maltby (MARS, G4SKM)—4 April (AGM), 11 April ("Amateur tv", G6OYL). 7.30pm. **NB** new venue, The Community Hall, Clifford Way, Hellaby. Details G3ZHI, tel 0709 814911.

Mexborough (M & DARS, G4BTS)—Fridays, Harrop Hall, Dolcliff Rd. Details G1BJB, tel 0709 586239.

North Wakefield (NWRC, G4NOK)—3 April ("Slow scan", G4FBA), 10 April (On the air), 17 April (Natter night), 24 April (Monthly meeting), 1 May ("Crime prevention", Morley CPO). 8pm. White Horse PH, Fall Lane, East Ardsley. Details G4RCH, tel 0532 536633.

Pontefract (P & DARS, G3FYQ)—3 April (Committee meeting), 4 April (Ceildih), 10 April (Visit to British Telecom), 17 April (Raynet group agm), 24 April (Project evening). Carleton Community Centre. Details G0AAO, tel 0977 43101.

Ripon (R & DARS, G4SJM)—Thursdays, 7.30pm. St John Ambulance Hall, North Rd. Details Liz Bulman, The Lodge, Lister House, Sharrow.

Sheffield (SARC)—7 April ("UHF propagation", G1JAJ). Firth Clock Tower. Details BRS86758, tel 0742 581766.

Spen Valley (SVARS, G3SVC)—3 April (Prelim agm), 17 April (AGM), 1 May ("Amateur radio from a different world", G4GJV). Old Bank WMC, Mirfield. Details G4PHR, tel 0924 499397.

Todmorden (T & DARS)—7 April (Talk by UK Atomic Energy Authority), 21 April (Informal chat night). Queen Hotel. Details G1GZB, tel 070681 7572.

UK FM Group (Northern)—6 April (Visit by RR2, G4EJP), 4 May (Monthly meeting). Royal Hotel, Barnsley. Details G4UNA.

White Rose (WRARS, G3XEP)—2 April (Video satellite comms). Moortown RUFC, Moss Valley, Kings Lane. Details G6NIZ.

York (YARS, G3HWW)—18 April (Homebrew night). United Services Club. Details G3WVO.

REGION 3—RR G Ross, G8MWR, 81 Ringwood Highway, Coventry CV2 2GT. Tel 0203 616941.

Atherstone (ARC)—14 April ("POW camp radio", G3BA), 28 April ("Amtor", G3WHO). Sixth Form College, Long St, Atherstone. Sec G6YQV, tel Chapel End 393518.

Bromsgrove (BARS)—8 April (Surplus sale), 22 April (Open meeting). 8pm. Hundred House, Stourbridge Rd, Bromsgrove. Sec G4LVK.

Coventry (CARS)—4 April (VHF NFD), 11 April ("Operating techniques", G3BA), 18 April (Night on the air), 25 April (144MHz df contest). 8pm. 121 St Nicholas St, Radford, Coventry. Sec G4JDO, tel 73999.

Dudley (DARC)—24 April ("Back garden antennas", G3BA). 7.45pm. Allied Centre, Greenman Alley, Tower St, Dudley. Sec G4NRA, tel 0384 278300.

The president of the Halifax & D ARS, Arthur Wood, G3XG, (L) presenting an engraved tankard to the Rev Hubert-Makin, G4FDC, a founder member of the society, in appreciation of his services to amateur radio, having taught RAE courses at the local college since 1950

Halesowen (MEB RC)—8 April ("AR in S Africa", G4UFM), 22 April (AGM). 8pm. MEB Social Club, Mucklow Hill, Halesowen. Sec G4RWH, tel 021-747 8784.
Hereford (HARS)—4 April (Construction contest), 18 April (Informal evening). 8pm. Civil Defence HQ, Goal St, Hereford. Sec G3WRQ, tel 0432 54064.
Kidderminster (KARC)—1 April ("Radio regulations", G4PZA), 9 April (Committee meeting), 15 April (Night on the air), 29 April ("Amtor", G3WHO). 8pm. Vice-President's Club, Harriers FB Ground, Hoo Rd, Kidderminster. Sec G8WOX, tel 0562 751584.
Midland (MARS)—15 April ("50 years of amateur radio", G3BA). Unit 5, Henstead Hse, Henstead St (off Bromsgrove St). Sec G8BHE, tel 021-422 9787.
Moorlands (MARS)—24 April (AGM). Ex-Service Centre, Bank St, Cheadle. Sec G4OUG, tel 0538 756323.
Redditch (RARC)—10 April (Morse practice), 24 April (Natter night). 8pm. WRVS Centre, Ludlow Rd, Redditch. Sec G3EVT, tel 0789 762041.
Solihull (SARS)—17 April ("Transmission lines", G3NXC). The Shirley Centre, Stratford Rd, Shirley. Sec G8AYY, tel 021-783 2996.
Stone (Brit Tel ARS)—1 April ("Anything might happen"), 8 April (Activity night), 15 April ("50MHz operation", G8SXL), 24 April (Foxhunt). 7.30pm. The College. Sec G8ATB, tel 0785 762593.
Stratford-u-Avon (SuA ARC)—14 April (Electronic building blocks), 28 April ("SWR", G3PGQ). 7.30pm. Baptist Church, Payton St, Stratford-u-Avon. Sec G8OVC, tel 750584.
Sutton Coldfield (SCRS)—14 April (Field-day discussion), 28 April ("Fault-finding", G4BCN) 7.30pm. Public Library, Sainsbury Centre, Sutton Coldfield. Sec G4MFN, tel Tamworth 282360.
Wolverhampton (WARS)—1 April (Discussion night), 8 April ("Home computing", G3KQJ), 12 April (Open evening), 15 April (Visit to Eddystone Radio), 22 April (Committee meeting), 27 April (144MHz df hunt), 29 April (Night on the air). 8pm. Electricity Sports Club, St Marks Rd, Chapel Ash, Wolverhampton. Sec K Jenkinson, tel 0902 24870.
Worcester (WARC)—7 April (Construction contest), 16 April (Natter night). 8pm. Oddfellows Club, New St, Worcester. Sec G4RBD.

REGION 4—RR M Shardlow, G3SZJ, 19 Portreath Drive, Darley Abbey DE3 2BJ. Tel Derby (0332) 556875.

Derby (DADARS)—2 April (Junk sale), 9 April ("Meteor scatter", G4UIG), 16 April (Technical topics), 23 April (Video show), 30 April ("Enamelling", B Neil), 7 May (Junk sale). 7.30pm. 119 Green Lane, Derby. Sec G4EYM, tel 556875.
Leicester (LRS)—7 April (VHF contest seminar), 14 April (Activity night), 21 April (Constructors' Contest), 28 April ("Equipment for 1,296MHz and above", G8LMW), 5 May (Activity night). 7.30pm. Gilroes Cottage, Groby Rd, Leicester. Sec G4PDZ, tel 0533 871086. Sunday meetings have been cancelled.
Lincoln (LSWC)—2 April (Activity night), 6 April (Committee meeting), 9 April (So you want to build a shack?), 16 April (Activity night), 23 April ("HF antennas", G4OO), 30 April (Activity night). 4 May (Committee night). 8pm. City Engineers Club, Waterside South, Lincoln. Sec G4STO, tel Gainsborough 788356.
Melton Mowbray (MMARS)—18 April (Construction Contest). 7.30pm. St John Ambulance Hall, Asfordby Hill, Melton Mowbray. Sec G3NVK, tel 63369.
Nottingham (ARCON)—3 April (AGM), 10 April (10GHz update), 17 April (Night on the air), 24 April (Packet radio), 1 May (23cm talk). 7.30pm. Woodthorpe House, Mansfield Rd, Sherwood, Nottingham. Sec G4JAE, tel 232604.
Worksop (WARS)—8 April ("VHF then and now", and "The RSGB awards system", G5UM). 7.30pm. The Maltkins, Gateford Rd, Worksop. Sec G4ZUN, tel Worksop 486614.

REGION 5—RR J S Allen, G3DOT, 77 Rosslyn Crescent, Luton LU3 2AT. Tel 0582 508515 or at work on 0582 21151.

Daventry (DARC)—This club is looking for new premises, but in the meantime meetings are being held on the first Thursday of each month at the Raynet Control Centre. April meeting (QRP demonstration). The sec has now passed his morse test and his new callsign is G0DPA.
Dunstable (D Downs RC)—11 April ("Spectrum checklog program demo", G3XJO), 25 April (DF hunt). 8pm. Meeting Room 3, Chews House, High Street South, Dunstable. Sec G6EES, tel Dunstable 607623.
Milton Keynes (MK&DARC)—14 April (SWL activity night). Sec G3ZPA, tel 501310.
Nene Valley (NVRC)—NB new venue, Prince of Wales PH, Well St, Finedon, Northants. Sec G6UWS, tel Wellingborough 71189.
Northampton (NRC)—3 April. (Construction evening judging, G3VMU), 10 April (VHF contest—how it all went. Contest Committee), 17 April, ("Microwaves", G8MWR). Sec G4YJP.
Peterborough (P R&EC)—4 April, (Junk sale, Scout Hut, Occupation Rd, Peterborough. Talk-in S22, 7-8pm. Traders, light refreshments), 14 April (Satellite tv, Q & A session, Werrington District Library, Staniland Way, Werrington, Peterborough). 16 May (DF hunt, meet at Brook St, 7.30pm). Sec G4PNW.
Shefford (S&DARS)—10 April (RSGB interference forum), 24 April (Computer communication). Sec G4PSO, tel Hitchin 57946.
Wisbech (W&DAR&EC)—NB new venue, Astral Hse, Old Market, Wisbech, Cambs.

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.
Oxford (RAFARS)—Third Wednesday, odd numbered months. Monthly net 3,710kHz ssb, 11.30am, second Sunday of each month. 14 May (Visit to London Air Traffic Control Office. All attending please advise G0BDG, tel 0491 37452). Civil Service Club, Marston Rd, Oxford. Details G6ZH, tel 0491 651259.
Oxford (O&DARS)—The society's agm was held on 22 January 1986. Election results as follows: president, Robin Pierce-Boby, G3JLE; chairman, Philip Edwards, G6MKK; hon sec, Cyril H May, G4PUU; program sec, Philip Edwards, G6MKK; committee, G4KSQ, G8PX, G8IB, G4SQI, G4GKL; junior committee, G1OBS; auditor, Barry Crook, G4AZM. Club meetings, second and fourth Wednesday in each month, 7.45pm. Civil Service Club, Marston Rd, Oxford. Details G4PUU, tel 52859.
Reading (RADAC)—Please contact new sec G6BOX.
Slough (Burnham Beeches RC)—7 April (TBC), 21 April (Power supplies), 3/4/5 May (Spring dx picnic). 8pm. Haymill Youth & Community Centre, 112 Burnham Lane, Slough. Details G6EIL, tel Maidenhead 25720. **NB** McMichael '86 Mobile Rally, 20 July.

REGION 7—RR R Sykes, G3NFV, 16 The Ridgeway, Fetcham, Leatherhead, Surrey KT22 9AZ. Tel 0372 372587.

Ashford (Echelford ARS)—14 April (AGM), 24 April ("Receiver parameters", G3MCK). 8pm. The Hall, St Martin's Court, Kingston Crescent, Ashford, Middx. Sec G4VAZ, tel Sunbury 83823.
Bexleyheath (North Kent RS)—15 April (AGM). 8pm. The Pop-in Parlour, Graham Rd, Bexleyheath. Sec G6CUE tel 01-309 7214.
Cray Valley (CVRS)—17 April (AGM), 1 May (Surprise evening, G3XMD). 8pm. Progress Hall, Admiral Seymour Rd, Eltham SE9. Details G3TAA.
Croydon (SRCC)—7 April (AGM). 8pm. TS Terra Nova, 34 The Waldrons, South Croydon, Surrey. Sec G8IYS, tel 01-657 0454.
Crystal Palace (CP&DRS)—19 April ("Solar cycle 21", G2FKZ). 8pm. All Saints Parish Room, Upper Norwood SE19. Sec G3FZL, tel 01-699 6940.
Redhill (RATS)—15 April (AGM). 8pm. Constitutional & Conservative Club, Warwick Rd, Redhill. Sec G8JXV.
Sutton and Cheam (S&CRS)—18 April ("The 50MHz band", G5KW). 8pm. Downs Lawn Tennis Club, Holland Ave, Cheam, Surrey. Sec G4BOX.
Thames Ditton (TVARTS)—1 April (Surplus equipment auction), 6 May ("EMC", G3AEZ). 8pm. Thames Ditton Library, Watts Rd, Giggs Hill, Thames Ditton. Sec G3ENI.
Wimbledon (W&DRS)—11 April ("Electric shock", G3ESH), 25 April ("Solar cycle 21", G2FKZ). 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.

Crawley (CARC)—23 April ("Antennas", G3TNO). 7.30pm. **NB** new venue, Crawley Leisure Centre, Haslett Ave, Crawley. Sec G4IQM. tel 882641.
Eastbourne (Southdown ARS)—5 April (Activity weekend, to celebrate anniversary of clubroom opening), 7 April ("Linear amplifiers", Ken Willis, G8VR), 5 May (Foxhunt with HERC). Mondays, 7.30pm, Chaseley Home, South Cliff. Tuesdays and Fridays, 7pm. Hailsham Leisure Centre, Vicarage Lane, Hailsham. Sec G4XNL, tel 638653.
Gillingham (Bredhurst R&TS)—3 April ("Active filters", G4EGH), 17 April ("Repeaters", lecture by KRG). 8pm. Parkwood Community Centre, Parkwood Green, Rainham, Gillingham. Sec G4ZTF, tel Medway 374670.
Hastings (HERC)—16 April (Junk auction). 7.45pm. West Hill Community Centre. Sec G4NVQ, tel 420608.
Horsham (HARC)—3 April ("Mechanical tv", G3PVH), 1 May ("Data basis", G3IEE). 7.30pm. Guide HQ, Denne Rd, Horsham. Sec G4YFY.
Maidstone (MYMCAARS)—4 April ("Chassis bashing", G3REM), 18 April ("Contest operating", G3ORP). 8.30pm. YMCA Sports Centre. Melrose Close, Cripple St, Maidstone. Sec G4AXD, tel 0622 29462. RAE classes 11 and 25 April, 8.30pm.
Swanley (Darenth Valley RS)—Wednesdays, twice monthly, 8pm. Crockenhill Village Hall, Nr Swanley. **NB** new sec, L F W Thomas, tel 0322 63368.
Tunbridge Wells (West Kent ARS)—18 April (AGM), 2 May (Construction contest). 8pm. Adult Education Centre, Annex, Quarry Rd, Tunbridge Wells. Sec G4KIU, tel 33586.

REGION 9—RR A H Hammett, Rosehill, Ladock, Truro, Cornwall TR2 4PQ. Tel 0726-882 758.

Cornwall Raynet—Keith Harding, G3XFL, has been elected as county controller. The Truro area group controller's post is now vacant.
Cornwall (Mid-Cornwall Beacon and Repeater Group)—GB3NC and GB3HB are now both operational from the new site.
Plymouth (PARC)—7 April ("The RSGB and future events", G3VWK). 7.30pm. Plymouth Albion RFC, Beacon Park, Peverell, Plymouth. Sec G4SCA, tel 0752 337980.
Redruth (CRAC)—3 April (AGM), 14 April (Computer section, speech and music on the computer), 21 April (Constructors evening), 1 May (General meeting). 7.30pm. Treleigh Church Hall, Treleigh, Old Bypass, Redruth. Assist sec G4RVP.
Saltash (S&DRC)—4 April ("The history of the internal combustion engine", E T Barwell-Jones), 18 April (Visit to place of interest, details tba), 2 May ("DX tv", an illustrated talk, R Roper). 7.30pm. Burraton Toc H Hall, Warraton Rd, Saltash. Sec G0AKH.
Torbay (TARS)—26 April (AGM). 7.30pm. ECC Social Club, Highweek, Newton Abbott. Sec M K Waite.

REGION 10—E J Case*, GW4HWR, 2 Abbey Close, Tyrhiw, Taffswel, Mid-Glam. CF4 7RS tel 0222 810368.

*Acting until post is filled.
Abergavenny (A&NHARC)—3 April (Video night). This will be repeated every first Thursday in each month. Morse classes every week on club nights. The club is a registered examination centre for the RAE in May 1986. 7.30pm. Pen-Y-Fal Hospital. Sec GW4XQH, tel 0873 4655.
Cardiff (CRSGBG)—14 April (The first of a series of four lectures on antennas. Lecture 1, "Fundamentals", GW6MNC). 7.30pm. Pantmawr Hotel, Tyla Teg, Pantmawr Estate, Whitchurch, Cardiff. Sec GW0CUM, tel Cowbridge 3212.
Cardiff (S E Wales Repeater Group)—A new group operating GB3SG, 432MHz, and GB3VG, 1·3MHz repeaters. 13 April (AGM). 2.30pm. Eastern, Cyncoed. Details GW6CUR, tel 0222 488722.
Llanelli (LARS)—Meeting dates given in January issue were incorrect. Second and fourth Mondays in each month. 14 April (AGM). 7.30pm. Next RAE course commences 18 August, first lesson 24 August. Fee £6.50. Current pass rate is 95.58 per cent. All meetings at DDA Hall, Albert St, Llanelli. Contact GW1MGW, 1 Maestir, Felinfoel, Llanelli SA15 3NS.
Pembroke (P&DRAC)—This club is celebrating its 25th anniversary by awarding a certificate to any amateur radio station that works the club callsign GW2OP, GW2OP/A plus five members of the club on any band, commencing 1 April 1986. The event will run for one year. Meetings last Friday in the month, 7.30pm and a mid-monthly meeting, Sunday, 2pm. Defencible Barracks, Pembroke Dock. Sec D J Workman, GW6EHC, 103 High St, Pembroke Dock, Dyfed SA72 6PE. Tel Pembroke 686532.
Rhondda (PARC)—3 April (Clubs get together) 17 April (Meeting/natter night), 1 May (Noise bridge talk, GW4NOS). 7.30pm. National Union of Mineworkers' Club, Tonypandy. Sec GW4BUZ, tel Tonypandy 432542.

REGION 11—RR B H Green, GW2FLZ, 1 Clwyd Court, Tan-y-Bryn Road, Colwyn Bay, Clwyd LL28 4AH. Tel 0492 49288.

Bangor (Dragon ARC)—First and third Monday of each month. Bangor Rugby Clubhouse. **NB** new sec Mr W Williams, 31 Ty Groes Estate, Llanfair PG, Anglesey, Gwynedd LL61 5JR.

Colwyn Bay (Conwy Valley ARC, GW6TM)—10 April (Talk by Dr D Last), 24 April (Open meeting), 15 May (Foxhunt). 8pm. Green Lawns Hotel, Bay View Rd, Colwyn Bay. Sec GW4VVW, tel 0492 636376.

Deeside (Alyn & DARS)—7 April (Indoor df hunt), 14 April (AGM), 28 April (Open meeting). 8pm. Shotton Social Club, Shotton Lane, Deeside. Sec GW1ILZ.

Dolgellau. (Meiron) ARS)—3 April (Meeting), 1 May (Meeting). **NB** new sec GW3KOR.

Holyhead (H & DARS)—13 April (Quiz and social visit by Bangor Radio Club), 27 April (Lecture by the section officer of the local Coastguard). 11 May ("Construction", lecture and demonstration, GW4WLZ). 8pm. Foresters Arms, Kingsland, Holyhead. Sec B Anziani, 12 London Rd, Holyhead. Tel 0407 50577.

Porthmadog (P & DARS)—18-20 April (Special event station to commemorate the 150th anniversary of the Ffestiniog Railway), 15 May (Ladies night). 8pm. Harbour Cafe, Ffestiniog Railway, Porthmadog. Sec GW4WKQ, tel 0758 740445.

Rhyl (R & DARC, GW4ARC)—7 April (Activity night), 21 April (TBA), 5 May (No meeting). 7.30pm. 2nd Rhyl Scout HQ, Vale Rd, Rhyl. Sec GW8OYT, tel 0745 37284.

Wrexham (WARC)—2 April (DF hunt on 144MHz), 16 April (Visit to British Aerospace; meet at 6.55pm by security gate. Number restricted to 25 over 14yrs of age). 7pm. Friends Meeting House, Holt Rd, Wrexham, Clwyd. Sec G4HRH, tel 0948 5161.

REGION 12—RR M R Hobson, GM8KPH, 17 Well Brae, Pitlochry, Perthshire PH16 5HH. Tel 0796 2140

Aberdeen (ARC)—4 April (Junk sale), 11 April ("Getting set" concrete techniques etc, GM0CQV), 18 April ("Keeping it up", GM0CQV), 25 April (How to fix your tv), 2 May (Junk stall). 7.30pm. 35 Thistle Lane, Aberdeen. Sec GM4GXD, tel Pitcaple 251.

Dundee (Kingsway Tech ARC)—No meetings on the 1 and 8 April as the college is closed. 29 April (Antennas for dx—video), 13 May (Aurora—the cause, part 1). 7.30pm. Kingsway Tech Annex, Grayham St, Dundee. Sec GM4WEQ, tel 0382 552362. The homebrew section will meet on alternate Tuesdays.

Raynet—The annual Raynet Symposium is being held on 3 May, Strathspey Hotel, Aviemore Centre, at 10am. The theme will be communications and co-ordination, and the speakers include Geof Griffiths, Raynet Committee chairman. Details GM3RFA, tel 0397 3833.

REGION 13—RR A J Scott, 2 Manderston Grove, Duns, Berwickshire TD11 3PP. Tel 0361 83221.

Border (BARS, GM0BRS)—4 April (Visit to RAF Boulmer—Air Sea Rescue), 18 April ("SSTV—weather sat", GM8JFE). 7.30pm. Tweedview Hotel, Berwick. Sec GM1IRN, tel 0289 82491.

Dunfermline (DRS, GM3IDS)—3, 10, 17, 24 April (Meeting). 7.30pm. Club QTH, Knockhill by Dunfermline. Contact GM4WYR, tel 0383 736401.

Galashiels (GM3YEQ)—9 April, ("Satellites", GM0BPY), 23 April ("Computing", S Hastie). 7.30pm. Focus Centre, Galashiels. Sec GM0AMB, tel 0896 55569.

Glenrothes (GM4GRC/GM3ULG)—2, 11, 18, 20, 23, 30 April (Meeting). 7.30pm. Club QTH, Provosts Land, Leslie, Fife. Details GM4TNP, tel 0592 755958. Club is also busy planning for the Scottish Convention '86, provisionally set for 13 September.

Kelso (KARS, GM4KHS)—7, 14, 21, 28 April (Operating nights). Abbey Centre QTH. Sec GM3VLB, tel 0573 24664. Also planning for 3rd Anglo Scottish Rally, Sunday 4 May, Kelso.

Leith (L Nautical College AR/Electronics Club, GM4AXG)—Tuesdays (Construction evenings). 5-7pm. Room T2-4. Details GM4SGB, 24 Milton Road East, Edinburgh. This club is open to past/present students and staff.

Lothians (GM3HAM)—9 April (DF construction competition/rig checking), 23 April (HF/vhf operating night, courtesy of GM4BYF). 7.30pm. Harwell House Hotel, Ettrick Rd, Edinburgh. Sec GM4YPL, tel 0506 890177.

Scottish Borders Repeater Group (SBRG GB3BT, GB3SB, GB3HK)—13 April (AGM). 2.30pm. Focus Centre, Galashiels. Sec GM4BDJ, tel 0541 80018.

REGION 14—RR T G Wylie, GM4FDM, 3 Kings Crescent, Elderslie, Strathclyde PA5 9AB. Tel Johnstone (0505) 22749.

Glasgow (WOSARS)—4 April ("Hoy there", illustrated talk on an expedition to Orkney, GM4NUN), 18 April ("Regional roundup", GM4FDM, Region 14 representative). Details GM0DZP, tel 776 2814.

Motherwell (MLARS)—11 April ("Data communications", GM8BBA). 7.30pm. Wrangholm Hall Community Centre, Jerviston St, Motherwell. CW and RAE classes. Details GM4UXX, tel 0698 350926.

Stirling (SADARS)—13 April (Stirling University Rag Week, special event station). 7.30pm. The Argyll Centre, Princes St, Stirling. Details GM0BFS, tel 0259 217702. RAE and cw classes each Tuesday.

Regional event, Region 14 Workshop '86—Sunday 13 April between 12.30 and 5pm, Wrangholm Hall Community Centre, Jerviston St, Motherwell. An afternoon with GM4IHJ, GM3OXX, GM3HAT and GM4NUN. Lectures, demonstrations, RSGB information stand and bookstall. Details GM4FDM *RR14*

REGION 15—R R Parsons, GI3HXV, 45 Erinvale Avenue, Belfast BT10 0FP Tel 0232 612322.

Ballyclare (E Antrim ARC, GI4KKK)—8 April (AGM). 8pm. Fairview Primary School, Ballyclare. Sec GI4PRH.

Bangor (B&DARS, GI3XRQ)—4 April (A talk by the DTI Radio Interference Service). 8pm. Royal Hotel, Bangor. Sec GI4OCK.

Belfast (RSGB Group)—22 April (Meeting). 8pm. 90 Belmont Rd, Belfast. AR GI6ATZ.

Enniskillen (Lough Erne ARC)—13 April (Mobile rally—Killyhevlin Hotel). 8pm. Railway Hotel, Enniskillen. Sec GI4CZW.

Londonderry (North-West of Ireland ARC, GI3CFH)—7 April (Inter-club quiz). 8pm. Prehen Municipal Boathouse, Victoria Rd, Londonderry. Sec GI4OUN.

REGION 16—RR A Owen, G4HMF, 102 Constable Road, Ipswich, Suffolk IP4 2XA. Tel 0473 51319.

Braintree (B&DARS)—7 April (Arrow Electronics), 21 April (TBA). 7.30pm. The Community Centre, Victoria Rd, Braintree (next to bus station). Contact G6THE, tel 0376 25587.

Bury St Edmunds (BStEARS)—NB changes. Third Tuesday in each month, 8pm. Westgate Primary School (off Hospital Rd), Bury St Edmunds. Sec G1FUU, tel 0358 50271.

Chelmsford (CARS)—1 April (Early days of Marconi). 7.30pm. Marconi College, Arbour Lane, Chelmsford. Sec G4KQE, tel 0376 83094.

Colchester (CRA)—17 April ("The story of broadcasting, 1919-26", J Stanley Wood), 1 May (Planning for NFD and rally). 7.30pm. Colchester Institute, Sheepen Rd, Colchester. Sec G3FIJ, tel 0206 851189.

Felixstowe (F&DARS)—7 April (Social), 21 April (10-pin bowling), 5 May ("Fibre-optics", G4DDK). 8pm. The Feathers PH, Walton High St, Felixstowe. Sec G4YQC, tel 0473 642595.

Ipswich (IRC)—9 and 23 April (TBA). 8pm. Rose and Crown PH, Norwich Rd, Ipswich. Sec G4IFF, tel 0473 44047.

Leiston (LARC)—1 April ("EME", K6LEW), 6 May (Visit to Parham Air Museum). 7.30pm. Sizewell Sports & Social Club, Georges Ave, Leiston. Sec G0CJX.

Loughton (L&DARS)—11 April (AGM), 25 April (Informal). 8pm. Loughton Hall, Rectory Lane, Loughton. Sec G6LWR, tel 0279 29457.

Norwich (Norfolk ARS)— 2 April (AGM), 9 April ("Technical topics", G3PTB), 16 April (Visit to Fire Service), 23 April (Technical topics), 30 April (AGM of GB3NB Group), 7 May (RSGB videos). 8pm. Valley Drive Community Centre, 79 Plumstead Rd, Norwich. Sec G4WTR, tel 0603 610874.

Vange (VARS)—3 April (Junk sale) 10 April (Films), 17 April (Construction contest), 24 April (G3ASH, Talk) 1 May (Junk sale). 8pm. Barnstaple Community Centre, Basildon. Sec Mrs D Thompson, 11 Feering Row, Basildon SS14 1TE.

REGION 17—RR T Emery, Wilverley, Old Lyndhurst Road, Cadnam, Southampton SO4 2NL. Tel 0703 812435

Amateur Radio and Computer Club (AMRAC)—4 April ("Weather satellites", G4NWP), 2 May (AGM). 8pm. The Crown, Bishops Waltham, Hants. Sec G1NIM, tel 0705 381062.

Basingstoke (BARC)—7 April ("Propagation", G3LTP). Forest Ring Community Centre, Sycamore Way, Basingstoke. Sec G4WIZ, tel Tadley 5185.

Eastleigh (Itchen Valley ARS)—11 April ("The weather", G3LTP), 25 April (Junk sale). The Scout Hut, Brickfield Lane, Chandlers Ford, Hants. Sec G6DIA, tel 0703 863039.

Fareham (F&DARS)—2, 16, 23 April (Natter nights), 9 April ("How to predict lift conditions", G8VOI), 23 April "The Termitg", G4ITG). 7.30pm. Portchester Community Centre, Portchester, Hants. Sec G4ITG, tel Fareham 234904.

Farnborough (F&DARS)—9 April (Bring and buy sale), 23 April ("Weather satellites", G8ATK and G3RRA). Railway Enthusiasts Club, Access Rd, off Hawley Lane, Farnborough. PRO G4SBU.

Guernsey (GARS)—11 April ("VHF/UHF high power amplifiers", GU6EFB), 25 April ("The GU3GU repeater project", GU4EON). The Lodge, La Corbinerie, Oberlands, St Martins, Guernsey. Sec GU1PMY, tel 0481 26392.

Liphook (Three Counties ARC)—2 April ("The solar system", B States), 16 April ("Direction finding", G2FIX), 30 April (AGM). The Railway Hotel, Liphook. Sec G0BTU, tel Petersfield 66489.

Lymington—Results of recent agm: chairman G5IK; treasurer G2HCG; secretary, G2AIV. Tel Lymington (Hants) 72844.

Poole (PARS)—25 April (AGM), 7.30pm. Commander's House, Constitution Hill Rd, Poole. **NB** change of meeting place. Sec G4XYX.

Swindon (S&DARC)—3 April ("Buying of used radio equipment", G4LVK), 10, 24 April (Natter nights), 17 April ("POW radio on the Burma Road", G3BA). 7.30pm. Oakfield School, Marlowe Ave, Swindon. Sec G4YQZ.

Waterside (WSWC)—8 April (Natter night), 22 April (AGM). Fawley & Blackfield Community Centre, Blackfield, Southampton. Sec G1KMY.

Weymouth (SDARC)—1 April (AGM). 7.30pm. Army Bridging School, Wyke Regis. Sec G6HKD.

Winchester (WARC)—18 April ("Satellite tv", G3WPI). 7.30pm. **NB** change of venue and day of meeting, third Friday, Durngate Hse, Winchester. Sec G4ZNO, tel 0703 772191.

I am now very short of advance programming information. Please help me to help your club—even if only to report you are still active. Dates by which information should reach me are printed at the beginning of "Club News". *RR17.*

REGION 18—RR Ian Gibbs, G4GWB, 61 The Gables, Widdrington, Morpeth NE61 5QZ Tel 0670 790090

Berwick (Borders ARS, G0BRS)—4 April (Visit to RAF Boulmer), 18 April ("Slow scan tv and wx satellites", GM8JFE and GM3WIG), 2 May (Collection and arrangements for Kelso Rally), 4 May (Kelso Rally). Tweed View Hotel, Tweed St, Berwick. Sec GM1IRN, tel 0289 82491.

Consett (Derwentside ARS, G4PFQ)—7 April (All you ever wanted to know about the gdo), 14 April (Natter night), 21 April ("Top band, yesterday and today", ex-GD3EGF), 28 April (Natter night and morse and RAE tuition), 12 May ("Amateur radio in Antarctica", G4BCP). Consett Assocn FB Club, Belle Vue Park, Consett. Sec G3KMG, tel 0207 504198.

Easington (EARS, G4APN/G6APN)—24 April (Video evening). Easington Workmen's Club, Seaside Lane, Easington, Sec G4RIK, tel 0783 815331.

Whitley Bay (Tynside ARS, G3ZQM)—2 April (Informal), 9 April ("Converting cb rigs for 28MHz", G4AZB, also foxhunt briefing, G0DZB), 13 April (Sunday foxhunt), 16 April (AGM), 23 April (Forward planning, general discussion), 30 April (Activities evening, constructional projects, demos, club station etc). Community Centre, Earsdon. Details G4ILW.

REGION 19—RR R J C Broadbent, G3AAJ, 94 Herongate Road, Wanstead Park London E12 5EQ. Tel 01-989 6741.

Barking (BR&ES)—Mondays, RAE class and slow morse practice. Tuesdays, morse class. Thursdays, club natter night and talks. Westbury Recreation Centre, Westbury School, Ripple Rd, Barking. **NB** new sec T Marston, 57 Suffolk Rd, Barking, Essex, tel 01-594 0291

Boreham Wood (BEARS)—Third Monday of each month. 21 April. ("Dxpedition to Lundy Is",). Talk by Nene Valley ARS. 8pm. The Wellington, Theobold St, Boreham Wood, Herts. Sec G0DDJ, tel 01-207 3809.

Cheshunt (CDARC)—2 April (TBA), 9 April (Natter night), 16 April (Chairman's lecture), 23 April (Natter night), 30 April (Brains trust). 7.45 for 8pm. Church Rooms, Church Lane, Wormley, Herts. Sec G4VMR and G4VSL, tel 0920 84250 evenings. Morse classes are also held.

Chiswick (ABCARC)—10 April (Current affairs discussion). 7.30pm. Chiswick Town Hall, High Rd, Chiswick, London W4. Sec G3GEH, tel 01-992 3778.

Edgware (E&DRS)—10 April ("Clandestine radio", Pat Hawker, G3VA), 24 April (Informal round table discussion). 8pm. Watling Community Centre, 145 Orange Hill Rd, Burnt Oak, Edgware. Details G4SYI, tel 958 9869.

Harrow (RSH)—4 April (Activity night), 11 April (Inmarsat), 18 April (Activity night), 25 April (SSTV, rtty and others). The Roxeth Room, Harrow Arts Centre, High Rd, Harrow Weald, Middlesex. Pub Off. Details G8XBZ, tel Rickmansworth 779942. Talk-in on GB3HR.

London (Civil Service ARS)—7 April (AGM, 12.30pm). Chair/station manager, B Treacher, tel 01-212 8823, or sec G6IMM, tel 01-698 4437.

St Albans (Verulam ARC)—8 April (Activity night), 22 April ("LF antennas and sunspot minimum", G3BDQ). 7.45 for 8pm. RAFA HQ, New Kent Rd, St Albans. Details G Wimpenny, 30 Faircross Way, St Albans, tel 52003. PRO G4DUS, tel 0923 720616.

Southgate (SARC)—10 April (Surplus equipment sale, junk sale). **NB** new venue Holy Trinity Hall, Green Lanes, Winchmore Hill, London N12. Please contact PRO R F Snary, 12 Borden Ave, Enfield, Middlx.

SW Herts UHF Group—This group maintains GB3HR (RB14) now located at Stanmore, Middlx, and welcomes monitary support. All donations from users and others will be gratefully received by G3WCB, or G3THQ.

Stevenage (SDARS)—1 April (Report on Giotto by Pilot), 15 April (Film evening). SITEC Ltd, Ridgemond Rd, Telford Park, Stevenage. Sec G4ISO.

I have waited until the very last minute before writing this months notes to enable club secs to update their programmes and send them to me. Will committee members bring to the attention of their secretary the dates that publicity material must reach me in order to be published in "Club News". The London RSGB Group is now defunct. I am informed by the committee who wound up the affairs of this long established group that all monies in the bank account have been sent to the RAIBC. *RR19.*

REGION 20—N F O'Brien* G3LP, 26 Southfield Road, Gloucester GL4 9UD. Tel 0452 34890

*Acting until post is filled.

Bath (B&DARC)—2 April (Open night), 16 April (AGM). 7.45pm. Englishcome Inn, Englishcombe Lane, Bath. Details G6EIY, tel 0225 318128 or G3FIH, tel 0225 837539. Club station G4TMH regularly operating.

Bristol (BARC)—2 April (Specialist video), 9 April (Club management meeting), 16 April (Night on the air), 23 April (Computer night), 30 April (TBA). 7.30pm. YMCA, Park Rd, Kingswood, Bristol. Details G4YOC, tel Bitton 4116.

Bristol (RSGBG)—28 April ("G-QRP Club", G4LQF). 7.30pm. Small Lecture Theatre, Bristol University. Details G4SQQ, tel 0272 508451, or G4ROX, tel 0272 513573.

Bristol (South Bristol ARC)—2 April ("CW in a foreign language", G4WUB), 9 April ("Microwave activity night", G8BDZ), 16 April ("Start of club vhf/uhf dx contest", G4KUQ), 23 April ("Report on expansion of club facilities", G4RZY), 30 April ("Crime prevention", Avon & Som Police), 7 May ("Simple hf antenna construction"). 7.30pm. Whitchurch Folk House, East Dundry Rd, Whitchurch, Bristol BS14 0LN. Details G4RZY, tel Whitchurch 834282.

Gloucester (GARS)—2 April (Construction contest), 9, 16, 23, 30 April (Natter nights), 7 May (Medical talk "Does amateur radio give you a pain in the back?"). 7.30pm. St John Ambulance HQ, Heathville Rd, Gloucester. Details G6AWT. RAE and morse classes every Wednesday, 7pm.

Yeovil (Y&DARC)—3 April ("j notation", G3MYM), 10 April ("The lambda diode oscillator", M3MYM), 17 April (AGM), 24 April (Natter night), 1 May ("Fading and fade-out", G3MYM). 7.30pm. Recreation Centre, Chilton Grove, Yeovil. Sec G3GC, tel 0935 75533.

Weston-Super-Mare (WSMRS)—14 April (Visit to British Telecom International's Burnham Radio Station, Highbridge. Rugby Club, 7.15pm. Prior arrangements with sec). Full details G1DJW, tel 514429.

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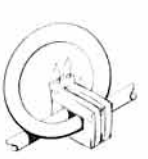

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Completely updated with 50% more information. Covering 2-30? This publication is a must for all UK short wave listeners. It contains information that no serious listener should be without. Listed are details not normally available to the public of frequencies used by a wide range of services. As well as some general information the main body of the publication contains a comprehensive list of non-broadcast stations such as Military, Air, Navy, Marine & Embassy, even details of stations whose whereabouts are still a mystery! In addition, there is a comprehensive list of broadcast stations with times and frequencies of all the broadcasts in English. This publication will certainly have you burining the midnight oil. Only a fraction of the price of some overseas publications and written with the UK listener in mind.

New third edition available April **£5.95 + 40p P&P**

SCANNER OPERATORS' GUIDE TO THE VHF/UHF SPECTRUM **NEW!**

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**

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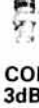

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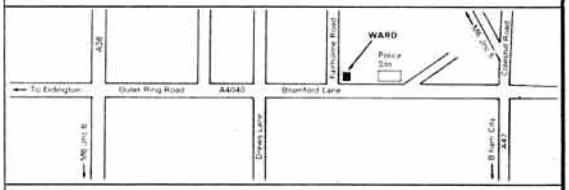

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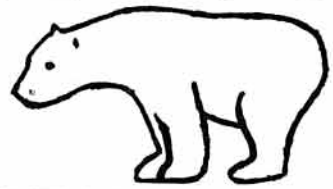

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WHAT DO YOU GET IN A HOWES KIT?
All our kits contain a good quality fibre-glass PCB which has its holes drilled, its tracks tinned, and its parts locations screen printed on it for easy assembly. All board mounted components are supplied, as are full, clear instructions, parts list, circuit diagram etc. You do not have to be an "old hand" at construction to enjoy the pleasures of home brew equipment with one of our kits. Many would be constructors have chosen a HOWES kit as a first project, and found that not only was it enjoyable, it was successful too! Choose yourself a worthwhile project from our expanding range! The kits are also available as ready assembled modules if you prefer.

HOWES QRP EQUIPMENT

If you listen around the QRP frequencies on 80M you will almost certainly know of the existence of C. M. HOWES COMMUNICATIONS! Hundreds of people are on the air with our CTX80 transmitter. Many are using it as part of a transceiver in conjunction with our DcRx 80 receiver and CVF80 VFO. If you have gained the impression that you can't work much at these power levels, you should take a look at some of our customer's log books! Far more than just the odd one or two have worked twenty or thirty countries in the first couple of weeks on the air. I could hardly believe the USA call areas one customer listed as worked in under a week! QRP is certainly a satisfying challenge. Using our kits, you could build a super little rig for holiday and portable use, as well as for fun of QRP operating from the home station.

HOWES CTX QRP CW TRANSMITTERS

Two versions are available, one for 80M, and one for 40M. One crystal is included, but there is space for two more on the PCB. The CVF VFOs can be used for full band coverage. Output power is adjustable up to about 5W on 80M and 3W on 40M. The design includes key-click suppression, and a five element low-pass output filter. The note is excellent.

CTX Kit: £12.95
Assembled PCB Module: £18.95

HOWES DcRx DIRECT CONVERSION RECEIVERS

The DcRx is a single band receiver, versions are available for 20 or 30M, 40, 80 and 160M. These receivers come with ready-wound coils and are very straightforward to build. They provide up to 1W of audio to drive a loudspeaker or headphones. A case and two tuning capacitors are the only major parts you need to add to finish your receiver. We have suitable tuning capacitors for all but the 160M version (approx. 50pF) at £1.50 each. Modes: SSB and CW.

DcRx Kit: £14.80
Assembled PCB Module: £19.90

HOWES CVF 40 or 80M VFOs

These fully featured VFOs have dual buffered outputs, and can drive both the DcRx and CTX to form a transceiver. Features include a stable FET oscillator, onboard voltage regulator, IRT (clarifier). A suitable tuning capacitor is available at £1.50.

CVF40 or 80 Kit: £9.30
Assembled PCB Module: £14.90

HOWES HC220—use your 2M rig on 20M!

Your 2M SSB/CW rig is magically transformed into an HF rig with the HC220! There is a good 10W of RF output from miss-match proof transistors, and the receive sensititivity and signal handling of the balanced mixer is good too. If you are competent with a soldering iron, you should be able to build this transverter. You don't need any fancy test equipment to align it, broadband techniques and fixed value filters help make this easy-HF mobile becomes feasible for anyone who can squeeze a 2M rig under the dash! Plus it's great for home station use too. I find it great fun to work all over the world with an FT290!

- ★ .5 to 5W (adjustable) of 2M drive for full output.
- ★ RF or PTT switched.
- ★ 13.8 Volt DC operation.
- ★ 14.0 to 14.35MHz tunes as 144.0 to 144.35MHz on 2M.
- ★ No modifications to the 2M transceiver.

HC220 Kit: £48.90
Assembled PCB Module: £79.90

HOWES TRF3 SHORTWAVE BROADCAST RECEIVER

The HOWES TRF3 kit has been designed to bring the pleasures of a home built receiver within the reach of the newcomer, as well as the experienced constructor. It is simple and easy to build, covering 5.7 to 12.8MHz in three bands with a 50pF tuning capacitor (available at £1.50). In the early days of radio, all radios were TRFs, unless they were crystal sets! An ancient concept has been brought up to date with the TRF3, but it still provides the old thrill of hearing far away stations on a home built set!

- ★ Up to 2W of audio output.
- ★ Can operate with a large or small antenna due to switchable input impedance and attenuator.
- ★ Operates from 9 to 14V DC at approx 15mA quiescent.
- ★ Band and input selector switches included.
- ★ 7 pages of documentation.

This kit is designed to be educational, as well as good fun. The documentation includes a "how it works" explanation, in addition to the full, clear instructions etc. Use of the receiver, once it has been built is also an education! Comparing the news and political output of the various countries is fascinating! An excellent little project that appeals to the old timers as well as the newcomer.

HOWES TRF3 Kit: £13.90
Assembled PCB Module: £18.90

SOME OTHER HOWES PRODUCTS

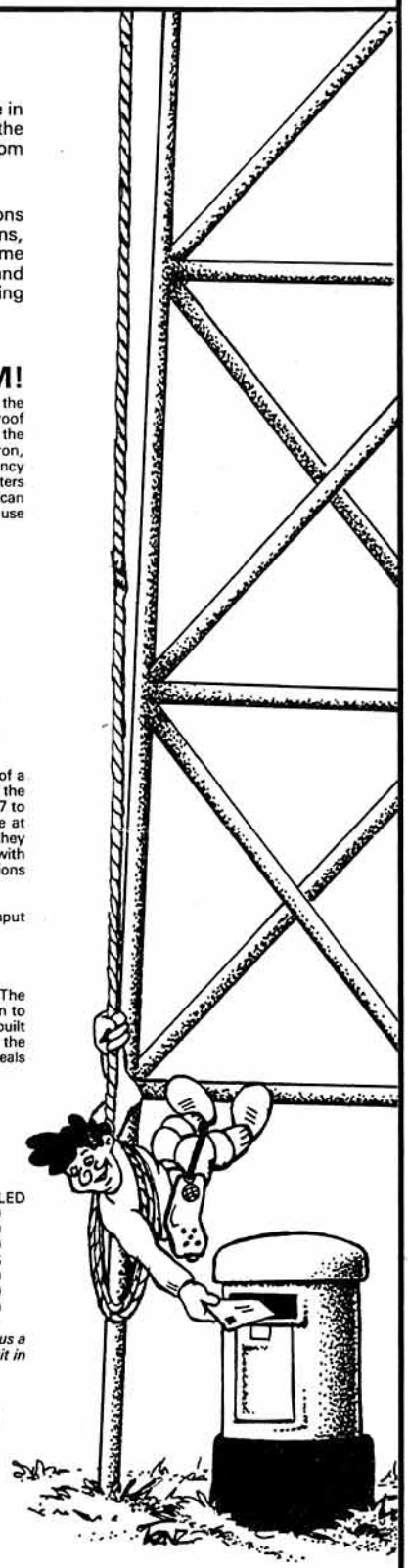
	KIT	ASSEMBLED
ST2 Side-tone/CW Practice Oscillator	£7.30	£10.80
XM1 Crystal Calibrator (8 o/p)	£16.80	£21.30
AP3 Automatic Speech Processor	£15.90	£21.40
CM2 "hands free" Mic with VOGAD	£10.25	£13.75
PA2/15 2M 10dB 15W Linear Amp.	£18.90	£23.90
PA2/30 2M 8dB 30W Linear Amp.	£22.90	£27.90
CO1 TX/RX for Linears	£9.80	£13.80

If you would like further information on any product, simply drop us a line, enclosing an SAE. We have an information sheet for each kit in addition to our general product information.

PLEASE ADD 80p to your total order value. Export prices are the same as above (except for airmail delivery outside Europe—add £2.00 per kit).

UK delivery normally within 7 days

**73 from Dave G4KQH,
Technical Manager.**



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Isopole 144 omni-directional antenna: Price £39.95 (p & p £2.50)

ALM-203E 3/5 WATTS 2 METRE HANDHELD

- 144-146 MHz FM
- 3 watts with NiCad, 5 watts with DC/DC converter
- 10 memory channels
- Programmable band scan
- Switchable 150-160 MHz Rx (marine band)
- 'S' metre
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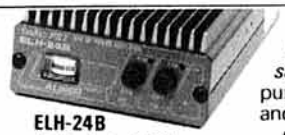

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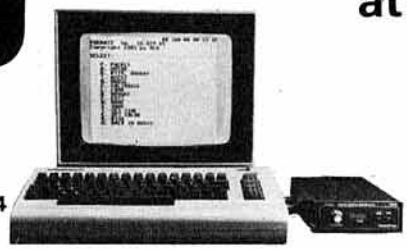

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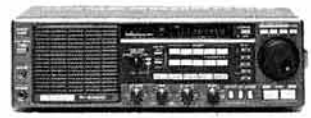

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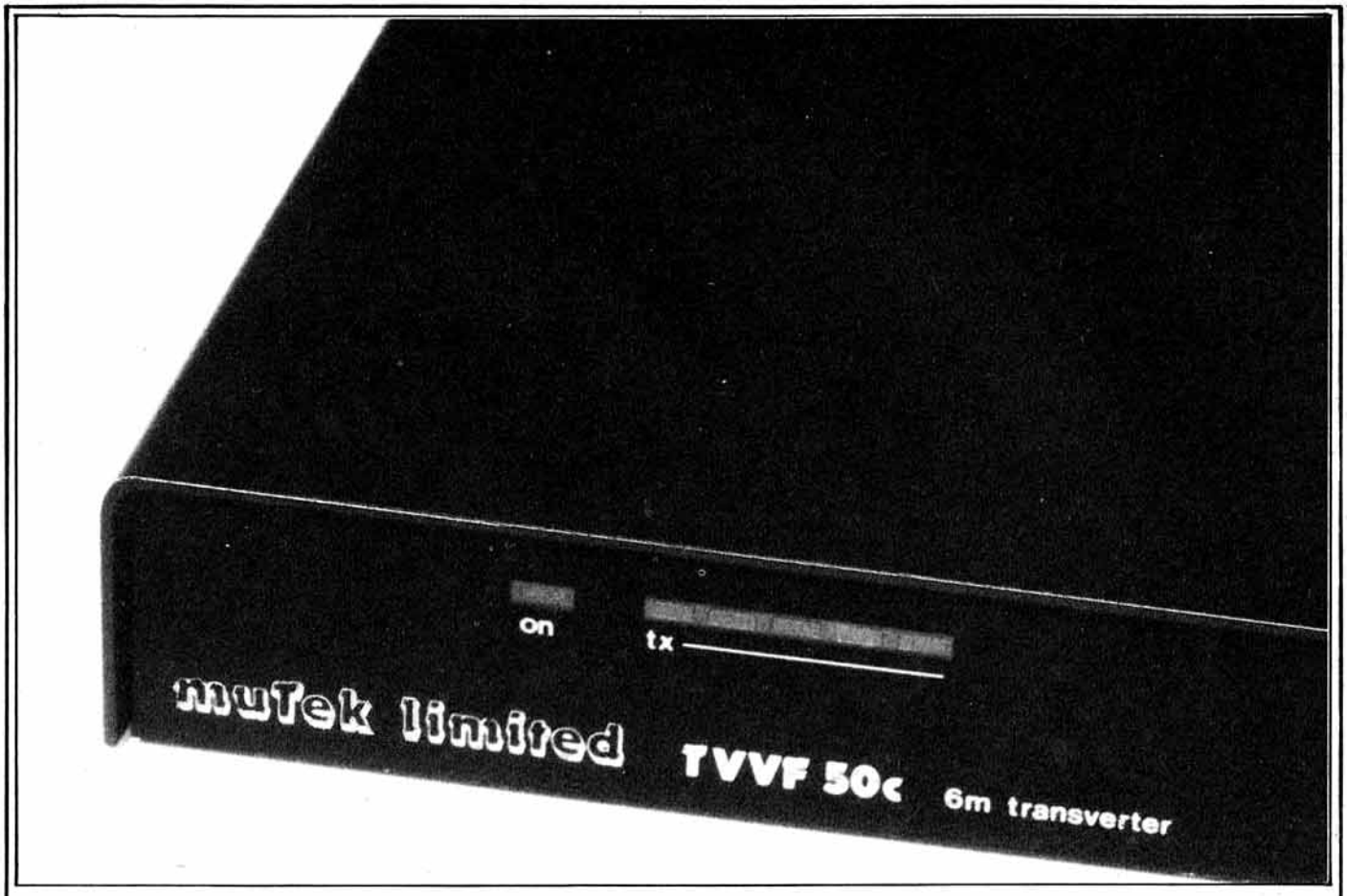


Peter Hart, G3SJX takes a close look at one of the transverters for the new 50 MHz band available from the muTek range.

50 MHz EQUIPMENT REVIEW

The muTek TVVF50c

INTRODUCTION

Becoming operational on a new VHF band may be achieved in two different ways. A dedicated transceiver may be purchased for that band or a transverter added from an existing band. The latter approach requires considerably less financial outlay if an existing transceiver is already available. MuTek Ltd include two 50 MHz transverters within their product range, the TVVF50c for use with 144 MHz transceivers, and the TVVF50a for use with 28 MHz transceivers. The TVVF50c is the subject of this review.

The most suitable bands from which to transvert to 50 MHz are 28 MHz and 144 MHz. Use of 144 MHz has the advantage that the conversion is potentially free of in-band spurious signals up to high orders. With 28 MHz, there are two backward tuning 7th-order products. On the other hand, 28 MHz receivers generally have a higher dynamic range and improved reciprocal mixing performance. Direct signal breakthrough on 144 MHz can also be a problem when large signals are around on that band. However, the decision on which band to use is more likely to be determined by the availability of an existing transceiver than for any technical reason.

To achieve optimum receive performance on 50 MHz, the noise figure, gain and dynamic range of the transverter should be carefully considered with regard to the noise figure and dynamic range of the transceiver, in much the same way as adding a preamplifier. The factors to be considered are fully described in References (1) and (2). In general, the following assumptions are true:

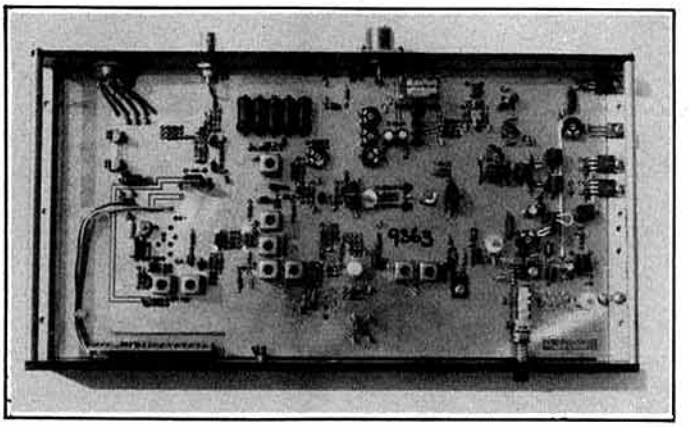
(i) The overall dynamic range can never be better than that of the worst part of the system (transceiver or transverter).

(ii) The optimum balance between overall noise figure and dynamic range is achieved when the conversion gain of the transverter is approximately 2-3 dB more than the difference between the transceiver and transverter noise figures (transceiver noise figure assumed to be the worse). In this case the overall noise figure is about 2 dB greater than the transverter noise figure alone. Higher conversion gains will result in a diminishing improvement in overall noise figure but every dB of additional gain is a dB reduction in strong signal performance. Lower conversion gains will degrade the overall noise figure. A 4-5 dB system noise figure including feeder loss is generally adequate for 50 MHz operation.

(iii) If the output intercept of the transverter is substantially greater than the input intercept of the transceiver, the strong signal performance is limited by the transceiver. If it is substantially less, the strong signal performance is limited by the transverter.

DESCRIPTION

The TVVF50c covers 50-52 MHz when used with 144-146 MHz transceivers and operates from a 13.8 volt supply. An alternative version (not reviewed), the TVVF50a, is available for use with 28-30 MHz transceivers. 1 to 10 watts RF drive is required at 144 MHz settable by an internal preset control and an ALC loop is used to prevent overdrive. Both external switched and RF-sensed transmit/receive switching is incorporated. The transverter circuitry is constructed on a single through-hole plated PCB and housed in a low height wrap-around case measuring 31cm (w) by 17cm (d) by 3.5cm (h). The front panel contains an on-off switch and a five segment bar-graph display indicating drive level. The rear panel contains connectors for RF input and output and power/control. No provision is made for separating the receive and transmit RF paths. Control lines are provided for transmit/receive switching, linear switching and power-on sensing. Note that pins 2 and 4 were shown transposed on fig 3 in the handbook provided.



The innards of the muTek TVVF50c 144-50 MHz transverter. The PA transistors are bolted to the square section bar on the right.

The circuitry comprises a common ring mixer for transmit and receive using four discrete diodes and a diplexer IF filter for minimum intermodulation. The 94 MHz oscillator and buffer use J310 FETs. A future option will allow a second crystal (92 MHz) to be selected to cover the band 52-54 MHz. The PCB already includes the tracks. The receive RF amplifier uses balanced BF981 MOSFETs and the IF amplifier a J310 JFET. This is followed by a PIN diode T/R switch and a 6 dB power attenuator in the 144 MHz input/output common to both receive and transmit. The PIN diode switch forms an ALC-controlled attenuator when on transmit. Four stages of final frequency amplification generate the transmitter power using plastic TO220 power transistors. Rather minimal heatsinking is provided for these devices. Forward/reflected power sensing on the output is used to provide ALC and power reduction with high load VSWR.

An 8-page handbook is provided which describes the setting up and use of the equipment. The basic design philosophy and circuit is described with the aid of a block diagram but full circuits are not included.

MEASUREMENTS

Laboratory measurements made on the transverter are summarised in Table 1. These measurements were made before the announcement of the 50 MHz allocation in the UK and hence were not restricted just to the band 50-50.5 MHz.
Additional comments are as follows:

Frequency error.

A trimmer is provided to set the crystal frequency.

Conversion gain.

The conversion gain is about optimum for most VHF transceivers.

Receiver spurious responses.

The IF breakthrough figure (measured with respect to an on-tune signal) may be insufficient when strong signals are around on the IF. This figure varied with pressure on top of the case and could be improved by 10 dB by grounding the PCB earth plane to the back panel between the RF input and output sockets. A further 10 dB of improvement could be achieved by placing an earthed screen across the PCB between these two sockets. According to muTek Ltd, design changes have now been incorporated in current production models to reduce this level of IF breakthrough. A well screened lead connecting the transverter to the transceiver is essential to prevent direct IF pick-up. A double braided coaxial cable such as RG223/U is particularly recommended.

The transverter exhibited very few other spurious responses (43 MHz at -70 dB, 4 at vhf/uhf at -80 dB).

Intermodulation.

3rd order intercept point measurements were made with input signals at 50.4 and 50.6 MHz. Some variation across the band would be expected due to the change in conversion gain. The figure given in the table corresponds to a two-tone spurious free dynamic range in SSB bandwidths (2.5 kHz) of 93 dB. The limitation on dynamic range will be the 144 MHz receiver in virtually all cases.

Output power and spurii.

Although the transverter is specified as delivering 10 W PEP output, this was not achieved at a reasonable level of distortion. 10 W output could be achieved but 3rd order distortion products were less than -20 dB (measured with respect to either tone of a two-tone test signal). Higher order products reduced at a rate of about 5 dB/order. The transmitter failed with short circuit supply after 5 minutes operation at 8 W CW output. Fearing the worst, the fault was eventually traced to a misfitting mica washer under the driver transistor. This fault was simply rectified.

As the second harmonic of 50 MHz falls within FM broadcast band II, it is essential that harmonic outputs are kept to a very low level. The level measured may be insufficient in some circumstances, in which case, an additional antenna filter will be required. MuTek claims that the harmonic rejection measured for the review transverter was some 10 dB worse than normally measured on a typical TVVF50c.

Supply voltage variation.

The transverter continued to function satisfactorily on receive down to 9 V or below. On transmit, the power was down to about half at 10 V supply.

PERFORMANCE ON THE AIR

Up until 1 February air tests were limited to receive only. The latest stage in the 50 MHz experiment - the general release of the band on a 24h basis to Class A licensees - was eagerly awaited and many contacts were made. The transverter was used in conjunction with an FT225RD (which also included a muTek front end) and a Tonna 5-element Yagi. No problems were experienced and a healthy increase in noise was obtained when the antenna was connected to the input compared with a 50 ohm load. The strong signal performance appeared excellent with no problems from a strong local station. No spurii were observed at any time. The transmit to receive delay introduced by the RF sensing circuitry can be annoying with push-to-talk operation. The delay can be disabled by cutting a link as described in the manual.

RECEIVE		
Current consumption		180mA
Frequency error		550Hz
Conversion gain:	(i) 50MHz	8.2dB
	(ii) 51MHz	7.5dB
	(iii) 52MHz	6.5dB
Noise figure		<2.5dB
-3dB bandwidth		48.4-53.7MHz
-30dB bandwidth		45.5-57.8MHz
LO feedthrough to 50MHz		-65dBm
LO feedthrough to IF		-60dBm
Image response		-80dB (238MHz)
3rd order input intercept		+1.5dBm
3rd order output intercept		+9.5dBm
TRANSMIT		
Current consumption @ 8W output		2.4A
Minimum input power for RF sense operation		100mW
Drive power range for 8W output		1.4 - 20W
Output power for -26dB two tone intermodulation products:	(i) 50MHz	8.5W pep
	(ii) 51MHz	7.5W pep
	(iii) 52MHz	6.0W pep
Harmonic outputs		-55dB(2nd)]-65dB(higher)
Spurious outputs		]-65dB
Gain variation across band		1.5dB

Table 1. Performance Measurements for muTek TVVF50c

CONCLUSIONS

The muTek TVVF50c transverter is a well conceived design which achieves the optimum balance between noise figure and dynamic range. When used with a top grade multimode transceiver, state-of-the-art performance on 50 MHz can be achieved. On transmit, the transverter is a little short of output power particularly at reasonable distortion levels.

The muTek TVVF50c currently costs £199.90 and the TVVF50a £239.90. All prices include VAT at 15%.

ACKNOWLEDGMENTS

The transverter reviewed in this article was kindly loaned by muTek Ltd of Holsworthy, Devon.

REFERENCES

>1½ "The effects of preamplifiers on receiver performance, and a review of some currently available 144MHz preamplifiers (part 1)", J N Gannaway, G3YGF. Rad Com November 1981, pp 1026-31.

>2½ "Modern vhf/uhf front-end design", I White, G3SEK. Rad Com April - July 1985 (in 4 parts).

Comment from muTek Ltd

We have read Peter Hart's review of our TVVF50c transverter with considerable interest. Although generally in agreement with his comments there are two points upon which we would like to enlarge.

We are concerned that the transmitter linearity (or rather the lack of it) measured on the review sample gave rise to comment. Our test procedures, applied to every 50 MHz transverter leaving the factory, allow the third-order intermodulation products generated in a two-tone test to reach -33 dB with reference to the PEP output level reached (about 12W) when the unit is driven into ALC before rejection. Usually we measure rather better than this, as confirmed by reviews in other publications.

We chose to use a broadband amplifier driving a low-pass filter rather than the more usual tuned amplifier precisely because it is very difficult indeed to obtain adequate linearity from a tuned amplifier over the bandwidth involved. That the linearity varied substantially across the band, together with the very high second harmonic level, suggests that the low-pass filter was either faulty or had somehow become misaligned.

Regarding Peter's comment on heatsinking, the enclosure used for the transverter will quite happily dissipate the 15W or so involved within the ambient temperature ranges to be expected. The package was specifically designed for this application and has been used for similar products over the last two years with no failures directly attributable to thermal problems.

MuTek Ltd keeps the designs of its products under review and is responsive to constructive criticism. The sample of the TVVF50c reviewed by G3SJX was manufactured in July 1985; since then we have made changes both to the design of the transverter (some of which were suggested by this review) and also to our alignment procedures.

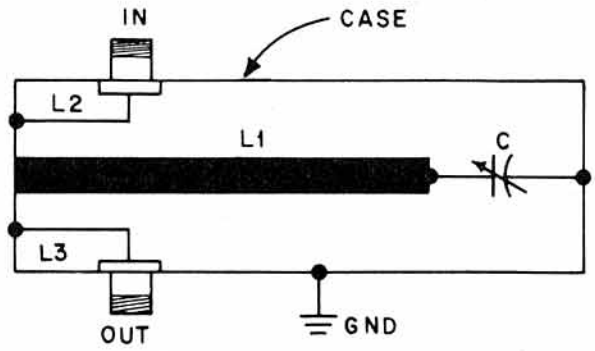
Easy-to-build 50 MHz stripline filter

We mentioned in last month's Bulletin that a low level of second harmonic is particularly important in a 50 MHz transmitter, basically because the second harmonic falls in Band II. Frequencies in this band around 100 MHz are used both for broadcasting and for emergency services and it's obviously vital not to cause interference. So this month we present an easy-to-build design for a 50 MHz stripline filter; the design originally appeared in the ARRL Handbook and we are grateful to the American Radio Relay League for their permission to reproduce it here. The filter consists of a folded inductor brought to series resonance by a variable capacitor at one end. Input and output coupling is by means of loops. Its insertion loss at 50 MHz is around 1 dB.

The filter is made in a standard 17" by 6" by 3" chassis, which could be bent up from 16 or 18 SWG aluminium alloy or formed from sheet and angle stock. A bottom cover plate is required, attached with self-tapping screws or via hank bushes. A partition along the centre of the assembly, as shown in the photograph, is 14" long and 3" wide and can be mounted with angle stock or bent up from sheet with extra folds to suit. The inductor is 32" long and 13/16" wide, folded approximately in the centre round a mandrel of 2 3/4" diameter - a bottle containing Roses' Lime Juice was used for the filter made for GB3RS but other household bottles or cans may well be the right size. Brass or copper strip could be used for the inductor if a suitable piece is to hand.

These four items are the heart of the filter, and the Society has arranged for them to be available as a kit from Messrs H L Smith & Co of 287-289 Edgware Road, London W2 1BE. The cost over-the-counter is £6.12 and by post £7.47.

The tuning capacitor is a wide-spaced 30 pF variable; a Jackson C804 type was used in the GB3RS version, obtainable from various sources including Maplin, STC, Electrovalue, etc. Remember that the voltage across the capacitor in a series-tuned circuit is high, so don't use a variable whose plates are too close together.



Equivalent circuit of the 50 MHz stripline filter. L1 is the main inductor and L2 and L3 are the input and output coupling loops.

Input and output coupling loops are 10" long and run between SO239 sockets and the chassis as shown in the photograph, spaced about 1/4" away from the main inductor. They can be made of 12 or 14 SWG wire.

The inductor is supported in the chassis by four radially disposed spacers (see photograph) which in an ideal world would be 1 1/2" long and ceramic. Since ceramic spacers of any length seem to be getting more and more difficult to find, it may be necessary to improvise with shorter spacers shimmed with washers or to make them from Tufnol, fibreglass or PTFE if available. Do not use Perspex or nylon spacers since these are lossy at VHF and will get warm - probably to the point of distortion.

Construction is simple. Firstly, and BEFORE bending the radius in the approximate centre of the main inductor, work out how the tuning capacitor will be connected to one end of the line; it will probably be necessary to use solder tags unless the inductor is made from brass or copper and consequently can be soldered directly to the capacitor's stator supports. Having decided on a suitable method, establish the point along the line about which the radius will be bent - bearing in mind that although one end of the line will be attached direct to the end wall of the chassis, the other end will be a couple of inches away because of the variable. If using a Jackson C804 the bend should be made about a point 18" from the end of the line connected directly to the chassis; this brings the variable nicely opposite the chassis end of the line. Larger capacitors will obviously require an extra half inch or so on this dimension. Make the bend, then drill holes for the spacers and bolt them to the line. Then attach the tuning capacitor. Offer up the assembly to the chassis and establish the position of the mounting hole for the shaft of the variable capacitor, the other ends of the spacers and the holes for attachment of the other end of the inductor to chassis; these can then be drilled and the inductor-capacitor assembly finally mounted in the chassis.

The next stage is to mount the centre partition, which is simply a matter of marking-out, drilling and assembly. Take care to mount it in the centre of the U formed by the folded inductor. Finally, the input and output coupling loops should be fitted; probably the best way to establish the position of the hole for the SO239 sockets is to attach the 10" of wire to the centre conductor of the socket and then make a right-angle bend in the wire at a distance from the socket corresponding to the distance of the centreline of the main inductor from the top of the chassis. Then connect a solder tag to the other end of the loop and offer up the entire assembly to the chassis; mark out the position at which the socket ends up and also the position of the solder tag, bearing in mind that the loop wants to be about 1/4" away from the line. Repeat the process for the other loop, then drill holes and assemble. Construction is now complete.

Alignment is simply a matter of adjusting the variable capacitor (and possibly the spacing between the input and output coupling loops and the line) for lowest reflected power on an ordinary SWR bridge - ours tuned up nicely without altering the loop spacing. Then you can go on 50 MHz, secure in the knowledge that your harmonics are a lot further down than they were....!

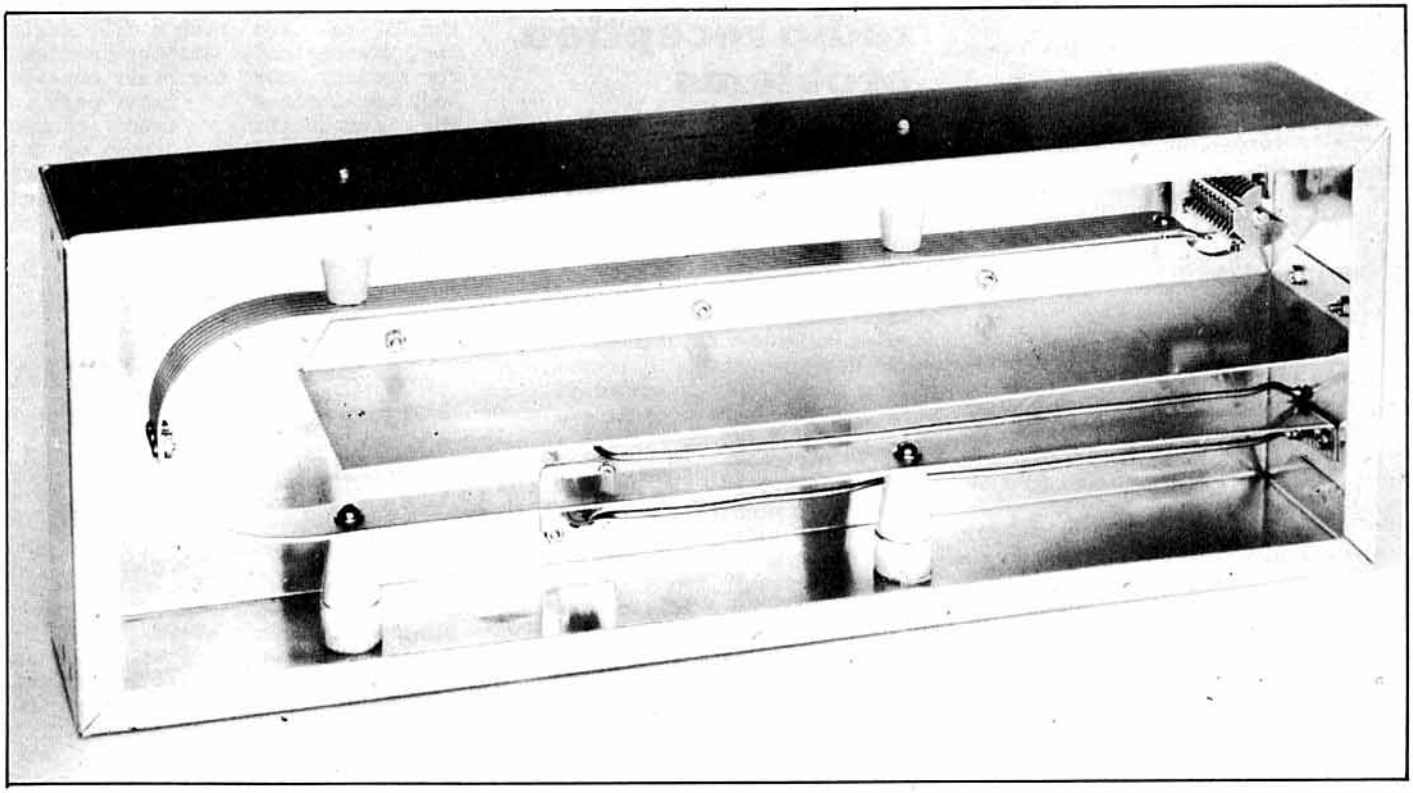
ADDRESSES

H L Smith & Co, 287-289 Edgware Road, London W2 1BE.

Maplin Electronic Supplies, PO Box 3, Rayleigh, Essex, SS6 8LR. Tel: 0702 554155.

STC, Edinburgh Way, Harlow, Essex. Tel: 0279 26777.

Electrovalue, 28 St.Judes Road, Englefield Green, Edgham, Surrey, TW20 0HB. Tel: 0784 33603.



THE RSGB News Bulletin PAGES

SOCIETY UNCOVERS NEW RIS STRATEGY

It took effect from January...

For many years some of the most important issues in amateur radio have been associated with breakthrough of amateur transmissions into various forms of domestic electronic entertainment equipment. Known over the years as TVI, BCI, RFI and latterly EMC (standing for Electromagnetic Compatibility), the phenomenon of "breakthrough" has traditionally been a source of friction and dispute between transmitting amateur and uncooperative TV-watching or radio-listening neighbour. Often there has been a mediator involved, the Radio Interference (or Investigation) Service; usually called in by the neighbour at the behest of the amateur, the RIS officer has been both a problem-solver and a valuable intermediary with the ability to defuse an often difficult situation by skilful and impartial diplomacy.

Not all the conclusions were made publicly available...

Until 1984 the RIS was operated by British Telecom (formerly the Post Office and prior to that the GPO) on behalf of the Home Office on an agency basis; with the passing of the 1984 Telecommunications Act, which privatised British Telecom, control of the RIS was transferred to the Department of Trade and Industry. A review of the structure and functions of the RIS was promised soon after the transfer, and duly took place in late 1984. Not all the conclusions of the review were made publicly available; the September 1985 edition of the RSGB Bulletin (page 1) gave all the published information. The essence of the review was that the RIS would be re-orientated towards the enforcement role and would carry out what Mr Geoffrey Pattie, Minister of State for Industry & Information Technology called

"... a phased withdrawal from ... domestic TV & radio reception problems

"....a phased withdrawal from the time-consuming effort put into dealing with domestic TV and radio reception problems". The DTI subsequently published a booklet (obtainable from any Post Office) which was intended to assist ordinary members of the public in identifying such problems and finding suitable solutions: the RIS would not now attend a complainant unless a call-out charge of £21 was paid and some other conditions were fulfilled.

The Editorial in the same edition of Radio Communication set out the Society's initial reactions. At that time the Society itself was involved in two cases of breakthrough which, although technically no different from many other similar cases, had attracted the attention of Members of Parliament and thereby the Minister of State. This obviously made them more delicate and difficult to handle, since solutions which may be politically expedient are not always intellectually rational or morally equitable. It was in the course of these cases that the Society became aware of the DTI's increasing interest in immunity standards for domestic entertainment equipment. In September 1985 it had been announced that the provisions of BS 905 were to be incorporated in legally binding regulations "....as soon as possible". However, it now appears that a CENELEC standard will be adopted by the EEC and will therefore override BS 905; it is likely to be introduced into the UK in a year or two. Amongst other things this will require certain categories of mains-powered TV and radio receivers to continue to function correctly in the presence of an RF field strength of about 1.8 volts per metre.

In January 1986 the Radio Investigation Service began operating to a new strategy, which had been largely devised as a response to the cases mentioned earlier, and also to the prevailing restrictions on its budget in the contemporary political climate. This strategy was contained in a document which was said later by the DTI to have been a "....draft for discussion", although neither the Society nor any other outside body was invited to take part in its production. Even though nominally a draft, a copy of the document was sent to all RIS District Managers; since the word "draft" did not appear anywhere on it or in it, the implication was that it was a strategy to be introduced with immediate effect.

... said later by the DTI to have been a "draft for discussion"

It contained a draft letter to be sent to a radio amateur implicated in breakthrough problems, which is discussed in more detail in this month's Editorial; its import was that it was up to the amateur to negotiate with his neighbour, fit filters and generally solve the problem.

The Society's views were made clear to the DTI.

It is perhaps unnecessary to say that the Society had most severe reservations about both the quality and the scope of the strategy. An urgent meeting with the DTI was requested, prior to which the strategy document was analysed in depth by Society staff and volunteers. Legal advice was also taken. The Society's views were made clear to the DTI at a meeting which took place on 20 February, and as we went to press the situation was that the Society was considering its position and its next course of action. It is necessary for the RSGB to consider several interrelated factors; one is the legal basis for the DTI's actions with regard to licence variation, especially having regard to the reasonable expectation of the radio amateur that he can continue to exercise the privileges of his licence. The CENELEC proposals also require careful consideration, particularly with regard to possible input to the BSI Committee which represents the UK in these matters.

To use a fashionable expression, the "bottom line" of all this is that unless the RSGB takes vigorous action - possibly even involving the courts - it is likely that individual radio amateurs in the UK could suffer quite severe restrictions on their operation because of the highly inequitable imbalance of apparent statutory support between a complaining neighbour and a radio amateur. It also seems abundantly clear that high-level decision-making in the Department of Trade and Industry is being carried out on the basis of poor technical and legal advice. It is imperative that this state of affairs is drastically changed. In fact, the Society views the entire complex and politically sensitive situation as a grave potential threat to the well-being of amateur radio in the UK.

Just to reiterate what was said in the Editorial, any member who is currently in a situation involving breakthrough and who has received correspondence from the Radio Investigation Service - or any other part of the DTI for that matter - is asked to send copies of such correspondence IMMEDIATELY to The Secretary (RIS) at RSGB Headquarters.

Pirates:

Latest convictions

Two South London pirates were convicted recently under the Wireless Telegraphy Act 1949. Kevin Baker, of 35 Cranmer Road, Forest Gate, London E7, appeared at Newham Magistrates' Court on 17 January and was found guilty on a charge of installation and use of amateur radio equipment without a licence. Baker was given a conditional discharge for 12 months and ordered to pay costs of £115. The Court ordered that all the equipment involved, worth more than £550, was to be forfeited.

Raymond Bittner, of 105 Elderton House, Loughborough Park, Brixton, London SW2, pleaded guilty at Camberwell Magistrates' Court on 21 January to three charges under the Wireless Telegraphy Act 1949. For the first two charges, of operating a 144 MHz amateur transceiver from his home on 23 and 24 October 1985, Bittner received a fine of £24 and 12 months' conditional discharge respectively. The third charge, under Section 13 of the Act, of deliberately causing interference to the South London repeater GB3SL, is an indictable offence and can be tried in a higher court. For this offence Bittner was fined £25. He was also ordered to pay the DTI's costs of £120 and the equipment involved was ordered to be forfeited. The Court showed considerable leniency to Bittner because of his reduced circumstances.

It is understood that further prosecutions along similar lines are imminent.

We're still not sure about the current status of the French national society, REF, but we recently received a press release from them giving a new address for their QSL Bureau! For anyone who might be interested, it is:- REF QSL
BP 273
81209 MAZAMET Cedex
France

RSGB ON THE ROAD

The rally season has started in earnest, and the Society will be at the following events this year.

18th May
Northern Mobile Rally,
Gt Yorkshire Showground,
-*-
15th June
RNARS Mobile Rally,
HMS Mercury.
-*-
22nd June
Denby Dale Mobile Rally.
-*-
3rd August
RSGB Mobile Rally,
Woburn Park,
-*-
17th August
Red Rose Rally,
Haydock Park Racecourse
-*-
24th August
Preston Rally,
Lancaster University
-*-
7th September
Lincoln Hamfest '86,
Lincolnshire Showground
-*-

We may be at one or two others which had not been planned as we went to press.

-*-

One reminder - we can only sell books at members' prices to members! We obviously need to know whether or not you're a member, so you must BRING YOUR MEMBERSHIP CARD if you want to buy books from an RSGB bookstall and receive the members' discount. If you forget your membership card, please don't kick the bookstall staff when they refuse to give you the discount.....

News about new books

By the time you read this the new 1986 RSGB Callbook and Members' Handbook should be available. This has 292 pages, 40 more than last year, and it costs substantially less than the 1985 edition - it's £4.89 to members by post. If you purchase over-the-counter at Headquarters, you only need to part with a mere £3.83! Incidentally, the Callbook will now be updated twice yearly - there'll be another edition in the autumn.

We've now got the softback version of the ARRL Handbook 1986 in stock - it costs £16.79 to members by post. By the time you read this the new ARRL Antenna Compendium should also be available: this contains a large selection of antenna-related material previously published in QST. As yet we don't have a price for this excellent book, so please phone Headquarters for details.

Now that spring has arrived, why not add an RSGB tee-shirt to your wardrobe? These extremely natty numbers in grey cotton have the RSGB logo in black and come in three sizes - medium, large and extra-large. They cost £4.90 to members by post, and don't forget to tell us what size you are when ordering.

Also don't forget that if you're suffering from TVI/BCI we can supply a pack of two ferrite rings which may help. They cost £2.30 per pack to members by post.

Final-final - are you interested in microwaves? If so, did you know that the Society keeps a comprehensive stock of microwave components available to members? We have chip resistors and capacitors, GaAsFETS, doppler modules and all sorts of other bits and bobs. Ring for an up-to-date price list - and you could also enquire about a subscription to the Microwave Newsletter at the same time....

Rad Com delivery survey

In recent months we've had many more of our UK members than usual reporting postal delays affecting deliveries of their magazine. In order to present the Post Office with hard evidence of this increasingly annoying problem, the Society needs the facts and figures and we need your help to obtain those facts.

With this month's RadCom UK members only will find a postcard containing our "quick questionnaire". Obviously, the more members that respond, the better our evidence and the more weight we will have when tackling the Post Office.

We've also used the postcard to ask some other questions - on band occupancy, EMC (a topical issue) and computers in amateur radio, so again the more replies the better.

Help us to help you!

VOLUNTEER VACANCY

The RSGB Repeater Management Group has a vacancy for a volunteer for the job of data repeater co-ordinator.

This newly created post will involve the setting of data repeater standards, overseeing experiments and - most importantly - the planning and subsequent administration of a network of packet data repeater stations. As with all RSGB committee posts, the job is unpaid reasonable out-of-pocket expenses will be reimbursed by the Society. The principal reward will be a sense of satisfaction derived from having presided over the early stages of what is expected to become a large and complex network of stations.

The Repeater Management Group is responsible for the administration of all the repeaters in the British Isles. It meets approximately 8 times a year on Saturdays, normally near King's Cross in London. All RMG members are expected to attend at least half of these meetings and to provide written progress reports for each meeting.

Applicants MUST have a good knowledge of RTTY and ASCII data communication, including packet radio, and should be actively involved with these modes of operation. Above all, he or she must have sufficient drive, dedication and spare time to do justice to what is likely to become a very responsible job.

Applications - giving details of relevant experience - should be sent to the RMG Chairman, Mike Dennison, G3XDV, 5 Lambs Walk, Whitstable, Kent CT5 4PJ.

Class B Morse experiment: 91% say YES!

Just before we went to press this month we'd compiled a report to the DTI on the Class B Morse experiment, which ended its one-year run on 31st March 1986. The report was mainly compiled on the basis of the questionnaire we ran in the February Bulletin, and it was interesting to note that 91% of those who replied to it were in favour of the facility continuing to be available.

The Society now expects the facility for Class B licensees to use Morse in this way to be written into the Class B licence. As of midnight on 31 March the facility ceased to be available; however, the Society expects that it will re-appear - this time on a permanent basis - as soon as the DTI is able to formalise it in the shape of a Gazette notice. We will advise members as soon as the facility is available again.

The results of the Raynet Zone 1 Election which took place in January/February 1986 are as follows:

Mr D Chilton, G6LIJ	7 votes
Mr L A Graves, G4BCP	58 votes
Spoilt votes	0
Late votes	4

Mr L A Graves is therefore elected to be the Raynet Zone 1 Representative.

REDUCING RF BREAKTHROUGH USING FERRITE RINGS

Some notes on fabricating and fitting chokes

Remember the item in this issue on new books and other products available from RSGB Headquarters? We mentioned that a little pack of two ferrite rings was available from us. Well, to help you get the best out of them, the RSGB EMC Committee has recently produced a leaflet on using ferrite rings to reduce RF breakthrough. The leaflet is sent out with each pack, but we thought the information was so useful it deserved a wider circulation. So here's the text and diagrams from the leaflet:

Methods based on the use of ferrite rings can be most effective in reducing RF breakthrough. As a service to members, suitable rings are now being made available direct from RSGB HQ. The purpose of these notes, which have been prepared by the RSGB's EMC Committee, is to suggest some ways in which they can be used.

The problem of RF breakthrough into electronic equipment has been with us for some time now, and has been tackled in a variety of ways. One method involves fitting capacitors between the base and emitter of transistors; another is fitting chokes or capacitors between IC inputs and ground. In both cases, this requires opening up the equipment to provide access to the internal circuitry.

Unfortunately, there is a serious disadvantage associated with this approach to the problem. Any modifications made to domestic electronic entertainment equipment can - and in practice often are - blamed for any subsequent faults which may develop in it.

An alternative approach involves reducing the amount of RF entering the equipment via the mains and antenna leads, and also those used to interconnect the units which make up a hi-fi system. This method has the great advantage of not involving the need to open up the equipment to reach the internal circuitry, although plugs may have to be removed and refitted in some cases. Whilst the effectiveness of this (or any other single method) cannot be guaranteed, it is an excellent first approach.

This reduction in breakthrough is achieved by inserting a high impedance at the frequency of the offending RF source in series with some or all of the

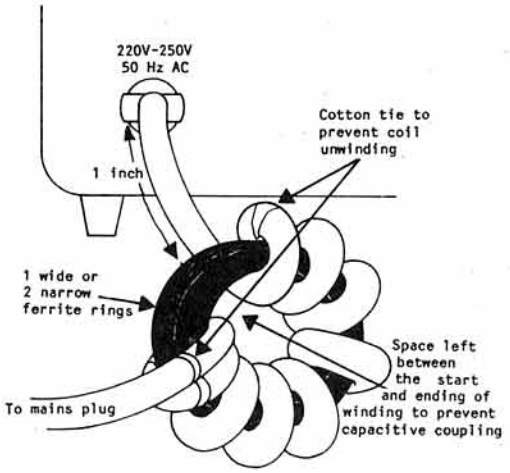


Fig 1: Ferrite rings on mains lead

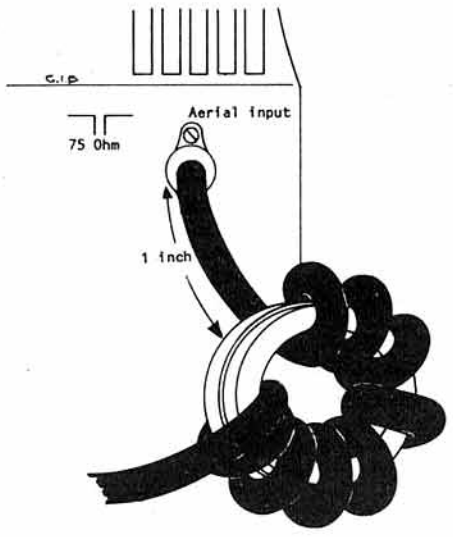


Fig 2: Ferrite rings on coax cable

input and output leads of each of the units making up the equipment. In practice, this is achieved by simply winding each lead through a suitable ferrite ring to produce an RF choke. The rings stocked by the Society are equivalent to FX1588, which is now difficult to obtain; note that many "surplus" types are not suitable for this application.

Fabricating chokes: winding the lead

The chokes are made by winding the lead to be filtered through the ring in the manner shown in Figs. 1 and 2. The number of turns required is calculated by converting the centre frequency of the band to be rejected into wavelength in metres and using one turn of cable per metre round the ring. Ten or eleven turns are usually the maximum which can be wound with coaxial cables or mains leads. The number of turns is not critical because of the wide bandwidth over which the chokes are effective; for example, one with ten turns gives useful attenuation between approximately 12 and 60 MHz.

Fitting the chokes: making the job easy

The chokes should be made to fit as closely as possible to the equipment which is to be protected, since any length of lead left between the ring and the equipment can still act as an antenna and inject RF into the equipment. If the cable is a continuous run from the roof (or from some distance from the set), it is easier if the turns are initially fitted loosely on to the ring. Starting at the plug, the first and second turns can be tied together as shown in Fig.1, followed by the rest. Finish off the job by tying the final turn so that it is kept away from the first turn.

In tackling a particular installation, the best place to start is the mains lead(s).From an RF point of view the chokes cause the equipment to float above ground since the RF path to earth is removed. In the case of TV and FM radio this makes no difference to the received signal; a path to earth is not required because of the type of antenna and feeder used. This technique also has little effect on medium wave receivers since the chokes will have negligible impedance at these frequencies.

The next chokes which can be fitted are to the coaxial antenna cable(s). The objective here is to insert a high impedance into the screen outer in order to prevent RF from entering the equipment via this route.

For straightforward hi-fi installations, the mains leads should first be filtered, followed by the loudspeaker leads and then the leads connecting other units such as a cassette recorder.

Examples: vcr and sound system

1. A stereo video recorder, with a cable connecting audio between itself and the TV, picked up a local transmitter. In this system it was found essential to fit chokes to both ends of the audio cable; if fitted only at the TV end, the system was still affected in "record" mode. It was evident that the length of cable between the VCR and the single choke was still an effective antenna. At the end of the day, this particular installation required chokes on the TV and VCR mains leads, the antenna input to the VCR and the antenna input to the TV, plus the chokes at each end of the audio cable.

2. A church sound system had four microphones and an induction system for the deaf. Eight pairs of chokes were necessary to give complete freedom from breakthrough, plus the noise generated by a local thermostat and an AM CB set being used locally. Installing and testing chokes on the speech amplifier and induction amplifier mains leads, the speaker and induction loop outputs and the four microphone inputs took about an hour. This was done without undoing any screws on the equipment, thereby leaving the guarantee valid; the cost was also less than a quarter of the estimate furnished by the original supplier. It was also done at a time convenient to all parties.

3. Experience has shown that when lower radio frequencies are involved, two chokes in series can effect a cure when one results only in a reduction in breakthrough.

4. Cases have been encountered where a TV has picked up RF signals via its chassis as well as its antenna. This has resulted in ghosting on the TV screen which could not be cleared by antenna adjustment - until, that is, ferrite rings had been fitted for interference purposes to the mains lead. After this, the ghosting cleared completely!

It is worth noting that in some equipment the entire printed circuit board and its internal leads are completely unscreened. If breakthrough occurs in this case, we recommend that the owner contacts his dealer so that the necessary modifications can be made. Even in this case, however, fitting chokes can sometimes provide an improvement in the interim, until the owner has the modifications carried out.

Availability: sizes and prices

The RSGB can supply narrow ferrite rings, 40 mm outside diameter and 6 mm thick; a pack of two costs £2.30 to members including postage and packing. The price to non-members is £2.71. Order in the usual way from RSGB Headquarters.

JAS-1 bird is go for August launch

The Japanese Amateur Radio League and the Japanese AMSAT Group, JAMSAT, have recently announced the major operating parameters of their new JAS-1 satellite which is due to be launched in early August this year.

JAS-1 was planned and has been promoted by the Japanese National Society, under which the Amateur Satellite Committee has taken the role of a co-ordinating group. The large Japanese Corporation, NEC, is responsible for the manufacture of the satellite structure, including its power supplies and also for system design and integration. Many members of JAMSAT are helping to construct the various electronics on-board. The satellite is to be launched by NASDA.

The satellite will be launched into a circular low earth orbit which will be non-sun synchronous and non-polar. Initial estimates are as follows:

Launch date: August 1986
Inclination: 50 degrees
Altitude: 1500 km
Period: 120 mins
Operating Window: 20 mins per pass
Passes per Day: 8 maximum
Satellite Life Time: 3 years

JAS-1 will carry two separate mode J transponders. One will be a conventional linear transponder and the other will be a digital "store-and-forward" transponder intended mainly for non-real-time communication between packet radio stations located in different parts of the World. The packet protocol to be used is AX25 level 2, version 2, at 1200 bauds for both the up-link and down-link.

Further details of frequencies to be used will be published later, prior to launch date. The RSGB's DataBox is currently carrying information on the JAS-1 project.

1987 President elected

At its meeting on 18 January, Council unanimously elected Mrs Joan Heathershaw, G4CHH, to be the Society's President for 1987. This clearly reflects Mrs Heathershaw's great achievements during her earlier term of office in 1985.

Operation USA

Many members will no doubt visit the USA this year, either on holiday or on business. If you visit the USA regularly you might wish to take out a permanent USA licence. It is free and available to anyone who passes the appropriate USA examinations. Details of these examinations may be obtained from the Membership Services Department at HQ by requesting the USA reciprocal details.

RSGB slow morse practice transmissions

Day	Time	Callsign	Frequency	Modes	Town	Notes
MON	1030	G4YMK	144.250	A1A/J3E	Roehampton, South London	Omnidirectional
	1400	G4OOC	145.250	F2A/F3E	Leeds, West Yorkshire	Omnidirectional
	1830	GW4OXB	145.275	F2A/F3E	Swansea, West Glamorgan	Omnidirectional
	1830	G3GNS	1.910	A1A	Locking, Avon	5 - 12 wpm
	1830	G3GNS	3.550	A1A	Locking, Avon	5 - 12 wpm
	1830	G3GNS	144.250	A1A	Locking, Avon	5 - 12 wpm
	1900	G3CMH/A	144.250	A1A/J3E	Yeovil, Somerset	Omnidirectional
	1900	G3ZQS	145.250	F2A/F3E	Darwen, Lancs	Omnidirectional
	1900	G4DLB	145.250	F2A/F3E	Banbury, Oxon	Omnidirectional
	1900	G4ILD	145.250	F2A/F3E	Rishton, Lancs	Omnidirectional
	1900	G4NZU	145.250	F2A/F3E	Horsley Woodhouse, Derbyshire	Omnidirectional
	1900	G4PYR	1.888	A1A/J3E	Solihull, West Midlands	
	1915	GM4RSJ	145.250	A2A/F3E	Prestwick, Strathclyde	Omnidirectional
	1930	G3XBF	144.250	A1A/J3E	Ilford, Essex	Omnidirectional
	1930	G4GBK	145.275	F2A/F3E	Atherton, Greater Manchester	Omnidirectional
	1930	G4IAV	145.275	F2A/F3E	Atherton, Greater Manchester	Omnidirectional
	1930	G4JSQ	144.160	A1A/J3E	Wolverhampton, West Midlands	Omnidirectional
	1930	G4LLU	144.160	A1A/J3E	Wolverhampton, West Midlands	Omnidirectional
	1930	G4NRO	145.275	F2A/F3E	Atherton, Greater Manchester	Omnidirectional
	1930	G4SXU	145.250	F2A/F3E	Harrogate, North Yorkshire	Omnidirectional
	1930	G4VBL	144.625	F2A/F3E	West Kensington, London	Omnidirectional
	2000	GI4VSC	145.250	F2A/F3E	Belfast, Northern Ireland	
	2000	G2FXA	145.525	F2A/F3E	Stockton-on-Tees	Omnidirectional
	2000	G3GMS	145.250	F2A/F3E	Whitley Bay, Tyne & Wear	Omnidirectional
	2000	G4INM	145.250	F2A/F3E	Chelmsford, Essex	Omnidirectional
	2000	G4OO	145.250	F2A/F3E	Spalding, Lincs	Omnidirectional
	2030	G3ASR	1.875	A1A/J3E	Harrow, Middx	
	2030	G3ASR/A	1.875	A1A/J3E	Bushey, Herts	
	2030	G4ICC	3.535	A1A/J3E	New Duston, Northants	
	2030	G4RPQ	145.250	F2A/F3E	Goudhurst, Kent	Omnidirectional
	2030	G4RWT	145.250	F2A/F3E	Paddock Wood, Kent	Omnidirectional
	2100	G3AVJ	145.250	F2A/F3E	Huyton, Merseyside	Omnidirectional
	2100	G3WOR	144.250	A1A/J3E	Lancing, West Sussex	Horizontal to East & West
	2100	G4OTV	145.250	F2A/F3E	Tunbridge Wells, Kent	Omnidirectional
	2115	GW2FOF	145.250	F2A/F3E	Rhondda, Mid Glamorgan	Omnidirectional
TUE	1030	G4YMK	144.250	A1A/J3E	Roehampton, South London	Omnidirectional
	1100	G4IAV	145.275	F2A/F3E	Atherton, Greater Manchester	Omnidirectional
	1200	G3GNS	1.910	A1A	Locking, Avon	5 - 12 wpm
	1200	G3GNS	3.550	A1A	Locking, Avon	5 - 12 wpm
	1200	G3GNS	144.250	A1A	Locking, Avon	5 - 12 wpm
	1830	GW4OXB	145.275	F2A/F3E	Swansea, West Glamorgan	Omnidirectional
	1830	G4ILD	145.250	F2A/F3E	Rishton, Lancs	Omnidirectional
	1900	G3ZQS	145.250	F2A/F3E	Darwen, Lancs	Omnidirectional
	1900	G4RS	3.565	A1A/J3E	Catterick, North Yorkshire	
	1900	G4RS	145.250	F2A/F3E	Catterick, North Yorkshire	Omnidirectional
	1915	GM4RSJ	145.250	A2A/F3E	Prestwick, Strathclyde	Omnidirectional
	1930	G4BFJ	144.625	F2A/F3E	Banstead, Surrey	Omnidirectional
	1930	G4DAL	145.250	F2A/F3E	Lancaster	Omnidirectional
	1930	G4GBK	145.275	F2A/F3E	Atherton, Greater Manchester	Omnidirectional
	1930	G4IAV	145.275	F2A/F3E	Atherton, Greater Manchester	Omnidirectional
	1930	G4NRO	145.275	F2A/F3E	Atherton, Greater Manchester	Omnidirectional
	1930	G4TDO	144.160	A1A/J3E	Wolverhampton, West Midlands	Omnidirectional
	2000	G3WQK	144.775	F2A	Hailsham, East Sussex	Omnidirectional
	2000	G4INM	145.250	F2A/F3E	Chelmsford, Essex	Omnidirectional
	2000	G4KAR	144.775	F2A	Hailsham, East Sussex	Omnidirectional
	2030	G4PDP	144.250	A1A/J3E	Biggleswade, Bedfordshire	Omnidirectional
	2100	G3HQH	145.250	F2A/F3E	Stockport	Omnidirectional
	2100	G4EWK	144.850	F2A	Burton-on-Trent, Staffs	Beaming to the South West
	2115	GW2FOF	145.250	F2A/F3E	Porth, Mid Glamorgan	Omnidirectional
	2200	G3AWL	144.250	A1A/J3E	Easington, Co Durham	Omnidirectional
	2200	G4OJD	145.250	F2A/F3E	Brixham, Devon	Omnidirectional
	2200	G4RXR	144.250	A1A/J3E	Easington, Co Durham	Omnidirectional
	2230	GI4NRE	145.250	F2A/F3E	Enniskillen, Northern Ireland	
WED	1100	G4IAV	145.275	F2A/F3E	Atherton, Greater Manchester	Omnidirectional
	1400	G4OOC	145.250	F2A/F3E	Leeds, West Yorkshire	Omnidirectional
	1830	GW4OXB	145.275	F2A/F3E	Swansea, West Glamorgan	Omnidirectional
	1830	G3GNS	1.910	A1A	Locking, Avon	5 - 12 wpm
	1830	G3GNS	3.550	A1A	Locking, Avon	5 - 12 wpm
	1830	G3GNS	144.250	A1A	Locking, Avon	5 - 12 wpm

Day	Time	Callsign	Frequency	Modes	Town	Notes
	1830	G4TYF	145.250	F2A/F3E	Bishop Auckland, Co Durham	Omnidirectional
	1900	G2ABC	145.250	F2A/F3E	Truro, Cornwall	Omnidirectional
	1900	G3KWT	145.250	F2A/F3E	Leeds, West Yorkshire	
	1900	G3ZQS	145.250	F2A/F3E	Darwen, Lancs	Omnidirectional
	1900	G4DNB	28.450	A1A/J3E	Brighouse, West Yorkshire	Omnidirectional
	1900	G4ILD	145.250	F2A/F3E	Rishton, Lancs	Omnidirectional
	1915	GM4RSJ	145.250	A2A/F3E	Prestwick, Strathclyde	Omnidirectional
	1930	G4GBK	145.275	F2A/F3E	Atherton, Greater Manchester	Omnidirectional
	1930	G4IAV	145.275	F2A/F3E	Atherton, Greater Manchester	Omnidirectional
	1930	G4NRO	145.275	F2A/F3E	Atherton, Greater Manchester	Omnidirectional
	1930	G4SXU	145.250	F2A/F3E	Harrogate, North Yorkshire	Omnidirectional
	1930	G4VIT	144.160	A1A/J3E	Great Wyrley, West Midlands	Omnidirectional
	1930	G4WVX	144.625	F2A/F3E	Burnham, Bucks	Omnidirectional
	2000	GI4VSC	145.250	F2A/F3E	Belfast, Northern Ireland	
	2000	GJ4TXB	145.250	A1A	St Peter, Jersey, Channel Is	Omnidirectional
	2000	G2FXA	144.250	A1A/J3E	Stockton-on-Tees	Omnidirectional
	2000	G3SWP	144.250	A1A/J3E	Doncaster, South Yorkshire	Omnidirectional
	2000	G4INM	145.250	F2A/F3E	Chelmsford, Essex	Omnidirectional
	2000	G400	145.250	F2A/F3E	Spalding, Lincs	Omnidirectional
	2100	G3AVJ	145.250	F2A/F3E	Huyton, Merseyside	Omnidirectional
	2115	GW2FOF	145.250	F2A/F3E	Porth, Mid Glamorgan	Omnidirectional
	2130	GM4HYF	28.350	A1A	South East Glasgow	Omnidirectional
	2130	GM4HYF	145.250	F2A	South East Glasgow	Omnidirectional
	2200	G4KZZ	145.250	F2A/F3E	Coventry, West Midlands	Omnidirectional
THU	1030	G4YMK	144.250	A1A/J3E	Roehampton, South London	Omnidirectional
	1400	G400C	145.250	F2A/F3E	Leeds, West Yorkshire	Omnidirectional
	1830	GW40XB	145.275	F2A/F3E	Swansea, West Glamorgan	Omnidirectional
	1830	G3GNS	1.910	A1A	Locking, Avon	5 - 12 wpm
	1830	G3GNS	3.550	A1A	Locking, Avon	5 - 12 wpm
	1830	G3GNS	144.250	A1A	Locking, Avon	5 - 12 wpm
	1830	G4ILD	145.250	F2A/F3E	Rishton, Lancs	Omnidirectional
	1900	G3BLS	145.250	F2A	Osney, Oxford	Omnidirectional
	1900	G3ZQS	145.250	F2A/F3E	Darwen, Lancs	Omnidirectional
	1900	G4FEX	145.250	F2A/F3E	Horsley Woodhouse, Derbyshire	Omnidirectional
	1900	G4RS	3.565	A1A/J3E	Catterick, North Yorkshire	
	1900	G4RS	145.250	F2A/F3E	Catterick, North Yorkshire	Omnidirectional
	1915	GM4RSJ	145.250	A2A/F3E	Prestwick, Strathclyde	Omnidirectional
	1930	G3ASR	1.875	A1A/J3E	Harrow, Middx	1st & 3rd Thursdays
	1930	G4GBK	145.275	F2A/F3E	Atherton, Greater Manchester	Omnidirectional
	1930	G4IAV	145.275	F2A/F3E	Atherton, Greater Manchester	Omnidirectional
	1930	G4NRO	145.275	F2A/F3E	Atherton, Greater Manchester	Omnidirectional
	1930	G4ZPD	144.625	F2A/F3E	Fulham, London	Omnidirectional
	2000	G2ACZ	1.818	A1A	Mablethorpe, Lincs	
	2000	G3GMS	145.250	F2A/F3E	Whitley Bay, Tyne & Wear	Omnidirectional
	2000	G4INM	145.250	F2A/F3E	Chelmsford, Essex	Omnidirectional
	2030	G3ASR/A	1.875	A1A/J3E	Bushey, Herts	
	2100	G3AVJ	145.250	F2A/F3E	Huyton, Merseyside	Omnidirectional
	2100	G3WOR	144.250	A1A/J3E	Lancing, West Sussex	Horizontal to East & West
	2100	G4EWK	144.850	F2A	Burton-on-Trent, Staffs	Beaming to the South West
	2200	GM4HYF	28.350	A1A	South East Glasgow	Omnidirectional
	2200	GM4HYF	145.250	F2A	South East Glasgow	Omnidirectional
	2200	G4OJD	145.250	F2A/F3E	Brixham, Devon	Omnidirectional
FRI	1030	G4YMK	144.250	A1A/J3E	Roehampton, South London	Omnidirectional
	1830	GW40XB	145.275	F2A/F3E	Swansea, West Glamorgan	Omnidirectional
	1830	G3GNS	1.910	A1A	Locking, Avon	5 - 12 wpm
	1830	G3GNS	3.550	A1A	Locking, Avon	5 - 12 wpm
	1830	G3GNS	144.250	A1A	Locking, Avon	5 - 12 wpm
	1830	G4ILD	145.250	F2A/F3E	Rishton, Lancs	Omnidirectional
	1830	G4TYF	145.250	F2A/F3E	Bishop Auckland, Co Durham	Omnidirectional
	1900	G3ZQS	145.250	F2A/F3E	Darwen, Lancs	Omnidirectional
	1900	G4PJZ	145.250	F2A/F3E	Mapperley, Notts	Omnidirectional
	1930	G3HVI	145.250	F2A/F3E	Stoke-on-Trent, Staffs	Omnidirectional
	1930	G4GBK	145.275	F2A/F3E	Atherton, Greater Manchester	Omnidirectional
	1930	G4IAV	145.275	F2A/F3E	Atherton, Greater Manchester	Omnidirectional
	1930	G4NRO	145.275	F2A/F3E	Atherton, Greater Manchester	Omnidirectional
	1930	G4OBK	3.565	A1A/J3E	Chorley, Lancs	Omnidirectional
	1930	G4WVX	144.625	F2A/F3E	Burnham, Bucks	Omnidirectional
	2000	G3RR	145.550	F2A/F3E	Barnoldswick, Lancs	Omnidirectional
	2000	G4INM	145.250	F2A/F3E	Chelmsford, Essex	Omnidirectional
	2030	G3CAR	144.625	F2A/F3E	High Wycombe, Bucks	Omnidirectional
	2030	G4ODC	145.250	F2A/F3E	Norwich	Omnidirectional
	2030	G4RCI	145.250	F2A/F3E	Norwich	Omnidirectional
	2100	G3AVJ	145.250	F2A/F3E	Huyton, Merseyside	Omnidirectional
	2115	GW2FOF	145.250	F2A/F3E	Porth, Mid Glamorgan	Omnidirectional
	2200	G3AWL	144.250	A1A/J3E	Easington, Co Durham	Omnidirectional
	2200	G4RXR	144.250	A1A/J3E	Easington, Co Durham	Omnidirectional
SAT	1200	G3GNS	1.910	A1A	Locking, Avon	5 - 12 wpm
	1200	G3GNS	3.550	A1A	Locking, Avon	5 - 12 wpm
	1200	G3GNS	144.250	A1A	Locking, Avon	5 - 12 wpm
	1830	GW40XB	145.275	F2A/F3E	Swansea, West Glamorgan	Omnidirectional
	1930	G4TDO	144.160	A1A/J3E	Wolverhampton, West Midlands	Omnidirectional
	1930	G4VBL	144.625	F2A/F3E	West Kensington, London	Omnidirectional
	1930	G4XQI	145.275	F2A/F3E	Stockport, Greater Manchester	Omnidirectional
	2000	G4TKM	145.250	F2A/F3E	Birmingham	Omnidirectional
	2115	GW2FOF	145.250	F2A/F3E	Porth, Mid Glamorgan	Omnidirectional
SUN	0915	G3WNR	145.250	F2A/F3E	South Shields, Tyne & Wear	Omnidirectional
	0930	GW2FOF	145.250	F2A/F3E	Rhondda, Mid Glamorgan	Omnidirectional
	1015	G3CGD	1.875	A1A/A3E	Cheltenham, Glos	
	1100	G2FXA	1.910	A1A/J3E	Stockton-on-Tees	Omnidirectional
	1100	G3BLS	145.250	F2A	Osney, Oxford	Omnidirectional
	1200	G3GNS	1.910	A1A	Locking, Avon	5 - 12 wpm
	1200	G3GNS	3.550	A1A	Locking, Avon	5 - 12 wpm
	1200	G3GNS	144.250	A1A	Locking, Avon	5 - 12 wpm
	1200	G3HVI	145.250	F2A/F3E	Stoke-on-Trent, Staffs	Omnidirectional
	1200	G3PER	145.575	F2A/F3E	Heysham, Lancs	Omnidirectional
	1815	G3WNR	145.250	F2A/F3E	South Shields, Tyne & Wear	Omnidirectional
	1830	GW40XB	145.275	F2A/F3E	Swansea, West Glamorgan	Omnidirectional
	1830	G4NZU	145.250	F2A/F3E	West Bridgford, Notts	Omnidirectional
	1900	G4PYR	1.888	A1A/J3E	Solihull, West Midlands	
	1930	G3LDW	144.250	A1A/J3E	Halesowen, West Midlands	Omnidirectional
	1930	G4VBL	144.625	F2A/F3E	West Kensington, London	Omnidirectional
	1930	G4XQI	145.275	F2A/F3E	Stockport, Greater Manchester	Omnidirectional
	2000	G4TKM	145.425	F2A/F3E	Birmingham	Omnidirectional
	2005	G3OLU	145.375	F3E	Braintree, Essex	Omnidirectional
	2100	G3HQH	145.250	F2A/F3E	Stockport	Omnidirectional
	2100	G4EWK	144.850	F2A	Burton-on-Trent, Staffs	To South West
	2100	G4TET	145.250	F2A/F3E	Great Barr, Birmingham	Omnidirectional
	2130	G0BUW	144.250	A1A/J3E	Maidstone, Kent	Tilted polarisation to North & South
	2130	G3ORP	144.250	A1A/J3E	Maidstone, Kent	Tilted polarisation to North & South
	2200	G4OJD	145.250	F2A/F3E	Brixham, Devon	Omnidirectional

THE Members' Ads PAGES

FOR SALE ••••••••

COMMAND EQUIPMENT: BC454 RX 3-6MHz, BC455 RX 6-9.1MHz, BC456 modulator, BC457 TX, 4-5.3MHz, BC458 TX, 5.3-7MHz, offers? Eddystone 870A, £25. Another for spares FOC. Hallicrafters S38, poor, £2.50. Buyer collects or carriage extra. Please write G6BTO, QTHR.

KW2000 & psu, excellent standby rig for club, £170 ono. Harry Rice, tel: 038482-4441, 8am to 4.30pm.

TS830S HF TCVR ex condx with original packing etc £575. GM3WCS, QTHR, tel: 0383-726456.

FT103D HF RIG, FP103 psu, display needs attn, £430 Tri-band 3-ele beam, £60. IC202E, nicads, original packing, £95. Sota 100W linear, pre-amp, £95. MM432/28S cvtr, £22. G3SQA, QTHR, tel: 0602-625099

TRIO TR8400, 10W UHF TCVR with scanning mic & mobile mount, £185. MML432/50 UHF linear with pre-amp, 10W i/p 50W o/p, £85. Homebrew 144MHz 2N6084 pa & pre-amp, 10W i/p 50W o/p, £45. G8GHU, QTHR, tel: Weymouth 789022, evenings.

TERMINAL-BURROUGHS MT686 intelligent vdu, 3x1802 microprocessors +64k RAM c/w keyboard, requires monitor, £25. Monitor for MT686, £45. Modem Transdata 307 - 300 baud professional acoustic coupled, £30. Chas Mackinnon, GM8LMA, QTHR, tel: 0224-704844, daytime or 641695, evenings.

OSCILLOSCOPE NAGARD 311, double beam, 100uV/cm, manual, £35. Audio sig/gen, Marconi TF195M, manual £25. Muirhead FAX RX, D900, manual, £35. Induction motor, 1/2 HP, £10. Vintage Olivetti typewriter, £10. Buyer collects. G8CLG, Sunnycroft, Great Massingham, Norfolk, tel: 048 524-563.

HRO c/w mains psu, 6 coil packs, £45. BC221T 125kHz-20MHz c/w built-in mains psu & calibration £25. Payne, tel: West Haddon (078887) 684.

VHF MULTIMODE FDK MULTI 750E plus 8-ele Yagi, both vgc, £250. Neil, G0CBH, tel: 0924-451537.

FDK MULTI PALM 4 70cm handheld, 1W, FM, 6ch (SU8/SU20/RB2/RB6/RB11), gc, c/w nicads, chgr, c/case, helical & handbook, nearest offer to £85, delivery free. Steve, G4WXC, QTHR, tel: 0476-77708.

ICOM IC260E TCVR & MML144/40, vgc, £220. Ferguson, tel: 0463-241211.

HEATHKIT MICROPROCESSOR TRAINER ET3400 (for 6800) and course with interfacing experiments EE3401, unused, £200. G3GIQ, QTHR, tel: 01-567 6389.

FT200 HF TCVR with psu, ex condx & gwo, recently realigned, some spare valves available, very tidy clean radio, ideal for first HF radio, can deliver West Midlands only. G6ZMR, QTHR, tel: Tamworth (0827) 874010.

TEN-TEC 228 atu, swr bridge, 1.8-30MHz, 200W intermittent 100W continuous, switched for dummy load, bypass, coax's, 1/wire, twin feeder, vgc, gwo, £55. Sharp, tel: Derby 700610.

ICOM 271E, 25W multimode base/stn with muTek f/end vgc, £540. G0BQP, NOT QTHR, tel: 0642-590416.

IC251E TCVR with muTek board, £425. Tono 2m-90G linear amp, £105. SMC psu 8A, £30. Heathkit HW202 2m FM, 6ch xtal rig, no xtals, £40. G1GZA, QTHR, tel: Thornbury 412185.

EDDYSTONE EC10 Mk2, vgc, manual, ccts, mains unit, buyer collects, £75. WANTED: Atlas 215X with manuals in mint condx. Also wanted Trio R1000 cct diagram. G3FK, QTHR, tel: 0202-873175.

MICROWAVE MODULES' 144/100-S linear amp, £95. Drae 12A psu, £45. Welz CH-20A coaxial switch, £10. All items as new, try an offer! G4UWW, tel: Colchester (0206) 395720.

KW 2000B plus mains psu and handbook, £150. G0DKW, 36 George Avenue, Skegness, Lincs.

TRIO TS530SP, mint, 270Hz & 1.8kHz filters, £600. Jaybeam, new unused, £150. G3ICH, QTHR, tel: 0823-680234.

FT290 c/w soft case, nicads, helical, mobile mount £225. Telereader CW680 CW decoder, £90. Datong speech processor module, working, in diecast box, £25. G3RSJ, QTHR, tel: 0392-32797.

YAESU FT708R, as new, case, original packing etc, £130. Sony 7600D, dc adaptor, ex condx, £105. SMC T3-170L pwr/swr meter, £10. Drae wavemeter, £15. Post extra. G6XYZ, QTHR, tel: Radcliffe 2327.

TRIO TR9130 multimode mobile, gc c/w service manual, official mod for 10W low power, all modes, ideal for linear, offers over £340 (plus carriage) going FM only. G8PWA, QTHR (Poole).

ICOM IC251E with muTek, gc, £425. G4UFG, QTHR Manchester, tel: 061-633 7892.

SWAN 500 TCVR also matching psu/spkr, vgc, 480W pep, just been revalved, £250, buyer collects or pays carriage. G4SKQ, QTHR, tel: 0742-466530.

FT290R with 9-ele Tonna antenna & rotator, also Alinco linear, needs attention, £220. Sony ICF2001, £75. G3LIV RTTY BBC interface, £25. G4VJD, tel: Emsworth 374458.

YAESU FL2100Z HF linear with WARC bands, vgc, boxed, £425 ono. Peter, G1ELK, NOT QTHR, tel: 01-804 4565, after 6pm & weekends.

FT-ONE £1,200. Heathkit SB200, 1kW HF linear amp, £250. Both gc. Holland, G0BXR, 29 Heads Lane, Hessle, N Humberside, tel: 0482-643165.

MMT 432/50 tvtr, 50MHz IF, ideal for 70cm. G8AYY, QTHR, tel: 021-783 2996, evenings or weekends only

PRIME HF CONTEST & DX LOCATION in south Wales. 3 bed semi, gas fired heating, end plot, easy access to M4, £24,000. 60' tower, cables etc, negotiable. GW4BLE, tel: 0633-613756.

80m QRP CW TCVR (Howes modules) c/w stabilised psu, £60. Curtis chip iambic keyer, mains/battery c/w MK704 squeeze paddle on half inch steel base, £50. WANTED: 2off 813 bases. G3RB, QTHR, Tyneside, tel: 091-253 0504.

TRIO 9130 2m multimode, 2 hours use only, £375. M100M professional gen/cov RX, VLF-30MHz digital readout to 1Hz, all solid state, £600, offers? WANTED: Photographic equipment, equivalent value, HF TX/RX WHY? G6SFD, QTHR, tel: Dronfield 413413.

VERSATOWER P60, £350. Trio TR9500 70cm all mode, incl BO30, £295. Icom IC471 70cm base/stn, £585. All items gc. Banks, tel: Lymm (Cheshire) 3796, before 9pm please.

TRIO TR9000 2m multimode with PS10, headset mic, mobile mount, £310. TR9500 70cm multimode with mobile mount, £290. Both with wiring for base/stn use. If collected, both come with 10x ele beams. G8FQT, NOT QTHR, tel: 0403-56245/40414 (Horsham).

HALLICRAFTERS SX-117 RX, matching HT-37 TX, 180W SSB/CW, £250. Racal RA-17 RX, vgc, £120. KW77 RX, £90. KW Viceroy TX, £50. Codar PR-30, £20. SX-42 RX, £125. P/exch want FT7B. Shimizu SS105S QRP. 70cm Ringo. Black Star 600MHz counter. G4AFY, tel: Kidderminster (0562) 747480.

SHACK CLEARANCE: 10FM DNT40 29.310-29.7MHz, £25. NATO 2000 all mode 28.0-30.0 MHz 10W, £130. CI110 3-30MHz 120W solid-state linear, £55. Daiwa RF670 speech processor, £25. Lightweight rotator OK4 2m beam, £25. MMB11 bracket for 290,790, £12. G4TKP, QTHR, tel: Derby 383442.

FT290, nicads, MB10 chgr. FT708, NC7 70cm handheld also Palm IV chgr etc. EC10 Eddystone RX. R209 Army RX. R1155 aircraft RX. A14, RF amp, atu Army Manpack. A510 WW2 Manpack, complete stn. Brownie No.2 crystal set. Thandar 5MHz pulse generator. G4OFO, tel: 01-949 2317.

MARINE EQUIPMENT: Ocean Star 25W synthesised R/T, £125. 6ch handheld, nicads, £85. Ultrasonic depth sounder, brand new, 4 ranges, TV display, £85. Also Pye PF1 TX, £10. Creed teleprinter, good order, £20. Dymar L/B FM, 25W base, £45. G6HLK, tel: 0538-382117.

FT730R 70cm 10W mobile, 10 memories, £165. AOR240 140-150MHz 2m handheld, nicads & chgr, £85. FT202 2m handheld, 6ch, £60. TH21E, spare nicads, case, £135. 10W 70cm amp, £20. WANTED: cheap 2m mobile, 25W 2m linear. G6HLK, tel: Leek 382117, daytime.

DRESSLER D200S linear, £550. Dressler D200S linear £600. FT726R, 2m/70cm/sat/HF (10m/12m/15m) modules fitted, £950. Mutek GFBA144E, £80. Power splitter, 144MHz 2-way, £25. RF speech processor SP4RF, £40. ATU FC707, £65. G6HHH, QTHR, tel: Southampton 437888, evenings or weekends.

YAESU FT301 HF TCVR, matching psu, £295. MM144/28 tvtr, as new, £55. 4-ele 70MHz Jaybeam, new, £20. 14-ele Parabeam + 15m cable (used in 3 contests only), £20. 4-ele 144MHz Jaybeam quad, £10. Asahi swr/pwr meter, £8. Drake TV-3300-LP 1kW LPF, £10. Minns balun, 600-50 ohm, 1.5-30MHz, 750W pep, £15. 2off Dragon 32 computers, one faulty, c/w manual, 5 books on Dragon & demo cartridge, £65. Ex-PO psu +5V @ 2A, +12V @ 1A, -12V @ 1A, +24V @ 500mA and 5V floating @ 100mA, £20. Tandon TM100/2A double sided, double density disc drive, new c/w spares and manual, £60. Fluke 9010 micro system troubleshooter with Z80 and 6502 pods, a very powerful piece of test equipment, all popular 8/16/32 bit processors supported, c/w probes, manuals, tapes, etc, any offers? Soligor telephoto zoom lens, 90-230mm, £55. Ian, tel: 0202 825727.

REDIFON R408 professional communications RX, 13kHz-28MHz continuous coverage, 160Hz-8kHz variable bandwidth, ex condx c/w workshop manual, £390. Trio 7010 TCVR xtals & vfo, £85. G6MNX, QTHR tel: York 410146.

YAESU FT757GX HF TCVR, £600. BNOS LPM-144-10-180 linear, £220. Both c/w DTI stn report to verify clean o/p (at time of test). Mutek FT290R pre-amp, £22. MM 432MHz tvtr, 28MHz IF, £115. WANTED: IC451E. G4RNI, NOT QTHR, tel: Stanley (Co.Durham) 235569.

TIMESTEP ELECTRONICS satellite interface 2.0 c/w pwr lead & EPROM for BBC computer. Revco RS2000 scanning RX modified for satellite reception. Full documentation, (see my article HRT Oct '85), £320. G3RDG, NOT QTHR, tel: 01-455 8831.

FT209R, £195. HL45V 70cm 45W, £115. FRG7700M-ATV, £300. Sota 40W 2m linear, £45. 70cm+2m duplexer, £25. Trio 9130, £360. Customer collects. G4MHI, QTHR, tel: Ipswich 714563.

RSGB Members' Ads - seen by over 37,000 amateurs & SWLs each month

TONNA 5-ele crossed 2m Yagi, ex condx, £20 or exch for 2m colinear, 2m 7/8 mobile or WHY? G3NQX, tel: 09952-5590.

YAESU FRV7700D VHF cvtr, 118-130MHz, 140-150MHz & 70-80MHz. New condx, £30. G3ZZR, QTHR, tel: Witney (0993) 3792.

YAESU FT790R 70cm portable multimode TCVR with memories, scanning etc, immac, £250. Yagi antenna 70cm 8-over-8, 50' feeder, £15. Penury forces sale Jon, G6OYJ, QTHR, tel: Sevenoaks (0732) 456553.

FM BOARDS for Shimizu SS105, brand new, never used £50. GOCGN, QTHR (as G1BVY), tel: 0742-481158.

TR7800, 25W FM mobile, keypad entry, 15 memories, mic, mobile bracket, manual & box, gc, £160 cash, buyer collects. WANTED: Mobile bracket for Trio 3200 & manual for Tektronix 533 scope. G4PHC, QTHR tel: Minehead 6936.

COLLINS 30L-1 linear, latest production version, mint condx, virtually unused, ideal companion for KWM-2A or S-line, collectors item. Also 136B-2 noise blanker for KWM2/2A. G4DFU, QTHR, tel: 0602-626626.

ICOM IC2E, BC25E chgr, ICHM9 spkr/mic, vgc, incl vinyl case, operating manual, £115 ono. G8XMP, NOT QTHR, tel: 0724-872727.

TRANSVERTERS: 2m-70cm; MMT432/144, £110; SSB Products TV144-432, £75. 2m-HF; WPO Communications 20/15/10m tvtr, boxed, £80. Antennas: HQ1 Minibeam £65; Tonna 70cm 19-ele crossed, £15; Sonim 2m 9-ele crossed, £18. Datong D70 Morse tutor, £35. G4YBU, NOT QTHR, tel: 01-393 9691.

SMALL COLLECTION OF CLANDESTINE RADIOS. Incl B2 (container version) in near mint condx, rare 121 set type A and 128 set. Xtals & spare valves incl. Serious offers around £500. G4TMO, tel: Ottershaw (Surrey) 3892.

TRIO 2300 portable or mobile TCVR c/w nicads, chgr & accessories comprising kit built pre-amp & 10dB pa, 7/8 antenna (SMC78F) magnetic & wing bases plus cable & connectors, £110 ono. G1ELZ, QTHR, tel: 0980-24391, evenings.

HW8 QRP, 80-15m, fitted swr/pwr, RIT, frequency counter o/p, manual, vgc, c/w, matching solid state broadband linear, 80-10m vari pwr o/p, fully switched. Coutant psu 13.8V included, £150 ono or exch 2m SSB CW TX/RX. GOAYZ, tel: Gosport 589560.

SILENT KEY SALE: TS820S ext vfo, mic & spkr, £600 ono. KW107 atu, £30 ono. KW108 monitorscope, £90 ono. Catronics 180MHz counter, £50 ono. Katsumi keyer with sidetone, £15. Datong FL1, £30. Offers? G8ALR, QTHR, tel: 0264-23741.

TRIO TR7500 2m FM, £120. ITT Starphone 2m FM, £30. UHF Westminster fitted 8ch on 70cm, £75. PF70 3ch fitted, £50 plus battery chgr, £25. SF1 Starphone 70cm with batteries, £25. G4LUL, QTHR, tel: 0457-65185, after 7pm.

HF TCVR, home made with FL110 linear 15/20/80, bargain, £150. IC202, £50. 10m multimode 28.460-29.700MHz + psu, £35. Small rotator + 2m ZL, £24. WANTED: ALM203E or similar, mint only. John, G4RCU, NOT QTHR, tel: Rugby (0788) 68397, evenings.

TRIO TS530S, new bands, £450 ono. HF linear amp, 80-10m, professionaly built in two 19" cabinets. Single 4-400 passive grid, adjust, EHT, tapped primary auto-transformer, £150 ono. Many metal octals. G3FRB, QTHR, NO PHONE CALLS.

ALTAI GDO. Kenwood SW100 mobile meter for VHF. Kenwood separate spkr. Leader RF sig/gen LSG-16. Cumana 40T/S/S disc drive. Offers? Steve, G6SGA, 15 Elvington Crescent, Leconfield, HV17 7LD, tel: 0482-52116.

RX HEATHKIT RG1 gen/cov, mains, bfo, 1MHz marker, handbook, £35. Meters: 2.75" dia, 5mA, 20mA Weston, 30mA, 50mA Weston, 1mA USA, 500uA; 2" dia 1mA, 25mA, 30mA, 50mA; £3 ea. G3MBL, NOT QTHR, tel: Bury St.Edmunds (0284) 60984.

YAESU FT480R multimode TCVR c/w handbook, service manual, 5/8 whip antenna & mag-mount, vgc, £275. R1000 gen/cov RX, 200kHz-30MHz, AM/SSB/CW, handbook & service manual, excellent, £185. G3RDG, NOT QTHR, tel: 01-455 8831.

TIMESTEP ELECTRONICS weather satellite interface for BBC computer c/w ROM. Revco RS2000 AM/FM scanning RX, used with system, full documentation, all in £320. Pace Nightingale modem, still under guarantee c/w Commstar ROM. leads, manuals, £100. G3RDG, NOT QTHR, tel: 01-455 8831.

IC240, £90. Phillips FM321 70cm mobile Datong FL1, £35. Tono 1/3 in 50 out 2m linear, £45. MML432/50, £85. 4-ele 2m quad, £15. Eddystone diecast S-meter £45. HW12A plus new HP23B, £80. Alan, G4HMF, QTHR, tel: 0473-51319.

SHACK CLEAN-OUT: PC1, £95. TS130S, PS30, DFC230, £550. FC707 atu, £75. FT901DM, all options, FC901, SP120, £600. TR7930 25W mobile, £235. TR2300, £95. All gc, boxed, manuals, collect or pay carriage. MML432/50, £85. Alan, G4HMF, tel: 0473-51319.

SWAP FOR HW7, HW8, 10m FM box, Mizuho 2m SSB portable. Codar AT5 TX plus psu, leads, pristine condx. ZL1LH SSTV boards plus all IC's incl RAM cash adjustment as required. G4XBD, tel: Stevenage (0438) 62554.

FT757GX, FT757AT, FP757MD, ex condx, boxed, hardly used, £900 but will split. Thomas, tel: 021-449 6803.

YAESU CPV2500R, 2m FM TCVR, digital display, mems, keypad, mic, 25/3 o/p settings, a new o/p amp fiited, £150 ono. Tim, G1CMI, tel: Cheltenham (0452) 576411.

TW4000A by Trio/Kenwood, FM dual band TCVR for 2m & 70cm c/w the usual bits, £395. G4JEF, Suffolk, tel: Rattlesden (04493) 7764.

KW202 RX, vgc + handbook & spares, £100. Steve, GOCSH, Southport, tel: 0704-69013

HQ-1 2-ele triband Minibeam, vgc c/w 25m UR67 coax + extra frequency spokes, on tower 7 months only, unclaimed order, £60 purchaser pays carriage very good bargain. G4MVW, QTHR, tel: 0202-36306.

FT290R c/w chgr, nicads, case & strap, unmodified, gc, £215. Mike, G4TVP, QTHR, tel: 0473-76667.

TRIO TS780 2m & 70cm multimode, as new, unused, still under guarantee, £800 ono, genuine reason for sale. G1HBO, QTHR, tel: 01-898 0996.

SM30 mast, inner tube + cable, new, £25 + haulage. GM4XEQ, tel: 0292-268055. Multiscope Yaesu YO-901, vgc, connection cables, £250. GM4XEQ, tel: 0292-268055. HQ1 mini-beam, boxed, used 6 months, spare spokes, £100. GM4XEQ, QTHR, tel: 0292-268055.

BBC B, Viglen (tec) 80/40 track disc drive, incl DFS utilities disc & interface components (except 8271 controller), £100. Acorn teletext adaptor, £150. GOC software *RTTY ROM (incl TU details), £15. Also various games & books. G4BXT, QTHR, tel: 0322-77401.

MULTI U11 70cm scanning TCVR ex orig condx, mic, mobile mount, very little use, £140. Icom IC22A 2m TCVR, vgc, mic, mobile mount, £120. Lunar modules HF amp, HF3-100L2 10W in/ 100W out, suit TS120/130V FT7 etc, original condx, 2hrs use, £125 G4GDM, Wirral, tel: 051-334 1819.

HRO, £30. Band spread coils, £5. RX1224, £15. BC221E, £25. Mini-mitter, £20. KW Vanguard, £25. Band checker, £5. Layfayette vfo, £12. Epsom area, buyer collects. Potter, tel: Ashtead 72689, after 6pm.

ICOM IC27E 25W 2m multimode base stn only 3 months old, £550. Hansen pep/rms swr/pwr meter, 50-150MHz £50. G8ETD, QTHR, tel: 0793-694479, evenings.

HF5V 5-band vertical antenna c/w radial kit, ex condx, £65. G3BFL, QTHR, tel: 0635-298492.

YAESU FT107M with DMS (for split freq working) 500Hz CW filter, all solid state, 160-10m, very reliable, £450 or £510 with FP107E 20A psu/spkr. WANTED: TS930S in gc. G4OBK, tel: Chorley 74451.

SEVERAL STORNO CQM614 (hi-band 10ch FM boot mount, most with control units), £25ea. Several ITT Star (hi-band 5ch FM dash mount, most with spkrs) £35ea These radio telephones are all solid-state & easily converted to 2m. G3RIK, tel: Rochdale 33400 after 7pm.

JVC CX610UB multi-standard 6" colour TV, VHF/UHF PAL/SECAM, complete with nicad pack, carrying case & dc lead, £245 ono. Thandar TF200 freq counter in original packing, £125. Sony ICF7600 RX in gc, £105. Pentax MF with power winder, £120. G6JNS, tel: 0905-620041, anytime.

SEM TRANSMATCH 3.5-30MHz, £45. G4HMC, QTHR, tel: 01-878 5303.

SIDEWAYS ROM/RAM expansion for BBC micro CVX16 by Computer Village, £15. Hitachi V202F dual beam scope, 20MHz, £225 or exch for SM220 stn monitor with BS8 panadaptor with cash adjustment. Tektronix 202-2 scope trolly, £20. G4RKO, NOT QTHR tel: 0635-60263.

30' TOWER, 3 boxed sections, tilt-over c/w base post, winch, £245. Calder, tel: Brentwood (0277) 228525 or Ingrebourne 45470.

DRAKE TR4 HF SSB/CW TCVR, new valves, £275 ono. Solartron CT436 dual trace scope + probes, £25 ono Buyer collects. G8RWG, QTHR, tel: Camberley 32195.

YAESU FT102 HF TCVR, first class condx, handbook, mic, original packing, used for standby only, £525 G3PJK, QTHR, tel: 061-643 3213, after 7pm.

FT209R plus PA3 chgr & MH12 spkr/mic, 12 months old, boxed, £190 ono. Complete set of working Omega modules, case etc, phone for details. Wordwise+ EPROM for BBC in original packing, £30. Forth 85 EPROM, £30. Evans, tel: 051-228 3237.

WESTOWER 42' heavy duty telescopic tilt-over galvanised lattice tower, Emoto rotator, TET 3-ele tri-band Yagi, £420 complete. LCL TCVR, DNT TCVR, both converted 29.3-29.7MHz, £25ea. Cubical quad steel spider, £10. G4TXV, tel: Kidderminster 515305.

TRS80 model 1, level 2, 48k, manual, books and software, bargain, £40. G4CRU, QTHR, daytime tel: 061-439 5050 extn 3450.

LIGHT DUTY ROTATOR, control box, 20m cable, 8-ele SQY 2m antenna. G1GPE, NOT QTHR, tel: Leamington Spa 30178.

YAESU FT730R 70cm 10W FM mobile TCVR, unused in maker's packing, £200 ono carriage at cost. G1JNR, QTHR, tel: 0252-25165, evenings.

MICROWAVE MODULES 23cm tvtr, latest model with GaAsFET pre-amp, little used, £165. Trio JR599 custom special RX, vgc, 160-2m, £125. HF5 vertical antenna, 80-10m, used RX only, £40. All ono and as new. Baxter, tel: Huddersfield 666497.

YAESU FT101E, £300. FC107 atu, £75. FT207R, NC3A chgr/psu, YM24 spkr/mic, £175. Datong D70 Morse tutor, £40. HF5V/HF5R ant, £50. Morse key, £20. All vgc c/w manuals etc. Martin Swain, G4HZK, QTHR tel: 0734-723512, anytime.

COMPLETE STATION: FT290R, MM25L, Welz 100W pwr/swr meter, AP3 speech processor, 12-ele ZL, wall brackets, pole, 2off psu's, 27' portable mast plus 12-ele ZL plus cables, AR250 rotator plus cables. £350. G1NBO, 9 Althorpe Way, Stretton, Burton-on-Trent.

TRIO TH21E 2m handheld with chgr & spare battery pack, £130. Tonna 23cm 23-ele, never used outside, £20. Jaybeam MBM48 70cm 48-ele, £20. All ono. G3ILO, tel: Nailsworth (0453 83) 3411.

FC707 atu, vgc, £75. HK708 key, boxed, £10. SMC DL150 50/150W, £10. Mirage 2m linear, 25W i/p 160W o/p, pre-amp, £75. Consider exch 2m handheld or WHY? GODJH. NOT QTHR, tel: 07372-40815, evenings.

OLD COSSOR 1035 d/beam scope, manual, some spare valves. Also B40 RX manual reasonable condx. WANTED: help, advice, ccts etc, replacing valved if RX stage with transistors (frequencies 500 and 800kHz), offers? Chris, G6YAH, tel: Reigate 22200.

LEAK STEREO '20' AMP, varislope pre-amp, trough line 2 FM tuner, GL75, Philips stereo cassette recorder, KEF spkr's, all in vgc, buyer collects, offers? G4FXS, tel: 021-458 3537.

HF5 VERTICAL ANTENNA, 10-80m + radial kit, £45 ono Also Pye Westminster WF15FM 2m, xtals R6/S20 fitted, c/w service manual, any reasonable offer considered for good home. Brian, tel: 0422-206539.

VERSATOWER P60 c/w safety brake winches, HR2 rotary bearing, vgc, new £760, sell £500. MET 19-ele, £25. Don Hughes, G8WPL, 12 Spencer Street, Reddish, Stockport, SK5 6UH.

TRIO 120V TCVR with psu, immac, boxed, as new, with manual. Also swr/pwr meter & HF5 antenna c/w radial kit, unused & boxed, 30' low-loss cable if buyer collects. £350 the lot. G3VNP, QTHR, tel: 0245-74335.

TRIO SEPARATES, TX599 & JR-599, connecting cables, manuals, LS. all in vgc & perfect w/order, £300. James, GM4MKU, QTHR, tel: Lossiemouth (0343 81) 2626, after 6pm.

YAESU FT902DM, ex condx, £550. G3ZIF, QTHR, tel: Huddersfield 863936.

TB3 TRI-BANDER, brand new, never used, also KR600RC rotator, brand new, still in box with cables. Reason for sale, moving to new QTH, £350. No time wasters please! GW4YLF, QTHR, tel: 0443-730492.

EX-ARMY R107 RX in w/order c/w workshop manual, 240V or 12V, 1.2-17.5MHz, reasonable offers around £15 to collectors. G6NVL.

TR3200 70cm 12ch FM, £120. Bremi 10A psu, vgc, £50 Duplexer HS-770, £10. 70cm mobile colinear & mount £10. Box of 120 xtals, offers. 70cm 21-ele Tonna, 9-ele 70cm antenna, rotator, £25. Alex, G6YYU, QTHR, tel: Wymondham (0953) 604626.

FT101ZD Mk3 incl fan, fitted FM board, manual, recently overhauled, £500 or would swap for FT290R multimode with nicads, chgr etc and cash

adjustment. Each pay postage. Phone Joe and have a chat, tel: 0227-455725, evenings or weekends.

COLLINS KWM380, full line-up, pristine condx, 14 months old, offers? G4TTS, QTHR, tel: 0533-857652.

SATELLITE TRACKING SYSTEM, comprising 144/432 Tonna antennas, g/fibre boom, KR-5400/5600 rotator long cables, phasing harness, controller and software by G4GPQ for auto control by BBC B, £275. Yaesu FT726R with 2m/70cm/satellite boards, muTek pre-amps, £850. Apple 2+, 2 disc drives, monitor, over 200 programs (RTTY, mailbox, beacon), Amptor, SSTV with ST5/6 (Toni-Tuna) TU & Transtel printer, £675. BNOS 25A psu, £90. Anton, G4SCR, QTHR, tel: 01-997 1416.

SILENT KEY SALE: Skyking rotator, £90. Mirage B108 £70. Trio 7500 2m FM, £50. KW Ezematch, £40. Oskerblock swr/pwr, £40. Subtronics frequency counter, £50. 9-ele X-Tonna with UR67, £25. FRV7700 118-160MHz tvtr, £30. Microdot CW/RTTY RX/TX, £300. Datong up-cvtr, £40. Video Genie 32k, CW TX/RX, £80. B&W monitor, 2ch, £40. Various items, mics etc, offers? Dave, G4NIP, QTHR Reading area, tel: 0734-733626, (24hr).

BBC RTTY TERMINAL UNIT, £30. FM board for Yaesu FT707 or FT107, £55. 10m conversion kit for 11m multimode, will fit if required for £5, full 29-30MHz coverage. G4ODM, QTHR, tel: 0256-26050.

ICOM FL32 CW filter, 500Hz, 9MHz IF, little used, removed from IC735, £27 p&p paid. G3ZNF, QTHR, tel: 0509-502432.

BC342, £50. BC221 with charts, £25. Command TX's, £10ea. Misc pre-war valves & components, hand generator c1910-1920, offers? Cowl Gill motor, £10 G3LYP, QTHR, tel: High Wycombe 881298.

ICOM AT100 auto, near mint condx, £235 ono. No time wasters please! Rowe, tel: Gainsborough (0427) 5266.

TRIO TW4000A, £420. R2000 RX with YG455CN CW xtal filter, £335. Both mint condx. Datong AD270 active antenna, £25. Buyer collects. GM6IZX, QTHR, tel: 041-339 4552, evenings.

TRIO TS780S VHF/UHF multimode, gc, sale due to HF purchase, £650 or consider exch or part exch on good quality HF rig, pref with gen/cov. WANTED: Heavy duty rotator. G6ZYC, NOT QTHR, tel: Rushden 318493.

TRIO TR8400 synthesised 70cm FM TCVR, £135. Mizuho SB-2M 2m SSB TCVR, £75. Mizuho LA2X 2m 10W linear, £20. Solartron CD523S scope, £20. VDU+keyboard ADM3A, £125. FRG7 RX 0.5-30MHz, £120. Polyskop 400MHz, £175. Heathkit SB620 scanalyser, £85. G3MCD, tel: 01-455 7093.

50MHz SPECTRUM tvtr, 20W o/p, 28MHz IF, worked W/VE/LA/CT etc, £95. 4m 100W linear, MMT70/100, £120 WANTED: Paper/developer for Plessey KD111 fax machine or info on supplier. FT901 accessories. MMT28/144. Coil winder. G3AZI, QTHR, tel: 0772-37815.

ICR70 GEN/COV RX, 150kHz-30MHz, fitted FM board, mint, manual, £425. Tandy DX302 gen/cov RX, digital readout, mains/12V, manual, £130. Sony ICF2001 gen/cov RX c/w psu, manual, £85. Mirror trailer tent, new braked chassis, awning, spare wheel, £175. G1JTE, QTHR, tel: 01-989 3686.

TWO POCKET WATCH TYPE VOLTMETERS, offers please. Also VHF-UHF Manual, 3rd ed, £3.50. GM4IIR, NOT QTHR, tel: Lanark (0555) 4420.

CLASSIC RTTY STATION, professional build in rack, chrome handles etc, incl 444 & manual, psu, jack field, TU, 5" CR shift monitor, 2 afsk oscs, suit club or youth training, deal can be struck. G8LT, QTHR, tel: Towcester 860321.

YAESU FT480R 2m multimode, vgc, mobile mount, £275 would exch for FT290 c/w all accessories. Eddystone gen/cov RX 840A, ex condx, £50. Advance sig/gen SG62, £10 c/w leads. Reasonable offers considered, buyer collects etc. G1AFW, QTHR, tel: 0795-876447, evenings.

ICOM 751, with internal psu, speech board and keypad, unused, reason for sale - an inbuilt inability to pass the Morse test! Sensible offers. G8HTG, QTHR, tel: 01-868 2516.

HEATHKIT APACHE TX & Mohawk RX plus SB10 unit, TX requires attn LT heater rectifier cct, RX working order, large units 60lBs ea but vg appearance. All units with handbooks. Exasperated OAP owner now handicapped. Offers? G3YNL, QTHR, tel: 0423-884568

UHF swr/pwr meter, Daiwa type 650, as new in original packing, £65. Coaxial relay type CX5200, £20. Memopak 32k RAM for ZX81 computer, £5. Mutek 2m pre-amp SLNA144S, as new, £25. Burnard, tel: Newport Pagnell (0908) 613523.

NAG 144XL 2m valve linear, 200W FM, 250W SSB, vgc, £350 ono. GODCQ, NOT QTHR, tel: 04215-69901, anytime.

TRIO TR9000 2m multimode, vgc, £230. MML 50W linear/pre-amp, 4 months old, £70. BNOS psu, 12V @ 6A, auto overload shutdown, £50, psu powers TCVR & linear on SSB, interested? Dave, G1HVP, tel: Crewe 257578, after 6pm.

DAIWA LA2060 linear amp, 1-3W i/p, 60W o/p, £55. 19-ele 70cm Metalfayre beam, still in pkt, £25. Trio 9000 multimode, £260. Daiwa 7500A rotator, £85. Top bearing £17. Tower, 50' tilting, £165. G4SYR, QTHR, tel: 01-554 3544.

DAI COLOUR COMPUTER, cost £550, perfect, unused, £250. 5.25" disc drives, Shuggart, £30ea. Pye PF70 3ch xtalled RB14/RB10/SU8, £50. Pye UHF Olympic, £70. Fax machine, working, £50. MX-80 F/T + RS232, offers? All ono. Dilworth, tel: 0473-311665.

50MHz PW 'MEON' tvtr with valve linear 829B, all psu's, cabinet, working on RX,needs aligning, lost interest, £50. Jaybeam 2m 5XY, £12. 500W trans 240-415V pri, 4x 56V sec, £15. 2off panel mounting DVM's, 3.5, 1.999V mains, £5 ea. Folded dipole 300 ohm ribbon + feeder 132', £7. Big Parmeko trans 650/350 + LT's, £12. Doppler radar unit 10.7GHz, mains, in die-cast cases, £20. G3KPW, QTHR, tel: Camborne 717612.

NASCOM 2 Microcomputer system housed in smart computer case, fitted with NAS-SYS 3 monitor, 16k memory expandable to 64k, Nascom ROM basic, Naspen text editor & Zeap assembler in EPROM. UHF or video o/p's, serial & parallel ports, c/w Nascom Imp printer F/T feed, Cotron 12" B&W monitor, cassette data recorder & Crystal extended basic on cassette, full documentation on all hardware & software plus other info, £190. Buyer collects. G4KLT, QTHR, tel: 0706-46428, evenings.

TR9130 2m multimode boxed accessories, £325. Sharp MZ80K, tapes, manual, £230. KW202 RX, spkr, manual £90. Lowe ASV-1515 2m RX, 12ch, spare xtals, 240V or 12V, £15. Can help deliver London/S.East. GM4WGC, QTHR, tel: 0259-216349, Saturdays only.

TRIO R1000 RX 0-30MHz, ideal swl & mobile use, 12V & 240V, no trouble from new, £225 ono. Also Cobra 148GTL II, no mods, ex audio un-locked, ideal 10FM always Q5, £110 ono. G4ZJY, QTHR.

YAESU FTDX560 QRO HF TCVR, £175. FV400S vfo to match, £35. Belcom Liner 2, £65. KDK 144MHz FM 25W mobile, £125. Sun 144MHz colinear, £25 possible exch 70cm TCVR. G1GLJ, NOT QTHR, tel: Swindon (0793) 874614.

FLUKE DIGITAL MULTIMETER model 8020A 20Mohm/V two conductance ranges AC/DC to 1000V DC and 750V AC, ex condx with case & manual, value £170 accept £85 ovno. G0BLS, NOT QTHR, tel: 0527-500130 after 6pm.

KW107 SUPERMATCH atu, mint condx, £125. Rotator mast clamps, £4. Mutek TVI filter, £2. "Secrets of Ham Radio DXing", £5. "Complete DXer" W9KNI, £5 all items as new. 2m mag/mount mobile antenna, £8. Witney, tel: 0376-84478, evenings.

KW2000B HF TCVR 160-10m, KW E-zee match atu. TCVR recently serviced by KW, gc, £175 ono. G4XUT, QTHR Swindon, Wilts, tel: 0793-25662.

SX200N SCANNING RX + discone antenna, £205 ovno. Adler 120p printout type mains operated calculator working order, £10 ono. Majestic domestic radio USA origin, early 1930's, no cabinet, suitable restoration project, offers? John, G6FRB, QTHR, tel: Worcester (0905) 421182.

TR2400 handheld, leather case, batteries, chgr, aerial etc, £135. Approx 120' UR67 50 ohm h/duty coax, new, £17. G3ZLS, QTHR, tel: Knowle 70235.

HRO HF RX, c/w psu, all gen/cov coil packs, unmodded, working, buyer collects, £40 ono. Read, tel: 0734-425291, after 6pm.

ICOM 251E multimode, muTek board, mint, £450. 10m TCVR, 28-29.8MHz multimode, £110. Telequipment D43 dual trace scope, mint, £55. Ron, GW4RKZ, QTHR S.Wales, tel: 0443-673000.

YAESU FT-221RD, £300. Yaesu FT102, £450. Yaesu FRG7, £90. Standard 8900 mobile, £150. Hansen swr/pwr meter, £10. 2m 4-over-4, Hirschman rotator £30 complete. Roberts, tel: 0203-444428.

TS830M nine-band HF TCVR, ex condx, little used, original packing etc, £620. G4RUR, NOT QTHR, tel: Newbury (0635) 46856.

VERSATOWER P40 less groundpost, £250 buyer collects. GM2FHH, QTHR, tel: 0224-324495, evenings

DRAGON 64k computer, ex condx + B&W 12" TV, £70. Telewriter word processor package on 5.25" disc c/w manual, £10. Complete set (52) of "Input" magazine, ex condx, £28 incl p&p. G4LTM, QTHR, tel: 061-351 1152.

EDDYSTONE 840C, beautiful as new condx, sell or swap for complete unmodified Marconi Atlanta vintage American conbined valve tester/multimeter, Supreme 540-A, ripe for restoration with manual, £10. Hundreds of early valves, cheap. Jim, G4XWD, tel: Kidderminster 3674, evenings.

ICOM IC290D 2m rig c/w MM 2m pre-amp, in ex condx, few hours use only, £350. Arthur, G1NVW, tel: 0242 67-5632.

WANTED••••••••••

HEATHKIT Q Multipliers, QPM1, QPM16, Crystal calibrator CL-1, loudspeaker SG-4. Correct mains transformer & o/p transformer for Hallicrafters SX28. Also pre-war or post-war Hallicrafters & National RX's. Range 2 coil for MCR1. G4HHZ, QTHR, tel: 0962-822401, daytime or 04215-68705, evening.

HEAVY DUTY ROTATOR new, old or faulty unit considered. Also Icom filters FL44A, FL52A & FL45. Icom FM unit type IC-EX-242. Hustler mobile loading coil for 28MHz. Faulty quality HF gen/cov RX. G3TA, QTHR Glos, tel: Miserden 571.

PYE Labgear Compac 8, HF SSB 2-9MHz. G3IAG, QTHR, tel: 0638-730373.

FT790, linear FL7010. VHF/UHF scanner SX200N or AR2001 or similar. 20A (at least) psu, commercial or h/brew if neat and regulated. 70cm & 2m beams, must be gc. Mobile mount for FT290. Phil, G4WMO, tel: Lincoln (0522) 752563.

DRAKE R7A RX, must be in first class condx. G3NSM, QTHR, tel: Oxford (0865) 56321.

GENERAL COVERAGE RX, ICR70/71 or similar high quality RX. G6POR, QTHR, tel: Letchworth 683189.

DRAKE MN2700. Any info on Advance Electronics sig/gen E2, loan or purchase, all costs refunded. FOR SALE: New unused Brother M1009 dot matrix printer. G3ONU, QTHR, tel: 0923-676344.

70cm LINEAR using 2C39 valve ie EDL-432P. G6OKB, QTHR, tel: 0843-821260.

TS700G or S or exch for TR9130. G4MEJ, QTHR, tel: Bedford 712865, after 5pm.

YAESU 70cm module for FTV700, same as FTV107R. Steve, G4STE, QTHR, tel: 0789-763855.

I NEED COMPONENTS for the K2RIW 70cm amp. SK620A bases required & any other useful bits & pieces. Complete or unfinished projects considered. Good money waiting for the right gear. Would like to hear from other constructors. Ron, G4SHC, QTHR, tel: 0706-350748.

ICOM IC202S SSB/CW 2m TCVR in gwo needed. Offers to Rod McMillan, G2CWY, QTHR, tel: 01-445 2508.

CUSHCRAFT R3 ANTENNA. Also following ex Army equipment: psu for WS22 any condx; high power & standard vario for WS19, WS21, WS48 & WS62. Morriss, G4GEN, QTHR, tel: 082571-2205.

HANDLE & FRONT ENDPLATES & full manual for Solartron A100 scope, good price paid or loan me your manual for photocopy & expenses returned. Also want good scope leads x1, x10, x100 if cheap. G6MMG, QTHR, tel: 051-430 9167.

TRIO TS430S, gc. G6JNS, tel: 0905-620041, anytime.

PAIR 813 VALVES, new condx or good please. Reasonable price paid. GM3AHR, QTHR, tel: 0333-311770.

AR30 ROTATOR CONTROL BOX, will buy complete rotator if sensibly priced. Also wanted, Jaybeam TB1, GM3HAT DOD pref covering 40/80. Also gc gdo Altai etc. Terry, tel: 0634-64962.

YAESU FTV901R tvtr with at least 2m module, will sell or part exch my FV901 vfo. G3VYP, QTHR, near Ludlow (Yarpole), tel: 056 885 296.

EXCHANGE FT790R multimode TCVR c/w car mountings (also fit FT290), chgr etc, for Icom IC04E. G6DRJ, QTHR, tel: 044 482-617.

TRIO SPEAKER UNIT for TS930. G3AOS, 3 Church View, Sutton Lane End, near Macclesfield, SK11 0DT, tel: 02605-2764.

FV901DM, must be in gc and at a reasonable cost. G1NOH, tel: 05436-75301, after 6.30pm.

YAESU FRA7700 ACTIVE ANTENNA, must be in gc. Also Yaesu FRG8800 RX. FOR SALE: Trio R2000 with VC10

cvtr, £425. Wood, tel: Clochen 378.

ANY OLD CHEAP COMPUTER, eg ZX81, VIC20, working or not. G1FEF, NOT QTHR, tel: 06285-26003.

PAIR 587 BLY TRANSISTORS. GD3FXN, QTHR, tel: (Day) 0624-75646 or (evenings) 0624-851737.

ANY INFORMATION regarding the Quasar 720 25W/1W marine VHF TCVR (cct diagram, repair manuals etc) to photocopy or buy. Any help gratefully received. Joe, G6WPH, NOT QTHR, 92 Manor Abbey Road, Halesowen, West Midlands, B62 0AA.

XTALS, glass encapsulated, fundamental holder HC6U 3.5MHz to 3.8MHz. G3IPV, QTHR.

INFORMATION REQUIRED on valve voltmeter, Furzehill Laboratories type 378B/2, handbook, service manual anything appreciated, will purchase or pay copying costs. Also required, Bencher paddle. G3EAO, QTHR, tel: 0932-228722.

OSCILLOSCOPE, type Scopex 456, 4D10 or similar in gc. G3GC, QTHR, tel: Yeovil (0935) 75533.

SP120 MATCHING EX/SPKR for FT221R, good price paid and costs. Nixon, tel: 01-980 3283, after 6pm.

SPEAKER UNIT with audio filter: Yaesu SP901P, SP980, SP102, Trio SP230, SP930. G2FXS, QTHR, tel: 0632-572852.

EMI WM26 oscilloscope manual for purchase or copying. G4ZZS, QTHR, tel: Stafford (0785) 664667.

MARCONI MERCURY 1017 RX. Also Heath RA1 RX & Codar 250/S (AT5) pwr units plus vintage Eddystone and Raymart plug-in coils. Write with price & condx to Marris, 35 Kingswood House, Farnham Road, Slough, Berks, SL2 1DA.

TELEFUNKEN AZ11 valve for WW2 RX. G1EAD, QTHR, tel: 0579-43233, (work).

Conditions of Acceptance

These subsidised flat-rate advertisements are accepted as a service to members of the RSGB only. They must be submitted on the Members' Ad form printed on the back of a recent address label carrier used to mail RadCom to the advertiser: this will automatically provide proof of membership and should not be more than 2 months old. No acknowledgement of receipt will be sent and advertisements not clearly worded, or which do not comply with the conditions of acceptance, will be rejected. No correspondence concerning this service will be entered into.

Trade or business advertisements, even from members, will not be accepted for "Members' Ads", these should be submitted as "Classified " or "Display" advertisements in the usual way. Traders who are members must enclose a signed declaration that the items for sale or wanted are part of, or intended for, their own personal amateur station.

The RSGB reserves the right to refuse advertisements and accepts no responsibility for errors or omissions, or for the quality of goods offered for sale. Advertisements for 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 - Tranceiver
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.
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Access

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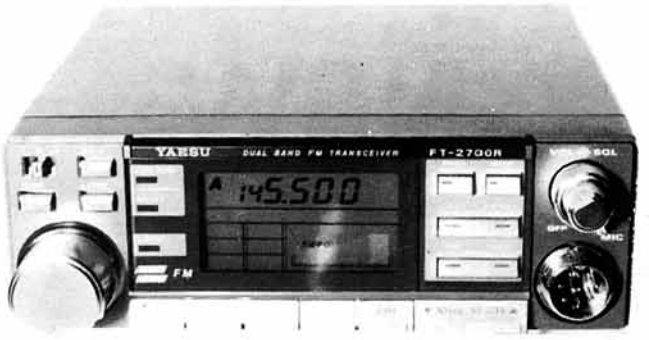

2M & 70cm FULL DUPLEX FT2700RH

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.

SCANNING
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 stages make this the first mobile transceiver capable of *true* full duplex cross-band operation.

PRIORITY
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!

CROSS BAND
Independently programmable transmit and receive frequencies, standard repeater shifts (with reverse facility), offers total freedom of operation.

READOUT
The large green back-lit dimmable LCD offers an aesthetically pleasing and easy to read display of the complete operating status of the transceiver, including memory and reverse repeater indications at a glance. The PO/S meter incorporated in the main display is a distinctive graphical two colour type. (Optional Voice Synthesiser available, see FT270R/RH text.)

The FT270RH 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 FT270RH, with fan assisted cooling provides 45W RF output. It is also fitted with a "low power switch which provides around 10% of full output.

DISPLAY
The FT270RH uses a high visibility back-lit LCD, with large 5mm ditis, providing a readout of frequency and all important transceiver functions. Pleasant green illumination and newly developed wide angle LCD ensure easy visibility day or night from most angles.

MICROPROCESSORS
The dual 4-bit microprocessors of the FT270RH provides 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.

MEMORIES
The FT270RH cn memorise a number of scanning parameters for maximising performance. Upper and lower limits may be set (tor 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.

VOICE SYNTHESISER
For easier and safer 'eyes on thé 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.

45 WATTS OUTPUT FT270RH

GENERAL SPECIFICATIONS

Mode	: FM (F3, G3E)	Antenna	: 50ohms, unbalanced
Supply	: 13.8V ± 15%	Modulation	: Variable reactance
Circuit	: Double Conversion	Deviation	: ± 5KHz
	: 21.6MHz, 455KHz	Tone Burst	: 1,750Hz
Sensitivity	: 0.2μV @ 12dB Sinad	Spurious	: −60dB (or better)
	: 1.0μV @ 30dB Sinad	Maximum BW	: 16KHz
Selectivity	: 14KHz −6dB	Microphone	: 600ohms, nominal
	: 28KHz −60dB	Temperature	: −10°C + 60°C
Image	: −60dB (or better)		
Audio	: 4 to 16ohms	**OPTIONS**	
	: 2W in 8ohms (10% THD)	FVS-1, MF-1B3B, SP55, YH1, S810	

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

FT270RH.

Frequency	: 144-146MHz
Power out	: RH; 45W/5W
Supply	: RH; 9A/3.5A Tx
	: 0.6A (Sq Rx) RH
Stability	: ± 10ppm (−5 +50°C)

DIMENSIONS: (Ex/Inc Projections)
140W, 40H, 143/175D mm, 1.25Kg

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