July 1986

RADio COMmunication

RSGB NATIONAL MOBILE RALLY

SUNDAY 3 AUGUST 1986

From 10am

Woburn Abbey, Beds
(Coach Park Site)

Photograph of Woburn Abbey reproduced by kind permission of the Marquis of Tavistock

- Large trade exhibition
- RSGB bookstall and enquiries stand
- Members' Mart (All under cover)
- Raynet stand
- BARTG stand

Members' Mart this year will be charged at **£3 per hour per table**, which will enable members to sell direct. Tables will be offered on a first-come first-served basis but will not be available before 10am.

The RSGB makes no charge for entrance to the rally but all visitors must pay for entrance to Woburn Park, in which the rally takes place, at **£1.50 per car including passengers.**

All the normal Woburn attractions will be available at small extra charges. Various bars and cafés are available nearby.

HOW TO GET THERE

Via the M1—Leave the M1 from north or south at intersection 13, **not 12 as signposted.** After leaving the motorway follow signposts through Husborne Crawley to Woburn Abbey.
From the south via the A5—Turn right at Hockliffe and follow the A50 to Woburn.
From the north via the A5—Turn left at A418, five miles south of Fenny Stratford, and follow to Woburn.
From other directions make for the points indicated above and proceed as indicated.

Avoid routes signposted to "The Wild Animal Kingdom" or "Game Reserve". The rally takes place in Woburn Park and correct routes are signposted to "Woburn Park" or "The Abbey". Also watch for RSGB signs.

Usual talk-in facilities will be in operation by Dunstable Downs RC on 144 and 432MHz.

All enquiries regarding this event should be made to Norman Miller, G3MVV, 180 Warley Hill, Brentwood, Essex CM14 5HF.

Journal of the Radio Society of Great Britain

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

ICOM IC 745

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

IC 751A

NEW FROM YAESU — FL7000

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

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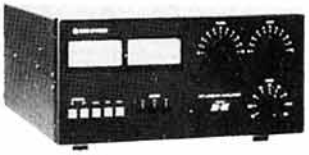
FT 980

NEW THE TOKYO TRIPLETS . . . EXPECTED EARLY JUNE



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

CAPCO S.P.C. 300 ANTENNA COUPLER

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

ICOM R71
General Coverage Receiver

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

IC 02

IC 04 E

IC 2 E

IC 4 E

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FT 209 RH

FT 209 R

FT 703 R

FT 709 R

YAESU FRG 8800 — Continuous Coverage Receiver

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

YAESU FT 770

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

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WITH ANY HF RIG BOUGHT THIS MONTH, TAKE YOUR CHOICE FROM 3, 4 OR 5 BAND VERTICALS — 10 AND 15M QUADS — WHILE STOCKS LAST!

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JULY 1986

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RADio COMmunication

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

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CONTENTS

Technical articles on subjects of amateur interest are always welcome and should be sent to: The Editor, *Radio Communication*, Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE.

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

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

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

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Kent Thanet Electronics Ltd.
2 Stanley Road, Herne Bay, Kent.
Tel: 02273 63859.

the **NEW** two metre multimode from TRIO, the **TR751E**.

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

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

The transceiver has two VFO's and 10 memory channels. Memory information is easily transferred to either VFO. Each memory holds information on frequency, mode and also the step rate to be set when transferring the memory information to VFO. Memory channel one is also the ALERT frequency, memories 7 and 8 relate to DCL and memory 9 programs the user defined limits of frequency scan.

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

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

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

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

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

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

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

KENWOOD CORPORATION

Shionogi, Shibuya Building, 17-5, 2-chome Shibuya, Shibuya-ku, Tokyo 150, Japan

KENWOOD COMMUNICATIONS

Division of Kenwood Electronics, Deutschland GmbH
Rembrücker Strasse 15, D-6056 Heusenstamm, West Germany

station accessories

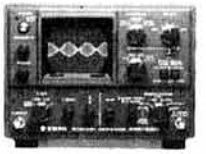
TL922 HF amateur band linear amplifier

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 . . . **£1250.00** 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

amateur band transceivers

TS830S HF amateur bands transceiver

Needing no description, the TRIO TS830S, which uses a pair of 6146B valves in the PA, is well known on the amateur bands (160 to 10 metres) for its superb signal quality. Modes of operation are USB, LSB and CW. Having variable bandwidth tuning, IF notch, IF shift and provision for various filters, its receive performance is excellent too.

TS830S . . . £898.00 inc vat, carriage £7.00

TS530SP HF amateur bands transceiver

An HF amateur bands (160 to 10 metres) valve transceiver without frills but providing today's amateur with all the necessary facilities for reliable worldwide communication. Modes of operation are USB, LSB and CW.

TS530SP . . . £779.79 inc vat, carriage £7.00

send for the **TRIO** general catalogue

All advertised prices subject to excnange rate variation

amateur band plus general coverage transceivers

TS940S HF transceiver with general coverage receiver.

Top of the range, the TS940S has every operating feature that the discerning HF operator needs. Amateur bands from 160 to 10 metres plus a general coverage receiver tuning from 150 kHz to 30 MHz. Modes of operation are USB, LSB, CS, AM, FSK and FM. Forty memory channels, each effectively a separate VFO and easy keyboard frequency entry make operation and ownership of the TRIO TS940S a pleasure.

TS940S . . . £1795.00 inc vat, carriage £7.00.

TS930S HF transceiver with general coverage receiver

Much has been said and written about the TS930S and it now has a place high in the affection of radio amateurs. Modes of operation are USB, LSB, CW, AM and FSK. Providing full coverage of the amateur bands from 160 to 10 metres and including a general coverage receiver tuning from 150 kHz to 30 MHz, the TRIO TS930S is the ideal rig for today's crowded bands.

TS930S . . . £1395.00 inc vat, carriage £7.00

TS440S HF transceiver with general coverage receiver

A step forward in compact HF equipment, the TS440S covers the amateur bands from 160 to 10 metres and is also a general coverage receiver tuning from 100 kHz to 30 MHz. It has keyboard frequency entry, full and semi break-in on CW, one hundred memories and provision for fitting an internal ATU. Modes of operation are USB, LSB, AM, FM and AFSK.

TS440S . . . £950.00 inc vat, carriage £7.00

TS430S HF transceiver with general coverage receiver

A compact HF transceiver suitable for mobile or portable operation, yet having all the facilities necessary for effective radio communication. The TS430S covers the amateur bands from 160 to 10 metres and is a general coverage receiver tuning from 100 kHz to 30 MHz. Modes of operation are USB, LSB, CW, AM wih FM optional.

TS430S . . . £750.00 inc vat, carriage £7.00

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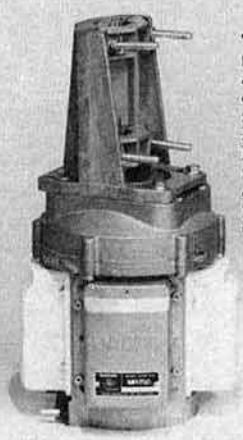
DAIWA rotators . . . . .



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

DAIWA meters.

CN410M. . .3.5 to 150 MHz, forward 15/150 W, reflected 5/50 W, SO239 connectors. . .**£53.28 inc vat.** carriage £1.50.
CN460M. . .140 to 450 MHz, forward 15/150 W, reflected 5/50 W, SO239 connectors. . .**£57.73 inc vat.** carriage £1.50.
NS448 with remote head. . .900 to 1300 MHz, forward 5/60 W, reflected 1.6/6.6 W, N type connections. . .**£75.00 inc vat.** carriage £2.50.
NS660P with switchable meter reading (average, normal PEP and hold PEP) and provision for optional remote head (U66V), 1.8 to 150 MHz, forward 15/150/1500 W, SO239 connectors. . .**£99.50 inc vat.** carriage £2.50.
U66V remote head. 140/525 MHz, max 300 W, N type connectors. . .**£48.00 inc vat.** carriage £1.50.
SC20 extension cable for U66V, approx 20 metres long. . .**£25.85 inc vat.** carriage £1.50.

CN410M

NS660P

NS448

CN460M

data communications equipment.

CD600. . .RTTY, CW, ASCII, TOR, AMTOR decoder, output for UHF television, monitor and printer, can also be used as morse tutor. . .**£188.19 inc vat**, carriage £7.00.
CD670. . .A higher specification RTTY, CW, ASCII, TOR, AMTOR decoder complete with liquid crystal dot matrix display, variable RTTY shift, normal/reverse mode switch, outputs for TV, monitor and printer and can also be used as morse tutor. . .**£286.73 inc vat**, carriage £7.00.
CD660. . .Similar to the CD670 but without the built-in display. . .**£231.79 inc vat.** carriage £7.00.

AR2002 interface.

AR2002

RC PACK

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

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

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

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

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

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

AR2002.....	**£435.00** inc VAT carriage £7.00
RC Pack.....	**£221.00** inc VAT carriage £7.00
ARPROM (BBC).....	**£10.00** inc VAT carriage £1.00

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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.

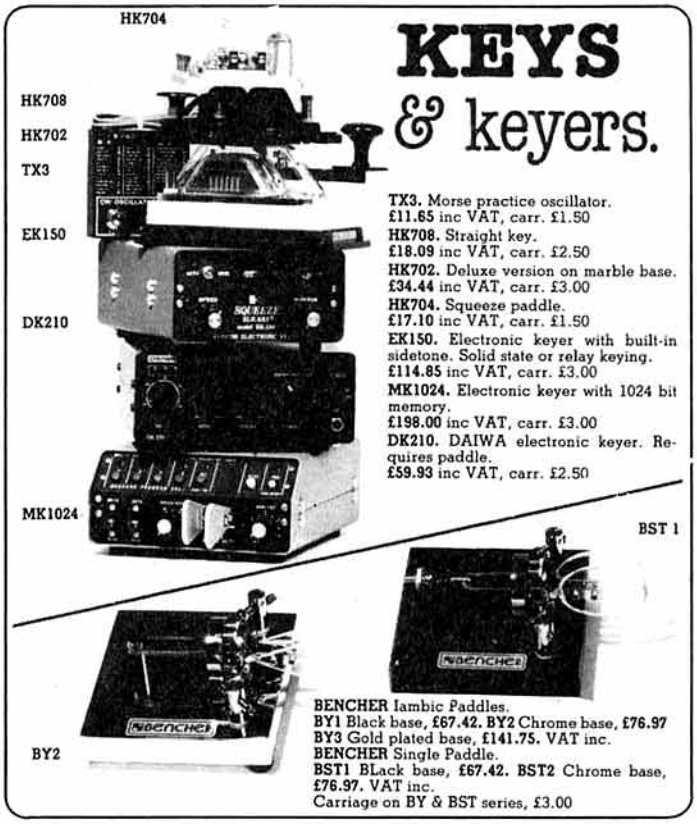
Memory capacity is 200 channels. As well as frequency, each memory holds mode, bandwidth, AGC setting (slow, fast and off) and whether or not the attenuator (approx 20dB) is on or off. Frequencies can be easily transferred from memory to VFO.

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. An excellent feature when receiving very weak signals. When bypassed the display indicates PASS.

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.**

KEYS & keyers.



TX3. Morse practice oscillator. **£11.65** inc VAT, carr. £1.50

HK708. Straight key. **£18.09** inc VAT, carr. £2.50

HK702. Deluxe version on marble base. **£34.44** inc VAT, carr. £3.00

HK704. Squeeze paddle. **£17.10** inc VAT, carr. £1.50

EK150. Electronic keyer with built-in sidetone. Solid state or relay keying. **£114.85** inc VAT, carr. £3.00

MK1024. Electronic keyer with 1024 bit memory. **£198.00** inc VAT, carr. £3.00

DK210. DAIWA electronic keyer. Requires paddle. **£59.93** inc VAT, carr. £2.50

BENCHER Iambic Paddles.
BY1 Black base, **£67.42. BY2** Chrome base, **£76.97**
BY3 Gold plated base, **£141.75.** VAT inc.
BENCHER Single Paddle.
BST1 BLack base, **£67.42. BST2** Chrome base, **£76.97.** VAT inc.
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telephone 01-429 3256.

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

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

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send £1 for complete mail order catalogue.

TWO FOR THE ROAD.

The very latest IC-28E 2m. FM mini-mobile from ICOM.

This new 2 metre band transceiver is just 140mm (W) x 50mm (H) x 133mm (D) and will fit nearly anywhere in your vehicle or shack. Power output is 25 watts or 5 watts low power and is supplied complete with an internal loudspeaker.

The large front panel LCD readout is designed for wide angle viewing with an automatic dimmer circuit to control the back lighting of the display for day or night operation.

The front layout is very simple, all the controls are easy to select making mobile operation safe. The IC-28E contains 21 memory channels with duplex and memory skip functions. All memories and frequencies can be scanned by using the HM-15 microphone provided. Also available is the IC-28H with the same features but with a 45 watt output power.

Options include IC-PS45 13.8v 8A power supply, SP8 and SP10 external speakers, HS15 flexible mobile microphone and PTT switchbox.

→» Rx Range 138-174 MHz.«←

IC-290D/490E Mobiles

These SSB, CW, FM transceivers are ideal for mobile or base station operation. The IC-290D for 2 metres produces 25 watts/5 watts low power. The IC-490E for 70 centimetres produces 10 watts/1 watt low power. Both transceivers have a range of operating features, these include 5 memory channels, dual V.F.O.'s and a priority channel to automatically check your most used frequency. Squelch on FM and SSB to allow silent scanning whilst searching for signals, slow or fast AGC for SSB and CW and a noise blanker to suppress pulse type QRM. Sidetone is provided on CW.

Memory and full or programmable band scan with internal switches to stop on busy or empty channels. Programmable offsets are included for odd frequency splits.

Options include: IC-PS45 13.8v 8A power supply, IC-BU1 memory back up battery unit, IC-SP8 and SP10 mobile speakers.

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IC-R7000.

The R71E now has a team-mate – the IC-R7000. With these matching receivers it is now possible to tune from 100KHz-2GHz.

The IC-R7000 covers Aircraft, Marine, FM Broadcast, Amateur Radio, Television and weather satellite bands. The IC-R7000 incorporates FM wide/FM narrow, AM, USB and LSB modes of operation with six tuning speeds:- 0.1, 1.0, 5, 10, 12.5, and 25KHz. Frequency coverage 25-1000MHz and 1025-2000MHz (25-1000MHz and 1260-1300MHz guaranteed specification). With the IC-R7000 you have normal tuning capability with the front panel tuning knob or for quick tuning of a desired frequency by using the front panel key-pad. A total of 99 memory channels are available for storage of received frequencies and operating mode. Memory channels can be called up by pressing the memory switch then rotating the memory channel knob or by direct keyboard entry.

These receivers are available seperately but together would make a superb listening station for the shortwave listener or licensed amateur.

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

Options include: RC12 infra red controller, EX310 voice synthesizer, SP3 and SP7 external loudspeakers, HP1 headphones and the ICOM AH-7000 super wideband discone antenna.

The IC-R71E is a general coverage receiver 100KHz-30MHz featuring direct keyboard frequency entry and infra-red remote controller (optional). SSB, AM, CW, RTTY and FM (optional) modes of operation. With 32 programmable memory channels, twin VFO's scanning systems, selectable AGC, noise blanker, pass band tuning and a deep notch filter. 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: EX257 FM unit, RC11 infra-red controller, CK70 D.C. adaptor for 12 volt operation, CW filter options and a high stability crystal filter, SP3 and SP7 external loudspeakers, EX310 voice synthesizer, HP1 headphones.

Computer Control These receivers can be connected to a computer terminal via a suitable interface.
JT602 Serial Interface for IC-R7000.
JT603 Parallel Interface for IC-R71E (IC-R7000).
The ICOM IC-R71E requires the IC-EX309 interface connector.

IC-R71E.

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IC-751A, The New ICOM HF Flagship.

ICOM are proud to launch their new flagship. The IC-751 was good, the new IC-751A is even better, with a general coverage receiver from 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, a 9MHz notch filter, adjustable AGC, noise blanker, RIT and XIT. A receiver pre-amp provides additional sensitivity when required. On C.W. the electronic keyer is standard, QSK rated up to 40 w.p.m. The FL32A 9MHz/500Hz CW filter is fitted and CW sidetone on RX and TX modes. On SSB the new FL80 2.4KHz high shape factor filter is fitted.

A high reliability transmitter full 100% duty cycle designed for SSB, CW, AM, FM, RTTY and AMTOR, with a high performance compressor for better audio clarity. With 32 memory channels and twin VFO's scanning of frequency and memories is possible from the transceiver or the HM36 supplied.

The IC-751A is supplied for 12 volt operation but can be used with either an internal or external A.C. power supply. It is fully compatible with ICOM auto units such as the IC-2KL linear amplifier and the AT500/100 antenna tuners.

Options available: PS35 internal AC power supply, PS15 external power supply, EX310 voice synthesizer, EX309 microprocessor interface connector, SM8 and SM10 desk mics, SP3 and SP7 external speakers and GC5 world clock.

The SM10 desk top microphone consists of an electret condenser microphone element with a compressor amplifier plus tunable equaliser for maximum control of the audio characteristics of your transmitted signal. The SM10 is highly sensitive and produces clean crisp audio.

SM10 Desk mic.

ICOM HF Filter selection guide:

Transceiver	Mode	Desired Filter Bandwidth	Optional 455KHz Filter Selection (1st Choice)	Optional 9MHz Filter Selection	Special Notes
IC-751A	CW	500Hz	FL-52A	FL-32*	Must remove FL-32 filter to install FL-63 or FL-33.
	CW	250Hz	FL-53A	FL-63	Signal loss with FL-63 is 4dB less than FL-32.
	AM	5.2KHz	–	FL-33	PBT control is not effective when FL-33 is selected.
IC-745	CW	500Hz	FL-52A	FL-45	Add FL-52A before adding FL-45.
	CW	250Hz	FL-53A	FL-54	Add FL-53A before adding FL-54.
	SSB	2.4KHz	FL-44A	–	High skirt selectivity SSB filter. Replaces standard ceramic filter.
IC-735	CW	500Hz	–	FL-32	
	CW	250Hz	–	FL-63	Signal loss with FL-63 is 4dB less than FL-32.

* FL-32 is factory installed in IC-751A.

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TONO

RTTY Morse and Amtor.

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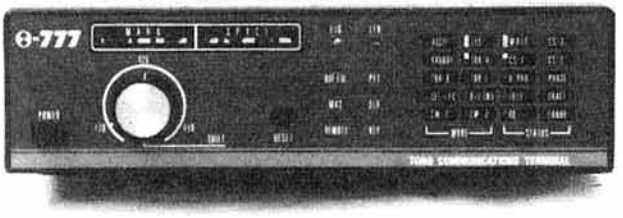
5000E, Sender/decoder.

From the famous TONO stable comes the new THETA-5000E now ready to send and receive AMTOR as well as CW, RTTY, and ASC11.

Features include:- 5" high resolution monitor displaying 400 chr. x 16 lines x 2 pages, ARQ/FEC, time clock, Selcal (Selective calling), high speed RTTY demodulator – up to 300 bauds (600 baud using TTl level); 3 shifts (170, 425 and 850Hz) and two tones (2125 and 1275Hz); manual or automatic TX/RX, Battery back-up memory (72 chars x 7 channels and 24 chars x 5 channels); type ahead correctable buffer memory; Morse code 5-100 wpm (variable weights) + autotrack on receive; CW practice feature with random generator; Automatic CR/LF with wrap around display; Automatic letters code insertion; Printer interface; Bargraph LED meter for tuning; TOR A,B, and L – the list goes on and on... Power requirements by the way are AC mains or 13.8v DC.



777, Computer interface.

The Theta-777 is an advanced code converter designed with Tono's computer technology. The unit automatically sends/receives morse code (CW), baudot code (RTTY), ASC11 (RTTY) and Amtor (ARQ/FEC/SEL-FEC). The built in RS232 and TTC level interface enables you to use in combination with most computers. Morse code transmitting speed set at any rate between 5-100 wpm, with autotracking on receive. For baudot and ASC11 codes 12-300 bauds when using RTTY modem and 12-600 bauds when using TTL levels. The send and receive switching of a transceiver is done automatically with the computer control. The buffer memory can store the message as written from the keyboard instead of sending them immediately. The stored message can then be sent by keyboard command. A transceiver without FSK function can transmit RTTY mode by using the high stability crystal controlled modulator controlled by the computer.

We also stock the Tono range of VHF/UHF linear amplifiers with GaAs pre-amp. For further details of Tono equipment contact Thanet Electronics Limited.

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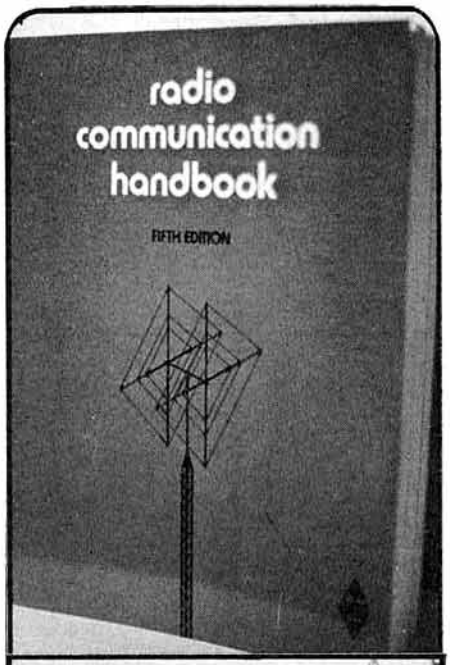

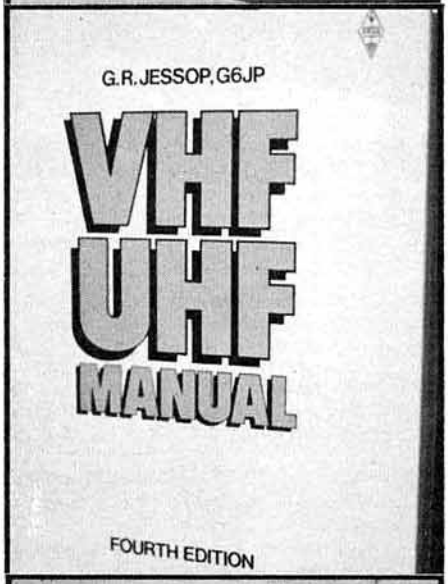

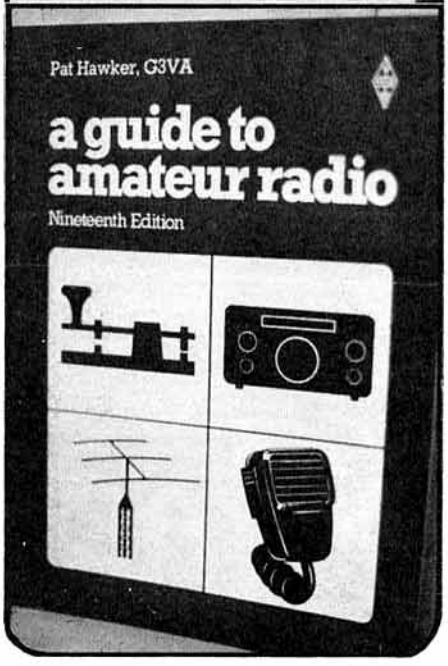

SOME RSGB CLASSICS

THE RADIO COMMUNICATIONS HANDBOOK VOLUMES 1 AND 2 is regarded by many as the ultimate in radio handbooks and covers everything from first principles to satellite and image communications. It deals with transmitters, receivers and antennas for HF, VHF and UHF, together with chapters on keying, modulation systems, propagation, station layout and operating, noise, and measurements. This book is used as a course text on many university and college electronics and radio courses and is well regarded by the electronics industry. Fifth edition, Copyright 1982, 796 pages, £11.99 to members by post, softbound.

THE VHF/UHF MANUAL is also held in high esteem and is essential reading for all those who are interested in this part of the radio spectrum. The first chapter 'Historical Perspectives' is a fascinating insight into the early days of VHF/UHF. Did you know that Marconi built a 150MHz AM transmitter in 1919? This book certainly isn't all history however. Most of the Manual contains up-to-date information on VHF and UHF receivers, transmitters, filters, antennas, satellite communication, test equipment, and equipment for the microwave bands. The appendix gives lots of useful information on feeder characteristics, VHF and UHF PA valves and transistors, mixers, and much more. Fourth edition, Copyright 1984, 528 pages, £9.52 to members by post, hardbound.

THE GUIDE TO AMATEUR RADIO, by Pat Hawker G3VA, is primarily intended to assist the newcomer to learn more about amateur radio and to help him or her to obtain an amateur transmitting licence. The book also contains technical information and operating data of interest to all radio amateurs and listeners. The conditions of the UK amateur licences and the syllabus for the Radio Amateurs' Examination are incorporated together with a set of specimen questions. There is also a separate chapter devoted to the principles of electronics. Both newcomers and all those seeking basic information on the very large range of equipment that has been produced for amateurs will find the chapter on factory-built receivers, transmitters and transceivers particularly useful. Nineteenth edition (first published in 1938), Copyright 1983, 154 pages, £3.52 to members by post, softbound.

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

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TH21E 2m h'held	£189.30
TH41E 70cm h'held	£220.95
TR2600 2m h'held	£299.00
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NEW TRIO TR751E 2m MULTIMODE IN STOCK!

NEW

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

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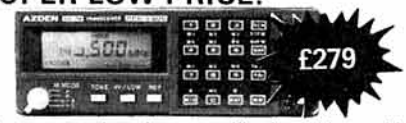

£279

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

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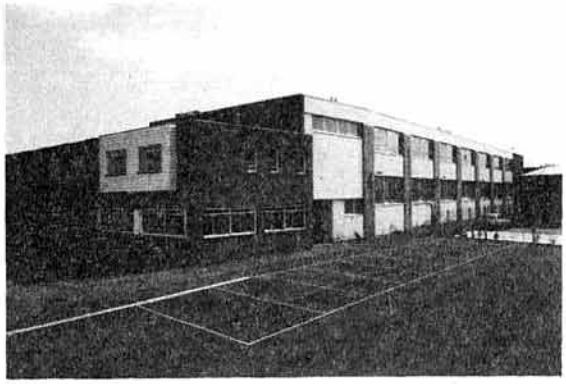
SMC South Midlands

SM HOUSE, SCHOOL CLOSE, CHANDLERS FORD IND. EST



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It is SMC's policy to offer the best service to the radio amateur. To enable us to improve this service we are moving to new larger premises with a substantial increase in showroom space as well as car park!!

COME AND SEE THE NEW YAESU FT767GX AND FL7000 AT OUR NEW LARGER SHOWROOM. PERSONAL CALLERS MAY FIND SOME POST-MOVE BARGAINS! DON'T DELAY—POP IN TODAY!!

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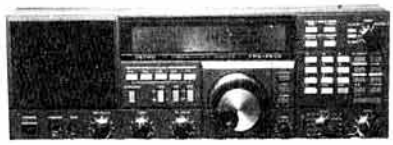
FRG 9600



FRG 8800

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

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

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

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

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

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

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

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

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YAESU'S TOP PORTABLES

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

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

The optimum synthesizer steps for SSB/CW FM operation are very different. That's why Yaesu gives you the flexibility of two synthesizer steps per mode: 100Hz or 1kHz per step on SSB, AM & CW, and 12½/25kHz on FM. When changing modes from SSB/CW to FM, you transceiver is automatically set to the nearest standard channel when you start scanning or tuning.

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

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.

FT690R

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.

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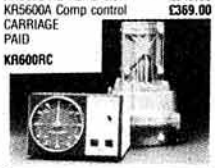

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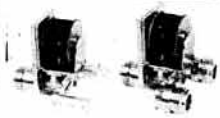

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JD

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T3-170L

FS500

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Founded 1913 Incorporated 1926 Limited by guarantee A member society of the International Amateur Radio Union

PATRON: HRH PRINCE PHILIP, DUKE OF EDINBURGH, KG

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

Headquarters and registered office: **Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE**
Telephone 0707 59015. Telex 25280 (RSGBHQ G)
Secretary and general manager: D A Evans, G3OUF

COUNCIL OF THE SOCIETY

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EXECUTIVE VICE-PRESIDENT: K E V Willis, BSc, ARCS, CEng, MIEE, G8VR
IMMEDIATE PAST-PRESIDENT: J Heathershaw, G4CHH (Mrs)
HONORARY TREASURER: P F D Cornish, FCA, G3COR

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Zone D	*(Regions 6, 9, 17 and 20)*	J N Gannaway, G3YGF
Zone E	*(Regions 10 and 11)*	E J Case, GW4HWR
Zone F	*(Region 15)*	J T Barnes, GI3USS
Zone G	*(Regions 12, 13 and 14)*	F Hall, GM8BZX

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Region 3 G Ross, G8MWR, tel 0203 616941
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Region 4 M Shardlow, G3SZJ, tel 0332 556875
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Region 5 J S Allen, G3DOT, tel 0582 21151
(Beds, Cambs, Northants)
Region 6 N P Taylor, G4HLX
(Berks, Bucks, Oxon)
Region 7 R Sykes, G3NFV, tel 0372 372587
(G London S of Thames, Surrey including part of London N of Thames administered by Surrey)
Region 8 M Elliott, G4VEC, tel 0795 70132
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Region 9 A H Hammett, G3VWK
(Cornwall, Devon)
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Region 11 B H Green, GW2FLZ, tel 0492 49288
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Audio Visual Library co-ordinator: R G Auckland, G2PA
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HF manager: E J Allaway, G3FKM
Microwave manager: D S Evans, G3RPE
Observation Service organizer: R J Osborne, G4FJN
Trophies manager: Mrs H Claytonsmith, G4JKS
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EDITORIAL

HAPPY RETURNS

As the more observant readers will have spotted, the editorial offices of *Radio Communication* are now at the Society's headquarters in Potters Bar. The move from Chelmsford on 1 July came about as a result of favourable negotiations regarding the lease outstanding on the Chelmsford offices together, of course, with the co-operation of the staff concerned.

The reasons for the original move to Chelmsford in 1977 were the difficulty in obtaining suitable editorial staff in London, and the pressure on space in the previous headquarters in Doughty Street—the unsolicited close working conditions of those not-too-distant days had to be seen to be believed.

The long-awaited reunion marks a further step along the objective of having **all** the essential central facilities of the Society under one roof: as readers will recall, this was one of the considerations in determining what sort of building we looked for before moving headquarters.

The change will enable a reorganization of the Society's publications activities which will allow more flexibility in the use of staff. Apart from an overall raising of the effectiveness of this important area, one of the advantages we hope to see is a significant reduction in the lead times—an even more up-to-date magazine can only be a good thing.

David Evans, G3OUF

Amateur Radio News

Regional representation

The results of the recent ballots in Region 6 and 20 are as follows:

Region 6

D J Chislett,	G4XDU	9 votes
C M Clark,	G1GQJ	4 votes
R Ray,	G3NCL	7 votes
N P Taylor,	G4HLX	97 votes
Spoilt/invalid		1 vote

Mr N P Taylor, G4HLX, has therefore been elected as representative for this region.

Region 20

C R Hollister,	G4SQQ	132 votes
B M Woodcock,	G4CIB	64 votes
Spoilt/invalid		4 votes

Mr C R Hollister, G4SQQ, has therefore been elected as representative for this region.

Area representative, Isle of Man

This office is at present vacant. Any five corporate members resident on the Isle of Man may nominate any qualified corporate member resident on the Isle of Man for this office by delivering their written nomination, signed by each nominator, together with the written consent of such person to accept office if elected, to the Region 1 representative Mr B Donn, G3XSN, 7 Thurne Way, Liverpool L25 4SQ, to arrive not later than Monday 14 July.

An election will be held, details of which will be published in the August issue of the *RSGB News Bulletin*. All votes (and proxies) should reach G3XSN by 18 August, and the election count will be held at the Howstrake Hotel, Harbour Road, Onchan, Isle of Man, at 8pm on Monday 8 September.

"Linear amplifier for the hf band transceiver"

The author of this article published in the April issue of *Radio Communication* regrets that an error crept into the track layout for PCB2 (Fig 22, p257). As printed there is a short superfluous piece of track which should be removed—that piece which is shown joining the top block of three holes along the right-hand edge to three other holes.

Great endeavours rewarded

In *Technical Topics* (*Rad Com* May 1986, p337) the item "Wonders of morse" included a report from Bob Smith, G6TQ, on the project in which he, the West Kent ARS and the RAIBC had all been involved in teaching severely-disabled Mark Brownfield to communicate by morse and obtain a Class A licence.

At the agm of the West Kent ARS in April, the president's award for merit, the Kevin Keen Cup, was presented to Bob Smith, G6TQ, for his tremendous involvement in the project over two years. A new trophy, donated by Dave Green, G4OTV, for the year's most outstanding member, was awarded, at the same meeting, to Mark Brownfield, now G0EMZ and a member of WKARS. (Apologies to Mark for the unintentional "short-form" of his name in the May item—*Ed*).

CHANGE OF ADDRESS

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

All correspondence concerning the *content* of the journal should now be addressed to: The Editor, *Radio Communication,* Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE.

Third Yeovil QRP Convention

Instead of being held in October, as were the 1984 and 1985 conventions, it has been decided that future conventions will be held in May each year. This is in response to many requests for a change of date to avoid clashing with other events. The third Yeovil QRP Convention will be held on 10 May 1987, and further details will be given nearer the date. The second convention in 1985 was a great success, and an unexpected profit enabled a donation of £50 to be made to the RAIBC.

Frequency synthesis and control conference

This conference, organized by the Institution of Electronic & Radio Engineers (in conjunction with the RSGB, IEE, IEEE and Institute of Navigation), will be held at the University of Surrey, Guildford, in April 1987.

The organizing committee welcomes papers on any applicable subject: for example, components for or design techniques for frequency synthesizers or standards, applications of synthesizers to communications, navigation, instrumentation and computing, new techniques in synthesis or standard design etc. The committee is under the chairmanship of Peter Chadwick, G3RZP, and synopses should be submitted by 2 September 1986.

Further details may be obtained from: The Institution of Electronic & Radio Engineers, Conference Secretariat, 99 Gower Street, London WC1E 6AZ.

Do you play chess?

Mr T J Pearson, G0DXT, 45 Frobisher Close, Daventry, Northants, is compiling a list of radio amateurs who have an interest in playing chess over the air. Anyone wishing to be included is asked to send the following information to G0DXT (hf) or G4XCW (vhf): name, callsign, bands used, modes am/fm, ssb, cw, rtty etc, and BCF grading if known. Copies of the list will be sent to those who include an sae.

Ramsey Island, 1071HU/WAB SM62

The Pembrokeshire RS will make an expedition to this island on 10–13 July inclusive, and will operate on all hf bands and 144MHz using the club callsign GW0EJE/P. There will be a special QSL card, and an award will be given for contacts on three different bands. Details: GW4UZL, QTHR.

Bob Smith, G6TQ, (l) holding the Kevin Keen Cup which he had just received from Hugh Richards, BRS40902, president of West Kent ARS, who is holding the trophy awarded to G0EMZ, which G6TQ was about to accept on his behalf. *Photo:* G4OSH.

COUNCIL PROCEEDINGS

A brief report on the Council meeting held on 26 October 1985

Present: Mrs J Heathershaw (President, in the chair), Dr E J Allaway, Messrs J T Barnes, E J Case, Dr D S Evans, Mr G R Jessop, Dr J N Gannaway, Messrs F D Hall, H M Holmden, W J McClintock, H S Pinchin, D M Pratt, D S Smith, K E V Willis (members of Council), D A Evans (secretary/general manager), Ms H M Norman (minutes secretary).

Apologies for absence were received from Messrs Barrett, Cornish, Hutchinson and O'Brien.

Hon treasurer's report
The secretary noted the main points in a letter from the hon treasurer with regard to the first quarter's accounts for 1985-6, and the letter was circulated among those present.

Secretary's report
The latest membership figures were circulated to Council; these indicated an annual rate of increase of some 3.4 per cent since 1 July 1985. Mr Pratt raised the question of introducing a joining fee. Mr Evans felt that the question should be raised again within the Finance & Staff Committee.

Mr Evans reported on the use of the databox since its launch on 1 October, and spoke of other related facilities and three specific offers which the Society had received from Prestel/Micronet. These were: shadow database, chat-line and low-cost modems.

After discussion, it was proposed, seconded and carried that the secretary be instructed to proceed with the third offer and that the Finance & Staff Committee should consider the shadow database facility.

The secretary circulated copies of the latest publications report, and outlined titles currently in the pipeline. Mr Evans reported on the current involvement with the DTI.

Recommendations from committees
Technical & Publications
"That the following awards be made for 1985: Ostermeyer Trophy—Mr L Knight, G2DXK, for 'A transceiver for the hf bands' published in June-October 1984; Norman-Keith Adams prize —Messrs P Robinson, G3MRX, and A Jones, G8WJL, for 'Amateur packet radio' published in March 1985; and Wortley-Talbot trophy—Mr R Cracknell G2AHU, for 'How good are our hf propagation predictions?' published in October 1984.

These were approved.

HF Contests
Council approved the award of the Milne Trophy to Mr J T A Johnston, GM3LYY, and the Braaten Trophy to Mr D J Andrews, G3MXJ.

Membership and representation
Council noted:
(i) that reduced subscriptions had been granted to a further 35 members;
(ii) that the subscriptions of a further 11 members had been waived;
(iii) that the following had been granted affiliation:
Ariel Radio Group;
Brookmans Park;
Duxford ARS, Cambs;
Hesketh ARC, Southport;
Humberston Amateur Radio Contest Group;
South Africa Radio League, Cape Town Branch.

Council Standing Orders
Mr Holmden requested that Standing Orders be discussed again at the next meeting, when Mr Jessop would be present. However, the President decided to proceed.

Following discussion, Mr Holmden's proposed amendment to paragraph 1 was agreed. This was: *Delete "seven" in 4th line and substitute "three". Also delete the last sentence in brackets, as this conflicted with Article 64.*

After much discussion on Mr Holmden's proposed change to paragraph 15 (to delete "whether or not they personally agree with them", substituting "unless those views conflict with or seek to override the Society Memorandum & Articles of Association or the Companies Acts"). Mr Holmden said that assuming the Articles were to be amended, he was happy to leave this paragraph as it stood.

Mr McClintock then proposed acceptance of the Standing Orders of Council. This was seconded by Mr Hall and carried unanimously.

Acting secretary
Mr Evans explained the requirement, under the Articles, to appoint an acting secretary in his absence. Although this formality had not been undertaken before, he felt it prudent for Council to do so now. He suggested that Ms Norman be appointed acting secretary on a permanent basis, to provide continuity for any occasion during which he was out of the office for any reason.

Acceptance was proposed by Mr Hall, seconded by Mr Smith and carried unanimously.

Annual meeting and possible egm
Mr Evans noted that no call for an egm had been received by the deadline. The expected egm could not, therefore, take place on 7 December as had been the intention of those proposing it.

The draft agenda for the Society's annual meeting was circulated, together with a draft proxy form.

Mr Evans said that if an egm were to be called by the membership in future, Council was obliged to advise the members (ie by posting a notice) within 21 days. However, the data and venue for such an egm was to be decided by Council, provided that the meeting was held within three months of the date the requisition had been received. It was hoped that, if called, notices could be despatched with *Radio Communication* to avoid unnecessary postage costs.

A draft response from Council to documentation circulated by Messrs Lundegard, Smith and Crosland was considered and various amendments made to it. The paper, entitled "Changing the Society—the RSGB Council replies"—would be sent to clubs and volunteers as soon as possible.

RSGB representation on BSI Committee GEL/111/5
Council approved the appointment of Mr N G Brinkworth, G3UFB, on the above committee, which dealt with the subject of electromagnetic compatibility.

Repeater Management Group
The President circulated a report of a meeting on 21 October between members of the Presidential Advisory Group and Mr Dennison, G3XDV, which outlined recommendations for the implementation of a regional scheme of representation, similar to that employed by the Raynet Committee.

After discussion, Mr Willis moved acceptance of the proposed terms of reference. This was seconded by Mr Jessop, and agreed.

Mr Dennison would be asked to prepare job specifications and terms of reference for the new representatives for Council's approval.

A brief report on the Council meeting held on 28 November 1985

Present: Mrs J Heathershaw (President, in the chair), Messrs J T Barnes, R G Barrett, E J Case, P F D Cornish, Dr D S Evans, Mr G R Jessop, Dr J N Gannaway, Messrs F D Hall, H M Holmden, W J McClintock, B O'Brien, H S Pinchin, D S Smith, K E V Willis (members of Council), D A Evans (secretary/general manager), A W Hutchinson (editor), Ms H M Norman (minutes secretary).

Apologies for absence were received from Dr Allaway and Mr Pratt.

Council Standing Orders
Mr Jessop spoke at length on the implications of increasing from a simple majority to two thirds, the number required to remove a chairman from office. Mr Jessop insisted that this was out of order, being in contravention of Article 66, which states that "Questions arising at any meeting of the Council shall be determined by a majority of the votes of the members present . . . "

Much discussion ensued. There was some agreement that Article 66 should not be overridden. The secretary said that it had been the advice of the Society's solicitor, during a telephone conversation, that if Council, by a majority, wished to set up a mechanism for changing the majority then that was in order.

The President commented that this topic had already been discussed by Council three or four times this year, and all the agreed changes had been accepted by Council.

The President said that, in view of the discussion, she regretted having to hand this on for consideration next year, but felt that no more could be done to progress the matter at this meeting.

Hon treasurer's report
Mr Cornish drew attention to the recently-circulated management accounts for the three months to 30 September 1985 and answered several questions thereon.

Secretary's report
A letter from the DTI, dated 18 November, was read by Mr Evans. This stated its decision to give the RSGB responsibility for amateur morse testing, as from 1 April 1986. The secretary outlined the actions he was proposing to implement the setting up of the testing system.

Mr Evans reported that the RSGB presence at the IARU Region 3 Conference had been welcomed in New Zealand. The conference had been positive, well-organized and enjoyable.

An RSGB pennant which had accompanied Tony England on his recent space mission had been mounted on a card with photographs of the shuttle crew and had recently been presented to the Society. This was shown to Council, and Mr Evans announced the intention to have this framed and put on display in the reception area at HQ. Various book reports were distributed, Mr Evans then answered several questions arising from them.

End of year
At the conclusion of the previous agenda item, the President said that as it was getting late she wished to make a statement before anyone left the meeting.

She said that this was personally a sad meeting, being her last as President; she had thoroughly enjoyed her year in office and she thanked Council for its support; and added that she felt the Council had become a team and it seemed a shame that changes had to be made. She then referred to those members of Council who would be retiring at the end of this year, Messrs Barrett, Holmden, Jessop and Pratt, and thanked them on behalf of the Society for their services. Finally, Mrs Heathershaw offered her best wishes to Mr McClintock as 1986 President.

Mr Jessop said he had to leave the meeting early, and made a few final comments before retiring. Mr Willis said he felt that Mrs Heathershaw had been one of the finest Presidents the Society had ever had. She had handled meetings well and had made a great impact on the membership through her many visits to clubs.

Mr Barrett said that he had enjoyed his six years on Council. He hoped to be able to participate in Council again.

Recommendations from committee minutes
VHF Contests Committee
The following recommendations were approved:
(a) "That the VHF Contests Committee Cup be awarded to Warrington Radio Club G3CKR/P as overall winner of the 1985 1,296MHz Trophy Contest."
(b) "That the 1951 Council Cup be awarded to the Parallel Lines Contest Group GW4LIP/P as overall winner of the 432MHz Trophy Contest 1985."
(c) "That the Arthur Watts Trophy be awarded to Warrington Radio Club as winner of the restricted section of VHF NFD."
(d) "That the Surrey Trophy be awarded to the HADRABS & Addiscombe Contest Group as winner of the open section of VHF NFD."
(e) "That the Tartan Trophy be awarded to the South of Scotland VHF/UHF Contest Group as overall leading Scottish station in VHF NFD."
(f) "That the VHF Manager's Trophy be awarded to the Parallel Lines Contest Group GM4LIP/P as overall winner of the 1985 70MHz Trophy Contest.

Microwave Committee
(a) "That the Marconi Medal be awarded to HB9MIN and HB9AMH for their work up to and including the establishing of a world record distance on 47GHz."
(b) "That the Mullard Award* be presented to G6FK for his work on 1·3GHz."
(c) "That the Fraser-Shepherd Award* be made to G3NKL for his experiments and research into propagation at 10GHz and 24GHz."

Dr Evans explained that these awards may be subject to alteration, depending on the exact terms of reference.

No objections were raised to these recommendations.

* The allocation of these awards was subsequently transposed.

Raynet Committee

Mrs Heathershaw read a letter received from Mr Griffiths, following Council's ruling that the Raynet Trophy could not be awarded in connection with efforts concerned with the Mexico City earthquake disaster, since it was after the end of the relevant committee year. The committee requested that, in view of the particular and quite exceptional circumstances surrounding the operation for international relief during the Mexico City earthquake disaster, the operation be considered as part of the activity of Raynet for the year 1984–5.

After some discussion, Mr O'Brien proposed that the Raynet Trophy be awarded in this connection. This was seconded by Mr Hall and agreed unanimously.

Membership and representation

Council noted:
(i) that reduced subscriptions had been granted to a further 23 members;
(ii) that subscriptions had been waived in respect of eight members. It was noted that the Finance & Staff Committee was continuing to monitor the numbers applying for reduced and waived subscriptions.
(iii) that the following had been granted affiliation:
BBC Club, Manchester;
Bolton Amateur Radio Club;
Haywards Heath College ARS;
Hong Kong Telephone Sports & Social Association AR Group;
London Weekend Television RS;
North Cheshire Radio Club, Wilmslow;
Plessey Christchurch ARS, Dorset;
Sandwell ARC, Wareley, West Midlands.

Council approved an application for life membership from Mr M F Niven, G4AHT, who had been a member since 1970.

A nomination for the position of Region 13 representative had been received, after the published closing date, in respect of Mr A J Scott, GM8BDX. Approval was given to this appointment.

The appointment of the following area representatives was noted:

F Collett, G3OVT	Stevenage
G H Curry, GI6ATZ	Greater Belfast
J F McCreight, GM3DJS	Cunninghame district
S D Reeks, G4WCP	Hastings

Aerial Planning Panel

Notes of a meeting of the President, two members of HQ staff and a member of the Aerial Planning Panel, held on 11 November, had been circulated to Council.

After some discussion, it was agreed that the Presidential Advisory Group should include the role of the Aerial Planning Panel in its committee structure review in 1986.

Presidential Advisory Group

The group had made the following recommendations:
(i) Notification of committee vacancies
"That chairmen of committees, when seeking to fill vacancies on their committees involving non-ex-officio members, are required to advertise the vacancy in *Radio Communication*, giving details of the qualifications required and the conditions under which the committee meets. The chairman would be under no obligation to accept any volunteer."

Council felt that it had not had sufficient notice of this recommendation to be able to vote thereon. It was agreed that the President would inform the committee chairmen that Council saw merit in this proposal and sought the reaction of chairmen.

Meanwhile, a specific vacancy on the Technical & Publications Committee would be advertised. This action was proposed by Mr Barrett, seconded by Mr Willis and carried unanimously.

(ii) Specification of the size of committees
"That the PAG consider the implications of specifying the size of committees in terms of an average rather than a maximum size and report to Council on the results of its considerations."

Dr Evans proposed that this be accepted. This was seconded by Mr Pinchin, and carried by 5 votes to 4, with 1 abstention.

(iii) "That the size of the non-staff membership of the T & P Committee be increased from 8 to 10 to allow for greater effort on books."

Mr Willis moved that this recommendation be accepted. This was seconded by Mr O'Brien and passed unanimously.

Staff workload

Dr Evans voiced his concern at the amount of time spent responding to detailed enquiries from members demanding considerable research by HQ staff, and he asked what information the Society was legally required to give its members.

The secretary replied that the Society should provide the services which it had led the member to expect, since that formed the contract in law. He agreed that it would be useful to formulate a policy.

Council expressed its concern at the amount of time and effort currently being spent on answering such questions, from just a few members, to the detriment of other work; there was a need to establish an order of priority.

A brief report of the Council meeting held on 18 January 1986

Present: Mr W J McClintock (President, in the chair), Dr E J Allaway, Messrs J T Barnes, E J Case, Dr D S Evans, Dr J N Gannaway, Messrs F D Hall, J Greenwell, Mrs J Heathershaw, Messrs J D Heys, A A McKenzie, B O'Brien, N F O'Brien, H S Pinchin, F S G Rose, D S Smith, K E V Willis (members of Council), A W Hutchinson (editor), Ms H M Norman (minutes secretary).

Apologies for absence were received from Messrs Cornish and Evans. Council was sorry to learn that the general manager was still unwell, and expressed its good wishes for a quick recovery.

Mrs Heathershaw reported that Mr Griffiths, G3STG, chairman of the Raynet Committee was currently in hospital. The President would write to him expressing Council's best wishes for a speedy recovery.

Hon treasurer's report

In the absence of the hon treasurer, Mr B O'Brien was asked to give his report.

Mr B O'Brien referred to a letter he had recently written, in response to a member who was most concerned at the Society's financial state, following publication of the accounts in the November issue of *Radio Communication*.

Mr O'Brien had pointed out in reply that on the date of the last Balance Sheet the Society had a net credit with the bank of £70,000. Surplus assets (largely fixed) over liabilities being £367,000. There had been a fall in liquid assets but the position was enhanced by subscriptions in advance of £251,000. Although the last two years had resulted in a total deficit of £81,000, if the last nine years were taken into account, this would show a total surplus of £235,000.

He emphasized that one of the main jobs of Council and the Finance & Staff Committee was to ensure that the Society broke even this year and, to this end, to exercise caution in proposed new ventures etc. Contrary to statements made in recent scurrilous documents, the Society's book sales had never made a loss. The smallest profit in recent years had been £59,000 in 1979.

Secretary's report

In his absence, the secretary reported briefly by telex on the following: Data Protection Act; Morse testing; and the 50MHz allocation.

Recommendations from committees

HF
"That the RSGB vigorously oppose individual licence alterations or amendments, through lobbying at Parliamentary level if necessary, and that Council give the highest priority and best available resources, in support of the EMC Committee, to extend the range of equipment and frequency bands covered by British Standards."

It was noted that Council was aware of the situation and was already making a great effort in this area.

HF Contests
"In view of the current problems concerning IARU Field Day, the HFCC recommends to Council that a member of the committee attends the Region 1 HF Working Group meeting in Vienna in March 1986."

Dr Allaway explained the background to the problem concerning dates for HF Field Day, concluding that it would be advantageous for a member of the HFCC, preferably Mr Glaisher, G6LX, to attend the meeting of the HF Working Group.

This was accepted.

VHF Contests
"That the Thorogood Trophy be awarded to GJ4ICD and the Mitchell Milling Trophy to G4LIP/P". This was agreed.

Following a short discussion, the President undertook to suggest to the chairman of the VHFCC that a declaration as to power levels be included on the cover sheet in future.

Membership and representation

Mr B O'Brien spoke of his continuing concern at the numbers applying for reduced subscriptions.

There was a general agreement that some further evidence of hardship was required. It was pointed out that in the past one of the duties of regional representatives was to approve applicants for reduced subscriptions following contact with the applicant.

The matter was referred back to the Finance & Staff Committee for further consideration as to future procedures.

Council noted that reduced subscriptions had been granted to an additional 46 members.

There was some discussion on the number of applicants for waived subscriptions to Council. Council noted that subscriptions had been waived in respect of a further 17 members.

Council noted that affiliation had been granted to: Darlington & DARS;
East Kent RS;
Glossop & DARG;
Leicestershire Metrewave Group;
Marple Contest Group;
Milton Abbey School ARC, Blandford;
Red Dragon Contest Group, Blackwood.

Council confirmed applications for affiliation from: SE Wales Repeater Group;
Meopham Parish Radio Club;
Hatfield Polytechnic Students Union RS.

Morse testing

The general manager had requested that Council agree to the setting up of a morse examiners vetting panel.

After discussion, Mr Willis proposed that Council give authority to the President and the Presidential Advisory Group to set up a vetting panel to undertake the necessary action to implement the Society's commitment as detailed in the guidelines submitted to the DTI. This was seconded by Mr Pinchin and agreed unanimously.

Repeater Management Group

Mr Smith said he had been asked by the RMG if it could have representation on the spectrum committees.

Dr Allaway said there was currently controversy over 29MHz fm repeaters, where the RSGB was apparently seen to be flaunting an IARU regulation, which had resulted in letters of criticism from one national society.

Mrs Heathershaw said that the importance of liaison between the RMG and spectrum committees was recognised, and the President added that this factor would be taken into consideration when the Presidential Advisory Group discussed committee structure in general later this year.

75th anniversary

The President drew attention to the fact that in 1988 the Society would celebrate its 75th anniversary. The Presidential Advisory Group was already giving consideration to various suggestions.

Dr Allaway wished to place on record the fact that the general manager had done a superb job in representing the RSGB at the 75th anniversary celebrations of the WIA in Melbourne in November.

The idea of having a "prestige" President in

1988 was thought to be desirable, and Mr McClintock commented that an experienced person was therefore needed to fulfill the role of 1987 President, to enable them to provide a strong back-up for a prestige President.

1987 President
Mr Willis proposed that Mrs Heathershaw be asked to be President in 1987. This was seconded by Mr Hall. There were no other nominations.

Mrs Heathershaw confirmed that she would be delighted and honoured to accept this office, and the appointment was approved unanimously.

1986 executive vice-President
In response to the President's call for nominations, Mr Hall was proposed by Mr Barnes and seconded by Mr Smith; Mr Willis was proposed by Dr Evans and seconded by Mr O'Brien.

Messrs Hall and Willis withdrew from the meeting.

After a secret ballot, the two candidates were asked to return and the President announced that Mr Willis had been elected.

Council elections
Some discussion ensued on the large number of late votes received. It was resolved to include a statement in this year's election information, stressing the importance of posting votes as early as possible. The effects of such a statement would be noted to see whether it made a significant difference in the number of late votes returned.

We regret that publication of these "Council Proceedings" has been delayed due to editorial staff workload and sickness. It is hoped to restore regular publication after the editorial office moves to Potters Bar and additional staff is recruited.

Mobile Rallies Calendar

13 July
Sussex Mobile Rally, Brighton Racecourse. Tickets £1 (Children and disabled free). Free car park. Talk-in by GB2SMR. Details G4UAW, tel 0903 782594. Advance tickets from Mr S Sims, G8NFZ, 71 Green St, Eastbourne, E Sussex BN21 1QZ.
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.
26–31 July, GB2NSR
Operational from Norfolk Scout Reach Camp for able-bodied Scouts and handicapped local youth by Norfolk Scout County HQ, Eaton Vale, Norwich. On hf and vhf, evenings daily and all day 26/27. Special QSL cards. Details G0CLR, tel Norwich NR10 3PB.
27 July, GB2OKM
This station will operate on 144MHz and all hf bands, plus rtty and Amtor. Details G0DAE, tel 0730 64821.
27 July
Scarborough ARS Rally, The Spa, Scarborough. Open 11am. Talk-in 144MHz (S22), and 432MHz (SU8) and RB0-GB3NY. Details G4UQP.
3 August
RSGB National Mobile Rally, Woburn Abbey.
3 August
Rolls-Royce ARC Mobile Rally, Rolls-Royce Sports & Social Club, Barnoldswick, Skipton. Access from A59 and A56. Open 11am. Free car park and entrance. Enquiries to G4ILG, tel 0282 813271 ext 337, daytime, or 0282 812288 evenings.
10 August
29th Annual Mobile Rally celebrating the 75th anniversary of the Derby Wireless Club, Lower Bemrose School, St Albans Rd (off Derby Ring Road A5111) Derby. Open 10.30am. Talk-in by GB3ERD. Details G4EYM, tel Derby 556875.
10 August
Hamfest '86, Flight Refuelling Sports & Social Club grounds, Merley, Nr Wimborne, Dorset. Open 11am. Free car park. Talk-in on S22. 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.
24 August
Torbay ARS Rally, STC Social Club, Brixham Rd, Paignton, Devon. Open 10am. Talk-in on S22 and demonstration hf station with GB2NJA. Free car park. Details G1EUA, tel Teignmouth 78554.
31 August
Telford Mobile Rally, Telford, Racquet & Fitness Centre, Telford Centre, Shropshire. Details G3UKV, tel Telford 55416 or G8UGL, tel Telford 584173.
7 September
Lincoln Hamfest, Lincolnshire Showground. Further details to be published at a later date.
7 September
Vange ARS Rally, Nicholas School, Basildon. Open 10am–5pm. Talk-in on 144MHz. Details Mrs D Thompson, 10 Feering Row, Basildon, Essex SS14 1TE, or G4OJN.
13 September
Wight Rally, Wireless Museum, Arreton Manor, Nr Newport, IOW. Details G3KPO, tel 0983 67665.
13 September
Ballymena ARC 12th Annual Rally, Ballee High School. Opening address given by RSGB President, G3VPK. Talk-in S22. Details GI4HCN, tel 0266 3044.
21 September
Harlow Mobile Rally, Harlow Sports Centre, Hammarskjold Road, Harlow, Essex. Open 10am. Talk-in on S22. Details G4KVR, tel 0279 22365, day, or G3UEG, tel 0279 27788 evenings.
21 September
National Amateur Radio 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 50p. Details and advance bookings G6EES, tel 0582 607623 evenings.
21 September
Peterborough R&ES Mobile Rally, Wirrina Sports Stadium, Bishops Road, Peterborough. Open 10.30am to 5pm. Free car parking. Food in the adjacent Tropicana Restaurant. Bar until 3pm. Details G4PNW.
5 October
Great Lumley AR Rally, Community Centre, Great Lumley, Chester-Le-Street. Open 11am (10.30am for disabled). Talk-in S22 and RB0 (GB3NT). Details G4MSF, tel 091 4693955.
5 October
Wakefield Mobile Rally, Outwood Grange School, Potovens Lane, Wakefield. Open 11am (10.30am for disabled). Free admission, easy parking. Talk-in on S22, GB3WU. Dealer enquiries and further details G4RCH, tel Leeds 536633 or G3SPX, tel Wakefield 828520.
12 October
Carmarthen ARS Rally, St Peter's Civic Hall, Nott Square, Carmarthen. Open 10.30am–5pm. Talk-in on S22. Free parking. Details GW3GVE, tel 026-783 460.
19 October
South Bristol ARC present the Second Bristol Radio Rally at Hartcliffe Youth Centre, Hareclive Avenue, Hartcliffe, Bristol. Open 10am–5pm. Talk-in and special event station, GB2BRR. Details G1LDJ, tel 0272 667179.
26 October
Aycliffe & Shildon ARC "Ham-day", Elm Road, Working Mens Club, Shildon, Co Durham. Talk-in S22. Open 11am–5pm. Details G4OHZ, tel 0325 314638.
23 November
West Manchester RC Mobile Rally, Pembroke Halls, Walkden, Worsley, Gtr Manchester. Details G1IOO, tel 0204 24104 evenings.
7 December
Verulam Christmas Rally, The City Hall, St Albans. Open 11am–5pm. Talk-in on S22 and SU8. Details G4JKS, tel St Albans 59318.
14 December
Leeds & DARS Annual Christmas Rally, Pudsey Civic Centre, Dawsons Corner, Pudsey. Open 11am (10.30am for disabled). Talk-in on S22. Trade enquiries G4WYD, tel 0274 685039, details G1EBS, tel 0274 665355.
8 February, 1987
Bury RS Hamfeast 1987, Mosses Youth and Community Centre (only minutes from the M66), Cecil St, Bury, Lancs. Details available from G1PKO, tel 061-764 5018.
5 April 1987
Pontefract & DARS Components Fair, Carleton Community Centre, Pontefract, midway between Pontefract and Darrington just off the A1. Open 11am–4pm. Details G0AAO , tel 0977 43101.

Special Event Stations

1 May–26 October, GB4NGF, GB8NGF, GB2NGF
North Staffs ARS are operating three special events stations, for the National Garden Festival, Stoke-on-Trent. GB4 and GB8 will be on the Festival site, GB2 is located at the QTH of G4XEE. Open 11am–8pm. Transmission on all bands using cw, rtty and tv. Special QSL cards. Details G6MLI, tel 0782 332657.
1 April–31 December, GB2RIP
Celebrates 1,100 anniversary of the granting of the Charter by King Alfred the Great to the city of Ripon. Station on air most evenings on hf cw/ssb, 144MHz fm. Other modes/bands as equipment becomes available. QSL via RSGB. WAB-SE37, Maidenhead 1094FD. Details G0CLY.
3–5 July, GB0FOH
In recognition of the help given by the Friends of Highfields. Operation on all hf bands and 144MHz. QSL via the Bureau. Details GW4LFO, and GW1LFO, tel Cardiff 750315.
5 July, GB2BAE
This station will be located at the British Aerospace Civil Division, Hatfield, Herts, during the annual public open day. Operating from 8am–4pm on 3·5, 7, 14, 21MHz using cw, ssb and rtty. Talk-in on 145·550MHz. Details G6IYF, tel 07072-62300 8489.
5–6 July, G0MFC
Martham Fund Carnival, Norfolk. Operation from WABTG41 on 3·5, 14, 21 and 144MHz. Sponsors welcomed. Details G0APV, tel 0692 670600.
12 July, GB0RAF
Operating from RAF Hendon Museum on 144, 14 and 3·5MHz from 9am to 4pm. Transmission on 3,740kHz ssb, 14,015kHz cw, 144·170MHz ssb plus or minus QRM. QSL cards via bureau or direct. RAFARS members required to man the station. Contact G4PSH tel 01-446 0266.
12 July, GB2RAF
Operating from the RAF Digby fete for 24h non-stop. Activity on hf and vhf. Special QSL cards. Reports from swls welcomed. Local volunteers especially welcome to come and help operate the station. Details G4ZYR, tel 0529 306089
12, 13 July, GB2DTS
Barking Radio & Electronics Society will be operating on 3·5–28MHz, 144 and 432MHz. Details G0EAG.
13 July and 17 August, GB4BGG
GB4BGG will operate on all major hf, vhf and uhf bands from BBC Beechgrove Gardens, centre of Aberdeen. Open morning and afternoon. Forms part of the activities associated with the twice yearly opening of the gardens to the public. Special QSL card. A QSL card from this station will count as a "wildcard" towards the Worked all Scottish Regions Award, WASR, operated for the ARS by GM4BKV. Details GM4GXD, tel Pitcaple 251.
14–20 July, GB6NP
Celebrates 21 years of safe operation of Trawsfynydd Nuclear Power Station, which is open to the public on 20 July. Station run by Porthmadog & DARS on hf and vhf. Special QSL cards. Details GW6IMS, tel 0766 770546.
14 July–11 August, GB2FRH
Pre-event and demonstration station for Hamfest '86, FR Sports & Social Club, Merley, Wimborne, Dorset. Station operated by members of the Flight

Refuelling ARS on hf and vhf. Special QSL cards. Reports via QSL Bureau or direct to G4YTA, tel 0202 882271.

19 July, GB4NMW
Coincides with the Snowdon Race. Station operated at the National Museum of Wales' Environmental Gallery at Llanberis, near to start and finish of race. 10am-6pm, on hf bands. Details GW4CFC, tel 0286 870636.

19-21 July, GB2RPC
Commemorates 100 years of Plumbers' Registration. Operation on hf and vhf from the Institute of Plumbers' HQ, 64 Station Lane, Hornchurch RM12 6NB. Details G4VIW, tel 04024 45199.

23, 24 July, GB2WAD
Celebrates the Annual Great Weston Air Days, from Beach Lawns, Weston-super-Mare. Operated by members of the Weston-super-Mare RS, 10am-6pm. Transmissions on hf, 144 and 432MHz. Details G1DJW, tel 0934 514429.

24 July-2 August, GB8CG
Commemorates the 1986 Commonwealth Games, Edinburgh. Organized by the Lothian RS from a venue near to Meadowbank Stadium. Operation on as many hf bands as possible and 144MHz fm ssb. Special QSL cards via bureau. QRP contacts welcome. Details GM6JAG, tel 031-664 5403.

27 July, GB2MLB
Margate Lifeboat House Open Day. Station operated by Radio Club of Thanet on hf and vhf. Club will make a donation to RNLI funds for each QSO. Special QSL Cards. SWL reports welcome. Details G4SBD, tel 0843 33213.

27 July, GB4SRS
Stroud ARS operating from the Scout Hut, Seley, Stroud, on hf 3·5-28MHz and 144MHz. Junk sale. Special QSL cards. Details G4XWZ, tel Stroud 70267.

31 July-12 August, GB4MEJ
International Scout and Guide Jamboree, Mount Edgcombe Park, Torpoint, Cornwall. Operated by Torbay and Plymouth AR societies on all bands from 1·8MHz to 30MHz, also 144MHz. QSL cards to all contacts and swl reports. Details G4SBH, tel 0803 34640.

2, 3 August, GB0NFB
Second annual vintage fire-engine rally; Wollaton Park, Nottingham. Station operated by four members of the Robin Hood ARS on hf, vhf and uhf, ssb, fm, cw and rtty. Special QSL cards. Details G6PDA, tel 0777 707698.

2-9 August, GB4FES, GB8FES
Operating during "Festival", a Christian family festival at Royal Agricultural Showground, Stoneleigh, Warwick. Operation on hf and vhf. Special QSL cards. Details G4OXM, G4LOF, G1PCD.

8, 9, 10 August, GB4YHA
Youth Hostels Association. Transmissions on hf and vhf from Holmsbury St Mary Youth Hostel, Nr Dorking, Surrey. Details G1LKJ, tel 01-688 4075.

8-10 August, GB2YFT
Yeovil ARC will be operating from the Yeovil Festival of Transport, Yeovil Showground on 3·5 to 432MHz ssb and cw. Meteor scatter is planned from the evening of 8 August on 144MHz and skeds would be appreciated. Details G4JBH, tel 0935 23873.

9-16 August, GB4BIF
Station operating during the Billingham International Festival. Operation on all hf bands, 144MHz and 432MHz. Particularly looking for contacts with stations of the competing countries. Details G1NOY, tel 0325 310058.

16 August, GB2MSS
Yeovil ARC will be operating from the Mid-Somerset Show, Shepton Mallet Showground, on 3·5 to 144MHz ssb and cw. Details G4JBH, tel 0935 23873.

22-25 August, GB2TVF
22nd annual Towersey Village Festival. Operation on hf and vhf, 3·5, 14, 144MHz ssb and cw. Details G0FCV, tel 0844 208635.

23 August, GB0ABC
Station run during the annual Billingham Carnival by Stockton & DARG. Operation on hf, 144 and 432MHz. Special QSL cards. Details G1NOY, tel 0325 310058.

23, 24, 25 August, GB2FHI
Barry College of Further Education RS operating from Flat Holm Island, Bristol Channel. Operation on hf, vhf and uhf. Location qualifies for the WAB islands contest and will be the only opportunity to work it this year. Details GW0AGA.

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.

30 August, GB2MAC
Celebrates 250yrs of Margate as sea-side resort. Station operated by Radio Club of Thanet from sea-front location, Margate. Operation on hf and vhf. Special QSL cards. SWL reports welcome. Details G4SBD, tel 0843 33213.

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.

13 September, GB2RAF/GB2AB
Royal Air Force Abingdon Battle of Britain At Home Day. GB2RAF on 3·5 ssb and 14MHz cw. GB2AB on 144MHz ssb and fm. Station operated by Oxfordshire RAFARS. Members wishing to participate contact G6ZH before 31 August.

13 September, GB2WMF
Celebrates Annual Winscombe Michaelmas Fair, Winscombe, Somerset. Operated by Weston-super-Mare RS on hf, 432 and 144MHz. Open 10am-6pm. Details G1DJW, tel Weston 514429

15-22 September, GB2GAF
Commemorates Battle of Britain Week. The station will be operated by the Gloucester ARS from the RAF Association Club, Gloucester. Activity on hf and vhf. Special QSL cards. Details G3MA, 40 Calton Rd, Gloucester GL1 5DY.

17-19 October, GB4OYC
Station QRV 0000gmt 17 October to 2400gmt 19 October to start the Yeovil ARC's 40th year. Operation from the club HQ on 3·5 to 432MHz, cw and ssb. Details G4JBH, tel 0935 23873.

25, 26 October, GB2EMR
On the occasion of the International Endurocross Motor Cycle Races, from Beach Lawns, Weston-super-Mare. Operated 10am-5pm each day by members of the Weston-super-Mare RS. Transmissions on hf, 144 and 432MHz. Details G1DJW, tel 0934 514429.

3-9 November, GB4PW
In remembrance of Poppy Week. Station operational from The Royal British Legion HQ, 49 Pall Mall, London SW1. Open 10am-8pm on 3·5, 14, 144MHz, cw, ssb and fm. Operators required from Services & Royal British Legion Members, class A or B. Contact G4PSH, tel 01-446 0266, giving name, callsign and day/s you wish to attend. SWLs welcome to assist in keeping log and QSL cards up to date.

Other Events

5, 6 July
Wembley '86 Amateur Radio & Electronics Hobby Fair, Wembley Conference Centre, London. Details tel 021-421 5516.

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

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

5 October
Welsh Amateur Radio Convention, Oakdale Community College, Blackwood, Gwent. Details GW3KYA, tel 0495 225825.

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

24, 25 October
Leicester Amateur Radio Exhibition, Granby Halls, Leicester. Details G4PDZ, tel (day) Leicester 553293, (evng) Leicester 871086.

OBITUARIES

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

Mr J Adams, GI5AJ
Jimmy Adams was one of the pre-second world war enthusiasts. First licensed in the mid 'thirties, he was one of the earliest vhf experimenters, and during the war he held the rank of Lieutenant Colonel in the Royal Corps of Signals. He was an enthusiastic member and supporter of the RSGB, and the Bangor & DARS.

Mr T Burton, G2BON
Tom Burton, who died on 29 April, was an active member of the Sutton Coldfield RS. He was active on hf and had worked many countries on dx.

Mr C J Bury, G3PJV
Cliff Bury, who died recently, was a founder member of the newly re-constituted Darwin ARC. He was a quiet and helpful person who will be sadly missed at club meetings and by his many friends in the amateur radio movement.

Mr H E Cadman, G3LBQ
Hal Cadman died in April, aged 76. He was a founder member of the Acton, Brentford and Chiswick club. He operated mostly on cw and was very active working for Scandinavian awards.

Mr D A Campbell, MIQA, GI8LDG/EI4BFB
Danny Campbell died on 21 November aged 33. A member of the RSGB, Raynet, BARTG, Microwave Society and the Mid-Ulster ARC, he was interested in all aspects of amateur radio. He was also a keen home-constructor.

Mr W A Drewell, G8SMV (ex G3RMR)
Austin (Aussie) Drewell died on 28 April aged 40. He was active on topband during the 'sixties as G3RMR, but let his licence lapse while working abroad. Re-licensed as G8SMV he was active in the Luton area during the past two years.

Mr C Harris, G3IJ
Mr Harris died on 20 March aged 75. Licensed in 1934 he served with the RAF during World War Two on radar installations and maintenance of stations between the Scottish Isles and the Isle of Wight. He was a keen experimenter and constructor, and had erected many large wire antennas.

Mr H Leishman, GM2TW
Henry Leishman, who died on 6 March, was first licensed in 1927 and had been a member of the RSGB for over 50 years. He was a founder member of the Falkirk & DRC and up to the time of his death, was very active with the club on the air dx hunting, mostly on cw.

Mr J M'Mullan, GI4FUV
John M'Mullan died on 4 April. He had been a member of the Bangor & DARS for many years, and attended meetings regularly, in spite of his difficulties in walking.

Mr G Murrie, GM6TBR
Gordon Murrie died on 10 May. He was an enthusiastic member of Kilmarnock & Loudoun ARC and a good friend of many local hams.

G Pollock, G2OY/VK2FU
Mr Pollock died on 31 July 1985 aged 73. He was first licensed as G2OY in 1932. Following a short spell in the army he was thence transferred to BBC Scottish Region as station engineer. He had resided in Australia since 1951.

Mr C N Strong, LDS, MRCS, LRCP, FRCS G2RQ
Cecil Naylor Strong died on 4 January aged 85. He was a very early member and several times president of the Midland ARS, highly acclaimed for his scientific lectures. In war years he gave much time as an operator in the Radio Security Service, the "secret listeners". A keen constructor and member of RAOTA, many local amateurs benefited from his wide experience, some of whom he assisted in their preparation for the RAE.

Mr H Watson, G3HTI
"Doc" Watson, who died on 9 May, was first licensed in 1951, and prior to that was BRS18949. After obtaining his licence he achieved the Veron 30wpm Certificate and was a member of TOPS. A founder member of the Grimsby ARS, he had been made honorary life member only this year. He founded and ran the Hereford School RC, G3YMF, and he was also a member of RSARS. His interest was mainly in cw, but for many years he organized and ran the RAE courses locally and gave morse lessons to all those who were interested.

Also:
Mr K Draper, G4IWT, on 14 March
Mr S E Frater, G1CZY
Mr F Gould, G3BFG
Mr A P Haberhauer, G6HTC
Mr K M Hooper, RS87711, on 14 February
Mr J D Hughes, GW8BJH
Mr G R Kelman, VK2EEW
Mr J Quinn, G4LSJ, on 24 January
Mr D Sturrock, GM4LHD, on 15 May
Mr J Versmissen, ON4VT, on 16 August 1985

Members' Mailbag

THE EDITOR,
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POTTERS BAR, EN6 3JE

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.

IN REPLY TO G2WS

Sir—I am surprised at the comments from G2WS (*Rad Com* March) regarding the current state of ham radio and the lack of practical work being undertaken by the fraternity in general.

How can Bill Scarr deplore the present situation when there is no requirement these days for a fully-licensed ham to be able to recognize a single electrical component when he sees it. In fact he does not even have to be able to operate a transmitter when it is put in front of him, and provided he can identify the knob of a morse key when he takes the test, he has satisfied all the legal requirements.

I can only presume that at some time in the dim and distant past the hierarchy of the RSGB must have co-operated with the Post Office to let this state of affairs come into existence, and surely as a long-time member of that hierarchy G2WS must himself "carry the can" or should I say "walk with the suitcases".

When I was licensed in 1936, Galpins of Lewisham and the back streets of the West End were an endless source of surplus gear, but today these sources are long since departed, and unless the newly-licensed ham has a good friend in an old-timer who has a bottomless junk box, his chances of even being able to obtain the raw material for his projected research are very slim.

If the RSGB is not happy with the present state of the art then they should be devoting all their time to rectifying the situation and cease filling the *Bull* with instructions for building houses for people who need not be able to recognize a brick.

L R K Gregory, G2AVI

PS Ever tried to buy a variable capacitor in Herne Bay or Canterbury for that matter?

Sir—Two-and-a-half cheers for G2WS's letter in your March issue. There is very little information in *Radio Communication* directed towards the beginner; no wonder he buys his rigs ready-made. If Mr Scarr's plea for simple constructional articles bears fruit, might I suggest a start with the building of the elementary test gear which every shack should have?

As for training in the art (as distinct perhaps from the science) of radio communication, I shouldn't be surprised if G2WS could himself help a lot by passing on his acquired knowledge of good operating procedures and by sending in circuits of his own home-brews which he knows work well.

I keep back half a cheer because I think G2WS is being a bit hard on the many amateurs who, for one very good reason or another, cannot become as technically knowledgeable as he is. But they maybe *have* succeeded in getting a licence, can afford a moderately-priced second-hand rig, operate with care and consideration, and much enjoy the friendly contacts made by means of this fascinating hobby. Yes om, they *can* be classed as radio amateurs, and the amateur radio world would be much the poorer for their absence.

D Hannaford, G0BYY

Sir—The letter from G2WS moves me to write in defence of the repeater and its users.

I daily use 'VT and 'MN on my 70-mile journey up the M6 to Manchester. During the recent cold weather, both have proved a source of information as to the state of both weather and roads. On one of what turned out to be the last days of the latest cold spell, two gallant guys turned out to a very cold site and set about fixing the ailing 'MN repeater. I did not envy them their cold and thankless task, and the box works very well with the good coverage it now provides. So much for the purpose that they serve.

I remember the thrill of my first contact with a non-G station via a repeater. It was great, especially as the repeater in question was outside my area. I soon got over the shock, and subsequent mobile work revealed the true nature of repeaters to me, not to mention the vagaries of vhf propagation. Even the most naive operator gains some experience, sometimes.

G2WS mentions the trivial nature of the conversations he has heard. They may not have been to his taste, but has he objectively listened to 3·5MHz on a Monday afternoon? On the last occasion I tried to listen to that part of the hf spectrum, all I got was two chaps waffling about the heating of a domestic greenhouse, and not by rf either. I assume that those two were enjoying their hobby and their friendship, but most QSOs could be considered boring by the non-interested listener. Surely he would concede that the hobby is broad enough to encompass all forms and conditions of conversation? Furthermore, some "cb-type" resemblance in the mode of conversation (I would not know, I never had one), is inevitable given that the cb boom of a year or two ago injected thousands of keen radio enthusiasts into the amateur fraternity.

With the lack of "operational training", it is more than likely that such jargon as is around at the time will be heard. It is in the nature of the English language that obscure references, jargon and puns punctuate the chatter. It is like being in a little clique, using jargon—a feeling of exclusivity, engendered by a general lack of more formal training and possibly education. But it does not matter much, as long as normal rules of civility apply.

I know of several amateurs who cannot make contacts (at least on 144MHz), without the use of a repeater. Terrain, finances and local planning rules have curtailed for them the hobby: but on the night I contacted one small group, they were civil enough to allow me to make a QSO (I was operating mobile), and they took up after I had made my arrangements, and even called me into the QSO. I realize that there are those to whom the deliberate interruption of even a mobile QSO via a repeater is a matter of harmless, if frustrating, fun, and there are folk around who like to swear or play music: but there are IQ0s in any activity. These idiots should be weeded out and their licence, if any, revoked. It may not, however, be enough for the dedicated pirate. They are best left ignored.

With regard to constructional projects, it is not the price of the parts or the technological achievement, but the sheer complexity and tight specification of the modern vhf/uhf radio which makes many of us shy away from doing it ourselves. Good test equipment is hard to buy, operate and calibrate. I suspect that many operators would like to have a go at something, if there was enough requirement in the shack. Antennas, psus and odd little add-ons are about "it" for most of us. The trouble is that there are many to whom a neat 3·5MHz cw transceiver is not quite what they have in mind when it comes to a little something for the soldering iron to do. And chassis bashing is quite out of the question in a modern kitchen. (My wife complained for days after I had applied solder and filings to the front room carpet after building my first receiver! I had no shack at the time.) What does G2WS regard as a simple project of universal appeal? The subject is too diverse to be so sweeping, is it not?

I have a lot of respect and admiration for the "old-timers" who got on the air by dint of their own efforts without any help from the black box, later often using converted ex-WD gear. They are a piece of living history, and often know more about the basics of radio and propagation than many text books. I listen and talk to them when I can, but it does hurt when some of them think the radio world ends at 28MHz and uhf is a black art best left to the military. To mis-quote Harold Wilson: "Radio is a broad church"—let us pray for a little tolerance—on all sides.

D R Coomber, G8UYZ

Does anyone disagree with Mr Coomber's assessment?
These are the letters in reply to G2WS, but where are the simple technically-sound articles?—Ed.

THE AMATEUR AND THE GOVERNMENT

Sir—It was with great concern that I read, in your April issue of the latest stupidity on the part of the government. Yes, you guessed right away, I refer to the "policy of the RIS on amateur/neighbour breakthrough".

The RSGB is, in its usual fashion, being the perfect and professional gentleman in its approach to the DTI. It is to be applauded for being so cool and calculated in such a provocative situation, where the amateur is made to be the villain of the piece and the neighbour the so called innocent party.

In nearly all cases of interference it is the pathetic quality of the consumer equipment which is the cause of the trouble and not the amateur gear.

I have, over the years, been forced to become ever more a cynic, and in consequence see that the amateur has no obligation whatsoever, moral or otherwise, to remedy the situation with regard to the neighbour. In addition, the neighbour may, indeed, through tv timebase transmission or computer circuits, be causing interference to the amateur receiving apparatus. Is he going to step forward and say "sorry old chap, I will put some screening around my offending objects"? Why ever should he!?

As you say in the editorial, the situation may only be resolved after a costly litigation or at the least the use of some of the Society's reserves. In view of this fact, I am sure an appeal for some financial help from the membership, particularly for a fighting fund, would not fall on deaf ears.

Ian D Campbell, GM4FFP

Sir—G3OUF's editorial in your April issue paints a fairly bleak picture of the future of those of us who happen to live in fairly congested areas; in particular, where interference is caused to television receivers installed in neighbours' properties.

The position will become even more difficult with the ever-increasing installation of video and similar equipment attached to tv receivers. Having operated in one location for some two years and having caused no interference of any kind, even to our own domestic receiver, all sorts of problems have arisen since one of my neighbours was persuaded to change his tv equipment for an up-to-date video package obtained from a well-known rental company.

Despite two visits from the RIS and the expenditure of a very considerable amount of time and effort on the part of the technical staff of the rental company, who have sought advice from the Japanese manufacturers of the video equipment, the problems still persist, and in this I would quote from a recent letter from the technical director of the rental firm concerned:

"We are convinced that no technical solution involving filtering or any other method of which we are aware will cure this problem. Any video recorder using European standards will inevitably have a high sensitivity at around 3·5MHz, and therefore, when this band is used, interference is inevitable."

In my particular case I have had the utmost co-operation from my neighbour, the RIS and the rental company, and the only solution we have been able to achieve is the use of the landline with the request that I close down for a period to enable my neighbour to use the video equipment. This, of course, involves considerable restrictions on my operations,

but fortunately I and my neighbour remain on reasonable terms.

One would feel that in circumstances such as these the DTI should be requested to ensure that, while the amateur takes all reasonable precautions to ensure that his equipment is properly maintained and operated within the terms of his licence, a similar standard should be required of the manufacturers and suppliers of tv equipment—especially of video recorders, which act as wideband amplifiers, and for which internal frequencies required for their operation should be well clear of amateur bands. Importation of equipment not to this standard should not be permitted.

J T Blackwood, G3TG

Sir—The robust comment from the RSGB about the RIS affair marks a welcome change in the three-cornered relationship between the DTI, the RSGB and UK radio amateurs.

In the past the RSGB has too often allowed *Radio Communication* to be used to notify amateurs of dubious rulings from the DTI and its predecessors. By failing to exercise its right of independent comment, the RSGB has often seemed closer to the DTI than to its own members. It is good that this too-cosy relationship has changed. But it will be a disservice to UK radio amateurs if the relationship between the RSGB and the DTI deteriorates into antagonism.

There is no conflict between the real interests of the DTI, the RSGB and the radio amateurs on whose behalf the RSGB negotiates. Everyone stands to gain from fair and reasonable regulations which require a minimum of supervisory effort on the part of the DTI, yet which provide adequate safeguards against abuses and against undue interference.

The DTI has the authority to regulate amateur radio, but it also has the responsibility to regulate with fairness and competence. UK radio amateurs expect DTI administrators to brief themselves with the best possible information about amateur radio, the only professional source of which is the RSGB. Close consultation with the RSGB represents the most effective use of the DTI's own administrative effort.

The DTI can never lose its right to make the final regulatory decisions, so it need never fear to share the preparatory work on new regulations with the RSGB. What UK radio amateurs require of the DTI and the RSGB is a no-nonsense relationship based on the mutual respect which each side deserves. Given that, the two organizations should never be forced into conflict. But it is good to know that the RSGB is now prepared publicly to demand that amateur radio be well regulated.

Ian White, G3SEK

Sir—The emc policy change introduced by the DTI is full of foreboding for the amateur.

While hoping that the RSGB can argue successfully for the scrapping of this new policy, it may be that the amateur fraternity can only win its case after an enormously expensive challenge in the courts.

Perhaps the Society might be pleased to know that they can call on me for a £50 donation when, and if, required.

T Cheesley, G4CHP

Sir—In the last century Charles Dickens observed: "The Law is an Ass". If he were around today, he might well say that "The Law is a very well-heeled Ass", but the real wallies are its clients—those who get drawn into expensive, and often cost-ineffective, litigation.

In the April editorial the Society appears to be considering taking-on the Government (in the shape of the DTI) in the courts over the issue of the RIS policy to radio amateurs. In the light of case history over the past few years, this would appear to be an extremely unwise course, and an extremely expensive operation. David Evans, G3OUF, tacitly confirms this, when he calls for increased membership for the Society; ie your subs will be used to pay our lawyers.

This is one member who is not ready to see his subscription thrown into another crock of gold for the legal profession, and I am sure that "vigorous court action" will not be a very effective recruiting slogan for the Society.

A far wiser strategy would be to head-off Senelec now by gaining greater powers and responsibility for RSGB by tactful lobbying of the Government (don't we have any MPs to put our case?). The aim being to have RIS, at least as far as amateur/emc is concerned, to be transferred to the Society from the DTI. There is a clear precedent for this: that being the new involvement in morse testing—a function like the RIS, previously under British Telecom. Perhaps if you were to stress the privatization aspect, with special emphasis on reducing costs to the taxpayer etc, you might receive a positive response. It should be possible for Government legal departments to draft a law giving the RIS function to the Society in all relevant areas; even including mobile/portable telephones, since we, the amateur fraternity, are the most numerous users of, certainly, the hf part of the spectrum. A second benefit would be the creation of some full-time posts with experienced amateurs and transferred personnel from the DTI/RIS.

At any rate, far better to spend members' subs in this way than the open-ended commitment to legal action which could easily take you to the House of Lords and European courts.

Peter Dyer, G4BUV

These letters represent, we hope, a reasonable cross-section of the correspondence which the Society has received on this topic; the latest news about the subject itself can be found in this month's RSGB News Bulletin *pages. As has been said elsewhere, the Society dislikes (and, indeed, will not tolerate) the implication that the radio amateur is always the villain of the piece as far as breakthrough problems are concerned; the essence of the vast majority of them is simple lack of rf immunity, which is the sole responsibility of the designer and manufacturer of the domestic electronic entertainment equipment. Probably because it is politically embarrassing and would require wholesale changes of attitude in various quarters, facing that simple technical fact seems to be quite beyond both manufacturers and legislators—and it is that situation which the Society is determined to change.*

However, the Society must itself strike a balance between the aggressive and vociferous pursuit of an honest solution to emc problems—which has involved, and will continue to involve, firmness in debate and continuing demands that proper justice be done—and the necessity of maintaining dialogue and a good everyday working relationship with the DTI, which has in other areas done a great deal for amateur radio in the UK.

As far as litigation is concerned, the Society would much prefer to exhaust every other possible avenue of debate and discussion before casting precious financial resources in the general direction of the British legal system!

"MEMBERS MAILBAG"

Sir—This section of *Radio Communication* appears to have become a medium for certain elements in amateur radio to air their pet hates. I refer to the extremists who are convinced that amateurs are not doing it the right way unless they are doing it their way. I am sure the readers of this mailbag will know some of their own local extremists.

Who really gives a hoot whether its Maidenhead or QRA, Class A or Class B, black box or homebrew? Is it not time for amateurs to put their hobby into perspective, because after all it is only a hobby. Let us put the amateur back into amateur radio and stop all this petty-minded bickering, of which I for one have had enough.

I have made a lot of friends during my four years on the air, and I value their friendship enormously. It does not matter to me who sat the "real exam" or who sat the multi-choice paper, because to me all hams are the same, people participating in their hobby of amateur radio.

So please do not use the radio spectrum or "Members Mailbag" to exercise your ego, enjoy radio for what it is, an ever-changing hobby that caters for a multitude of varying interests.

Finally, if any ham objects to the use of cb terminology on the air, might I suggest that instead of making smug remarks over the air when they know the offending station is listening, they should try to help the newcomers to become better operators by politely advising them "off the air". This would save them an awful lot of embarrassment and I am sure the help would be greatly appreciated.

D A Guest, G4RSR

CONTESTS

Sir—Re vhf/uhf contests. It might be an idea in the future to make it a rule that a portable station must not occupy the same site for more than one year at a time. At present you have the same portable stations using the same sites year after year, giving rise to the same 10-12 callsigns in the top 10 of any contest, making it a "no contest" for any newcomers. Contests could soon be in danger of becoming boring!

However, contests would be made more exciting and challenging if we were made to search for and experiment with new locations (as they did years ago!). I noticed that a few of the usual leading stations in a recent contest did not enter because their usual site was snowbound (*shame!*) and they did not bother to look elsewhere.

Also, what is preventing a sensible power limit being adopted for vhf contests to alleviate idle QRM.

I will be interested to hear comments from you and any society member.

P L Massey, G4YCA

Sir—I should like the RSGB to try and restrict some of the contests (not necessarily RSGB ones) or try to influence the sponsors. Though I am not wholely in favour of contests I can see that many do gain great pleasure from them, and far be it for me to be their "kill joy". However, to hold contests and use the whole of weekends for them is just not on.

Many hams have only weekends to do their operating, and that becomes of little use when hf bands are filled with "CQ CONTEST". So I propose a strict time limit of no more than 3h, and restrict the contest to the upper parts of the relevant bands, avoiding the so-called dx parts. This may make contests that little bit harder but, after all, it is a contest.

Also, perhaps, now may be the time to discuss the scrapping of calling frequencies which seem to plague the vhf bands. So let's start with S20. Many people use the repeaters to call initially and after checking inputs will QSY to a simplex channel. Also, poor operating it may be, but often a weak signal responding to an S20 call will be blocked by stronger ones calling before checking on its occupancy. The same goes for 144MHz ssb and cw calling frequencies.

On hf we manage QSOs without calling channels, and on vhf when a contest or special event station is about, so there seems little use for such a waste of a frequency?

A Skaife, G4XIV

CRIME PREVENTION

Sir—As an officer engaged in a police department dealing with crime prevention, may I offer to fellow amateur radio enthusiasts a word of caution.

I do not think I need to tell you that over the last few years there has been a marked increase in thefts of amateur radio equipment. One often hears amateurs telling friends or contacts of their impending holiday, or being absent from home for a period of time, and this information can be heard by criminals as well as others. The criminal element is able to obtain, in most cases, the address of an amateur from the *Call Book*, and it is not beyond the bounds of possibility for the amateur to return home from a delightful holiday only to find that all his radio equipment has gone.

I therefore appeal to all fellow enthusiasts for more awareness in crime prevention terms, particularly when disclosing information about absences over the air.

D W Allan, G1DWA

Conversion of the FT707 for top band

Front panel of modified FT707 showing 1·8MHz position

M J GRIERSON, G3TSO*

THE YAESU MUSEN FT707, featured as the new "go anywhere" transceiver of the 'eighties, was one of the first miniature hf transceivers to appear on the market fitted with the new WARC bands. Some earlier models were sold in the USA and Japan fitted with two AUX bands and WWV in anticipation of new amateur allocations, but few if any of these models reached the UK. The FT707 sold in considerable quantities until finally withdrawn from production in 1984.

In many respects the FT707 is an excellent little transceiver offering many of the features of larger and more traditional equipment, but has always suffered from the lack of 1·8MHz coverage. Bearing in mind the provision on very early models for two optional extra bands, the possibility of replacing one of these new bands with 1·8MHz was considered. The advice of the manufacturer was sought, but such a modification was discouraged because the FT707 was claimed to be designed to operate between 3 and 30MHz only, besides which modification would negate the warranty.

Now that the FT707 has been out of production for some time, few are likely to remain under warranty. Regular numbers of secondhand FT707s appear in for sale columns at reasonable prices, making modification a more attractive proposition to the would-be purchaser, as well as the owner of the older equipment.

Researching the modification

Examination of the circuit diagram of the FT707 reveals that there are a total of 11 band-switched crystal oscillators, one for each band segment; three sets of bandpass filters, diode switched to cover each major band; and a set of five lowpass filters, with cut-off frequencies from 4 to 30MHz for the attenuation of transmitter harmonics, which are selected into circuit by pairs of relays. Fig 1 shows a simplified block schematic diagram of the FT707, showing the position of the respective filters.

The FT707 is basically a single-conversion transceiver with an i.f of 8·9MHz (in practice, two further conversions take place but this is of no consequence here). A conventional vfo operates between 5 and 5·5MHz, and is pre-mixed to the local oscillator injection frequency by mixing with one of the 11 crystal oscillators. The pre-mix signal is filtered in a bandpass filter before being fed to the mixer which operates on both transmit and receive.

Two sets of front-end bandpass filters, which can be regarded as the rf and mixer filters, provide front-end selectivity on receive and filter the transmit signal prior to final amplification. Eight filters permit one for each amateur band covered.

The transmitter signal is amplified to the final output power in a broadband amplifier and then filtered in one of five lowpass filters. The receive signal is also filtered through a highpass filter with a cut-off of 1·7MHz to remove unwanted broadcast signals from the long and medium wavebands.

In order to facilitate 1·8MHz operation, it is necessary to provide a suitable heterodyne oscillator in the pre-mix circuit, provide three suitable bandpass filters for the pre-mix and front-end filtering, and to provide a lowpass filter with a cut-off frequency in the vicinity of 2·1MHz to attenuate harmonics.

Examination of the FT707 will reveal little or no space for additions in the form of new inductors and tuning components, as it is very densely packed into its relatively small case. The band-switching and filter design do not lend themselves to the addition of padding capacitors in the style of early FT101 modifications. Fitting a new band would appear to require the removal of one of the existing bands and substitution of the new one, but fortunately this is not the case. The modification to be described will permit the addition of 1·8MHz without loss of any other facilities, and does not require any form of surgery other than drilling one 6BA-size hole in an existing pcb, and even that can be avoided if necessary.

Comparison of the circuits of the FT707 and the FT107 provided most of the clues to the modification. There is a remarkable similarity between the rf circuitry of both these models, except that the FT107 includes 1·8MHz. Front-end circuitry is almost identical, with the same inductors being used in both models, the pa unit is the same on both sets and by collecting part numbers from the FT107 manual a set of Yaesu 1·8MHz filters can be identified.

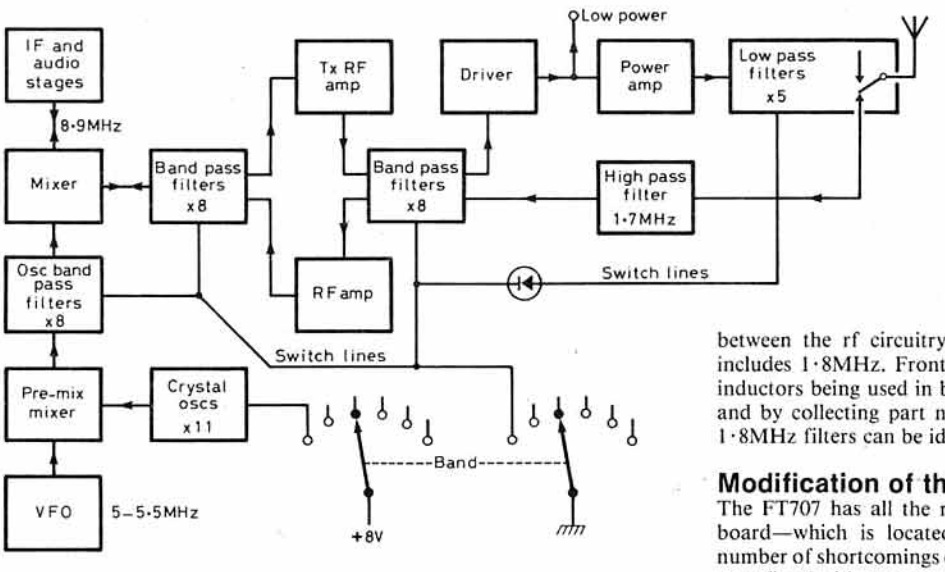


Fig 1. FT707 simplified block schematic diagram

Modification of the rf board

The FT707 has all the rf bandpass filters mounted on one pcb—the rf board—which is located directly under the top cover. There were a number of shortcomings on the original rf board, PB2093, and later models were fitted with an uprated board, PB2201; it is just possible that there may be other boards, but this should not be a major problem. All my modifications were made to the later version, PB2201, and all references in

*9 Conegar Road, Quenington, Cirencester, Glos GL7 5BY.

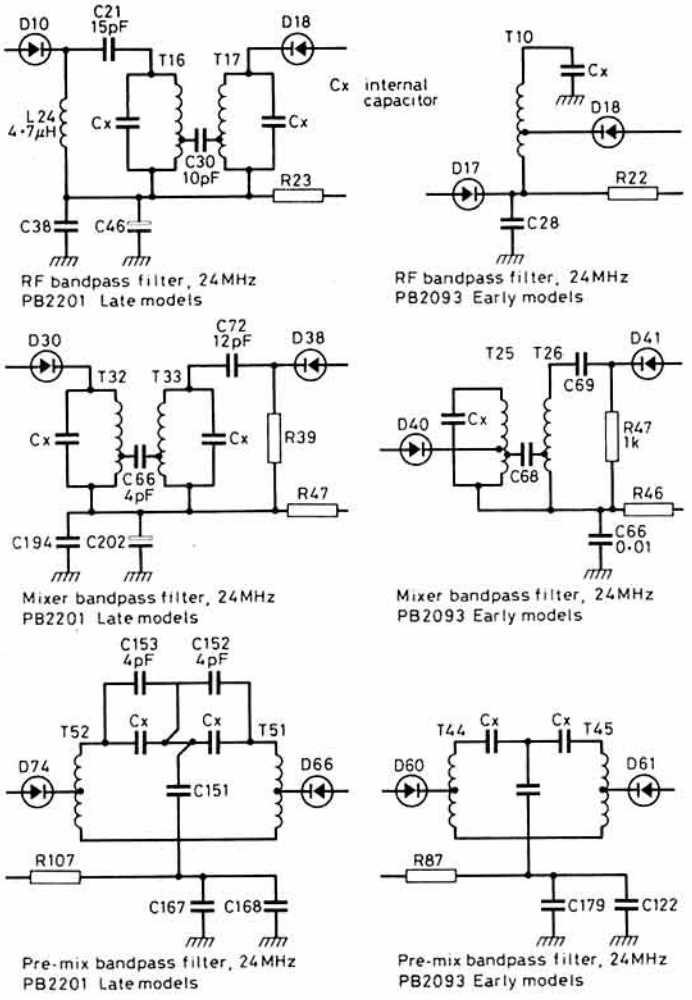


Fig 2. FT707 existing 24MHz bandpass filters, early and late models. Use in conjunction with FT707 operating manual

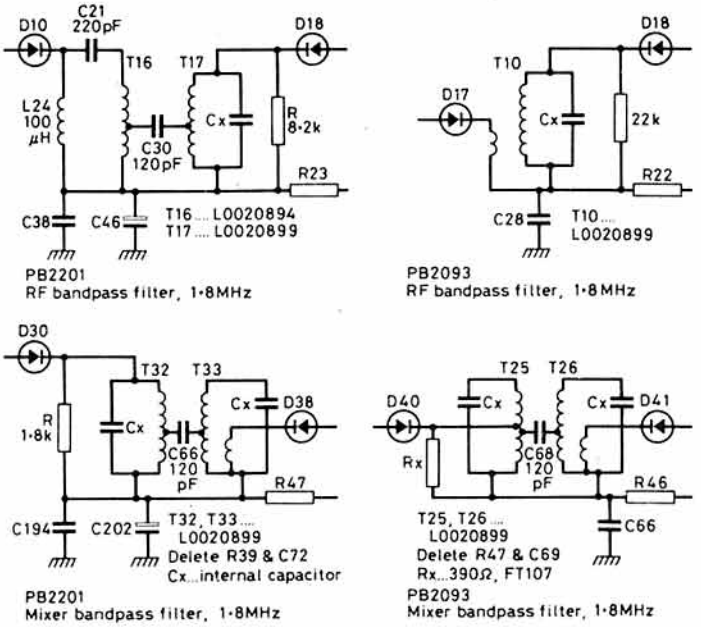


Fig 3. FT707 1·8MHz modification: rf and mixer bandpass filters

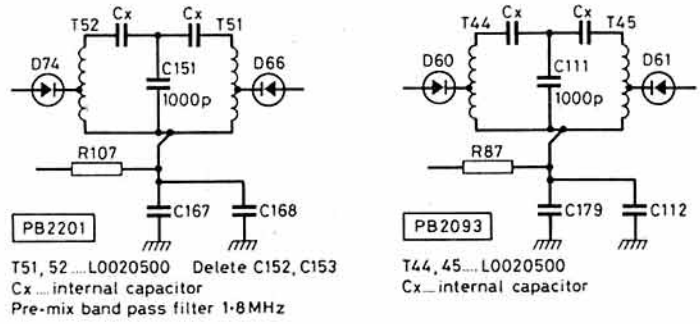


Fig 4. FT707 1·8MHz modification: pre-mix bandpass filter PB2201 and PB2093

the text will be to this board. Fig 2 illustrates the differences between the two boards and Figs 3 and 4 show suggested modifications to both rf boards.

After acquiring a complete set of Yaesu inductors for the 1·8MHz band, all the 24MHz inductors were removed from the rf board. This operation requires a good-quality soldering iron and a solder sucker, together with some experience of working on high-density pcbs. The unnecessary components associated with the 24MHz coils are also removed, and the new components associated with the 1·8MHz coils are added first, followed by the new coils themselves. Careful attention should be paid to pcb track and component location to ensure that the circuit complies with Figs 3 and 4. I prefer to preserve all components removed, after suitable identification, just in case a reverse mod is ever required.

If Yaesu inductors cannot be obtained, it is possible to rewind the existing 24MHz coils and retune them for 1·8MHz operation. Alternatively, it is possible to use readily-available Toko 7mm inductors and add the necessary link windings. Fig 5 indicates a range of suitable Toko inductors available from Cirkit, together with the number of turns required, which can also be used as a guide for rewinding the original 24MHz tuned circuits for 1·8MHz operation.

It is common practice in broadband filters to use relatively low values of inductance combined with high values of capacitance in order to achieve a relatively flat response over the desired band. This is particularly important on 1·8MHz where traditional values of inductance can produce a very peaky response.

If homemade filters are contemplated, it is recommended that they be breadboarded and aligned before fitting to the rf board, if pcb damage caused by excessive soldering is to be avoided. In the interest of simplicity the use of Yaesu inductors is recommended.

The only other modification to the rf board is to locate J04 and remove the link connecting the 24 and 28MHz pins to prevent the 28MHz lpf being selected on 1·8MHz. On PB2093 the link is not shown on the circuit, but must be located and removed.

Modification of the af board

The crystal oscillators are located on the af board mounted directly under the base cover. The oscillators are arranged neatly in two rows, and if all original bands are to be retained an additional 15,984·5kHz oscillator, Fig 6, will have to be added. A small pcb measuring 0·5 by 1·37in and mounted on a 6BA 0·25in pillar can conveniently be located between the two rows of oscillators. Layout of the pcb is shown in Fig 7 and is the same as the original oscillators. Output from D1 Fig 6 on the new pcb is taken to the common output line shared by the existing oscillators.

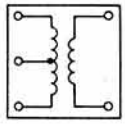
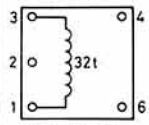
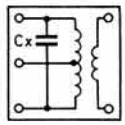
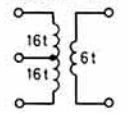
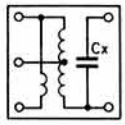
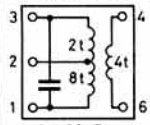
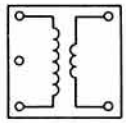
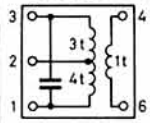
Rewiring the main chassis

With the rf and af boards removed, the front panel can now be separated from the main chassis. Remove the two screws at either end, and a fifth from the top of the panel. Do not attempt to remove the vfo unit from the front panel. With the five screws removed, the front panel can be eased forward from the chassis sufficiently to allow access to the bandswitch.

Removal of the rf/af gain control greatly assists the next operation. Halfway down the bandswitch on the same side as the rf/af gain potentiometer, two unused contacts will be observed, one on each wafer; these coincide with the blank position on the front panel between the 80 and 10D bands. This is the new 1·8MHz position. Fig 8 shows switching details.

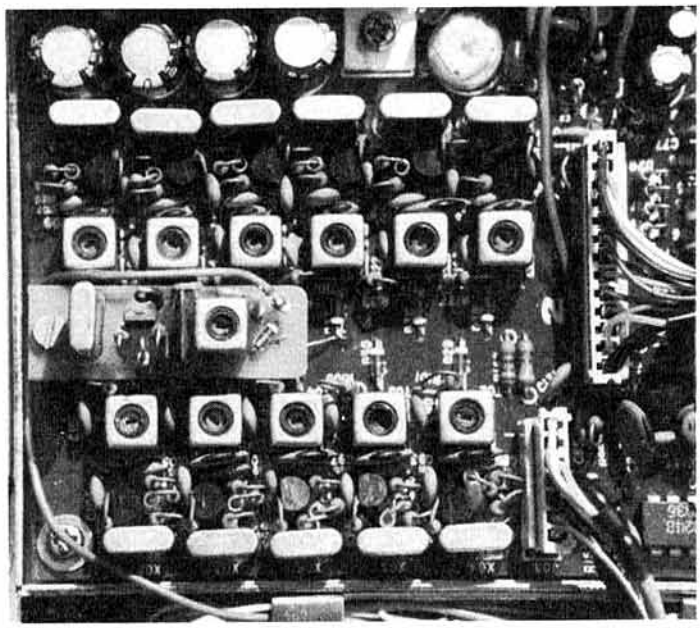
The rear switch wafer S3a carries the earth control line, while the front wafer S3b carries the 8V rail used to switch the oscillators. The 8V rail on the new 1·8MHz oscillator should be connected to the unused contact on the front wafer. Locate the 24MHz contact on the rear wafer (first left of centre at bottom of switch) and remove the wire attached. This wire should now be connected to the unused contact 1·8MHz position on the rear wafer. The now unused 24MHz contact should be connected to the adjacent 10D contact which is wired to 10C, 10B and 10A. (Fig 8).

The front panel can now be reassembled. Reassemble the transceiver except for the case, and check that it is still working on any band except 24 or 1·8MHz (the blank position). So far the major part of the modification is complete and alignment can be attempted.

PB2093	PB2201	Yaesu Pt No	Yaesu coil	Suggested Toko	Modification required to Toko coil
—	T16	L0020894		119ANA5872HM 	Unwind 16 turns of primary pin 3 Connect to pin 2 (centre-tap) Rewind 6 turns from pin 2 – pin 3 Use 300pF parallel C to tune (Secondary on Yaesu coil is not used)
T10 T25 T26	T17 T32 T33	L0020899		Modified to ...  L = 22μH	Add 16 turn centre-tap as above. Add 6 turn secondary, pins 4–6. Use 300pF to resonate (Cx) external (Secondary only required on T10, T26 and T33)
T44 T45	T51 T52	L0020500		119AC30099R  C = 82pF	Remove 82pF internal capacitor. Remove secondary winding, pins 4–6. Remove primary from pin1, join to pin 6. Add Cx 68pF, pins 4–6 (Secondary on Yaesu coil is not used)
Crystal oscillator coil L1	L1	L0020628		119KCA314N  C = 47pF	Use 200pF parallel C to resonate

Toko inductors are suggested as alternatives to Yaesu inductors, 24MHz inductors could be rewound using suggested turns information. Yaesu inductors can be inserted directly in place of 24MHz inductors subject to circuit changes shown in Figs 3 and 4.

Fig 5. Yaesu-Toko replacement inductors and winding details for FT707 1·8MHz modification



Location of 1·8MHz crystal oscillator on af board

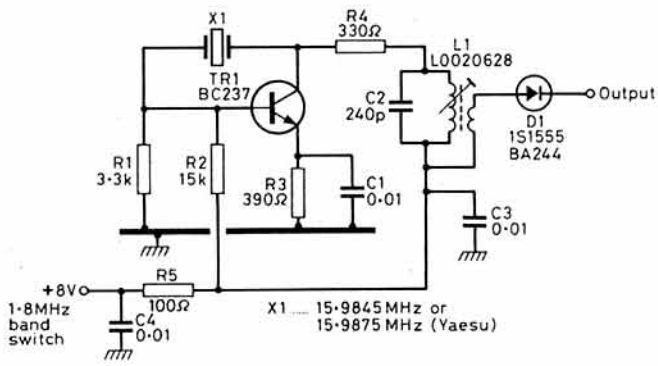


Fig 6. 1·8MHz crystal oscillator circuit diagram

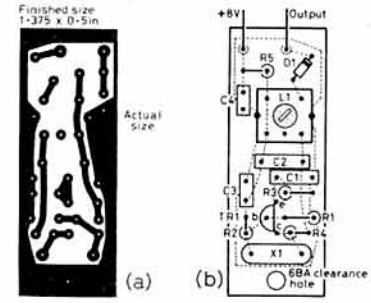


Fig 7. 1·8MHz crystal oscillator: (a) pcb layout; (b) component layout

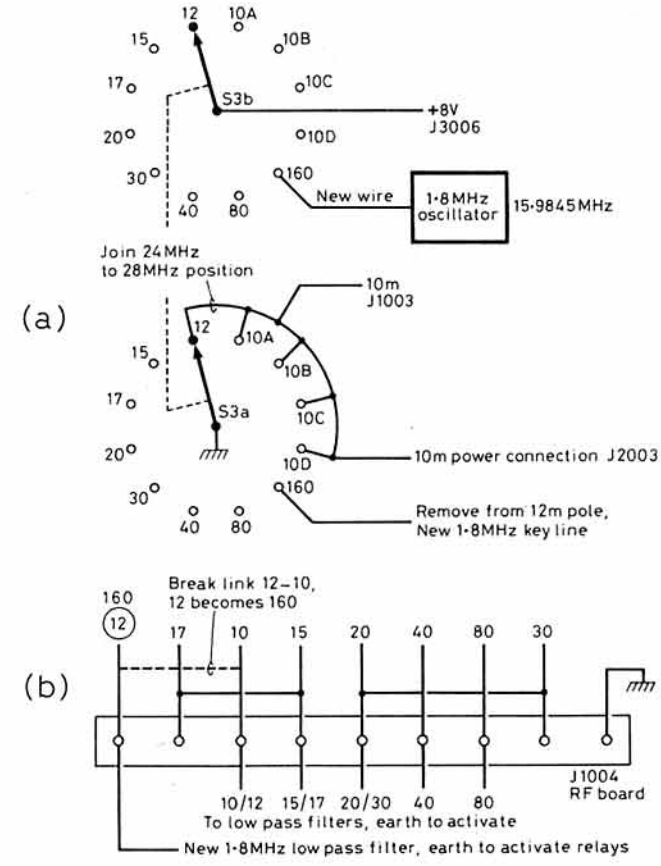


Fig 8. FT707 1·8MHz modification: wiring changes

1·8MHz receiver alignment

The alignment procedures will assume that you do not have the luxury of a sweep generator; those who are so fortunate should be capable of devising how to use it themselves.

After checking that the transceiver still functions on, say 3·5MHz, select the new 1·8MHz position and check that 8V are present on the new oscillator board. While monitoring the oscillator output, adjust L1 (Fig 6) for maximum output, if nothing happens then check the circuit and try again. Once the oscillator is working, the digital display should indicate somewhere between 1·5 and 2MHz, but it may not yet be very stable.

Apply a scope probe to TP1 rf board and adjust T51 and T52 for maximum signal on 1·9MHz (T44, T45 PB2093). Now retune to 1,825kHz and adjust T51 for maximum output, then retune to 1,975kHz and readjust T52 for maximum output. This procedure should be repeated several times with the objective of obtaining a constant output over the range of 1·8 to 2MHz. There is little to be achieved by trying to extend the operation down to 1·5MHz, as the 1·7MHz hpf will rapidly attenuate signals below this frequency.

The digital readout should now indicate a stable display. Tune to 1·9MHz and switch on the marker oscillator, adjust T33 and T32 for maximum signal on the S-meter (T25, T26 PB2093) and then adjust T16 and T17 for a further increase in S-meter reading (T10 only PB2093). Set the tuning to 1·8MHz and, using any convenient signal source, peak T16 and T32 for maximum S-meter reading. Retune to 2MHz and adjust T17 and T33 for maximum signal; repeat this process a few times in order to achieve a flat response across the band. Now connect an antenna and listen on 1·8MHz. Do not attempt to transmit at this stage, or permanent damage may result; there is no connection between the pa and the antenna.

So far the most complicated part of the modification is complete and it is now time to consider the lowpass filter requirements for the transmitter output.

Lowpass filter

In theory, a lowpass filter will pass any frequency below the cut-off frequency and attenuate any signals above the cut-off frequency. In practice, ripple in the passband can cause problems when the frequency falls more than one octave below the cut-off frequency. Yaesu have used elliptic-function filters in the FT707 lpf which have a much steeper attenuation response above the cut-off frequency than the more common Chebychev filter, and in addition have an increased ripple which limits the usable bandwidth even further.

The FT707 lowpass filters are housed in a totally-screened metal box in the rear compartment of the chassis, each filter being switched into circuit by a pair of relays activated by an earth return through the bandswitch. All unused filters are short-circuited to earth when the relays are de-energized. With no filter selected in the 1·8MHz position there is an open circuit between the pa and antenna socket. It is therefore necessary to arrange for a suitable path within the FT707, as well as providing the necessary filtering of harmonics.

The simplest signal path is to use one of the existing filters. However, experiments with the 3·5MHz lowpass filter revealed that it presented an input swr of greater than 1·7:1 on 1·8MHz. In addition, it would not provide any second harmonic suppression, and the location of the swr protection circuit is after the filter rather than before it. There appeared to be three possible courses of action regarding the provision of an lpf for 1·8MHz operation:

(a) modify the existing 3·5MHz filter to a Chebychev design with a flatter response and use an external in-line lpf for 1·8MHz;
(b) fit an external lpf for 1·8MHz with internal selection, or
(c) fit an internal lpf for 1·8MHz.

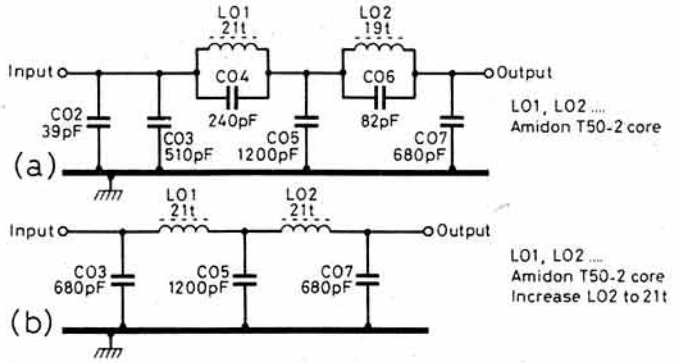


Fig 9. (a)FT707 3·5MHz elliptic lowpass filter PB2128. (b) Alternative 3·5MHz Chebychev lowpass filter

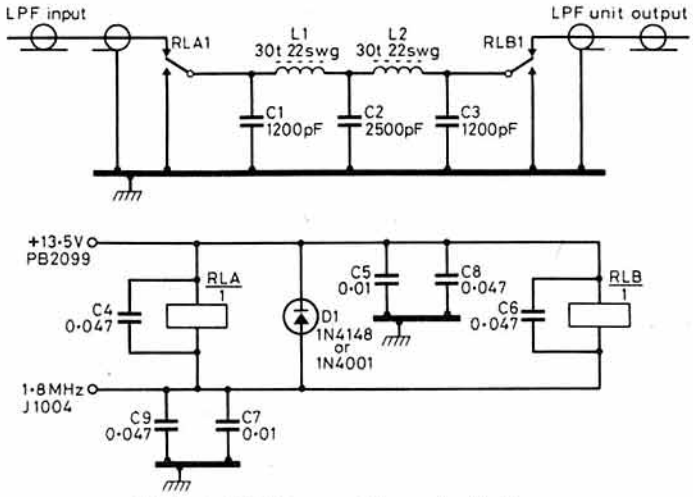
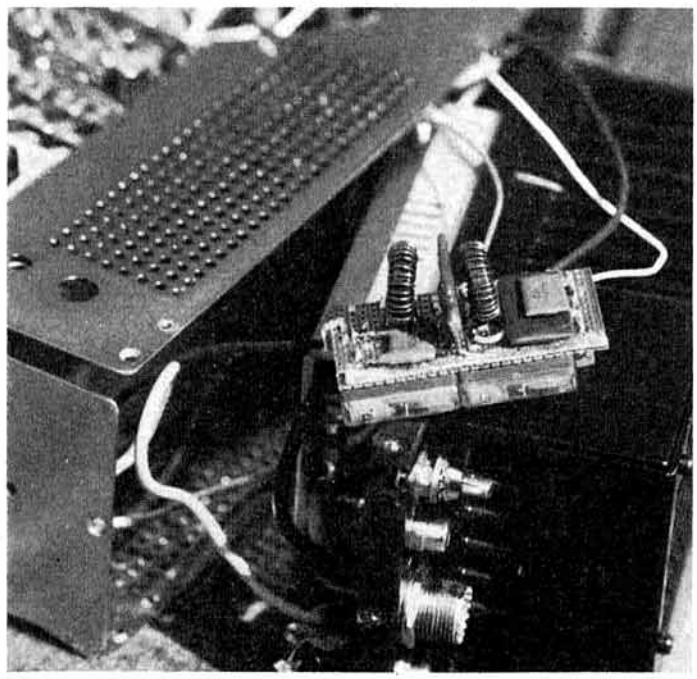


Fig 10. 1·8MHz lowpass filter and switching

Option (a) was the simplest; however, any external filter would need to be removed for operation on other bands. Changing the existing filter for a Chebychev design, Fig 9, resulted in an input swr of 1·4:1 at 1·8MHz, and of course it offers no second harmonic suppression and limited suppression of the third harmonic. This is not a problem for mobile operation, as a loaded whip makes an excellent lowpass filter, but for operation into a normal antenna, an external lowpass filter with a cut-off frequency of 2·1 to 2·5MHz must be included in the antenna line.

Options (b) and (c) are the most realistic, with the internal filter being the most ideal solution. Examination of the limited space available led to the selection of option (c).

Two single-pole changeover low-profile relays were obtained and mounted onto a piece of Veroboard 65 by 38mm, this was wedged into position between the end of the pa unit and the antenna socket. A new lowpass filter, Fig 10, was made up from two toroidal inductors and three silver mica capacitors, which were wired onto the track side of the board so as to miss all surrounding components. Relay decoupling was also included on the board, and connections were made to the +13·5V rail via the regulator board, PB2099, and the 1·8MHz earth connection via J1004 rf board, Fig 8. RF connection was made into the original lpf box (Fig 11) using miniature high-quality coaxial cable by feeding it through existing holes at either end of the filter unit. The new filter board wedges into position and does not foul anything when the pa unit is re-assembled. Removal of the pa and lpf units is quite straightforward and requires only the removal of six screws for the pa and a further four for the filter. Hinging out the units is sufficient to complete the necessary connections.



Construction of 1·8MHz lowpass filter—T68-2 cores

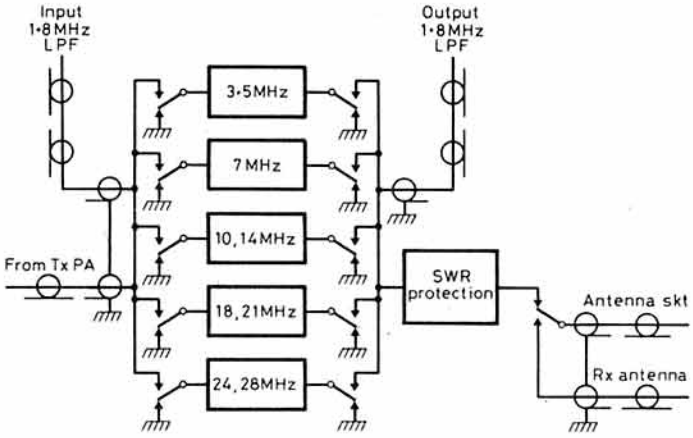


Fig 11. Connection of 1·8MHz lpf to existing lpf unit PB2128

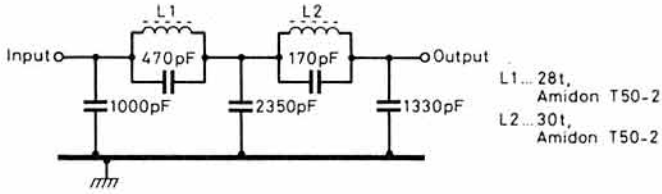


Fig 12. Alternative 1·8MHz elliptic lowpass filter

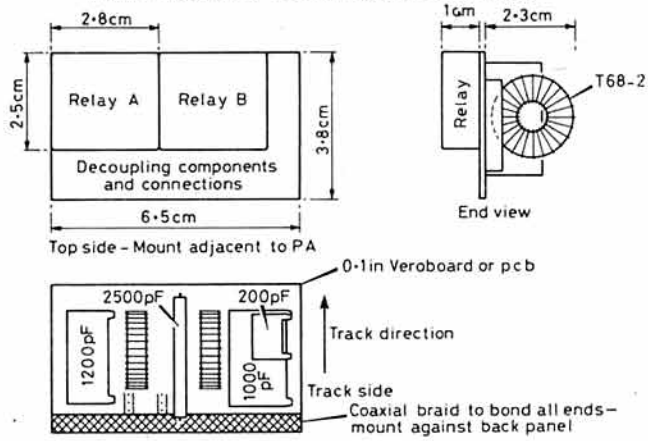


Fig 13. Lowpass filter, suggested layout

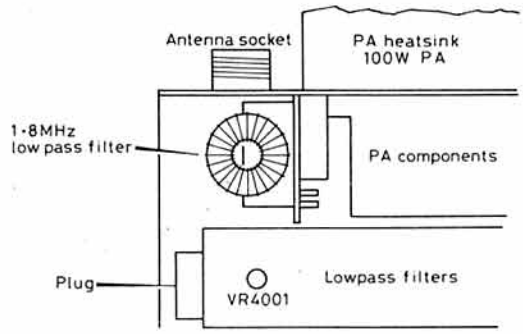


Fig 14. Lowpass filter location

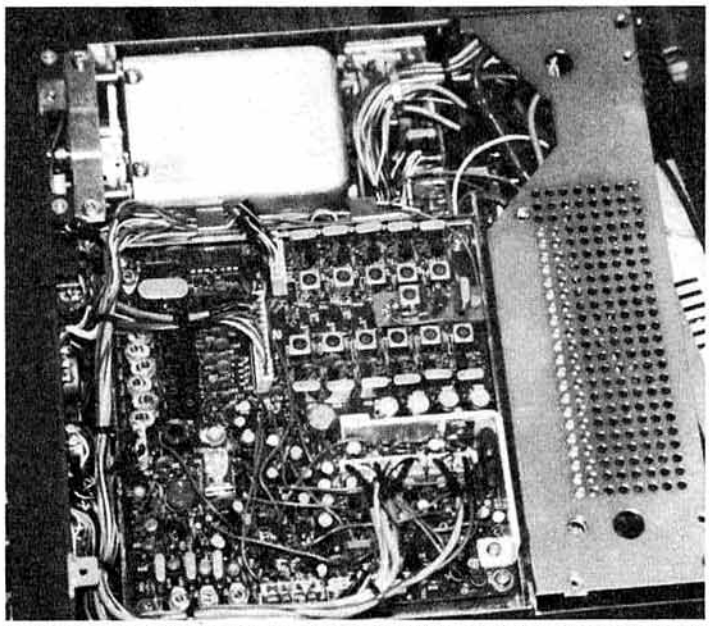
The final 1·8MHz lpf was made on a pcb; however, the layout will depend entirely on the relays used and so no layout has been given. The completed filter switching should be checked for operation of the relays before final reassembly by switching through the 1·8MHz position on the bandswitch several times. The relays should operate on the selection of 1·8MHz and de-energize on selection of any other band. Fig 12 shows an alternative elliptic function filter which may be substituted for the Chebychev design in Fig 10, and is the design used in the FT107. Suggested layouts for both the Veroboard and pcb versions of the lowpass filters are shown in Fig 13; the capacitance values are critical and can be made up from one or more silver mica capacitors in parallel. Working voltage should not be below 300V. Fig 14 shows the location of the lpf in the pa compartment of the main chassis.

Transmitter alignment, 1·8MHz

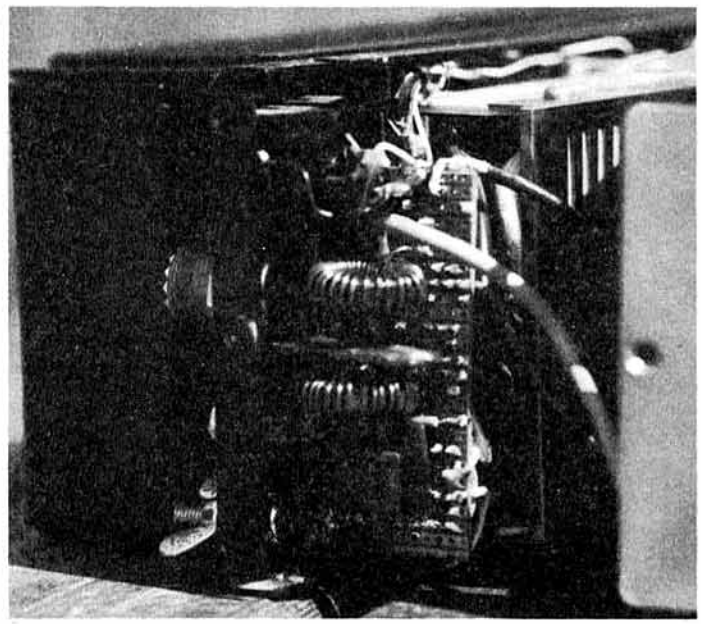
As the front-end bandpass filters have already been aligned on receive, they should be OK on transmit as well. Connect a dummy load and power meter to the antenna socket and select 1·8MHz on the bandswitch. Set the mode switch to cw and press the MOX switch. Slowly increase the drive level and, if all is well, the power should rise steadily to over 100W. Tune the transmitter from 1·8 to 2MHz and check that the output is constant across the band. If not, retune the bandpass filters as described in the receiver alignment paragraph—it is easier to adjust the bandpass filters on transmit than by watching the S-meter on receive. To avoid overheating, do not leave the transmitter on for long periods. Any strange noises, smells or peculiarities should be investigated at once. If for any reason the 3·5MHz lpf is used on 1·8MHz, a link must be inserted between the 1·8 and 3·5MHz pins on J1004 rf board in order to activate the relays on 1·8MHz.

24MHz alignment

In order to use 24MHz with the 24MHz inductors removed, it is necessary to increase the bandwidth of the 28MHz bandpass filters. Once 1·8MHz is working satisfactorily, re-alignment on 24MHz can begin. The 24MHz



Underview of FT707 showing location of 1·8MHz crystal oscillator (centre) and 1·8MHz lowpass filter (bottom right)



Veroboard version of 1·8MHz lowpass filter in position—T68-2 cores

Modification Components list

RF BANDPASS FILTER

T16	Yaesu L0020894
T17	Yaesu L0020899
C21	220pF ceramic plate
C30	120pF ceramic plate
R	8·2kΩ 0·125W

MIXER BANDPASS FILTER

T32, 33	Yaesu L0020899
C16	120pF ceramic plate
R	1·8kΩ 0·125W

PREMIX BANDPASS FILTER

T51, 52	Yaesu L0020500
C151	1,000pF ceramic

1·8MHz OSCILLATOR

X1	15,984·5kHz, Yaesu HC 18/U	(15,987·5kHz also available FT101ZD)	
L1	Yaesu L0020628	C1, 3, 4	0·01μF
R1	3·3kΩ	C2	240pF ceramic
R2	15kΩ	TR1	BC237
R3	390Ω	D1	IS1555 or BA244
R4	330Ω		
R5	100Ω		

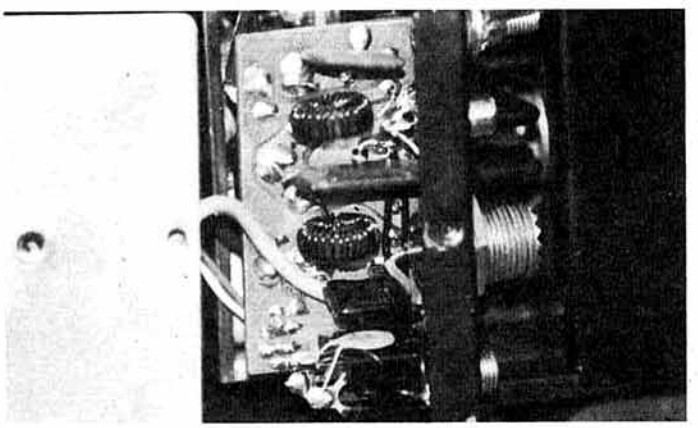
LOWPASS FILTER BOARD

L1, 2	30t 22swg Amidon T68-2 core, or 31t T50-2 (24swg)
C1, 3	1,200pF sm 350V dc
C2	2,500pF sm 350V dc
C4, 6,8,9	0·047μF disc ceramic
C5, 7	0·01μF disc ceramic
RLA, RLB	SPCO low-profile relays 12V coil 2A contacts. Radiospares 348-510 and 345-038 suitable
Veroboard	65 by 38mm

crystal oscillator has not been disturbed, and the 28MHz bandpass filters have been wired to the 24MHz bandswitch position. First of all we must broaden the pre-mix filter. Connect a scope probe to TP1 rf board and select Band 10A; the lo injection signal should be seen and its amplitude noted. Select 24MHz on the bandswitch—no signal should be apparent on the scope—carefully adjust T47 (T41 PB2093) until a signal appears, now reselect 10A and compare signal amplitudes, adjusting T47 until the amplitude is fairly constant over the bands 10A, B, C, D and 12. A reduction below 24·9MHz and above 29·7MHz is acceptable. T48 (T40 PB2093) is wax sealed and need not be adjusted. The easiest way to align the rf and mixer bandpass filters is to do it on transmit, connect a dummy load and power meter, select cw and transmit. On 24MHz with full drive level no output will be apparent, while on transmit with full drive slowly adjust T12 until some rf output appears, then increase it further by adjusting T28 (T08 and T21 PB2093); full output should easily be achievable.

Check the output on 28MHz and it will have fallen to 50W or less, slight adjustment of T13 and T29 should enable the power to be increased around 29·5MHz. (T08 and T21 on PB2093.) It is now a case of carefully tuning from 24·9 to 29·5MHz, adjusting T12 and T28 at the lower frequency and T13 and T29 at the higher frequency. It is not difficult to obtain 100W output across all five band segments. Using the marker oscillator, check the S-meter readings on 24 and 28MHz; the deflection should be fairly constant across the bands. Again expect to see a fairly sharp drop-off above 29·7MHz and below 24·9MHz outside the amateur allocations. Receiver gain is reduced by about 5dB when the 28MHz inductors are broadbanded across 24 and 28MHz.

The modification is now almost complete apart from one very important check which was discovered by accident rather than design.



Final version of lowpass filter on pcb using T50-2 cores

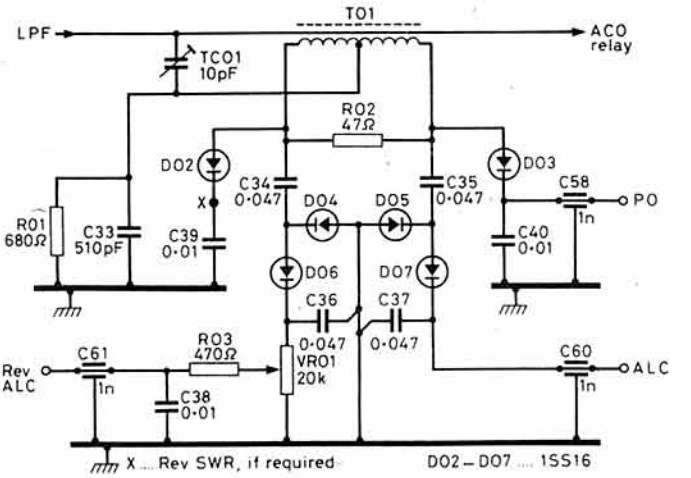


Fig 15. PB2128 values modified for 1·8MHz operation. C34, 35, 36 and 37 changed from 0·01 to 0·047μF

The swr protection circuit

Contained within the lowpass filter unit PB2182, is a fairly conventional swr bridge, Fig 15, which derives voltages for power output, alc and reverse alc for pulling back the gain if a high swr condition prevails. A rev swr indication could also be derived, but the l.e.d meter is not the best way to display it.

It was discovered that on 1·8MHz excessive alc voltages were present and the power did not necessarily pull back under an swr condition; in fact, it actually increased as the swr rose in one direction and decreased as the swr rose in the other direction. It appeared as if the bridge was not in balance. Careful examination of the circuit and the bridge revealed that some component values were different to those shown on the circuit. C33 had been reduced to 330pF and R01 was 470Ω. Further reference to the FT107 circuit showed values of 510pF and 680Ω, both of which were tried and the bridge balanced on 1·8MHz; however, it was now out of balance at the hf end of the spectrum.

After a number of tests it was considered that the problem was most likely to be the core of the toroidal transformer T01, it was removed, the turns counted and a replacement toroid wound using a ferrite core of known permeability. Initially this appeared to cure the problem, but when the FT707 was reassembled the swr bridge was still frequency conscious. Further comparisons were made with the FT107 circuit; both bridge circuits were essentially the same, in addition the toroidal transformer was identified as being the same item in both equipments. It was decided to analyse the circuit to work out what was really going on. The swr bridge is fairly conventional and the circuits loading the bridge are comprised of diodes D02 and D03 providing forward and reflected voltages, while the diodes D04–D07 with capacitors C34–C37 act as voltage doublers to provide forward and reflected alc voltages. The values of capacitors C34–C37 vary from one Yaesu circuit to another; however, all circuits intended for 1·8MHz used 0·047μF disc ceramics while the FT707 used 0·01μF. These capacitors were changed to 0·047μF and the values of C33 and R01 were changed to 510pF and 680Ω respectively. It was now found that the swr protection circuit could be effectively balanced on 14MHz for operation on all bands 1·8 to 28MHz.

For those in any doubt about the operation of the protection circuit, its operation can be checked using the following procedure: Connect the transceiver to a 50Ω dummy load through an atu and an accurate swr/power meter. Using as low a power as possible (not more than 20W) set the atu to give a 1:1 swr on 1·8MHz. The reflected voltage from the internal bridge can be measured by connecting the positive lead of a multimeter (0·5V range) to the centre of VR01 accessible through the hole in the lpf unit and connecting the negative lead to ground. Alternatively, measure the voltage at pin 3 J4001 on PB-2110. Slowly adjust the atu in order to create an swr of 1·5:1; the reverse alc voltage should now have risen from its previous low level. Now retune for a 1:1 swr and continue adjusting the atu in the opposite sense until a 1·5:1 swr is obtained again. The reflected or reverse alc voltage should have passed through a dip which coincides exactly with the 1:1 swr condition indicated by the external swr meter. If the two dips are not coincident, remedial action will be necessary. After any alterations to the circuit its operation should be checked on all bands and the calibration of alc, po and rev alc should be rechecked using the procedure described in the instruction manual. The importance of the swr protection

(Continued on page 494)

POWER SUPPLIES ON A SHOE STRING

(PART 1)

John Case, GW4HWR*

John Case was a senior lecturer in electronics and radio communications at South Glamorgan Institute of Higher Education. He is now retired and able to devote more time to amateur radio, especially to home construction of equipment which is one of his major interests.

Power supplies, especially high current types, are expensive items to purchase. The home-constructor has often found that the cost of new parts can be almost as high as that of a ready-built equivalent commercial unit. Although the fun of building and using a piece of homebuilt equipment is present, much more satisfaction will be experienced if there is also a considerable saving in cost. The main object of this article is to show ways by which a very considerable saving in outlay can be made—costs in the region of one-tenth of that of the commercial unit can usually be possible. Experienced constructors may find these notes rather elementary, but they are written with newcomers to the art in mind.

The transformer

This is probably the most costly item of a low-voltage power supply, so much of the article will concentrate on saving as much as possible on this. For example, a transformer having a secondary that will provide 20V at 25A will cost in excess of £30. If time is not taken into account, it should be possible to modify a suitable transformer to give the above output at a cost of £3-4! It is not too difficult, and once attempted will often become standard practice for any future low-voltage/high-current units. First, a suitable sample must be found—likely sources include: old valve radio receivers and radiograms, the junk boxes of other amateurs, radio rallies and the second-hand shops. It is most important to be able to quickly and fairly accurately assess the suitability of a particular transformer, especially if buying at a rally etc, so before commencing the search a little homework is necessary.

The rating

The output voltage and current must be decided, and from these figures the rating of the transformer in Volt Amperes (VA) calculated. The secondary voltage needed will be about one-and-a-half times the required dc output voltage of the power supply unit. Remember that if the input voltage is too high the excess must be dropped across the control element, causing it to get hotter than necessary, thus requiring higher power devices and bigger heat sinks. If the input voltage is too low, the voltage across the reservoir capacitor may drop below the minimum required by the stabilizer circuit during the period when the rectifiers are non-conductive. The rating is obtained by multiplying the maximum output current by the transformer secondary voltage. For example, a psu giving 10A at 14V, the transformer secondary voltage should be $14 \times 1 \cdot 5 = 21$V and the rating $21 \times 10 = 210$VA. Now a double-wound transformer, ie separate primary and secondary windings, for use on a 50Hz supply will weigh approximately 4·5lb (2·5kg) for every 100VA of its rating. By this rule the above transformer should weigh in the region of 8-10lb. This is the weight of the complete transformer —those with metal shrouds will, of course, weigh more than the more normal and, for our purpose, more useful skeleton types. If you are not very good at estimating weight, perhaps a spring balance would be useful!

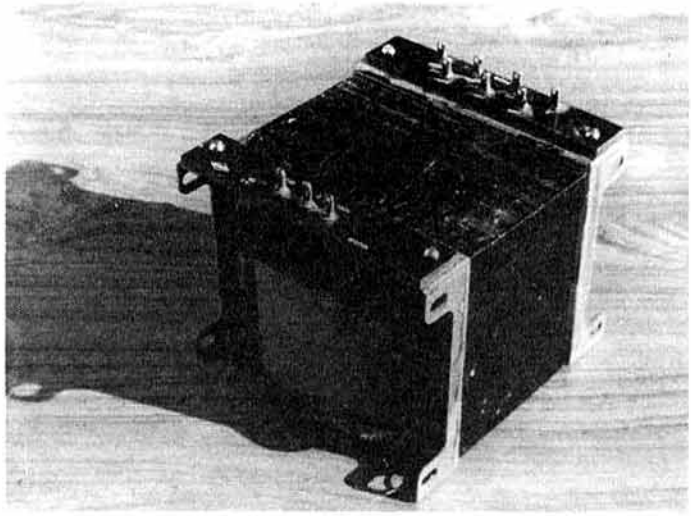
*2 Abbey Close, Tyrhiw, Taffswell, Mid-Glamorgan

A suitable type

Having found a "door stop" of the required size, examine it very carefully for the following characteristics: *(a)* Does it look as if it will be possible to remove the core. Avoid any that are covered in varnish or coated in thick plastic-looking material and those with toroid or C cores. *(b)* Can the windings be identified. Low-voltage, high-current windings (4V, 5V or 6·3V on old valve radio transformers) will be wound with thick wire 20swg (1mm) or thicker, and are normally the outside windings. HT windings, possibly labelled 250V-0-250V, or 350V-0-350V, will be in thinner wire —30swg or thereabouts. The primary, the most important one, may have a number of taps marked 0, 200V, 220V, 240V, or even −10V, 0, 200V, 220V, 240V, or it may be a simple winding with no taps. Occasionally you may come across two separate windings marked 0-120V and 0-120V, these being connected in series for 240V mains and in parallel for 120V supplies used in some parts of the world. Anyway, the primary must be identified and *it must be the innermost winding* on the bobbin because this is the only winding to be retained. Incidentally, the primary is almost always on the inside of the bobbin.

Test it

Let us now suppose that a suitable transformer has been found: ie the weight is about right, the core looks as if it can be removed (with difficulty) and the primary is on the inside; and, of course, the cost, if any, should be very low—after all the only use of the thing (as already mentioned) is as a door-stop—£1 or less is about right. We are in business. Before proceeding with our modification a test must be made to make certain that there are no faults on the transformer. Nothing is more upsetting than to spend a great deal of time rebuilding only to find that the thing was faulty before work commenced. Simple tests will show the presence of two possible faults: *(a)* Use an ohmmeter to measure the resistance between one



1007VA. A very heavy "doorstep" awaits treatment

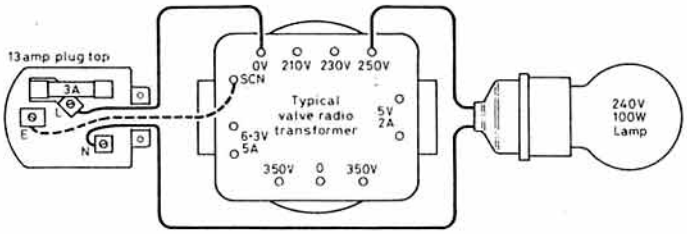


Fig 1. Testing for shorted turns

end of the primary and the core. It should be very high, more than 1MΩ unless the thing has been stored in very damp conditions, in which case the resistance should rise when it is dried out. (*b*) This test will indicate the presence of one or more shorted turns in the windings; if there are, then it is pointless to proceed—take the transformer back or put it down to bad luck. Cut off or desolder all the old leads from terminal tags or, if there are no tags, insulate the ends of all leads except the 0 and 240V primary leads. Now connect the primary to a mains plug, with a 3A fuse, with a mains type bayonet cap lampholder in series as in Fig 1.

Fit a 100W mains lamp into the holder. Make sure that you observe all the normal safety procedures, then plug into the mains and switch on. If the lamp lights brightly, check the connections and make sure that the winding used is all of the primary. Do not proceed if the lamp lights brightly—either the primary is short-circuit or you have used a low-voltage winding! If the lamp lights very dimly or not at all but gets hot, leave the circuit switched on and feel the core every 10min or so for about half-an-hour. If at the end of this time the core is only slightly warmer than at the beginning of the test, the primary is almost certainly OK. If you want to be absolutely sure, repeat the test with the lamp replaced by a direct connection. Before switching on make sure that the fuse in the plug top is not rated at *more than 3A*; 1A or 2A would be better. Switch on and leave for a further half-hour. Do not use the transformer if there is a significant temperature rise.

Anyone having access to a variac transformer should be able to devise a similar test by using a low input voltage and progressively increasing it to 240V while monitoring the core temperature. Whichever method you use, be very careful to insulate mains connections and keep clear of terminal tags. Old radio transformers may have 700V or more across the ht secondary. No problem as long as great care is taken while the mains are connected. Later these windings will be removed. Once satisfied that there is no great rise in temperature, switch off and remove the mains connecting wires.

Getting the core out

Remove any fixing bolts or studs and clamps, being careful to avoid damage to the windings at this stage. The next bit is the most difficult, and if you can succeed here you are almost there. Cores are made up from either Ts and Us or Es and Is as shown in Fig 2. These laminae, or laminations as they are sometimes called, are thin sheets of high permeability iron insulated on one side, interleaved alternately to make up a core with excellent magnetic properties but a poor electrical conductor from one side of the core to the other to prevent eddy currents flowing in the core. They are tightly packed. The Us or Is on the outside of the core are easy to remove; an old kitchen knife comes in handy for this, but the first E or T must be carefully driven out. A thin piece of steel such as a short section of an old steel rule may be used as a drift. Stand the transformer on the edge of a stout bench or thick piece of wood with the edge of the core just clear of the edge, then with the drift against the centre of the T or E, give several blows with a light hammer (see Fig 3). It will be almost impossible to get the first or even the second lamina out without damaging it or them, but don't worry about this, it is almost impossible to get them all back anyway. When removing Es the outer legs should be released, again using the knife.

If you can manage to drive one of the end laminae out just a little so that it can be gripped in the jaws of a vice, a bit of brute force will probably do the rest (see Fig 4). If there is no vice available, try mole grips or a large

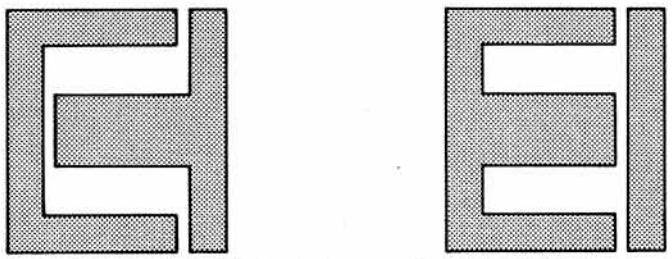


Fig 2. Typical core sections

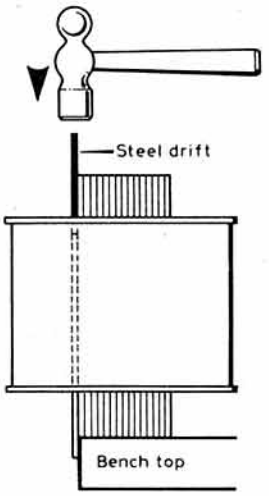


Fig 3. Using a thin drift to move the first lamina

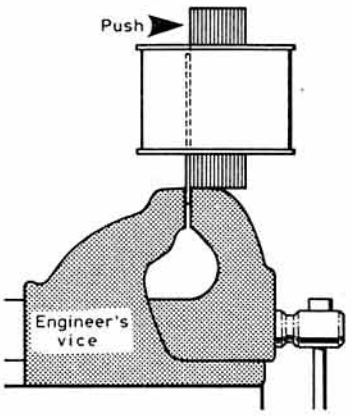
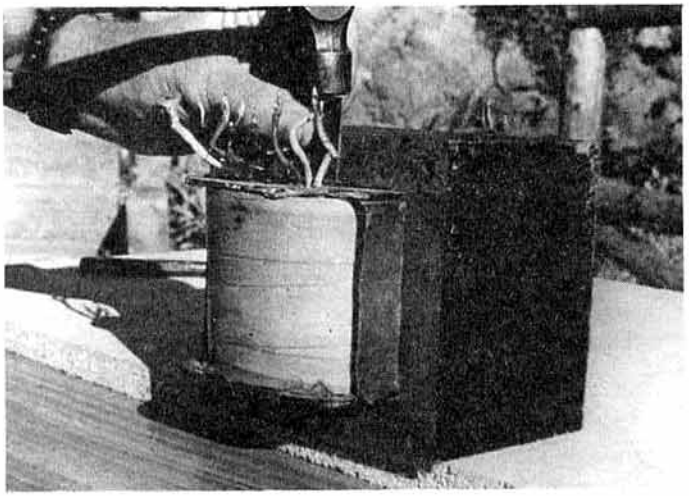


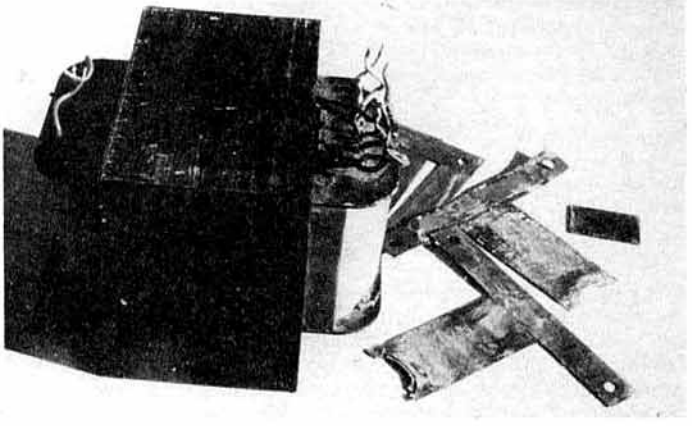
Fig 4. Grip the end of the lamina in the vice

pair of snub-nosed pliers. Having cleared one or two laminae (by force), it will be necessary to break the others apart as they are usually stuck together by paint or varnish or even rust! The kitchen knife is again useful, together with the judicious use of a light hammer. Separate all the laminae even if they come out in pairs or more, and stack them individually as Ts, Us etc.

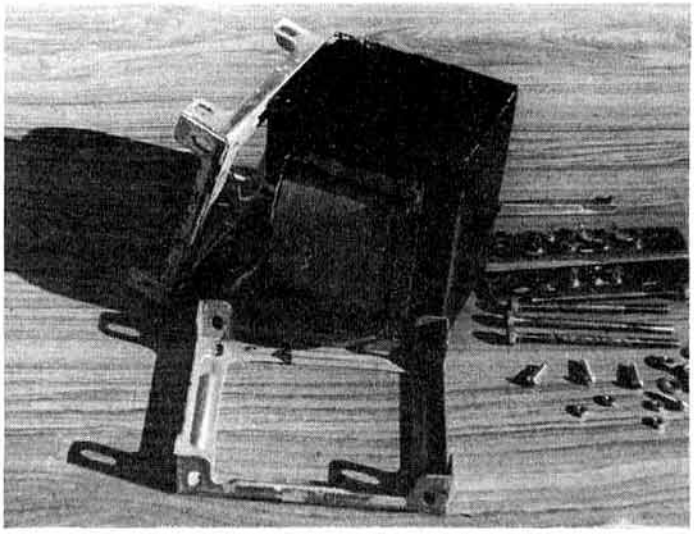


The first lamina moves under protest

You should now have a bobbin of wire and insulation, and the next task is to remove all of the windings except the primary. Any method of removing the wire may be adopted, such as unwinding—tedious and generally messy. There is rarely,any point in trying to save the wire removed as it will be varnished and have bits of paper, used to separate layers and windings, sticking to it. I normally unwind thicker windings, almost always



Damaged but out!



Transformer stripped of end plates and terminal posts

on the outside of the bobbin, and then use a hacksaw to saw *almost* down to the primary insulation. Great care is necessary to ensure that the primary is not damaged in any way.

Some transformers may have an electrostatic screen between primary and secondaries, and if this is the case with your sample it can be retained, as it will help to prevent the passage of rf through the transformer back into the mains and so reduce the chances of tvi when the psu is used with an ssb transmitter. The screen normally takes the form of a strip of brass foil, almost as wide as the bobbin, wrapped around the outside of the primary insulation but with insulating paper interleaved, so that the ends of the loop do not short together and so form a disastrous shorted turn. Make sure that the connection to the screen is still intact, as this must be connected to chassis for the rf shielding to be effective.

Now a good insulating layer must be put on over the top of the primary, and the screen if present. This can take the form of strips of brown paper having the same width as the bobbin. The paper should be covered with melted paraffin wax (candle grease) which will hold the paper in position as well as improving the insulating property of the paper. If waxed paper from a large paper dielectric capacitor is available, it is ideal for this purpose. About four layers of waxed paper should be satisfactory.

The new winding

The next step is to determine the number of turns required for the new secondary. A number of ways are possible but the following will always work. Wind a few turns of "hook-up" wire around the bobbin, counting the number very carefully. Ten or 12 turns is normally quite sufficient. Twist the ends of the wire together to hold the winding in place and remove about 5mm of insulation from each end. Now push most of the core back into the bobbin. There is no need to interleave the core as it was originally for this part of the exercise, pack 10 or more Ts one way, then the same number in the opposite direction, continuing until almost all of the core is put back, with packs of Us filling in the gaps. If the core is made up from Es and Is there is no need to put in the Is at all. Connect an ac voltmeter (10V range) between the bared ends of the hook-up wire, and connect the 240V primary to the mains via a 1A fuse, again observing all of the safety measures normally used with supply mains. Carefully read the voltage indicated by the voltmeter. Switch off and disconnect.

Calculate the number of turns required on the new secondary from the simple formula:

$$\text{Turns required} = \frac{\text{No of test turns} \times \text{voltage required}}{\text{Measured voltage}}$$

For example, with 10 test turns a voltage of 2·5V occurs across the test winding, and a 21V winding is required:

$$\text{Turns required} = \frac{10 \times 21}{2{\cdot}5} = 84 \text{ turns}$$

Incidentally "Turns required/measured voltage" gives what is known as the turns/volt, and just for fun the number of turns in the primary winding can be calculated by the same method. In our example the primary would have $10/2{\cdot}5 \times 240 = 960$ turns. The high number of turns required on the primary is one reason why we have made use of a ready-made winding. Another point worth remembering is that the turns/volt gets lower as the transformer gets bigger. As a rough guide, a core with a cross-sectional area (through the bobbin) of 1in², would have about 8t/V. The figure is in inverse proportion to the area, ie a core area of 2in² gives 4t/V (our example). The transformer used in the photographs has an area of 4 by 2in = 8in², and will therefore require only 1t/V or less. The actual value of t/V will be measured as previously described—if I can get the core out!

Choosing the wire gauge

There are a number of ways of deciding what gauge of wire to use, the easiest being the use of wire tables if you have access to some. Not only will they give the current-carrying capacity but also the amount of space that will be required for a given number of turns. Note that the current rating must be for transformer use; open wires such as house wiring cables can carry much more current because of the better heat dissipation whereas in a transformer there is a long length of wire in a very small space. See Table 1.

Alternatively the cross-sectional area of the required wire may be calculated by using a current density of about 1,500A/in² or 2·5A/mm². For example, suppose that we need wire that will carry 15A, then the cross-sectional area must be: 15/1,500 = 0·01in² or 15/2·5 = 6mm². Then with the help of a calculator or any budding mathematician we can calculate the diameter of the wire required:

$$\text{Diameter} = 2 \times \sqrt{\frac{A}{\pi}} = 2 \times \sqrt{\frac{6}{3{\cdot}14}} = 2{\cdot}75\text{m}$$

If you have a micrometer, then a good approximation to the capacity can be obtained by squaring the diameter of the wire, expressed in mils (1/1,000in), this gives what is known as the area in "circular mils". A circular mil will carry 1mA, therefore circular mils = milliamperes.

Is there enough winding space

Having decided on the correct gauge of wire, it is necessary to ensure that the required number of turns will fit into the space left by the windings that have been removed. Place a T or an E into the bobbin so as to locate the position of the core and then measure the space in inches (see Fig 5). A × B gives the winding space in square inches, and reference to Table 1 will enable the space required to be ascertained. For example, using the figures previously given, ie 10A at 21V, the new winding would need 84 turns of 13swg. In Table 1 13swg gives 12A and 108 t/in² so that a winding space of about 0·75in² would be needed. In practice it is difficult to achieve the turns density given by the wire tables, so a generous allowance should be made and for 84 turns rather more than 1in² would be about right. If the space available is less than indicated it would be necessary to reduce the wire gauge, in this case to 14swg or 2mm. In fact this would be satisfactory, as the rating given is 9A.

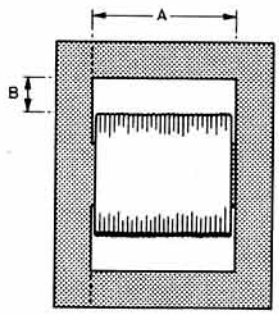


Fig 5. Assessing the available winding space

Table 1. Winding and current capacity details for different wire gauges

Diameter mm	Diameter mils	Gauge (swg)	Turns/in	Turns/1in² of winding space	Approx current (A)
1	39	19	23	550	1·5
1·25	49	18	19	388	2·5
—	56	17	17	287	3·5
1·5	59	—	15·7	230	4·0
—	64	16	14·5	219	5·0
1·75	67	—	13·9	190	6·0
—	72	15	13·25	175	7·0
2·0	80	14	11·9	141	9·0
—	92	13	10·42	108	12·0
2·5	98	—	9·8	96	13·5
—	104	12	9·25	85	15·0
3·0	118	11	8·33	69	20·0
—	128	10	7·6	58	25·0

Both metric and imperial sizes are given, and where the dimension is almost the same only one entry is shown. One mil = 1/1,000in.

TO BE CONTINUED

Transatlantic propagation by sporadic E at 50MHz

G. F. KIMBELL, G3TCT*

ALTHOUGH much attention has been focussed on the recent events on 50MHz involving contacts between North America and Europe, there is evidence to show that such events have occurred every summer since 1980 and quite possibly before that. In fact not only has propagation to North America been evident, but South America has also been represented, mainly in the form of a regular series of reports of reception of the FY7THF beacon in French Guiana.

The existence of a beacon is extremely helpful in looking at propagation statistics; it is to be regretted that the USA is so poorly represented in this respect. If we consider the dates and times of FY7THF reception first, we find the following pattern:

Table 1. FY7THF reception in Europe

F Layer	Postulated Es
November-December 1979	June, July 1980
October 1980-January 1981	June, July 1981
April 1981	May-July 1982
October 1981-February 1982	May-June 1983
October-December 1982	June 1985

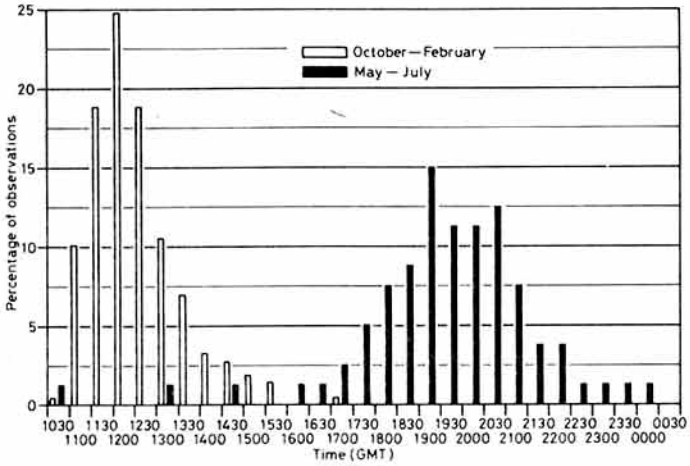


Fig 1. FY7THF reception in Europe 1979-1985

Table 2. Summertime openings to North America

Date	Time start	Time stop	Path	Used in Fig 3	Sunspot No	Ap
2 June 1980	1625		W3-ZB2		124	7
17 June 1980			VE-ZB2		129	3
12 July 1980	1157	1530	W-ZB2		98	5
15 July 1980			W-ZB2		161	6
16 July 1980	2300	0100	W-ZB2		198	6
28 June 1981			W-ZB2		112	9
30 June 1981			W-ZB2		148	14
5 June 1982	2140	2230	see below	✓	111	6
14 June 1983	2315		W4-ZB2		88	12
16 June 1983	2204	2315	VE-G	✓	84	8
19 June 1983	2230	2300	VE-G	✓	103	20
21 June 1983			VE-GM		117	20
1 July 1983	1845	2230	W-G,GI,GM	✓	62	6
1 July 1983	1845	2154	VE-SM	✓		
6 July 1983			W-G		79	14
22 June 1984	1445	1505	VE(TV)	✓	48	6
30 June 1984	2234	0100	W-GJ	✓	42	12
6 August 1984	2132	2205	W-G,GW	✓	24	4
8 June 1985	2057	2121	W3-SM	✓	62	18
26 June 1985	0000		W7-G		24	25
29 June 1985	1700		W-G	✓	11	16
2 July 1985	1950	0050	W,VE-G	✓	31	5
30 July 1985	2136	0000	W1,4-G	✓	58	12

(5 June 1982: PJ2, W4, ZB2, 5B4, ZS6—G, GW)

39 Downs Way, Great Bookham, Leatherhead, Surrey KT23 4BL.

There is good evidence that the events on the left of Table 1 were F layer, since they coincided with high solar flux and sunspot activity. What then of the events on the right? Fig 1 shows the distribution of times of reception, consolidated into half-hour periods. The F2 reception events correspond to reports from UK amateurs on 59 days during the four winters involved. The *Es* reception events correspond to reports from UK, France and Sweden on 24 days. It can be seen immediately that a quite different time of day is favoured by the summer events, which is another indication that a different mechanism is responsible. Fig 2 shows the distribution of dates for the summer events.

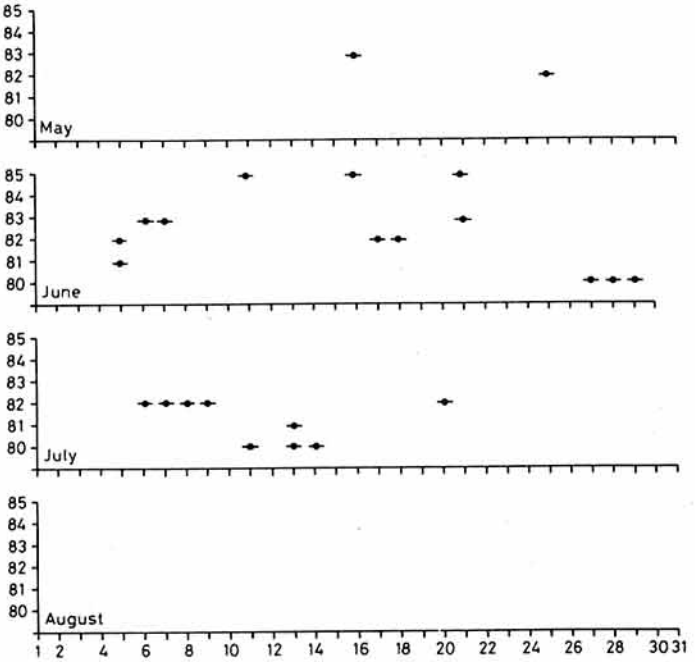


Fig 2. FY7THF reception in Europe

The opening of the Europe-North America path on 50MHz has occurred on the dates shown in Table 2. Before amateurs or beacons in the UK were on the air, these events were principally between North America and Gibraltar. The last three years have seen a number of cases where the path opened to UK and Sweden. Fig 3 shows the distribution of times (gmt) for these latter events, 11 days in all. The mean of the distribution is 2144gmt, some 2h later than the mean of the distribution for FY7THF reception, 1937gmt. This difference is (in a statistical sense) highly significant.

In addition to FY7THF reception, there have been other notable openings to South America on 50MHz. These are summarized as follows:

23 June 1981	1825gmt	LU9AEA heard by G3WBQ
4 June 1982	1603-1613	PY2AA heard by G4BPY
4 June 1982	1517-1548	TV2 Porto Alegre, Brazil, heard in Holland
14 August 1982	2014	ZB2VHF heard by LU3EX

As these reports are difficult to analyse on their own, I have not included them when considering modes of propagation.

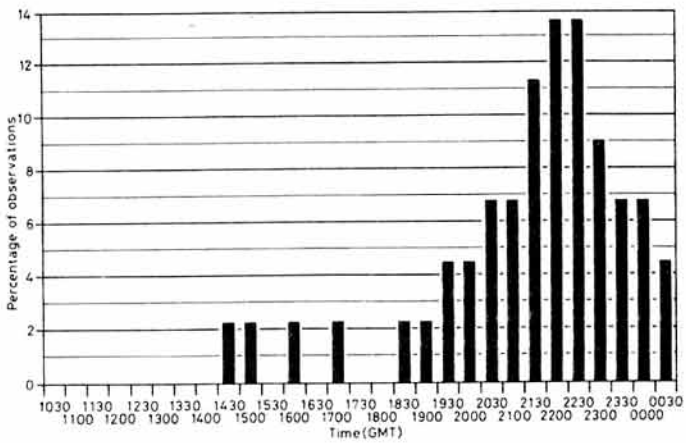


Fig 3. N America-Europe 1982-5

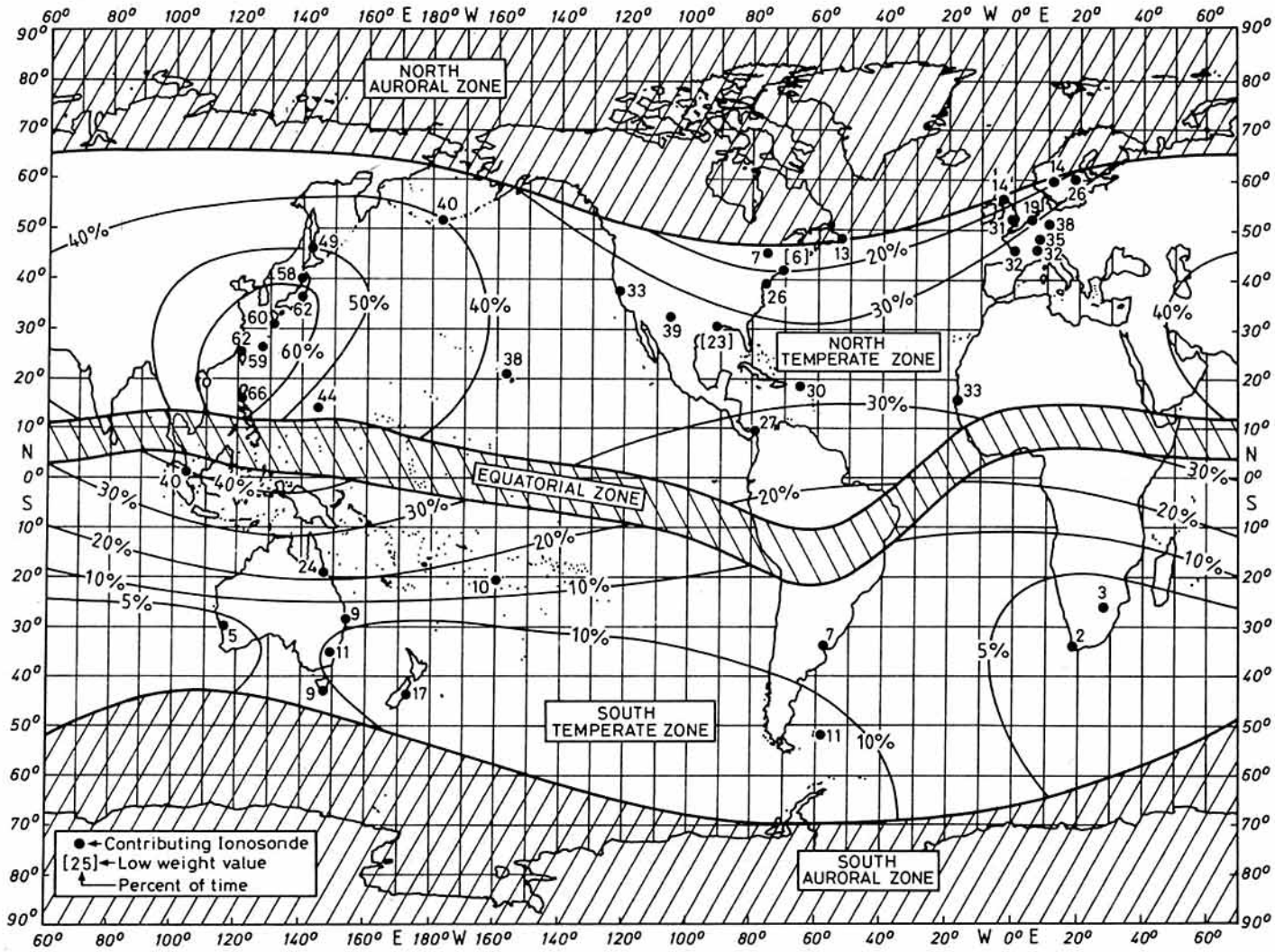


Fig 4. Map showing boundaries of Es zones and percentage of the daytime hours during the June solstice months (6am to 6pm, May to August) during which fEs exceeded 5MHz for the period 1948 to 1954 (after Smith, 1957)

Es characteristics

Before debating the exact propagation mode involved in the summer events, it is useful to recap on some of the basic characteristics of Es.

Fig 4 (from Ref [1]) shows the percentage occurrence of sporadic-E as measured during the International Geophysical Year, 1958. Of interest here is the shaded portion which shows the region around the geomagnetic equator. We can see straightaway that the French Guiana–Europe path is completely in the north temperate zone, and the path is not therefore transequatorial. (Note: fEs is the maximum vertical incidence frequency as measured by ionosondes)

Geometry and number of hops

The single-hop path geometry at maximum range is illustrated in Fig 5.

The maximum arc length (great circle distance) between stations in contact via the E layer is given by:

$$d = 2R \arcsin\left(\frac{\sqrt{(R+h)^2-R^2}}{h+R}\right)$$

where R is the earth's radius, and h is layer height, both in kilometres.

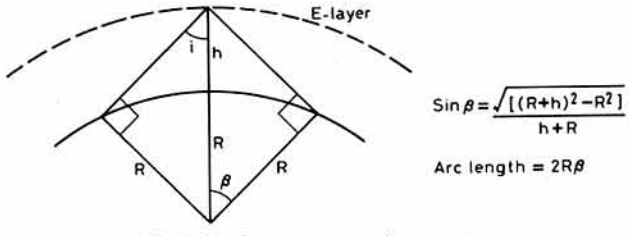


Fig 5. Maximum range path geometry

The height of the Es layer varies in the range 100–130km (Ref [2], p178), with a figure of about 115km appropriate for this analysis. Taking the earth's radius of 6,370km, we obtain d ≈ 2,400km. This estimate is affected by several factors: it has assumed a zero take-off angle, which may be unrealistic in practice; it varies with effective height of the layer; and it is affected by tropospheric refraction. There is thus no very hard limit to the maximum range for a single hop; there will be a progressively reducing probability for ranges exceeding, say, 2,000km.

These figures can be compared with the great circle distances achieved on 50MHz, shown in Table 3. On the assumption that multi-hop Es may be responsible, some options for such paths are shown.

Table 3. Typical distances and geometries

Path	Distance (km)	Path options	
5B4-G	3,200	2*1600	3*1067
W1-G	5,100	2*2550	3*1700
FY7-G	7,100	3*2367	4*1775
FY7-SM	7,900	3*2633	4*1975

Table 3 suggests that for FY7-G, three hops at a range of 2,367km/hop are possible, with four hops at 1,775km also possible. It should be noted that the world Es distance record on 50MHz is claimed by WA5LIG, Dallas, who worked a number of Japanese stations at 0500gmt, 9 July 1981 —a distance of about 10,000km.

The existence and occurrence of multi-hop Es has been recorded previously by Miya and Sasaki (Ref [3]). In their paper they point out that a multitude of different path geometries may exist in general, and the received signal will be the vector sum of these components. In the measurements quoted it was shown that three such paths were the norm on a particular two-hop circuit.

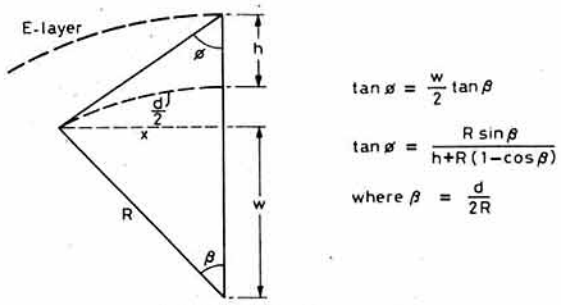


Fig 6. General path geometry

Frequency and minimum skip distance

Propagation at a frequency f is related to the incidence angle at the ionosphere by the relation

$$f/foEs = 1/\cos \phi$$

where ϕ is the angle of incidence and foEs is the maximum vertical incidence frequency. This relation can be used to determine, for a given electron density, the relation between frequency and incidence angle and (hence) range.

In Fig 6, the ray path meets the E layer with an incidence angle ϕ. By symmetry the arc length between transmitter and reflection point is equal to that between reflection point and receiver. It can be shown that

$$\tan \phi = \frac{R \sin ß}{h + R(1-\cos ß)}$$

where $ß = d/2R$, d is the arc length from transmitter to receiver and R is the earth radius.

Using the equations, we can determine ß and hence ϕ for a given range. From ϕ we can determine f/foEs. Thus we obtain a relation between ionization (electron density) and range. The maximum range is 2,403km, ignoring tropospheric effects. This gives a value of $\phi = 79{\cdot}2°$ and f/foEs = 5·33.

For a given frequency, how sensitive is minimum skip to intensity? The vertical incidence frequency foEs is proportional to $\sqrt{N}$, where N is the electron density. In Fig 7 the minimum skip is plotted against foEs. This shows that between 2,000 and 2,400km, only a very small increase in intensity is needed to support the shorter range. As we go below 2,000km, a much greater increase in intensity is needed to support propagation. Thus for "difficult" paths (ie 144MHz or very long range 50MHz) we would expect longer range hops to prevail.

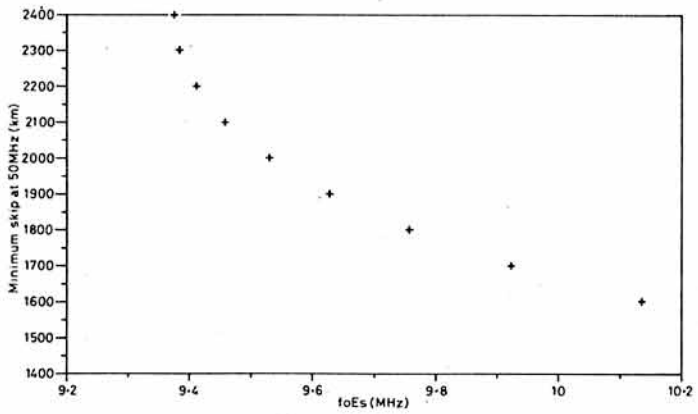


Fig 7. Minimum skip as a function of vertical incidence frequency

Comparison with 144MHz results

It is of interest to compare some of the Es contacts made on 144MHz in recent years with the maximum single-hop range of 2,400km derived above. I have selected some contacts from *Four metres and down,* see Table 4.

Table 4. 144MHz contacts

Date	Contact	Distance (km)
15 May 1982	G-3A2	1,220
5 June 1982	GI-IT9	2,390
4 May 1984	G-EA6	1,600
8 June 1984	G-RB5	2,438
	G-UO5	2,300
	G-SV2	2,100
6 August 1984	GJ-LZ	2,260
?	G-4X4	3,500
?	CT1-OD5	3,864

Table 4 demonstrates first that in a given event (say, 8 June 1984), many contacts were made at ranges comparable with the single-hop limit derived above. Secondly, the record-breaking contacts of 3,500 and 3,864km are unusual events consistent with the idea of double-hop propagation. Lastly it is interesting to note the shortest-range contacts because they indicate the maximum intensity of ionization reached, and hence the muf.

There is a difficulty in that short range Es contacts can be confused with tropo; however, the 1,220km contact of 15 May 1982 seems reliable. (Information on shorter range contacts would be most interesting.) These results suggest that double-hop propagation can be over a range as short as 2,500km on 144MHz. Single- and double-hop together should therefore allow Es contacts on 144MHz over any range between 1,200 and 4,800km in principle.

A range of 1,220km on 144MHz corresponds to a maximum usable frequency of 176MHz (at this frequency a 2,400km contact could be made). The corresponding vertical incidence frequency is 33·1MHz.

Correlation of transatlantic events with solar and geomagnetic indices

In an attempt to establish the cause of the 50MHz events, the sunspot numbers and geomagnetic indices have been examined. Considering first the relation with sunspot numbers, Table 5 shows the sunspot numbers* for days on which FY7THF was heard. It can be seen that sunspot numbers vary between 12 on 21 June 1985 and 188 on 28 June 1980. Applying statistical tests to the events in June and July 1982, it can be shown that there is no significant difference between the numbers on Es days and a random selection. (The method used is the Kolmogorov-Smirnov goodness of fit test for completely specified distributions—see Ref [4]).

Table 5. Summertime observations of FY7THF

Date	Time start	Time end	Heard by	Sunspot No	Ap
27 June 1980	2045	2122	G4BPY	185	3
28 June 1980	1730	1936	G4BPY	188	3
29 June 1980	1447	1449	G4BPY	149	5
11 July 1980	2055	2227	SM6PU	87	10
11 July 1980	2032	2034	G4BPY		
13 July 1980	2001	2010	G3WBQ	105	9
13 July 1980	2032	2110	G3WBQ		
13 July 1980	2200	2235	G3WBQ		
14 July 1980	2002	2025	G3WBQ	128	9
14 July 1980	2302	0010	G3WBQ		
14 July 1980	2030	2040	G4BPY		
5 June 1981	1850	2004	G4BPY	55	6
13 July 1981	1810	1815	G3WBQ	153	9
13 July 1981	1921	1923	G3WBQ		
13 July 1981	1940	1949	G3WBQ		
13 July 1981	2029	2034	G3WBQ		
25 May 1982	1900	1935	SM6PU	88	8
5 June 1982	2140	2230	G4BPY	111	6
17 June 1982	2029	2031	G3TCT	136	6
17 June 1982	2100	2125	G4GLT		
18 June 1982	1724	1937	G4GLT	134	7
6 July 1982	2022	2113	G4GLT	32	15
7 July 1982	1920	2033	G4GLT	33	21
8 July 1982	2017	2019	G4GLT	49	15
8 July 1982	2052	2054	G4GLT		
9 July 1982	1850	2153	G4GLT	61	10
20 July 1982	1900	1940	G4GLT	180	24
16 May 1983	1600	1700	F0FDB	99	9
6 June 1983	1918	1922	G4GLT	85	11
7 June 1983	1030	1032	G4JCC	104	6
21 June 1983	1757	1905	G4GLT	117	20
11 June 1985	1909	1935	G4BPY	88	13
11 June 1985	1917	2046	G4GLT		
16 June 1985	1308	1330	G4BPY	50	4
16 June 1985	1720	1840	G3WBQ		
21 June 1985	1800	1930	G3TCU	12	10

We turn next to the relation with the planetary geomagnetic index, Ap, the average daily amplitude, prepared by the University of Gottingen. Fig 8 shows the distribution of Ap values for each June and July between 1980 and 1984. On the same figure is shown the distribution of Ap for days on which transatlantic Es occurred (both W/VE and FY7). We can see that nearly 70 per cent of Es days have Ap of less than 10, compared with only 45 per cent of all days in June and July 1980–4. Therefore, days with low geomagnetic activity are best for transatlantic Es. Applying the Kolmogorov-Smirnov test as before we can compare the distributions. The results show that the distribution obtained for all Es (W,VE and FY7) is significantly different from a random selection, at 99 per cent confidence.

* Provisional Brussels numbers except 1983 and 84 which are definitive, and 1985 which are provisional Boulder numbers.

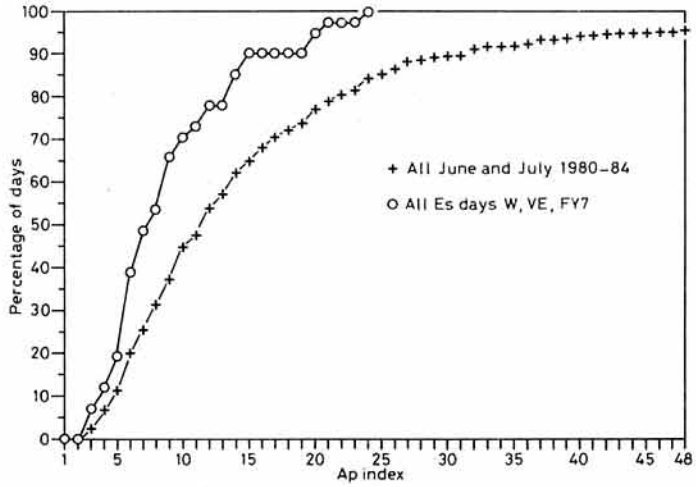


Fig 8. Cumulative distribution of Ap

Notes

1. "All Es days" are defined as days of FY7 reception 1980–4 from Table 5, W/VE openings 1980–4 from Table 2, plus the following events:

Date	Path	Ap
6 June 1981	VP2-ZB2	14
23 June 1981	LU-G	5
10 July 1981	Puerto Rico TV-UK	4
4 June 1982	PY2-G	7
14 August 1982	ZB2-LU	7

2. Observations in 1985 were excluded because Ap values were not available to the author.

3. No observations of FY7 were made in 1984: the three principal UK amateurs were not listening that year due to domestic circumstances.

Comparing the distribution of Ap for the "FY7" days only, again there is a significant difference at 90 per cent confidence. In addition, if we just consider the year 1982 alone, the difference between "all Es days" and all days in June and July is again significant at the 99 per cent confidence level.

Conclusion

Transatlantic propagation at 50MHz in the summer is not sunspot related, nor is it transequatorial. The correlation with low geomagnetic index indicates that auroral-E is not involved. The most likely explanation is multi hop Es, which previous workers have shown is quite frequent and not too lossy.

Other mixed modes are possible, however, and to help confirm that this is indeed multi-hop Es, it would help to have stations located along the USA–Europe path or French Guiana–Europe path, for example in the Azores.

Graham Kimbell first became interested in radio while at school, starting with a one-valve receiver kit, and obtaining his licence in 1964. After graduating from university with an electronic engineering degree, he worked as a scientist at the Royal Aircraft Establishment, and is currently employed by an international software and systems company as a consultant and project manager in defence computing. Graham's interest in propagation in the low vhf region started with operation on 70MHz in 1965. Since 1980 he has been active in 50MHz crossband working, and with the opening of 50MHz in the UK is looking forward to the widened opportunities of two way working.

Given the incidence of events at 50MHz, it would be worth trying on higher frequencies when 50MHz is open.

Reliable high power beacons in Canada and USA on 50MHz would help further propagation studies.

Consideration should be given to correlating these events with the presence of solar radiation, rather than its absence.

Another area for study is the extremely selective nature of transatlantic Es, ie an explanation is needed for the geographical selectivity and its stability over periods up to an hour.

Acknowledgements

The author acknowledges the information and help received from: David Newman, G4GLT; Gordon Pheasant, G4BPY; Trevor Brook, G3WBQ; Phil Guttridge, G3TCU; Ray Flavell, G3LTP; and Olof Karlsson, SM6PU.

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CONVERSION OF THE FT707 FOR TOP BAND

(Continued from page 487)

circuit cannot be over-emphasized in preserving the life of the pa transistors.

Conclusion

Modification of the FT707 to include 1·8MHz proved to be much simpler than at first imagined, although there were a few unexpected surprises. Substitution of the bandpass filters is relatively simple, taking only a couple of hours and there are only a few wiring changes to make in the main chassis. The construction of the new lowpass filter is simple but may take a little longer. Components are likely to vary tremendously in size, but provided two suitable low-profile relays with 3A contacts can be found, most sizes of mica capacitors and two T68-2 cores can easily be accommodated. The T50-2 core is smaller in diameter, and if wound with 24swg wire it can hold sufficient turns and is used by Yaesu in the FT107. Amidon cores are obtainable from Cirkit Holdings and GW3TMP Electronics, and I am advised that Yaesu inductors can be ordered by part number from Amateur Electronics UK. I had no difficulty in obtaining the inductors direct from the factory. The 15,984·5kHz crystal is available as a spare for other Yaesu models; in some cases 15,987·5kHz is used, causing a 3kHz split from the digital to analog dial on lsb; it is of course correct on usb. Crystals are available, both plug-in and wire-ended, the latter being preferable.

The problems encountered with the pa protection circuit were unexpected and may not be characteristic of all FT707s. The later models with PB2201 are those believed to require modification; however, as the swr protection is vital in protecting the pa transistors from high rf voltages, the operation should be checked for peace of mind.

The FT707 performs exceedlingly well on 1·8MHz. The receiver is very sensitive, and the transmitter is capable of over 100W output—considerably more than the legal limit of 32W p.e.p.

When making modifications it is my policy to engineer them so as to avoid major surgery, in order to permit a return to standard if ever required. As mentioned earlier, the only hole to be drilled is in the af board to facilitate the mounting of the 1·8MHz crystal oscillator. After modification of the rf board, a brush-over with cellulose thinner will remove any flux from the pcb and make it appear as original. The addition of 1·8MHz makes the FT707 a very creditable base station as well as being an exceedingly useful little mobile rig. I am sure that its withdrawal from production is the result of changing fashion rather than for any reason of obsolesence. The modification described may well lend itself to modification of the FT77 as well.

Credit must be given to G4HOJ, who pioneered the modification to an FT707S, and without whose inspiration this modification would have remained no more than a collection of ideas. □

Technical Topics

by Pat Hawker, G3VA

TT HAS ALWAYS been dedicated to reporting "progress" in the technical development of radio communication, but increasingly it is becoming ever more difficult to define "progress". Aldous Huxley claimed "Technological progress has merely provided us with more efficient means for going backwards". Evelyn Waugh wrote "Never use the word 'progressive' to me . . . it makes me sick and agitated for hours . . . please, please never again." Havelock Ellis claimed that "What we call progress is the exchange of one nuisance for another nuisance." "Nothing" it has been said "dates faster than people's fantasies about the future."

Looking forward by looking back?

But such views are still anathema to many scientists and engineers. Recently, in the 1986 *National Electronics Review*, Dr William Gosling noted that "The whole pattern of Western technical and scientific thought is based on an assumption of ceaseless progress and development. It was Dr Ian Ross, president of Bell Laboratories, who said that technologies come in two kinds: those which are exponentially developing and those which are unimportant. We take it for granted that the science and technology of today will necessarily differ in essence from that of yesterday, and will be better . . . The assumption of progress is pervasive and irresistible . . . Technology either grows or dies . . ."

If one accepts this view of technology, then there would be clearly little place for continuing with conventional thermionics in amateur radio. But, on the other hand, history suggests that "progress" is cyclical rather than linear. Did not Poulsen develop magnetic recording at the turn of the century only to see it fade virtually out of existence until the revival of interest in the 'thirties? Did not the advocates of space communications a quarter-a-century ago suggest that hf and ocean cables would quickly fade away as communications media? Yet hf remains vitally important for Defence and low-cost "thin-line" communications. "Cable" in the form of fibre optics is re-emerging as the prime broadband carrier!

Should we not be cautious today, in accepting that electronic mail, packet networks and data transmission will replace paper? Professor Igor Aleksander, head of the Kobler Unit for the Management of Information Technology at Imperial College (*Business Computing & Communications* May 1986) writes of the "widely-voiced myth" of the "paperless office" adding: "Had computers been invented first and paper second, the latter would have been hailed as a remarkable achievement of high technology on which much information could be stored at a cost much lower than that of the magnetic medium."

There is surely no reason for amateurs to feel ashamed of sometimes advocating "old technology" although (unfortunately) changing fashions may result in old technologies fading away, not on grounds of inferior or unsatisfactory performance, but because falling demand may take them right out of the market place.

In *QST* March 1986, Greg Livingstone, WA2EHV, writes: "Are you looking for a new thrill in ham radio but can't afford packet or computer equipment? Does your super-duper all-mode transceiver do everything but fill out the QSL?. . . . Take a bold step backwards and build a transmitter. Not a solidstate QRP rig, but a 25W tube rig that you can use every day.

"After getting bored with guaranteed solid-copy QSOs on my HW101, I built a 6C5-6L6 rig on a breadboard. I run it at about 25W and have worked 24 states with my eight 7MHz crystals. I've never enjoyed ham radio so much. . . .

"If you're an old-timer, I'm sure you've built many such rigs, but there are a lot of hams out there who, like me, were licensed in the past 15 years and have grown up with the 'plug-in appliances'. If you're in that group, then dig out some old circuits, hit a few flea markets and be a 'born again ham'. My transmitter cost me $10, including the power supply."

So there is the quandary. Should one regard such activities as non-progressive, mere nostalgia or do they reflect something that is basic to amateur radio . . . the desire to get on the air with something that you have built yourself without first having to take a degree course in electronics?

Solidstate QRP

It is for QRP that cost considerations tend (for new components) to tip the balance in favour of solidstate. Again, for portable lightweight "week-end cottage" rigs working off batteries few would now advocate valves.

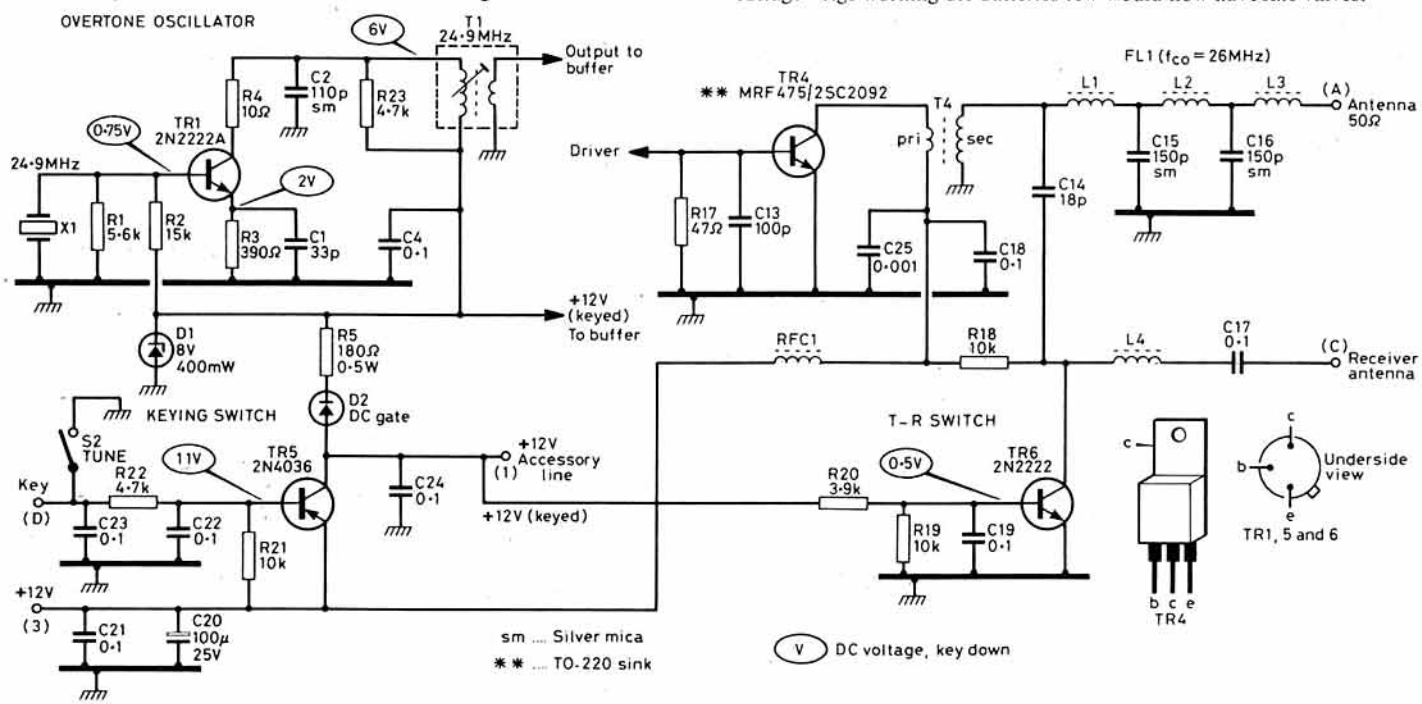


Fig 1. Overtone 24·9MHz crystal oscillator, keying switch, 4W power amplifier and transistor t-r switch as used in W1FB's low-power 24·9MHz cw transmitter with break-in facilities (*QST* February 1986). The buffer amplifier and driver stages are not shown. T1, 6t primary, 4t secondary No 28 enam on bobbin of Amidon L57-6 shielded transformer unit. T4 broadband transformer on stacked (two) FT50-43 ferrite toroid cores, 7t primary, 10t secondary, No 24 enam. Y1 overtone crystal, 30pF load capacitance, HC-6/U holder. Do not attempt to use 12·45MHz crystal. L1, L3 0·266µH, 8t, No 24 enam on Amidon T50-6 toroid core. L2 0·5µH, 13t No 24 enam on T50-6 core. L4 2·27µH 24t, No 26 on T50-6 core

In *QST* (Beginner's Bench, February 1986, pp23-6) Doug De Maw, W1FB, describes a 4W crystal-controlled transmitter for the 24·9MHz band with full break-in (QSK) facilities. It is intended to provide an opportunity to try the 24·9MHz band at minimum cost in conjunction with a companion 24·9MHz receiver converter (*QST* April 1985). This is a band on which, as the sunspots begin to return—hopefully we may see a start to Cycle 22 this autumn or next—worldwide cw communications should be possible with very low power at times when the muf along the desired paths is above 21MHz but still below 28MHz. It uses an overtone crystal rather than a fundamental 12·45MHz crystal (with doubling) since this would produce significant output at 12·45MHz. Transistor line-up is two 2N2222A (oscillator and buffer amplifier), 2N3866 (driver), MRF475 or 2SC092 (power amplifier), 2N4036 (keying switch) and 2N2222 (transit-receive switch). The circuit diagram of the overtone oscillator, keying switch and tr switch is given in Fig 1. This could be readily adapted for other bands etc.

Solidstate linear amplifiers

The article by John Matthews, G3WZT, on a single-stage linear for 50MHz with an rf output of 100W p.e.p rf output from 6-7W of drive (*Rad Com* June 1986, pages 402-7) showed vividly the problem facing amateurs who wish to retain a significant element of "home construction" in their stations yet would make no claim to being professional designers. For G3WZT, in his introductory notes, describes himself as a "self-confessed valve man where high-power linear amplifiers are concerned", more especially for the constructor "with a junk box brimming over with valves, bases and high-voltage transformers etc". But he notes that for the others, high-voltage valve equipment is fast becoming synonymous with high costs, unless constructors are prepared to salvage and re-cycle old equipment—and this can rule out the less-experienced constructors who would prefer to duplicate, or near-duplicate, a proven, published design.

For solidstate, G3WZT shows clearly the advantage, both in linearity and psu construction, of getting away from the 12V, 30A approach in favour of 24V or, better still, 48V (or even for some power mosfets 150V). But the article also reflects the fact that the design of a reliable medium-power solidstate amplifier still calls for significantly more basic engineering knowledge than a comparable valve amplifier, primarily in the need to cope with low and reactive input and output impedances, but also the added requirements for filtering and protection circuits—not to mention the stress that arises from the knowledge that rf power transistors are perhaps the fastest acting fuses yet invented!

It is perhaps worth remembering that not only the QQVO series of vhf double-tetrodes are capable of working satisfactorily at 50MHz. For example, even the 807 is usually listed for full ratings up to 60MHz. The same goes for the 6146B. There can be few of the television "sweep" (line-output) valves that would be unable to provide high power gain up to 50MHz.

This is in no way a criticism of the excellent design by G3WZT, whose potted biography, not unexpectedly, reveals him to be a professional development communications engineer. But it does indicate why, despite such excellent and informative guides as the ARRL *Solid state design for the radio amateur*, so many amateur-amateurs without much in the way of test instruments etc hesitate to embark on do-it-yourself solidstate transmitters at other than QRP.

A detailed, blow-by-blow description of the construction of a 100W solidstate 144MHz linear amplifier, with all components available in kit form, appears in *Electronics Australia* (March 1986) for use with a heavy-current 12V power source. One wonders, however, whether its linearity, at full rated power output, would really be sufficient to provide a "clean" ssb transmission acceptable in the more crowded European band conditions. It is probably better suited to fm.

Close-in dynamic range of receivers

Modern high-performance solidstate hf receivers do not come cheaply, and are not necessarily an improvement, in terms of basic performance, on some of the better valve models that preceded them. This was well shown in a set of receiver measurements made by Sherwood Engineering Inc and drawn to the attention of *TT* readers by Peter Lonsdale, G3PVX (*TT* August and October 1984, pp677-8 and pp858-9). These detailed measurements underlined the way in which, in many receivers, the dynamic range deteriorates significantly when a very strong interfering signal is located only a few kilohertz away from the wanted signal (a not infrequent situation in amateur radio operations). This is due to the growing use of up-conversion to vhf implying a vhf first oscillator, the relatively poor noise (jitter) characteristics of most frequency synthesizers, the use of relatively broad "roofing filters" in the first fixed-i.f section and the lack of good pre-mixer selectivity. The Sherwood measurements showed that many highly-regarded receivers and transceivers have some 30-35dB less dynamic range when measurements are made with narrow spacing between the signals. It is gratifying to note that in his reviews, Peter Hart, G3SJX, is now including both conventional and narrow-spaced dynamic range measurements. There is also evidence that manufacturers are now paying more attention to this problem.

Ham Radio (December 1977) showed that after modifications (including the fitting of a narrowband cw filter to replace the roofing filter of the stock-models), the valved Drake R4C emerged at the top of the table of receivers in terms of narrowband dynamic range (85dB measured with 2kHz spacing).

Modifying an R4B receiver

It was therefore interesting to receive from Dave Johnstone, G4EVS (8 Newtondale, Cleveland Park, Guisborough, Cleveland TS14 8EY) a detailed account of his experiences in modifying an old Drake R4B receiver. Although the new filters that he has fitted do not come cheaply, the results appear to justify the cost and the effort.

"About four years ago I bought an old Drake R4B at a rally. Since that time I have spent many enjoyable and sometimes frustrating hours modifying and experimenting with this receiver to improve its performance. The changes I have made are in principle applicable to other valve equipment of a similar vintage, leading to signal performance levels comparable with many current hf black boxes. The modifications I have carried out are described below. (G4EVS's comments are set out at length as they provide a good insight into this whole area of receiver modification —*G3VA*.)

"**Filtering.** I have replaced the rather wide 5,645kHz filter in the first i.f with switchable crystal filters for the different modes of operation. These limit any overloading of the second mixer by significantly attenuating strong signals within the passband of the rf stages but outside the passband of the second i.f filters.

"A 5kHz eight-pole filter is used for lsb/usb/a.m, while a 600Hz six-pole filter is used for cw. Both these filters are made by Sherwood Engineering in the USA. I believe similar filters can also be obtained from International Radio Inc, the Kenwood/Icom/Yaesu newsletter organization, also in the USA.

"My filters are mounted on a home-made pcb together with relay switching which grounds the input and the output of the unused filter to prevent any unwanted bypassing. This technique requires two miniature two-pole two-way relays but avoids any possible imd problems that might arise with diode switching. The pcb is mounted on the side of the vertical plate supporting the preselector assembly.

"**Audio amplifier.** I have removed the original 6EH5 audio pa valve and associated transistor preamp. A new audio amplifier using a TBA810 ic

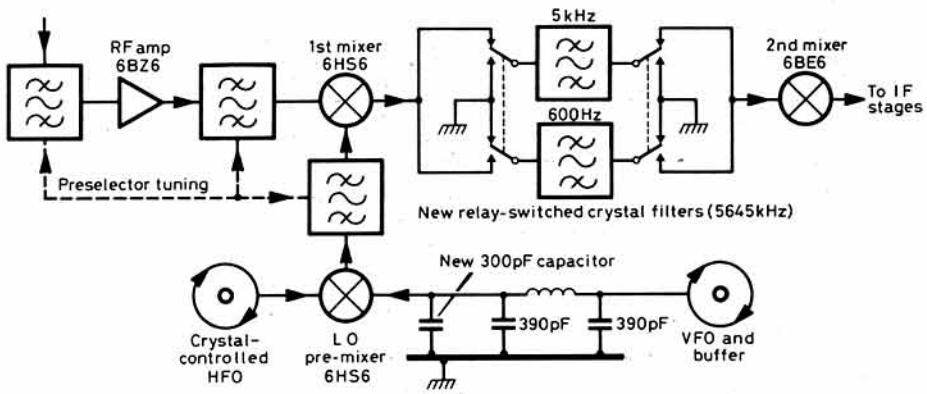


Fig 2. G4EVS's modified front-end for the valved Drake R4B receiver with switched "roofing" filters and improved filtering of the vfo output to reduce "birdies" on 21 and 28MHz

driven by a TL071 preamp has been fitted. This provides hum-free audio, as well as reducing the ht current demand by 30–40mA and the heater current demand by 1·2A. The mains transformer runs considerably cooler.

"Power supply. A small 15V 500mA transformer/rectifier/regulator (7812) assembly is mounted on a small pcb. This stands vertically in the space left by removing the 6EH5 tube.

The new 12V supply powers the new audio stages as well as all other existing solidstate stages in the rig, ie the vfo, hfo, bfo, a.m detector and calibrator. Previously all these stages were supplied by large (and hot!) dropping resistors from the 150V ht rail.

"Product detector. The original twin diode product detector does not give very good recovered audio, due both to an inadequate bfo injection level and a lack of balance providing poor isolation between the i.f, bfo and af ports. I have fitted a doubly-balanced product detector using an MC1496 active mixer. The SL640 chip also works well in this role. The imd performance of the MC1496 seems somewhat better than the SL640, but considerably more external components are needed.

"Front-end modifications. Assessing the effect of changes (Fig 2) to the receiver front-end can be done qualitively. For instance, reducing the rf amplifier gain so that the preselector gives a less-pronounced peak on band noise is trading away sensitivity for hopefully improved overload performance. This kind of move is probably worthwhile for lower-frequency band operators with little interest in working 21/28MHz. To be more certain about these kind of trade-offs, I have found it necessary to build some simple test equipment as follows:

(a) A low-level (−89dBm) crystal oscillator on 14,030kHz for noise floor measurements.

(b) A pair of high-level (+4dBm) crystal oscillators on 14,040 and 14,060kHz respectively, together with a −6dB hybrid combiner for imd measurements.

(c) A 0–100dB attenuator (in 1dB steps) using nine slide switches and a compartmented box made from double-sided pcb.

(d) An audio voltmeter calibrated in decibels.

"This equipment, which is straightforward though time-consuming to construct, allows me to measure with reasonable accuracy receiver noise floor and dynamic range. The exact techniques for doing this are described in *Solid State Design for the Radio Amateur* published by ARRL (obtainable from RSGB Publications).

"Based on an information sheet from the USA, I changed the original arrangement of the first mixer (6HS6) so that the local oscillator was injected via a 10pF capacitor into the control grid with the signal instead of separately via a 0·005μF capacitor into the cathode. This change was claimed to reduce the loading on the tracking filter used on the lo pre-mixer output, as the mixer control grid has a much higher input impedance than its cathode. The reduction in loading improves the sharpness of the tracking filter response, eliminating a number of birdies which are particularly noticeable on 21 and 28MHz with the "stock" receiver. Tuning 21 and 28MHz after making this change certainly showed that the birdies had been significantly reduced. However, there was a marked reduction in overall gain with no significant preselector noise peak possible on the higher frequency bands.

"My R4B was in this modified condition at the time that the test equipment was ready for use. Initial measurements showed an mds (minimum discernible signal or noise floor) of −128dBm together with a dynamic range of 80dB with the ssb filters in use. This was disappointing, as published figures for the later Drake R4C, which has very similar front-end circuitry, showed an mds of about −139dBm together with an 85dB dynamic range.

"One of the requirements for high-level diode-ring mixers is adequate lo injection level. Increased noise figures and degraded strong-signal handling are characteristic of insufficient lo drive. I suspected there might be a similar problem with the R4B valve mixer. The lo signal on the mixer control grid on 3·5MHz showed 400mV p-p on a 20MHz bandwidth 'scope. This seemed rather low since a heterodyning ratio of some 10:1 for lo level:signal level is required for good performance. When calculating the expected signal levels at the mixer grid, remember that the preselector/rf amplifier combination will provide 20–30dB gain.

"I disconnected the lo signal from the mixer and measured its open-circuit value as 4V p-p. By using a selection of fixed resistors I established that a 50Ω load was needed before the lo voltage dropped to 2V p-p, suggesting that the output impedance of the lo tracking filter was about 50Ω. This was puzzling. How could the cathode input impedance of the R4B mixer (probably a few hundred ohms) cause any significant damping, as claimed in the information sheet, on a circuit with only 50Ω output impedance? The answer is that it does not! The information sheet is in error!

"Reconnecting the first mixer with lo drive to the cathode, the measured lo level on the cathode was almost 4V p-p. However, not surprisingly, the 21/28MHz birdies had returned!

"I began to think more carefully about where the birdies were coming from. Harmonics of the crystal-controlled hfo seemed unlikely, the 4·9–5·5MHz vfo seemed a more likely candidate. I had noticed when tuning the R4B up and down the bands that the squelch on the 144MHz rig was sometimes opened by spurious signals! Examination of the vfo output circuit revealed a simple lowpass pi-filter made from a small series inductor and two 390pF shunt capacitors. A little experimentation showed that an extra 170pF capacitor across the output of this filter caused a marked reduction in the 21/28MHz birdies, while the resultant lo drive to the mixer dropped by only 0·2–0·3V—problem solved!

"The first mixer injection level after this change was about 3·5V p-p. However, the dc cathode bias is only about 2·1V. Therefore, during each cycle of the lo, the mixer was being driven almost into cut-off conditions. My understanding of this type of additive rather than switching mixer is that operation should be on a portion of the characteristic curve where there is a large amount of second-order curvature. It is the predominantly square law response of a fet which gives it good additive mixing characteristics.

"Accordingly, to avoid cut-off during the lo cycle, the lo drive level was reduced to 2V p-p. This meant that under no-signal conditions the mixer remained at least 1V above cut-off. A very strong mixer input signal (around 2V p-p) would be needed before the mixer would cut-off. The traditional wisdom used for setting up fet mixers is that the lo drive plus the maximum input signal should not cause the fet to pinch-off or (in the case of a depletion device) be driven into enhancement. Presumably similar arguments hold true for valve mixers?

"The lo level was reduced to 2V p-p by increasing the value of the extra capacitor fitted to the vfo output filter from 170pF to 300pF, which also further helps the 21/28MHz birdie situation.

"Measuring receiver performance now showed an mds of −136dBm and a dynamic range of 87dB—a worthwhile improvement relative to the lo injection into the control-grid case. These tests were made using a screen supply dropping resistor of 4·7kΩ (the original was 220kΩ) and a cathode resistor of 470Ω (the original was 2·2kΩ). Increasing the screen dropper to 220kΩ had no measurable effect on the mds but the dynamic range dropped by 4dB. This would lend weight to the principle that improved signal handling performance is obtained by having high standing currents on mixers and amplifiers.

"What more? How does one improve performance from here? The Drake R4C uses an EF184 mixer which has lower noise and higher mutual conductance than the 6HS6. Interestingly, in the R4C the lo is injected into the mixer grid with the signal! Using an EF184 in an R4B might allow the rf stage gain to be reduced while still maintaining an acceptable mds. There should be some consequent increase in dynamic range though the overall benefit is probably small.

"Some years ago in *TT* an article from the November 1968 *DL-QTC* magazine was mentioned. This described how the first mixer of a Drake R4A was changed from a 6HS6 to a 7360 beam deflection tube, ie changing from additive to switching mixing. Can anyone let me have a copy/original of this? Even though the 7360 is now expensive and not too robust I suspect this change may prove most effective (Beam deflection valves can be susceptible to hum—*G3VA*.)

"High-level diode ring mixers are readily available today. Fitting one of these into an R4B/R4C would pose a number of problems:

(a) The lo signal (currently about 10dBm) would need boosting by about 10dB.

(b) A post-mixer amplifier (grounded gate fet or fet/bipolar with noiseless feedback) would need to be built.

(c) A satisfactory broadband input network to match the rf stage plate circuit to the 50Ω input of the diode ring would need to be constructed.

Problem (a) and (b) would be fairly easily achievable, though (c) may not be possible and a number of band-switched coils would have to be used.

"I would be interested to get in touch with anyone who has carried out investigations and modifications along similar lines to myself."

Modern filter technology

Eventually we may see the introduction of the all-digital receiver with high-grade digital filtering at i.f rather than the audio digital filtering used in the early professional hybrid analogue-digital communications receivers (eg Rockwell-Collins HF2050). But in the meantime the performance of receivers and ssb transmitters depends to a significant extent on the quality of their analogue fixed-frequency bandpass filters. Wire-wound lc filters, used for so many years in the form of i.f transformers, are still found, but the emphasis these days is on such devices as bandpass crystal filters, surface-wave (saw) filters, ceramic resonators and ceramic filters. There is

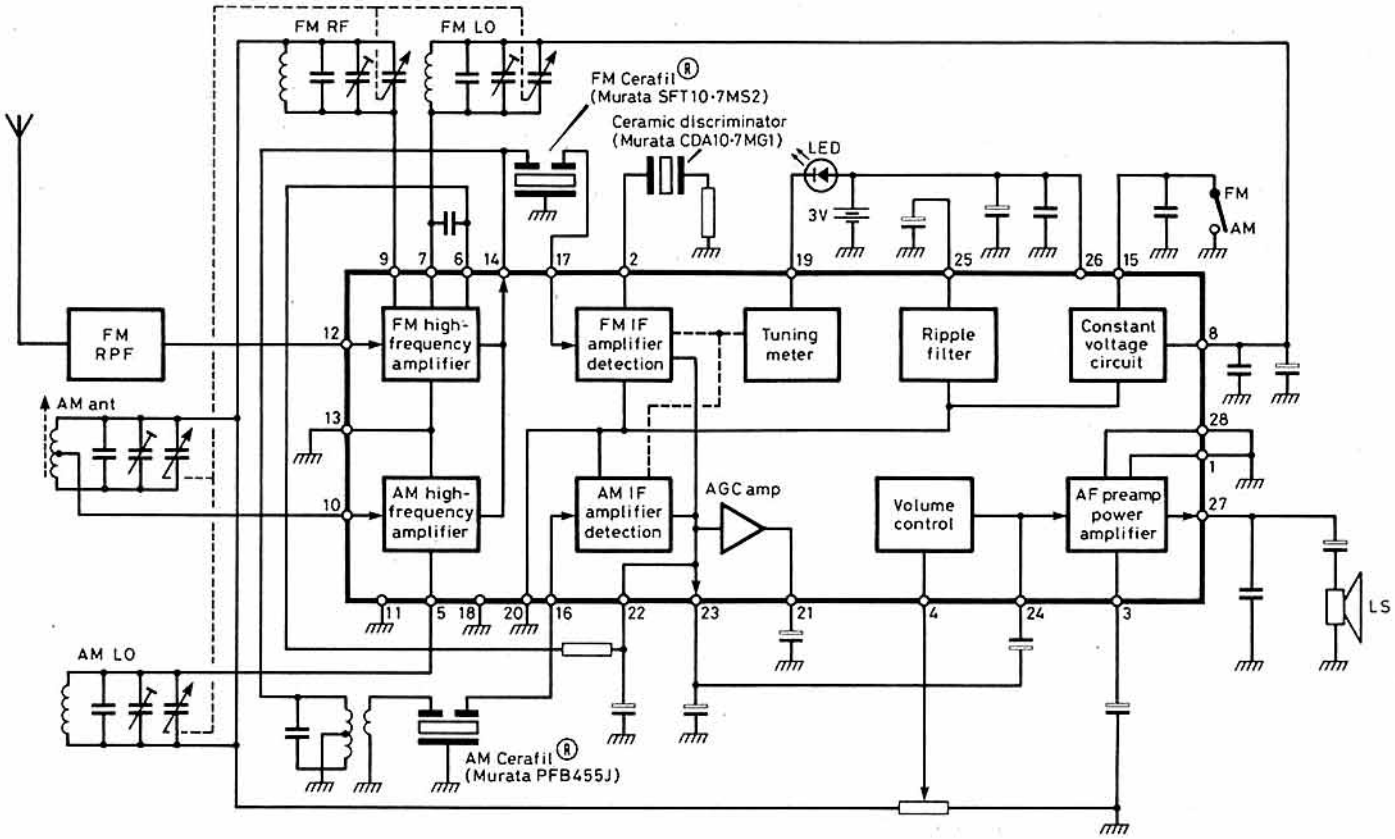


Fig 3. Japanese single-clip a.m/fm broadcast receiver showing use of ceramic resonators, filters etc

also still a role for mechanical filters, although these are limited to frequencies below about 500kHz.

An interesting series of articles covering all these forms of filters appears in the Japanese industry-orientated (English text) magazine *JEE* (April 1986, p58–74). These cover current filter units offered by Toyo, Nihon Dempa Kogyo (NDK), Murata and Goyo (the firm which took over production and marketing of mechanical filters from Kokusai). The range and forms of construction of filters are considerable, including mcf (monolithic crystal filters), dms (double-mode saw), ceramic filters mostly based on pzt (lead titanate zirconate), and including devices intended for use with surface-mount technology.

Ceramic resonators are finding increasing application in oscillators and filters (see *TT*, January 1984, p42) including clock oscillators for microcomputers. Fig 3 shows a single-chip a.m/fm broadcast receiver with a Murata CDA ceramic discriminator etc.

Fig 4 is a composite diagram showing the approximate frequency range to which each form of filter is applicable and the possible bandwidth. It will be noted that crystal filters up to well over 100MHz are now being manufactured in mcf form.

Goyo have an interesting range of 455kHz miniature mechanical filters that retain the good shape factor associated with this type of filter: Fig 5. Typically these are 28·5 by 16 by 10·5mm, although the MF-455-12GZ is 46 by 16 by 16mm.

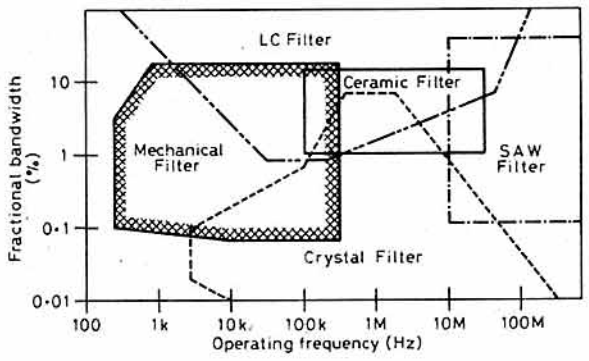


Fig 4. Typical frequency ranges for various filter techniques

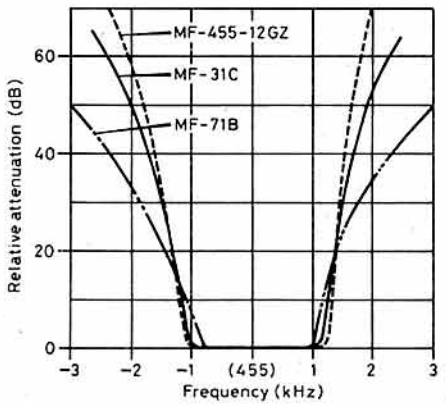


Fig 5. Characteristics of miniature 455kHz mechanical filters made by Goyo

Microphones in vehicles

In *TT* a number of references have been made, particularly in May and July 1984, to the safety aspects of the use of handheld microphones in moving vehicles, a subject that has come to the fore again partly as a result of the growing use of the mobile cellular networks, the use of cb and the general growth of two-way mobile radio. Attention was drawn to RSGB mobile safety recommendations, numbers six and seven, viz:

(6) The microphone should be attached to the vehicle so that it does not impair the vision or movement of the driver; and

(7) A driver/operator should not use a hand microphone or double headphone.

It was noted that these recommendations are disregarded by some amateur mobile operators and by many cb, pmr and cellular driver/operators; in fact, all of the early cellular microphone/earphones were in the form of quite bulky handsets. There exists the curious anomaly that a driver seen using an electric razor while driving is liable to prosecution, but the basically similar act of using a handheld microphone does not, in itself, constitute an offence. It was also noted that an attempt in 1966 by the then Ministry of Transport to introduce a draconian regulation that would have

outlawed the use of *any* radio transmitter while driving was dropped as a result of the intervention of the mobile radio industry etc.

It does appear, however, that the Department of Transport (which now forms part of the large Department of the Environment) has taken up this question again, in the form of a draft revision to the *Highway Code*. While officially the department claims that this revision is not finalized, and has not been made available for publication, its press office confirms that the department is generally not in favour of the use of hand microphones while driving. Other sources are more positive that the revised code is likely to contain specific recommendations that handheld microphones should not be used while driving.

The *Highway Code*, issued under the Road Traffic Act, sets out rules for safety on the road. The Secretary of State is empowered to revise the code from time to time in such a manner as he thinks fit, subject to the approval of Parliament. Failure to observe a provision of the code does not, of itself, render a person liable to criminal proceedings but a failure to observe it may be used in either criminal or civil proceedings to establish liability.

T2FD antenna still has supporters

One of the very first unconventional and "experimental" antennas ever to be described in *TT* more than 25 years ago was the so-called "T2FD" derived from "terminated titled folded dipole", and the basic details have appeared in every edition of *ART*, although usually accompanied by a warning that its performance as an aperiodic multiband antenna may leave something to be desired, particularly on some bands where an appreciable proportion of the transmitter output power is wasted in the "terminating" resistor.

This antenna stemmed from a development by the US Navy as a technique for broadening the bandwidth of a folded dipole to a reasonable degree. However, it was, and still is, being publicized in the amateur radio journals as suitable for use on all bands from 3·5 to 28MHz.

Since the terminating resistor is usually specified as having a wattage for cw of about one-third or one-quarter of the input power of the transmitter, this suggests that, at least on some frequencies, a very large amount of power is being dissipated in the resistor. Unlike the terminating resistors used in rhombics, long-wire vee beams, etc. there is no compensating directivity gain. *Ipso facto,* there must be frequencies on which the aperiodic T2FD radiates a lot less power than a resonant dipole.

Having said that, one has to admit that the T2FD has always found supporters who consider that the advantages of omni-directional, multiband, mixed (slant) polarization etc compensates for the lower efficiency on some bands. John Heys, G3BDQ, resurrected the design in *Ham Radio Today* (June 1985). It has also won the support of several members of the West Kent Amateur Radio Society, as reported in their *Update* newsletter of 24 January, 1986 by Alex Korda, G4FDC: Fig 6.

The feedpoint impedance of a T2FD is considered as roughly 300Ω, and the antenna can simply be fed directly with any length of Ω balanced feeder or from 50Ω coaxial cable via a 6:1 balun or with a 4:1 balun plus transmission-line transformer, Fig 7. It is claimed that a low vswr can be achieved (with suitable atud), over at least a 4:1 frequency range. Undoubtedly, with a good site and with the element sloping at about 20° to 40° to the horizontal, then the 2 to 3dB of power that may be lost in the non-inductive resistor (several resistors in parallel can give the necessary wattage) is not a serious drawback, though it always goes against the grain to develop expensive rf only to lose it all in a resistor, though there are other quite well-respected antennas where it is not unusual to have an efficiency of a similar order.

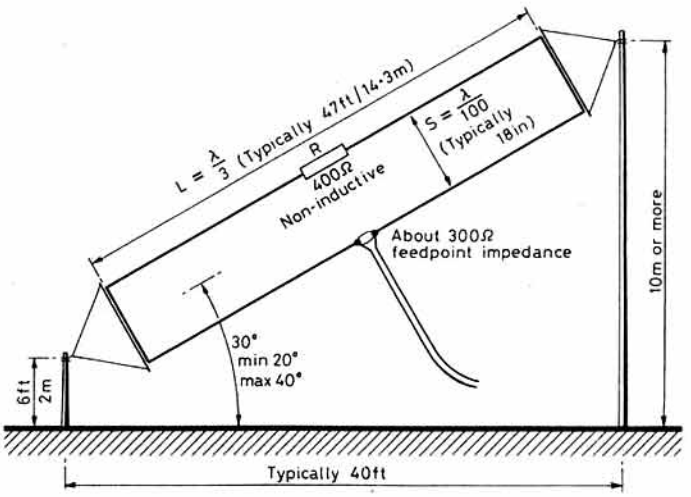


Fig 6. The controversial but often useful T2FD antenna. With a span of only about one-third of the wavelength of the lowest band of interest, it covers a frequency range of at least 4:1 and often more (3·5MHz design suitable for up to 14 or even 28Mhz)

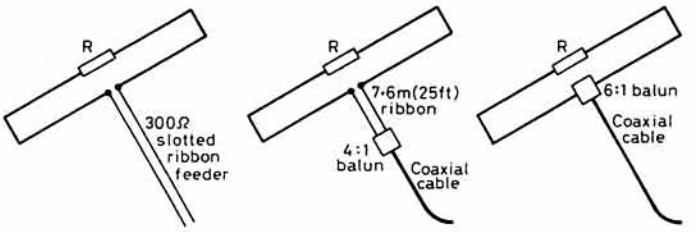


Fig 7. Some methods of feeding the T2FD antenna which has a feedpoint impedance of roughly 300Ω

Tips and topics

Pat Painting, G30UC, draws attention to the serious and growing interference to 1·8MHz operation resulting from illegal "cordless telephones" being used apparently as low-cost mobile units by garages and tv service technicians etc and operating around 1·95MHz. The fm signals spread over many kilohertz and some units appear to be considerably more powerful than the legal devices. To add insult to injury, it would seem that cordless telephones are covered by the "Interception of Communications Act 1985" that came into force in early April. Under this Act it is a criminal offence (liable to up to two years' imprisonment) intentionally to intercept "a communication in the course of its transmission by post or by means of a public telecommunication system". The Act makes it quite clear that this includes radio transmission where this is part of a public telecommunication system. It undoubtedly covers legal "cordless telephones" and possibly even when these are not of the approved type!

D J Bunyon, G4XHN, feels that it is time to remind readers of the effectiveness of the "single-turn transformer braid-breaker" as a means of reducing breakthrough of hf signals into vhf/fm stereo receivers which often use roof-top antennas to reduce stereo-hiss. This device (Fig 8) appeared very many years ago in *TT* and all editions of *ART* in connection with vhf/tv, but may be new to some as a means of combating interference to 88–108MHz stereo hi-fi systems.

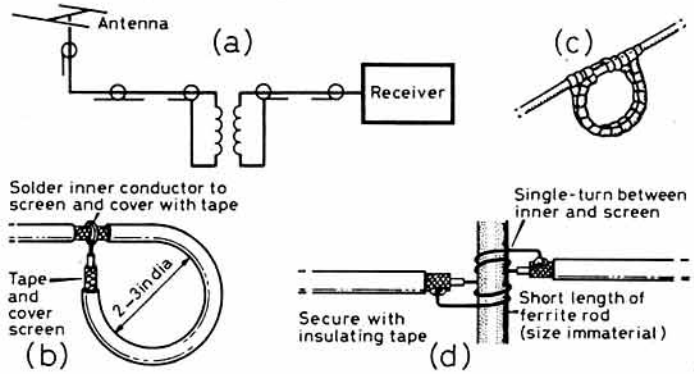


Fig 8 (a)–(c). Faraday double-loop "braid-breaker" filter using single-turn coaxial cable loops. (d) Alternative form of filter using short length of ferrite rod

The problems of electromagnetic compatibility (emc) now extend far beyond amateur radio, and increasingly the subject is being recognized as a vital aspect of electronic engineering.

Two universities in the UK now offer emc as a degree subject or as part of a postgraduate course. The IERE is organizing its fifth international conference on emc at York University from 30 September to 3 October, 1986. This will also cover the controversial subject of the potential hazards of non-ionizing radiation, including the accidental detonation of explosives etc.

Pat Painting, G30UC, draws attention to the continuing problem of static discharges that can destroy solidstate devices, including ics, even when soldered into equipment. In his case, a 741 ic microphone amplifier in his homebuilt 28MHz ssb mobile transceiver went faulty following a period of cold dry weather in which high static voltages built up on the vehicle and sparks were generated between his hands and the car chassis when his feet touched the ground. One day he got out of the car while holding the microphone. . . .

C B Raithby, G8GI, welcomes recent references in *TT* to the reliability problems of complex transceivers. He is concerned that "equipment reviews" usually depend on equipment selected and loaned for the purpose by manufacturers or distributors who may be taking care to ensure that only fully-working models, 100 per cent within spec, reach the reviewers. In practice, not all equipments reviewed in *Rad Com* fall within this category, and some, I believe, arrive in unopened boxes. But it is a problem that all journals and reviewers recognize.

Cecil Broadhurst, G3PH, sends along a fascinating extract from *The Times* of 26 January 1922 reporting the findings of the Wireless Telegraphy Commission (the vice-chairman of the committee, incidentally, was Dr W H Eccles, an early President of the Wireless Society of London which became the RSGB). This committee was charged with deciding what type of transmission equipment should be used for the very-long-delayed Imperial wireless chain using extremely high-power on wavelengths of the order of 14,000m. The committee came out firmly in favour of thermionic valves, but recommended that initially all stations should be equipped also with arc transmitters, considered to need less skilled maintenance. In practice, following further delays, the vlf "chain" was abandoned in favour of beam transmission on "short wave" which by then had been pioneered by radio amateurs.

In the January *TT* (p37), it was noted that recent work at the high-power hf "ionospheric heating" transmitter at Ramfjord in northern Norway included the generation of frequencies in the range 1 to 1·5kHz by using the non-linear effects in order to modulate and radiate elf signals from the polar electrojet.

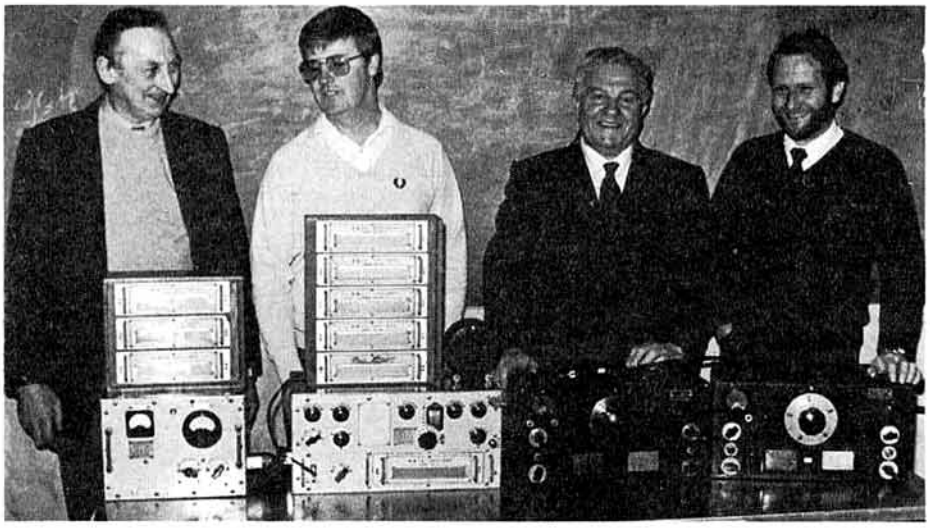
S. Ganguly (Rice University, Houston, Texas) reports on some basically similar experiments at the Arecibo Observatory, near Islote, Puerto Rico, where four 100kW hf transmitters can be fed to an array providing a massive22 to 25dB gain. The transmitters consist of one pair on about 3,175kHz and one pair on about 5·1MHz. The transmitters were either pulsed at elf or alternatively operated with an elf difference in frequencies. Both these processes were shown to result in the generation and radiation of elf signals at 3, 5 and 6·25Hz and observed by three receivers including one sited on the island of Mona about 150km west of the transmitter site with a signal-to-noise ratio of up to 20dB.

The Japanese HRO

Few communication receivers have achieved such universal acclaim as the series of HRO models made by the National Company of Malden, Mass, USA, which spanned the years from 1934 to a final HRO-500 solidstate design with partial frequency-synthesis in the mid-sixties. The HRO-Senior (1936), HRO-M and HRO-5 (wartime models), HRO-7 (1947), HRO-50 (1950) and HRO-60 (1960) featured the famous HRO "PW" dial mechanism, and plug-in coil assemblies. The HRO was even paid the compliment of being closely copied as wartime receivers by both the Germans and Japanese.

An interesting collection of HRO receivers, including a Japanese copy, was assembled recently by members of the Welwyn-Hatfield ARC (see photo).

The rare Japanese model belongs to Norman Williams, G3BYG, who recovered it from an abandoned Japanese communications centre in Singapore in September 1945 and subsequently used it while he was VS1AC. It is still in regular use as a general-coverage receiver. It was one of nine in the Japanese centre, and uses the standard UX-based HRO valves such as the 6C6, 6D6 etc. Although not fitted with the classic "PW" dial, the gearbox and four-section tuning gang are similar and the circuit appears to duplicate the American design almost exactly, although the layout differs and the bfo and i.f transformers plug-in. The wooden cases that contain the plug-in coil assemblies fit like drawers into a compartmented wooden transit case. The receiver is built to an extremely high-standard, with superb workmanship and great attention to detail. It must have cost far more to manufacture than the original! Mechanically the Japanese version was of an altogether superior standard. □



Members of the Welwyn-Hatfield ARC with two "genuine" wartime HRO receivers (r) and the Japanese copy owned by Norman Williams, G3BYG, and modified psu (l). One of the genuine models comes from the Mosquito Aircraft Museum wartime wireless collection by G3LXP. The other belongs to Roy Cable, G4WSL. L to r: G3BYG (ex VS1AC), G1LQS, G3LXP and G4WSL.
***Photo:* G1HWH**

BOOK REVIEWS

Guide to Utility Stations 1986 (4th edition, including 12th edition of *Guide to Radioteletype Stations)*. Published December 1985 by Klingenfuss Publications, 456 pages plus three fold-in maps (240 by 170mm), soft covers. £19.00 or DM60 (including air mail postage to any country) from Klingenfuss Publications, Hagenloher Strasse 14, D-7400 Tuebingen, Fed Rep Germany.

Guide to Facsimile Stations (6th edition). Published April 1986 by Klingenfuss Publications, 128 pages (240 by 170mm), soft covers. £9.50 or DM30 as above.

Radioteletype Code Manual (9th edition). Published April 1986 by Klingenfuss Publications, 86 pages (240 by 170mm), soft covers. £7.95 or DM25 as above.

The publishers, with some justification, claim these and several associated titles as "the most actual, comprehensive and reliable manuals in existence". Few of those interested in the busy hf airwaves outside the amateur and broadcasting bands would dispute this claim. For example, the massive *Guide to Utility Stations* lists the 15,083 frequencies used by commercial point-to-point, marine, aeronautical, weather stations using 2,976 callsigns, including facsimile and rtty, standard abbreviations, relevant Radio Regulations etc. Although published annually, some 6,318 changes have been made in this edition.

The Guide to Facsimile Stations includes detailed schedules of 94 press and meteo (weather) stations with some 50 sample weather charts and how to interpret them, 346 frequencies used by stations operating with 223 callsigns, information on meteorological satellites etc.

The *Radioteletype Code Manual* is supplementary to the *Guide to Radioteletype Stations* (included with the *Guide to Utility Station)* and provides the 10 rtty alphabets used worldwide (eg Cyrillic, Arabic, Greek, Japanese etc), and details of rtty systems, amtor, arq, fec, mfsk, navtex, sitor, tdm, vft. For good measure it includes Arabic, Cyrillic, Greek, Hebrew, Japanese and Latin cw alphabets, CCITT definitions, a concise introduction to cryptology, and also to the multi-frequency shift-keying system originally developed by the former British Diplomatic Wireless Service (now FCO Communications Department), including the modified Mk 6 system, known as Piccolo.

For British listeners the usual warning about infringement of the Wireless Telegraphy Acts must now be coupled with the even more stringent terms of the new Interception of Communications Act 1985, covering intentional interception of any messages of a public telecommunication system.

G3VA

Beginner's Guide to Amateur Radio (2nd edition 1986) by F G Rayer, G3OGR (revised by Gordon J King, G4VFV). Published by Newnes Technical Books, 188 + IV small-format pages, 185 by 122mm). Soft covers, £4.95.

This is an updated and extended edition of a useful little book originally written by the late F G Rayer, G3OGR, and now revised by Gordon J King, G4VFV. It can be compared, in effect, to a pocket-sized version of the RSGB's *A Guide to Amateur Radio*, but concentrating only on the bare essentials.

There are, unfortunately, dangers in simplifying radio communication principles and practice to the degree attempted here. Was it not Albert Einstein who said: "Everything should be made as simple as possible, but not simpler"? Nevertheless it will help beginners through the RAE, even if subsequently they will need to "unlearn" some of its simplifications.

G3VA

RSGB NATIONAL VHF CONVENTION 1986

A JOINT REPORT BY

Ken Willis, G8VR; Brian Bower, G3COJ; and Barry Chambers, G8AGN

The RSGB NATIONAL VHF CONVENTION 1986 was held at Sandown Park on Sunday 16 March. Difficulties in booking the Sandown Park venue made this the first such convention to be held on a Sunday, so the organizers were concerned that this might affect the attendance at this previously very popular event. Their fears were not lessened by the news, on the eve of the convention, that British Rail did not plan to open the nearby railway station, Esher, on the Sunday due to staff shortages. So it was very much with fingers crossed that those responsible for setting up this event awaited the opening hour.

They need not have worried. Once again records were broken both for attendance and for trader participation. Some five per cent more passed through the turnstiles compared with last year's total of over 2,600, while the number of firms manning stands was again the highest in the history of this convention. The only small cloud on the horizon was the fact that no printed tickets arrived at Sandown Park, so there were problems of pass-outs which had to be solved on the spot by the committees organizing the event.

The fact that everything went so smoothly bears testimony to the hard work of the Exhibition & Rally Committee under Norman Miller, G3MVV, while, as in previous years, Les Hawkyard, G5HD, handled much of the donkey-work associated with the trade show.

Although the event followed much the same pattern as earlier events, the halls were noticeably more crowded, making progress around the stands difficult at times, so there may be a case for a larger layout next year if this proves to be possible. This year there were several products on show relating to the 50MHz band, and the VHF Committee featured this band on its stand as well as covering it in one of the lectures.

Angus McKenzie, G3OSS, provided a popular equipment-test facility, which was kept busy throughout the day as operators either rejoiced at their rigs' capabilities or had their worst fears confirmed. As previously, some specialist groups took the opportunity to meet at the convention: the 6 Metre Group held its annual general meeting during the day, while the Remote Imaging Group—one which is gaining strength rapidly—manned a stand full of interesting "pictures from spacecraft" as they sought to recruit new members to this facet of our hobby.

The afternoon lecture session was formally opened by Willie McClintock, G3VPE, President of the RSGB, who in his address commented on some of the achievements of the Society during the previous year, notably the extension of facilities on the 50MHz band and the use of morse on the air by Class B licence holders. He stressed the fact that many problems faced the amateur radio movement as demands on the vhf/uhf part of the spectrum increased, and emphasized the need for a strong, well-supported national society to represent amateurs in this country. Following his address, Mr McClintock presented several awards made by the VHF Contests Committee, following which he declared the lecture session open. This was arranged in the now familiar pattern of three separate streams. The VHF Committee always receives criticisms that lectures of great general interest overlap, so that one is forced to make an "either/or" decision. While this is recognized, it is clearly a problem attempting to fit in nine sessions during a single-day event, though the possibility of making some improvement in this area is under consideration by the committee.

Lecture stream A

This stream opened to a packed house eager to hear from tv weatherman and radio amateur Jim Bacon, G3YLA, on the topic of "VHF/UHF propagation and the weather". The fact that Jim is accustomed to addressing an audience of millions was immediately obvious from his relaxed style in describing a highly scientific subject.

Using a series of colour transparencies, Jim traced the build-up of a typical major tropo event, and described the importance of water-vapour content in the lower atmosphere in providing a sharp discontinuity causing refraction of vhf waves. By the use of weather maps associated with known tropo openings, Jim showed how operators could monitor the weather situation and be ready to take advantage of situations which might lead to abnormal propagation. In the chair was Ray Flavell, G3LTP, chairman of the Propagation Studies Committee, himself no stranger to the realms of professional weather science. At the end of a most intriguing talk, Jim was treated to a barrage of questions which indicated the interest displayed by the audience in his topic. In retrospect, it was also obvious that he made a highly scientific subject sound almost simple, and certainly more understandable than the text in books and articles dealing with this subject. It is to be hoped that he will favour us again with talks on allied subjects in the future.

In the next lecture, Ken Willis, G8VR, dealt with the early days of vhf. He adopted the stance that vhf is a relative term, and that in the early days, a change from operating on a wavelength of 1,000 to 100m required many problems of equipment and techniques to be solved. Early dx on 100m suggested to others then operating on longer wavelengths that the higher the frequency, the greater the distances covered, but this was in the days before there was a full understanding of the ionosphere or the eleven-year solar cycle. Ken traced the development of transmitters and receivers from the very earliest days (from around 1913), using a collection of slides provided by George Jessop, G6JP, who himself took part in 56MHz (5m) tests as early as 1935.

In concluding his talk, G8VR showed a fascinating collection of valves which showed how miniaturization and engineering had made possible the move to higher and higher frequencies. As a finale he fired up his 'fifties 144MHz transmitter, lighting a "looped lamp" from the final tank circuit in the approved style of the period, and flattening the audio system in the hall with rfi which was another peril of that era.

The final session in this lecture stream was devoted to a forum at which members of the VHF Contests Committee took the stage to face a barrage of questions from the audience. In opening the discussion, John Quarmby, G3XDY, chairman of the committee, outlined changes in the contests

A clean sweep by the Parallel Lines Contest Group whose representatives received (l to r): the Mitchell-Milling Trophy for the fourth consecutive time (leading multi-operator station in the 144MHz Trophy Contest); the 1951 Council Cup for the third time (overall winner of the 432MHz Trophy Contest); and the VHF Manager's Trophy (overall winner of the 70MHz Trophy Contest



L to r: the Tartan Trophy to the leading GM station in the 1985 VHF NFD, being accepted on behalf of the South of Scotland VHF/UHF Contest Group; members of the Warrington ARC Contest Group receive the Arthur Watts Trophy for winning the restricted section of VHF NFD; Geoff Brown, GJ4ICD, was again the leading fixed station in the 144MHz Trophy Contest and received the Thorogood Trophy

calendar, and made particular reference to the inclusion of 2,320MHz in VHF Field Day. This led to a discussion on the field day being confined to a low-power event, though most were against this suggestion, a majority felt that some limit should be imposed on the erp of contest stations because of the interference caused. The committee disagreed with this, believing the problem to be due to receiver overload, so although they did not favour any change it was accepted that a large number of operators would prefer to participate in low-power events. In a very busy session, the wide range of questions embraced adjudication standards, scoring systems—including square multipliers which appeared to favour east-coast operators—the use of automatic keyers for general calls, 50 and 70MHz contest possibilities, affiliated societies contests and, inevitably, the locator systems to be used. The lively audience testified to the popularity of vhf/uhf contests, and the wide-ranging discussion illustrated the difficult job which the committee has in organizing and adjudicating these events.

Lecture stream B

The first lecture in this stream, by Ron Broadbent, G3AAJ, and Jeff Ward, K8KA, discussed "AMSAT future developments—the way ahead". Ron gave details of the Phase 3 satellite due to be launched late in 1986 carrying transponders built by Amsat-DL. These will be similar to those on Oscar 10, but with the additions of a 144MHz input for Mode L, and a new one for 432MHz input—2,320MHz output. A completely new facility will be "Rudik", the German acronym for "Regenerative transponder for digital amateur radio communication". It is a regenerative digital repeater suitable for packet radios. Jeff, who is with the University of Surrey, described the digital communications experiment being flown on Uosat 2. This is a digital store-and-forward system, suitable for a low-orbit satellite, in which a message can be stored when it is over one part of the earth and retrieved in a completely different part, possibly several orbits later.

The second lecture, by David Butler, G4ASR, was entitled "Optimizing your vhf/uhf station". He covered many aspects of equipment, operation and propagation, including such matters as the pitfalls associated with low-noise amplifiers. How many realize that the sky noise level on 50MHz is such that there is little point in building a front-end with nf better than 8dB —yet manufacturers strive to provide 2dB in order to sell their equipment. David also surprised many by saying that the gain of a Yagi depends more on its boom length than the number of elements in it, though this must be treated with reservation since two elements on a very long boom would not provide very much gain!

Finally in this session, Ray Cracknell, G2AHU (ex ZE2JV, Z22JV) spoke on 50MHz results and expectations for the future. He traced the history of the band from its pre-war origins on 56MHz and the transition to 50MHz after the war. Ray referred to pioneering work by MD5KW (now G5KW), the late G6DH and others. He stressed the fact that 50MHz dx propagation is possible by sporadic-E, even in the years of sunspot minimum. The sunspot maximum conditions in 1979-81 produced much interesting propagation, and Ray showed an analysis of signals heard by G5KW, who was operating from the Scillies at that time. Since the issue of permits in the UK in 1983, systematic reports had been made and analyses of these had been issued by G2AHU in December 1985. He went on to describe how sporadic-E clouds were formed in temperate zones, and referred to the transatlantic openings in July 1985 which were generally ascribed to this mode of propagation. Finally he stressed the importance of operators in the UK remaining within the terms of their licence and doing everything possible to avoid interference with Continental television in those countries still using Band 1.

Lecture stream C

This stream comprised three lectures organized by the RSGB Microwave Committee. In the first, dealing with equipment for 1·3 and 2·3GHz, Chris Smith, G8LMW, made a comparison of power budgets at vhf, 1·3 and 2·3GHz for typical low-power and advanced equipment for line-of-sight and tropospheric paths. He then gave overviews of receivers and transmitters for these bands, followed by a detailed discussion of individual building blocks in both cases, high-lighting differences between 1·3 and 2·3GHz where appropriate (for example, in preamps, mixers, relays, antennas and power amplifiers).

In the second lecture, Bob Harris, G4APV, described 11GHz TVRO in some depth. He discussed the basics of orbits of satellites for TVRO,

The Hadrabs & Addiscombe Contest Group, winner of the 1985 VHF NFD, receiving the Surrey Trophy

The VHF Contests Committee Cup being presented to members of the Warrington ARC Contest Group, overall winner of the 1,296MHz Trophy Contest

footprints and typical power fluxes at surface, and the required signal/noise ratio. This led to a discussion on dishes and feeds, 11GHz receiver circuits, a comparison of Gunn and DRO as local oscillators, GaAsfet preamplifiers, wideband fm demodulation and sound demodulation. Following this very comprehensive survey, he listed currently-available satellites and described how they might be "found", and rounded off his talk by a slide show of channel callsigns "taken off the air", and a video showing his own equipment for both 4 and 11GHz plus some additional programme material recorded off-air.

In the final lecture in this stream Charlie Suckling, G3WDG, who is no stranger to these events, gave an excellent survey of dishes and feeds in his talk "Getting the most out of your dish". His subject matter included the basics of dish antennas, f/d ratio and its significance, illumination and edge taper, space loss to dish edge, gain *v* diameter, illumination efficiency, surface and profile errors, feed systems (their losses and dependence on f/d ratio), and the choice of optimum f/d for amateur use. Charlie then described some constructional techniques for dishes, and suggested how the performance of focal-plane dishes might be improved. He introduced Cassegrain and off-set systems, and produced some experimental results which compared a focal-plane dish fed with either a "penny" feed, a "scalar" feed or an off-set horn.

Leaving little more to be covered, he then spoke on feed-horn design, pyramidal, beer-can and dual mode. An interested audience was left in no doubt that there is more to a dish antenna than simply sticking a dipole at the focus!

Convention round-up

As the lectures progressed, a very large crowd was circling the traders' stands, and numerous bulky parcels were seen being carried out of the hall. In particular, the 50MHz antennas were somewhat larger than we have been used to at vhf events, but in fact everything which one could require was available somewhere in the show, from components to complete rigs, from slim-Jims to dishes.

The ever-popular flea market was again organized by the Echelford ARS. This admirable group also provided a working party to clear away the tables and chairs from the exhibition hall at the end of the convention—no mean effort, this.

Those approaching the convention by car were able to use talk-in facilities provided by the South West London Raynet Group, which set up an installation giving excellent coverage. Sandown Park looks to be a very good vhf location from an operating point of view as well as a convention centre.

So, another even more successful vhf convention has passed by. Congratulations and sincere thanks are due to Geoff Stone, G3FZL, VHF Committee member and overall convention organizer, for his work in making this yet another record year. Thanks are also due to the large number of volunteers who provided services of one sort or another yet whose names never appear in print. Without them there would be no convention.

Here's to next year. There were some at this year's event who said that it was becoming more of a "rally in the south", than an old-style vhf convention. Whether or not this is true, the VHF Committee must consider the implications of it becoming still larger, for attendances in past years have continued to increase and there seems to be no reason why the event should lose its popularity in the future.

See you there in 1987. □

NEWS & VIEWS

VHF/UHF

Ken Willis, G8VR*

Aurora

In *QST* May 1986, Bill Tynan, W3XO, devoted his entire column *The World Above 50MHz* to the big aurora of 8 February 1986. Contacts were made in the USA on all bands from 50 to 432MHz, including the interesting USA 220MHz band on which, apparently, auroral signals were extremely strong. There is conjecture whether 1·3GHz contacts would have been possible had more operators attempted to use the band, so intense was this event. Bill confirms much of the information given in *VHF/UHF* earlier, and of course includes much more which is local to the USA, so read the article in full if you get the opportunity. Two most interesting facts emerged: Firstly, there was much evidence of the presence of auroral-E during the overall event, which permitted transcontinental contacts to be made without the typical buzz-saw notes of normal signals. Beacon FY7THF (50·038MHz) was copied on the east coast, as was the Ecuador beacon HC2FG (50·1MHz). On 50MHz, K3ZO worked HV3HVU using fm. Secondly, the aurora was also experienced by our friends "down under", since Bill reports contacts between JA1VOK and VK4TL, VK4FXX, both of course on 50MHz, while Australian tv was copied by JA1VOK on 51·75MHz. Signal strengths for the JA–VK4 path were S9 plus 20dB. KH6IAA and KH6IJ were also both involved in this very widespread event.

There is no doubt that 50MHz is a good band for auroras, producing workable paths with events too weak to be useful on 144MHz. Even with simple dipoles and very low power, UK stations are finding it possible to make auroral contacts on the band (and via Es, see later), so the only thing restricting this band is the fact that not all UK amateurs are yet authorized to use it, and most European countries are still not prepared to make amateur allocations at 50MHz.

Phil Catterall, G4OBK (Chorley), made some auroral contacts on the band on 6 March, working GM3ZBE and GM4YPZ, though he is not too impressed with the activity on the band and also looks forward to the day when Class B operators are permitted to use it, since this should improve things considerably.

The 6 Metre Group had its act together on 6 May when another impending aurora was notified by telephone to quite a lot of operators. So far few reports have come in, except from G5KW who said that the event was not very intense in the south. It lasted (with him) about three hours, commencing at 6pm, and Ken worked Angus, G3OSS, with very auroral tone despite the relatively short distance between stations. He also worked GW4HBK with signals 33A both ways. Ken said that G4IJE (Essex) worked GM4NFC on ssb, but when G5KW tried, the weak signal with considerable doppler shift prevented a complete QSO.

Sporadic-E

Ted Collins, G4UPS (Devon), was listening on 28MHz on 29 April, and noted it to be wide open all over Europe from 0830 until late afternoon. He fired up his 50MHz transmitter and, using the crossband frequency of 28,885kHz, had a 28/50 contact with Heinz, DK1PZ (1306gmt), and then at 1416 worked LA6QBA two-way on the higher band. At 1602gmt he had another crossband contact, this time with SM6PU on both cw and ssb, using 25W from a homebrew linear and a HQ1 minibeam. A couple of days later, after the ill-fated Chernobyl disaster, Ted read in the press about the radioactive cloud over Scandinavia on 29 April, and over Poland next day, and wondered if there was any connection with these unusual propagation conditions. During 29 April, in addition to the contacts he reported initially, Ted had noted that propagation swung from mid-Europe up to SM/OZ/LA, yet at the same time was strong down to Italy where the robot 1Y4M, on 28,195kHz was 599 plus around mid-day, persisting until about 1400gmt. Next day (cloud over Poland) the only stations workable on that band were SP9 and SP2 from around 1000 to 1200gmt. Ted also noted a

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"lift" in 144MHz conditions, with a French repeater breaking through the local GB3WR "box". He hopes that others will write giving their own experiences of things heard during the same period.

This is not quite the end of this particular story, for having been bitten by the bug, Ted clearly kept an eye on 28MHz for possible openings, and was rewarded by working LA6QBA *crossband* "several times" (was it only a one-way 50MHz path?). On 9 May he had contacts with CT1LN and CT1AWO two-way on 50MHz between 1725 and 1811gmt, the former being a "first" for the Portuguese operator. On 11 May at 2024gmt, he worked EA3ADW crossband 28/50 and learned from him that the Spanish station is hoping to be granted a special 48h 50MHz licence during the CQ-WW contest, which you will find detailed in *VHF/UHF* June, scheduled for 19/20 July.

Ted says his minibeam works fine on 50MHz, and suggests that "the guys with the big antennas are finding they are too sharp and with too much forward gain, so they miss what is going on behind".

G3IMW reported an Es opening on 50MHz on 9 May when CT1LN, CT1AWO and CT4PO were all worked by G3UKV. G5KW worked CT1LN on 11 May. John Branegan, GM4IHJ, heard a weak CT station on this band as early as 29 April, so things started up quite early this year.

There was widespread Es on 16 May which extended up to the 144MHz band. It started with a flurry of activity on the 28,885kHz crossband calling frequency, and many 50-28MHz contacts were made during the day. Stations in Europe active with 50MHz receivers included YO2IS, OH5IY, LA1K, OZ7JV, OZ1DOQ, DK1PZ, SM6PU, SM4PUB, OH1ZAA and OH2KT. G3IMW had several good contacts, and also heard beacons GB3SIX and 5B4CY. G4UPS heard the same beacons and worked most of the Europeans. GW3MHW heard 5B4CY a day earlier, as did G4UPS.

On 144MHz, Jonathan, G1EDS (Basingstoke) was in contact with another G around 1000gmt when a strange-sounding signal appeared on the frequency. It turned out to be RQ2GGS (KO16OX—LQ square) and Jonathan promptly worked him for a new country and square using only 2·5W to a nine-element antenna. Jonathan then went on to work SM7LXV (JO65) and SM1MUU (Gotland, JO97), and heard UQ2GJN (KO26) but could not penetrate the pile-up which by this time had developed. Within 15min it was all over, proving, as Jonathan said, the need to be in the right place at the right time. However, further proof of this truism came from Mike (Beeston, Notts) who was presumably so excited he failed to give his callsign in his letter. He was driving south on the M1 between junctions 27 and 26 when he signed with another mobile on 145·350MHz. He was then called by SP5IYV who gave Mike a 58 report, with severe variations due to the motorway terrain. This was at 1120gmt, and when Mike left the motorway at junction 25, the Polish station was still calling the dx but getting no response. This was presumably fm, judging by the frequency; all too few try for dx on fm, but during Es it can be worked just as well as ssb or cw. Mike uses 10W to a 5λ/8 antenna.

The event extended quite far to the west, since GW4HBZ, on this occasion signing GD4HBZ/A, worked three SPs in the Warsaw area: SP5AD, SP5NHF and SP5EFO, plus SP7DSB in JO91. He used 2W from an IC202 and a nine-element Tonna 12ft high.

Further north, John Branegan, GM4IHJ (Fife) noticed strong German tv signals on 62·5MHz around 1015gmt, so he turned the beam in that direction and was rewarded by contacts with OK3CBU/P, OK3KCM, Y25HN, OK1DIG, OE3JPC, OE3CEW, SP9EWO, OK2BFH, SP9AMH and SP6AZT. There was more crossband activity 28-50 on 17 and 18 May, but probably the biggest event was when N4EJW called G4UPS at 1213 on 18 May on the 28MHz crossband frequency to say that he had heard either Ted or a beacon the previous day (17 May) at 1111gmt. As Ted remarks, it may not be long before a W/VE opening to the UK on 50MHz.

Beacon notes

SM6AFH/SM6EOC report a new beacon in Greece signing SV1VHF from KM17BX (LX09b) and running 25W to a vertical antenna 1,000m above sea level, so it might well be heard in the UK during any sporadic-E from that direction. Frequency is 144·900MHz.

Ken Ellis, G5KW, says that he is disgusted by a proposal by the Propagation Studies Committee of the RSGB to make the Cornish 50MHz beacon GB3CTC omni-directional, and believes that he is not by any means alone in taking this view. He comments on the lack of 50MHz operating experience by any of the committee, and says that 50MHz specialists first suggested the need for a beacon as far southwest as possible, with low-angle radiation beaming south to take advantage of any possible tep. It was admitted that at appropriate times the heading might be changed when there was a chance of F2, ie westwards to work states-side, but Ken feels that an omnidirectional beacon will serve no useful purpose. His experience when operating from Cornwall was that the high ground in that county and Devon screens off everything except a path along the Severn valley, except when there is a "lift" in conditions, when there are "enough stations QRV in those parts to take care of that".

Norman Fitch, G3FPK, whose vhf column in *Short Wave Magazine* is known worldwide, had some comments on the 144MHz beacon band. He was concerned by the German proposals for a 144MHz beacon band (see *VHF/UHF* March 1986) which he says can only have been made by people who use the band purely for simplex and repeater contacts, and who have no idea of the proper use of 144MHz. He goes on to say, however, that it is perhaps difficult to justify the use of "7·25 per cent of this precious band" for beacons. He proposes reducing the beacon band to 100kHz, ie 144·890 to 144·990MHz, and to adopt 2·5kHz channel spacing to provide 41 frequencies. This would require two beacons to share each frequency (on a present count of those operational) with three sharing just a few frequencies, which would cause no problems if they were spaced geographically and with regard to antenna headings.

Unfortunately, there are many operators who never listen for beacons and therefore gain the impression that there are acres of unused band tied up to little purpose. This is a pity, since quite apart from the propagation information provided by the beacons, they can enliven periods of flat conditions by "popping up" via meteor reflections. It is interesting that at this location, only some 70 miles from Potters Bar, the headquarters' 50MHz beacon GB3NHQ is in and out of noise most of the time but also exhibits strong pings taking it to above S6. Whether this is due to back-scatter or the fact that only an indoor dipole is currently in use here on this band is debatable. Dipoles are, of course, very good for short-range ms working because of their higher-angle radiation patterns. Tom, GM3MXN (near Motherwell), copies this beacon at S4 from time to time, also using a dipole antenna, this one being outside at about 18ft agl.

G3IMW had a telephone call from OX3LX, Bo Christiansen, who helped to activate the Greenland beacon OX3VHF. Bo said the beacons are on a small island off the tip of Greenland, locator GP60QQ, and confirmed the frequency as 50·045MHz. Power is 20W to a groundplane antenna. On 144MHz, the OX3VHF beacon is on 144·902MHz, running 10W to a five-element beaming southwest. Bo hopes to add another antenna beaming east to this beacon at a future date. The site is 250m asl. G3IMW said that he had heard at secondhand that G3PTO (Avon) had copied the 50MHz Greenland beacon during the aurora of 6 May. In a contact on 28MHz, OZ7JV told me that he had heard that a station in Copenhagen had copied this beacon also, but by what mode was not known.

OX3LX is located some 30km north of the Greenland beacons, and is QRV on 50MHz with 150W to a five-element antenna 200m asl. The station is 10min from his apartment, which can be reached on telephone 38903, but while at work (5min from the rig) the number is 38255-Local (ie extension) 338. He may be able to come on the band if a call is received from the UK telling him that the beacon is being heard. Dialling code from the UK is 010-299. G3IMW has skeds with him on Tuesdays and Wednesdays at 1900gmt on 14,135kHz.

Activity in some rare squares

From H de Jong (Amsterdam) some news of proposed activity in some seldom-heard squares, all on 144MHz. LA6HL/TF should be QRV from squares RX or RY until 10 July. He is then scheduled to be in Greenland as LA6HL/OY (WW or WV squares) until 14 July. For those needing Corsica, TK5EP is one to look out for this summer when he plans to be on from EC and ED squares. Even rarer, San Marino should be on the air from T77C (operator PA3DFT) but only until 7 July, so maybe he will have departed before you get a chance to read this. Further north, SM2CEW should commence operation from LB square, and maybe other adjoining ones, this summer. Of interest to the moonbounce operators, K6MYC will be QRV from Senegal, 6W8 or KH5, so my correspondent says, though these two are not exactly close to one another, KH5 being Jarvis Island.

In a very interesting letter, Dave Rycroft, ZC4DR (RAFARS, Cyprus), mentions that a 144MHz expedition is under consideration for 1987 to a local mountain peak, 6,400ft asl, with a view to attempting contacts to the UK. They welcome suggestions, QTH being Air Headquarters, Cyprus, BFPO 53. More information from Cyprus next month.

Repeater news

The Kent Repeater Group Newsletter No 44 for May 1986 contains much information on the health of its flock, CK, EK, KN, KS, NK, SK and RE, quite a full house to manage, one would think. However, what really touched me was a letter from one of the group's members, much of which I will reproduce here because of its sincerity and the simple message, to us all, which it contains. The writer, whose name and address have been withheld at his own request, commented: "The only Kent repeater I can use is GB3KS, which was off the air for nearly two years . . . I have supported the group in any way I was able . . . though I am an oap, I enclose an extra

£2 on my subscription to assist the good work being carried out by the present group, to whom I pass my thanks for the restoration of what is a lifeline to its oldies. Sometimes I wonder and worry over some of the language I hear on the box, and fear the box may be taken away . . . Members should, I feel, be respectfully reminded of their licence regulations and refrain from bad language and some remarks which are filthy and suggestive, perhaps fun to them, but not to us all, thank heavens" . . . The writer says it all, and any further comment would be superfluous.

The Kent RG Road Show (secretary, G4RVV) has been active again with visits to clubs, and has also manned a stand at the Rainham (Kent) Radio Rally. Bob Mersh, G8JNZ, has been appointed RMG Region E4 representative, with responsibility for liaison between local groups in Kent, Essex and Suffolk.

This year the South Dorset RG's repeater GB3SD celebrates its tenth birthday, having been one of the first 432MHz units to become operational. A new power amplifier has been installed which now provides the full legal erp. By fitting a single-notch and two-section bandpass filters to the transmitter, and a single-notch filter after the receive preamp, no detectable desense of the receiver is observed during transmit periods. The group is seeking information on the availability of a 3-5dB colinear antenna. Chairman of this group is G8BCH; secretary, G3EGV; and treasurer, G3VPF. Anyone interested in maintaining this repeater or wishing to help in the production of new equipment should contact one of these officials, QTHR. The group is also very interested in packet radio, and has attended a joint meeting on this topic with groups from Bristol, Southampton and Bournemouth.

Meteor scatter

Paul Turner, G4IJE, has been running regular skeds on 50MHz with LA6BQA. They are usually completed in 10 to 15min, according to G3IMW, who sometimes follows on. G4RSN (Berks) is a new recruit to 50MHz ms working, and can work LA6BQA with about 40W to a two-element quad antenna in the roof space, using ssb. He has also worked LA2AB, so this should encourage those who cannot put up a large array on this band.

G4JHM (Lincolnshire, QTHR) would be interested to know if anyone has written programs for ms working based on the Spectrum micro. Since he wants fast cw up to 1,000lpm, he assumes that a machine-code program would have to be used, and he would like the same program to carry out certain housekeeping jobs such as turning off the transmitter and switching on the tape recorder. If any readers have programs to offer for the Spectrum or, indeed, any other micro, would they write to G4JHM or to me, since there must be others who would be interested in such a program.

SM6AFH/SM6EOC report that from 29 July to 6 August, the SK0NZ group will be activating some rare squares in northern Scandinavia, from probably (old style QTH) IC, JC, JE, LE, ME, MF, NE, OE, PE, PD. Callsign on ms will be SM0FSKLA, speeds up to 1,000lpm, random on 144·438MHz 2·5min periods with SM0FSKLA to transmit first period. If calling CQ they will add the new locator number, eg CQ90 SM0FSKLA. Skeds to SM0FSK, Peter Hall, home phone 08-7544788.

Members of the VHF Committee on their stand at NEC 1986. L to r: (standing) G3ZNU, chairman; G5KW, corresponding member 50MHz; G3COJ; G3UBX; and (sitting) G8VR

Poor conditions or low activity?

From time to time I receive pleas from operators in the less-populated areas, for others—particularly those "down south"—to turn their beams away from the Continent from time to time. The indications are that they might then get some interesting contacts on what might otherwise appear to be a dead band.

Just to illustrate this point, on the afternoon of 6 April for just four hours, Barking Radio & Electronics Society held its annual contest. A little local affair, you might think, but because it was published in advance it brought a few more operators on to the band on a day when the barometer suggested that an afternoon snooze might be more attractive. Ela, G6HKM (Chelmsford), thought otherwise and casually reports having worked (on 144MHz) 123 contacts, 43 multipliers, seven GIs and G0AEA in the Scillies. Not so bad for a dead band.

Tom Sorbie, GM3MXN, this time referring to the 50MHz band, makes much the same point when he says, "Don't forget to turn the beam north —both myself and GM4UBJ are active from the Motherwell area".

On the same theme, since Eire amateurs are being encouraged to make Monday evenings (8-10pm) an activity night on both 144 and 432MHz, turn the antenna that way and try some calls. You won't win them all, for someone will say, knowingly: "That lid G***** is calling EI on a dead band", but just every so often you will have the pleasure of working one or two and then enjoy the ensuing pile-up!

GI operators have sometimes made a sort of reverse request. During auroras, many G stations call the GIs, who naturally prefer to work into the Continent to catch some squares which are normally very difficult for them to access. They are frustrated by having to fight off hordes of loud G signals in their attempts to reach the Continent, whereas, as they comment, they could be worked on innumerable occasions via a minor "lift" in conditions, if people would only look their way more often—not just when there is an aurora in progress.

QSL Bureau

The RSGB QSL Bureau will be closed for the entire month of August so that staff can take a vacation. Experience has shown that many members tend to overlook these notifications, with the result that enormous piles of cards await the return of those able to deal with them. Please send no cards towards the end of July, nor throughout the month of August. The request will be printed again next month—it is *your* cards we are trying to protect, so let's avoid having a pile-up if at all possible.

From the postbag

Peter, DL7YS (JO62OL), wrote to say that he has sent information relating to UK 70 and 50MHz operation to other DLs who were interested, particularly in the 50MHz band. He mentioned especially DL4MDQ, DL5MBG and DL7ACG among those who now have information, and they presumably intend to build receiving-converters for the band. Peter has obtained a 42MHz crystal and can now complete his 70MHz converter. He has already tried listening on 50MHz with a homebrew converter using two BF900s in the front-end, but the high gain caused many problems due to instability. If Peter had attended G4ASR's lecture at the VHF Convention he might not strive so hard for a low-noise front-end on that band! He says also that 22MHz crystals, useful for a 50MHz converter with 28MHz i.f, are expensive in his country, so G4DHF has promised to send a few from the UK. I use one at 20·93MHz purchased at a rally for 60p! This gives an approximate i.f of 29MHz for 50MHz and misses the cb noises at the top end of 28MHz. DL7YS still wants more information on 50MHz in the UK. I will send some to him, but anyone else who cares to do the same and maybe make some crossband ms skeds, can write to him. The rather cryptic address he gave me was DL7YS, Peter John, 1-BLN-22, Federal German Republic.

Another overseas reader who wants 50MHz information is H de Jong, an swl in Amsterdam. He has very sophisticated receiving equipment for 144MHz (including eme capability) and has also built a 50MHz receiving-converter. He writes a regular vhf/uhf bulletin for the magazine *CQ-PA*, and operates a sporadic-E telephone warning net which he says is very successful. See "Expedition news" for some further information supplied by this well-equipped listening station. His address is H Bulthuisstraat 13, 1067 SC Amsterdam, The Netherlands.

G3IMW reports that SM6PU, DK1PZ and OH2KT are all equipped for 70MHz reception, and have in fact worked into G and GW during Es openings. We hear little about 70MHz since the arrival of 50MHz permits. Jeremy, in conjunction with G4JCC, is carrying out daily 50MHz tests with F9LT in the Paris area, and says his signals are copied "about 95 per cent

of the days".

John Quarmby, chairman of the VHF Contests Committee, says that in the aurora of 8 February, he worked about 20 stations on 144MHz and six on 432MHz. Since he called the other stations rather than initiating CQ calls, he was interested to note who used Maidenhead and who preferred the old locator system when giving their reports. On 144MHz he found that out of 20 contacts, 19 used "Maidenhead" and only one the old system. On 432MHz, however, the new IARU system was less popular, with four using the old style and two the new one. John says: "Listening around, it seemed that it was the DL and PA stations who used the old QTH system, whereas Scandinavians and Eastern bloc countries used the new format. As an aside, the strength of this aurora is indicated by John's "bag" on 144MHz, four UQ2s, one RA3, one UP2, one SP, four LAs being among those worked. It gets more like news from the hf bands every day!

Some basic facts relating to G3IMW's dual-band (50/70MHz) beam antenna, which he hopes to describe more fully in an article shortly. The 50MHz element spacing is 0·15λ, five elements used, beamwidth 60°, f/b ratio 18db. The 70MHz element spacing is 0·2λ plus extra first director at 0·08λ, beamwidth 40°, f/b ratio 12dB. Most importantly, he says, weight is 14lb all up. □

HF

*John Allaway, G3FKM**

Operation Raleigh

John Layton, G4AAL, wrote to me the day before leaving (on 7 May) for Santiago together with Alastair, G4RUL. They were to drive 600 miles south to join the ship at Puerto Montt. Scheduled departure date from there was 18 May en route to the Juan Fernandez Is. After two weeks the plan was to sail westwards mainly along the Tropic of Capricorn to reach Fiji in late August. During this time some 22 different volcanic and coral islands will be visited. After two weeks in Fiji it is planned to leave for Australia where the ship will join the main land-based expedition and assume its role as expedition flag ship and hq. Running concurrently with the sea journey are similar scientific, medical and conservation projects in and around H4, VK and ZL, and all these activities come under the overall umbrella of Operation Raleigh. At any one time between 150 and 400 people are in the field on various tasks. Places visited by early May were C6, TI, HR, V3, HP, OA and CP, as well as CE. No dates can be given for future movements as the main object of the crossing is to carry out a multitude of scientific tests on behalf of universities and other bodies.

John emphasizes that the main function of the amateurs will be to run all the communication requirements for the expedition, and little activity on the amateur bands has taken place so far—only 187 QSOs having been made between December 1984 and November 1985, 53 of these with western Europe. Plans are under foot to remedy this and, hopefully, with three amateurs aboard much more activity may be possible. Most of this will be on hf, but it is planned to carry out some vhf experiments which may include satellite operation. Frequencies to be watched on hf are 14,175/280kHz and 21,175/280kHz for ssb and 14,020/030 and 21,020/030kHz for cw. For other modes (Amtor, rtty) look near the approved operating frequencies. Please keep QSOs short and to the point—the ship's "silence" periods have to be observed, and these last for the 5min following the quarter past and quarter to the hour during which a listening watch has to be kept on 2,182kHz. A special QSL has been produced, and all QSOs and listener reports will be confirmed either via RSGB, Box 73, Ipswich, or G4AAL, and cards will go via bureaux unless a sae is supplied—they will not be sent out until the logs and operators have returned to the UK. The latest schedule is as follows: 3–12 July, Outer Cook Is; 13 July, Rarotonga; 17–28 July, KH8 (several islands); 28 July–8August, 5W1; 10–17 August, A35; and 20–28 August 3D2.

Overseas news

Les Hickingbotham, V85LH, has returned to the UK and is using his former callsign G3HZG once more. He reports that BARTS (the Brunei national society) recently held its agm and is now able to negotiate with the authorities on behalf of the amateurs of Brunei. V85GA is now active on Oscar 10 and looking for QSOs with Europe when conditions are right. A copy of *BARTS Newsletter* contains an invitation for those interested in taking the RAE to contact V85MB, who is willing to organize a course. It

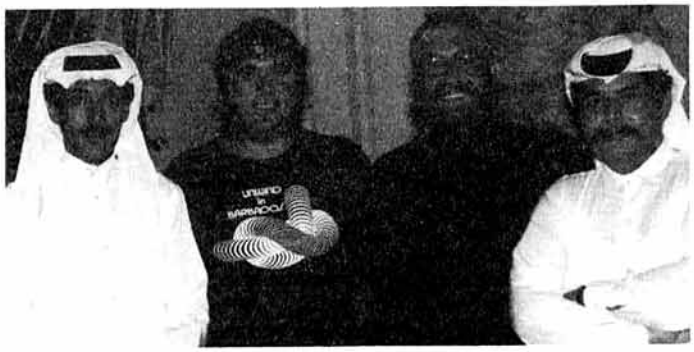
V85GA in the shack. G3HZG photo

is interesting to note that this is the same City & Guilds examination which is taken in the UK and which is still used in a number of former British territories. The 18 and 24MHz bands are now available, as is the band 1·8 to 2MHz. It is noted that it is being suggested that there should be a one-year probationary period for new amateurs, with privileges restricted to a novice callsign (V85N . .) in limited band areas. Mobile, portable and /A operations are still under consideration, and an experimental 144MHz repeater is being licensed for a two-year period. Visitors need only show proof of their qualifications in their home country to obtain a V8 licence.

G3UD reports that he will be on the air from Poland as SO9UD from 13 to 26 July. He will be taking a TS130S and TS7730 with him. He reports that applications for reciprocal Polish licences should be sent to reach the appropriate authorities at least three months before the intended visit. It is necessary to give full name, callsign, home permanent address, father's name, birthday, birthplace, education, profession, proposed period of operation, exact address of the station in Poland (no mobile is permitted), and proposed input power, emission types and bands to be used, and a photocopy of the home licence, plus a 35 by 50mm photo of the applicant. If equipment is to be taken, full details must be given of date and place of frontier crossing, and if the equipment of a Polish amateur will be used full details and written permission included. The licence is sent via PZK and there is no charge. Requests must be addressed to Panstwowa Inspekcja Radioma, Glowny Inzpektorat, Warszawa, Poland, and sent via Polski Zwiazek Krotkofalowcow, Zarzad Glowny, PO Box 320, 00-950 Warszawa 1, Poland. Graham will be looking specially for QSOs with the UK using his rather unusual prefix.

Les Anstead, G4HOU, is at present in Doha, Qatar, and on the air as A71BJ. He reports that some good openings have taken place on 28MHz and that he listens most days at 1215 around 28,510kHz. Les says that G5VS has, for the time being, stopped handling QSLs for A71BH, A71BK and himself due to pressure of work, but will continue when things ease off; in the meanwhile, cards should be sent direct to the individual PO box numbers and must be accompanied by an sae and two ircs. Please note that the A71BJ QTH in the *Callbook* is not correct and that the right one is listed in "QTH Corner".

RSGB member Ross, WB6GFJ, has sent a cutting from the *Pacific Islands Monthly* March 1986, which is headed "Yacht haven planned on Clipperton". The article says that there is a likelihood that the island will be fitted out as a stopover and shelter for the tuna and sailing boats which



L to r: Moh'd, A71BK; Les, A71BJ; Dick, G0ANF; and Moh'd, A71BH

*10 Knightlow Road, Birmingham B17 8QB.

visit the area. The idea is said to have come from the president of Geomarex, a USA exploration company, and the announcement of the plan from the French Government. An old passage through the atoll will be reopened, the lagoon dredged, and a pier built. In addition, an airstrip is mentioned—quite a future for the island and one which if it actually happens will perhaps take Clipperton offthe "rare" list!

The Boy Scouts of America will operate a special station from the Connecticut International Camporee in conjunction with the Southern Conn ARA and the Camp Sequassen Alumni Assn during the period 0800 to 2200 (local time) from 12 to 20 July at Camp Sequassen, Winsted, Conn. In attendance will be over 3,000 scouts and scouters from the USA and other countries. SSB operation will be on the JOTA frequencies 3,940, 7,290, 14,290, 21,360 and 28,990kHz, and cw on 3,725 and 7,125kHz on the Novice bands. It is hoped to use the callsign K2BSA (if this can be obtained) or KA1CFA. QSL with sae to the address in "QTH Corner".

DX news

Ted Allen, G3DRN, RSGB QSL Bureau manager, has received a note from BY1PK which asks for publicity to be given to the fact that BY100, BY3AK/MM, BY5HN, BY4CL, BY4RB, 3H8C, BY1CW, BY5SN and BY5FS are all pirates.

The secretary of IARU Region 3 Association recently enquired of the Burmese authorities about the status of amateur radio in their country. The reply was terse and unequivocal: "With reference to your letter stated above, may I inform you that the operation of amateur radio activities has been suspended in Burma since 10 January 1964 until further notice".

DX News Sheet reports that operator Ruan of BY5RF is a school teacher who also drives a bus and considers that amateur radio is a good way to practice English. A new station was due to be opened in Suzhou, Jiangsu Province, early in June. This should have a callsign in the BY4 series. BY4AA has a yl operator, Chen, and the station is reported in the USA to be on the air often on 14,210kHz after 0100.

Richard, G3CWI, of VP8ANT fame, has not gone to Nigeria as expected but is in Jordan and on the air as JY8NT.

Don Wallace, W6AM, has been posthumously awarded the KV4AA Memorial Plaque by the YASME Foundation. Officers this year are W6KG (president), Danny Weil (ex-VP2VB etc) (vice-president), W6RGG (secretary) W6BSY (treasurer), and directors K5RC, W0MLY, K3ZO, W6QL, N7NG, W6OAT, OH2BH, JA1KSO and VK2HD.

Congratulations to Jim Smith, VK9NS, who has been awarded the CQ DX Hall of Fame Award for his services to dxers. No one could have devoted more time and personal money to the pursuit of dx than Jim, and this is a very much deserved reward.

Problems occurred with QSLs from ZK3PM and ZM7PM for contacts in 1985. The operator is now back in New Zealand, and anyone who had a card returned is asked to apply again to Peter Moore at Box 7344, Wellington, New Zealand. The visit to Tokelau by ZL1AMO was cut short because of operating hours being cut by lack of power and by the poor food available. Activity has been reported by T32AB on 24,950kHz at 2000, and by T30AC at weekends in the W7PHO "family hour" at 2330 on 14,227kHz.

DP0GVN is found most days around 14,060kHz from 1530 to 1700 and near 14,175kHz at 1830. HF0POL, also in Antarctica, operates in the 14,020–14,030kHz segment around 0100. The *Long Island DX Bulletin* says that CE0ZIG on Easter Is is often to be found on 7,010kHz at 0800.

HI60RCD is a special station celebrating the 60th anniversary of amateur radio in the Dominican Republic. HI0JR will be on the air until early July and is the official callsign for the Central American and Caribbean Games and special QSLs will be sent out.

It is rumoured that JA1UT was hoping to visit Laos in May and that he planned to set up an amateur station which could become operational by August.

The stations with DV prefixes in the Philippines are allowed on 14MHz only above 14,275kHz, and those with DW are allowed on 7MHz cw only.

5V7HL will be in Togo until November and keeps schedules with N4LBG on 14,220kHz at 2200 on Mondays and Wednesdays. According to *DX News Sheet*, OE6EEG has been trying to activate the two Yemens for several years and is not optimistic about prospects for the immediate future. Selim also says that strenuous efforts are still being made to have 4U1VIC accorded DXCC status, and invites all those who believe that this should happen to write to ARRL with their views.

Ernie Sumption, G3DQL, is visiting The Gambia again next month and hopes to be active on 14 and 21MHz cw. He left his antenna there last year, so only needs to carry the FT101 this time! He will make special efforts to work beginners whose morse speed is limited.

G4XKR will be using the special callsign GB6AR during July, and airing the rare prefix particularly during the IARU Contest. He also passes along the information that OH2BH, OH2BAZ, OH0NA and several Ws will visit Market Reef between 8 and 15 July. Callsign will be OH0MD—but the OJ0 may be mentioned at frequent intervals to help to identify the location. Special attention will be given to the lower frequency bands including 1·8MHz.

Expedition

Ron Hill, G3SGQ, will be active as EI2VNI between 16 and 31 July from Kinvara in Galway. From 19 to 27 July he will join the Galway Radio Experimenters for their expedition to Inisbofin Is. The callsigns used there will be EJ2VNI and EJ4IDX, and cw, ssb, fm, rtty and Amtor will be used. Special efforts will be made to work RNARS members around 3,520, 3,740, 7,020, 7,088, 10,140, 14,052, 14,310, 18,100, 21,052, 21,360, 28,052 and 28,380kHz.

Spain in Europe international mobile rally

This special event is being organized by the Zaragoza and Aragon branches of the Spanish national society URE to celebrate the entry of Spain into the EEC. It is planned that four teams will undertake journeys in which all capital cities of the 12 EEC countries will be visited on various dates in August as follows: Route 1—from Madrid to Lisbon (4th-6th); Route 2—Paris (5th), Brussels (6th), London (11th) and Dublin (14th); Route 3—Luxembourg (8th), Bonn (10th), The Hague (12th), and Copenhagen (15th); and Route 4—Rome (9th) and Athens (13th). It is hoped that a special station AM0EEE will be on the air from each location, subject to local modification presumably. The EEE Diploma will be given to those who work the special stations at two or more locations. Send QSLs plus seven ircs, or US$3 to: The Organizing Committee, Apartado 2.071 CP 50.080, Zaragoza, Spain.

RSGB QSL Bureau to close. . . .

No—not for ever! However, G3DRN does make a special plea for members to note that the bureau will be closed for the whole month of August and to ask for cards not to be sent to him during this time please.

Contests

In the **1986 UBA SWL Competition** interim results (by 15.4.86) showed **RS28198** with 18,375 points; RS87865, 12,740; and RS86766, 2,160 in the phone section. Top score in this section was NL8265 with 113,360. In the cw section the leader is F11AKV with 48,511—**RS52868** has 31,970 and RS84869 14,418, and in the rtty category **RS28189** has 2,924 points. A second interim list will be issued in September.

AGCW-DL QRP Summer Contest
1500 19 July to 1500 20 July
CW only. 1·8 to 28MHz (excluding lowest 10kHz of each band). Class A, below 2W output; Class B, below 5W output; Class C, ditto but multi-operator; Class D, QRO stations (to contact QRP stations only); and Class E, listener section. Class C stations may operate 24h, others must take a 9h break which may be taken in two parts. Exchange RST, QSO number and input. Add "x" if crystal controlled. Copies of rules are available from G3FKM (sae please).

Venezuelan Contest
0000 5 July to 2400 6 July (CW)
0000 26 July to 2400 27 July (Phone)
Work everyone. Exchange RS/T plus serial number from 001. QSOs with own country count for multiplier credit only, with stations in other countries two points. The multiplier is the total of YV and USA call areas and DXCC countries worked on each band. Send logs to reach RCV, PO Box 2285, Caracas, Venezuela, by 15 August for the cw section and by 15 September for the phone.

Award

Worked EI Counties Award
IRTS has announced the creation of its first operating award, which is given to those who have worked (or heard) at least 20 of the 26 Irish counties on or after 1 January 1982. The counties are: Carlow, Cavan, Clare, Cork, Donegal, Dublin, Galway, Kerry, Kildare, Kilkenny, Laois, Leitrim, Limerick, Longford, Louth, Mayo, Meath, Monaghan, Offaly, Roscommon, Sligo, Tipperary, Waterford, Westmeath, Wexford and Wicklow. Send list of QSL cards (verified by the award manager of a national society) plus 10 ircs to: IRTS Award Manager, PO Box 462, Dublin 9, Eire.

1986 ALL-BAND TABLE No 2

	1·8MHz	3·5MHz	7MHz	14MHz	21MHz	28MHz	Total
G4OBK	54	40	63	59	35	19	270
GM3YOR	46	71	70	20	19	4	230
G3TXF	43	24	31	67	4	1	170 (cw)
G4GOF	2	4	15	18	16	1	56
G4ZCG	-	20	15	5	-	-	40

Next deadline - **15 July** (Scores to G3GIQ please)

1986 28MHz COUNTRIES TABLE

G3XQU - 69	G0AGP - 53	G4DXW - 22
G4JBR - 67	G4MUW - 45	G3XBM - 6 (QRP)
G0AEV - 55	G4XAH - 43	5B4DN - 2
G4RAB - 54 (ssb)	G0DNV - 37	G4YWG - 1

QTH CORNER

A71BJ L J Anstead, c/o QNTS, PO Box 14, Doha, Qatar, Arabian Gulf.
AZ1ARU LU4AA, RCA, Carlos Calvo 1424, Buenos Aires, CF, Argentina.
FO0XX YASME Foundation, PO Box 2025, Castro Valley, Cal, 94546, USA.
HI60RCD Box 1157, Santo Domingo, Dominican Republic.
HI0JR Box 945, Santiago, Dominican Republic.
KA1CFA, K2BSA c/o Al Schwartz, 18 Russo Drive, Hamden, Conn, 06518, USA.
JH5EES/JD PO Box 2, Seya, Yokohama, Japan.
VP2MIU, VP2MM via AB1U, 85 Hacienda Cir, Plantsville, Ct, 06479, USA.
VP2MU via WA0MHJ, 4745 170th Ln NE, Wyoming, Minn, 55092, USA.
VP8PTG via G4PPQ, 24 Blunham Rd, Moggerhanger. Bedford MK44 3RA.
VO9EE W7LAN, 1419 35th St, Anacortes, Wash, 98221, USA.
ZF1MM/9 VE5RA, D Renwick, Box 50, Clavet, Sask, S0K 0Y0, Canada.
ZF2AD via K3MBF, RFD1—Box 251, New Hope, Pa, 18938, USA.

Band reports

No G8KG summary this month, so straight in to the reports received from G2HKU, G3YY, G5JL, GM3CSM, G3GVV, GM3ITN, G3s KMR, KSH, PJT, PXT/M, SVW, YPM, G4s EHQ, JBR, GW4KGR, G4s LRS, MUW, UOL, UZN, XAH, XKR, G0s AGP, AEV, DNV, and RSs 10906 and 88639 —to whom many thanks.

Stations listed in italics were using A1A.

3·5MHz 0100 *KP2N*, 4X5J. **0400** *TI4BGA*. **0500** *FG5AM, OA4JR, VP2VA, ZLs 1AIZ, 2NP, 4IE*. **0600** ZL2BT. **2000** 4N0IARU. **2100** Z21EV. **2200** C39LU, *VQ9QM, 3B8FK*. **2300** *LU2BFX, TF3GCN, ZF1MM/8*, 5B4JE.

7MHz 0200 *FO0XX*. **0300** *KP4IH*. **0400** *PZ2AC*. **0500** *DK6NW/C6A, CO, HK, W6–W7, XE2AHQ, ZL1ATZ, ZL2MM, ZS2AD*. **0600** *CE0ZIG, FO8s FO, FW,* KP4YD, *VE8RCS,* VK0SJ, *ZL1–ZL4*. **0700** J88AN, *VK2–VK4, VP2VP,* 7P8AR. **1600** *4U0ITU*. **1900** *JA5AUC, JI6GGP, VU2TTC*. **2100** *G4DUW/DU1, OY1R, ZS6JF*. **2200** *CX2AQ, HI0JR, KP2H, UA0WW*. **2300** *FM5WO, ZF2AD, ZF1MM/9, 4U1UN, 4X5J*.

10MHz 0400 *5B4OG*. **0500** *VK2, 5. W6, ZL1–2*. **0600** *EA8AGF, FT8YA, VE, W5–W6, ZL*. **0700** *VK6ZE*. **1600** *TK/DK6AS*. **1800** *VE1–2*. **1900** C30BBC, *JA3QGI, JA1IFP, VE8HL, ZS3E, 7X2AX*. **2000** *PZ1DV, VE8HL*. **2100** *FG5XC, PZ1DV, YV1BVJ*. **2200** *OY1R, PZ1DV, UH8AAW, V2AZI, VK3NK, W1,2,4,5,9*. **2300** *FM5WD, VP2VA*.

14MHz 0600 VK. **0700** *AH6AZ*, BY1QH, FO8GW, JA, JT5AA, KL7, SU1HK, W6–W7. **0800** *KH6, RZ1OWA, VU2SCI*. **0900** BY5RF, *KX6DS*, ZL, 3D2DW. **1000** NL7FU, *OX3LX, P29FJ*, RF0FWW, *4U0ITU*. **1300** BV2B, CE9AA, JA, SU1ER, VS6CT. **1400** DU1RG, VK, 9M2DP. **1500** DX9C, V85DU, *9M2FP*, 9V1WL. **1600** BY1QH, *V85s AC, TT*. **1700** A4XRS, EI4EJ/OD5, *RZ1OWB*, 9M8GH. **1800** JY8NT, ON7IP/ST2, VK6ABQ, *VQ9RB*, YI1BGD, 4S7EA. **1900** FP4CJ, *NN7T(Utah)*, VP8MT, 5X5GK. **2000** FM4DR, JA, SV8CS, TA2G, TJ1CH, LA2EX/3X. **2100** JH5EES/JD1 (Minami Torishima), P4/HB9TL, *PJ7A*, S92LB, *SU1AH, VP2MU, VP8PTG, VU2ISV*, 5V7RW. **2200** AZ1ARU, *CE0ZIG*, JA, JY3ZH, *TA3B*, W6–W7, *6F2AQ, J6LAD/9Y*.

18MHz 1000 *DK6AJ/SV5*. **1100** *CT1BCM*. **1400** *I4ZFY*. **1600** *EA8AGF, EI5DR, LU1DOW, PY2BZD, DL2GGJ/YV5*. **1700** *5H3ZR*. **1800** *EA1BSU, LU5DJO*.

21MHz 0800 *VQ9EE, 3B8FS*, 5Z4RLH. **0900** A71BJ, BY8AC, YI1BGD. **1000** A92BS, HB0CPL, OD5YU, ZS3GB. **1100** DX1MM, *VQ9QA*, VU2ZAP, 3D6BW. **1200** JA, YK1AO. **1300** DP0GVN, FR5BT, *YB1YC*. **1400** 5H3ZO, ON7VD/5N6. **1500** *VQ9QM, VQ9RB, OE3EMN/YK, 5H3CM*. **1600** J28EL, TR8LD, OE5JTL/YK. **1800** AZ1ARU, *TU2FI/6W1*. **2000** *EA8, FM5CT*, J88AB, *LU, PY, YV*, V44KAR. **2200** TI8CBT, W6, *6F2AQ*.

28MHz 1000 UM8MIG, *UW9CO*. **1100** *OY2J*. **1200** A4XZF, VU2DVP, ZB2IF. **1300** J28DN, *Z21FN*, ZC4MR. **1400** *OD5LX*, ZS. 5N8AFE. **1500** ZP5CF, *5H3JR*, JG1FVZ/5N0. **1600** CT3DL, FG4DA, HV2VO, T77C, TA2G, *TU2JT*. **1700** FY7DG, S79CW, 8R1RPN. **1800** C53FE, TU2LN, VE1BNN, OE5JTL/YK, 5Z4RT, 9Y4BA. **1900** CE3DPD, EA8BML, EA9MM, LU, PZ1AP. **2000** CN8EL, TK/DL4FF, 8R1J. **2100** AZ1ARU/8, CU2DG, EA, LU1HTF, V2AK, VP2MO. **2300** FO0XX.

Once again thanks to the authors of the following for information extracted: *Long Island DX Bulletin* (W2IYX), *DX News Sheet* (G4DYO), the *Ex-G Radio Club Bulletin* (GI3OEN/N6), *Long Skip* (VE3IPR), *Lynx DX Group Bulletin* (EA2JGO), the *DX Family News Letter* (JH1KRC), *DX'press* (PA3CXC), *CQ Magazine* (W1WY) and *DXNL* (DL3RK).

Closing date for receipt of material for **September** issue is **15 July.** □

HF F-layer propagation predictions for July 1986

As part of a general reduction of space allocations on economy grounds, the Propagation Studies Committee devised the vertical format first published in the December 1985 issue. However, this proved to be unpopular, and the former horizontal format has been reintroduced with the addition of all the WARC bands. This additional information has resulted in a smaller type size in order to accommodate all the predictions within the page width. Production is by photographic reduction of computer print-out, and it is hoped that the legibility as well as the format are now acceptable to a majority of readers.

The time is presented vertically at two-hour intervals 00(00)gmt to 22(00)gmt for each band, ie ♀ = 0000, ♀ = 0200, ♀ = 0400 etc.

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. Additionally 50MHz F-layer and 1·8MHz openings are indicated by a plus (+) sign in the 28 and 3·5MHz columns respectively.

Time / GMT	28MHz 0000011112 2 0246802468	24MHz 0000011112 2 0246802468	21MHz 0000011112 2 0246802468	18MHz 0000011112 2 0246802468	14MHz 0000011112 2 0246802468	10MHz 0000011112 2 0246802468	7MHz 0000011112 2 0246802468	3.5MHz 0000011112 2 0246802468
***EUROPE								
MOSCOW	.....	.....	.....12.	....1211145.	1.2445545785	645555445789	764222222478	53.....4+
MALTA	.....	.....	.....23.	22111461	1..355545895	624655556799	986432223578	++4.....24+
GIBRALTAR	.....	.....	.....1.	.....1...14.	...144322684	511565555799	976543333578	++52.....25+
ICELAND	.....	.....	.....	.....1.	13222363	523455555678	777543333456	5542.....24
***ASIA								
OSAKA	.....	.....	.....	.....11.1...	..1123223.22	1.1131112363	241	.....
HONGKONG	.....	.....	.....	....121111..	..1133324522	1...11113465	253	.....2.
BANGKOK	.....	.....	.....1..1...	...1131121..	..1224334531	21...1113476	2.....255	22
SINGAPORE	.....	.....	....11.....	...12311....	..123433....	21..11111...	2.....121	23
NEW DELHI	.....	.....	....11..13..	...12311251.	..2223335751	421..1113576	41.....257	2.....24
TEHERAN	.....	.....11.	...111..143.	...22321376.	..3333335785	5331..113578	731.....257	4.....24
COLOMBO	.....	.....	....12..1...	....223213...	..2223335...	121..1113232	41.....256	2.....24
BAHRAIN	.....	.....2..	...1121.252.	...223224751	1.3323335785	6331..112578	741.....257	4.....24
CYPRUS	.....11.	.....1...22.	...123212661	...345435883	314666556897	866433334689	87311.111368	+4.....25
ADEN	.....	.....11..	...1.21133..	...2133356..	1.2322345744	7431...12578	751.....257	52.....24
***OCEANIA								
SUVA/S	.....	.....	.....	.....1.	..1222...142	113422...342	..12.....11.	.....
SUVA/L	.....	.....	.....	1	1..1.....33	1113.....142	..12.....12.	.....
WELLINGTON/S	.....	.....	.....	.....1.	..12.....52	22341..11.63	..11.....131	.....
WELLINGTON/L	.....	.....	.....	.....	1.....3	2221.....13	.122.....31	.....
SYDNEY/S	.....	.....	.....	...11.....	..243.....2	112431..2335	...1.....252	.....2.
SYDNEY/L	.....	.....	.....	1.....	3.....3	3113.....14	...2.....42	.....
PERTH	.....	.....	...11.....	...231.....	..2452.....	322231..123.	31.....252	24
HONOLULU	.....	.....	.....	.....1.	..1112..1321	.134221.231.	..221.....	.....
***AFRICA								
SEYCHELLES	.....	.....1...	...1..113...	...211335...	..23223453..	..31..11241.	.11.....241	52.....24
MAURITIUS	.....	.....	...112111...	...224333...	..14343452..	..4211112411	4.2.....245	53.....24
NAIROBI	.....	.....11..	.....1244..	...2113466..	..142234571.	..42....1255.	2.3.....255	54.....23
HARARE	.....	.....11..	....112244..	...2233466..	...5433457..	1.341111244.	7141.....255	542.....24
CAPETOWN	.....	.....	....1111....	....33331...	....3533331..	...43111233..	24.2.....22.	552.....23
LAGOS	.....2..	.....14..	....1.12472.	...12.24685.	...44223578.	44242...2474	7742.....257	552.....24
ASCENSION Is	.....1..	.....31.	....1...264.	....31.1487.	53225781	....31.12477	2.....157	51.....24
DAKAR	.....11.	.....33.	....1..1267.	31134782	2..253233687	852431..1378	8852.....157	552.....24
LAS PALMAS	.....1.	.....13.	22111461	44333684	41.376555798	964654334589	88642111268	++3.....35
***S. AMERICA								
Sth SHETLAND	.....	.....	.....1...	.....232..	.....13551.	...1...112462	5541.....156	552.....24
FALKLAND Is	.....	.....	.....1231.	.....23453.	.....33567.	..1...111246.	1441.....145	552.....4
R DE JANEIRO	.....1.	.....23.	.....1.11571	3233684	2....4334588	72...1111368	872.....36	552.....4
BUENOS AIRES	.....1.	.....13.	11462	233684	3....2334578	851...1111258	7741.....26	552.....3
LIMA	.....	.....1.	143	211255	6...1.333347	8523211111.25	77521.....2	452.....
BOGOTA	.....	.....1.	32	111155	6....2322246	85221211...14	67521.....1	342.....
***N. AMERICA								
BARBADOS	.....	.....1.	.....1...143	2221265	6....4322257	8522221...25	77521.....3	452.....
JAMAICA	.....	.....	12	111134	5....1322236	752...111...13	5752.....1	242.....
BERMUDA	.....	.....	12	1111134	5....3322246	752.121...24	57521.....2	242.....
NEW YORK	.....	.....	1	.....111.13	4....2222135	65311211...13	47521.....1	.42.....
MEXICO	.....	.....	1	.....1..13	3....121124	453...11...1	1552.....	.22.....
MONTREAL	.....	.....	1	.....111.13	4....2232235	65311211.123	57521.....1	.42.....
DENVER	.....	.....	.....	.....	2....1111112	3441.1111.11	14421.....	..2.....
LOS ANGELES	.....	.....	.....	.....	2.....12112	2343...12..1	.2421.....	..2.....
VANCOUVER	.....	.....	.....	.....	1.11...11112	235321112111	.2421.....	.....
FAIRBANKS	.....	.....	.....	.....	1.1111111111	223421112221	..121.....	.....

The provisional mean sunspot number for April 1986 issued by the Sunspot Index Data Centre, Brussels, was 20·4. The maximum daily sunspot number was 64 on 24 April, and the minimum was 0 on 4, 5, 6 and 8 April. The predicted smoothed sunspot numbers for July, August, September and October are respectively: (classical method), 8, 7, 6 and 5; (SIDC adjusted values) 0, 0, 0 and 0.

SWL

Bob Treacher, BRS 32525*

Listener Contest

The Society's Listener Contest takes place on 12/13 July, and the rules were published in "Contest News" *Rad Com* May. It is hoped that following more widespread publicity this year, the contest will attract a large number of entries, which will prove the popularity of this type of contest. Last year's event attracted a sizeable entry, and we look forward to an even bigger collection of logs this year. Those placed in the top eight will gain points for this year's HF SWL Championship. Unlike other Society contests for the swl, this one enables any station, not just British Isles stations, to be logged and counted for points; that should swell the claimed scores. I hope that band conditions are favourable and that the contest is a success.

While on the subject of listener contests, the White Rose ARS has sent a copy of the results of their sixth lower frequency band contest held in January. Entries were received from seven countries, including the USA. Leading G in the ssb section was David Whitaker, BRS25429. Don Piccirillo, BRS52868, led the cw section. The event was staged during my LF Challenge. Next year's event will be held on 17/18 January.

VHF happenings

A letter from G4JT asked for the help of swls who monitor 144MHz to assist the development of a project he and G4WGY are carrying out into the effects of the weather on vhf conditions. The weather data itself presents no problem. G4JT is particularly keen to know of sudden changes in the weather pattern locally which might trigger off a change in vhf conditions; eg snow, rain or thunderstorms, fog, mist or a damp atmosphere (or, particularly this year, a burst of sunshine!). The details required are date, time, town, details of weather incident, details of changing vhf conditions. This information should be sent to G4WGY, Internews, Dulwich Road, Herne Hill, London SE24 0WG.

As for unusual happenings on 144MHz during the period under review, I can mention two. Following probably the warmest spring day we experienced this year—30 April—there were "lift" conditions to southern Ireland from the London area. Stations in JO51 and 61 were logged. David Whitaker caught the second phase of the aurora which occurred on 2 May, logging LA5XAA (JO28UN) at 2334. This was followed by three GMs in XR square, and others in XP, YQ and YR.

During the contest on 3/4 May a few Continentals were heard. In London, a short tune around the bands here gave stations in JO30 and IN97, while in North Yorkshire David heard F1KSL/A (JN28QJ), together with PA0s in CM, CN, DM and DN squares.

The *Es* season started early this year with an opening around 1100 on 16 May when UP2, UQ2, OK, OZ and SP stations were heard on ssb and cw. UP2BH (MP) and SP4DGN (LN) were, perhaps, the best heard, and it was unusual to hear of OZs being heard via *Es*.

Elsewhere at vhf the Society's contest in mid-May provided only average conditions. From the south, GM and GI were audible during the Saturday while, on the Sunday, stations in the near-Continent were to be heard. The fine day on 19 May gave slight lift conditions to DL, F, ON and PA, while at uhf, 432MHz provided even better conditions to ON and PA in the evening.

1986 UHF/VHF TABLE

Station	QTH	70MHz		144MHz		432MHz		Total
		Squares	DXCC	Squares	DXCC	Squares	DXCC	
BRS25429	IO93	0	0	42	14	8	1	65
BRS31976	JO01	0	0	30	14	0	0	44
BRS52543	IO83	3	2	22	10	4	2	43
BRS32525	JO01	0	0	22	7	10	4	43
BRS62088	JO01	0	0	7	2	2	1	12
F11ATZ	JN15	0	0	5	2	0	0	7

HF news

Apart from the odd mention of the Clipperton Is expedition on 14MHz cw and 7MHz ssb, the most interesting news from the period under review had been the good short-skip conditions on 28MHz. Most of Europe was audible on 16 May when the band was full of 59 signals from many parts. It was good to hear the band busy after such a long period in the doldrums; signals could be heard from 28,450 up to 28,690kHz. FM signals from LA, OZ and SM were also copied around 29,600kHz. This was my first experience of fm on 28MHz and it was certainly of interest. Some of the European stations heard were running only modest power levels, so it was certainly a good indication of good sporadic-E propagation. Why not listen around 29,600kHz next time you hear 28MHz open to Europe? Good *Es* propagation was also noticed on the band on 15, 17, 20 and 21 May. Indeed, on 20 May signals did not appear until around 1800, but Italians were still audible at good strength at 2300gmt!

Elsewhere around the spectrum, Tony Blackburn, BRS87156, provided the fullest report from a new QTH in Stratford-upon-Avon. He had been monitoring 7 and 3·5MHz around sunrise and had logged much from the Caribbean and South America. On 7MHz, C6ANI, HC1MG, HP1XHT, OA4AWS and TG9EO were noted, while on 3·5MHz FM5WD, KP2AD, TI5EWL, VP9HL, XE1ALH and ZF1RC were heard. Looking towards the east, several reporters mentioned K6ZM/A9.

As for 14MHz, Robert Small, BRS8841, noted good signals from AH6GJ, KH6LJ, NL7GE, T30AT, WH8AAM and 5W1DZ, while on cw TU2CV and 7X2KS were new. Malcolm Harrington, BRS20249, reported S79CW and S79WHW, but other reports received commented on poor band conditions and, as a consequence, had little to report. Dick Stanbridge, BRS31879, had got onto rtty and had copied signals from HI8DLA, KE4FE/KH2 and 3C1MB.

On the QSL front a number of reporters mentioned recent additions. They included BT1BK, G3YCM/C6A (3·5), CO2KG, D44BC (1·8), D68WS (7 and 3·5), OA4ZV (1·8), 3V8PS (3·5), ZL3GQ (1·8), 4U1UN (3·5), 5H3HM, 5T5RY and 9M8EN.

HF COUNTRIES TABLE

(Updates and new entries only)

Station	DXCC	28	21	14	7	3·5	1·8	Total
BRS8841	209	11	82	164	125	140	45	567
BRS25429	205	13	83	148	113	144	60	561
BRS31879	189	14	102	150	135	103	54	558
BRS87156	170	11	83	125	81	106	29	435
BRS1066	148	5	70	113	102	70	61	421
BRS52543	125	2	52	67	86	80	43	330
BRS20249	104	2	19	75	47	52	11	206

Here and there

Brad Bradbury, BRS1066, reported an all-time new Russian oblast taking him to 176 heard. He also reported a QSL from ZC4CZ who, it seems, gets few QSLs from G swls. S90AS provided Brad with country No 264 confirmed all-time. Douglas Johnstone, BRS54163, had acquired a heavy duty rotator and he hoped to have it turning a cubical quad for 14MHz by the time this piece appears in print. Douglas also mentioned his interest in broadcast-band dxing. Although as a rule this column covers only amateur band news, I thought it worth mentioning that for one report sent to a radio station in China, he received a silk embossed diary, several handmade panda bears and mandarin ducks, together with his QSL card. I wonder if the amateur movement will ever reward an informative listener report in the same way?

Tony Blackburn, BRS87156, sent me one of his excellent home-designed QSL cards. They cost £15 per 1,000 and show a little ingenuity, some good artwork, and that Tony is a dab hand with dry transfer lettering.

On the QSL front, Robert Small, BRS8841, mentioned a card from ZC4CZ for a 3·5MHz cw report. He indicated that "a cw report from G was as rare as a Heard Is QSO!". That comment adds some fuel to the fire which G3FKM started in his March column which suggested that perhaps the time had come for amateurs to stop answering phone reports. Opinion to hand at my deadline considered that the remark was somewhat rash, especially by one who is widely read. Surely it is for the amateur himself to decide who he is going to QSL. I am always trying to make it clear that reports—on either cw or ssb—must be accurate, informative and worthwhile. If the report meets that criteria I cannot see why any amateur should not QSL a listener card. After all, in the majority of cases it is today's listener who is tomorrow's amateur. Surely, they should be encouraged?

Finale

G3DRN has asked me to let all swls know that the QSL Bureau will be closed for the whole of August. Therefore, do not send your outgoing cards to the bureau during that month. Past experience suggests that members have taken little notice of such advice in the past, so this year, let we swls show the way and assist with the efficient operation of the bureau.

News, views and table scores for inclusion in the September issue should reach me no later than **4 July**; late news must be received by **14 July**. □

*93 Elibank Road, Eltham, London SE9 1QJ.

SATELLITES

*Bob Phillips, G41QQ**

Oscar 10

At the time of writing (mid-May) the attitude of the satellite was far from optimum, resulting in rather difficult operating conditions. If the manoeuvres planned for the end of May are successfully completed, as has been the case on previous occasions, the situation should be much improved during the month of July. Ian Ashley, ZL1OAX, has carried out the necessary calculations for attitude manoeuvres and the satellite transponder switching schedule which will be consistent with maximizing the life of the satellite. It has not been possible to give the operating schedule for quite some time in this column due to the short duration of schedules over the last year or so. The situation from mid-May until mid-August looks to be fairly stable and the following schedule has been planned:

Mode B	050—119	**OFF**	200—219
Mode L	120—136	**Mode B**	220—244
Mode B	137—199	**OFF**	245—049

It should be possible to maintain this schedule throughout the period indicated, but minor changes may be required depending on the sun angle and the times of eclipse. Any such changes will be notified on the general data beacons on 145·810 and 436·04MHz.

As a reminder, the sequences of the beacon transmissions are as follows:

Mode B 145·810MHz		Mode L 436·04MHz	
CW	00—05	**RTTY**	00—05
PSK	05—15	**PSK**	05—15
RTTY	15—20	**RTTY**	15—20
PSK	20—30	**PSK**	20—30
CW	30—35	**RTTY**	30—35
PSK	35—45	**PSK**	35—45
RTTY	45—50	**RTTY**	45—50
PSK	50—00	**PSK**	50—00

The visibility chart, shown in Fig 1, clearly indicates that if you want to take advantage of the improved operating conditions of Oscar 10 you will have to rise very early in the morning. Mode L operators should find the best

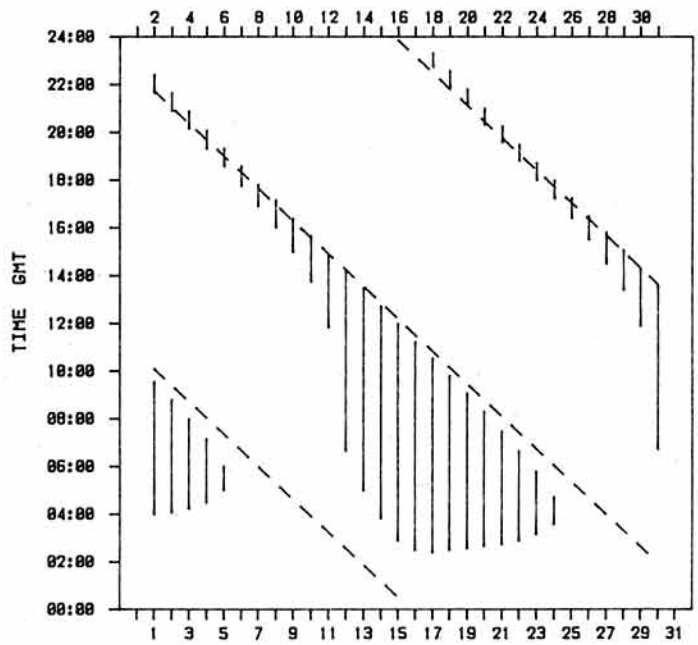


Fig 1 OSCAR 10 VISIBILITY (London area) - JULY 1986

period between the 12th and 20th of the month when access for the full 43min should be possible.

An apparent malfunction of the on-board computer of Oscar 10 has resulted in both transponders being switched off. Users are requested not to access the satellite until the problem has been resolved.

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

JAS-1

Information is still in short supply concerning the satellite but K. Wilkinson, ZL2BJR, has managed to obtain some details of the ground station interface equipment that will be suitable for operation to the Mode JD transponder. ZL2BJR provided a schematic diagram of the interface which is reproduced in Fig 2. On the transmit side, the NRZI data from the AX.25 terminal node controller is routed via the Manchester encoder to the input of an fm transmitter. An audio psk demodulator converts the received signal into the required digital bit stream for input to the tnc. There is still the possibility that interface kits will be available for direct connection to the TAPR style tnc, but no further information is available at this time.

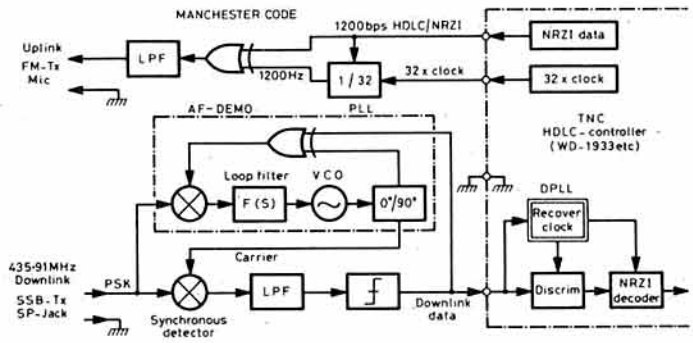


Fig 2. Schematic diagram for JAS-1 interface to AX.25 tnc

Uosat

Further experiments with the Uosat 2 digital communications equipment have been quite successful, with several ground stations having communicated via the spacecraft. The university has stressed that the Uosat equipment used for the experiment is very limited and will not be open for direct access to amateurs. It is hoped that gateways to suitably-equipped ground stations can be installed in major areas of activity. One such ground station is likely to be established by a group of amateurs in Dallas, Texas. In addition, gateway stations are planned for VK, ZL and Western Europe.

There has been renewed activity on the Uosat 1 ccd camera, with images now being transmitted on a fairly frequent basis. The picture quality is not particularly good but it does provide some experience for those interested in this subject. Uosat 2 also has a ccd imager and associated digital store and readout capabilities, but due to the demands of the other activities it has not been possible to progress beyond the initial functional checks carried out last year. Now that many of the other on-board experiments have been successfully implemented it should be possible to devote more effort to the ccd imager. Transmissions will probably be on the 435MHz down-link, and these will be announced on the bulletins from both satellites.

Other news

Following the *Challenger* disaster earlier this year, there has been growing concern in the commercial sphere about delays in satellite programmes. This was further compounded by the subsequent failures of Titan and Delta class launchers. While there may not be any direct effect on the amateur space programme in the immediate future, it is quite likely that it will be increasingly difficult to obtain cheap launches for a number of years to come. Ariane will launch Phase 3C and Arsene, but it may be some time before a further lift is offered. One interesting possibility for the future is the progress that has been made in the People's Republic of China. Commercial launch services have been offered to Western organizations and it may well be that we should look to this area over the coming years.

Many operators use simple computer-based telemetry decoders, or modified modems, for the Uosats and Oscar 10. It is possible to obtain much-improved performance by using optimized data demodulators. Amsat-UK supplies printed circuit boards for the 1200 baud (Uosat) and 400 baud (Oscar 10) demodulators designed by Jim Miller, G3RUH. Further details can be obtained from Amsat-UK, London E12 5EQ, on receipt of an sae.

The Amsat board of directors has decided that, now that there are many national Amsat groups, it is appropriate that it should change its name to Amsat-North America. The organization will still be concerned with worldwide activities but the emphasis will be on representation of satellite users in the USA and Canada. □

DATA COMMS

*Ian Wade, G3NRW**

MORE ON RTTY software. BARTG chairman Alan Hobbs, G8GOJ, has written in the Spring 1986 issue of *DATACOM* about some of the problems of rtty software from the teleprinter man's point of view. He recommends five guidelines for rtty software writers: (1) maximum line length must not exceed 69 characters; (2) the newline sequence CR CR LF LTRS should be automatically inserted at the first space after 64 characters on a line, or when the 69-character limit has been reached; (3) the mark and space tones should be 1,445Hz and 1,275Hz respectively—some computer systems use a 200Hz shift instead; (4) at the start of each over, the system should transmit a steady mark tone for 1s, to allow for autostart operation at the receiving end; (5) the system should send a steady mark tone when no data is actually being sent—some systems send a blank or null character, sometimes known as a "diddle", as an idle filler character, causing excessive mechanical wear on the printer. Alan also hints that software packages not conforming to these rules may be blacklisted in a future issue of *DATACOM*. Certainly it should be remembered that the average teleprinter has already seen many years of active commercial service before falling into amateur hands, and so excessive wear caused by diddling and by overprinting at the end of lines is a real problem.

HF packet

AX.25 packet activity on the hf bands is increasing by leaps and bounds, with 14,103kHz taking most of the load. This frequency has become so heavily congested that a second frequency is now in use: 14,107kHz. Another frequency to listen for AX.25 is 7,093kHz. John, G5DS, has worked 40 stations in 12 countries on the hf bands, with best dx being YB3CBF in Java, at a distance of 12,291km. He also reports that G3LDI has worked 23 countries! David, G3NHB, is active on 14MHz from Cambridge, using a PK-80 tnc and TS930S running 75W to a groundplane, and reports a brief packet QSO with VK2XA on 3 April at 1425gmt.

Bytes and nibbles

Mr J Hampson, G3PJL, of 1 Fawborough Road, Wythenshawe, Manchester 23, has a Sharp MZ80A micro and needs rtty and cw software, or guidance on writing it. Can you help? . . . Mr D R Coomber, G8UYZ, of 14 Francis Green Lane, Penkridge, Staffs ST19 5HF, has an Einstein computer running Xtal DOS (which is rather like CP/M), and wants rtty and packet software for it. Again, can you help? . . . The 1986 BARTG Rally at Sandown Park takes place on August Bank Holiday Sunday, 24 August. This is the number one rally for data comms enthusiasts, and also for that rare breed of amateur, the home constructor, with emphasis on components and kits rather than on expensive black boxes. Details from Peter Nicol, G8VXY, on 021-453 2676 . . . Clive, G3XIG, of Crawley, West Sussex, is on AX.25 packet on 144MHz and 432MHz, using a PK-80 tnc, and would like to get in contact with other AX.25 users in the area . . . Barry White, VK2AAB, is treasurer and equipment supply officer of the Australian Amateur Packet Radio Association, with about 120 operators in New South Wales. The association supplies bare TAPR boards, and also a packet program for the Commodore 64—this program is a full implementation of AX.25, and is obtainable for $50 Australian, including a small pcb for a 2206/2211 modem and an operating manual. This is a very cheap way to get on to packet if you already have a Commodore. Barry's address for more details is 28 Redgrave Road, Normanhurst, NSW, Australia, 2076 . . . The price of the Heathkit HD4040 AX.25 tnc kit has been reduced to $199, and now includes the excellent WA8DED multi-connect firmware (see *Data Comms* March 1986).

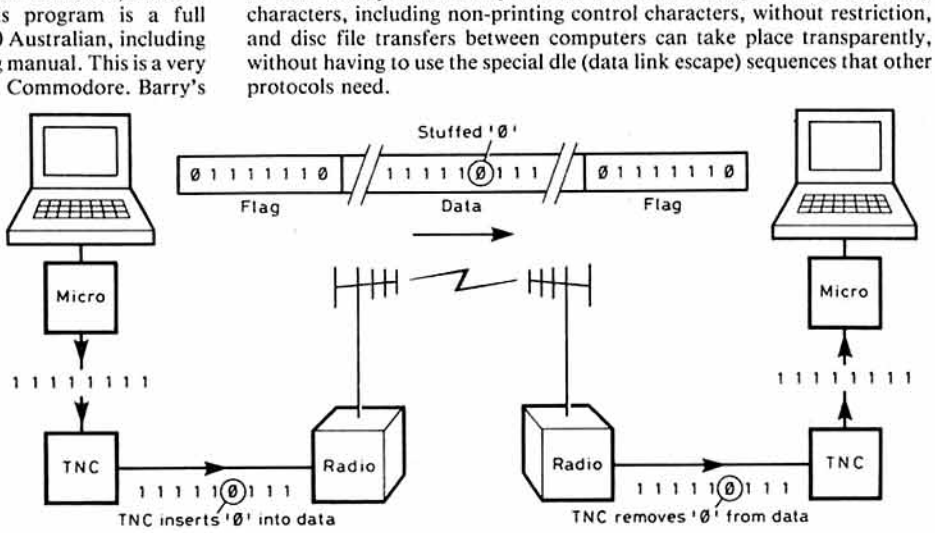


Fig 1. Bit stuffing in AX.25 packet

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

Amtor information

There seems to be a growing interest in Amtor, judging from the increasing number of letters received recently on the subject—the light is at last dawning, with more and more people realizing that there just has to be something better and more reliable than rtty!

To find out more about Amtor, the references listed below are worth reading. The first two are articles written by Peter Martinez, G3PLX, the founding father of Amtor. Reference [1] describes the basic principles, and includes a skeleton Amtor program as a model for those who want to write their own software. Reference [2] includes a practical design for an Amtor controller; this design was later marketed as the popular Amtor Mk II controller, which connects between a Baudot teleprinter and a terminal unit (note that the Mk II should not be confused with the much more comprehensive AMT-2 Amtor/rtty/Ascii/cw terminal unit). The Z-Amtor project designed by Paul Newland [3] is an easy-to-build Amtor controller based on the Z80 micro. Finally, reference [4] contains a reprint of the full specification of CCIR Recommendation 476-3, with all the details of the protocol used by Amtor.

[1] "Amtor, an improved radioteleprinter system, using a microprocessor", J P Martinez. *Rad Com*, August 1979.
[2] "Amtor, the easy way", J P Martinez. *Rad Com*, June/July 1980.
[3] "Z-Amtor", Paul Newland. *ARRL 1985 Handbook*.
[4] CCIR Recommendation 476-3. *Proceedings of the Third ARRL Amateur Radio Computer Networking Conference*. Available from RSGB.

Bit stuffing

One of the big advantages of packet systems like AX.25 is that there is no technical restriction on the data you can send. Data can be represented using any character code, or could even be pure binary numbers, representing perhaps computer machine code or digitized speech, for example. The question now arises: how does the receiving end distinguish a flag character (01111110 binary), signifying the beginning and end of a packet frame, from a binary data word with the same value, 01111110?

The answer lies in a technique sometimes called "zero bit insertion", or, more usually, "bit stuffing"—see Fig 1. When sending a packet frame, the tnc at the transmitting station continuously scans the stream of outgoing data, looking for a pattern of five '1' bits in a row. When this pattern is detected, the tnc automatically inserts a '0' bit after the five '1's. Thus, referring to Fig 1, when the eight-bit data pattern to be sent is 11111111, nine bits are actually transmitted: 111110111. The '0' bit following the five consecutive '1's was automatically inserted, or "stuffed", into the data stream. Similarly, when the data to be sent is 01111110, which happens to look like a flag, the bits actually transmitted are 011111010.

The only parts of a frame which are not subjected to bit stuffing are the flags themselves; these are always sent as 01111110, with no '0' inserted after the first five '1's. This gives us the clue about what happens at the receiving end. The receiving tnc continuously scans the incoming bit stream, looking for five '1's in a row, and when it finds them it tests the next bit to see if that is a '1' or a '0'. If it is a '1', the tnc assumes that a flag is being sent, and continues to scan the incoming stream for the remaining bits of the flag. If, however, the bit following five consecutive '1's is a '0', the tnc assumes that a flag is not being sent and that the '0' was stuffed into the data. Accordingly, the tnc strips out the '0' and passes the remaining data, now back in its original form, on to the micro.

This elegant yet simple technique for separating flags and data allows us to send binary data in any format or code. Messages can contain any characters, including non-printing control characters, without restriction, and disc file transfers between computers can take place transparently, without having to use the special dle (data link escape) sequences that other protocols need.

Talks on data communications

This year has seen a tremendous upsurge in interest in all aspects of computer communications, and with the winter lecture season fast approaching there is a real need for individuals to give talks and demonstrations of rtty, Amtor and packet to local radio clubs. Can you help? If so, please send me details of your lecture topic(s), daytime and evening telephone numbers, and the geographical area you are prepared to cover, for publication in this column. □

MICROWAVES

*Mike Dixon, G3PFR**

Operating news

Spring has at last arrived! It appears that as a result of the better weather in the first few days of May, conditions on the bands are also improving. Sam, G4DDK, noted a considerable lift in conditions on 1·3GHz, but operation on that band, looking east, was made difficult by the appearance of a new, very strong radar signal centred on 1,296·77MHz and believed to emanate from Schiphol airport near Amsterdam. Dutch stations worked were plainly perturbed by this new QRM which was reported as being strong even in East Anglia. Sam's normal source of radar QRM is to the southwest and apparently comes from the Greater London area. Heathrow radar has given some problems with the proposed High Wycombe atv repeater, GB3HV, and another source to the east of the London area has created problems for operators during a recent 1·3GHz contest. It seems as if this is a growing problem doubly compounded: first, more high-powered radars are appearing in or close to the narrowband segment and, second, enormously-improved amateur antenna systems coupled with really sensitive, low-noise (GaAsfet) receivers which are now in widespread use. It is yet another problem of co-existence which, I suppose, the amateur will have to learn to live with!

Sam also mentioned working Alec, G4PEC, in Tyne & Wear, while beaming due east. Turning the beam to the correct heading lost the signal. This is similar to effects previously reported by Peter, G6YLO, during lifts last year. One wonders whether this anomaly is due to reflection from a large man-made object such as a very large ship in the North Sea or whether it is due to some freak form of atmospheric reflection. It seems odd that in both cases northerly signals were workable by easterly-sited stations working only with easterly beam headings. It would be interesting to receive and report similar occurrences which might then begin to fall into some sort of pattern. If you notice odd effects like this, please report them.

Dave, G4FRE, is now QRV on 24GHz wideband using the Plessey GDHM32 in-line oscillator/mixer and has had his first QSO over a 10km path, using talkback (would you believe) on 3·4GHz! Further trials over a longer path under murky, wet conditions failed to yield results. A cautionary note: the oscillator "pulls" when looking out through glass, although Dave has not noticed this effect when operating outdoors.

He also reported that Fraser, G8FEZ, now has about 100mW of ssb on 3·4GHz from a "scaled" version of a *VHF Communications* design, and that he (Dave) has been receiving quite strong signals from the GB3NWK beacons. The recent 3/4 May 432MHz to 24GHz Contest gave him around 70 contacts on 1·3GHz, 39 on 2·3GHz and eight on 3·4GHz—a fair indication that activity is increasing on all these bands and that, for once, a lift to PA0 of about 3·5h occurred on the Saturday evening of the contest. Midlands operators, apparently, did not experience a lift in conditions. As far as Dave was concerned, this was from about 1900 to 2230. He received several reports of the reception of the GB3MHX 10GHz beacon during the lift, including a phone call from a PA0 station who "played back" the beacon, live, on the landline. Recent lack of reports, he found, may have been due to a faulty multiplier diode which, although giving output, was not developing its full power: it now is.

This underlines my recent remarks about microwave beacons probably needing more maintenance than their lower frequency counterparts. One way in which the beacon keeper can be kept informed of the state of the beacon is to receive regular reports from listeners. To the nearer receiving station (including the beacon keeper's own monitoring equipment) all can appear well when, in fact, output is well down, and it is in these circumstances that regular reports from more distant stations are so valuable.

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

Committee and IARU matters

Now on the "run-up" to the next triennial IARU Region 1 conference to be held in Holland next March, many of the Society's committees, including the Microwave Committee, are busy preparing information and recommendation papers for the conference. Matters of importance to the microwave amateur lie mainly in the frequency allocation area, and some concern has already been expressed in this column (and elsewhere) about the possible loss of some of the bands in nearer Europe (particularly France, Belgium and Holland). In order to clarify the situation, the VHF Manager's Conference (held in Vienna) resolved to form a working group to collect together information on the present "state of play" in Region 1 in time for serious discussion and recommendations to be formulated at the full conference.

The UK 1·3GHz band plan will be submitted as a model for discussion, since it seems to be one of the more developed band plans in existence at the moment. Another aspect to be addressed is the need and desirability of maintaining harmonic relationships between the various bands, in view of the fact that as narrowband operation extends higher and higher in frequency, so the need for harmonic relationships diminishes with the increased use of transverters as distinct from frequency multiplication. Probably the most powerful reason for retention of harmonic relationships is that the average constructor/operator may only have access to the harmonics generated by lower frequency equipment to align newly-built equipment for the higher bands. Without access to such "calibration" points or to professional signal generators, such alignment can prove very difficult.

Technical items

There have been a few remarks to the effect that technical items have not been appearing in the column for some time. There are two main reasons why this has been so. First, because of financial restraint the column is now necessarily occupying less space than before, and most of the technical ideas received have been a little too long to include here; they have appeared, instead, in the *Microwave Newsletter* where there is more space. Second, comparatively few brief, novel ideas have emerged from letters. However, here are a couple of items which it is hoped will be useful.

Constructors often express difficulty in obtaining small quantities of hardware items: nuts, bolts, sheet, bar, studding and rod materials (both plastic and metal), and certain special tools such as taps, dies, reamers and drills. Recently arrived in the post is the Spring/Summer (No 114) issue of *The Whiston Catalogue* which is described as a list of "engineer's haberdashery". This seems a singularly good description, containing details of all kinds of bits and pieces useful to the constructor. It offers both a postal service and a "call in" service. Many items are at surplus prices which should delight the avid constructor. The address for the catalogue is K R Whiston, New Mills, Stockport SK12 4PT.

GaAsfet dielectric resonance stabilized oscillators designed for satellite tv reception in the 11 to 12GHz band have been around for some time and appear to offer a good alternative to the conventional Gunn oscillator. They require quite simple power supplies, and their improved stability allows both the use of narrowband fm and potentially narrower receiver bandwidths. Both these advantages have to be offset against higher prices than the surplus Gunn modules which are in use by many operators. They are, however, comparable in price to the 24GHz devices now in use by many amateurs, so this should not make them prohibitive on cost grounds.

One device, the NEC MC5808, offers a minimum power output of 10mW for an 8V 80mA supply. The frequency stability over a temperature range of −40 to +50°C is typically ±0·7MHz and will frequency push to a maximum of 1·5MHz/V. It is available at the following centre frequencies (all in gigahertz): P, 10·75; N, 11·35; E, 10·00; F, 10·50. The one to nine price is £47 from Castle Microwave.

Mitsubishi also make a range of units similar in specification but operating from a 6 to 6·5V supply. Their FO-1010X and XS oscillator-only modules have a similar specification to the NEC device, the XS module being a high stability version of the X module. Both can be supplied to a preset frequency of choice in the range 10 to 11GHz. The FO-UP11KF device is an oscillator/mixer operating in the range 10·455 to 10·475GHz which, it is understood, could be retuned to operate in the "upper" wideband segment of 10GHz *viz* 10,380 to 10,400MHz. A modification was featured in *VHF Communications*, Vol 15, No 4, 1983. No details of prices are to hand but it is believed that around £30 for small quantity orders is about right. In the UK, Aspen Electronics are stockists.

I would be very pleased to hear from anyone who has experience with these modules: they look good on paper, and Bob Harris, G4APV, has used them very successfully for their intended purpose, the reception of satellite tv. They should offer a "narrowerband" alternative to the traditional Gunn. □

Contest News

70MHz Cumulative Contest results

This year's 70MHz cumulatives showed an overall increase in both entries and activity compared with last year's event. The whole contest was marked by a prolonged period of bad weather, with snow in some locations for all five periods.

Conditions were generally described as "flat" with session 1 providing the most activity and session 5 providing the few long distance QSOs of the event.

The timing of the event was generally liked with only one request to reschedule the event for weekday evenings.

Comments from this year's logs included: "WX conspired to kill us (frostbite and almost got stuck in the snow)", G4VXE/P; "A struggle under flat conditions with QRP", G4UDE; "A very civilised contest, time for breakfast and time to make the pub afterwards!", G4BVY/P.

Congratulations and certificates to the winners, by a convincing margin, the Wirral & District ARS and to the runners up, the Sheppey Outcasts.

G4FRE

Posn	Callsign	Points	QSOs	Loc	Sessions	Best dx	Km
1	G4MGR	687	95	83KH	1,2,5	G4RIS	357
2	G4BVY/P	529	113	82UA	1,4,5	GM4ZUK/A	560
3	G3UKV	513	101	82RR	1,2,5	G4RIS	289
4	G4NXO/A	502	101	81UQ	2,4,5	EI2CA	297
5	G4RXD/P	501	101	83XD	1,2,3	G4RIS	287
6	G4FOH	466	67	92XI	1,2,5	EI2CA	417
7	G3UAX/P	461	101	91GI	1,3,4	G3EKP	272
8	G4CIZ	279	63	91KI	1,2,4	G4MGR	257
9	G3VIP	270	39	93XN	1,2,5	GM4ZUK/A	411
10	G4AFJ	236	64	92HO	1,2,3	G4RIS	216
	G4RIS	236	32	01MI	1,3,4	G4MGR	357
12	G4FRO	231	54	81QM	1,2,3	G3PWK	219
13	G4EPA	216	62	92KI	1,3,4	G4RDT	181
14	G4UDE	199	39	82LU	2,4,5	G4RDT	268
15	G3RDQ	141	25	91GD	2,3,4	G3VIP	285
16	GW4HBK	139	29	81KP	1,3,5	G3VIP	298
17	G5UM	119	35	92MP	1,4,5	GW3NYY	180
18	G4FMC	118	34	92DM	1,2,4	G4RDT	202
19	GM4ZUK/A	51	6	87WB	1,3,5	G4BVY/P	560
20	G4XFD	50	12	91OF	1,2,-	G3RSI	247
21	G4ZFQ	49	17	90IR	1,4,5	G4RXD/P	273
22	G2DHV	4	4	01BK	1,4,5	-	-

Check logs received with thanks from G4VXE/P, G4FRE, GB4MTR (in Gwent), G3BPM

432MHz Fixed Contest February 1986 results

The contest was marked by generally poor conditions which made it hard for the badly located stations and gave an overall impression of low activity.

No specific poor signal reports appear in the logs but some deliberate jamming was reported. It is deplorable that this form of vandalism should occur within our hobby, which has, for so long, been known for its co-operative and friendly spirit, and this is particularly so when the apparent offenders (or offender) are themselves licensed amateurs.

The leading single operator entry was that of G8TFI, with a commanding lead over the runner-up, G3JXN. In the multi-operator section, G8XVJ, operated by the Warrington Contest Group, led the field, with G4RFR, the Flight Refuelling ARS, in second place. Congratulations and certificates go to these entrants.

The check log from GIDRG/P is gratefully acknowledged. *G3LCH*

SINGLE-OPERATOR SECTION

Posn	Callsign	Points	QSOs	Loc	Best dx	Km	Power	Antenna
1	G8TFI	1,100	181	IO81UQ	DC9KK	670	400	4 × 16E
2	G3JXN	720	149	IO91UM	DJ9DL	517	120	4 × 21E
3	G4NBS	672	114	JO02AF	DL1EBS	419	100	21E
4	G8HHI	661	121	IO91OH	DJ9DL	550	400	2 × 21E
5	G4NVA	616	117	IO83UF	G1SVH	321	300	2 × 21E
6	G1DOX	579	81	IO84JC	G8BIS	433	50	19E
7	G6OYL	518	91	IO93JK	G1EBW	310	100	84E
8	G4XEN	480	116	IO92PH	GI6ATZ	424	50	48E
	G3WHK	480	102	IO91VJ	G3IZD/P	375	100	2 × 21E
9	G3XDY	448	58	JO02OB	DL2OM	471	250	21E
10	G0AHQ	434	98	IO83UB	G3PMX	316	250	2 × 21E
11	G4WYJ	311	77	IO91VH	G6WZO	319	30	24E
12	G6WZO	298	52	IO83LO	G1SVH	385	30	21E
13	G0BIX	284	58	JO01GI	G1KDF	337	40	19E
14	G4ULS	274	62	IO82TI	G1LSB	265	-	19E
15	G8IFT	246	56	IO82XJ	G8BIS	242	45	21E
16	G6IAT	237	55	IO91TV	PA0FRE	331	40	21E
17	G4VXE	231	57	IO81WV	G8PNN	372	25	21E
18	G4YFN	225	49	IO91MK	DC9KK	579	30	19E
19	G0CES	213	51	IO95MD	G3XDY	305	40	18E
20	G4UDE	208	40	IO82LU	G1LSB	330	45	2 × 21E
21	G4DFI	186	40	JO01BL	G4MGR	300	10	19E
22	G5UM	176	48	IO92MP	G1DOX	203	10	14E
23	G6HLL	149	43	IO83RE	G4RFR	271	50	19E
24	G6HXU	140	42	IO83RF	G3WHK	258	8	19E
25	G1NOD	130	34	IO92JC	G6WZO	208	10	21E
26	G8XPZ	120	24	IO93IA	G4RFR	254	10	48E
27	G4IDF	116	34	IO82VE	G3WHK	163	10	11E
28	G1HLT	111	29	IO93JD	GB0RAG	354	15dbw	48E
29	G8UYD	80	20	IO93JD	G4RFR	290	10	6EQ
30	G6OKU	78	20	IO93GF	G4FUF	230	10	3/8
31	G6UVZ	74	10	IO94FW	G8TFI	365	50	48E
32	G8TZJ	60	14	IO84OA	G4RFR	365	100	17E
33	G1GEY	39	5	IO94FW	G8KJF	323	6	19E
34	G6BDV	35	17	IO91TT	G8TFI	133	1	10E
35	G3ILO	32	12	IO81VQ	G4NVA	171	1	19E
36	G6CSY	14	4	JO01BJ	G8JHL	373	5	19E

MULTI-OPERATOR SECTION

Posn	Callsign	Points	QSOs	Loc	Best dx	Km	Power	Antenna
1	G8XVJ	940	150	IO83RJ	PA0FRE	504	400	21E
2	G4RFR	904	125	IO90AS	DC9KK	643	400	4 × 24QL
3	G4MGR	843	142	IO83KH	G6YLO	365	400	21E
4	G8OHM	327	83	IO93AJ	G6XYT	243	50	24E
5	G1LIQ	322	66	IO91VW	G3IZD/P	328	25	21E
6	G1AZJ	315	69	JO01EH	DJ9DL	470	50	48E
7	G1SVH	299	45	JO00DT	G6WZO	384	45	2 × 21E
8	G4NOK	262	56	IO93FQ	G4RFR	326	25	2 × 21E
9	G8AHK	225	63	IO91QF	G1KDF	300	30	17 × y
10	G4WRW	204	45	IO81SJ	G1DOX	305	30	19E
	G4MWS	204	53	IO83WG	G8BIS	316	50	2 × 48E
11	G6LMV	173	41	IO91VT	PA3AEF	338	20	21E
12	G1IBM	160	58	IO91UN	G3NDE	232	28	21E
13	G6PNB	118	34	IO81RM	G8JHL	223	50	17E
14	G4TVI	101	19	JO01IS	G4MGR	301	10	19E

Ropoco 2 1986 rules

1. The general rules for RSGB hf contests, published in the "Operating Guide" supplement, *Rad Com* January 1986, will apply.

2. Date and time. 0800-1000gmt Sunday 31 August 1986.

3. Sections. Single-operator entries only. All entrants must be paid-up members of the RSGB resident in the British Isles holding a class A licence.

4. Band and mode. CW in the 3·5MHz band only. Entrants are requested to confine their operations to 3,520-3,570kHz.

5. Exchange. Send RST, plus—for the first contact, entrants own postal code; for the second and subsequent contacts, the postal code received in the previous contact. Contacts with European stations will not count.

6. Scoring. Ten points per contact.

7. Documentation. Entrants are requested to use RSGB hf contest log sheets (HFC1) and the cover sheet (HFC2) which must include a signed declaration stating that the rules and spirit of the contest were observed. Column 5 should be headed "post-code received" and used for this purpose.

8. Name and address for logs. Logs should be sent to A K Gray, G4DJX, 44 Sherwood Ave, St Albans, Herts AL4 9PQ.

9. Date for entries. Logs to be postmarked not later than Monday 15 September, 1986.

Contests Calendar

1 Jan-31 Dec	UBA SWL *(Rules in December* SWL News)
May-Sept	Microwave Cumulatives *(Rules in March issue)*
May-Sept	10GHz Cumulatives *(Rules in March issue)*
5, 6 July	VHF NFD and SWL *(Rules in April issue)*
5, 6 July	BATC Summer Fun *(Details G6IQM)*
5, 6 July	Venezuelan (cw) *(Rules in July* HF)
12, 13 July	HF SWL *(Rules in May issue)*
12, 13 July	IARU HF Championship *(Rules in June HF)*
13 July	DF Qualifying Event, South Manchester *(Details in June issue)*
19, 20 July	Colombian Independence *(Rules in June HF)*
19, 20 July	AGCW-DL QRP *(Rules in July* HF)
20 July	Low Power FD *(Rules in June issue)*
26 July	144MHz Low Power and SWL *(Rules in June issue)*
26, 27 July	Venezuelan (phone) *(Rules in July* HF)
27 July	432MHz Low Power and SWL *(Rules in June issue)*
3 August	DF Qualifying Event, Mid-Thames *(Details in June issue)*
3 August	Hopscotch *(Rules in June issue)*
17 August	DF Qualifying Event, Coventry
24 August	1,296/2,320MHz *(Rules in June issue)*
31 August	Ropoco 2 *(Rules in July issue)*
6, 7 September	144MHz Trophy and SWL *(Rules in June issue)*
6, 7 September	IARU Region 1 SSB FD *(Rules in May issue)*
6, 7 September	IARU Region 1 VHF *(Rules in June issue)*
7 September	DF Qualifying Event, Slade
13, 14 September	BATC International *(Details G6IQM)*
21 September	70MHz Trophy and SWL
21 September	DF National Final, Salisbury
4, 5 October	432MHz-24GHz
4, 5 October	IARU Region 1 UHF/VHF *(Rules in June issue)*
7 October	432MHz Cumulative
12 October	21/28MHz SSB *(Rules in May issue)*
15 October	1,296/2,320MHz Cumulative
19 October	21MHz CW *(Rules in July issue)*
23 October	432MHz Cumulative
26 October	70MHz Fixed
26 October	DF Treble Night Event, Mid-Thames
31 October	1,296/2,320MHz Cumulative
1, 2 November	144MHz CW
8 November	432MHz Cumulative
8, 9 November	Second 1·8MHz
16 November	1,296/2,320MHz Cumulative
24 November	432MHz Cumulative
2 December	1,296/2,320MHz Cumulative
7 December	144MHz Fixed and AFS
10 December	432MHz Cumulative
14 December	70MHz CW
18 December	1,296/2,320MHz Cumulative

10. Awards. Certificates of merit will be awarded to the first, second and third placed entrants. The Edwin Hodson G3XTJ Memorial Trophy will be awarded to the entrant with the highest checked score and most accurate log. This trophy will be awarded only once in 10 years to the same station. Previous winner, GW3YDX.

21MHz CW Contest 1986 rules

Special note for both sections: entrants are particularly requested to use standard size (A4) log sheets.

TRANSMITTING SECTION

1. The general rules for RSGB hf contests, published in the "Operating Guide" supplement, *Rad Com* January 1986, will apply.
2. Eligible entrants. Single operator stations only. British Isles entrants must be members of RSGB. Overseas entrants, all licensed amateurs.
3. Period. 0700 to 1900gmt, Sunday 19 October 1986.
4. Sections.
(a) British Isles section.
(b) QRP British Isles section. British Isles stations using less than 10W input.
(c) Overseas section (including EI).
(d) QRP Overseas section. Overseas stations using less than 10W input.
5. Frequency/mode. 21MHz. CW only. Entrants are requested **not** to operate in the band 21·075 to 21·125MHz.
6. Exchange. RST report plus a progressive QSO number starting with 001.
7. Scoring.
(a) British Isles stations. Only contacts with overseas stations will count for points. Each contact shall score three points. The final score is the number of countries worked multiplied by the total number of points. The ARRL Countries List will apply with the exception that VO1, VO2, VE, VK, ZL and USA and Japanese call areas, irrespective of prefix, will count as separate countries. Contacts with British Isles stations will not count for points or multipliers.
(b) Overseas stations. Each completed contact with a British Isles station will score three points. The final score is the number of British Isles prefixes multiplied by the total number of points. British Isles prefixes are; G0, G2, G3, G4, G5, G6, G8, GD0, GD2, GD3, GD4, GD5, GD6, GD8, GI0, GI2, GI3, GI4, GI5, GI6, GI8, GJ0, GJ2, GJ3, GJ4, GJ5, GJ6, GJ8, GM0, GM2, GM3, GM4, GM5, GM6, GM8, GU0, GU1, GU2, GU3, GU4, GU5, GU6, GU8, GW0, GW2, GW3, GW4, GW5, GW6 and GW8. Contacts with GB stations will not count for points or multipliers.

Duplicate contacts. Unmarked duplicate contacts for which points have been claimed will be penalized at 10 times the claimed points. Entries containing more than five such duplicates will be automatically disqualified.
8. Logs. Log sheets to be headed: Date/time gmt; station worked; RST and serial number sent; RST and serial number received; multiplier; points claimed. They should be submitted with a cover sheet indicating antenna, equipment and power used and must include a separate list of countries worked as specified in rule 7 above.
9. Declaration. Each entry must be accompanied by the following declaration signed and dated: "I declare that this station was operated strictly in accordance with the rules and spirit of the contest and agree that the decision of the Council of the RSGB will be final in all cases of dispute".
10. Address of logs. RSGB HF Contests Committee, c/o J Bazley, G3HCT, "Brooklands", Ullenhall, Solihull, Warks B95 5NW.
11. Closing date for logs. British Isles entrants, 26 November 1986: overseas entrants, 31 December 1986.
12. Awards. The leading British Isles station will be awarded the T. E. Wilson G6VQ Cup, and will also receive RSGB publications to the value of £10. Certificates of merit will be awarded at the HF Contests Committee's discretion to the leading three stations in each overseas country.

RECEIVING SECTION

Rules as transmitting section except where specified below.
2. Eligible entrants
(a) British Isles. RSGB members only.
(b) Overseas (including EI) all swls.

Holders of transmitting licences for frequencies above 30MHz may also enter the receiving section.
7. Scoring. British Isles swls should only log overseas stations in contact with British Isles stations participating in the contest.

Overseas swls should only log British Isles stations in contact with overseas stations participating in the contest. Scoring and multipliers as in transmitting section.
11. Logs. Log sheets to be headed: date/time gmt; callsign of station heard; report and serial No sent; callsign of station being worked; multiplier; points claimed.
Note. In the column headed station being worked, the same callsign may only appear once in every three contacts except when the logged station is a new multiplier for the receiving station.

Each entry should be accompanied by a completed declaration: "I declare that this station was operated within the rules of the contest and that I do not hold a transmitting licence for frequencies below 30MHz".
12. Awards. Certificates of merit will be awarded at the HF Contests Committee's discretion to the leading three entries from the British Isles, and to the leading entrant from each overseas country.

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 **January 1987**.

RSGB affiliated organizations are requested to report all programmes and new items to their regional representatives regularly. Information for inclusion in the **September** issue should reach them by **4 July** and for the **October** issue by **18 August**.

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.

Accrington (NW Repeater Group)—Third Thursday of each month, 8pm. Globe Bowling Club, Willows Lane, Accrington. Sec G6IKK.
Ainsdale (AARG, G2OA)—Meetings fortnightly, 8pm. Carlton Hotel, Lord St, Southport. Sec G4YYV, tel 79825.
Barnoldswick (Rolls-Royce ARC)—First Wednesday of each month, 8pm. Rolls-Royce Sports & Social Club, Sec G4ILG, tel 0282 812288.
Barrow-in-Furness (South Lakeland ARS)—First and third Thursday of each month, 8pm. Norweb Sports & Social Club, rear of Ormsgill Hotel. Sec G6LKB, tel 0229 54982.
Blackburn (E Lancs RC)—First and last Tuesday of each month, 7.30pm. The Conservative Club, Cliff St, Rishton. Club net on 145·400MHz, 9pm, Wednesdays. PRO G6LXU, tel 0254 887385.
Bolton (B&DARS, G8WY)—23 July (Visit by Bert Donn, RSGB regional representative). 8pm. Horwich Leisure Centre. Details G4UQK.
Burnley (B&DARC)—Meetings alternate weeks, Mondays, 7pm. Adult Education Centre, School Lane, Burnley. RAE and morse classes weekly. Sec G0BQC, tel 0282 39765.
Bury (BRS, G3BRS)—8 July (Surplus equipment sale). 8pm. Mosses Youth & Community Centre, Cecil St, Bury. PRO G0CUK, tel Bolton 706191.
Carlisle (C&DARS)—Mondays, 7pm. Upperby Parish Hall, Upperby Rd, Carlisle. Sec G4WOQ, tel 022872 500.
Chester (C&DARS)—1 July (Committee meeting), 8 July ("FT726R" G4UXD, with video), 15 July (Treasure hunt, 7pm start), 22 July, Visit to British Aerospace, Broughton), 29 July ("Around Western Isles, Scotland", GM3TZO/MM). Morse classes 7.15pm, main meetings 8pm. Chester Rugby Union Football Club, Hare Lane, Vicars Cross, Chester. Details G6IFA tel 336639.
Chorley (The Leyland Hundred ARG)—Second and fourth Monday of each month, 7.30pm. Astley Park Sports Club, Chorley. Details G4WGT.
Crewe (SCARS)—Second and fourth Monday of each month, 8pm. LMR Sports Club, Goddard St, Crewe. Details G1PUV, tel 07816 73185.
Darwen (DARC)—Second Tuesday of each month, 7.30pm. Albion Hotel, Railway Rd, Darwen. Details G2AKK, tel 0254 73767.
Eccles (E&DARS)—Informal meetings Tuesdays, 9.30pm. Duke of York Hotel, Church St, Eccles. Sec G8KRG, tel 061-773 7899.
Ellesmere Port (EPDARS)—Alternate Tuesdays, 7.30pm. The Grosvenor Hotel, Ellesmere Port. Details G4STZ, tel 051-339 7201.
Fylde (FARS)—1 July ("Propagation", part 2, G3KEN), 15 July (Informal), 5 August ("Top band dx", G4OBK). 7.45pm. The Kite Club, Blackpool Airport. Sec G8GG, tel 725717.
Isle of Man (I of M ARS)—20 July (Station to celebrate Lezayre Heritage day). Mondays, 8pm. The Howstrake Hotel, Harbour Rd, Onchan. In addition local amateurs meet on Tuesdays, The Peveril Court Hotel, Ramsey; Thursdays, Tynwald Inn, St Johns; Fridays, Perwick Bay Hotel, Port St Mary. Details GD4GWQ, tel 0624 22295.
Kendal (The Westmorland RS)—8pm. The Strickland Arms, Sizergh, Nr Kendal. Details G1IIE, tel 0539 28491.
Liverpool (L&DARS)—1 July (Quiz), 8 July ("ICS", G6XBK). 8pm. The Churchill Conservative Club, Church Rd, Liverpool 15. Sec G1EXJ, tel 051-728 8811.
Liverpool (L Raynet Group, G1KOP)—Details G6DXF, tel 051-427 9350.
Liverpool (Riversdale ARS)—Dept Elect & Rad Engineering, Riversdale College of Technology. **Again**—no further details available.
Liverpool (Sefton ARC)—Alternate Wednesdays, 8pm. The Liverpool Prison Officers Club, Hornby Place, Walton. Details G1HDU, tel 051-525 6152.
Liverpool (University of Liverpool ARS, G3OUL & G8JUL)—Thursdays, 12.30pm. The Shack, top of the old Union, 2 Bedford St North, (top of Brownlow Hill). Contact G1KNM, tel 051-724 2522/3878.
Macclesfield (MDRS)—Tuesdays, 8pm. The Fermain Club, Oxford Rd, Macclesfield. Sec, G1NUS, tel 0625 24534.
Manchester (Trafford ARC)—Thursdays, 7.30pm. The Sea Cadet Unit, Bradshaw Lane, Stretford. Sec Graham, tel 061-748 9804.
Manchester (MUARS, G3VUM & G8FUM)—Wednesday lunchtimes. The Shack, 1st floor, on the northside of the Students Union, Oxford Rd, Details G6ZGP, tel 051-625 7311, (during term).
Manchester (WMRC)—Wednesdays, 8pm. Astley & Tyldesley Miners Welfare Club, Meanley Rd, Gin Pit Village, Astley, Tyldesley, Nr Manchester. PRO G1IOO, tel 0204 24104.
Maryport (The Solway RC, G4BBX)—Wednesdays for "chats". Maryport Educational Settlement, High St, Maryport. Details G0AFP, tel Cockermouth 826461. RAE classes on demand.
Merseyside Raynet—Details County Controller, G8RXB, tel 051-638 5879.

Morecambe (MBARS)—Mondays, 7.30pm. Canteen of The Luneside Eng. Co, Mill Lane, Halton, Nr Lancaster. 7 July (Night on the air/hf), 14 July (Morse class), 21 July (VHS film evening), Details G3PER, tel 0524 52659.
Oldham (OARC)—Thursdays, 8.30pm. The Moorside Conservative Club, Ripponden Rd, Moorside, Oldham. Sec G4ZEP tel 061-624 7354.
Ormskirk (O&DARC)—First Thursday of each month, 8pm. Ormskirk Community Centre. 3 July (Crime prevention talk, Lancashire Police), 12 July (Visit to BBC World Service, Penrith), 4 September ("Microwaves", G4UGH). Special club station 5/6 July, Westhead Carnival plus National VHF FD Contest. Details G1KDF, tel 0695 74868.
Penrith (Eden Valley RS)—17 July (Foxhunt, G4JHV). 7.30pm. at The Ullswater School Evening Centre or at The Crown Hotel, Eamont Bridge. Details G4XPO, tel Culgaith 462.
Preston (PARS)—Alternate Thursdays, 8pm. Lonsdale Club, Fullwood Hall Lane, Fulwood, Preston. Sec G3ZXC, tel 0772 718175.
Rossendale (RARS)—Wednesdays, The Huntsman, Burnley Rd, Loveclough, Rossendale. Sec G4VVK, tel 0706 214076. Morse class for beginners recently started, 144MHz and hf facilities.
St Helens (SH&DARC)—7.30pm, Rugby Union Football Club. Details G1GNS, tel 092-572 6821.
Sale (South Manchester RC)—4 July (Preparations for VHF FD), 11 July (Quiz), 18 July ("Operation Raleigh", F Chan), 25 July ("50MHz operation", G4HON). 8pm. Sale Moor Community Centre, Norris Rd, Sale. Sec G3WFT, tel 061-973 1837.
Skelmersdale (S&DARC)—Thursdays, 8pm. The Beacon Park Centre, Dalton Lane, Skelmersdale. Details G4ZPY, tel 0704 894299.
Southport Raynet (G1SRG)—First Wednesday of each month, 8pm. The Carlton Hotel, Lord St, Southport. Details group controller, G4RQX, tel 25172.
Stockport (SRS)—8pm, The Magnet Inn, Wellington Rd North (A6), Stockport. Sec G4FFW, tel 061-224 7880.
Tarporley (Mid-Cheshire ARS)—Wednesdays, 7.30pm. The Cotebrook Village Hall, Off the A49, Cotebrook, Nr Tarporley, Sec G4VOH, tel Winsford 4719.
Thoynton Cleveleys (TCARS)—7, 14, 21, 28 July (Informal/club on air). 7.45pm. 1st Norbreck Scout HQ, Carr Rd, off Fleetwood Rd, Bispham, Blackpool. Details G4BFH, tel 0253 853554. New morse class by G3ZRZ.
Warrington (WARC)—Tuesdays, 8pm. Grappenhall Community Centre, Bell House Lane, Warrington. 1 July (Open forum), 8 July (Guest speaker, G3WOH, from Microwave Modules Ltd), 15 July (Guest speakers G Scott, G8TRY and P Langford, G6SNO, on "df".) 22 July (Treasure hunt, G8HLZ and G0CPD), 29 July (RSGB film, Lord Howe Island), 5 August (Open forum). Details Paul, tel 0925 814005.
Wigan (Douglas Valley ARS)—8pm, Shevington Conservative Club, Shevington, Wigan. Sec G4XMG. Details G4GWG, tel 211397.
Wilmslow (North Cheshire RC)—G4WCE, tel 061-980 5173.
Wirral (WARS)—First and third Wednesday of each month, 8pm. Club room, Ivy Farm, Arrowe Park. Sec G3VEB.
Wirral (W&DARC)—9 July (Annual barbecue), 23 July (Medley, df hunt). 8pm. Irby Cricket Club, Mill Hill Rd, Irby. PRO G6CGJ, tel 051-677 7376.
Wirral Raynet Group—Details G6FNF, tel 051-653 4067.
Woodford (RATEC)—8pm, British Legion Club, Moor Lane, Woodford, Nr Bramhall, Cheshire. Details G4SFU, tel 061-485 3912.

Congratulations to Wirral ARS on their recent golden jubilee. Thank you for a most stimulating meeting at your club premises and for the excellent dinner dance. My thanks also to Morecambe Bay ARS for their hospitality on my visit.

Would persons in possession of the Region Reps Cup, the Harold Hilton Rose Bowl and the G3SMM Shield please contact me as soon as possible.

Thanks to those clubs who have sent me their magazines/news sheets. *RR.1*

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

Area representatives:
J Clegg, G3FQH, Huddersfield.
P Gilson, G3WSZ, Leeds North.
S Thompson, G4RCH, Leeds South & Morley, tel 0532 536633.
P Goben, G4BVV, Maltby.
M Valentine, G4ANP, Mexborough, tel 0709 893995.
R Sterry, G4BLT, Wakefield, tel 0924 255515.
K Cass, G3WVO, York, tel 0904 422084.

Doncaster (D&D Raynet Group)—7.30pm, Sypte Club, North Bridge. Details G4NZX, tel 0302 854985.
Goole (GR&ES, G8HSG)—Mondays, The Pavilion, West Park. Details G6REL.
Halifax (H&DARS, G2UG)—15 July (Open forum). Running Man PH, Pellon Lane. Details G0DLM, tel 0422 202306.
Hornsea (HARC, G4EKT)—Wednesdays, The Mill, Atwick Rd. Details G4YTV, tel 0401 62498.
Hull (H&DARS, G3AMW)—11 July (DF hunt). Details G0DMP, tel 0482 862149.
Humberside (Humberside Repeater Group)—Responsible for maintaining Hull, Goole and Hornsea repeaters. Details G4NJP.
Keighley (KARS, RS84851)—8 July (Informal meeting). 29 July (Foxhunt), 8pm. Victoria Hotel. Details G1IGH, tel 0274 496222.
Leconfield (RCTARS, G4GGD)—3 July (Noggin and natter night), 10 July (closed), 17 July (Guest speaker), 24 July (RR2 visit, RSGB update). Normandy Barracks. Details G4SMB tel 0401 51200.
Leeds (L&DARS, G4LAD)—Meetings at Yarbury RUFC. Details G1EBS, tel 0274 665355.
Maltby (MARS, G4SKM)—Fridays, Hellaby Community Hall. Details G3ZHI, tel 0709 814911.
Mexborough (M&DARS, G4BTS)—Meetings at Harrop Hall. Details G1BJB, tel 0709 586329.
Northern Heights (NHARS, G2SU)—Meetings at Bradshaw Tavern. Details G3UI, tel 0422 60574.
North Ferriby (NFUARC, G4ECR)—Fridays, Ferriby Club. Details G1LSZ, tel 0482 493777.
North Wakefield (NWRC, G4NOK)—3 July (Natter night), 10 July (Visit to Kirksall Road Fire Station), 17 July (On the air), 24 July (Rally meeting), 31 July (Monthly meeting). White Horse PH. Details G4RCH, tel 0532 536633. **NB:** Wakefield Mobile Rally, 5 October. Details G3SPX, tel 828520.
Pontefract (P&DARS, G3FYQ)—Meetings at Carleton Community Centre. Details G0AAO, tel 0977 43101.
Ripon (R&DARS, G4SJM)—Meetings at St Johns Ambulance Hall, North Rd. Details Liz Bulman, The Lodge, Lister House, Sharow, Ripon.
Sheffield (SARC, RS87916)—First and third Monday of each month at Firth Park Clock Tower, and third Monday at Sheaf House PH. Details RS86758, tel 0742 581766.
Spen Valley (SVARS, G3SVC)—3 July (Swindon Cup), 17 July (Closing night on the air). Old Banm WMC, Mirfield. Details G4PHR, tel 0924 499397.
Todmorden (T&DARS, G4WYT)—Mondays, Queen Hotel. Details G1GZB, tel 070681 7572.
UK FM Group (Northern, G8KFM)—6 July (Monthly meeting). Royal Hotel, Barnsley. Details G4UNA.
World Association of Christian Radio Amateurs (WACRAL, G3NJB)—An organization to foster worldwide christian friendship and fellowship through amateur radio. Details G3AGX, tel 0482 822276.
Wakefield (W&DARS, G3WRS)—8 July (Bring and buy junk sale), 22 July (Pitch and putt competition, Holmfield House). The Community Centre, Prospect Rd, Ossett. Details G4VRY, tel 0532 820198.
White Rose (WRARS, G3XEP)—2 July (Visit by P Sheppard, G4EJP, RR2). Moortown RUFC, Moss Valley, Kings Lane. Details G3VMW.
York (YARS, G3HWW)—Fridays, United Services Club, Micklegate. Details G3WVO, tel 0904 422084.
York (YRC, G4YRC)—8 July (Informal), 22 July (DF night). Ashcroft Hotel, Bishopthorpe Rd. Details G1FTA, tel 0904 704634.
Wawne (Wawne Raynet Group, G4UWE)—7 July (Communication tests with county Raynet), 21 July (Group meeting and training). EP Section, Meaux Rd. Details G4EJP, tel 0401 50397.

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

Area representatives:
N Read, G8CXL, Warwick
I Hopwood, G6CWK, Stratford
M Henley, G3OQO, Rugby
B Jones, G8ASO, Worcester
L Craven, G4EQI, S Birmingham
J K Harvey, G4IVJ, S W Birmingham
S H Jesson, G4CNY, Hereford
D Bushell, G4WAD, Evesham.

Aldridge (Barr Beacon ARC)—Alternate Mondays, 7.30pm. Barr Beacon Community School, Old Hall Lane, Aldridge. 7 July (Natter night), 21 July (Informal evening). Sec G1OBA, tel 021-353 6233.
Ariel Radio Group—Club for BBC personnel only. Contact G3DEF or G3PGG.
Atherstone (AARC)—Second and fourth Monday of each month. Sixth Form College, Long St, Atherstone. Sec G6VQU, tel Chapel End 393518.
Birmingham (Aston University ARS)—Lunchtime Mondays and Fridays. Sec G1KTH, tel 021-359 3611, ext 5155.
Birmingham (Midland ARS)—Mondays, Construction night. First Tuesday of each month, committee meeting. Second Tuesday, computer night. Third Tuesday, lecture. Fourth Tuesday, Raynet group meeting. Wednesdays, morse and natter night. Thursdays, night on the air. Fridays, RAE class. Weekends contests. Unit 5, Henstead House, Henstead St (off Bromsgrove St). 15 July ("The RIS", G4PZA). Sec G8BHE, tel 021-422 9787.
Birmingham (Slade RS)—First Friday of each month, 7.45pm. Community Centre, 75 Kingsbury Rd, Erdington, Birmingham. Sec G4FGF, tel 021-770 3474.
Birmingham (South BARS)—7.45pm. Hamstead House, Fairfax Rd, West Heath, Birmingham. Sec G6KOA, tel 021-458 1441.
Birmingham (B University RS)—Every day, 1pm. Fridays, 7.30pm, club night. Tuesdays, 7.30pm, RAE classes. Club Room, Second Floor, Union Building (Midland Bank entrance, follow the signs). Sec GW4YEG.
Bridgnorth (Severn RS)—Sec E Churchyard, 11 Greenfields Drive, Bridgnorth.
Bromsgrove (BARS)—Second and fourth Tuesday of each month, 8pm. Hundred House, Stourbridge Rd, Bromsgrove. Sec G4LVK.
Bromsgrove (B&DARC)—Alternate Fridays, 8pm. Thursdays, Club net on 144·575MHz and morse tuition. Avoncroft Arts Centre, Bromsgrove. Sec G4NYH, tel 73847.
Burton on Trent (BoT&DARS)—Wednesdays, 8pm. Stapenhill Institute, Main St, Stapenhill. Sec G4HBY, tel 0283 62344.
Cannock Chase (CCARS)—Thursdays, 8pm. Bridgetown War Memorial Club, Union St, Bridgetown, Nr Cannock. Sec G8UYZ.
Cheadle (Moorlands &DARS)—Thursdays, Ex-Service Centre, Bank St, Cheadle. Sec G4OUG, tel 0538 756323.
Coventry (CARS)—Fridays, 8pm. Scout HQ, 121 St Nicholas St, Radford, Coventry. 4 July (VHF NFD preparations), 11, 18, 25 July (Night on the air). Sec G4JDO, tel 73999.
Coventry (C Tech ARS)—Mondays, 7pm. Room E17, Wynfray Bldg, Technical College, Coventry.
Droitwich (DARC)—Second and fourth Monday of each month, 8pm. Scout HQ, Droitwich. Sec G4HFP, tel 02993-3818.
Dudley (DARC)—Mondays, 7.45pm. Allied Centre, Greenman Alley, Tower St, Dudley. Sec G4NRA, tel 0384 278300.
Evesham (ERAC)—Sec G4UXC, tel 831508.
Evesham (BBB Contest Group)—Private club. Contest working only. Sec G4WAD, tel 0386 6246.
Halesowen (Midlands ES&SC, G4MEB)—8 July ("ATV", G5KS), 26 July (Open meeting). 8pm. MEB Social Club, Mucklow Hill, Halesowen. Sec G4RWH, tel 021-747 8784.
Hereford (HARS)—4 July (Visit to Nuclear Medicine Dept at County Hospital), 18 July (Informal meeting). 8pm. Civil Defence HQ, Goal St, Hereford. Sec G3WRQ, tel 0432 54064.
Keele University (KUARS)—Mondays, 7.30pm. Room 112, Physics Bldg. Sec G4TQB, tel 0782 621111.
Kidderminster (K&DARC)—Alternate Tuesdays, 8pm. Vice-presidents Club, Harriers Football Ground, Hoo Rd, Kidderminster. Sec G8WOX, tel 0562 751584.
Lichfield (Chad RC)—Mondays, 8.30pm. Cricket Club, Birmingham Rd, Lichfield. Sec G4VKA, tel 0543 252646.
Malvern Hills (MHARC)—Second Tuesday of each month. Red Lion Inn, St Annes Rd, Malvern. Sec G4TXG, tel Malvern 65802.
Much Wenlock (MWARES)—Second and fourth Monday of each month, 8pm. Raven Hotel, Much Wenlock. Sec G3ZSL, tel 07462 861332.
Oswestry (O&DARC)—First Tuesday of each month, 8pm. Bell Hotel, Oswestry. 1 July (Informal meeting). Sec GW6YIY.

Redditch (RARC)—8pm. WRVS Centre, Ludlow Rd, Redditch. Sec G3EVT, tel 0789 762041.
Rugby (RATS)—7.30pm. Cricket Pavilion, "B" Entrance, Rugby Radio Station. Sec G8TWH.
Sandwell (SARC)—Mondays and Thursdays, 7.30pm. Club Premises, Broadway, Oldbury, Warley. Sec G4UMY, tel 021-422 1554.
Shrewsbury (Salop ARS)—Thursdays, 8pm. Old Bucks Head, Frankwell, Shrewsbury. Sec G6OMJ, tel 0743 67799.
Solihull (SARS)—Third Thursday of each month. The Shirley Centre, Stratford Rd, Shirley. Sec G8AYY, tel 021-783 2996.
Solihull (S Contest Group)—Sec G4PYR, tel 021-744 1558 or Prestel 217458337.
Stratford (SARS)—Tuesdays, 8.30pm. Coach and Horses, Pasturefields, Staffs. 1 July (Informal), 8 July ("Joys of amateur radio", G3BA), 15 July ("Motor cycle restoration", G1ONZ). Sec G6DAT, tel 08894 2453.
Stoke-on-Trent (SoTARS)—Thursdays, 7.30pm. The Cottage, 2a Racecourse Rd, Oakhill, Stoke-on-Trent. Sec G4IMV, tel 0762 613207.
Stoke-on-Trent (North Staffs ARS)—8pm. Harold Clowes Community Centre, Dawlish Rd, Bentilee, Stoke-on-Trent. Sec G6MLI, tel 0782 332657.
Stone (Brit Tel ARS)—British Telecom staff and students only. Tuesdays, 7.30pm. at college. Sec G8ATB, tel (Works) 0785 762593.
Stourbridge (S&DRS)—First and third Monday of each month, 8pm. Robin Woods Centre, School St, Off Enville St, Stourbridge. Sec G3ZOM, tel 0384 288900.
Stratford upon Avon (SOA&DRC)—Second and fourth Monday of each month, 7.30pm. Baptist Church, Paytan St, Stratford upon Avon. 14 July (Surprise night), 28 July (Construction competition). Sec G8OVC, tel 750584.
Sutton Coldfield (SCRS)—Second and fourth Monday of each month, 7.30pm. Public Library, Sainsbury Centre, Sutton Coldfield. 14 July ("Satellites and computers", G8AVH). Sec G3CNV, tel 021-354 4369.
Tamworth (TARS)—Mondays, 8pm. Rugby Club, Cotton Green, Tamworth. Sec G4SRI, tel 0827 68137.
Telford (T&DARS)—8pm. Dawley Bank Community Centre, Bank Rd, Dawley, Telford. 2 July ("VHF NFD preparations", G6UDX), 9 July (Committee meeting and natter night), 16 July (NFD debriefing). Sec G0CZD, tel 0952 770568.
Tenbury (T&DARS)—Thursdays, 7.45pm. The Barn, Pool House, Hanley Childe, Tenbury Wells. Sec G6PQX, tel 08854 274.
Walsall (WARC)—Wednesdays, 8pm. Forest Comprehensive School, Bloxwich. Sec G6HZI, tel 0922 32607.
Warwick (Mid. WARS)—Second and fourth Tuesday of each month, 8pm. St John HQ, 61 Emscote Rd, Warwick. 8 July (DF hunt), 22 July ("Test gear", G6ARP). Sec G6VHI.
Warwick (W University ARC)—Wednesdays, 1pm and 7.30pm in the "Cholo". Sec G1NFR, tel Coventry 503702.
West Bromwich (WBARC)—Sundays, 8pm. "Hop and Barleycorn", Dartmouth St, West Bromwich. Sec G6ZLW, tel 021-553 0531.
West Bromwich (WB Central RC)—Sundays, 7.30pm. The Victoria, Lyng Lane, West Bromwich. Sec G4ZAD, tel 0902 48263.
West Midlands (WM Police ARC)—Sec D Mytton, tel 021-458 3236.
Willenhall (W&DARS)—Wednesdays, 8.30pm. Cross Keys, Willenhall. Sec G4LWI, tel 0902 782036.
Wolverhampton (WARS)—Tuesdays, 8pm. Electricity Sports Club, St Marks Rd, Chapel Ash, Wolverhampton. Sec K Jenkinson, tel 0902 24870.
Worcester (W&DARC)—13 July (Droitwich Rally help) 8pm. Oddfellows Club, New St, Worcester. Sec G4RBD, 14 Oakleigh Heath, Hallow, Worcester.
Worcester (W Moonbounce Society)—Sec P Crosland, tel 0905 620041.
Wordsley (WRC)—8pm., Vine Inn, Camp Hill, Wordsley. Sec G4VJU.
Wythall (WARC)—Tuesdays, 7.30pm. Community Centre, Silver St, Wythall. Sec G4SMA, tel 021-444 2427.

Thank you to all those clubs who have made me welcome over the last six months. It has been a pleasure meeting so many of you and putting the amateur radio world to rights! *RR3*

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

Alfreton (A&DARC)—Mondays, 8pm. ECP Social Club, Carnfield Hill, Alfreton. Sec G4NXB, tel Ripley 812010.
Buxton (BARS)—Second and fourth Wednesday of each month. Haddon Hall Hotel, London Rd, Buxton. Sec G8YHX, tel Buxton 6800.
Bolsover (BARS)—Wednesdays, 8pm. The Black Bull, Bolsover. Sec G1GNC, tel Chesterfield 824061.
Derby (DADARS)—2 July (Junk sale), 9 July (Back to basics), 16 July (TBA), 23 July ("Enamelling", B Neill), 30 July (Visit to Watnell Weather Centre). 7.30pm. 119 Green Lane, Derby. Sec G3KQF, tel 772361.
Derby (NHARG)—Fridays, 7.45pm. Nunsfield House, Boulton Lane, Alvaston, Derby. Sec G4PZY, tel Derby 767994.
Grantham (GRC)—Third Tuesday of each month, 7.30pm. Shirley Croft Hotel, Harrowby Rd, Grantham. Sec G8WWJ, tel 65743.
Grimsby (GARS)—3 July (DF hunt), 10 July ("Sunspots"), 17 July (DF hunt), 24, 31 July (TBA). 8pm. Cromwell Social Club, Cromwell Rd, Grimsby. Sec G4EBK, tel Grimsby 887720.
Heanor (SE Derbyshire ARS)—Each Tuesday during term. South East Derbyshire College of Education, Ilkeston Rd, Heanor. Sec G8RZM.
Hinckley (HARES)—Second Wednesday of each month, 7.30pm. John Cleveland College, Butts Lane, Hinckley. Sec G8STX, tel 632778.
Leicester (LRS)—7 July (TBA), 14 July (Committee meeting and activity night), 21, 28 July (TBA). 7.30pm. Gilroes Cottage, Groby Rd, Leicester. Sec G4PDZ, tel 871086.
Leicester (Wigston ARC)—Fridays, 7.30pm. Wigston United Reform Church, Long St, Wigston. Sec G6HAJ, tel Leicester 403105.
Lincoln (LSWC)—Wednesdays, 8pm. City Engineers Club, Waterside South, Lincoln. Sec G4STO, tel Gainsborough 788356.
Loughborough (L Falcon ARC). Fridays, 8pm. Brush Sports & Social Club, Fennel Street, Loughborough. Sec G4RVW, tel Quorn 412043.
Mansfield (MARS)—First Friday and third Tuesday of each month, 8pm. Victoria Social, Princes St, Mansfield. Sec G1DZH.
Marlpool (Notts & Derby Border ARC)—Tuesdays, 7.30pm. Marlpool United Reform Church, Chapel St, Marlpool. Sec G4UFC, tel Ilkeston 302990.
Market Harborough (Well & Valley ARC)—Mondays, 7.15pm. Willand Park College, Market Harborough. Sec G3LSL, tel 880746.
Melton Mowbray (MMARS)—Third Friday of each month, 7.30pm. St John Ambulance Hall, Asfordby Hill, Melton Mowbray. Sec G3NVK, tel 63369.
Newark (NADARC)—First Thursday of each month, 7.30pm. Worthington Simpson Sports & Social Club, Hawton Lane, Balderton, Newark. Sec G1SCF, tel Southwell 814541.
Nottingham (ARCON)—Thursdays, 7.30pm. Sherwood Community Association, Woodthorpe House, Mansfield Rd, Sherwood, Nottingham. Sec G4PJZ, tel 624764.
Nottingham (Plessey ARS)—Thursdays, 8pm. Plessey Communications, Beeston, Sec G4VFK, tel 226321.
Scunthorpe (SADARC)—Tuesdays, 8pm. Grange Farm Hobbies Centre, Franklin Crs, Scunthorpe. Sec G4ZGJ, tel 732268.
Skegness (S&DARS)—First Friday of each month, 7.30pm. White Swan, Burgh le Marsh. Sec G1ONN.
Spalding (S&DARS)—First Friday of each month, 7.30pm. The Ship Albion, Albion St, Spalding. Sec G4ZGT, tel 2781.
Stamford (S&DARC)—Wednesdays, twice monthly. Sec G4OSM, tel 54433.
Worksop (WARS)—3 July (Visit to Newark ARC), 15 July ("Packet radio", G4KAL). 7.30pm. The Maltkins, Gateford Rd, Worksop. Sec G4ZUN, tel 486614.
Glossop (G&DARG)—last Tuesday of each month, 7.30pm. Nags Head Hotel, Charlestown Rd, Glossop. Sec G4GNQ.

REGION 5—RR J S Allen, G3DOT, 77 Rosslyn Crescent, Luton LA4 2AT. Tel 0582 21151 ext 314 or 0582 508515 (after 6pm).

Bedford (B&DARC)—First and third Thursday of each month for formal meetings, second and fourth Thursday of each month for informal meetings, 8pm. Allen's Club, Hurst Grove, Queenspark, Bedford. Sec G4VHF.
Bedford (B Modern School ARC)—This club is run for the boys at the school. Contact G1BYT.
Bedford (Mid Beds Contest Group)—Further details G4BWP.
Cambridge (CUWS)—This society is being reformed. Treasurer C T Forshaw, St John's College.
Cambridge (C&DARC)—Fridays, 7.30pm. Visual Aids Room, Colleridge Community College, Radegund Rd, Cambridge. Sec G4TRO.
Daventry (DARC)—Third Thursday of each month. Conservative Club, Daventry, Northants. 17 July (Visit by RR5, G3DOT). Sec G0DPA.
Dunstable (DDRC)—First and third Friday of each month, 8pm. Room 3, Chews House, High Street South, Dunstable, Beds. 4 July (VHF NFD planning), 18 July (Junk sale). Sec G6EES, tel 0582 607623.
Luton (Kent Process Controls ARC)—Club in "moth balls" until better premises can be found. Details G3DOT.
Leighton Buzzard (LLRC)—7.30pm. A64, Vandyke Community Centre, Vandyke Rd, Leighton Buzzard. 7 July ("Morse telegraphy", G4FAI), 4 August (DF hunt). Chairman G8VQN. Sec D Jones, tel 0908 649238.
March (MADRAS)—Tuesdays, 7.30pm. Room 7, Neale-Wade Adult Education Centre, Station Rd, March, Cambs. 1 July (Club night, tba), 8 July (Committee meeting). Chairman G3REH. Sec G3PWK.
Milton Keynes (MK&DARS)—First Monday of each month. The Meeting Place, Hodge Lea, North Milton Keynes. 14 July (Talk and practical demonstration by the Royal Corp of Signals of Triffid UK TRC by 471 Radio Regt), 11 August ("Lundy Island expedition", G5LP). Chairman G1GOF. Sec G3ZPA.
Nene Valley (NVRC)—Wednesdays. The Prince of Wales PH, Well St, Finedon, Northants. Sec G6UWS.
Northampton (NRC)—Thursdays, 8pm. Kingsthorpe Community Centre, Northampton. 13 July (Tulip Rally and barbecue). Sec G4YJP. **NB** mid-July to mid-August, club shutdown, no lectures but rooms open for natter nights.
Peterborough (PR&ES)—Fridays, 7pm. Brook Street Institute, Brook St, Peterborough. Chairman G4NUG. Sec G4PNW.
Peterborough (Greater PARC)—Fourth Tuesday of each month during school term. Southfields Junior School, Stanground, Peterborough. Sec G4NRJ.
Shefford (S&DARS)—Thursdays, 8pm. Church hall, Ampthill Rd, Shefford, Beds. 3 July (28MHz fm propagation and demonstration, G3YPZ), 5, 6 July (VHF NFD, Toplers Hill), 10 July ("Lundy Island dxpedition", G5LP), 17 July (DF mobile foxhunt, start from Church Hall at 8pm), 24 July (Barbecue at Toplers Hill), 31 July to 21 August (club closed but informal meetings at Black Horse PH, Ireland, Nr Old Warden). Chairman G6PVS. Sec G4PSO.
Texas Instruments (TIARC)—For employees of Texas Instruments only. Chairman G1JKF. Sec G1IGX.
Wisbech (W&DAR&EC)—Every other Thursday. Astral House, Old Market, Wisbech, Cambridgeshire.
NB will the present secretary please get in touch with RR5.

REGION 6—RR N P Taylor, 87 Huntersfield, Stanford-in-the-Vale, Farringdon, Oxon.

Maidenhead (M&DARC)—First Thursday and third Tuesday in each month, 7.30pm. Red Cross Hall, The Crescent, Maidenhead. 3 July ("The new band 50MHz", G3VCT and G3TWG), 15 July ("Cable tv", J Delahunty of Windsor Television), 7 August ("Expedition to Andora", G4SVG). Sec G8RYW.
Oxford (Oxfordshire RAFARS)—Third Wednesday in odd numbered months, Civil Service Club, Marston Rd, Oxford. Net on 3,710KHz ssb, 11.30am second Sunday of each month. 18 July (Evening out with xyls, Rose Revived, Standlake, 7.30 for 8pm. Members attending please advise G6ZH before 11 July). Meetings continue on 17 September. Sec and area representative G6ZH. **NB** see "Special Events" column for RAF Abingdon At Home Day.

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

Addiscombe (AARC)—Tuesdays (Informal). 9pm. Lion Inn, Pawsons Rd, Croydon. Sec G3SJX, tel 01-656 9054.
Ashford (Echelford ARS)—14 July (Natter night), 31 July (TBA). 8pm. The Hall, St Martins Court, Kingston Crescent, Ashford, Middx. Sec G4VAZ, tel Sunbury 82823.

Bexleyheath (North Kent RS)—15 July (VHF NFD post mortem), 5 August (Film evening). 8pm. The Pop-in-Parlour, Graham Rd, Bexleyheath. Sec G4DIB.
Biggin Hill (BHARC)—15 July (Computer night). 8pm. Downe Village Hall, Downe, Kent. Sec G0AMP, tel 0689 57848.
Coulsdon (CATS)—14 July ("Cellular radio update", G6VYT), 31 July (RAE/morse help night). 8pm. St Swithuns Church Hall, Grovelands Rd, Purley, Surrey. Sec G6HC, tel 01-684 0610.
Cray Valley (CVRS)—17 July (Night on the air), 7 August ("The RSGB", G3NFV, RR7). 8pm. Progress Hall, Admiral Seymour Rd, Eltham SE9. Details G3TAA.
Croydon (SRCC)—7 July (Practical test instruments). 8pm. TS Terra Nova, 34 The Waldrons, South Croydon, Surrey. Sec G8IYS, tel 01-657 0454.
Crystal Palace (CP&DRS)—19 July (Informal evening). 8pm. All Saints Parish Room, Upper Norwood SE19. Sec G3FZL, tel 01-699 6940.
Dorking (D&DRS)—8 July (Informal), 22 July (Informal). 8pm. Star and Garter (8th), The Plough, Coldharbour (22nd). Sec G3AEZ, tel 0306 77236.
Farnham (VHF Group)—Second and fourth Monday of each month, 8pm. Farnham Central Club, Farnham, Surrey. Details G4EPX.
Guildford (G&DRS)—Second and fourth Friday of each month, 8pm. Model Engineers HQ, Stoke Park, Guildford. Sec G4KXA.
Guildford (UHF Repeater Group)—First Thursday of each month, 8.45pm. Anchor and Horseshoe, Burpham, Guildford. Details G4EML.
Kingston (KDARS)—Third Wednesday of each month, 8pm. "Alfriston", 3 Berrylands Rd, Surbiton. Sec G3ODH, tel Epsom 26005.
New Cross (Clifton ARS)—Fridays, 8pm. Telegraph Hill Community Centre, Kitto Rd, New Cross SE14. Sec R Hinton, 42 Sutcliffe Rd, Welling, Kent.
Redhill (RATS)—Third Tuesday of each month, 8pm. Constitutional and Conservative Club, Warwick Rd, Redhill. Sec G8JXV.
Surbiton (308ARC)—Last Tuesday of each month, 8pm. The Coach House, Church Hill Rd, Surbiton. Details G0CFH.
Sutton and Cheam (S&CRS)—Third Friday of each month, 8pm. Downs Lawn Tennis Club, Holland Ave, Cheam, Surrey. Sec G4BOX.
Thames Valley (TVARTS)—First Tuesday of each month, 8pm. Thames Ditton Library, Watts Rd, Giggs Hill, Thames Ditton. Sec G3ENI.
Wimbledon (W&DRS)—11 July (The Great Western Railway). 8pm. St John Ambulance HQ, 124 Kingston Rd, Wimbledon SW19. Sec G3DWW, tel 01-540 2180.

REGION 8—RR M Elliot, G4VEC, 20 Haysel Sittingbourne, Kent ME10 4QE. Tel: 0795 70132

Area representatives
S D Reeks, G4WCP, Hastings
J Brooker, G3JMB, Horsham, Crawley and mid-Sussex
G D Edy, G4AXD, Maidstone and district
B A Hancock, G4NPM, Swale
B E Pearson, G0CBY, Thanet
F J W Perry, G8ZXC, West Kent
S G Williams, G3LQI, Worthing and district.

Brighton (BADRS)—First and third Wednesday of each month, 8pm. Seven Furlong Bar, Brighton Race Course. Details G4IIL, tel 607737.
Burgess Hill (Mid-Sussex ARS)—Thursdays, except during school holidays. Marle Place, Burgess Hill. Details G1FRF, tel 07918 2937.
Canterbury (UOKARS)—Tuesdays, 7.30pm. Radio Shack, beside Oast House, beside Parkwood residences. Details G4SAY.
Chichester (CARC)—First and third Tuesday of each month, 7.30pm. North Lodge Bar, County Hall, Chichester. 1 July (Annual summer social evening at Goodwood), 12-19 July (Special event station GB2CHI for Chichester 911 festivities). Sec G4EHG, tel 789587. Thanks to all those who took part in the centenary special event station at Chalk Pits Museum.
Crawley (CARC)—23 July (Members' evening. One or two members will give short talks on equipment or projects they have been engaged on). The Leisure Centre, Haslett Ave, Crawley. Details G4TVC, tel 28612. Bar/cafe opens 7pm, Lectures start 8pm.
Dartford (DDFC)—1 July (Pre-hunt meeting), 6 July (Club hunt), 13 July (RSGB hunt). Pre-hunt meetings after 9pm. Horse and Groom PH, Leyton Cross, Dartford Heath. Details G8DYF, tel Greenhithe 844467.
Dover (SEKYMCARC)—2, 16 July (Natter night), 9 July (Treasure hunt). 8pm. Dover YMCA, Godwynehurst, Leyburne Rd, Dover. Details J H Dobson, tel 211638.
Eastbourne Electronics (EEARS)—Sundays, 7.30pm. Archery Youth Centre, Seaside, Eastbourne. Details G1EJB, tel 765701.
Eastbourne (Southdown ARS)—7 July (Main meeting, SARS barbecue). 7.30pm. Hailsham Observatory, Chaseley Home, South Cliff, Eastbourne. Details G4XNL, tel 638653. Various courses held on Tuesday evenings and Friday evenings are chat nights at the Club Rooms, Hailsham Leisure Centre, Vicarage Lane.
Edenbridge (EARS)—Second Wednesday each month, 8pm. The Scout Hut, High St, Edenbridge. 9 July (Field day inquest). Details G8VCH, tel East Grinstead 24748.
Gillingham (Bredhurst R&TS)—3, 17, 31 July (Construction nights), 10 July ("Communications", talk and demonstration, C M Howes). 8pm. Parkwood Community Centre, Parkwood Green, Wigmore, Gillingham. Details G0AMZ, tel Medway 376991.
Gillingham (MARTS)—Fridays, 7.30pm. St Lukes Church Hall, King William Rd, Gillingham. Details G4EVY, tel Medway 716463.
Gravesend (GRS)—Mondays, 8pm. The Windmill Tavern, Shubbery Rd. Details G4BNQ.
Hastings (HERC)—16 July (Converting cb equipment). 7.45pm. West Hill Community Centre. Details G4NVQ, tel 420608. Various activities on other nights.
Herne Bay (East Kent RS)—First and third Thursdays, 7.30pm. Radio Cabin, Kings Rd, Herne Bay. Details G4RIS, tel Whitstable 262042.
Horsham (HARC)—First Thursday of each month, 7.30pm. The Guide HQ, Denne Rd, Horsham. 3 July ("HF antennas and feed systems"). Details G4YFY.
Kent (K Repeater Group)—This group is responsible for seven repeaters: GB3CK, GB3EK, GB3KN, GB3KS, GB3NK, GB3RE and GB3SK. Details G4RVV, tel Orpington 27050 ext 91 office hours.
Lewes (L&DARC)—First and third Tuesday of each month, 7.30pm. Bridge View Community Centre, Lewes. Details G4PZU, tel 3239.
Maidstone (MYMCAARS)—Fridays, 8pm. YMCA Sports Centre, Melrose Close, Cripple St, Maidstone. Details G4AXD, tel 0622 29462.
Margate (RC of Thanet)—Second and fourth Tuesday of each month, 7.30pm. Grosvenor Club, Grosvenor Place, Margate. 27 July (GB2MLB, see special events), 12 August (Natter night). Details G4SBD, tel Thanet 32313.
Meopham (MPRC)—Second Sunday of each month, 7.30pm. The Club House, Vigo Rugby Football Club, Vigo Village, Nr Meopham. 13 July ("50MHz", G5KW). Details G6TXP, tel 0732 883812.
Sittingbourne (Swale ARC)—Mondays, except bank holidays, 8pm. The Ivy Leaf Club, 52 Dover St, Sittingbourne. Details G4NPM, tel Minster 873147.
Sussex (S Repeater Group)—This group is responsible for GB3BP, GB3CP, GB3HO, GB3NX, GB3SR, GB3WX. The SRG "Roadshow" is available to local clubs. Details G8TJQ.
Swanley (Darenth Valley RS)—Twice monthly on Wednesdays, 8pm. Crockenhill Village Hall, Nr Swanley. Details Mr Thomas, Tel 0322 63368.
Tunbridge Wells (West Kent ARS)—Fridays, 8pm. Adult Education Centre, Annexe, Quarry Rd, Tunbridge Wells. Details G4KIU, tel 33586.
Worthing (W&DARC)—Every Wednesday, 7.30pm. Lancing Parish Hall, South St, Lancing. 2 July (Weather satellites), 9 July (Ragchew evening and NFD preview), 16 July (TBA), 23 July (Ragchew and RSGB low power contest preview), 30 July (Power supplies), 6 August (Junk sale). Sec G4SWH, WADARC, PO Box 599, Worthing BN14 7TT.

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

*Acting until post is filled.

Area representatives:
C Laws, GW0CUM, Cardiff
A F Dowling, GW3GUE
R Bray, GW4ESV

Abergavenny (A&NHARC, GW4GFL)—Thursdays, 7.30pm. Pen-y-Fal Hospital, above Male Ward 2, Abergavenny. Sec GW4XQH, tel 0873 4655.
Aberporth (Dyfed ARS)—Wednesdays, 7pm. The Airfield, Aberporth, Building No 17. Sec GW0DDR, tel Llechryd 274.
Aberstwyth (A&DARS)—Second Tuesday in each month, 7.30pm. Bay Hotel (On the sea front opposite the bandstand). Sec GW4JXB, tel 0970 828446.
Barry (RAF St Athen ARC, GW3CKB)—RAF St Athen, Barry, South Glam. Contact D H Rycroft.
Barry (BCoFERS, GW3VKL, GW4BRS, GW6BRC)—Thursdays, 7.45pm. Barry College of Further Education Annexe, Weycock Cross, Barry. Sec GW0AGA, tel 736260.
Blackwood (BARS, GW6GW)—Fridays, 7pm. Oakdale Comprehensive School, Oakdale, Blackwood,. Gwent. Sec GW8UAM. This club does not meet during the school holidays.
Bridgend (B&DARS, GW4LNP)—First and third Fridays in each month, 7.30pm. YMCA Angel St (near Recreation Centre). Sec GW1LWC, tel 0443 226198.
Bristol (B Channel Repeater Group, GB3BC)—Sec GW6MBU, tel Barry 711146.
Cardiff (CRSGBG, GW5BI)—Second Monday in each month, 7.30pm. Pantmawr Hotel, Tyla Teg, Pantmawr Estate, Whitchurch, Cardiff. 14 July (Lecture 4 in the antenna series, "Measurements and compromise antennas", GW3RWX). Sec GW0CUM, tel Cowbridge 3212.
Cardiff (Highfields ARS, GW4LFO, GW1LFO)—Thursdays, 7pm. Highfields Handicapped Centre, Allensbank Rd, Cardiff. Sec GW6ZHM, tel 0222 750315.
Carmarthen (CARS, GW4YCT)—Second and fourth Fridays in each month, 7pm. West Wales Hospital Social Club, The Quay, Carmarthen. New sec not yet notified.
Chepstow (C&DARS, GW4LWZ)—Tuesdays, 7.30pm. Chepstow Leisure Centre. Club net every Sunday, 8pm. 144/5MHz fm. Sec GW1FJI, tel Chepstow 2808.
Cwmcynon (CARS, GW3FFE)—Sec R Allwood, GW4AUJ, 7 Daniel St, Cwmbach, Aberdare.
Fishguard (F&DARS)—Wednesdays, 7.30pm. Radio Shack, FE Centre, Ropewalk, Fishguard, Pembs, Dyfed. Sec GW3DWY, tel 0348 872671.
Llanelli (LARS)—Second and fourth Monday of each month, 7pm. Disabled Drivers Association Hall, Albert St, Llanelli. Sec GW1MGW, 1 Maestir, Felinfoel, Llanelli, Dyfed SA15 3NS.
International Listeners Association—Details from sec GW4OXB.
Lougher (LRA&EC, GW4HVL)—Thursdays fortnightly, 7.45pm. Lougher Scouts Hall, Lougher, Gorseinon. Sec GW8TYS, tel Gorseinon 893392.
Merthyr (Hoover [Merthyr] GW3RDB)—c/o Engineering Dept, MP9, Hoover Ltd, Pentrebach, Merthyr Tydfil.
Newport (NARS, GW4EZW)—Mondays, 7pm. Brynglas House, Brynglas Rd, Newport. Sec GW6ZUQ, tel 02912 6867.
Pembroke (P&DRAC, GW2OP)—Last Friday in each month, 7.30pm. Defensible Barracks, Pembroke Dock. Also a mid-monthly meeting on Sunday afternoon. Sec GW6EHC, tel 0646 686532.
Pontypool (PARS)—Tuesdays (excluding Bank Holidays) 7pm. The Settlement Adult Centre, Rockhill Rd, Pontypool. Sec GW4RJA, tel Cwmbran 06333.
Port Talbot (British Steel Corporation ARS, GW3OEP)—Thursdays, 7.30pm. BSC Sports & Social Club, Port Talbot, First Thursday reserved for general meeting. Sec GW4IGR, tel 0639 720416.
Powys (PARC, GW4HVN)—Thursdays, 7.30pm. Cricket Pavilion, Montgomery. Sec GW4DWX, tel Welshpool 2068.
Radio Club (LCR [Tredegar] ARC, GW4IYD)—Tuesdays, 7.15pm. MIM Factory, North Ave, Tredegar (Portacabin just inside the gates). Sec GW1EXF, tel 049525 6560.
Red Dragon Contest Group, GW8GT—Sec GW3KYA.
Rhondda (RARS, GW2FOF)—Thursdays, 7.30pm. National Union of Mineworkers' Club, Tonypandy. 10 July (Natter night), 24 July (Llanwonno mobile, evening), 7 August (Natter night). Sec GW4BUZ tel Tonypandy 432542. **NB** get ready to enrol on RAE course at Rhondda College of Further Education. Enrolment week commencing 1 September.
South East Wales (SEW Repeater Group, GB3SG)—Sec GW6CUR.
Swansea (SARS, GW4CC)—First and third Thursdays in each month, 7.30pm. Lecture Room N, Applied Sciences Building, Swansea University. Sec GW4HSH, tel Swansea 404422.
Swansea (SRACC)—Sec Mr Morgan, 1 Jersey St, Hafod, Swansea.
Swansea (UCoARS)—Sec R B Hughes, Electrical

Eng Dept, University College, Singleton Park, Swansea.
West Wales (WW Repeater Group, GB3WW)—Contact, 7 Crofton Drive, Baglan, Port Talbot.

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

Area representatives:
R H Tyson, GW6HUV, Conway Valley
A Evans, GW4HDR, Rhyl and district
P E W Allely, GW3KJW, Pwllheli.

Bangor (Dragon ARC)—First and third Monday of each month. Bangor Rugby Clubhouse. Sec W Williams, 32 Ty Groes Estate, Llanfair PG, Anglesey, Gwynedd LL61 SJR.
Colwyn Bay (Conwy Valley ARC, GW6TM)—Second and third Thursday of each month, 8pm. Green Lawns Hotel, Bay View Rd, Colwyn Bay. 10 July (Discussion evening). Sec GW4VVW, tel 0492 636376.
Deeside (Alyn & DARS)—Mondays, 8pm. Shotton Social Club, Shotton Lane, Deeside. 7 July (Meeting). Sec GW1ILZ.
Dolgellau (Meirion ARS)—First Thursday of each month. Sec GW3KOR.
Holyhead (H&DARS)—Alternate Sundays, 8pm. Foresters Arms, Kingsland, Holyhead. Sec B Anziani, tel 0407 50577.
Porthmadog (P&DARC)—Third Thursday of each month, 8pm. The Harbour Cafe, Ffestiniog Railway, Porthmadog. 17 July (Foxhunt), 21 August (Foxhunt). Sec GW1EGQ, tel 0766 2684.
Rhyl (R & DARC, GW4ARC)—First and third Mondays of each month, 7.30pm. Second Rhyl Scout HQ, Vale Rd, Rhyl. 7 July (RSGB video), 21 July (Activity night), 4 August ("Raynet", GW4PUX). Sec GW8OYT, tel 0745 37284.
Wrexham (WARC)—Meetings, 7pm. Friends Meeting House, Holt Rd, Wrexham, Clwyd. Sec G4HRH, tel 0948 5161.

Would club secretaries please send their club programmes for October 1986 onwards as soon as possible, to that I may insert them in "Club News." *RR11*

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

Aberdeen (ARC)—4 July (Junk sale and VHF NFD preparation), 11 July (Holiday gardening), 13 July (GB4BGG at the Beechgrove Garden Open Day), 17 August (GB4BGG as above). 7.30pm. 35 Thistle Lane, Aberdeen. Sec GM4GXD, tel Pitcaple 251.
Caithness (ARS)—Second Wednesday of each month, 7.30pm. The Loch Watten Hotel, Watten, (between Thurso and Wick). Sec GM1AHC, tel 0847 63638.
Dundee (Kingsway Tech ARC)—Sec GM4UZP, tel Dundee 644579. Alf has taken over as sec following the death of GM4WEQ, who was also area representative. RSGB correspondence to RR12 please until John's successor is appointed.
Elgin (Moray Firth ARS)—First Wednesday of each month, 7.30pm. Spey Bay Hotel, Fochabers. Remaining Wednesdays in the society's room, Moray College of Further Education, 7.30pm. Sec GM4IZY, tel Elgin 41549. **NB** correspondence should be sent to the sec and not to the college.
Forfar (F&DARC)—46 High St, Kirriemuir. Sec GM3ZXE, tel 082-85 312.
Grampian (GRG)—Sec GM6VGL, tel Aberdeen 702228.
Inverness (Black Isle RG)—GM4UMA, tel Beauly 782106.
Inverness (ARC)—Thursdays, 7.30pm. Cameron Youth Club, Planefield Rd, Inverness. Sec GM1GFX, tel 0463 242463.
Kirkwall (Orkney)—First Wednesday of each month. Sec GM3IBU, tel Kirkwall 3273 (office hours).
Lerwick (LRC)—Thursdays, 7pm. Isleburgh Community Center, King Harrold St, Lerwick. Sec GM3ZET.
Perth (P&DARC)—Tuesdays, 7.30pm. Perth City Sports & Social Club, Leonards St, Perth. Sec GM6OFO, tel Perth 28621.
Yell (YARC)—Thursdays, 6pm. North Isles Motel, Yell, Shetlands. Sec GM4FNE.
Unst (URC)—Sec GM3STU.

If your club is missing or the details are incorrect ask your club secretary to contact me. *RR12*

REGION 13—RR A J Scott, GM8BDX, 2 Manderston Grove, Duns, Berwickshire. Tel 0361 83221.

Border (BARS, GM0BRS)—Contact GM1IRN, tel 0289 82491 for summer activities.
Dunfermline (DRS, GM3IDS)—Thursdays, 8pm. Club station operational from Knockhill. Sec GM1OIN, tel 0383 414283.
Galashiels (G&DARC, GM4YEQ)—Wednesdays, 7.30pm. Focus Centre, 24 August (Club open day, Gala Rugby Club HQ, Netherdale). Sec GM0AMB, tel 55569.
Kelso (KARS, GM4KHS)—Mondays, 7.30pm. Abbey Centre. Sec GM3VLB, tel 24664. The society was delighted at the response/attendance at the rally on 4 May, and is planning an even better event in 1987.
Leslie (Glenrothes & DARC, GM3ULC, GM4GRC)—Wednesdays and third Sunday of each month, 7.30pm. Main activity is the arrangements for '86 Scottish Convention at Lomond Centre on 13 September. Sec GM3ZSP, tel 0334 53336.
Lothian (LRS, GM3HAM)—Society organizing special event station GB0CG, 24 July to 2 August. Details GM4HWO, tel 031-332 5502. A topband df hunt has been arranged for August, tel GM4YPL, tel 0506 890177.

REGION 14—RR T G Wylie, GM4FDM, 3 Kings Crescent, Elderslie PA5 9AD Tel Johnstone (0505) 22749.

Ayr (ARG)—Second and fourth Friday of each month, 7.30pm. Community Leisure Centre, 24 Wellington Square, Ayr. 18 July (VHF field day post mortem). Details GM3THI.
Cumnock (C&DARG)—First Thursday of each month. The Netherthird Community Centre, Cumnock. Details GM1SXZ, tel 38786.
Dumfries (D&GREC)—First and third Monday of each month, 8pm. The Cargenholm Hotel, Dumfries. Details GM4NNK.
Dumfries (MARK)—Twice monthly on Wednesday evenings, 8pm. The Tam O'Shanter Inn, Queensbury St, Dumfries. Details GM4NNC.
Dunoon (D&DARC)—Fridays, 7.30pm. Community Centre, Edward St, Dunoon. Details GM0BUL.
Falkirk (FARC)—First and third Wednesday of each month, 7.30pm. The Grange Centre, Redding Rd, Brightons by Falkirk. Details GM3XQJ.
Glasgow (WOSARS)—Fridays, 8pm. 154 Ingram St, Glasgow, CW classes available. Computer section alternate Wednesdays. Details GM0DZP.
Greenock (G&DARC)—Fridays, 7.30pm. 22 Inverkip St, Greenock. Details GM0ADF.
Helensburgh (HARC)—Thursdays, 7.30pm. Cairndhu House, Rhu Rd, Helensburgh. Computer section. Sec Mr J Thomson, 37 Grant St, Helensburgh.
Irvine (C&DARC)—Tuesdays and Thursdays, 7.30pm. The Community House, 1 Bonnyton Row, Girdle Toll, Irvine. Sec GM0DWH.
Kilmarnock (K&LARC)—Tuesdays, 7.30pm. The Glenfield Social Club, Queens Drive, Kilmarnock. Details GM4XGW.
Loch Lomond (LLARC)—Wednesdays, 7pm. Bonhill High Dykes Primary School, Bonhill. Details GM4LKJ.
Lochgilphead (MAARC)—First Monday of each month. The Stag Hotel, Lochgilphead. Details GM4VXA.
Motherwell (MLARS)—Fridays, 7.30pm. Wrangholm Hall Community Centre, Jerviston St, Motherwell. Details GM4UXX. CW and RAE classes available.
Oban—GM4AIE is attempting to start a club in the Oban area. Meets second Tuesday in each month, the Westbay Hotel, Oban. Details GM4AIE, tel 63399.
Stirling (SADARS)—Second and fourth Thursday of each month. The Argyll Centre, Princes St, Stirling. Details GM0BFS. RAE and cw classes available.
Stranraer (WARC)—Thursdays, 7.30pm. Communicy Centre, Lewis St, Stranraer. Details GM4BAE, "Northbrae", Brookfield Crescent, Stranraer, RAE classes available.

Please advise me of any changes in club details after your agm. Programmes for August/September should be forwarded asap. *RR14*

REGION 15—RR R Parsons, GI3 HXV, 45 Erinvale Avenue, Belfast BT10 0FP Tel 0232 612322

Ballyclare (E Antrim ARC, GI4KKK)—Second Tuesday in each month, 8pm. Fairview Primary School, Ballyclare. Sec GI4PRH.
Ballymena (BRC, GI3FFF)— Thursdays, 8pm, and Sundays, 3pm. 10 Nursery Rd, Grace Hill, Ballymena. Sec GI4HCN. RAE class, Wednesday evenings, GI4OZT.
Banbridge (Mid-Ulster ARC, GI4BAC)—Second Sunday in each month, 3pm. Guide Hall, Castle Hill, Gilford, Co Down. Sec GI1BIW.
Bangor (B & D ARC, GI3XRQ)—First Friday in each month, 8pm. Royal Hotel, Bangor. Sec GI4OCK.
Belfast (C of B YMCA RC, GI6YM/GI6YMC)—Tuesdays, 7pm, and Saturdays, 2.30pm. Club Room, 4th Floor, YMCA, Wellington Place. Belfast.
Belfast (RSGB Group)—Third Wednesday in each month, 8pm. 90 Belmont Rd, Belfast. AR GI6ATZ.
Belfast (QUBRC GI3LLQ/GI8FQB)—Tuesdays, 7.30pm (term and vacation). 37 Fitzwilliam Street, Belfast. Operational 3·5-430MHz. Contact GI4WWF or tel 0232 661111 Ext 4006. Morse and RAE tuition available.
Coleraine (North-West ARC GI4DBB)—First Tuesday in each month, 8pm. Scout Hall, The Crescent, Coleraine. (Meetings suspended) Sec GI4KIG.
Enniskillen (Lough Erne ARC)—Third Monday in each month, 8pm. Railway Hotel, Enniskillen. Sec GI4CZW.
Larne (L & D ARS GI4PHA)—First and third Wednesday in each month, 8pm. 100 Glenarm Rd, Larne. Sec GI4CPP. RAE class each Thursday, GI4UUC.
Lisburn (Lagan Valley ARS GI4GTY)—Second Monday in each month, 7.30pm. Rathvarna Teacher's Centre, Pond Park Rd, Lisburn. Sec GI4TCS.
Londonderry (North West of Ireland ARC, GI3CFH)—First Monday in each month, 7.30pm. Prehen Municipal Boathouse, Victoria Rd, Londonderry. Sec GI4OUN.
Moneymore (Magherafelt ARC GI4OMA)—Third Tuesday in each month, 8pm. Manor Hotel, Moneymore. Sec GI3SOO.
Moy (Armagh, Dungannon DARC GI4FVN)—Second Tuesday in each month, 8pm. Meets Lonsdale St, Armagh. For membership contact GI8RNX.

REGION 16—RR A Owen, G4HMF, 102 Constable Rd, Ipswich, Suffolk. IP4 2XA.

Basildon (Marconi ARS)—First Monday of each month, 8pm. The Shack, GEC Avionics Social Club, Gardiners Way, Basildon. Sec G8PKM, tel 0245 323323.
Braintree (B&DARS)—First and third Monday of each month, 8pm. The Community Centre, Victoria Rd (next to Bus Station), Braintree. Details G0EMK (temp. 88 Coldnailhurst, Braintree CM7 5PY, tel 0376 25587).
Bury St Edmunds (BStEARS)—Third Tuesday of each month, 7.30pm. Westgate Primary School, off Hospital Rd, Bury St Edmunds. 15 July ("Repeaters past and present", G8HVV). Sec G1FUU, tel 0358 50271.
Canvey Island (SEARS)—Wednesdays, 7.30pm. The Paddocks, Long Rd, Canvey Island. Sec G4FMK, tel 0268 683805.
Chemlsford (CARS)—First Tuesday of each month, 7.30pm. Marconi College, Arbour Lane, Chelmsford. Sec G4KQE, tel 0376 83094.
Colchester (CRA)—Alternate Thursdays, 7.30pm. Colchester Institute, Sheepen Rd, Colchester CO3 3LL. 20 July (Anglian Mobile Rally). Sec G3FIJ, tel 0206 851189.
Dengie Hundred (DHARC)—Second Thursday in each month, 7.30pm. Burnham Sailing Club, The Quay, Burnham-on-Crouch. Sec G6ZSJ, tel 0621 784225.
Felixstowe (F&DARS)—Alternate Mondays, 8pm. The Feathers PH, Walton High St, Felixstowe. 14 July (Social), 28 July ("Hospital Radio", P and B Hoger). Sec G4YQC, tel 0473 642595.
Great Yarmouth (GYRS)—Thursday fortnightly, 7.30 for 8pm. STC Sports & Social Club, Beevor Rd, South Denes, Great Yarmouth. Sec G3NHU, tel 0493 721173.
Harlow (H&DRS)—Tuesdays, 8pm. Mark Hall Barn, First Avenue, Harlow. Sec G4PGB, tel 0279 722612.
Haverhill (H&DRS)—Fridays, 7.30pm. Copse Hall Farm, Bumpstead Rd, Haverhill. Sec G4MVK, tel 0440 61207.
Ipswich (IRC)—Second and last Wednesday of each month, 8pm. Rose and Crown PH, Norwich Rd, Ipswich. 3 July (ESWR post mortem), 31 July (DF hunt). Sec G4IFF, tel 0473 44047.
International Police Association (IPARC BRIT,

G4IPA)—Sec B Boon, G4TRE, 32 La Plata Grove, Brentwood CM14 4LA, tel 0277 231077.
Leiston (LARC)—First Tuesday of each month, 7.30 for 8pm. Sizewell Sports & Social Club, King George's Ave, Leiston. Sec J Scott, G0CJX, Old Police House, Main Rd, Benhall, Saxmundham IP7 1JY (XD 3222).
Loughton (L&DRAS)—Alternate Fridays, 8pm. Debden Community Centre, Loughton Hall, Rectory Lane, Loughton. 4 July (The story of Laser 558). Sec G4FKI.
Lowestoft (LP&PYEARC)—In abeyance, contact A Seago, G4KDL, 50 Kimberley Rd, Lowestoft NR33 0TZ, tel 66289.
Martlesham (MRS)—Occasional first Wednesdays, 7.30pm. British Telecom's Research Labs, Martlesham Heath, Ipswich. Sec G4SYG, tel 0473 643317 (work). Visitors must book in advance with sec.
Norwich (NARS)—Wednesdays, 8pm. Valley Drive Community Centre, 79 Plumstead Rd, Norwich. Sec G4WTR, tel 0603 610874.
Rochford (RDRC)—Second Monday in each month, 7.30pm. Civil Defence Building, Rochford. Sec D Taylor, G3FGC, 265 Ferry Rd, Hullbridge SS5 6NA.
Saffron Walden (SW&DRAS)—Third Wednesday in each month, 8pm. Sec G6KDW, tel 0799 22715.
Southend (S&DARS)—Fridays, 7.30pm. Rocheway Centre, Rocheway, Rochford. Sec G3YOA, tel 0268 781126.
Stanford Le Hope (SLH&DARC)—Mondays, 8pm. St Joseph's Parish Rooms, Scratton Rd, Stanford Le Hope. Sec G4OVG, tel 0375 642312.
Stowmarket (S&DARS)—Temporarily suspended.
Thurrock (TARC)—First and third Tuesday of each month, 8pm. Grays Park Hall. Sec T Bass, G3KMD, 32 Whitmore Ave, Grays, Essex RM16 2HX.
Vange (VARS)—Thursdays, 8pm. Barstable Community Centre, Basildon. 3 July (Junk sale), 6 July (Picnic). Sec D Thompson, tel 0268 552606.

The details from Basildon, Canvey Island, Dengie Hundred, Great Yarmouth and Haverhill are probably so out of date as to be useless. How about getting in touch? *RR16.*

REGION 17—RR T Emery, Wilverley, Old Lyndhurst Road, Cadnam, Southampton SO4 2NL. Tel 0703 812435.

Andover (ARAC)—First Tuesday and third Wednesday of each month, 8pm. Wolversdene Club, Andover. Club net Tuesdays, 8pm, S18, G0ARC/A. 1 July (Visit to Salisbury club for quiz), 16 July ("Videcon history show", G8AER). Sec G0AMO, tel 51593.
Basingstoke (BARC)—First Monday of each month, 7.30pm. Forest Ring Community Centre, Sycamore Way, Basingstoke. 144MHz Foxhunt on last Sunday of each month, 2.30pm. 7 July ("Introduction to packet radio", G4NNS), 4 August (Natter night). Sec G4WIZ, tel Tadley 5185.
Binstead (IOW BARS)—Wednesdays, 7.30pm. Binstead Scout HQ. Morse lessons, RAE tuition, also amtor and atv is demonstrated on selected evenings. Sec G4VJF, tel Ryde 66298.
Blackmore Vale (BVARS)—Second and fourth Tuesday of each month, 7.45pm. The Bell and Crown PH, Zeals (on the A303). 8 July ("Raynet"), 22 July (Project night). Sec G4YXX, tel 0963 32389.
Botley (Amateur Radio and Computer Club, AMRAC)—8pm, Botley Grange Hotel, Botley, Hants. Results of agm: chairman, G4ZRT; treasurer, G1JAF. 4 July (TBA). Sec G6DLJ, tel 0703 891975.
Bournemouth (BARS)—First and third Friday of each month, 7.30pm. Kinson Community Centre, Kinson, Bournemouth. 4 July (Natter night), 18 July ("Topband transceiver", T Emery). Sec G4EKE, tel 0202 877945.
Chippenham (C&DARS)—Tuesdays, 7.30pm. Chippenham Sea Cadet HQ. Sec G4GFJ, tel 02214 4190.
Devizes (D&DARS)—Fridays, 8pm. Football Club Social Club, Nursteed Rd, Devizes. Sec G3MQD.
Eastleigh (Itchen Valley ARS)—Alternate Fridays, 7.30pm. The Scout Hut, Brickfield Lane, Chandlers Ford, Hants. 4 July ("The Communications & Electronics Museum", G3KPO), 18 July (Natter night). PRO G0EQG, tel Winchester 55339.
Fareham (F&DARS)—2 July ("Raynet", SE Hants Raynet), 16 July (Junk sale), 30 July (Portable planning), 9, 23 July (Natter nights). 7.30pm. Portchester Community Centre, Portchester, Hants. Sec G3CCB, tel 288139.
Farnborough (F&DARS)—Second and fourth Wednesday of each month. Railway Enthusiasts Club, Access Rd, off Hawley Lane, Farnborough. PRO G4SBU.
Gosport (Rowners & DARS)—16 July and every alternate Wednesday, 7.30pm. Searles Mfg Co, Newgate Lane, Fareham (opposite HMS Collingwood). Sec G6NUD.
Guernsey (GARS)—Tuesdays and Fridays, 8pm. The Lodge, La Corbinerie, Oberlands, St Martins, Guernsey. Sec GU1PMY, tel 0481 26392.
Hordean (H&DARC)—First Thursday of each month, 7.30 for 8pm. Murchiston Hall, London Rd, Horndean. 3 July ("A G6NZ special"). PRO G4BEQ. **NB** 1986 is 10th anniversary year of the club with a special award.
Jersey (JARS)—Fridays, 8pm, Sundays 10am. Le Hocq Tower, St Clement. Sec GJ4TXB, tel 24328.
Jersey (JAEC)—Club HQ, Belmont Rd, St Helier. Details GJ4ICD, tel 0534 77067 (day), 26788 (night).
Liphook (Three Counties ARC)—9 July ("History of Uosat", G8VLY), 23 July ("CW operating", G4RRA). 8pm. The Railway Hotel, Liphook. Sec G0BTU, tel Petersfield 66489.
New Forest (NF Repeater Group, GB3NF)—For information or to join the group and help support the repeater, contact G6DLJ, tel 0703 891975.
Plessey (Christchurch ARS)—Second Thursday of each month. Plessey Social Club, Grange Rd, Christchurch, Dorset. Sec G1PFX.
Poole (PARS)—Last Friday of each month, 7.30pm. Commander's House, Constitution Hill Rd, Poole. Results of agm: chairman, G6MXL; treasurer, G3ZPR. 25 July ("Story and data of GB3SC"). Sec G4XYX. The winners of the Construction Contest were: Junior, G1OCQ, for power meter and Senior, G1GOR, for hf converter.
Portsdown Hill (PH Repeater Group, GB3PH)—for information or to join the group and help support the repeater, please contact A L G Price, tel 0329 281852.
Portsmouth (Marconi EARS)—Last Tuesday of each month, 8pm. Broad Oaks Canteen, Portsmouth Airport. Sec G3FWE.
Salisbury (SRES)—Tuesdays, 7.30pm. Grosvenor House, Churchfield Rd, Salisbury. Sec G4LDR, tel 0980 22809.
South Hants (SH International Telegraphy Society)—Thursdays, 7.30pm. The Community Centre, Malins Rd, Portsmouth. Morse classes Monday. Sec G3JZV.
Southampton (SARS)—2 July (At Southampton show site), 16 July (Natter night). 7.30pm. Millbrook Community School, Green Lane, Southampton. Sec G4VKB. **NB** no meetings in August.
Southampton (SUARS)—Mondays, 7.30pm. 65 University Rd, Southampton. PRO G4STF via Student's Union.
Swindon (S&DARC)—Thursdays, 7.30pm. Oakfield School, Marlow Ave, Swindon. 10 July ("Photography", G1MCS), 3, 17 July (Natter nights). Next meeting 4 September. Sec G4YQZ.
Trowbridge (T&DARC)—Fourth Tuesday of each month, 8pm. Southwick Village Hall, Trowbridge. Sec G4SPE, tel 4532.
UK FM Southern Repeater Group (GB3SN)—For information or to join the group and help support the repeater, please contact Mrs J Steele, tel Fleet 3311.
Waterside (WSWC)—Second and fourth Tuesday of each month, 7.30pm. Blackfield Community Centre, Blackfield, Southampton. Sec G1MKY.
Wessex (W Amateur Wireless Club)—Alternate Tuesdays, 8pm. The Cricketers, Wimborne. Chairman G6SDQ, tel 0202 822125.
Weymouth (SDARC)—First Tuesday of each month, 7.30pm. Army Bridging Camp, Wyke Regis. Results of agm: chairman, G4VBY; treasurer, G3EAT. 1 July ("Theory and construction of psus", G4VBY). Sec G1AHK, tel 0305 67596.
Wimborne (FRARS)—Sundays, 7.30pm. Flight Refuelling Social Club, Merley, Wimborne. 6 July (Video), 13 July (Natter night), 20 July ("Antenna tuner units", G3RZP), 27 July ("Air traffic control", G3AAD), 3 August (Preparation for Hamfeast '86 on 10 August). Sec G0CDY.
Winchester (WARC)—Third Friday of each month, 7.30pm. Durngate House, Winchester. 18 July ("Topical quiz", G4NBU). Sec G4ZNO, tel 0703 772191.

REGION 18—RR Ian Gibbs G4GWB, 61, The Gables, Widdrington, Morpeth, NE61 5QZ. Tel 0670 790090.

Aycliffe & Shildon (ARC, G4ZKZ)—Tuesdays, Scout HQ, 4 Cross St, Shildon. **NB** new sec G4OHZ, tel 0325 314638.
Berwick (Borders ARS, G0BRS)—First and third Friday evenings of each month. Tweed View Hotel, Tweed St, Berwick. Sec GM1IRN, tel 0289 82491.
Bishop Auckland (RAC G4TTF)—Monday and Thursday evenings. Travellers Rest Pub, Evenwood. Sec G0ACY.
Blyth (ARC G4VKY)—Wednesday evenings, the Community Centre, Warwick St, Blyth. Sec G1JFW tel 0670 353069.
Consett (Derwentside ARS, G4PFQ)—Monday evenings, Consett Assocation, FB Club, Belle Vue Park, Consett. Sec G3KMG, tel 0207 504198.
Durham (DARS)—Friday evenings, Rowing Club, Green Lane, Durham City. Sec G4WJV, tel 0783 853552.
Durham (UOD R&ES, G4DUR)—c/o Mr Puddephat, Grey College, South Rd, Durham City.
Easington (ARS, G4APN/G6APN)—Tuesday and Thursday evenings, Easington Workmen's Club, Seaside Lane, Easington. Sec G4RIK, tel 0783 815331.
Great Lumley (R&ES, G4EUZ)—Wednesday evenings, Community Centre, Great Lumley. Sec G4MSF, tel 091 4693955.
Hartlepool (HARC)—Monday evenings, Grange Rd, Methodist Church Hall, Tankerville Street entrance. Sec G4SHJ, tel 0429 67419.
Hazelrigg (NER&CC, G4YPT)—Monday evenings, Village Hall, Hazelrigg. Sec, G1HDV, tel 0632 2742413.
Hetton le Hole (Houghton le Spring ARC, G3NMD)—Wednesday evenings, Hettondowns Hotel, Hetton. Sec G4ULJ, tel 0783 841897.
Middlesbrough (Post office ARC, G8GPO)—Thursday evenings, 6 Lytton St, Middlesbrough. Details G4ZML, tel 0642 244501.
Morpeth (Northumbria ARC, G4AAX, G6AAX)—Thursday evenings, Old Telephone Exchange, Cresswell Rd, Ellington, Morpeth. Sec G0EVV (G6IIA), tel 0670 513026.
Newcastle (Tyndale ARC, G4ONQ)—First Tuesday evening of each month, 8.30pm. French Arms pub, Throckley, Newcastle. Sec G0DZG, tel 091 2742840.
Redcar (East Cleveland ARS, G4CRS)—Friday evenings, RAFA Club, Newcomen Tce, Redcar. Sec G1GMF, tel 0642 474769.
South Shields (South Tyneside ARS, G3DDI)—Monday evenings, Marine & Tech College Club, South Shields. Sec G4XWR, tel 0632 543955.
Stockton (S&DARG G4XXG)—Wednesday evenings, Billingham Community Centre. **NB** new sec G1NOY, tel 0325 310058. RAE and cw classes in progress.
Sunderland (SARS, G4LPK, G6BXJ)—Monday and Thursday evenings, and Sunday mornings 11.30am to 1pm. Sec G4WMW tel 0783 343295.
Washington (W&DARC, G4YGW)—Sunday evenings, Oval Community Centre, District 12, Washington. Sec G6EPS, 091 4168648.
Whitley Bay (Tyneside ARS, G3ZQM)—Wednesday evenings, Community Centre, Earsdon. Sec G4KOT, tel 091 2341148.

REGION 19—RR R J C Broadbent, G3AAJ, 94 Herongate Road, Wanstead Park, London E12 5EQ. Tel 01-989 6741.

Barking (BDARS)—Details G4UIF, tel 01-594 0291.
Borehamwood (BEARS)—Third Monday of each month, 7.30pm. The Wellington, Theobald St, Borehamwood, Herts. Details G0DDJ, tel 01-207 3809.
Cheshunt (CDARC)—8pm. Church Rooms, Church Lane, Wormley, Herts. Club net frequency 144·535MHz 8–11pm, call G4MGC. Sec G4VMR and G4VSL, tel 0920 84250. All welcome to this club at any meeting. Morse classes are also held.
Chiswick (ABCARC)—15 July (Discussion on homebrew equipment). 7.30pm. Chiswick Town Hall, High Rd, Chiswick, London W4. Sec G3GEH, tel 01-992 3778.
Edgware (E&DRS)—10 July ("Microwaves", T Bordy), 20 July (Low Power FD, Copthall Stadium), 24 July (Informal). 145 Orange Hill Rd, Burnt Oak, Edgware. Details G4RMD, tel Hatfield 64342. Edgware 80M net on 3,775kHz at 9.15pm. All welcome to these meetings.
Grafton (GRS)—Details G3MCD, 40 Brookland Rise, London NW11 6DS.
Harrow (RSH)—Meetings at the Roxeth Room, Harrow Arts Centre, High Rd, Harrow Weald, Middlesex, Talk-in GB3HR. Details G8XBZ, tel Rickmansworth 779942.
Havering (HDARC)—2 July (Quarterly business meeting), 9 July (Informal), 16 July (DF hunt), 23

July (Informal), 30 July (TBA). 8pm. Fairkytes Arts Centre, Billet Lane, Hornchurch, Essex. Sec G0BOI. All welcome.
London (CSARS)—7, 21 July (Lunchtime natter, 12.30pm with GB3CSR from Monck St, Westminster SW1). Station manager B Treacher, tel 01-212 8823. Sec G6IMM, tel 01-698 4437.
London (NSYARS)—Not open to the public. Club station active from time to time using G4NSY and G6NSY. Sec Room 99, New Scotland Yard, Broadway, London SW1H 0BG.
Southgate (SARC)—10 July ("Homebrewing—alcohol type", K Roberts). 8pm. Holy Trinity Church, Green Lanes, Winchmore Hill, London N21. Sec G4YLL, tel 0992 30051.
Stevenage (SDARS)—First and third Tuesday of each month, 8pm. SITEC Ltd, Ridgmond Park, Telford Ave, Stevenage. Details G3OVT.
Herts (SW Herts UHF Group)—This group maintains GB3HR on RB14 located at Stanmore. The group would welcome donations to help maintain this repeater which was put into operation for all to use. Donations and details G3CWB.
St Albans (Verulam ARC)—8 July (Activity evening), 22 July ("Running hot and cold dxpeditions", G3RFS and G4OBH). 7.45 for 8pm. RAFA HQ, New Kent Rd, St Albans. Details G Wimpenny, tel St Albans 52003. PRO G4DUS, tel 0923 720616.
Welwyn (WHARC)—First and third Monday of each month, 8pm. 9th WGC Scouts HQ, Knightsfield, Welwyn Garden City, Herts. 7 July (Informal and NFD analysis and foxhunt briefing), 21 July (The foxhunt). Details G0AII, tel 0707 326138. Morse classes on Thursdays. All welcome.

REGION 20—C R Hollister, 34 Battersby Way, Henbury, Bristol BS10 7SU. Tel 0272 508451.

Bath (B&DARC)—Alternate Wednesdays, 8pm. Englishcombe Inn, Englishcombe Lane, Bath. Club station G4TMH regularly operating. Details, G6EIY, tel 0225 318128, or G3FIH, tel 0225 837539.
Bath (Downside School ARS)—Details Physics Department, Downside School, Stratton-on-the-Fosse, Bath, Avon.
Bridgewater (Sedgemoor ARC)—Third Wednesday in each month, 7.30pm. Bridgwater Sea Cadets HQ, The Docks, Bridgwater. Details G4EHU, tel Bridgwater 455923.
Bristol (BARC)—Tuesday, 7.30pm. YMCA, Park Rd, Kingswood, Bristol. Details G4YOC, tel Bitton 4116.
Bristol (BRSGBG)—28 July ("HF Propagation", G3LTP). 7.30pm. Small Lecture Theatre, Bristol University. Details G3SQQ, tel 0272 508451, or G4ROX, tel 0272 513573.
Bristol (First Crockern Scouts SWG)—Details P Knowles, tel 8814248.
Bristol (HTVRC)—Details G3TKF, tel Keynsham 3965.
Bristol (North Bristol ARC)—4 July (Natter night and committee meeting), 11 July ("27MHz to 28MHz", G4TRN), 18 July (HF activity night), 25 July (Talk), 1 August (Natter night and committee meeting). 7pm. SHE, 7 Braemar Crescent, Northville, Bristol. Details G4YQQ, tel 0272 690404.
Bristol (South Bristol ARC)—Wednesdays, 7.30pm. Whitchurch Folk House, East Dundry Rd, Whitchurch, Bristol BS14 0LN. Details G4RZY, tel Whitchurch 834282.
Bristol (UoBARS)—Details M Posen, G6DYY, c/o Students Union, Bristol University, Queens Rd, Clifton, Bristol BS8 1LN.
Bristol (432MHz Repeater Group, GB3BS)—Details G4MCQ.
Cheltenham (CARA)—4 July (Pre VHF NFD meeting), 17 July (50MHz evening, bring your 50MHz gear). 7.30pm. Stanton Rooms, Charlton Kings Library, Cheltenham. Details G4VXE, tel 0242 26723.
Cheltenham (Government Communications ARC)—Details c/o GCHQ, Benhall, Cheltenham.
Cheltenham (Smiths Industries RS)—Alternate Thursdays, 7.45pm. Club House, Newlands, Bishops Cleeve. Details G8UJG, tel Bishops Cleeve 2175 or 3333 ext 2511.
Cirencester (C&DARC)—Alternate Thursdays, 7.45pm. Phoenix Centre, Beeches Rd, Cirencester. Details G0AXD, tel Cirencester 5015.
Gloucester (GARS)—2 July ("Amtor and packet radio", G3WHO), 9, 16, 23, 30 July (Natter nights). 8pm. RAE and morse classes, 7pm. St John Ambulance HQ, Heathville Rd, Gloucester. Details G6AWT, tel 0452 504515.
Mendip (M Repeater Group)—GB3WR, 144MHz repeater, GB3UB and GB3US, 432MHz repeaters and GB3UT 1·3GHz tv repeater. Details and applications for membership from G8GMZ, tel Midsomer Norton 413902.
Portishead (Gordano ARG)—Fourth Wednesday of each month, 7.30pm. Ship Hotel, Down Rd, Portishead. Details G3LJD.
Shepton Mallet (Mid Somerset RC)—Alternate Sundays, 7.30pm. The Kings Arms, Shepton Mallet. Details G4WZF, tel Chilton-Polden 722946.
Shirehampton (SARC)—Fridays, 7.30pm. Twyford House, High St, Shirehampton, Bristol. Details G4GTD.
Street (S&DARS)—First Tuesday of each month, 7.30pm. Strode College, Church Rd, Street. Details G4SCD, tel 0458 45145.
Stroud (SARS)—9, 23 July (Meetings). 7.30pm. Nelson School, Stratford Lodge, Stroud. Details G0DZM, tel 045-383 2773.
Stroud (S&DARS)—Tuesdays, 7.30pm. Scout HQ, Parliament St, Bisley Rd, Stroud. Details G3TEV.
Taunton (T&DARS)—Fridays, 7.30pm. Basement, County Hall, The Crescent, Taunton (opposite the Crescent Car Park). Details G4ZLF.
Thornbury (T&DARC)—First Wednesday of each month, 7.30pm. White Horse Inn, Groves End (A38). Details G8AZT.
Wells (EMI Sports & Social Club RC)—Cedar House, Chamberlain St, Wells, Somerset BA5 2PJ.
Weston-super-Mare (RAFARS)—Headquarters station of RAFARS. Details Admin Secretary, RAFARS, RAF Locking, Weston-super-Mare, Bristol BS24 7AA.
Weston-super-Mare (WsMARS)—Second Monday of each month, 8pm. Rugby Club (off Drove Rd), Weston-super-Mare. Details G1DJW, tel 0934 514429.
Yeovil (Y&DARC)—10 July ("Single hop hf propagation", G3MYM), 17 July ("The halfwave dipole", G3MYM), 24 July ("Netting techniques", G3GC), 31 July (Natter night), 7 August ("An explanation of the 0800gmt G/VK phenomenon", G3MYM). 7.30pm. Recreation Centre, Chilton Grove, Yeovil. Details G4EVI, tel 0935 75920.
Yeovil Repeater Group—Details G6AGL.

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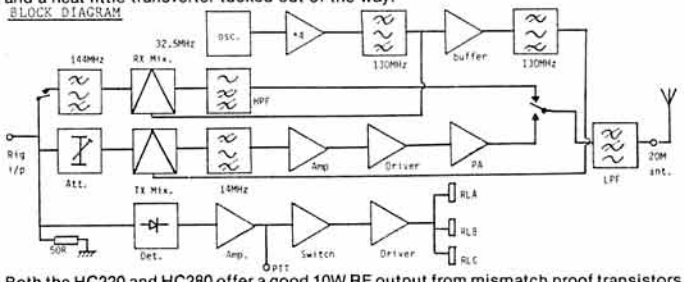

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ST2 Side-tone/Practice oscillator kit: £7.30	**Assembled PCB Module: £10.80**
AP3 Automatic Speech Processor kit: £15.90	**Assembled PCB Module: £21.40**
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If you would like more information on an item mentioned above, or any of our other products, simply drop us a line, enclosing an SAE. We have an information sheet for each kit, plus a general catalogue. **Please add 80p P&P** to total, except airmail outside Europe—£2 per kit. Export—use full prices listed above.
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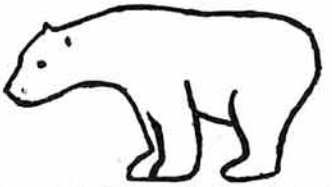

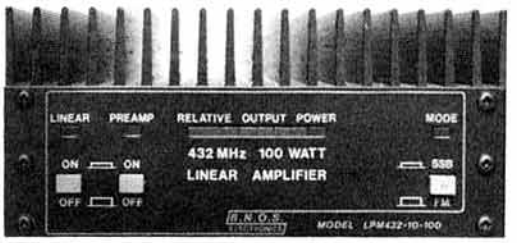

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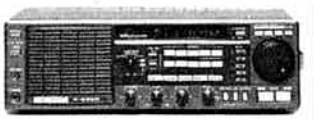

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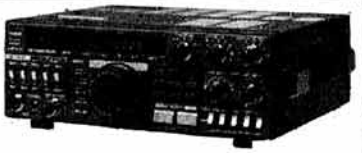

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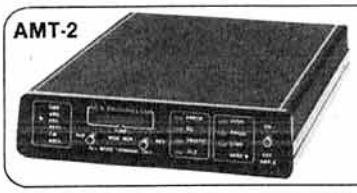

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AMPROM Transfers files over amateur radio, error-free. For BBC B or B+. SAE for details. CTP Software, 107A Shacklewell Lane, London E8 2EB.
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M/C PROGRAM FOR THE 16/48K Spectrum. Holds 1200 records of call-sign, name, town and date. Takes one second to search 1200 records for any detail. £4.00 on tape, £5.50 on microdrive. Mark Alston, 2 Rosetta Close, Wivenhoe, Essex. CO7 9RX.
MARK 2 G3WHO AMTOR program now available on 16K Eprom for BBC B. Greatly expanded with many new features including RTTY and CW transceive. Price unchanged at £27. This must be the best value amateur radio software available. SAE or phone for details. P.J. Harris, 10 Appleby Close, Great Alne, Alcester, Warwickshire B49 6HJ. (078 981) 377
TELEBOX turns your colour monitor into a colour TV set. New. British made. SAE for details or £29.50 (includes p&p) to Chiltern Comms Co, 8 Chiltern Street, London W1.
SPECTRUM MORSE TUTOR. On screen menu. Provides random letters/numbers, own message input, variable speed. Beginners to 20wpm. Class A value at £3.95. PO/Cheques to N. Talbot, 59 Heywood Avenue, Austerlands, Oldham OL4 4AZ. (G4EBQ).

HOLIDAY ACCOMMODATION

FLYING FROM GATWICK? Stay with G4MGU. Mill Lodge Guest House. 4 minutes from airport. Transport available. Telephone (0293) 771170.
SOUTH DEVON HOLIDAY: Farmborough House, Chudleigh, Newton Abbot, Devon, TQ13 0DR. Tel: (0626) 853258. In own 10 acres near Dartmoor. Opportunities: painting, Yoga, etc. Well equipped radio shack (G4YXC), metal/woodworking facilities. Vegetarian wholefood. Non-smoking. SAE please: Mrs Sophie Edwards.
STOP PRESS! FAIRMOUNT NOW LICENSED. Enjoy our wonderful meals, and good wines, in the peace and tranquility of Fairmount House Hotel. Ensuite bedrooms, all warm, comfortable and with tea-making facilities. Dogs welcome too. Special family holidays. From £18 BBEM. Also meet G6GR, licensed 64 years, use the rigs if you are licensed and try the new Tono communications-terminal computer. Tel (0803) 605446. Fairmount House Hotel, Herbert Road, Chelston, Torquay.

MISCELLANEOUS

COURSE FOR CITY & GUILDS, Radio Amateurs Examination. Pass this important examination and obtain your licence, with an RRC Home Study Course. For details of this and other courses (GCE, Career and professional examinations, etc) write or phone—THE RAPID RESULTS COLLEGE, Dept JT10, Tuition House, London SW19 4DS. Tel: 01-947 7272 (9am-5pm) or use our 24hr Recordacall service 01-946 1102 quoting JT10.
HEATHKIT. UK spares and service centre. Cedar Electronics, Unit 12, Station Drive, Bredon, Tewkesbury, Glos. Telephone (0684) 73127.
A BETTER DEAL INSURANCE for all Radio Amateurs. Complete cover for all radio equipment. Other types of insurance also available. Contact Charles Elliott, Hertfordshire Insurance Services, 41 Longfield Avenue, N.W.7. 2EH 01 203 2286.
REPAIRS amateur equipment. All bands, all types inc tone demodulaters. Fast turnaround, quotes by phone. W.T.S. Electronics, 5-9 Portland Road, Luton, Beds. Tel 24hrs (0582) 458375
WE'RE OFF AGAIN! To the biggest mobile rally in the South of England on Sunday 13th July 1986 from 10.00am to 5.00pm at the Brighton Race Ground. Huge "Bring and Buy" stall, 20,000 sq ft under cover exhibition area plus attractions for the XYL and children and restaurant facilities. The rally which caters for the whole family. Talk-in on S22 and 3.5MHz. Admission £1.00. Children free if accompanied by an adult. Further details, ring (0903) 782594.

WANTED

WANTED: German military radio equipment of WW II vintage. Collector will pay high prices for your gear. Write Box 201, PO Box 599, Cobham, Surrey KT11 2QE.

SITUATIONS VACANT

CUSTOMER ENGINEERS. A vacancy exists for a Technician with electro-mechanical and logic control knowledge to maintain company equipment throughout Britain. Full product training with be given together with a company car. This is an ideal opportunity to work mobile around Britain with a challenging job. Photomatrix Ltd is a progressive company based at Edgware, North London. For further information, please contact Robin Bye (G6XVW) on 01-951 1604.
ATTENTION RADIO ENGINEERS. Young engineer/salesman required by Radio Communications Company in Southern England. Please apply in writing. Box 200, PO Box 599, Cobham, Surrey, KT11 2QE.

RSGB MAIL-ORDER PRICE LIST

RSGB books

	Non-members' price	Members' price
A Guide to Amateur Radio (19th edn)	£4.14	£3.52
Amateur Radio Operating Manual (3rd edn)	£6.52	£5.54
Amateur Radio Software	£8.69	£7.39
How to Pass the Radio Amateurs' Examination	£3.62	£3.08
Morse Code for Radio Amateurs	£1.75	£1.49
RSGB Amateur Radio Call Book 1986	£5.75	£4.89
Radio Amateurs' Examination Manual (11th edn)	£4.07	£3.46
Radio Communication Handbook Vol 2 (hb)	£8.96	£7.62
Radio Communication Handbook Vol 1 & 2 (pb)	£14.10	£11.99
Radio Data Reference Book (5th edn)	£9.13	£7.76
Raynet Manual (1984 edn)	£2.95	£2.51
Teleprinter Handbook (2nd edn)	£7.67	£6.52
Television Interference Manual (2nd edn)	£2.45	£2.08
Test Equipment for the Radio Amateur	£6.79	£5.77
VHF/UHF Manual (4th edn)	£11.20	£9.52
World at Their Fingertips	£8.21	£6.98

RSGB logbooks

Amateur Radio Logbook	£2.93	£2.49
Mobile Logbook	£1.30	£1.11
Receiving Station Logbook	£3.04	£2.58

RSGB maps, charts and lists

HF Awards List and Countries List	51p	43p
Great Circle DX Map (wall)	£2.57	£2.18
IARU Region 1 Beacon List	42p	36p
Locator Map of Europe (wall)	£2.07	£1.76
Locator Map of Europe (card for desk)	75p	64p
Locator Map of Western Europe (wall)	£3.24	£2.75
Meteor scatter data sheets	£3.72	£3.16
Smith Charts, pad of 25 (Chartwell D7510)	£2.35	£2.00
UK Beacon List	42p	36p
UK Repeater List	53p	45p
World Prefix Map in full colour (wall)	£2.68	£2.28

RSGB members' sundries (members only)

RSGB badge car sticker	—	53p
RSGB belt (real leather)	—	£7.57
RSGB tie (coffee, maroon, green or blue—please state)	—	£3.20
RSGB callsign cap	—	£4.98
RSGB logo rubber stamp	—	£3.16
RSGB station callsign plaque (Five weeks' delivery)	—	£12.31
RSGB teeshirts (medium, large ex large—please state)	—	£4.90
Standard callsign lapel badge (Five weeks' delivery)	—	£2.21
De-luxe callsign lapel badge (Five weeks' delivery)	—	£3.18
Standard lapel badge (RSGB emblem, pin fitting)	—	60p
Mini lapel badge (RSGB emblem, pin fitting)	—	72p
Members' headed notepaper (50 sheets) quarto	—	£1.20
Members' headed notepaper (50 sheets) octavo	—	76p

Miscellaneous

Car sticker "Amateur radio" (two colours)	78p	66p
Car sticker "I'm on the air with amateur radio" (four colours)	89p	76p
Car sticker "I'm monitoring ·5 are you?" (two colours)	78p	66p
Radio Communication back issues	£1.40	£1.19
Radio Communication bound volume, 1983	£17.90	£15.22
Radio Communication bound volume, 1984	£17.90	£15.22
Radio Communication bound volume, 1985	£17.90	£15.22
Radio Communication Easibinder	£7.90	£6.72
RSGB coffee mug (plastic)	£2.16	£1.84
RSGB hf contest log sheets (100)	£3.69	£3.14
RSGB vhf contest log sheets (100)	£3.69	£3.14

Other publications

	Non-members' price	Members' price
All About Cubical Quad Antennas (RPI)	£7.73	£6.57
Amateur Single Sideband (Ham Radio)	£6.04	£5.13
Amateur Television Handbook (revised) (BATC)	£3.25	£2.76
Antenna Compendium Vol 1 (ARRL)	£10.29	£8.75
ARRL Antenna Book (ARRL)	£11.29	£9.60
AX25 Amateur Packet Radio Link-layer Protocol (ARRL)	£5.68	£4.83
Basic Radio Electronics (Willey)	£17.71	£15.05
Beam Antenna Handbook (RPI)	£8.22	£6.99
Better Short Wave Reception (RPI)	£7.57	£6.43
Care and Feeding of (Varian) *Power Grid Tubes (ARRL)*	£11.07	£9.41
CMOS Cookbook (Sams)	£14.47	£12.30
Complete DX'er (ARRL)	£8.60	£7.31
**Complete Shortwave Listener's Handbook* (Tab)	£13.53	£11.50
Design of VMOS Circuits with experiments (Sams)	£9.40	£7.99
DX Edge (hf propagation Aid)	£15.65	£13.30
FM and Repeaters for the Radio Amateur (ARRL)	£4.75	£4.04
Fourth ARRL Amateur Radio Computer Networking Conference	£11.16	£9.49
G-QRP Club Circuit Book	£5.00	£4.25
Guide to Oscar Operation (Amsat—UK)	£1.97	£1.67
Joy of QRP (Adrian Weiss, W0RSP)	£9.40	£7.99
Linear Op-Amp Handbook (Carr)	£12.93	£10.99
Oscar 10 Handbook (Amsat-UK)	£3.87	£3.29
Radio Amateurs' Antenna Handbook (RPI)	£8.72	£7.41
Radio Amateur Callbook Foreign Listings 1986 (ARCI)	£19.43	£16.52
Radio Amateur Callbook North American Listings 1986 (ARCI)	£19.98	£16.98
Radio Amateurs' Handbook 1986 (ARRL)	£18.12	£15.40
Radio Communication Receivers (Tab)	£17.43	£14.82
Radio Frequency Interference (ARRL)	£4.63	£3.94
RTTY the Easy Way (BARTG)	£4.69	£3.99
Satellite Experimenters' Handbook (ARRL)	£11.19	£9.51
Secrets of Ham Radio DXing (Tab)	£8.78	£7.46
Semiconductor Data Book (Newnes)	£8.80	£7.48
Shortwave Listeners' Antenna Handbook	£17.54	£14.91
Simple Low-cost Wire Antennas (RPI)	£10.55	£8.97
Towards the Radio Amateurs' Examination (Stam)	£4.77	£4.05
Towers International Transistor Selector	£15.46	£13.14
**Towers Op-Amp Selector* (Foulsham)	£10.51	£8.93
TV for Amateurs (BATC)	£2.45	£2.08
UHF-Compendium Parts 1 and 2 (Weiner)	£16.50	£14.03
Understanding Amateur Radio (ARRL)	£5.20	£4.42
Weekend Projects for the Radio Amateur (ARRL)	£5.45	£4.63
World Atlas (ARCI)	£3.72	£3.16
World Radio TV Handbook 1986 (Billboard)	£17.99	£15.29
**99 Test Equipment Projects You Can Build*	£10.75	£9.14

RSGB kits and components

RSGB Morseman (*Rad Com* December 1984) Kit 2 (27C16 eprom, pcb, artwork)	£15.32	£11.49
Kit 3 (Led display and holder, battery holder, potentiometers, knobs and knob covers, case, front panel)	£38.24	£32.50
D70008C microprocessor for Morseman	£10.63	£9.04
Ferrite ring for interference suppression (Pack of two) (Neosid)	£2.99	£2.54

MORSE INSTRUCTION AID

RSGB morse instruction tape (to 5wpm)	£4.80	£4.08

MAGAZINE SUBSCRIPTIONS

QST (including ARRL membership). One year	£33.39	£28.38
Two years	£63.53	£54.00
Three years	£95.02	£80.77
By air via KLM (to W Europe only) one year	£47.45	£40.33
Ham Radio Magazine, one year, by air	£34.69	£29.49

NEWSLETTER SUBSCRIPTIONS

Microwave Newsletter, VHF Newsletter, DX Newsletter. For details contact the membership services department at RSGB headquarters.

ORDERING INFORMATION

NON-MEMBERS. Use left-hand price columns. Note that members' sundries are only available to members of RSGB.

MEMBERS. Use right-hand price columns. It is essential that you quote your call sign or BRS number so that you can be recognised as a member.

PRICES. These include postage, packing and VAT where applicable, and are subject to change without notice. For airmail despatch, please ask for price before ordering. Goods are obtainable, less p & p, at RSGB headquarters between 10am and 4pm, Monday to Friday.

POSTAL TERMS. Cash with order. **Stamps and book tokens cannot be accepted.** Cheques and postal orders should be crossed and made payable to "Radio Society of Great Britain". Our Giro account number is 5335256. Please write your name and address clearly on the order, and allow up to 28 days for delivery.

***Items marked with an asterisk may not be available immediately; please telephone before ordering to confirm availability.**

ORDER FROM: RSGB Publications (Sales), Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE

(Raynet supplies should be obtained from Mrs J. Balestrini, Merrivale, Willow Walk, Culverstone, Gravesend, Kent)

THE RSGB News Bulletin PAGES

AMATEUR RADIO MORSE TEST

As we went to press our senior examiners in the counties had notified us of 27 Morse test centres which had been booked. Those who have already applied to the Society for a Morse test and who are within easy reach of these centres will already have been sent an application form. Details of the centres can be found on the next page. Most tests will take place during the evening, in clubrooms or in local colleges. Two of the centres will be at rallies - these are the West Manchester Radio Club's Red Rose Rally at Haydock Park and the Flight Refuelling Amateur Radio Society's "Hamfest '86" at Wimborne, Dorset.

Nevilie Ianson, the Society's Chief Examiner (who has moved, incidentally, and is now G3GDO) is progressing well with his task of teaching some 200 potential examiners. He'll be interviewing and testing some more applicants in the North-West and the Home Counties next month. As more examiners are appointed, there will be a corresponding increase in the number of centres available in various parts of the country. The situation is still changing almost daily, and the most up-to-date information can be found on the DataBox, the Headline News Service and via GB2RS.

Turn the page for the latest info on both confirmed and up-and-coming centres. Don't forget that applications can only be accepted if they come on a standard RSGB application form which is available from Headquarters. You can ask for a form by telephone if one of the confirmed centres on the list is near you.

CLASS B MORSE

- HOW TO GET ON THE AIR -

Last month we outlined some basic guidelines about the Class B Morse facility. What about actually getting on the air?

Well, here are the answers to the questions we've most often been asked;

Q How do I learn the basic procedures of Morse operation?

A Assuming you've learned the Morse code itself, we'd suggest that the next step is to spend some time listening to experienced operators - both from the point of view of reading the Morse and of becoming familiar with operating techniques and procedures such as calling CQ, beginning and ending a contact, changing frequency and so on. When you feel you have a reasonable idea of what's actually involved in having a contact using CW, you're ready to try one. Also, take a dip into the RSGB "Amateur Radio Operating Manual" - this gives a fair amount of info on how to go about having a CW contact. You could also invest in the RSGB "Morse Code for Radio Amateurs", which contains various basic bits of information.

Q How should I start?

A We suggest you start by building or borrowing a sine-wave audio oscillator which can be keyed with your Morse key and which has a speaker output - you'll need one for Morse practice anyway. The output of this can then be picked up by your normal transmitter microphone. When you feel ready to try Morse for real on the air, you can establish a normal voice contact and then go over to CW operation using the practice oscillator. This makes it very easy to switch between voice and CW operation, which is a great help in the early stages.

It's also a good move to talk to the keen CW operators at your local club and arrange your initial practice skeds with them - a friendly voice on the other end is a great asset during those initial contacts. Don't be afraid of making mistakes and getting yourself tangled up - everyone does in the early stages! Just take it slowly until the penny drops and you get the hang of it.

Q When should I announce my callsign?

A At least at the beginning and end of each transmission.

One general comment is that you should never ever send Morse at a speed faster than you can receive it. Other operators usually assume that you are capable of receiving at the speed you send at - and they'll almost invariably reply to you at that speed.

Here's a final thought. Because the restriction on "home QTH only" operation has now disappeared, there's no reason at all why microwave operators on hill tops can't use CW for their 10 GHz rigs and prove how good Morse is under marginal conditions.....

STOP PRESS NEWS

MORSE TESTS - LATEST

Here are two lists, correct as of 16 June 1986. The first is of counties where we now have the necessary minimum of two examiners - it'll probably take about a month to get the centres themselves operating. The second is of counties where we have one examiner established; these will take a little longer to go "live".

First list:

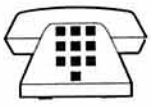
Avon, Berkshire, Cambridge, Derbyshire, Essex, Lancashire, Leicestershire, Nottinghamshire, Somerset, Staffordshire, West Midlands, Gwynedd and the Island of Guernsey.

We must stress that in these counties we are currently waiting to be notified of where the centres will be.

Second list:

Cheshire, Greater London, Hampshire, Tyne & Wear, Warwickshire, Wiltshire, Hereford & Worcester, South Yorkshire and Clwyd. Scottish regions: Central, Highland and Tayside. Again, these are expected to come on-line after the counties in the first list.

As we've said before, the situation is changing almost daily. Keep an ear on the Headline News Service (on Potters Bar 59312) and an eye on the DataBox (Potters Bar 52242, and have a look at the special feature in this month's Bulletin if you're wondering what on earth the DataBox is).



Telephone problems

We're sorry if members had some problems getting in touch with Headquarters for a few days at the end of May. We've been wanting for some time to upgrade the Headquarters telephone system to give members a better service - this involved British Telecom coming along to fit some new boards into the processor-controlled "exchange". Unfortunately, there were some bugs in the software - net result was that for a period of about five hours we couldn't answer any incoming calls..... That problem was fixed after some frantic work but another bug showed up and we couldn't make any outgoing calls for about three hours! Touch wood, the system is now working properly and we hope we're giving quicker service to members who ring Headquarters.

MORSE TEST CENTRES

The following list shows the dates and locations of all the available test centres as we went to press. It is anticipated that there will be a very high demand for places so if you want to take a test and any of the centres shown is within easy striking distance, send for an application form straight away without delay. Completed applications will be dealt with strictly on a first-come first-served basis.

If there is no appropriate centre for you please contact RSGB Headquarters in a few weeks. By this time we will have been notified of some additional centres, one of which may be more convenient for you.

Morse tests will be carried out in groups of three and will be of half an hour duration. Details of the test, the venue and how to get there will be notified to you as soon as your application has been processed and your place confirmed.

COUNTY	TOWN	DATE
Grampian	Aberdeen	3/07/86
Cornwall	Liskeard	3/07/86
Mid Glamorgan	Rhydyfelin	13/07/86
Cornwall	Liskeard	15/07/86
South Glamorgan	Penarth	15/07/86
Shropshire	Dawley, Telford	17/07/86
Dorset	Dorchester	19/07/86
Lincolnshire	Louth	22/07/86
Northants	Tiffield, Northampton	24/07/86
Grampian	Aberdeen	28/07/86
Strathclyde	Glasgow	28/07/86
Cornwall	Liskeard	31/07/86
Dorset	FRARS Hamfest '86, Wimborne	10/08/86
Mid Glamorgan	Rhydyfelin	10/08/86
Lincolnshire	Louth	12/08/86
Merseyside	Red Rose Rally, Haydock Park	17/08/86
Northants	Tiffield, Northampton	20/08/86
Shropshire	Dawley, Telford	21/08/86
Grampian	Aberdeen	25/08/86
Strathclyde	Glasgow	25/08/86
Mid Glamorgan	Rhydyfelin	14/09/86
South Glamorgan	Penarth	16/09/86
Lincolnshire	Louth	16/09/86
Strathclyde	Glasgow	22/09/86
Grampian	Aberdeen	22/09/86
Northants	Tiffield, Northampton	25/09/86
Shropshire	Dawley, Telford	25/09/86
South Glamorgan	Penarth	18/11/86

It is likely that more centres will have been notified to RSGB Headquarters since we went to press so please give us a call for an application form or for further details.

RAYNET REPRESENTATION - ZONE 11

Because of ill-health Danny Campbell, GI4NKD, has had to resign as RAYNET Representative for Zone 11 (Northern Ireland). This creates a vacancy in Zone 11. RAYNET members resident in this Zone may forward a nomination for their zonal representative to "The Secretary (RAYNET)" at RSGB Headquarters. Nominations should be supported by five RAYNET members who are currently registered within the Zone, and they must be received no later than 5.15pm on Monday 4 August 1986. They should be accompanied by a declaration that the nominee is a) normally resident within the Zone b) is a currently registered RAYNET member c) is a member of RSGB and d) is willing to serve if elected.

The period of appointment is normally three years. Where more than one valid nomination is received by the due date, an election will be held during the month of September 1986.

THE CHINA SYNDROME

Well, what did you do for your summer break last year? One man, a certain Henry Balen, G4MHB, took a holiday in China. As well as the Great Wall and some other cultural wonders, he visited the Chinese Amateur Radio and Sports Association Club amateur radio stations at Beijing and Shanghai. This is his story...

"'Having decided to make China our holiday venue, I wondered whether it was possible to make contact with Chinese amateurs. Letters written to BY1PK in Beijing and BY4AA in Shanghai brought an immediate and courteous reply to the effect that I would be most welcome, and indeed, that it would be an honour to receive a visit from the first UK amateur to call upon them! Needless to say, this made me feel very important. They added that if I wished to operate from local club stations, I needed only to bring a copy of my licence and a letter of introduction from the RSGB. A telephone number was given so that I could contact them upon my arrival.

'The RSGB provided me with the necessary letter of introduction and entered into the spirit of the occasion by giving me pennants and badges to be presented to the Chinese. My own club, the Amateur Radio Club of Nottingham (ARCON), provided similar gifts, so all in all I was in a good position to offer fraternal greetings in a practical way on behalf of all radio amateurs in the UK.

"'On arrival at the Beijing club station I was warmly received by the "Station Master" Mr Yan Pi Duong and his assistant Mr Huang Yon Liang. I was given tea and we discussed the amateur radio situation in our respective countries. I was told that amateur radio in China started in 1958 but it had been suspended during the Cultural Revolution in 1966; six club stations had been operating until then. Amateur radio activities resumed in 1982 and 10 club stations were now operational.

They are:-

BY1PK	Beijing	CRSA
BY1QH	Beijing	Qinghua University
BY1SK	Beijing	"Children"
BY4AA	Shanghai	CRSA Branch
BY4AOM	Shanghai	Old Timers'
BY5RA	Fuzhow	CRSA Branch
BY8AA	Chingdu	CRSA Branch
BY0AA	Wulmuji	CRSA Branch
BY5RF	Fuzhou	"Children"
BY8AC	Chingdu	"Children"

The "Children's" stations are at schools and similar places of learning.

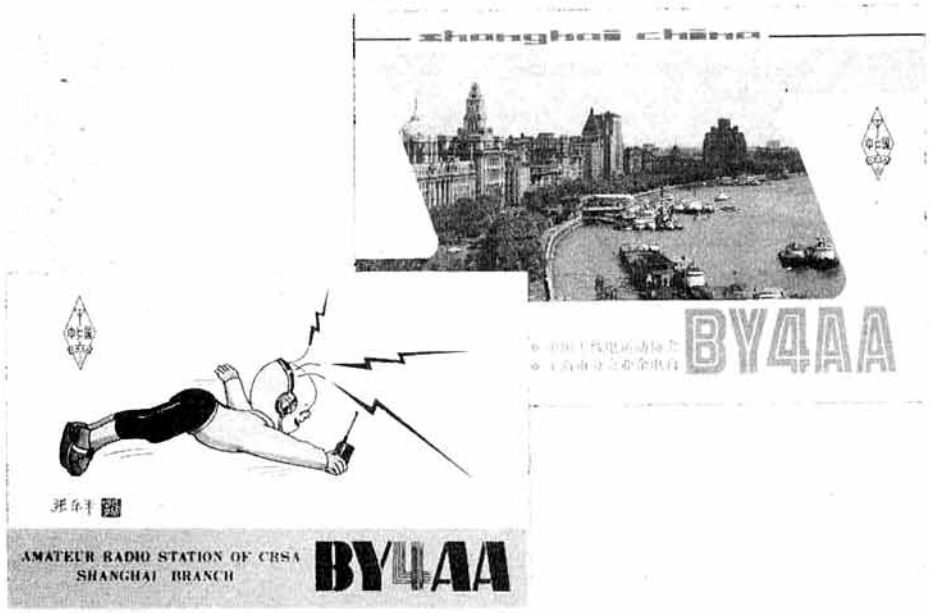
"'The two stations I visited were very well laid out and ambitiously equipped, with a great deal of equipment which had been donated by Richard Baldwin, W1RU, President of the International Amateur Radio Union on behalf of the American Radio Relay League (ARRL). The stations can operate on nearly all bands - HF, VHF and UHF - with RTTY and SSTV in addition to voice and CW. At Beijing the shack contained - FT101, FL2000, FT726, TS930S, TS670 and an Apple 2 computer and disc drives. The antennas were a TH7DX for 14, 21 and 28MHz, dipoles for 1.8, 3.5 and 7MHz and VHF and UHF Yagis. At Shanghai they had the following: TS930, IC750, TS670, TS711A, TS811B and IC511 - the antennas were similar to those at Beijing. SSTV and RTTY could be used at both stations.

"'I described a basic amateur radio situation in the UK and gave some details about the number of active radio amateurs and the amount of mobile activity. To a nation which has virtually no private transport and only ten licensed amateur stations, my comments probably seemed incomprehensible.

"'The time then came for operating and to transmit from China. It was 4pm Beijing time and early morning in the UK, so I failed to make contact with any British stations; I contented myself with working several other countries. I had to be careful to avoid contacts with Israel, South Africa, East Germany, Taiwan and Korea since

a large notice across the wall of the shack reminded operators that this was forbidden. At Shanghai - where again I was given a most courteous and warm reception by Mr Xuru and Chen, a lady operator who spoke good English - I was more fortunate. It was at Shanghai that I was blooded in the art of operating a pile-up. At about 4pm local time, and with tongue firmly in cheek, I called "CQ UK stations only" on 20 metres - to my great surprise and to the amazement of my Chinese hosts, the first call was from Ivan, G3VVU, a friend and fellow club member from my home town of Nottingham. Mr Xuru and Chen were most impressed by this display of magical powers! Ivan then got in touch with other amateurs and friends in the Nottingham area on VHF, UHF and landline, and in no time I had worked half a dozen of them - to the exasperation and frustration of the rest of the world who were cursing my "UK stations only" call. In the interests of international relations and the proper spirit of amateur radio I relented and worked as many other countries as I could in the time at my disposal.

Above:- Henry Balen, G4MHB presenting RSGB and ARCON (Amateur Radio Club of Nottingham) pennants to the station master of BY4AA, Mr Xuru, and his assistants.



"'This was my first ever experience of being responsible for a pile-up, and I now have the greatest respect and admiration for those rare DX stations who can handle such situations with apparent ease and dexterity. I must admit, however, that the experience tended to confirm a belief which I have had for some time. This is that amateurs in certain countries which shall remain nameless show a singular lack of courtesy and knowledge of operating procedures in their pursuit of rare DX contacts.....

"'All in all a most fascinating and thrilling experience which for me served to emphasise the fascination and wonder of amateur radio. It seems to me that our hobby probably has a better claim to the motto above the portals of a certain establishment in London which is engaged in roughly similar activities to our own: "Nation Shall Speak Peace Unto Nation"! I shall never forget the friendliness of my Chinese hosts, which was brought home to me even more by the receipt of a Christmas card from BY4AA. A BY4AA pennant was also presented to me and this permanent reminder of my visit hangs proudly in my shack, together with QSL cards from both the Beijing and Shanghai club stations confirming my "eyeball" contact.

"'As yet I have been unable to contact them by radio - much to my chagrin and disappointment - and I am currently casting envious eyes at the QSL cards which my friends in Nottingham proudly display as a result of my contacts with them. However, they assure me that they envy my experiences in China and on reflection I think I had the better deal!

"'I hope that the pennants, badges and copies of RadCom and other radio magazines (Are there any others? - Ed) which I left with my Chinese friends will help cement amateur radio relations between our two countries and will be a reminder to them of their many friends in the UK.'"

(Next month: 'What we did on our holidays 2 - a week on a mountain top!')

Calling the DataBox

by

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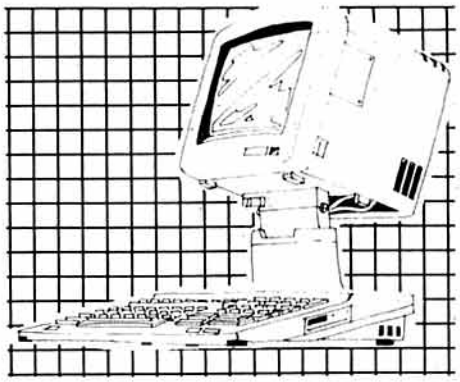


SPECIAL FEATURE

During the past year occasional references to the DataBox have been made on the pages of Radio Communication, on GB2RS and other sources. "What is the DataBox? - and how on earth do I get the information from it?". Well, the answers to both questions (and a few others besides) are given here. We hope they'll provide an introduction to on-line communications.

Towards the end of 1984 some inexpensive computer software became available which enabled a BBC microcomputer to be used as a "viewdata" system. Viewdata is the name given to on-line interactive videotext comprising 'pages' or 'frames' of information accessed by a computer connected to the Public Switched Telephone Network (PSTN). The other form of videotext with which we are familiar is Teletext (Ceefax and Oracle) which is transmitted with television pictures by the BBC and IBA. The potential of viewdata in providing regularly updated information to members, together with a messaging facility, was immediately recognised, and RSGB Council approved the introduction of an experimental service for evaluation. The experiment has proved successful and is now being made a permanent service to members. The full potential of the system has not yet been exploited, but in addition to the facilities which are seen by the regular user, the system has been used as an experiment to transfer information to GB2RS.

There is a variety of equipment which can be used to access the DataBox. Probably the least popular these days is the television set designed for the reception of Prestel. These were first conceived when Prestel was first launched some 10 years ago, but were not popular due to their relatively high cost. Alternatively, there is the Prestel adaptor costing about £100 which can be bought for connection to a TV set.

But perhaps a more popular and more ideal choice, particularly among radio amateurs, involves the use of a microcomputer. Almost any microcomputer can be used provided that it has a serial RS232 (or RS423) output. Particularly ideal is the BBC Model B or its successors. This has full colour and Prestel graphics capability as standard, thus making the use of sophisticated software to create the special Prestel characters unnecessary.

Unfortunately, British Telecom regulations do not permit the connection of home-constructed equipment to the telephone lines. It is therefore necessary to obtain a modem which carries one of the green approval labels. There are several suitable modems available at prices ranging from about £70 to £250. Modems can either use an acoustic coupler or may be directly connected to the telephone line. Acoustic modems were once quite popular but they do suffer from problems caused by room noise; also, the wide variety of shapes and sizes of telephone handsets now available can make their use limited. They do however have the advantage that they can be used anywhere without the need for a telephone jack socket. Direct-connect or hard-wired modems are generally more reliable. The one used by the writer is the Pace Nightingale which, together with the Commstar Communications software package for the BBC computer, costs £135.70 including carriage and VAT. It is available from Watford Electronics, Jessa House, 250 Lower High Street, Watford. In addition to this modem being suitable for the DataBox and Prestel, it may be used for user-to-user communications and software exchange, and for contact with bulletin boards and other databases at 300 bauds.

Going on-line

With the modem connected to the computer and telephone line, the modem switched to 1200/75 bauds and the software initialised for viewdata, it is then a simple matter to dial the DataBox on Potters Bar (0707) 52242. When the tone answers, press the 'modem connect' button and you're away. The first frame will greet you and ask you to enter your name and callsign. Then, by pressing # or various number keys you will be led through a series of menus to the information you require. Help and advice on how to use the system is included on the database and users will find the system very easy to get on with.

In addition to the normal text pages there is some telesoftware which may be downloaded to your computer and saved to tape or disc. Programs currently on the system are for the BBC computer and include a QRA locator calculator and a Morse sending program.

An on-line editor is available on which messages can be sent to headquarters. Also, it may become possible in the future to order RSGB publications on the DataBox by quoting your name, address and credit card number.

Other databases

Having obtained an installation to enable the DataBox to be used, it will be possible to access other databases such as Prestel, Swafax, Telecom Gold, and the open-access bulletin boards such as Hamnet. Prestel is a must for anyone with the equipment. For £6.50 a quarter it is possible to read thousands of information pages. An additional £10 a quarter for the Prestel Microcomputing service will give access to about 350,000 pages including Viewfax, Schools Telesoftware and Micronet) and enabling a host of software to be downloaded. A list of some of the many bulletin boards and databases is shown in Table 1 together with their transmission speeds and telephone numbers.

Database	Speed	Telephone number
RSGB DataBox	1200/75 baud viewdata	0707-52242
Hamnet	300/300 baud	0482-497150
Health Data	1200/75 baud viewdata	01-986 4360
Liverpool TBBS	300/300 baud	051-428 8984
London NW CBBS	300/300 baud	0895-420164
London TBBS	300/300 baud	01-348 9400
Manchester OBBS	300/300 baud	061-427 1596
Micro Live	300/300 baud	01-579 2288
Sheffield TBBS	300/300 baud	0742-667983
Swafax	1200/75 baud viewdata	0622-850440
Prestel	1200/75 baud viewdata	0532-470211*

* There are many numbers for Prestel. Log on using i/d 4444444444 and password 4444 & look on the exchange list for one nearest you.

Conclusion

This article is intentionally brief but it is hoped it will serve as an introduction to the DataBox, which, from 1 July is a regular service to members. The procedure for user to user communications and for transferring programs and text files is fully explained in the manuals and it would be inappropriate to repeat the information here. Please use the DataBox. The information on it is updated very regularly - daily if necessary - so ensuring that those using it are kept fully informed of up-to-date amateur radio news and information.

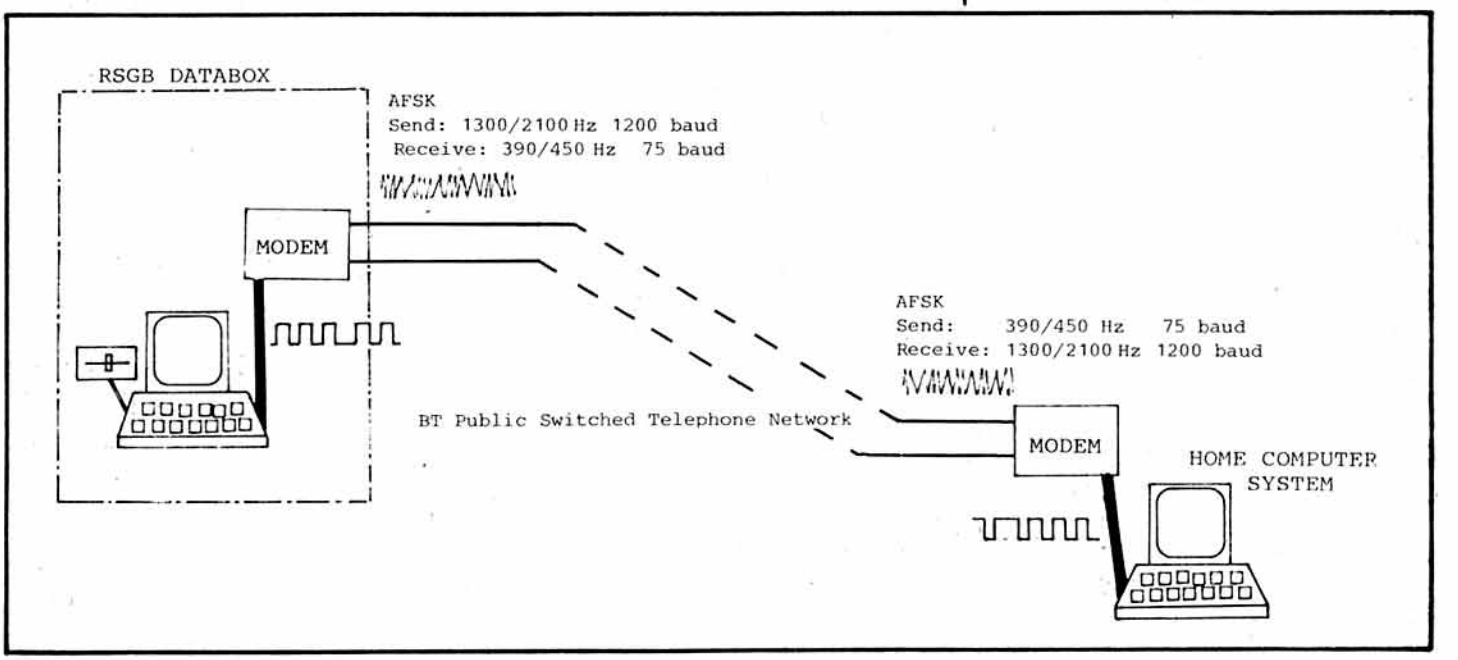
Bibliography

"The On-line Handbook"
by Ray Hammond, Fontana £4.95.

"Hotline" by Ben Knox,
Century Communications £6.95.

"Commstar User Manual",
by Andy Hood, Pace Microtechnology.

"Tele-Link" magazine, Database Publications Ltd, alternate months.



Diagramatic representation of the DataBox shown connected via the Public Telephone System to a home computer. The pulsed dc output from the computers is shown converted to AFSK by the modems.

Cordless phones

DTI responds

In the March issue of Radio Communication we mentioned some problems experienced by radio amateurs as a result of the use of cordless telephones. The DTI took up this point, and they've been in correspondence with the Society. In a long and detailed commentary on cordless telephones, they point out that "....It looks as though a large part of the complaints amateurs are airing stem from the use of high-power cordless telephones which are unapproved. Certainly a large number of these unapproved telephones have a return handset-to-base frequency of around 49.8 MHz. Such units also have a base-to-handset link between 1.6 and 1.8 MHz. By contrast approved cordless telephone apparatus operates on frequencies between 47.45625 MHz and 47.54375 MHz, although base unit frequencies for approved apparatus are between 1642 kHz and 1782 kHz".

".....using powers which will prohibit non-approved apparatus"

The DTI adds that "....In the case of non-approved apparatus (we) hope that the action we are at present undertaking will resolve the problem. Of course, it has always been unlawful to use non-approved apparatus, but this has not stopped the import and sale of such telephones. Using our powers in the 1984 Telecommunications Act, we have drafted a Statutory Instrument which will prohibit the manufacture, import, sale and possession of non-approved apparatus, and therefore enable us to deal with the problem before the apparatus reaches the consumer...."

This is very good news, and should help the position.

The DTI goes on to say that "....In anticipation of the Order entering into force, the RIS is already undertaking visits to dealers, selective action against users in some areas and general advance publicity designed to dissuade dealers from unloading illegal equipment cheaply in advance of the new prohibition. (We) hope that all this will actually reduce the amount of problems your members may be having.....should any of your members experience direct interference (from 49 MHz) of course we would be interested to follow up any information we receive, taking account of course of our other priorities".

The DTI then continues by discussing the potential for interference to amateur bands from approved cordless telephone systems. It points out that DTI Performance Specification MPT1322 - which relates to such equipment - lays down parameters for spurious emissions and harmonics. When devising the limiting values for spurious emissions, the DTI says,

".....giving adequate protection from interference"

"....a balance had to be struck between giving adequate protection from interference to protected radio services and permitting the economic manufacture of cordless telephones designed for the domestic market". The specified limits are as follows:

i) in the frequency range 0.5 - 30 MHz, a field strength not greater than 34 dB (uVm) at a distance of 30 metres.

ii) in the frequency range 30 - 1000 MHz, a radiated power not greater than 0.25 uW.

iii) in the frequency bands 87.5 - 118 MHz, 135 - 136 MHz, 174 - 230 MHz and 470 - 862 MHz, radiated power may not be greater than 50 nW. This more stringent limit is designed to protect specialist radio services including aeronautical, radio astronomy and broadcasting.

In its final paragraph the DTI says that "Any problems amateurs are experiencing from legal cordless telephones presumably arises from the sensitivity of their receivers and use of high-performance antenna systems which can be affected by low-level second harmonics. (We) are afraid that as a non-protected service you will have to accept the position, but.....a large part of your problems should disappear if only we can clear out illegal high-power apparatus".

Fair comment, and it only remains to add that the Society will be looking closely at the draft Order with a view to looking after the interests of radio amateurs in the United Kingdom.

P.S.

Statistics for the May/June 1985 RAE just out indicate that number of candidates for the exam was 50% of the 1983 figure. Seems that between 65 and 70% of those who take the exam pass, and some 10% pass with distinction.

Next WARC takes place next summer in Geneva - subject is Mobile Services.

Special event station GB4CHB will be active on the HF and VHF bands on Saturday 12th September. The station will be located at King Edward VI Camp Hill Boys School in Birmingham for the School's Summer Gala. Contacts with Old Boys of the school will be welcome.

Schoolmaster John Butler, G3VWZ, is looking for circuits for simple radios built around the ZN414 - he's lost one given to him years ago by a colleague and wants to use the topic in his school science class - any offers?

Stories of amateur operation from the Soviet MIR spacecraft were persisting as we went to press - try usual sources for latest information. Tnx AMSAT.

THE Members' Ads PAGES

FOR SALE•••••

TRIO R820 RX, £400 ono. Swap my YG88C CW filter for YG88A AM filter. Mr J P Wright, 12 Norn Hill, Basingstoke, Hants, RG21 2HD.

SILENT KEY SALE: NRD NSD 515 pwr unit, £1,400. FT-ONE modified, overhauled 1985, £1,100. FL3, £80 Trionyx TR1000 freq counter, KR400+ controller, £80. 10m beam, antenna wire, coax, miscellaneous. Jim, G2FRI, NOT QTHR, tel: 01-878 9428.

YAESU FT480R, 2m multimode TCVR, vgc, £285. Plus Cushcraft A147-20T 10-ele X Yagi, £20. Robinson, G4TSV, tel: 0282-64236.

YAESU FT707, 160-10m, CW filter, vgc, £350 ono. G4AQU, QTHR, tel: 0384-392147, anytime.

FT220 2m all mode TCVR c/w mic, £140. Mosley TA33JR beam, ex condx, £50, prefer buyer collects. G3RUN, NOT QTHR, tel: 0304-372094, after 6pm.

TRIO TR9130 2m multimode, 5W/25W o/p, used as base stn only, little used, mint condx, orig packing with manual, £380. G4DDG, NOT QTHR, tel: Derby 512560.

B2 SPY SET, 3 TX's, 1 psu, 1 box coils, offers? KW Vanguard, £50. KW2000A, £125. HRO & psu, 3 BS coils orig 2.5V heaters, £25. 2 xtal freq standard £2 ea. CI-5 scope, as new, 10Hz-10MHz, £30 ono. Buyer collects or pays p&p. G3YRB, QTHR.

MML144/100 2m linear, £65. AX25 packet radio unit, £129. FT230R 2m 25W mobile, £170. NEC 8023 dot matrix printer, £140. 'Practical Television' mags 1979-1985, £2.50. T Tugwell, 50 Mayridge, Fareham, Hants, PO14 4QP, tel: 04895-81032.

EUROPA B, 2m tvtr, as new, £50. Jaybeam MBM48, £20 WANTED: IC402 or 70cm tvtr; IC202; masthead pre-amp (must be high power); Datong FL2, 4CX250B valve bases (VHF); also transformers, blowers etc required for 4CX250B linear. G6XVV, QTHR, tel: Rotherham 813042.

YAESU FT790R, nicads, chgr, case, boxed as new, £295. Tonna 20118, 2x9-ele X 2m antenna, boxed, new, £25. Marconi freq meter type TF1026/1, 250-500MHz, boxed, £25. David, G0EHF, tel: Flitwick 715345 or 0908-315177 extn 3308, day

TONNA 17-ele 2m, £25. Jaybeam 14-ele 2m Parabeam, £20. Eumig b/w video camera c/w zoom-lens. extn cable, psu & manual, £60. KW Vespa Mk2 c/w manual, psu & spare valves, £70. G0DLF, tel: Northampton (0604) 770835.

AMT-1 t/unit, £165. TRS80 colour computer, £50. AR88LF plus lots of spares, £55. 2 off 12-ele 70cm beams, £40 both. Revox B77 reel-reel tape recorder £550 ono. G4TMI, QTHR, tel: 0425-618749.

BBC CUMANA 40/80 track double sided switchable disc drive, unused complete in own box, £80 ono. G1KIN, tel: West Wellow (0794) 23259.

KW2000A with power unit, 2 new 6146Bs fitted, incl mic & Datong D75 speech processor, £200. G4KBY, QTHR, tel: 01-778 9422.

FT290 MOBILE MOUNT, unused, £15. KP202 with xtals, leather case, helical whip, £20. Uher 4200 reel-reel tape recorder with mains psu, £40. G3ZER QTHR, tel: 09274-22085, after 8pm.

BARLOW WADLEY XCR30 gen/cov RX, PLL AM/SSB/CW, 500kHz-30MHz, either ext 6V-12V supply internally regulated or 6 x 1.5V batteries internal, vgc, £63 incl carriage or £60 collected. G3UJX, QTHR, tel: 051-677 1518.

THE GREAT RADIO SALE: Eddystone 888, spkr, S-meter £150. KW Vespa, 160-10m with psu, £65. KW2000A with psu, swr bridge, £180. B28 RX, psu, spkr, £35 Wayne-Kerr freq standard FS100, £10. R107 RX, 1-17MHz, £20. Programmable calculator PR100 with rechargeable batteries & psu, £15. Scientific calculators, 2off, £5 ea. Hand dictaphone, tapes, spare batteries, as new, £27. 26" colour TV, works £18. Homebrew TX, 80-10m, well made, CW/AM with psu, 20W, £20. Pye 2m TCVR, 10W, £30. Eddystone 740 RX, 1.4-30MHz, pristine, £70. Pye TCVR, 70MHz? £10. 'Practical Wireless' 1930-1981, most, £50 (£1 per year!). 'Everyday Electronics' 1970-1981, £10. Daltronic scope 381, 5MHz, £25. 50-300V psu, £25. 80m TX, AM with psu, atu, £20. 150kHz-12MHz gen/cov RX, £15. Most equipment in good order with manuals. Sale forced by having to move house. G8PWR, Worcestershire, tel: 06846-2244.

ADDISON eccentricity display unit type 221.7, never used, £50. Cosina XL204 macro sound cine camera + Sanyo sound 501 projector. Swap for HF mobile or 2m multimode. Doug, G4YIO, QTHR, tel: Winchester 712289.

TELETYPE ASR33 with manuals. Pye Bantam, fitted S20/S22/R5/R6, manual, nicad, offers? G3OJL, tel: Wells 75415.

FT208R, hardly used c/w 2off FNB2 nicad packs, NC9C chgr, case, strap, manual, ex condx, no mods, £160 or exch good HF RX with cash adjustment, still under guarantee. Ron, G4YYH, QTHR, tel: 0209-718021, evenings and weekends or 0209-712456, daytime.

RTTY STATION, MZ80K computer, integral monitor & data recorder, handbooks, CW/RTTY software, utilities, c/w modem & all cables, 48k useable memory, RFI proof Z80A PIO for automatic TX/RX built-in, reluctant sale, £185 ono. G0AYZ, tel: 0705-589560.

YAESU FT77 with FC700 atu & Hately DD14 antenna, orig boxes, ex condx, £450. G4VJD, tel: Emsworth (0243) 374458.

YAESU TCVR FT301D, 160-10m, CW filter, psu, mic, £225. Zetagi B300PS, 200W mobile linear, 160-10m, £75. Kenpro KP60 RF processor, audio in, £10. YW3 pwr/swr meter, £10. G3RCE, 9 Ripley Grove, Portsmouth, Hants, PO3 6NH, tel: 0705-699977.

70cm from 10m. MMT432/28R tvtr with rptr shift, £125. Also MX2 2m handheld, SSB/CW QRP TCVR, with HB9CV, £50. GDX1 2m/70cm discone and C8 70cm colinear, £25 ea. All ono, buyer collects. G8YHH, QTHR, tel: 0260-271831, evenings.

NEW XTALS: 3.579MHz, 3.686MHz also 4, 5 & 10MHz wire ends @ £1.50 ea plus SAE. Solatron CD1400 double beam scope, vgc, offers around £70. RTTY? Creed 15B 444 teleprinter, as new and unmodified, buyer to collect, offers? G4LSA, tel: 0785-74388.

TRIO TS930S, auto atu, MC-60 mic, immac condx. FT708R 70cm handheld with NC-11C chgr, YM24 spkr/mic & extra battery pack, £165. Bearcat 220 VHF/UHF scanning RX, £110. Paul, G4UOT, tel: 061-789 3089, evenings prefered.

TRIO/KENWOOD DFC 230 for TS120 or TS130, c/w mic, £50 ono. G4HYY, QTHR, tel: 070 681-5342.

726R, 2m/70cm/HF/satellite units, narrow CW filter ex condx, £1,050. SEM 2m 10x linear & psu, £110. G1IQJ, QTHR, tel: Epsom 42476.

FT7 with FL110 100W linear & PS30 psu, £200. Hy-gain 12AVQ, used 3 months only, £30. G3TXW, 11 Willow Garth Close, Leeds, LS14 2EB, tel: 0532-733957.

FRG7 RX, vgc, £125. Sony 3-head stereo reel-reel tape recorder, upright model TC377 with manual, vgc, £45 ono incl 8 off 7" reels of tape. Phillips tape recorder, reel-reel with 10 off 5" tapes, model 4308, vgc, £35 ono. G4PWB, QTHR Essex, tel: 0268-773398.

VHF MULTIMODE, FDK750XX, latest model, 20W, ex condx, orig packing, £270 ono. Bob, G4ZRS, NOT QTHR (Medway, Kent), tel: 0634-712351.

YAESU FT790R, 70cm mutimode plus 10W FL7010 matching amp, little used, £300. Trio 9000, 2m multimode, 10W, recently serviced by agents, £275 incl mobile mount. G6NMK, QTHR, tel: 0366-388713.

FT107 FM BOARD, will also suit FT707, £55. BBC RTTY terminal unit, £30. 10m conversion kit for 11m multimode, full logical 28-30MHz coverage, will fit if required. G4ODM, QTHR, tel: 0256-26050

DRAKE TR7, £575. Drake PS7, £120. Drake SP75 speech processor, £75. Shure 444D mic, £30. Kenpro KR400 rotator, £65. Hy-gain 18AVT vertical, unused £120. 'VHF/UHF Compendium', £6. 'VHF/UHF Manual' 4th edition, £4. 'VHF Communications' 1976-1982, £5. G4TFH, QTHR.

SHARP MZ80B computer with MZ80FB twin disc-drives, MZ80P5 printer, high res graphics, basic PASCAL assembler CP/M, lots of software & manuals, complete system, £500 ono. G2DWB, QTHR, tel: 061-761 5001, after 5pm.

SEIKOSHA GP100A dot-matrix printer c/w spare ribbon, dust cover & cable for BBC, £100 ono. G8OMB, QTHR, tel: 0203-396936.

813 boxed with holder, 813 not boxed, holder, Hi-mound key type 100, £6. 2.5" dia Eddystone coil 26T, new DAF RX, working, £35. HF roller coaster 30T. Poulton, tel: 0203-443488.

FT200B as new with G3LLL RF clipper & some spare valves incl 2 PAs, all in orig packing, £200 ovno. G3JQL, QTHR, tel: 0385-61116.

YAESU 480R & 780R 2m/70cm rigs with console and clock, base use only, immac condx, £650 ono. G3VGH, QTHR, tel: 0904-769245.

YAESU FTDX401 TCVR, ext vfo, also matching spkr, vgc, £275. Yaesu 790 incl nicads, chgr, case, strap, gc, £275. G4SKQ, QTHR, tel: 0742-466530.

HB23M 2-ele tri-band mini-beam with Hirschman rotator and controller with 3-section tubular mast and cable, buyer collects, £130. Reason for sale? Too much QRM from XYL! G4UCH, QTHR, tel: 0272-833296.

HEWLETT PACKARD OSCILLOSCOPE, 1707B, 75MHz dual beam, dual TB, all solid-state, portable, £450. Philips TV camera LDH26, 2/3" Videcon, small, ideal ATV, £75. Philips 14" video monitor, £35. WANTED: Direct reading microwave freq counter. G8BXH, tel: 01-428 0974.

INVERTER 24V dc to 240V ac 50Hz, xtal controlled, 150W with 2off 13A outlets, £75. Minature portable oscilloscope, dual-beam, 25MHz, mains/12V dc, datascan (US), £200. Hewlett Packard 3720A spectrum display, needs 3721A correlator to function, £200. G8BXH, tel: 01-428 0974.

MARCONI TF2200A dual-beam 25MHz oscilloscope, £75. Solartron LM1420 dvm, £30. Both with manuals. New oscilloscope tube, Mullard 95447CM (equiv D14-160GM), £90. Tamadenki 156MHz 1W handheld, xtal controlled TCVR, with nicads, offers? 12V 7.5A psu, £15. 200V 150mA stabalised + 6VAC,3A x2, £10. RCA TE149 wavemeter, circa 1940, offers? VCR97 tube, £5. VCR138A tube, £3. Bob, G8SAS, QTHR, tel: 0732-351361, evenings or 01-434 3311 extn 214, daytime.

FT290R, nicads, chgr, case, rubber duck, HB9CV antenna, Welz SP10X swr meter, all nearly new, £295. 30W 2m linear amp, £30. Pye PF70, 4 nicads, xtals, £30. Will deliver within 100 miles of Newbury. G6WNN, QTHR, tel: 0836-811310.

STANDARD C78 with case and spare nicads, will incl 2x5/8 mobile antenna, £150 ono. White, tel: Chipping Sodbury 317655, after 7pm.

HQ-1 HF tri-bander, vgc, list £185, bargain £85. Trio 4000A dual-band 2m/70cm, 5W/25W with Japanese lady (voice synthesised), boxed, £425. Charnock,

tel: 051-428 6731.

AR88D, £40. KW Vanguard TX, 160-10m, £30. BC221 freq meter, £10. RF, amp, meters, £1. LT transformers, 245V in, 6.3V @ 4.8A 6.3V @ 1A & 6.3V @ 5.6A out, £2. USA Vibroplex key, £30. G3HCY, QTHR, tel: Ruislip 75724.

COLLINS 75A4 RX incl all filters, perfect working order, £150 or exch WHY? G4OER, tel: Dunstable 608152.

YAESU FTV107R tvtr modded for use with FT102, fitted 2m module, c/w instruction manual, leads and modification details, gc, £125. G4WZQ, QTHR, tel: Herne Bay 374318, weekends or Canterbury 65968, daytime during the week.

ICOM IC740 TCVR with psu, desk/mic, handbook, ccts orig packing, ex condx, £600. G4MXJ, QTHR, tel: Tyneside (091) 285 8546.

TOTSUKO TR2100M 2m SSB portable, 1W/10W, mic, case telescopic whip, nicads, £89. 10FM, modified Fidelity, £25. Pye Cambridge, working on 2m, needs attn, £19. New 5.25" floppy disk head cleaning kits, £3.99 incl p&p. G4RAA, QTHR, tel: Burnham (06286) 4262.

KW VANGUARD TX, 180-10m CW/AM, working order, buyer collects, £50. G4SLS, QTHR, tel: Wellington (Somerset) 3367.

TRIO TR9130, the classic 2m all mode rig, practically as new, £395. G4VEN, QTHR, tel: Havant (0705) 473764.

DATONG MORSE TUTOR, £37. Belcom Liner 2 TCVR, £50. Heathkit oscilloscope model 10-17 with manual, £35 GODUF, QTHR, tel: 049161-2279.

VERSATOWER TRAILER ONLY, fits base plate mounted tower 40' or 60', £200. Transformers 17.5V @ 10A, ideal 50W linears psu, new, unused, £8 ea. Heathkit RG-1 communications RX, £50. Nigel, G4NRR tel: 021-744 8672.

FT901D with added memory unit, 270Hz CW filter & FM, desk & fist mics, p/exch HF mobile or sell £550 ono. Pye MF5 Europa cvtr, 4m FM, £30. WANTED: NCL-2000 elec, condx unimportant. G4BWP, QTHR, tel: 0638-751830.

EMIGRATING: have Icom 211E with muTek front-end, ICRM-3 remote keypad/memory. Require HF TCVR, with digital display, FM or able to modify for FM to drive tvtrs. Anything considered, cash adjustment possible or sell, £395 ono. Keith, G6HHV, QTHR, tel: 051-327 5804.

TRIO 9130 2m multimode, ex condx, never used mobile, £350. Leader LAC-897 144MHz atu, brand new boxed, £30. G4WFG, QTHR, tel: Congleton 273899, evenings.

TRIO TH21E. 2xdc dc units. Vox head set, nicad chgr, all Trio, £150 ono. David, G4YHV, NOT QTHR (Beds), tel: 0525-220582.

SOMMERKAMP FT277ZD, WARC bands, FM board, boxed, unused, mint condx. Labgear VHF/UHF colour bar generator, mint, offers? RS9191, 24 London Road, Kessingland, Suffolk, tel: 0502-740336.

DATONG D70, Morse tutor, ex condx, £35. GODLQ, QTHR as G1GZV, tel: Nottingham 640007, 8pm-10pm.

SHOCK HORROR PROBE! "Dashing amateur G8KUX passes Morse test". Datong Morse tutor held on charge for £36. Steve, GOEZB, NOT QTHR, tel: 090722-3772.

1,550' ASL COTTAGE IN SHROPSHIRE, south facing, beautiful view, needs complete renovation to give three bedrooms, has electricity, water, good roof, stone construction. £15,500. SAE for details, Morgan, 123 Laleham Road, London SE6.

TRIO TS820 with manual and orig packing, £450. Also AT200, £70. VF0820, £70. SP820, £20. The lot for £600. Carriage extra. G3HCS, QTHR, tel: 0602-635421, after 6pm.

YAESU FT101ZD Mk3 plus fan, immac, c/w owners manual, home-brew switching unit use with 101ZD, switches 70cm and 2m tvtr + linears & pre-amps. MM 2m tvtr. SP102. £625 ovno. Bob, GOEND, tel: 051-489 2321.

CW TX/RX UNIT, using ZX81, boxed with EPROM, active filter, psu, sidetone, keying relay, 8-250 wpm, data, £40. Philips LFH0084 Dictaphone, mic, accessories & cct, £20. Philips 1500 vcr head, used, £5. Tapes, £2 ea. GM4EWM, QTHR, tel: 0343 84-2530, evenings.

FT200 + MATCHING PSU, needs pa repair and checking over, spare pa valves and assorted valves, HB/mic, £75. MET 144-19T, new, boxed, £45. HE5R radial kit, £20. Memory unit FT901DM, £45. Cushcraft A20-3 mono-band Yagi, new, £85. Richard, tel: 0484-710313, daytime.

TRI-BANDER TET HB33M, ex condx, 6 months old, Emoto 103LBX rotator, £140 ono the pair. GOABW, QTHR (Cambs), tel: 07677-371.

TEN-TEC DELTA, matching psu model 280, also 215PC matching mic, mint condx, boxed, any test, £450. HW32 Heathkit 20m TCVR, needs attn, £20 to good home. G3OJS, tel: Frinton (02556) 5041.

APPLE 2E, 64k computer, 2 disc-drives, 80 col, Z80, serial, 128k RAM cards, software + games, manuals, £850 or exch HF rig with gen/cov or HF stn or WHY?. Newton, tel: 0592-756682.

TRIO TM401A 70cm 12W FM, immac condx, never used mobile, going multimode, £290. GW4HAT, tel: 0792-290770, evenings.

TELESCOPIC MAST, 3" steel bottom section 15', 2.5" then 2" ally sections c/w bearings, guy rings, rotator, base plate, £40 carriage extra. BBC B, dual disc-drives, 8 ROMS, Pace Nightingale modem, loads software/discs/mags, try £999 ono. G3LCS, QTHR, tel: 01-354 3354, work.

HONEYWELL dot-matrix printer, similar to Epson MX80 etc, Centronics interface BBC compatible, £100. 5.25" disc-drive, 40 track, faulty, BBC compatible, £15. Chris, tel: Bedford 851129.

YAESU FT221, 2m base TCVR, c/w YC221 readout and matching SP221 spkr, vgc, also manual, do not wish to split, £320. G1HQL, QTHR, tel: 0403-55011.

BIRD POWER METER + 3 elements, 43 thru-line, today's price, £152. 6m element, £55. 70cm 430MHz 0.25kW, £75. 2-30MHz, £45. First cheque £200 secures. J Berry, G3JZN, QTHR, tel: 061-723 2529.

YAESU FT290 c/w nicads, chgr, helical & 1/4-wave aerials, telescopic, muTek front-end fitted, also case & strap, box & handbook incl, clean, gc, £225. Russ, G4YLI, QTHR, tel: Workington 4954.

KW107 SUPERMATCH, incl dummy load, gc, £65. Linn Sondek LP12, SME3009 series 2 improved pick-up arm Shure V15 "super track plus" cartridge, £240. Teac A7300ZT stereo master tape deck, 7.5 & 15 ips, £490. Niven, tel: 01-653 1851.

TS520SE 160-10m incl 30m, mic, matching spkr, 250Hz filter fitted, gc, one owner, orig packing, changed rigs, genuine offer, £355. G4HZF, QTHR, tel: 0472-71215.

FT290, fitted muTek pre-amp c/w mic, handbook and carry case, £200. Mobile headset and switchbox, £20. SMC 7/8 whip, gutter-mount and cable, £10. Alan, G4YKC, QTHR, tel: 0734-424081.

EIGHT CHANNEL HANDHELD SCANNER, by Sound Air, 144-160MHz FM, new nicad batteries and chgr, also helical antenna, manuafacturers box, xtalled for S18/S19/S20/S21/S22, bargain at £37. Mike, G6MNX, QTHR, tel: York 422773, anytime.

EMMIGRATING: Trio TS430S, FM, CW filter, £600. TS780 multimode 2m/70cm base stn, £750. Yaesu FT708 70cm handheld, accessories, £145. Standard C8800 2m FM mobile, £145. DNT 10m FM with 25W pa, £35. All perfect, orig packing, ono. Drae 24A 13.8V psu, £80. 2A 0-18V variable psu, £18. ST5 RTTY TU, TTL i/o, suit computer, £30. Western WE1145 rotator, £10. 2m 9-ele Tonna, £12. 30' mast brackets, offers? G4VXF, QTHR, tel: 0582-33876, home or 0442-42233 extn 54, work.

IC290H all mode TCVR, as new, boxed, 1W/25W, 2 vfo 5 memories, very little usage, £320 ono. G4UVR, QTHR, tel: 0704-25964.

AMT-1 (incl CW/RX), £160. Daiwa PS-300, 9-15V/30A psu, £135. Daiwa CL-680 1.8-30MHz atu (17 bands), £68. Philips TP200 12" mono vdu, £58. Dragon 32 package, £50. Windrush EPROM programmer cartridge for above, £60. MCP-40 printer/plotter, £52. Bencher BY1, £34. GOAAV, QTHR, tel: 0942-729202.

6m RIG & 3-ELE BEAM, offers or exch atu, 2m linear 2m mobile, 25A psu, FT790R and 7010 amp, exch HF mobile. Cousins, tel: 0709-67471.

BNOS 13.8V 25A psu, 30A shut down, still in orig packing, £135. Ken, G1PYQ, QTHR, tel: 0386-554279.

TRIO TW4000A FM, dual-band TCVR, gc, £400. KLB 110 10m linear, 1-10W i/p 25-50W o/p, £30. G4VET, QTHR tel: 01-647 1879.

FRG7 COMMS RX, mint condx, no mods, boxed as new, manual, £120 ono. Yaesu MD-1B8 base/mic, given as present and never used, still boxed, £50 ono. Brian de Lara, G4VYW, tel: Southampton 550444, ask for flat 4.

AR88LF, gwo, £30. Ham Major 588 AM/FM/USB/LSB ideal for 10m conversion, £40. WANTED: Transtel AE9 45/50 bauds RO or (AH11). Tony, G4KDZ, QTHR, tel: 0375-378783.

RACAL RA17L with spare set new valves, vgc, £160. RA98B SSB adaptor, £40. Ex MA197B pre-sel unit, £35. gc all with manuals. Hindle, tel: 061-962 7577.

DRAKE TR4CW, 300W TCVR, psu/spkr, Shure 444 mic, all mint, the last and best of the famous range, £430 or consider exch HF mobile. G4FPU, QTHR, tel : 0707-320741.

SPACE REQUIRED, OFFERS INVITED: Ediswan R1103A psu, Level TG200D oscillator, 225-400 MHz directional coupler, Cawkell 1471 filter, Marconi TF144G sig/gen, Advance OS250 scope, Penny & Giles PG2100R, Calcomp 7042A and Data Systems 210-11-28 8" disc-drives. G6HUN, tel: Wolverhampton 713640.

ICOM 202S as new c/w chgr and 10 off N-900 nicads, extra xtals, £140 ono. 2m 17-ele Tonna, £25. 2m 16-ele 'BCX, £20. Wood & Douglas 2m pre-amp in waterproof diecast box c/w N-type sockets, £20. G6HUN, QTHR, tel: Woolhampton (Berks) 713640.

VIBROPLEX mechanical bug key, deluxe version, unused gift, £50. Hardman, tel: Blackburn 673184, 9am-4pm.

YAESU FTV107R tvtr, fitted 2m module and t/burst, wired for FT102, will fit other rigs, £125 or will exch for Yaesu FC102 atu. Brian, G1EUA, QTHR, tel: 06267-78554, after 5.30pm or weekends.

TRIO TS820S, fitted CW filter c/w mic, manual, brand new spare 6146Bs, mint condx, £495. Drake SPR4 gen/cov RX, fitted noise blanker, calibrator, all accessory xtals, incl Drake MS-4 spkr, absolutely mint condx, £350. GOAYZ, tel: Gosport 589560.

YAESU FRG7700 gen/cov RX, vgc, untouched, £210. Mizuho MX-2, 2m CW/SSB handheld with psu and handset, £40. 32k RAM pack for Sinclair Spectrum, £15. GODQL, NOT QTHR, tel: 0388-834270.

FT101ZD Mk3 FM, immac condx, one of the last to be made, £485 ovno, carriage by arrangement. WANTED: 10m multimode, 12v rig or TS120, reasonable price and condx. G4NVQ, QTHR, tel: 0424-420608.

THREE KILOWATTS! Kubota generator, ideal for NFD, has been run for 30 hours only. Substantial saving on new price, £525. Crosland, tel: 0905-620041, anytime.

YAESU FT102 TCVR, SP102 filter/spkr, MD1 desk/mic, HF5 vertical antenna, narrow CW filter and AM/FM board fitted, £600 ono. Peter, tel: Guildford 893436, after 6pm.

BARLOW WADLEY XCR30 Mk2 portable RX, £85. Yaesu FT7B 50W TCVR with YC7B digital readout, £290. Eagle sig/gen, TE188, £50. Heath Audio wattmeter, £25. Heath IM17U vvm, £30. Heath IT1B transistor tester, £30. G3UCE, QTHR, tel: Hest Bank (Lancs) 822125.

TRIO 9000 2m multimode plus 50W BNOS linear and Kent Morse key, all boxed and mint, swap for FRG8800. Cash adjustment if with FRV8800. Must be in mint condx. G1OIA, Brightlingsea (Essex), tel: 0206 30-4544.

EDDYSTONE EC10 Mk2, vgc, mains unit, battery unit, manual, buyer collects, £75. G3JNM, tel: 0204-43999.

YAESU 757GX HF TCVR, 100W, ex condx, £575. 2m 100W valve linear amp (Belcom LA106) with pre-amp and spare valve, vgc, £100. Alphacom 80 column dot-matrix printer with Commodore 64 interface, as new, £50. GOBUK, NOT QTHR (Crowborough), tel: 08926-64117.

SCOPE HP180 with 1801A 1821A. Goes [100MHz, £159. Pulse generator, valves, but vgc, £20, both £169. Teletype ASR33 vgc with reader, punch, £99 ono. All demo'd, working, offers? G6UTN, QTHR, tel: Norwich 713894.

FT290R, Sommerkamp version, very sensitive, listen i/p factory fitted c/w nicads, chgr, case, spkr/mic, rubber duck etc, £240 ono. Ambit 20W+ linear for above incl pre-amp, £30 ono. MMT144/432 2m-70cm tvtr, attenuators for 2-10W drive, £100 ono. GOAWL, tel: 0543-262916.

FT101ZD Mk3 FM, CW filter, FV101DM digital vfo, Daiwa CNW518 atu and pwr/swr meter, Tono 350 CW/RTTY RX terminal. Also FT290R, muTek front-end, nicads, chgr, soft case, 30W Sota linear, Daiwa 620, rotator, 8-ele Yagi. GM4PSF, tel: Saltcoats 62955.

VALVES: 6 new QQV02-6, £10 ea. 2 used YL1080 (quick heat QQV03-10), £20 ea. 2 used 813, £10 ea. (or offers) A G Heys, G4CEB, 32 Priorsfield Road, Woolton, Liverpool, L25 8TN.

TRIO AT940, internally fitted auto atu for TS940 TCVR, £160. G4CHP, QTHR, tel: 0508-470365.

IC720A TCVR with CW filter, FM board, desk/mic, £550. Daiwa 2002, 2kW auto atu, £75. FC301 atu, £50. KR400C rotator, £50. Philips stereo phones,

£5. Azden spkr, £5. Stuart Senior, G4MIB, QTHR, tel: 01-675 0280.

COMMODORE 64 with disk, printer, cassette, RS232, WP package, compilers, books etc, £250. Stuart Senior, G4MIB, QTHR, tel: 01-675 0280.

FT290 c/w nicads, soft case, MM30LS linear, ex condx, £300 or exch for HF linear or take FT730 in p/exch, must be in gc. G4XCL, tel: Nottingham 394068, after 6pm or weekends.

COMPLETE 2m BASE/MOBILE STN, incl Yaesu 480R, 7A psu, AEC swr meter, hardly used,ex condx, boxed plus 7/8 car antenna, Adonis MM202 mobile/mic and fixings, £400, no separate sale. G1HNS, tel: 0925 76-2310, evenings.

MOVING: Brand new IC's. BC108s. 10 sec loop tapes. 45 minute leaderless tapes. Caps, CF, Resistors. Test equipment, various used, SAE for list please. G3MVU, QTHR until July.

YAESU FT101E, CW filter, astatic mic, fan, £325. KDK 2033, 25W 2m FM, £175. Weltz SP250, £25. Hansen FS200 pep, £35. Commodore MPS801, virtually new, £65. WANTED: Yaesu FT726 + options, cash awaiting best deal. Mr Cole, G3RCQ, NOT QTHR, tel: 01-594 3495 (office).

HY-GAIN IV, 10m multimode, £75. Hy-Com Colt, 120ch FM/AM 10m rig, £30. 200W pep solid-state linear amp for 3.5-30MHz with pre-amp and variable i/p level, £50. G4ZDT, QTHR, tel: 0953-607594.

SWAP Polaroid Polarvision player c/w Polaroid Polarvision instant movie camera as new for HF TCVR in vgc, KW2000B, HW100 or separates eg KW204, KW202 or HF RX EA12, FRG7700, R1000, anything considered, WHY? GOCIC, QTHR, tel: 01-200 3825.

YAESU FRT7700 atu, £25. SSM Z-match atu, £20. MFJ1700 TX antenna switch, £50. CDC Centronics data switch, 2 i/p's, 1 o/p or vice-versa, cost £172, sell £100. P Karagianis, 20 Lea Road, Sonning Common, Reading RG4 9LJ, tel: 0734-722085.

AMSTRAD PCW 8256 computer, green screen monitor, keyboard, printer, dust-covers, software, 7 spare discs and computer desk, 5 months old, perfect condx, £300. Murphy, tel: Marlborough 52571.

YAESU FRG7700 gen/cov RX, ex condx, £250. Also Cobra 148 GTL DX c/w xtal for conversion, £110. Bremi BRL 200 linear for conversion, £50. G0EYN, NOT QTHR, tel: 0602-556509.

PS30 STABILISED PSU, 20A, £85. New 3-section 34' telescopic square steel boxed tilt-over tower, incl ground socket, rotator head unit, winch, Hammerite finish, suitable HF beam etc, £345. Trio TR7800, 14 memories, 25W mobile, £170. Mike, G3TSL, tel: Preston 635560.

SX200N SCANNER, as new, 26-514MHz, AM/FM, all bands, cost £325, accept £195 ono. WANTED: Electronic keyer, Star, Daiwa or similar also Yaesu FTV700 or FTV707 tvtr required, all must be mint. Adams, tel: Irvine 217611.

TRIO-KENWOOD TR9130 5W/25W 2m multimode, manual, mobile mount, orig packing, ex condx, £300. G4SPS, QTHR (North Cornwall), tel: 0288-55309.

REALISTIC DX302 RX, £130. Heathkit SW717, gc, £40. Wood, tel: Clochen 378.

FT290R c/w chgr, nicads, mic, c/case, muTek replacement front-end and Elinco 30W linear amp, all mint condx, 7/8 wave antenna, gutter mounting, £330 + p&p. G4XSE, QTHR, tel: Bishops Waltham 3511, evenings and weekends.

SPECTRUM 48k, ZX printer, amradio software, vucalc, vufile, vu3d, flight simulators, carrying case, Kempston joystick, user port connector, books, £95 ono. WANTED: 5.25" disk-drive and DFS interface for BBC B. G4BPW, QTHR (Burton), tel: 0283-813395.

TS830M 9-band HF TCVR with matching atu, MC35 dynamic hand/mic, dummy load, low-pass filter, all ex condx, little used, £850. G4SRV, QTHR, tel: Redditch 41121.

YAESU FT7B TCVR, used RX only, £210. BNOS psu 12V/25A, £60. 2 off Akai reel-reel 4000DS, £120. Dual trace oscilloscope 535A Tektronix, £50. All mint condx, buyer collects or pays carriage. Luis, GM1BVA, tel: 0324-36484, evenings.

FV901DM synthesised scanning vfo, 40 memory channels, auto/manual scan, clarifier, manual etc. Rick, G3YEC, tel: 01-405 6233, daytime or 0206-210710, evenings.

YAESU FT290, nicads, chgr, case, gutter mount, helical whip, vgc, £245. G1LPJ, tel: Leicester (0533) 413908.

YAESU FT560, full legal power in one rig plus Datong speech processor and spare valves, £250 for the lot. G3NDO, tel: 0705-465121.

JUNKBOX CLEAROUT: Avometer 1920/30's, working but tatty. Dynamotor 28V in 250V dc @ 60mA. Londex mechanical timer 0-15mins. Nombrex psu, 1-15Vdc @ 0-50mA. 19" rack psu, would suit HRO. Valved VHF broadcast tuner. Valved VHF radio complete. VFO 6L6 o/p, no info. Old audio amp chassis. 2 off Honeywell Controls chassis. Potentiometer resistance box (part). Multi-tapped auto transformer, 240V 700VA. HV chokes; 2.5H @ 4A, 0.875H @2.5A. Basic cassette recorder, vgc, £30 the lot or haggle. Buyer collects. G4FXU, tel: Lymm 6545.

FT102 c/w FM/AM, 500Hz filter, boxed, manuals, spare set new 6146Bs, vgc, £550. Durst M605 colour enlarger c/w 2 lenses, Rayco stabilised voltage unit type 111S, Colorneg analyser, Jobo CPE2 processor, custom bench, large qty related chemicals, unopened fridge-stored colour and B/W paper, focus finder, Luxoneg III, Durst TIM60 timer, transformer for enlarger etc. All vgc, £430 but buyer must transport. G4UKL, QTHR (Cornwall), tel: 0326-40595.

SONY HVC3000P colour video camera. vgc c/w c/case £250 or c/w F1 portable recorder, TTF1 remote control tuner/timer + car chgr, £650. Graham, G1SOI, QTHR, tel: Maldon (Essex) 784679.

'MODERN ELECTRONICS CIRCUITS REFERENCE MANUAL' by John Markus, McGraw-Hill publication, current edition, new price £60, ex condx, sell for £35. G0BRQ, QTHR, tel: 0202-699834.

GOOD HOME WANTED for 5-door Series IIA Land-Rover, never lost in the desert. Offers around £500. G8LQZ, QTHR, tel: Eastbourne 20872.

FT707 100W, FM board fitted (100W), ex working order, boxed, £400. G1LCI, QTHR, tel: Bourne End (Bucks) 26493.

CODEMASTER TELEREADER 610E, 12V vdu and TV/RF o/p from audio i/p, £130. 10m FM Oscar SMC conversion with rptr/shift, £45, postage extra. G4NDL, QTHR Ivybridge Devon, tel: Plymouth 894574.

MICROWAVE MODULES tvtr 28-432MHz. MBM88 70cm antenna. MM 50W 70cm linear c/w leads for Icom 740, £200. Hodges, tel: 0522-683113.

YAESU FT102 TCVR, c/w FM board. Yaesu MD1 scan/mic also Yaesu SP102 spkr c/w filter in new mint condx the lot, £695 ono. H/D CD rotator and controller, £95. G4TNG, QTHR, tel: 053756-265.

FT757GX, immac, MH1B8 fist scan/mic, YM38 desk scan/mic, FRB757 switching box for linear, £570 ono. FP757HD psu, immac, £140 ono. Both boxed with manuals. G4UDQ, QTHR, tel: 051-260 8594, evenings and weekends or 051-709 5431, work.

FT230 2m FM TCVR plus mobile mount, £200. IC202 2m SSB/CW TCVR, extra xtals, £90. RTTY system: Spectrum, Scarab interface and t/unit, £110. FRG7 with atu, £135. GOAHI, tel: 0689-39410.

COMMODORE 3032, upgraded 4032 c/w AMTOR, RTTY ARQ, FEC listen variable baud rates. Word processor, d/drive, d/recorder, hundreds didc programs, Micromon EPROM, books literature, demonstration preferred, best fair offer. G3VCO, QTHR.

SK620A BASE, £10. 4CX250 base, HF only, £5. Air pressure gauge 0-1.5 inches water, £10. 4CX250B, new boxed, £15. 4CX350A, new, £15. Several used valves,£5. Pair new QQV06-40A plus 2m linear bits, offers? G8ZGK, NOT QTHR, tel: 0494-448030.

"ADMIRALTY HANDBOOK WIRELESS TELEGRAPHY" 1938, both volumes, offers? B29 RX, 15-560kHz, gwo, £30, very heavy prefer buyer collects. Wireless Worlds back issues to 1949, offers? WANTED: Cheap CW TX 40/50W, anything considered. GOEBV, 45 Edge Court, Durham, DH1 2JY.

SHARP MZ-80K computer, 48k RAM, hi-res graphic board, PASCAL, Basic, extensions Forth, Morse tutor, music composer, other programs, books and manuals, fully working in vgc, shielded case, ideal for radio applications, £80 buyer collects. G1OSB, QTHR, tel: Hull 792839.

TAU 5kW SPC ATU, £110. MET NBS Yagis: 144/14T, £28; 144/7T, £14. Altron AQ6-20 3-ele spacesavers beam, £105. Microwave Modules MML144/100S linear amplifier, £105. Buyer inspects and collects, sensible offers considered. G4RKO, QTHR, tel: Thatcham 60263.

MIRACLE MODEM WS2000 as new, multi speed, £80. 12AVQ vertical antenna, £18. Super Star 2000 10m multimode incl CW, rptr/shift, 4 x 50ch 10kHz 28-29.7MHz 10kHz shift, £70. G4UVJ, QTHR, tel: 0268-697978.

BBC B complete ham program log with high-speed search from any i/p (call, name, QTH, date etc), spreadsheet list and access to all current log printout. 2m/70cm repeaters displayed on UK map, input callsign or QTH for full repeater information, map of UK or USSR any town or city pinpointed, add to as you please, full QTH/Maidenhead/Lat & Long/Locator cursor movement constantly gives accurate QTH/Maidenhead/Lat & Long parameters on map. Input any for pinpointed position on map, eraseable notepad, digital clock alarm, amny more features, auto band/date/mode facility to ease logging update. A fully professional program giving everything for the operator wanting all information at fingertips, disc only, £12. WANTED: FL2100 in good condx. John, G4TEN, tel: Blandford Forum 53075, weekends only.

TRIO TS430S range, TCVR fitted FM board, AM and 2xSSB filters PS430 psu, SP430 spkr, AT250 auto atu, up/down mic, mint condx, boxed, cost £1,100+ new, accept £800. Upgrading! G3HSW, QTHR, tel: 06614-3730.

PENTAX MX c/w 50mm, 28mm, 135mm, lenses and x2 Komura adaptor, motor drive, Vivitar flashgun plus some filters, all in metal custom style case, £215 or exchange for 2m multimode. G1FRY, QTHR, tel: 0984-31197.

PSU's, several, 9-16V 20A+ 12V, £39. Same 40+, £69, overload protection. Icom IC22A 1/10W, S10-23, R0-7, boxed, handbook, £125. Nicads, chgr for 290, £15. WANTED: old/new/SH mobile QRP HF, must be gwo, also mobile antennas. G4XOX, tel: 0245-324555.

WESTERN ALUMAST 40' c/w base, rotor mounting and top plates, £185, dismantled, buyer collects. G3TMU, NOT QTHR (Camberley), tel: 0276-32204.

ROTATOR KR400RC D/L bell, little used, as new with orig box, £100 ovno. G1LMM, QTHR, tel: 0622-44659, late evening.

FT200, FP200 TCVR, unmodified, all 10m xtals fitted, some spare valves, vgc with Shure 444 mic, £225. G4COH, QTHR Bracknell, tel: 0344-481946

YAESU FT203R, 2m handheld c/w chgr unit, vgc, £150 Niven, tel: Northampton 68247, evenings.

BELCOM LS102L mint condx, recent service by Lowe (Matlock), £180, prefer buyer to inspect/collect. Worthington, tel: Warrington 53407.

FT757GX, as new and under guarantee, £650 ono. FL2100Z HF linear amp, as new, £450 ono. Holland, GOBXR, tel: 0482-643165.

YAESU FT101B with Datong speech clipper fitted, spare set of unused valves, gwo, £290. G4SNY, QTHR, tel: 0442-66466.

DIAMOND DDCP5 trap vertical antenna with trap radials, 10-80m, £80. G4CLZ, tel: 0925-601236

YAESU FTV-901R tvtr, mint condx with manual, orig box, £140 or would exch for a 2m home base with case adjustment. Piper, QTH nr Heathrow Airport, tel: 01-890 4666.

PAIR CASTLE CONWAY 3-way spkrs, 50W per channel veneered walnut home-built enclosures fitted factory assembled front board, very heavy units on castors, 31 x 15 x 14, £75. John, G4WLD, tel: 01-857 8096.

SANYO 12" display monitor, green screen, hardly used, boxed, composite video i/p, £50. G6XTY, QTHR, tel: 01-467 5351.

HEATHKIT HW8 QRP TCVR, with mains psu, ex condx, £95. KT88s never used 4, £55. Peter, G4XYK, QTHR, tel: 01-368 8674, evenings.

SONY ICF2001 portable RX, mains psu, £75. Sharp MZ700 computer, integral cassette and printer/plotter, serial and parallel interfaces, modem, software, books, might split, offers? WANTED: NCM515 remote frequency controller for NRD515 RX. G4GXE, QTHR, tel: Buxton 71410.

TEXAS TI99/4A computer, as new, parsec cartridge, cassette leads, over 20 programs incl Morse, QRA, etc, £40. Philips N1501 copier model vcr, playback OK but slight record fault, with tapes, ideal repair for ATV use, £25. GOCAD, QTHR, tel: Oxford 863565.

DATONG D70 Morse tutor, £30. MM144/30LS 30W linear, £55. Both condx. John, GOEPL, 191 High Street, Henley-in-Arden, Solihull, West Midlands B95 5BA, tel: 05642-2773.

FT757 100W HF TCVR, ex condx c/w mobile mount, £575 ono. 19" equipment rack, 6' high, sides and rear enclosed with Rexine coated metal panels, on castors, collapsible, vgc, £10. Ken, G4UEN, QTHR, tel: Southampton 433837.

TRIO TR9130 2m TCVR, mint condx, only six months old c/w mobile bracket, handbook etc, £375. Icom IC490E 70cm 10W multimode TCVR, ex condx, only

twelve months old c/w bracket etc, £380. Martin, G1LHK, tel: 01-590 5490.

HW8 QRP TCVR, no mods c/w Morse key and headphones £90. MC-50 mic, ex condx, £20. G4/OZ1XB, tel: 09277-64094.

FT290R gc with chgr and c/case c/w orig packing, £200 ovno, prefer buyer to collect. R Young, G4MQH, NOT QTHR, 5 Manor Close, Shipton Bellinger, Tidworth, Hants, tel: Stonehenge 42543.

ICOM IC2A 144-148MHz FM c/w chgr, spare nicad pack spkr/mic, IC-DC1 adaptor, mobile charging cord, 1/4 wave antenna, 10W/15W pa homebrew from kit, £150. GU2FRO, QTHR, tel: 0481 83-2210.

DAIWA CNW419 atu, cross-needle, 500W pep, full band coverage, boxed, mint condx, £135. G4YNI, QTHR, tel: 061-740 7708.

KWM380, CW filters, speech processor, £2,500. Icom 701 p/s mic, £400. SB200 linear, £200. Ham IV rotator and control, £120. Datong speech processor, £20. FL1 filter, £25. Valves: 100s QY3/125, QY3/65, 813, 805, 6146, 3E29, TZ40 etc For your museum, variable air gap xtals. Transformers: 1500V 350mA, 400V 450mA. G2OT, QTHR.

ICOM IC251E, orig box and packing, manual, unmodified, unmarked, mint, £400. G4TSO, QTHR, tel: Torquay 213085.

RACAL 117E RX and SSB adaptor, both in one cabinet LF adaptor also cased, gc, service manuals for each and some spare valaves, £225 no split, buyer collects. BRS85986, tel: Leicester 782711, evenings or weekends.

HOUSE MOVE FORCES SALE: Trio TS520 SSB TCVR, 120W, 80/40/20/15/10m bands, hardly used since pa's changed, boxed c/w ac and dc power leads, £375 ono Yaesu FT708R 70cm handheld with 10 memories and scanning c/w YM24A spkr/mic, nicad pack, chgr and case, boxed, £150. Icom IC4E 70cm handheld 1.5W o/p, thumbwheel tuning c/w IC-HM9 spkr/mic, nicad pack, battery case, chgr and carrying case, £140. DM801 dip meter, 700kHz-250MHz, unused, boxed, £40 Mag-mounted 5/8 over 5/8 for 70cm, £10. G8TQH and/or G8YFW, tel: 021-440 4721.

KLM KT34XA tri-band beam, £500, buyer collects. Tektronix 581A oscilloscope, £50, buyer collects. Datong SRB2 auto 'Woodpecker' blanker, £55. G3FPQ, QTHR, tel: 0420-23168.

2m RIG, FT290R c/w nicads and chgr, MM144/30LS linear, psu's for each, pwr/swr meter, 5/8 wave colinear, all ex condx, £355. G3BFL, QTHR, tel: 0635-298492.

YAESU FT757GX TCVR, FC757AT auto atu, FP757HD, psu MD-1 desk/mic, £950. Yaesu FRG9600 scanner with BNOS 13.8V regulated psu, £350. Both items in mint condx. John, G4YDM, QTHR, tel: 091-416 2606.

FT980 with electronic keyer and 250Hz narrow CW filter fitted. Condx as new, rig seldom used due to illness, £1,200 will secure this first class rig. Wylie, tel: 041-889 5131, after 7pm.

COLLECTORS ITEM: National 110 RX, fair condx, as seen, £25. Eddystone EC10 c/w mains psu, £45. Leak Point One plus mono amp and Trough Line Two tuner, £30. G3LLZ, QTHR, tel: 0793-828188.

STANDARD C78 70cm FM TCVR, case, chgr, mobile bracket, £155. Double 5/8 70cm whip, £12. Stella tape recorder plus 7 tapes, workshop manual, £8. Heathkit IM1212 DMM plus manual, £15. Electronic organ workshop manuals, offers? G3JKN, QTHR, tel: Denham 832229.

TRIO TR7200G FM 2m mobile, fitted all rptrs, S23-18/S16/S10 c/w mic, mobile mount, packing, little use, gc, £80 or best offer. 5/8-wave 2m whip c/w gutter mount, cable, £10 ono. G6BCC, QTHR, tel: Hull 75674.

HEATHKIT TOWER HT-1G, 30' self-suppoting mast, £35 G3SBJ, QTHR, tel: Crawley 35485.

FRG7700 gen/cov RX, pristine condx, £250. FRV7700 model A, mint condx, £40 or both for £280, post & packing extra. John, tel: 0427-5266.

FT101B 160-10m TCVR, mic, fan, manual, leads, plugs etc, spare pair pa's, never used mobile, plus matching spkr SP101, all ex condx, £300 the lot, buyer collects or arranges carriage. GM4GIF, NOT QTHR, tel: 0436-78646.

KW2000A gc c/w psu/spkr in daily use, £175. Commercial computer DMS DSC2, twin 8" 512k floppys 14Mb hard disc 64k CP/M, £275. Heavy duty 30' steel tower, gc, recently repainted, £50. Mike, G4HSF, QTHR, tel: 051-722 0291.

YAESU FT709R, 6 months old, ex condx with FNB4 battery pack, £185. Icom IC2E 2m handheld, £95. Yaesu NC15 chgr, £45. Heathkit DX60B CW/AM TX, 90W dc i/p power, £45. UHF co-linear, 70cm, £15. Mike, G4HWJ, tel: 04893-4140.

FT101Z, absolutely pristine condx and in perfect working order, recently checked by emporium and in top class condx c/w pair new output tubes, handbook, orig packing, mic etc, £450. G4RWU, QTHR, tel: Maldon (Essex) 893067.

23cm tvtr, uncompleted kit, £45. 9m telescopic mast, unused, £40. Wood & Douglas 2m synth + RX, PCBs only, £60. FT290, muTek front-end, MMB-10, £255. Components - SAE for list. All ono. WANTED: IC240 or IC24C. G8OQN, QTHR, tel: 0705-750600, evenings or weekends.

AZDEN PCS3000, 2m mobile TCVR, keyboard or mic freq/vol input, full scan or memory scan c/w orig box, manual, ex condx, £195. Yaesu FRG7 gen/cov RX, digital freq readout, manual, vgc, £125. G1NLX, tel: 0376-20871.

KW2000B TCVR c/w psu, recently serviced by KW, vgc, £150. G4LAK, Devon, tel: 0626-66818.

COLOUR GENIE COMPUTER, split screen RTTY/CW software, recorder, B/W TV, ready to go on-air, £140. Trio TS530, MC/mic, £520. Yaesu 227R 2m TCVR FM, £120. Many other items, going QRT, buyer collects. G3ZLN, tel: Ipswich 49139.

FT690R, nicads and 3-ele beam, new, £220. Homebrew psu, 13.8V @ 15A, compact size, £40. MMT432/144R with 15dB attenuator, £120. Homebrew transmatch atu, internal 4:1 balun, OK up to 400W, £45. WANTED: HF mini-beam for 10/15/20m. Wallace, tel: Rugby 815506.

GOING QRT SHACK CLEARANCE: Yaesu FT101ZD Mk3, WARC bands with optional FM board fitted and IQD 250Hz narrow CW filter and YD148 desk/mic, matching spkr, £495. Matching FC902 atu, £90 or both £575. All gwo, full demo given. Icom 211E 2m base stn c/w muTek front-end, full service manual, all mode plus free Jaybeam 10-ele X Yagi with circular phasing-harness and UR67 cable, £350. TAU 5kW atu, unused, brand new, £200. Many more items available. Yaesu FT707 base/mobile TCVR c/w service manual, narrow CW filter, £375. FP707 matching psu/spkr, £85 or both £450 with set of Yaesu all-band mobile whips and mobile mount free! G0AQL, QTHR, tel: 0329-284105.

TRIO TM-401A 70cm mobile, £250. 10m 3-ele Yagi, £50. 5-band vertical with trap radials, £60. G4OII, QTHR, tel: 0472-813450.

COMMODORE PET computer 3032 basic 4 with printer, gc, £175. Marconi deviation meter model TF719D, ex condx, £100. Many spares for Commodore PET. Please call for details or send SAE. Ken, G4IZW, tel: 0498-21372, anytime.

ICOM IC240 2m TCVR, gc with marual, mobile mounts plus homebrew 80ch adaptor, £100. G4MGL, tel: 0252-546966.

SMC OSCAR 2, 10m TCVR, £35. TC35, 75W linear amp, £20. Buyer collects. G3PFE, QTHR, tel: Sleaford (Lincs) 304233.

YAESU FT480R, 2m multimode, vgc plus Microwave Modules MML/50-S 50W linear amp, vgc, £320. G4UNZ, NOT QTHR, tel: 0400-81431.

TS520SE, CW filter, MIC50, £320. 520S vfo, £45. EC10, £45. Ampere APB-82A 2m linear, £60. EK150 keyer, £50. All items vgc. G4DTT, QTHR.

FT101 with top band, vgc, £285. Pye Europa, aligned 2m , 25W o/p, £40. SA400L disc-drive, new in box, £40. Pye UHF Westminster, aligned 70cm, £40. G4LUL, tel: 0457-65185, after 7pm.

FT102, FC102 & SP102, £675. SSTV SC1 with keyboard £760. All items in ex condx. Hobson, tel: Rotherham 364569.

YAESU FT290R, chgr, nicads, mic, case, ex condx, £210. Yaesu FR101 2m/6m fitted, ex condx, £180. Pye Westminster W15AM, vgc, £25. Jaybeam 8Y/2M £8. Hi-mound key, HK808, £18. G6PBJ, tel: 051-525 4196

YAESU FRG7700 with memory, hardly used, in orig box with manual, immac condx, £200 ono. G6VSQ, QTHR, tel: 0625-73409.

FT77 100W, FP700, FC700, all mint condx, boxed c/w mic, narrow CW filter, manuals plus HF5 with radial kit, £600 complete. G0CNF, QTHR (Cambs), tel: 022023-3850, evenings.

YAESU FT480R + 90W mains linear, £300. FT290R, hardly used, £250. Trio TS120S, £350. All in mint condx, in orig packing. 2m X10-ele, £15. 46-ele 70cm 'M' beam, £10. P Gill, G3YTE, QTHR, tel: 0376-45234.

SIGNAL R532 synth air-band RX, 100ch, nicads, chgr leatherette case, whip and helical plus ext UHF cvtr, frequency lists and airnav charts, £235 ono. R528, nicads (2), case, 18 xtals, £120 ono. Sony ICF7600D, £110 ono. All vgc. Lockwood, G3XLL, QTHR, tel: Mellis 596.

KENWOOD M60A mic, fitted 8-pin plug, up/down, int pre-amp, dual imp, brand new, £49. G4CHP, QTHR, tel: 0508-470365.

RACAL RX RA217, gwo, solid-state, offers? Plessey, RX, PR155, gwo, offers? G8YMR, QTHR, tel: 0684-295189.

YAESU FT480R multimode, gc c/w mobile mount, £275 ono. Eddystone 840A, ex condx, £50 ono. For sale again due to time wasters! Buyer inspects and collects, pays all carriage. G1AFW, QTHR, tel: Medway 876447, evenings.

JAYBEAM Q4/2M Quad, new condx, collect assembled or part assembled from Rugby, £20. G3ADZ, QTHR, tel: Rugby 815222.

MIZUHO SB/2m CW/SSB 1W portable TCVR, 144.100-144.300 plus spare xtal 144-144.050, new vxo tuning capacitor, nicads, chgr, mic, manual, handkey, swr meter, homebrew Spectrum linear, £70. Swap small S/W RX? G4VLB, QTHR, tel: 061-480 1549.

COLOUR MONITOR, 14" Rediffusion 'System Alpha', RGB and composite video i/ps, built-in audio amp and spkr, bought new NEC April, unsuitable Spectrum computer, £150 or swap colour TV/cash. G8VXO, QTHR Solihull (West Midlands), tel: 021-705 3583.

JAYBEAM VR3 vertical HF antenna 10/15/20m c/w radials, £40 ono. RAF TX 1154, one valve missing, no pu otherwise mint, ideal for exhibition or spares, sensible donation to Scouts secures. Delivery possible South Bucks/London. John, G4KGT, tel: 01-920 8142.

COMPLETE TRIO/KENWOOD STATION, litle used, immac condx, all boxed. TS830S TCVR, atu, ext digital world clock, dummy load, instruction manuals, morse key, buyer inspects/collects, £1,000. G Bingham, 53 Hawkshead Lane, North Mymms, Hatfield, Herts, tel: 0707-57926.

SWL SILENT KEY SALE: FRG7 RX, freq readout, vgc, £230. QM70 cvtr, £15. Amtech 200 atu, £15. AR22R rotator, cables, control box, mast, 2m/70cm antenna, £60. Lowe TX40 TCVR, dc psu, £40. SWR/FS meter, £5. 240/110V 0.5kVA transformers, 2 off, £10 ea. Heathkit 10-102 scope, vgc, £50. In addition test equipment, many components incl old valves, transformers, loudspeakers etc. All prices ono. Details tel: 0727-24734 or 01-361 1922.

WANTED.....

URGENTLY SOUGHT: Yaesu FC102 atu, will collect within reasonable distance from Southampton or carriage paid. All reasonable offers considered but equipment must be in vgc. Particulars & price to Peter Barker, G0DZU, QTHR, tel: 07948-286.

LINEAR AMP, Pye type A200 band E0 in gwo. Good price paid incl costs. Mike Randall, tel: Home Valley (0407) 741193, evenings.

VERSATOWER P60, must be in gc, electric winch also wanted for same, can collect in 50 mile radius. G4VTC, QTHR, tel: Dorking 885533.

LVC120 or LVC150 black cassettes for Philips N1700 video recorder. G3NPF, QTHR, tel: Horsham 66290.

TRIO SP930, spkr unit, also AR2002 scanner. Peter, G4YTF, QTHR, tel: Leicester 416796.

YAESU FC102 atu or similar. G3YSN, QTHR, tel: 051-722 3644.

EDDYSTONE 770R in gc. Exch Amstrad 6128 computer for FT790R in gc. G1SFH, tel: Newmarket 720084, after 6pm.

70cm EQUIPMENT, exch only, SSB plus many other ancillary spares, genuine ad, interested portables base stn. SAE please to G6JGA, 97 Twyford Avenue, Gt Wakering, Essex, SS3 0EY.

AR2001/2002, must be unmod, buy or exch mint Leicaflex outfit. G3WDY, QTHR, tel: 01-653 4738.

CD1400 SCOPE, copy of manual referring to CX1448 time-base unit, costs refunded. G8UDJ, tel: 0865-735821.

YAESU FL101 TX, to match FR101S, must be in gc c/w leads etc, also handbook or photocopy cct for Lafayette HE30 RX. GI4RYP, QTHR, tel: Armagh 524267, after 6pm.

AT130 ATU. G3LQI, QTHR (Sussex), tel: 0903-754017.

* PYE 'BLACK BOX' CUBE, B&W TV/RADIO/CASSETTE * mains/battery operation, must be working and in reasonable condx, Philips equivalent model in white also acceptable. Price and condx please to David Gough, tel: 01-207 0709, evenings or weekends prefered.

STILL REQUIRED to complete long standing project:- black UX6 valve holder, max dia 1.125" or scrap USA RX containing same, also green painted Elstone LFC and o/p transformer. G4IMT, QTHR, tel: 0225 891254.

TERMINAL UNIT/SOFTWARE for decoding RTTY/CW on Commodore 8096. FOR SALE: Commodore 8032 computer SFD 1001 disc-drive 8023, 136 column printer incl all cables, £700. Consider exch Trio/Yaesu HF TCVR or Tele-reader. Cachart, tel: 062982-3207.

BIRD 43 elements, 500 or 1000, HF & VHF, might consider complete outfit, Bird coaxial switches, 50 ohm, 74, 72.2 or 718. Wide-band discone, HQ-1, MH-1. Details to Owen, G4HMF, QTHR, tel: 0473-51319.

'SPACECRAFT ATTITUDE DETERMINATION & CONTROL' Editor James R Wertz, by D Reidel Publishing Co 1984 ISBN 90-277-1204-2. My library not too benevolent, so need my own copy. Cliff, GI4CZW, QTHR, tel: 0365-24500.

FOR SOLARTRON SOLARSCOPE CD1220 dual trace plug-in CX1257 amplifier, working or not. G3ZUM, QTHR, tel: 021-747 5077.

BOUND VOLUMES of 'Radio Communication/Bulletin' from 1950-1968 inclusive, can collect in Midlands or South. G6JNS, QTHR.

PLEASE HELP to put G4TTT, Stafford & DARS on the air. HF TCVR required, FT101, FT201, FT560, TS520 etc or WHY? Limited funds available. Details to G4GKZ, QTHR, tel: 0785-212797.

25W or 10W 2m RF deck for Yaesu FT720. Complete 2m FT720 also considered. Also wanted, FT790. G6DAN, QTHR, tel: 0953-604201.

DRAKE 7 SERIES EQUIPMENT, eg MN2700, RV7, RV75, MS7, SP75, TR7A, L7, DL1000 etc. Also Hy-gain TH3 Mk3. G4DFU, QTHR, tel: 0602-609345.

FT902DM HF TCVR, must be in mint condx. FOR SALE: KW Vespa HF TX, 160-10m CW/SSB, spare valves, also semi break-in CW box c/w cables. Liner 2, 2m SSB TCVR, Both gc, offers? G0DLF, QTHR, (Northants), tel: 0604-770835.

FRG7 RX. Details and price to G3LP, QTHR, tel: 0452-34890.

ROTATOR. light weight, must be 100% working order, c/w controller. G4IXK, QTHR, tel: Crewe 767594, anytime.

12E1 VALVE PLEASE, any books on valve data. Panda Explorer, any condx. Good home waiting for any of the above. Chris, G4ILR, QTHR, tel: Cromer 761612.

5MHz XTAL in 7-pin valve base to make my US Signal Corps wavemeter work! G1DRG, QTHR, tel: Peterborough 63714.

TV502S tvtr to match TS820s, must be in gc and c/w leads and book. Norman, tel: 051-608 1504.

MANUAL FOR COSSOR 339A oscilloscope. Also mains psu for 1155 RX or chokes for same and old but serviceable HF RX. Also base/stn 2m all mode TCVR. Lankshear, 57 St George's Road, East Looe, Cornwall, PL13 1ED, tel: 05036-2823.

YC221 DIGITAL READOUT and muTek front-end for 221RD. Xtals for 7200G. Bird 43 high power elements. Details & price to G4HMF, 102 Constable Road, Ipswich IP4 2XA (all letters answered) or tel: 0473-51319.

TELEPHONE HANDSETS, older type preferred. Field telephones, working. Also 'Balanced Armature' earphone inserts. KW2000A psu diagram. Cheap electronic key for one-armed operator with artritis in wrist, WHY? GM3XFD, Badcaul House, Dundonnell, Ross-shire, Highlands, Scotland IV23 2QY.

SPC 300 or 3000 atu. Roger, G4CGU, QTHR, tel: 021-422 8477.

PX25, PX4 VALVES or equivalent. Westrex or Stentorian loudspeakers. Friedman, tel: 01-445 0613.

2m & 70cm VHF/UHF multimode base, Trio TS780S or Yaesu FT726R or Icom IC271E. Must be mint, best price given. Howard Johnston, The Walk, Lower Ufford, Woodbridge, Suffolk IP13 6DL, or tel: 0394-460474.

ECH35 VALVE, as used in class D wavemeter, cct diagram for class D wavemeter, handbook and cct diagram for Minimitter 2-7 TX. G3VPZ, QTHR.

HQ-1 MINI BEAM or AQ6/20E beam. Must be in vgc. G3HLI, NOT QTHR, tel: 0203-456128, evenings.

ICOM IC730 HF TCVR. Would also consider IC720A etc Must be in gc with any mods fully documented, cash waiting. GM3WCS, QTHR, tel: 0383-726456.

YAESU FT290R for standby, outside condx not important provided in reasonable working order, set only required, without nicads, c/case, chgr or antenna. Offers to G3HDT, Gatherick Duddo, Berwick-upon-Tweed, TD15 2PR.

MARCONI FREQUENCY METER TF1026 series in wooden box. G8ACE, tel: Winchester 55705.

DRAKE R-7A or TR7A, must be in ex condx, cash waiting. Bob McHenry, G3NSM, tel: 0865-56321.

KW MODEL 103 pwr/swr meter. GM4CUB, tel: 0292-262496.

YAESU FT102 TCVR, fitted FM/AM board, FV102DM ext vfo, FC102 atu, fitted 4-way selector. Jess, G4COF, QTHR East Sussex, no phone.

EXTERNAL VFO and psu matching Belcom Liner 2, c/w handbook, cct and details of any mods. G6CJL, QTHR, tel: 0422-54635.

ANDREWS HELIAX LDF450 or LDF250, also connectors for LDF450. GOAWP, tel: 0482-651827.

FOR THE WIRELESS MUSEUM: List of Edwardian amateurs, old callbooks, QSL cards, radio books, magazines, service sheets, manuals, equipment. Collection arranged. Details please to G3KPO, Hon Curator/Trustee, QTHR, tel: Ryde 67665.

GERMAN WW2 gear, parts, literature for museum purposes, need not be working, offering cash or harware in return, will collect. Leads also appreciated, finders' fee. OZ8RO, R Otterstad, Vejdammen 5, DK-2840 Holte, Denmark, tel: 010-425-80 1875.

HF TCVR with gen/cov RX. 720A preferred but others considered, also atu and psu to suit. Chris Whitaker, 4 The Crest, Goffs Oak, Waltham Cross, Herts EN7 5NP, tel: Cuffley (0707) 874494.

YAESU FC102 atu. Also MML144/30LS. G4PTT, QTHR, tel: 02372-73663.

KENWOOD SM220 monitor and accessories in gc. Kenwood SP930 spkr. G4YNI, QTHR, tel: 061-740 7708

VALVES to revamp aged TX. TT21s, 12BY7s, WHY? Offers to G3YRZ, NOT QTHR, tel: 0245-261003.

EDDYSTONE LOUDSPEAKER, information, handbook or cct diagram for valve voltmeter, Hewlett Packard 412A. G4CJL, QTHR, tel: Stalbridge 63357.

COMMODORE 64 SOFTWARE, and BBC software, amateur related - not games! FOR SALE: Vic 20, £45 ono. GP-50 printer, £35 ono. G1FEF, NOT QTHR, tel: 06285-26003, after 6pm or anytime at weekends.

MANUAL & INFORMATION incl cct diagram for old Minimitter TX, 40/80/160m. Will buy or copy, costa covered. G1ASW, 4 Carleton Close, Esher, Surrey KT10 8EE, tel: 01-398 0114.

VALVES: type W81, X81, DH81, KT81, SP130P, Osram or GEC versions preferred but equivalents by other manufacturers considered. G3XMM, QTHR, tel: 0452-422726.

MANUALS FOR SOLARSCOPE CD1212 (CT484) and plug-ins CX1251 and CX1252, also digital to analogue peripheral for BBC Micro. Cct for Hallicrafters 'Sky Buddy'. 50 and 70MHz cvtrs. G3PAI, QTHR.

TOWER. Good price paid for W60, must be in gc. Also interested in heavy duty rotator. Chas, G4UJW, tel: 01-203 2286.

FV102DM ext vfo for FT102. Price etc to G2FSA, 42 Broadhurst, Ashtead KT21 1QD, tel: Ashtead 74733.

INEXPENSIVE COMMUNICATIONS RX for young swl. Almost anything considered, working or faulty. R210 RX in complete unmodified condx required. No12 sender required with accessories if possible. Jim, G4XWD, tel: Kidderminster 3674, evenings.

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.
DO NOT POST TO THE ADVERTISING OFFICER

YAESU

THE WORLD's No1 HANDHELD RANGE

AUTHORISED YAESU

FT203R/FT703R

The FT203R/FT703R is packaged in a lightweight, high-impact plastic case providing comfort and convenience with high durability. The small size is made possible by using chip components.
Thumbwheel frequency selectors (with 5kHz up button) plus standard repeater shift. Volume and Squelch controls are on the top panel along with jacks for the antenna (BNC), external microphone and earphone.
With the optional external YH-2 Headset, the internal VOX system provides voice-actuated transmit/receive switching, for "hands free" operation when mobile or walking. (As FT209R).
Also included is an S/PO meter for monitoring of relative power output and signal strength. (As FT209R).
The FTE-2 1750Hz Tone Burst Generator, which is standard, is activated manually by a button on the side of the FT203R. (As FT209R).
A range of slide-on Nicad packs or AA-cell cases provides the optimum power source for your needs (As FT209R).

144-146MHz
−10kHz (+5kHz)
Supply: 5·5-13V DC
IF's: 10·695-0·455Hz
Selectivity: ±6kHz
@ −6dB (2:1SF)

430-440MHz
10kHz (+5kHz)
Supply: 5·5-13V DC
IF's: 21·6-0·455Hz
Selectivity: ±6kHz
@ −6dB (2:1SF)

FT209R/FT709R

The FT209R/FT709R with two 4-bit CPU's and a lithium backed RAM offers features far beyond anything yet conceived, in a package smaller and lighter than any previous CPU-controlled transceiver.
Ten memory channels allow storage of either standard +/− shifts, or independent Tx and Rx frequencies for any split/repeater shift on any channel, with touch-key reverse or simplex on either frequency. Scanning capabilities include step-programmable full or partial band memory bank priority scanning etc.
Battery life is greatly extended with a programmable Power saver which activates the receiver momentarily at programmable intervals.
Nineteen soft rubber dual function keys provide greater control than ever, yet operation remains easy: the keypad is carefully arranged, colour-coded and most commands are one-touch operations.
Fat ½" LCD digits are complemented by ten memory and nine special function indicators showing status at a glance.

144-146MHz
25/12·5kHz
Supply: 6-15V DC
IF's: 10·7-0·455Hz
Selectivity: ±7·5kHz
@ −6dB (2:1SF)

430-440MHz
50/25kHz
Supply: 6-15VDC
IF's: 21·6-0·455Hz
Selectivity: ±15kHz
@ −6dB (2:1SF)

GENERAL SPECIFICATIONS

Good 50 ohm match to linears and antennas. Frequency modulation (FM-F3-G3E) variable reactance linear modulator

Sensitive, quality 2K ohm condenser MIC. ±5kHz max. dev, 16kHz max. bandwidth. Transmitter spurious output −60dB

Sensitivity: 0·25μV for 12dB Sinad.
1μV for 30dB S/N.
AF O/P: 450mW into 80hms @ 10% THD

Large range of accessories available. Supplied with YHA 14A/YHA 44D helical antenna and appropriate soft case

FBA5

CELL CASE

FNB3

10·5V NiCd Pack

FNB4

12·5V NiCd Pack

NC9C/NC18C

Slow Charger

PA3

DC Adaptor

YH-2

Mic Headset (Vox)

MH-12A2B

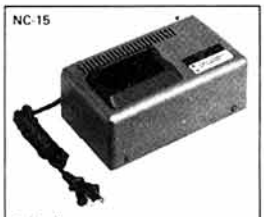
Speaker Mic

CSC (Series)

Soft Case

MMB-21

Mobile Bracket

NC-15

Quick Charger

MODEL, SUPPLIED CELL, POWER OUTPUT (Hi/Lo), CASES, DIMENSIONS				
FT203R	**FT703R**	**FT209R**	**FT709R**	**FT209RH**
1·5/0·2W* C/W FBA5 CSC6 65W, 34D, 153H mm	1·5/0·2W* C/W FBA5 CSC6 65W, 34D, 153H mm	1·6/0·2W* C/W FBA5 CSC10 65W, 34D, 168H mm	1·8/0·2W* C/W FBA5 CSC10 65W, 34D, 168H mm	2·3/0·3W* C/W FBA5 CSC10 65W, 34D, 188H mm
2·5/0·3W C/W FNB3 CSC6 65W, 34D, 153H, 482gms	2·5/0·3W C/W FNB3 CSC6 65W, 34D, 153H mm, 480gms	2·7/0·3W C/W FNB3 CSC10 65W, 34D, 168H, 512gms	3·0/0·3W C/W FNB3 CSC10 65W, 34D, 168H mm, 535gms	3·7/0·4W C/W FNB3 CSC10 65W, 34D, 168H mm, 512gms
3·5/0·4W C/W FNB4 CSC7 65W, 34D, 172H, 490gms	3·5/0·4W C/W FNB4 CSC7 65W, 34D, 172H mm, 495gms	3·7/0·4W C/W FNB4 CSC11 65W, 34D, 186H, 520gms	4·0/0·4W C/W FNB4 CSC11 65W, 34D, 186H mm, 520gms	5·0/0·5W C/W FNB4 CSC11 65W, 34D, 186H mm, 520gms

FT203R C/W FBA5 ..... £195.00
FT203R C/W FNB3 ..... £225.00
FT203R C/W FNB4 ..... £229.00
FT703R C/W FBA5 ..... £229.00
FT703R C/W FNB3 ..... £255.00
FT703R C/W FNB4 ..... £260.00
FT209R C/W FBA5 ..... £239.00
FT209R C/W FNB3 ..... £265.00
FT209R C/W FNB4 ..... £270.00
FT209RH C/W FBA5 ..... £245.00
FT209RH C/W FNB3 ..... £275.00
FT209RH C/W FNB4 ..... £279.00
FT709R C/W FBA5 ..... £255.00
FT709R C/W FNB3 ..... £285.00
FT709R C/W FNB4 ..... £290.00

SMC

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