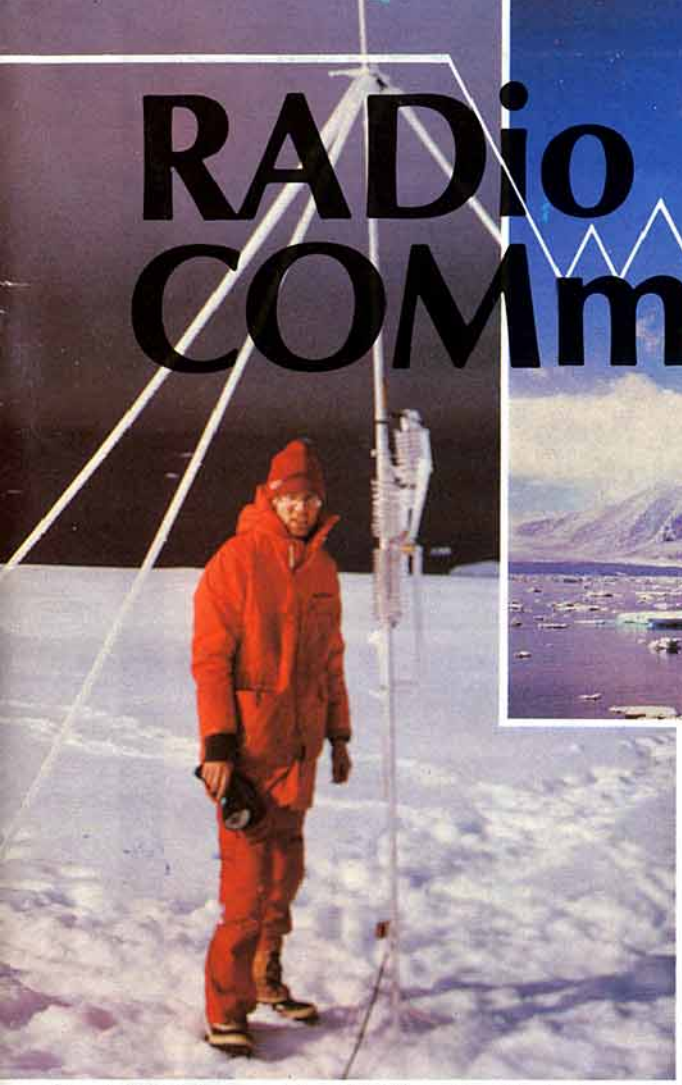
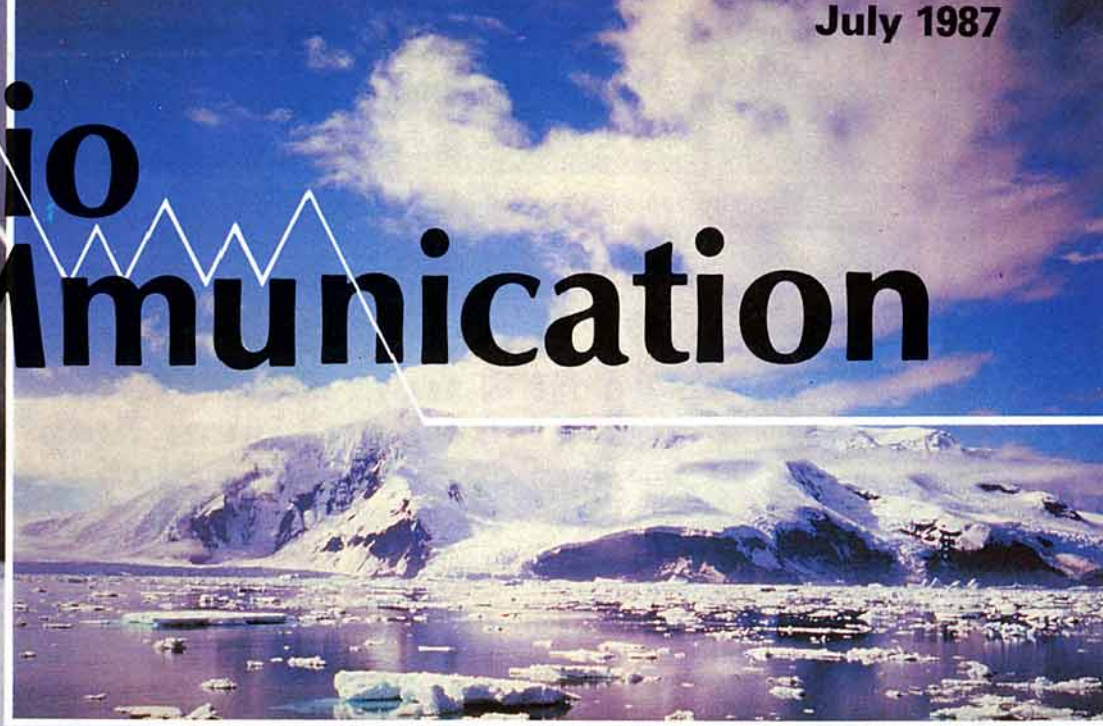
July 1987

RADio COMmunication



Einar, LA1EE (who operated as 3Y1EE) examines the ice-bound Butternut after a night of unpleasant weather. This 3Y2GV antenna was used for 95 per cent of the time because (a) it was better than the TH3jr beam 7m above the glacier on 14 and 21MHz, and (b) when 3Y1EE operated with his VS33 horizontal Yagi, both stations could operate on the band at the same time

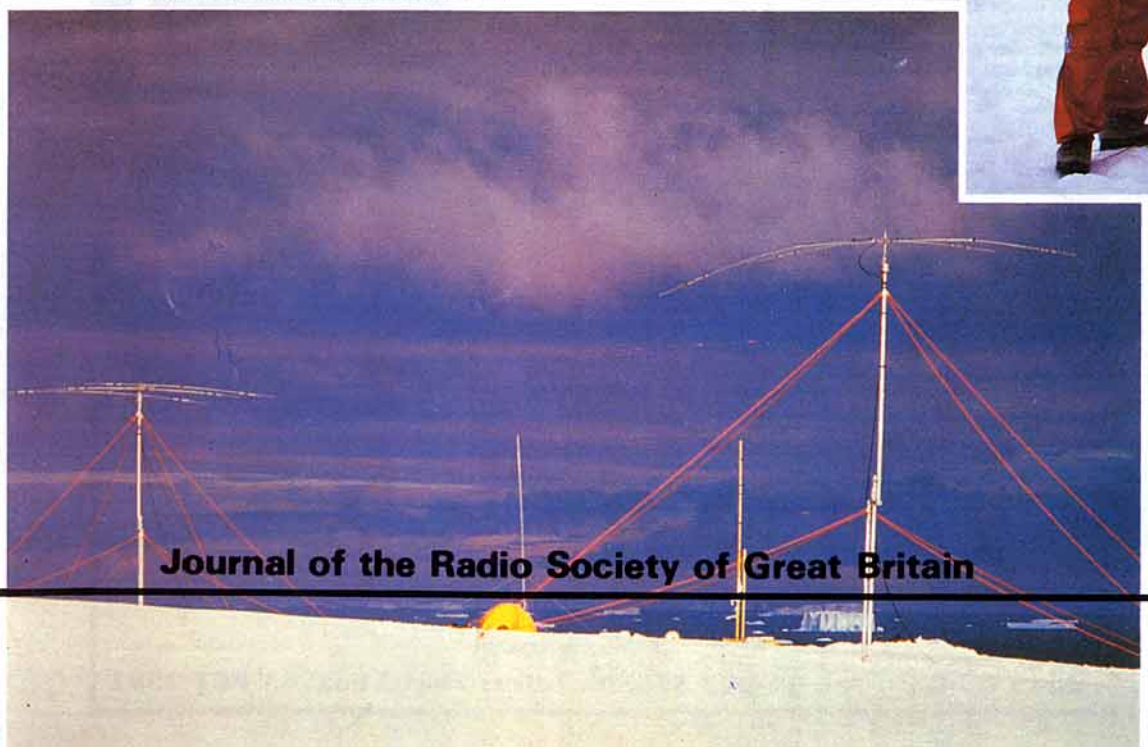
BELOW
The V33 (l) and TH3jr (r) with rotors, on 7m tilt-over aluminium masts by LA6VM. Both stations had a Yagi and a Butternut vertical. The separation between 3Y1EE's and 3Y2GV's (Kaare, LA2GV) antennas was approximately 100m



Peter 1 Island seen from the west. The island is approximately 20km long, 10km wide, and the highest point is 1,695m asl

THE LA DX GROUP PUTS PETER 1 ISLAND ON THE AIR FOR FIRST TIME

3Y1EE (l) with Cranleigh, the helicopter pilot, and Knut Svendson, the Norwegian Polar Institute's expedition leader



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JULY 1987

VOLUME 63 No 7

RADio COMmunication

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RSGB on Prestel page 8107

FRONT COVER

Photograph taken during the Norwegian LA-DX Group's expedition to Peter I Island in Antarctica in February this year. Two members of the group, LA2GV and LA1EE, established the first amateur operation from the island (see *Rad Com*: March 1987, p193; April 1987, pp269-70)

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.

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

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

ABC MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS 36,527 copies per issue average circulation in 1986

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

two great handhelds from KENWOOD.

Without a doubt the two new 2 metre FM hand-helds from KENWOOD now represent the best value for money in amateur radio equipment today.

For the amateur who wants a simple high quality transceiver from a reputable manufacturer at a rock bottom price but still wants high output power for shack use, the TH205E is the answer. And for the operator who is prepared to pay a little more to gain additional features, the TH215E is the obvious choice. As well as the new rigs for 2 metres, KENWOOD have produced 70 centimetre versions, these are the TH405E and TH415E.

	TH205E	TH215E
Frequency range	144 to 146 MHz for both receivers	
Power output	Depending on operating voltage up to 5 watts (with standard PB2 battery pack 2.5 watts)	
Operating voltage	Battery terminal 6.3 to 15 volts DC Top panel jack 7.2 to 16 volts DC	
Memory channels	3 with quick recall	10 with quick recall
Frequency stepping	5 kHz	5, 10, 15, 20 or 25 kHz
Battery saver	Built-in battery saver extends operating life	
Scan	Simple band scan	Band, memory and programmable scan
Size	67(2.64)W × 173(6.81)H × 37(1.46)D mm(in.)	
Weight	520 g (1.15 lb) with PB2 and aerial	

£218 **£258**

Prices include NiCad, charger & VAT

TM221E & TM421E

2 metre and 70 centimetre FM mobiles

45watts 35watts

The new KENWOOD TM221E and TM421E two metre and seventy centimetre FM mobile transceivers have been specifically designed to condense maximum performance and operating convenience into a compact package. Output power is 45 watts on two metres (TM221E) and 35 watts on 70 centimetres (TM421E). Receiver sensitivity matches the output power of the set and measures an amazing 0.141μV for 12dB SINAD (across 144-146). The figures are those given by Chris Lorek in his recent TM221E review published in the July edition of HAM RADIO TODAY.

Much discussion has taken place recently regarding 12.5 and 25 kHz spaced frequency channels on the two metre band. With the new mobiles channel spacing is not a problem. KENWOOD with their usual attention to detail have made the frequency step user selectable. The steps available are 5, 10, 12.5, 15, 20 and 25 kHz. Once programmed either microphone up/down button or the transceivers front panel knob can be used to step the transceiver across the band. Of course should it be necessary the selected step can easily be changed.

A new orange backlit liquid crystal display gives the transceiver an amazingly clear frequency readout that can be read in the brightest of sunlight.

The transceiver has all essential operating aids. There are 14 memory channels, each of which holds frequency, whether simplex or repeater operation is required and whether or not the tone burst is on or off. Scanning can either be memory with the ability to lock out unwanted channels or band with the scan limits set by the operator. The usual priority channel facility is also included to make sure that no call is missed. As well as showing the operating frequency the display also indicates which of the facilities are being used.

TM221E ... £334.60 inc VAT (carr. £7.00)
TM421E ... £372.08 inc VAT (carr. £7.00)

What is an RC10?
See next page

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GPV23	as above but 3 section colinear, 7.8 dB gain, 4.45 metres high . . . **£51.97 inc vat**, carriage £7.00.
GPV7	**Seventy centimetre triple 5/8 base station colinear**, 6.8 dB gain . . . **£45.59 inc vat**, carriage £7.00.
GPV720	**Dual band (144/430 MHz) base station aerial . . . £45.68 inc vat**, carriage £7.00.

FOR MOBILE USE

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2NE	**Two metres 7/8 whip**, 4.5 dB gain, foldover base . . . **£24.23 inc vat**, carriage £2.00.
OSCAR430	**Seventy centimetre triple 5/8 whip**, 6.3 dB gain . . . **£27.72 inc vat**, carriage £2.00.
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RG4M	**Cable assembly** for GSS base, complete with SO239 and PL259 plug . . . **£6.26 inc vat**, carriage £1.00.
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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. . .**£115.00 inc vat**, carriage £2.50.

U66V remote head, 140/525 MHz, max 300 W, N type connectors. . .**£55.27 inc vat**, carriage £1.50.

SC20 extension cable for U66V, approx 20 metres long . . . **£29.21 inc VAT**, carriage £1.50.

an RC10 is....

Occasionally a piece of equipment comes along which catches the imagination; the RC10 remote controller/handset for the TM221E and TM421E does just that. Designed to operate with either transceivers or link both together, the RC10 looks more like a cellular radio car phone than a piece of amateur radio equipment.

In fact the RC10 not only looks like a car phone, but as a speaker and microphone are built-in, operates as would a telephone handset. Easily mounted in any car, dashboard or transmission tunnel, the RC10 controls all transceiver front panel functions with the exception of on/off and high/low power selection. The functions controlled by the RC10 are volume, squelch on/off, frequency readout, keypad frequency entry, memory selection and frequency or memory scanning. Full duplex operation is possible when both transceivers are fitted. From a security point of view it may even be possible to mount the transceivers out of sight and only have the controller on view. Since most thieves now know that a cellular phone is not a saleable item, owning an RC10 may be a wise investment!

Although I have not seen the RC10, I am of the opinion that it will do much more than I have already described. I suspect that it will be possible for the RC10, when used in conjunction with both 2 metre and 70 centimetre transceivers, to operate as a personal repeater. Parked at the top of a multi-storey car park and left unattended, I would not be surprised if you could not talk-in to the installation from another small handheld on 70 centimetres (say a TH41E) and have your transmission re-broadcast at a higher power from the good location on 2 metres. Any reply would be re-transmitted to you on 70 centimetres. Useful and ideal for staying in contact when wandering around town. Helpful also for RAYNET use.

Of course I may be wrong!

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the address, c/o South Wales Carpets, Clifton Street, Cardiff, 0222 464154.

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the address, 223/225 Field End Road, Eastcote, Middlesex, 01-429 3256.

In Bournemouth.
the shop manager is Colin, G3XAS,
the address, 27 Gillam Road, Northbourne, Bournemouth, 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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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 . . . **£1495.00** 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 . . . £362.00 inc VAT, carriage £7.00
BS8 . . . £81.22 inc VAT, carriage £1.50

amateur band transceivers

TS830S HF amateur bands transceiver

Needing no description, the KENWOOD TS830S, which uses a pair of 6146B valves in the PA, is well known on the amateur bands (160 to 10 metres) for it 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 . . . £1095.00 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 communications. Modes of operation are USB, LSB and CW.

TS530SP . . . £895.00 inc VAT, carriage £7.00

send for the KENWOOD detailed leaflet

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 KENWOOD TS940S a pleasure.

TS940S . . . £1995.00 inc VAT, carriage £7.00

TS930S HF transceiver with general coverage receiver

Much has been said and written about the ST930S and it now has a place high in the affection of radio amateurs. Modes of aperation 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 KENWOOD TS930S is the ideal rig for today's crowded bands.

TS930S . . . £1750.00 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 . . . £1195.00 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 with FM optional.

TS430S . . . £995.00 inc VAT, carriage £7.00

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UX19	28—30MHz	10 watts
*UX59	50—54MHz	10 watts
*(No mobile operation allowed in UK)		
UX29	144—146MHz	25 watts
UX29H	144—146MHz	45 watts
UX49	430—440MHz	25 watts
UX129	1240-1300MHz	10 watts

IC-1200, 23cms FM Mobile.

To complete the range of VHF/UHF FM Mobiles this new model is now available for the 23cm Ham band, it is based on similar features to the already existing IC-28E 2m and IC-48E 70 cms mobile units. This Mini-mobile transceiver will fit easily anywhere in your vehicle or shack. Power output is 10 watts or 1 watt low. The IC-1200 is so new we do not even have a picture of it, however, the large front panel LCD readout is designed for wide angle viewing and front panel controls are straightforward to make mobile operation safe and easy. The IC-1200 is a superb example of ICOM's dedication to exploring new communication equipment.

ICOM

Communications

THE HOTTEST ITEMS THIS SUMMER

VHF/UHF FM Handportables
If you want a handheld with exceptional features quality built to last and a wide variety of interchangeable accessories, take a look at the ICOM range of FM tranceivers, all ICOM handportables come with a nicad battery pack, AC wall charger, flexible antenna and wrist strap.

Micro 2E/4E
These new micro-sized 2 metre and 70 centimetre handportables give the performance and reliability you've come to expect from ICOM.
Measuring only 148 x 50 x 30 the Micro fits in your pocket as easily as a cassette tape. The Micro 2E/4E features an up/down tuning system for quick frequency adjustments, 10 programmable memories, a top panel LCD readout, up to 2.5 watts of output (optional).

IC-2E 2 metre Thumbwheel Handportable
This popular handheld from ICOM is still available.
For those amateurs who require a straightforward and effective FM transceiver the IC-2E takes some beating. Frequency selection is by means of thumbwheel switches (with 5Khz up switch) simplex or duplex facility. Power output is 1.5 watts or low 150 milliwatts (2.5 watts possible with BP5A battery pack).

IC-02E/04E 2 metre and 70cm Keypad Handportable
These direct entry CPU controlled handhelds utilise a 16 button keypad allowing easy access to frequencies, memories and scan functions. Ten memories store frequency and offset, these handhelds have an LCD readout and power output is 2.5 watts or low 0.5 watt. 5 watts is possible with the IC-BP7 battery pack or external 13.8v DC.

IC-12E 23cm Handportable
Similar in design and style to the 02E/04E this 1296Mhz handheld utilises ICOM's experience in GHZ technology, gained by the excellent IC-1271E base station. Power output is 1 watt from the standard BP3 nicad pack, external 13.8v DC powering is available to the top panel jack. With the growing number of repeaters on 23cm. The IC-12E makes it an ideal band for rag chew contacts.

ALSO AVAILABLE FOR ICOM HANDPORTABLES ARE A LARGE RANGE OF OPTIONAL EXTRAS INCLUDING A VARIETY OF RECHARGEABLE NICAD POWER PACKS, DRY CELL BATTERY PACKS, DESK CHARGERS, HEADSET AND BOOM MIC, LEATHERETTE CASES AND MOBILE MOUNTING BRACKETS.

ICOM

IC-751A.

IC-751A

Features:

- All mode.
- 100kHz-30MHz General Coverage Receiver.
- 100 watts.
- 12v Operation.
- 105dB Dynamic Range.
- 32 Memories.
- Electronic Keyer.
- Full Break In (40wpm).
- 500 Hz CW Filter.
- HM36 Microphone.

TOP HF

IC-761, HF TRANSCEIVER with General coverage receiver.

The new ICOM IC-761 H.F. Transceiver has many features making it probably the best top of the line Amateur transceiver available today. This all mode transceiver features an internal aerial tuning unit and A.C. power supply. The A.T.U. boasts a 3 second band selection and tune up with a VSWR matching of less than 1.3:1.
For the serious operator the 100kHz-30MHz general coverage receiver and 105dB dynamic range make it ideal for DX chasing. Frequency selection is by the main VFO or via the front panel direct access keypad.
And for when reception is difficult, pass band tuning, I.F. shift, notch filter, noise blanker, pre-amp and attenuator should enable you to copy even those weak DX stations whether amateur or broadcast.
The C.W. operator will appreciate the electronic keyer, 500Hz filter and full break in (40wpm) other filter options are available.
The IC-CR64 high stability crystal is standard as is the CI-V communications interface for computer control. Twin VFO's and split mode for cross band contacts the IC-761 features program scanning, memory scan and mode select scan and the 32 memories can store frequency and mode.
The transceivers operating system is held permanently in ROM and is not dependant upon the lithium battery. The cell is used for memory back up only. A new style meter gives P.O., A.L.C., IC, VC, COMP and SWR readings.

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ACTS500	Sequential ctrlr for pre-amps	£ 33.90
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D3000071	Counter Unit for FT301	£49.00
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D3000055	DC Kit for FRG7700	£ 1.50
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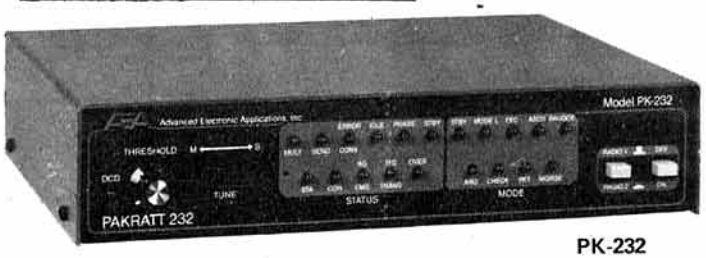

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A new Packet Radio TNC from AEA

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Four new commands allow you to restrict the use of your station for both connects and as a digipeater. The Mailbox monitoring command allows monitoring without displaying the callsign headers, while standard monitoring includes both MFROM and MTO lists.

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Note: This option does not provide the same high resolution or ease of use as the FAX-1, but provides a useful and cheap introduction to facsimile reception for the PK-232 owner. Parallel interface and Epson compatible printer required.

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Access

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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 secretary, from whom full details of Society services may also be obtained.

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UK students over 18 and under 25: £10.45 (Applications should give applicant's age at last renewal date and include evidence of student status)
Affiliated club or society/registered group (UK): £18.50 (including *Radio Communication*); **£11.10** (excluding *Radio Communication*)
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Membership application forms available from RSGB HQ

50 AND 70MHz—ONE MONTH IN

The release of the 50 and 70MHz bands to Class B licensees as of 1 June 1987—given extensive coverage in last month's *Rad Com*—seems to have been one of the most popular things the Society has ever achieved. If the volume of letters and telephone calls is anything to go by, you appreciate what the Society has done on your behalf and the difficulties and problems which had to be wrestled with and overcome along the way.

Perhaps when you've finished working someone exotic on 50MHz or had a nice 70MHz four-way with stations several counties away from yourself, you could spare a thought for the organization which made it possible. Obtaining an amateur 50MHz band at all in the UK, let alone obtaining general release for it, was the culmination of—if the editor will forgive the language—a hell of a lot of hard grinding work. So are many other things which the Society ultimately achieves—morse for Class Bs, packet repeaters and all the rest. None of these things just happen all by themselves one sunny morning. When things go well—especially when they continue to go well in several areas for some time—it becomes easy to take them for granted and to fall into the habit of expecting them to carry on going well. We're all for raising expectations—in a sense that's what the Society is for—but it's disastrous to neglect the mechanisms by which they become fulfilled, if indeed they do.

Ultimately, of course, that's why we need all UK radio amateurs to be members of the Society. If we all pull together and present a united face to the outside world, who knows what else we can do? Having retrieved the 50MHz band, perhaps we ought to go even further back in history and press for all spectrum between 1 and 30MHz to be handed back to radio amateurs . . .

Enjoy 50 and 70MHz (but do watch your erp on 50MHz) and have a lot of fun. That's a large part of what it's all about. Maybe we can even get to the bottom of some puzzling things about 50MHz propogation at the same time. If, by chance, you are not a member of the Society, or are a member but wondering whether you should remain one, perhaps you could take the 50/70MHz case as a perfect example of the argument for membership. In the words of the late Jim Morrison: "The time to hesitate is through . . ."

David Evans, G3OUF

RSGB NATIONAL MOBILE RALLY

SUNDAY 2 AUGUST 1987

Woburn Abbey, Beds
(Coach Park Site)

From 10am

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.

RSGB National Convention 1987

Home-constructors competition

The winning entry was a 3·5MHz ssb/cw transceiver using direct-conversion phasing on both transmit and receive, submitted by J R Hey, G3TDZ, who is preparing an article describing it for publication in *Radio Communication*.

A 13·8V 10A power supply unit submitted by K Wevill, G4UKW, was very highly commended.

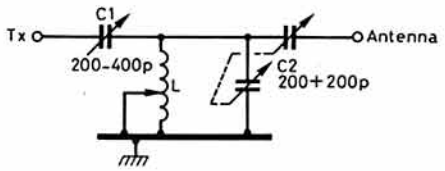
John Hey, G3TDZ, (r) receiving the Horace Freeman Trophy from Willy McClintock, G3VPK, RSGB immediate past-President. *Photo:* G3SZJ

FEEDBACK

"A general purpose antenna tuning unit" by M J Grierson, G3TSO

Since my article was published in the January 1987 issue, two points have been brought to my notice.

First, in Fig 1(c), the "SPC" transmatch has been drawn incorrectly, this was an error on my part, and the correct circuit is given below.



Second, there has been some debate regarding the earthing of the free end of the roller coaster coil in Fig 2 (L2). While I do not like the principle of shorted turns on a coil, there are occasions when a high voltage may be developed across the free end, and this can give rise to corona discharge. Earthing the free end will overcome this problem and does not appear to introduce any great losses due to the short-circuited items.

G3TSO

"A Droitwich standard frequency receiver for 198 and 200kHz", by N D N Belham, G2BKO, *Rad Com* June 1984.

As the change of frequency of Droitwich is getting nearer, I have had several enquiries, and the following notes are relevant:

(1) Bi-Pak no longer have stocks of TBA120a and TBAb, but they do have some TBAc ics and these are satisfactory. The TBA120S cannot be used.

(2) The TBA120 has internal negative dc feedback to stabilize the dc conditions. The external circuit also provides positive ac feedback. The TBA may therefore provide continuous square waves on its own. However, when a suitable Droitwich signal is applied, these will lock to the incoming signal.

G3BKO

Members' Mailbag

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

CW NORTHWEST

Sir—CW is alive and kicking in the Northwest. This is because of the dedication, professionalism and expertise of the following stations: G4ILD, G3ZQS, G3PER, and G4WPS. My special thanks also to G4WYH, G4RSK, G4OTN, G4PKD, G0CHV and last but not least, coach, bully, devil incarnate G0EHW, who pushed me screaming into the world of "A" licensee.

J A Lawson, G0GVA, ex G1RCU.

PS. My wife has dropped divorce action.

CARDS FOR THE ASKING

Sir—As QSL Bureau sub-manager for the G4X series of callsigns, may I appeal to the undermentioned radio amateurs to contact me so that I can relieve my shelf space of quite a number of QSL cards. These radio amateurs have received cards from me in the past but have not kept up their supply of envelopes.

Callsign	Date last cards sent	Number of cards at hand
G4XAL	8/8/85	40
G4XAR	28/5/85	47
G4XBY	8/8/85	237
G4XCT	16/9/85	189
G4XCQ	3/12/85	16
G4XCV	9/8/85	114
G4XEY	25/2/86	135
G4XKN	28/1/85	3
G4XLG	7/1/85	3
G4XLW	25/1/85	40
G4XMQ	4/12/85	50
G4XRI	9/12/85	5
G4XSH	9/12/85	29
G4XTQ	14/1/85	7
G4XVH	21/1/86	7

Will they please take notice, that if I don't hear from them within three months of this letter being published, I am sorry but I will have to destroy the cards.

Stuart Tyler, G4UDZ.

THANK YOU, RSGB

Sir—Under the recent ruling of the DTI on the subject of lapsed licences, I am pleased to tell you that my lapsed licence has been re-issued to me under this ruling.

V F Lucas, G3AQO, ex-BRS88617.

IT'S NICE TO BE MISSED!

Sir—I am surprised that you have deleted the correspondence pages from *Radio Communication*, surely these were most important in providing a forum for the average member of the Society, who does not otherwise have the chance to air his views.

Unfortunately the various other journals which cater for radio amateurs have such pages, which provide a platform on which various groups and individuals indulge in what is often destructive criticism of the RSGB. One of their frequent allegations is that the Society is run by a self-perpetuating hierarchy which stifles contrary opinions. The deletion of our own forum in *Radio Communication* could well be seized upon by such people as evidence of this.

Quite apart from the above, the letters from members often cover topics both general and technical in a lively and informative fashion and would be sadly missed.

One often hears of the problem of attracting young people into amateur radio in these days when instant worldwide communication is commonplace, possibly one way of achieving this is to obtain a small amount of air time, possibly on Channel 4, which seems to provide an outlet for various interests. A monthly 15-20min programme, with a suitably charismatic presenter, could present an attractive and stimulating view of amateur radio and show its many and varied facets, thus helping to dispel the image given to us by Tony Hancock all those years ago.

I feel sure that there are persons, or at least a person, within the Society who could do for us what Patrick Moore has done for amateur astronomy, if given air time. The objection that we are too small a minority would hardly hold water, I feel sure that we outnumber the astronomers!

L N Buck, G0DLR

Well, the short answer is that we haven't. "Member's Mailbag" is alive and well, and will continue to be as long as letters keep coming in. However, there are occasions when pressure on space in a particular month is simply too much and something has to give; regrettably one of the casualties is sometimes "Member's Mailbag".

We've seen the canard about "stifling contrary opinions" in other magazines, which demonstrates either that their editors feel that being rude about the RSGB sells magazines or that they simply can't be bothered to check their assumptions. The simple fact is that we receive very few letters which contain what Mr Buck calls "destructive criticism"; if they represent a valid point of view we'll print them anyway. For example, see the cross-section of letters we published about the Tom McClean/Rockall affair some time ago. The only criteria for letters to be printed in these pages are (a) they must be interesting and (b) they must stop short of libel!

WELSH—a secret language

Sir—I regret I can offer no assistance to J Adrian Oates, G4MOU, in his quest for information on the Welsh language being used as a secret code to confuse the enemy during the second world war (April "Mailbag"), but I can say that in my presence the "Geordie" accent was used successfully in baffling an Irish-born captain RN during an examination for promotion.

The candidate was told to answer "Yes" or "No" to a number of questions.

The questions were put.

Back came the answers: "Y-NAW-SER" or "Y-EYE-SER", with a few words added for amplification.

The captain looked perplexed, and, turning aside to his aide, asked: "Do you understand what this man is saying chief?"

"Afraid not, sir."

"He might be giving the correct answers, then?"

"He could, sir."

"I'll give him the benefit of the doubt, then", and, turning to the candidate, the captain said: "You've passed!"

Les Bober, G4NOZ RNARS 1335

Sir—According to Ken W Cooper's book *Little Men*, published by Robert Hale & Co, the Welsh language was used by company and battalion signallers of the infantry in South-East Asia when speed forced messages to be sent in clear.

This book refers to many of the 14th Army's signallers being Welsh and speaking fluent Welsh, and was written from Ken W Cooper's original notes from the time.

It was assumed that by the time any message had been decoded by the Japanese its information would have been out of date.

Hugh S Cumming, GM1FMP

WITHHOLDING PARTICULARS

Sir—I am always sorry to see "Particulars withheld" in the *RSGB Callbook*. I still recall the thrill when, as a young swl, I received my first callbook through the post, and eagerly scanned the columns to see if there were any amateurs in my locality (not that I had any intention of immediately descending upon them). I was proud when my own callsign appeared in its own right in the callbook—a roll of honour in my eyes—along with those which had become so familiar to me as a listener.

In those days, "Particulars withheld" was rarely seen. Rich and poor, high-born and low-born, amateur and professional—all were listed. I can appreciate that these days—as radio is more accessible to all sections of the community, including the less scrupulous—certain aspects of security must be considered, and occasionally it may be wise to avoid publication of the full address. However, it is a sad reflection on today's society that a growing body of amateurs (especially Class B) seems to be opting for total anonymity.

Ian Jackson, G3OHX

HELPING HANDS

Sir—As a disabled person I would like to thank three people for making it possible for me to be an active station through their help and kindness. To John Markham, G0CXH, for the loan of a transceiver and for the time he spent putting up my antenna and setting up my station. To Gerry, G4NYC, for the loan of the antenna, and to Colin, G1PLE, for the many bits and pieces that helped to make my station.

I think it will make a change for people to read of someone helping others, instead of reading 90 per cent moans and groans which seem to take over "Members' Mailbag".

Ted Brooks, G1SYY

REALISTIC CRYSTALS ANYONE?

Sir—Since 1985 I have been trying to dispose of Realistic Crystals, and have found no place that is interested.

So can anyone who reads this letter help me?

Colin Watson, BRS46598,
10 Torbrex Road,
Carbrain, Cumbernauld,
Dunbartonshire.

PUTTING THE EA/EX-G RECORD STRAIGHT

Sir—I would like to inform all your readers, and especially those with frustrated detective tendencies, that station EA1TH has been operated legally for over 10 years by myself, Robert S Sroczynski, ex G3URY. Until 1982 the licensee of this station was Maria-Isabel Arróniz González (my wife) and I, as a foreigner, was only permitted "second-operator status". In 1982 I became the licensee of this same callsign, EA1TH.

If any other 'G ZERO" feels in need of checking up on me or very amusingly interrupting my QSOs with comments like "Hello Isabel", I should like them to realise that it is not impossible for an EA to have an English accent, nor for an ex-G to have a Spanish identity card (No 16, 559, 421, for your budding Sherlocks!) Neither is it my responsibility to correct the entry in the American *Call Book* which is, apparently, still wrong after five years. One other point: I operate "portable" because I have no choice at the moment due to my rented home QTH. I should be obliged if the aforementioned sleuths didn't consider this further evidence of my "illegal status".

Kind regards to the hundreds of friendly, normal Gs whom I've contacted over the last 10 years, and look for me in XD this summer when the tropo begins!

Bob, EA1TH

AMSTRAD SOFTWARE

Sir—Along with G8AYM *et al*, I deplore the lack of amateur radio software for the Amstrad range, and would implore any commercial producer of programs to make himself known to us. However, all is not lost—send me an sae QTHR for three possible sources, or send a 3in disc/C60 for everything I have available here. Also £1 will get you a copy of the Program Exchange Register from HQ.

In defence of *Amateur Radio Software*, I must point out that it was never intended as a programming tutorial but as a source of ideas which amateurs could develop and adapt to their own requirements. It is up the individual amateur to develop his own programming skills —I would suggest to G3IVB that he probably learned quite a lot while converting the programs in that book to run on the 8512!

As far as assemblers are concerned, there are quite a few available on disc, tape and Rom. If Mr Jardine would like to drop me a line, perhaps I could help.

J M Dunnett, G4RGA

Sir—Mr Jardine may find some software to suit his interests within the pages of the newsletter put out by SARUG, which now covers the CPC range of Amstrads. An sae to me will bring details. Technical software is available; I already have an hf predictor, and predictors for almost all amateur satellites.

The Sinclair range probably has more technical software than any micro. Converting basic applications is actually very easy, and I can help Mr Jardine if he will write to me.

D Lewis, GW1PQE, should write to Terry Rowe, 68 Coburg Rd, Bristol—he can help him with his Spectrum program.

Paul Newman, G4INP,
3 Red House Lane,
Leiston, Suffolk IP16 4JZ

NON-LICENSED MICROPHONE USERS

Sir—I now feel that it is time that the RSGB gives serious consideration to the above subject. Should non-licensed people be allowed to speak into the microphone of a licensed amateur radio station? (After all, anyone can speak into the microphone of a licensed cb station.) I realise that such an idea might cause apoplexy in some circles! However, I feel that it should be allowed in certain circumstances and I give a case in point.

I was among a number of local radio amateurs who recently took part in a Raynet exercise where safety and emergency communications were provided for one of the major Scottish car rallies. In more than one instance the rally officials in the field wished to pass urgent messages to headquarters which could have an effect on safety etc. The message could have been much more effectively passed by the official concerned (since he knew what he was talking about) rather than the amateur operator who just acted as a "parrot". Delays caused by "relaying" from official to operator to HQ operator to HQ official and back again could have then been avoided. Such delays could have disastrous consequences in real emergency situations during exercises. It may be noted that the layman does not understand when you say: "Sorry, I'm, not allowed to let you speak into the mic", when it is obvious that he could say whatever much more efficiently.

I believe that a doctor or a police officer may be allowed to use the microphone during a real emergency but why should not everyone be allowed to use the mic while under the supervision of the licensed operator? At least this provision could be allowed during Raynet exercises. Therefore, could not the RSGB, as negotiator with the DTI, arrange for this facility to be incorporated into the amateur licence?

Robert D Knorr, GM4MYL

We would be interested to read members' views on this topic. However, the RSGB has put these points to the DTI as part of the licence review.

IN FAVOUR OF QRP

Sir—After a fairly lengthy period QRT, I decided to have a go at my old love, QRP. Over a few evenings a simple 5W rig was built and three crystals, ground in the early days of the G-QRP Club, were unearthed; one (3,559kHz) would have done, because I found QRP enthusiasts round 3,560kHz like a swarm of bees.

In my first week I got on each day either after breakfast or after tea. Six hours in the shack brought me 12 QSOs, which totalled about four hours; ie, about 10min listening found me, on average, a 20min QSO. Nine of the QSOs were with QRP stations, and these were, on average 230 miles distant.

Much credit for making this happy experience possible must go to the Rev George Dobbs, who has shown something like 10 per cent of the Society's membership that ham radio on a shoe-string is not only possible but worth supporting.

I believe that some people join the G-QRP Club not just for QRP's sake but because they associate QRP with simple, cheap, home-brewed gear; they later discover that the main difference with QRP is the 569 report instead of 599. Others, it seems, while they admit to a yearning for the thrill of using simple gear, simply refuse to believe that 5W is enough and stick to their professionally-built gear. Insufficient emphasis is given to the suitability of simple home-built equipment for (at least modest) QRO. Using valves, a 50W cw transmitter is little different from a 5W one. A direct-conversion receiver with a good (but simply-built) audio filter will outperform many expensive receivers. It must, of course, be admitted that in the interest of simplicity this approach is best suited to one- or two-band operation, which wouldn't suit some, but it must be emphasized that those who turn in this direction almost always become "born again" hams.

Is there not a case for a club or even a section in *Radio Communication* (in addition to *Technical Topics!*) to encourage this approach and supplement the excellent work of the G-QRP Club?

Des H Vance, GI3XZM

Comments anyone? Mind you, is home-brew QRO really all that difficult? We suspect it's parts procurement rather than actual difficulty in construction that tends to deter people from the kitchen table.

THANKS FROM SOLIHULL

Sir—I wish to thank those who contributed to the successful operation of the hf demonstration station at the RSGB NEC Exhibition on 27/28 March. The whole activity was basically planned by the committee of Solihull ARS, but credit must be given to th GB6OC group for the loan of the caravan, and to AEUK for the loan of all the major equipment.

Steve, G4YQE, and Colin, G6WON, put much effort into the application of computers into the demonstration. Colin was unable to attend the exhibition due to work commitments that extended through the weekend, which was most unfortunate. These two gentlemen also loaned their own computers and monitors for the duration of the exhibition. Thanks also to Mike, G4BMK, of Grosvenor Software, and Chris, G4USU, for their help.

It is estimated that 200 man-hours were put in to achieve the objective, which was only funded by the enthusiasm for amateur radio and the desire to demonstrate the subject in a proper manner.

The station was visited by Central News, which succeeded in compiling probably the best-ever short report on amateur radio which was transmitted on the Friday night. There was also a live broadcast with interviews by Radio WM during the afternoon, when possibly 20min actual time was devoted to amateur radio. The visit of a newspaper reporter resulted in publicity in the *Birmingham Post* and the *Solihull News*.

We were delighted to have our President, Mrs Joan Heathershaw, visit the station on the Saturday and complete a contact on 3·5MHz.

So, many thanks to the following: (especially to Stan, G3MRP, and Jim, G0/K2PW for some superb operating on the key) Steve, G4YQE; Colin, G6WON; Roger, G4BBT; Pete, G4NPG; Paul, G8AYY; Nigl, G4NRR, and last, but certainly not least, our QRP operator John, G4YZO.

Finally, may I apologise to our long-suffering wives who, I'm sure, wish we all had a different hobby.

R P Ralph, G4KSG
Chairman, Solihull ARS

Nigel Rollason, G4NRR (l) and Bob Ralph, G4KSG, chairman of Solihull ARS, operating the demonstration station GB4NEC at this year's RSGB Convention. *Photo:* G3RVM

SORRY!

On the "Members' Mailbag" page in the May issue the call-sign of E T Webster should have read G3JQ, not G3JX

432MHz OPERATION

Sir—I read with some interest your "talking point" in your April issue. I myself have been operating on 432MHz for three years with a Microwave Modules transverter, as suggested in your article. I agree with most of your comments, and find that uhf works quite well, even among the hills and valleys where I live, and that there are paths that are easier to work on uhf. However, I feel that the main problem facing newcomers to the band is that many of the existing operators, particularly on fm and particularly through the repeaters, make no effort whatsoever to make the newcomer welcome. The newcomer may spend a considerable amount of money on his equipment, make a few calls into his local repeater and find that it is run by a "clique" who use it to talk purely to one another, often without even callsigns being mentioned for a considerable period. The same problem is faced by operators driving into different areas with mobile equipment. I feel that it is this attitude, more than any other, which keeps activity low on 432MHz and a substantial improvement would be necessary before any increase in use takes place.

Paul F Rigg, G6FMP

Is Mr Rigg's experience of 432MHz shared by others?

RSGB CONTESTS

Sir—I again noted this year's SSB Field Day results, published in your March issue, with interest. I say "with interest" because I noted a similarity with last year's results in that the two leading stations were both using TL922 amplifiers, which we all know are more than capable of exceeding the maximum permitted licensed power by some considerable factor.

I am not for one minute suggesting that either or both of the section leaders were cheating but it is interesting to note the margins by which they exceeded the station who came third and ourselves in the West of Scotland ARS who came fourth. As it so happened, like the station who came third, we were also using an FL2100Z amplifier which I'm well aware is also able to exceed the maximum permitted power, but would hasten to add that the particular generator we were using would not develop that power limit.

It is time that the HF Contests Committee examined the rules pertaining to the use of linears, and placed a total ban on the use of such devices which are in the same category of

the TL922/SB220 etc, or even place a total ban on the use of linears full stop. We could all then be certain that we are competing on an equal footing.

The total concept of contests needs to be examined. The RSGB runs far too many hf contests throughout the year. While I personally enjoy contests and compete when shifts allow, I think the hf scene is too fragmented with separate contests for each band. While NFD and SSB FD should be retained, there should, in my opinion, be one other major contest sponsored by the RSGB held each year for stations to operate from their home locations. It could be a 48 hour event with the first 24 allocated to cw and the second 24 hours allocated to ssb. The contest could be categorized so that single band or mode entries could be judged separately. Thus the contests calendar could be shortened by the deletion of such contests as Town & Country, ROPOCO, QRP Fixed, 7MHz SSB/CW, Low Powered Field Day, 21/28MHz, 2MHz CW, and there must be others. All could be catered for in a single weekend which would go a long way to shortening the calendar and leaving some weekends free for the rag chewers.

I would appreciate the views of other contesters rather than what seems to be the norm of the editor referring controversial issues to the various committees.

Thomas G Wylie,
GM4 EDM (RR14)
Member West of Scotland "A".

Sir—Thank you for giving me the opportunity to answer the letter from Tom Wylie, GM4FDM, regarding hf contests. From the last paragraph of his letter it appears that Tom is not happy with the replies he has had to his previous letters on this subject. This is a pity as both the HF and VHF Contest Committees have tried to answer his complaints objectively.

As Tom well knows we consider his comments relating to the use of linear amplifiers in SSB FD to have some merit. However from correspondence received by the HF Contests Committee, the majority of entrants to the open section of this event, do not agree. The suggestion that a particular type of amplifier should be banned, while others are permitted might have more impact, had his own group not been using a linear that had a power output capability that was not so very different from those he has specified.

His opening remarks about the 1986 SSB FD results and the "large" linear amplifiers used by the leading stations is not relevant, as examination of the results table as published in the March 1987 issue of *Radio Communication* shows that his group not only achieved the leading scores on 3·5 and 28MHz, but were also second on 21MHz. Most multi-band contests are won or lost through optimum use of all bands. Analysis of the 1986 entries suggests that the leading groups spent more time on 7 and 14MHz, both high scoring bands, and their success was more related to this factor than by possible use of excessive power.

Tom has suggested that all linears are banned so that he can be certain that all groups compete on an equal footing. With all respect to this view, no two groups can ever be equal, particularly during an FD event. Antennas, site, operators and the geographical location within the UK vary widely and have a marked effect on the results of any contest. Conditions can also be quite different between the various UK regions, a point often made by FD stations who feel that the North is worse off than the South, or vice-versa. Tom has raised this point before and we have suggested that if he feels that his group are unfairly penalized because others use a different type of amplifier, they should enter the Restricted Section of the event where the rules prohibit the use of any amplifier and restrict the types of antenna that can be used.

His comments regarding the shorter and the single-bands contests are not in line with members' wishes. He asks that these limited contests should be discontinued to allow some weekends to be kept free for the ragchewers. This is the very reason why the RSGB introduced these shorter single-mode events which are so popular with the membership. To imply that Town & County, ROPOCO, Low Power FD and the QRP Fixed events clutter the bands is unjustified. The RSGB is frequently blamed by some members for supporting contests organized by overseas societies and commercial organizations. Let me make it clear that we have no control over what others do and we can only set an example.

The HF Contests Committee take a very responsible attitude towards minimizing interference to non-contest stations. Some of the actions we have taken in recent years include reducing the number of major events and limiting them to 24 hours, or less (instead of 48 hours as used by some other contest organizers). Restrict all contests to a single-mode and wherever possible limiting the frequencies that can be used (mostly to a segment of a single-band) so as to provide as wide a spectrum as possible free of contest traffic.

Currently there are well over 50 different international bodies that organize contests on the hf bands. In common with RSGB, many of the Region 1 IARU societies run short duration and special interest events. In order to further reduce contest interference RSGB is working with these societies in an attempt to combine like events and to expand the use of non-contest frequency segments. While this is a step in the right direction, it still leaves the matter of the major international 48 hour events organized outside of Region 1 IARU, that create such chaos on the bands. A similar chaotic situation would exist if the RSGB combined five or six different contests into a single 48 hour event. Tom has also overlooked the possibility that other bodies might follow the RSGB example. As they would probably wish to avoid a clash with other societies' contests, we might then be faced with a major 48 hour event for every weekend in the year, certainly a grim outlook for the non-contester.

R L Glaisher, G6LX,
Chairman HF Contests Committee,
Member IARU Committee.

JY1 DROPS IN FOR TEA

On Saturday 18 April, King Hussein of Jordan paid an impromptu visit to Ed Benou, G0BBD, in Stanmore, Middlesex. Ed, a Brazilian national with a French mother, speaks fluent Arabic (as well as a number of other languages). During a recent QSO with JY1, the king remarked on the outstanding signal that Ed puts into the Middle East, and added that, as he would be in the UK in a few weeks, he would like to see what sort of antenna and what kind of equipment could produce such a remarkable signal. The two amateurs had met in person some years ago during the king's last official visit to the members of the Radio Society of Harrow, of which he is an honorary life member because of his connection with Harrow, having attended Harrow School as a boy.

On 18 April, JY1 telephoned and said he would go to Stanmore that afternoon. Naturally, at such short notice some frantic shack tidying-up ensued, and in this Ed was assisted by G3FNJ, who met JY1 in January 1971 when he and some officials of the Radio Society of Harrow had gone to the Dorchester Hotel and presented the king with his certificate of honorary life membership.

King Hussein arrived at Stanmore accompanied by his young son, Prince Hamza, and his adjutant, Major Chukry, JY3AK. He stayed for over an hour-and-a-half chatting, having tea and operating Ed's station with his own UK callsign G0DEY/JY1/G0BBD, making a number of contacts on the 14MHz band, mainly with stations in Israel. In this connection, an item broadcast in the English language transmission of the external service of the Voice of Israel "Kol Israel" on Sunday 26 April was of particular relevance:

"Hullo, and welcome to the dx corner. Once again, the amateur radio short wave bands have been used in a most striking fashion to display international goodwill. For the first time in the history of amateur radio, the King of Jordan has appeared on the amateur radio bands to greet Israeli amateur radio operators.

"King Hussein, an enthusiastic amateur radio operator for nearly 20 years, who operates under the callsign JY1, was on a private visit to England eight days ago, when he visited the home of a well-known London radio amateur Edy Benou, G0BBD. At that time Edy happened to be in contact with a number of radio friends in Israel. Without the slightest hesitation the Jordanian Monarch took over the microphone and exchanged greetings with several of the Israeli hams on frequency at the time.

"Except for Egypt, there are no amateur radio exchanges allowed between Israel and the surrounding countries in the Middle East. Normally, therefore, King Hussein does not speak to Israeli hams from Jordan. In this case, however, he was transmitting from England with his UK callsign of G0DEY, consequently the Israeli hams speaking to him were not violating any rules." □

Left to right: Major Chukry, JY3AK; G0BBD; Prince Hamza of Jordan, and King Hussein, JY1. *Photo:* Richard Joly

THE GW4BWE VERSAFILTER

STEVE PRICE, GW4BWE

THE VERSAFILTER (versatile active filter) is the product of a quest for an audio filter design that would reconcile the requirements of high performance and operational flexibility with the potentially conflicting desire to present a straightforward home construction project that does not feature a control panel resembling the flight deck of Concorde! The result, arrived at after much head scratching, utilizes separate, cascaded lowpass and highpass filters that are independently tunable over the range 300Hz–3kHz, and which facilitate the synthesis of an infinite variety of bandpass responses—giving the operator complete control over both bandwidth and centre frequency. These features enable the optimum filter characteristic for nearly every conceivable mode, including ssb, sstv, cw, rtty and data, to be readily obtained. Despite such flexibility, the system requires only three front-panel controls.

How it works

Readers will be familiar with the concept of a bandpass response characteristic which, in the simplest realization, is obtained using a single-tuned circuit comprising just one inductor and one capacitor. The acceptor circuit thus formed will allow a signal at the circuit's resonant frequency to pass relatively unattenuated, but signals having either lower or higher frequencies are reduced in amplitude by a factor dependent upon the tuned circuit Q and the degree of frequency spacing; ie, how much lower or higher than the resonant frequency the off-tune signals are.

Within the i.f amplifier of a traditional superhet receiver, a number of tuned circuits are cascaded in order to increase the attenuation of adjacant, unwanted signals—hence the use of "shape factor" as a means of expressing the rejection ratio thereby obtained. Contemporary receivers will typically employ either quartz crystals or ceramic resonators to act as high-Q substitutes for LC tuned circuits, but the principle is exactly the same.

It is also possible to reproduce the tuned circuit bandpass response at audio frequencies using an active filter. Active filters allow us to dispense with bulky inductors by employing a clever circuit arrangement, known as the gyrator, which enables a humble capacitor to assume the role of an inductor. Active cw filters that are designed to be interposed between the receiver's audio output socket and an external loudspeaker or headphones have proved very popular. Cascading a number of simple bandpass stages (each being the direct equivalent of a low-Q tuned circuit) enables a respectable shape factor to be obtained, and by slightly off-setting the resonant frequencies of each stage we can arrive at a wider, flat-topped passband response [1]. A further design option involves the provision of a system for tuning a number of cascaded bandpass stages in unison. This allows the centre frequency of the entire filter to be shifted over a considerable range [2].

Although the construction of active filters intended specifically to be used for the enhancement of cw reception is both a practical and cost-effective pursuit, many operators are likely to demand a filter system which boasts a much wider range of applications. For instance, let's assume that aside from cw reception we also wish to improve the intelligibility of ssb signals during operation in crowded phone segments of popular hf bands. A high-performance audio filter featuring a much wider bandpass response, perhaps extending over the range 300–2,700Hz, would clearly be of value in rejecting adjacent channel interference. Of course, the degree of improvement obtainable depends, to some extent, on how good a shape factor the receiver's i.f filter possesses. Nevertheless, even if a high-quality eight-pole, 2·4kHz crystal filter is fitted in the station receiver/transceiver, the level of low-frequency "rumbles" and high-pitched "chatter" will still be significantly reduced by a decent audio filter.

We now have to ask whether it is possible to configure an active bandpass filter which can be varied in bandwidth from less than 100Hz at −6dB for cw reception under difficult conditions, to around 2·5kHz for phone operation. Also, there will be a requirement for a variety of intermediate bandwidths and centre frequencies so that the same filter may also cope with rtty and data modes. This is quite a tall order, especially if we further demand that a good shape factor is preserved at all settings.

The active cw filters discussed above can provide some flexibility, but the increase in bandwidth obtainable by, for instance, lowering the Q of each stage is, in the context of our stated requirement, only moderate. Furthermore, if Q is reduced to a value lower than about two, a large number of cascaded stages are required in order to achieve a respectable shape factor. There is, however, an alternative approach. This involves the synthesis of a bandpass response using separate lowpass and highpass filters that are simply cascaded.

As an example, let's imagine that the highpass filter has a cut-off frequency of 500Hz and the lowpass filter a cut-off frequency of 1kHz. Frequencies below 500Hz will be attenuated by the highpass filter and, conversely, frequencies above 1kHz are attenuated by the lowpass section. However, signals at frequencies falling between 500Hz and 1kHz will travel through the filters unaffected. We have therefore "synthesized" a bandpass filter of 500Hz bandwidth (1,000 − 500Hz), and provided that the lp and hp sections are correctly designed, a commendably flat passband response is assured.

It is perfectly feasible to make both filters independently tunable over the range 300Hz–3kHz, and as there is no requirement for a variation in the Q of either filter, shape factor is never unduly compromised. Needless to say, the variety of bandwidths and centre frequencies obtainable is infinite: if the hp section is set at 700Hz and the lp section at 800Hz we obtain our 100Hz cw filter, whereas hp = 300Hz and lp = 2·7kHz produces an effective ssb filter.

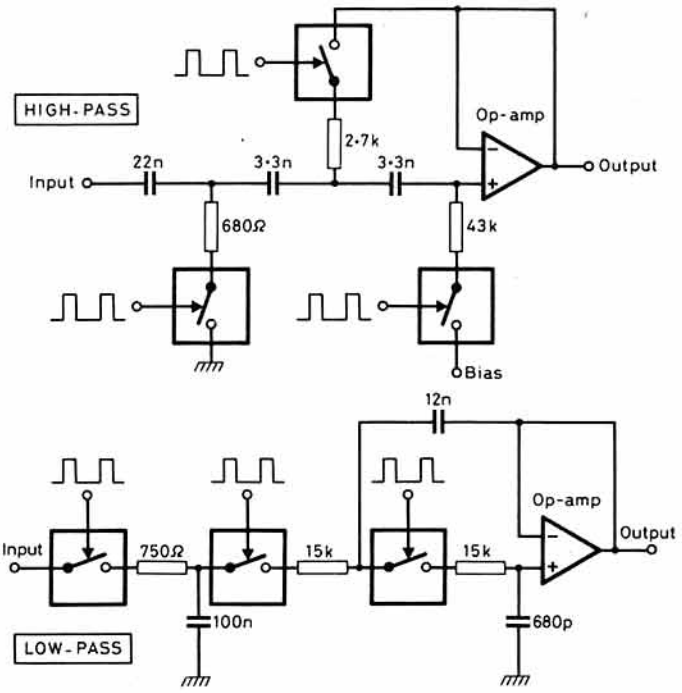


Fig 1. The tunable third-order active filters which form the heart of the versafilter

Design principles

The lowpass and highpass filter circuits which constitute the building blocks for the versafilter are shown in Fig 1. These are third-order types and therefore offer an ultimate attenuation of 18dB/octave. Readers may recognize a similarity between the lowpass circuit featured in Fig 1 and the filter stages employed in a direct-conversion receiver module that I have previously described [3].

Tuning is achieved by making the three resistors used in each circuit variable, so that their values may be altered in unison while maintaining the correct ratios; ie, in the highpass circuit, if we wish to lower the cut-off frequency by one octave, the 680Ω resistor is increased to 1·36kΩ, 2·7kΩ becomes 5·4kΩ, and 43kΩ becomes 86kΩ. In order to make this possible, logic-controlled signal gates, four of which are contained within a single

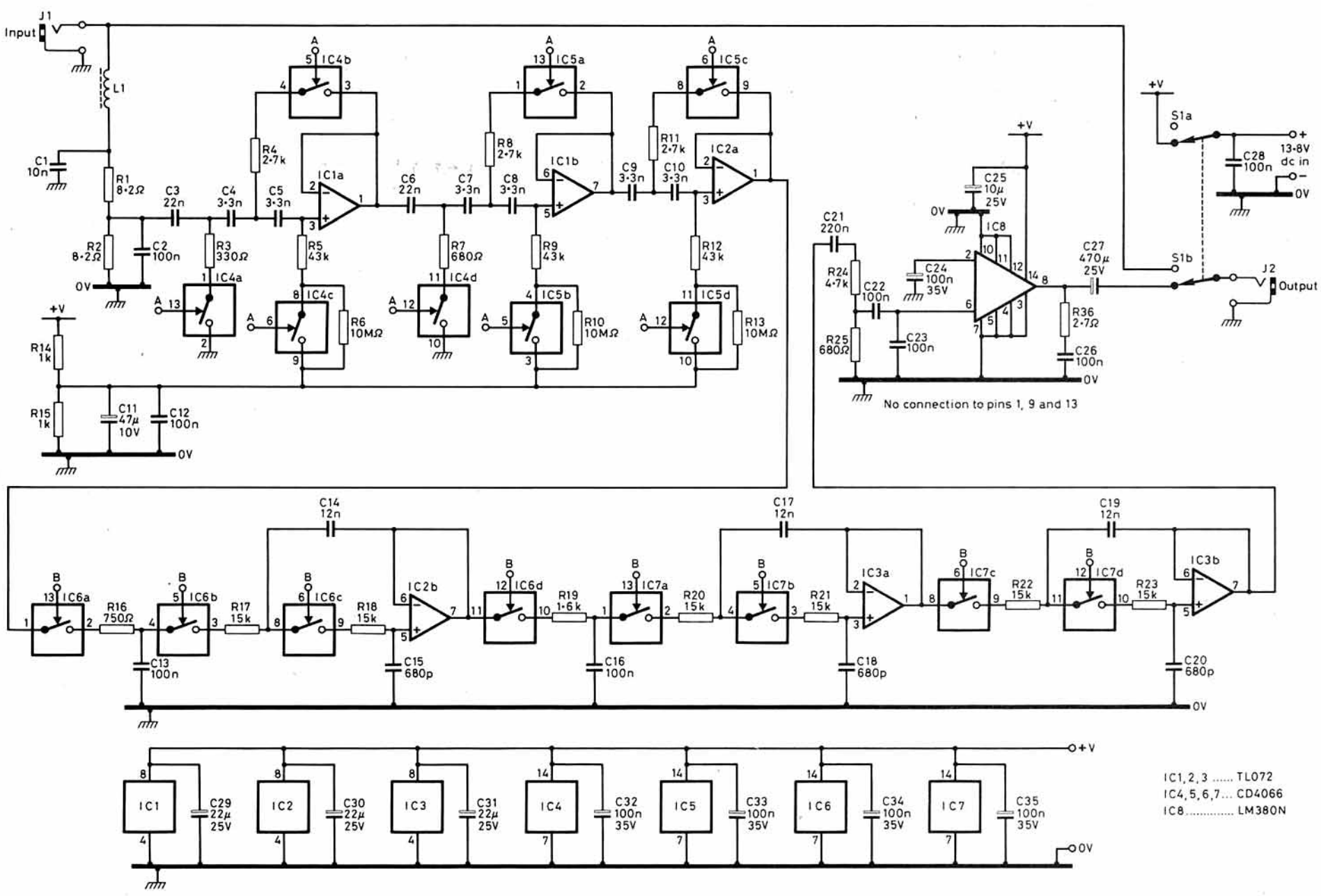


Fig 3. Circuit of the filter system. L1 is fabricated by winding two turns of 24swg enamel copper wire through a twin hole ferrite bead (see components list)

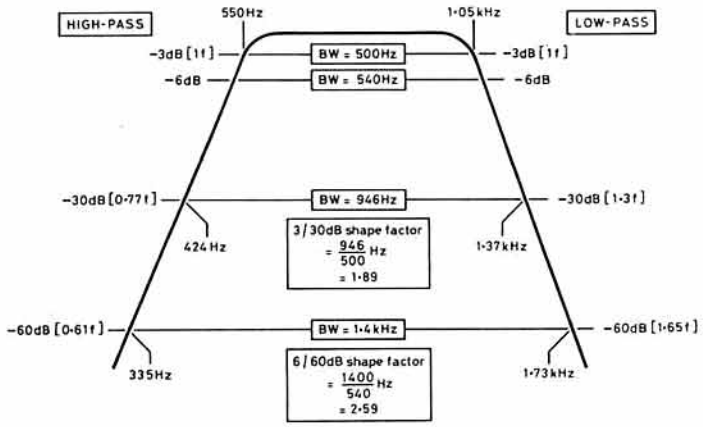


Fig 2. A typical versafilter response curve obtained by setting the −3dB cut-off frequencies of the highpass and lowpass filters at 550Hz and 1·05kHz respectively

CD4066 cmos integrated circuit, are wired in series with each resistor. By successively opening and closing the gates at an ultrasonic frequency, a multiplication of the fixed resistor value is obtained. The degree by which the resistances are multiplied is directly proportional to the mark/space ratio of the switching waveform, so tuning the filters becomes a matter of making this factor variable. The technique just described was also used in my tunable cw filter [2].

Unfortunately, the shape factor of a bandpass response obtained by cascading the two circuits shown in Fig 1 is not nearly good enough. It is practicable, however, to employ a number of third-order sections working in unison. The versafilter therefore uses the equivalent of three lowpass, and also three highpass sections so as to achieve much better performance.

The low and highpass filters must, of course, be made independently tunable over the range 300Hz–3kHz, and this is where the design begins to look rather unwieldly. As we have seen, each third-order section utilizes three "variable resistors", so three such sections would normally require the provision of no less than nine. This is annoying, because a single CD4066 contains four signal gates, and it is obviously more convenient to arrive at a circuit arrangement employing just eight variable resistors; ie, so that only two CD4066s are necessary in the lowpass and highpass filters respectively, making four in total.

Fortunately, a very minor modification allows us to dispense with two of the variable resistors. Each third-order section consists of a passive first-order network followed by an active second-order network. In the lowpass filter (Fig 1) the 750Ω resistor and 100nF capacitor form the first-order network, whereas in the highpass circuit the component positions are interchanged and the values become 680Ω and 22nF. It is possible, by appropriate scaling of values, to modify the cut-off frequency of a first-order network so that it may substitute for two separate first-order networks in a given filter design. This technique is exploited in the versafilter to reduce the total number of first-order networks from six to four. The modified lowpass network consists of 1·6kΩ and 100nF, and the highpass uses 330Ω and 22nF. Note that scaling of the cut-off frequency only involves changing the resistor value in each case.

In contrast to higher-order and/or elliptical arrangements, the uncritical, low-Q third-order design lends itself to home construction using "off-the-shelf" five-per-cent tolerance capacitors and resistors. A very respectable performance is virtually guaranteed, as illustrated by Fig 2 which shows a typical versafilter response curve.

Circuitry and construction

The circuit of the versafilter appears in Figs 3 and 4. Fig 3 shows the complete signal chain which is arranged as follows: The rig's external loudspeaker socket is coupled to the input jack, J1, and signals are routed via L1, C1 (an rf filter) to a 6dB attenuator formed by R1 and 2. The tunable highpass filter follows, and this comprises IC1, IC2(a), IC4 and 5 plus associated resistors and capacitors (R3–R13, C3–C10). The potential divider, R14 and 15, develops a half-rail bias supply which is decoupled by C11 and 12. The lowpass filter is driven from the output of IC2(a), and as the lp sections are essentially direct-coupled, no further bias feeds need be provided.

IC8, an LM380N audio power amplifier, provides a loudspeaker output via C27, S1b. S1a is the ON/OFF switch and therefore has its pole connected directly to the 13·8V dc power input socket. S1b is the by-pass switch and, because it is ganged with S1a, switching the filter off will also simultaneously couple the versafilters input straight through to the output jack, J2. IC8 contributes a voltage gain of approximately 30dB, so the potential divider comprising R24 and 25 is incorporated to provide a degree of attenuation at the input of IC8. The versafilter's net gain is close to unity, so provision of a volume control was considered unnecessary.

The tuning circuitry is shown separately in Fig 4. IC9 operates as a 32kHz clock oscillator with initial frequency setting facilitated by R29. The square-wave output from IC9 is fed to the inputs of IC10, a dual monostable. IC10 has two independent outputs, labelled A and B, which drive the control pins of the CD4066s used in the highpass (A) and lowpass (B) filters. For clarification, Fig 5 provides an overview of the versafilter system.

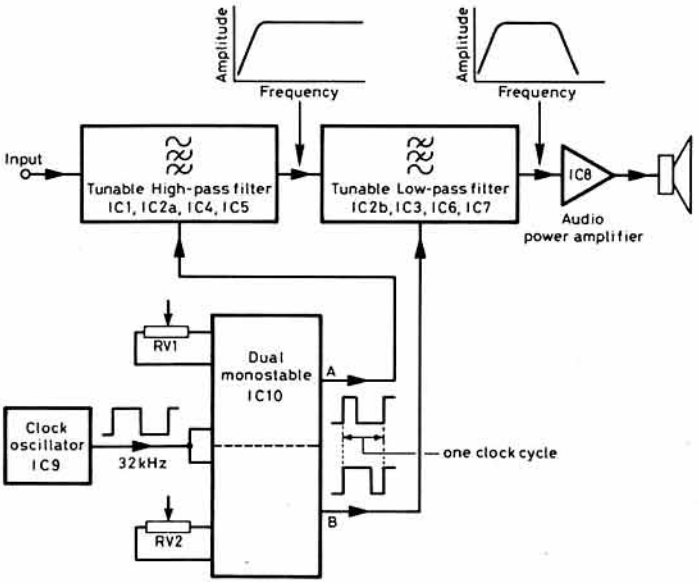


Fig 5. Versafilter block diagram

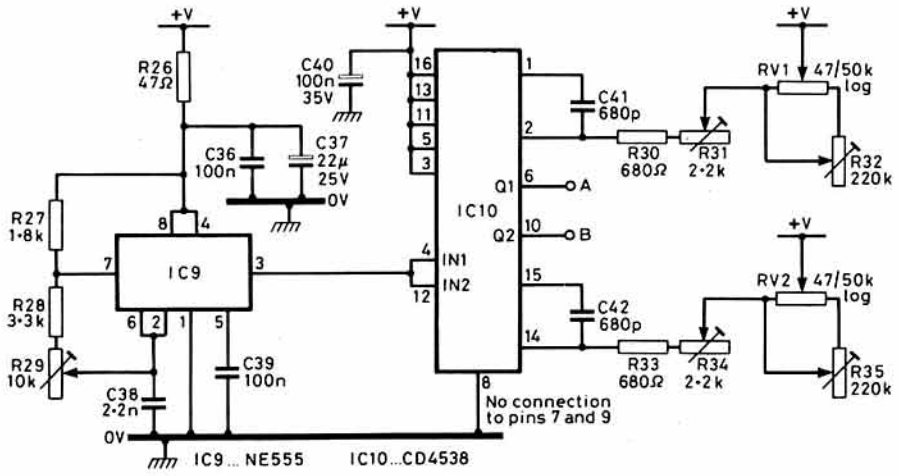


Fig 4. Clock oscillator and dual monostable tuning circuit

Components list

C1	10nF ceramic
C2, 12, 26 28, 36, 39	100nF ceramic
C3, 6	22nF polyester
C4, 5, 7, 8, 9, 10	3·3nF polyester
C11	47μF electrolytic 10V
C13, 16, 22 23	100nF polyester
C14, 17, 19	12nF polyester
C15, 18, 20, 41, 42	680pF polystyrene
C21	220nF polyester
C24, 32, 33, 34, 35, 40	100nF tantalum electrolytic 35V
C25	10 1μF tantalum electrolytic 25V
C27	470μF electrolytic 25V
C29, 30, 31, 37	22μF electrolytic 25V
C38	2·2nF polyester

The polyester capacitors are Siemens B32560, and the polystyrene are Siemens B31310 or similar (5% tolerance).

R1, 2	8·2Ω
R3	330Ω
R4, 8, 11	2·7kΩ
R5, 9, 12	43kΩ
R6, 10, 13	10MΩ
R7, 25, 30, 33	680Ω
R14, 15	1kΩ
R16	750Ω
R17, 18, 20, 21, 22, 23	15kΩ
R19	1·6kΩ
R24	4·7kΩ
R26	47Ω
R27	1·8kΩ
R28	3·3kΩ
R29	10kΩ preset type PR10, 10mm dia
R31, 34	2·2 kΩ preset type PR10, 10mm dia
R32, 35	220kΩ preset type PR10, 10mm dia
R36	2·7Ω

All fixed resistors are 0·33W, 5% tolerance carbon or metal film types (eg, CR25 or UPM033)

RV1, 2	47 or 50kΩ linear slider potentiometers. Cirkit stock code 48-90914
IC1, 2, 3	TL072
IC4, 5, 6, 7	CD4066
IC8	LM380N
IC9	NE555
IC10	CD4538

L1 Siemens twin-hole ferrite bead B62152 A0007 × 030 (See Fig 3 caption for winding details)
S1 Miniature toggle dpdt. Electrovalue S7201 or Cirkit 53-00201/
Case Radio Shack (Archer) aluminium enclosure size 49 by 210 by 156mm, cat no 270-272 available from Tandy.

Miscellaneous
PCB (see text). Sockets for ics: four 8-pin, four 14-pin, one 16-pin dil, input, output and power. Slider knobs for RV1, 2. Mounting/fixing sundries.

Front-panel control of the filter cut-off frequencies is achieved by the use of two linear slider potentiometers, RV1 (highpass) and RV2 (lowpass). But why slider, rather than the more popular rotary type? A glance at Fig 6, which illustrates the recommended front-panel layout, should answer this question. If RV1 and 2 are mounted as shown, the response shape that results from a particular setting is easily visualized. The preset pots, R31, 32, 34 and 35, facilitate calibration of the tuning controls (more about this later). IC8 is soldered in place so as to ensure maximum heat transfer from pins 3–5 and 10–12. The other ics should be mounted in dil sockets of proven quality; eg, Texas low-profile.

Fig 7 gives a rear view of the front panel. The prototype versafilter employs two 50kΩ, 60mm travel, linear slide potentiometers. S1 is a miniature dpdt toggle. The input and output jacks (J1, 2) plus the power socket are mounted on the back panel, and the types employed are left to the constructor's choice. Note that C28 is soldered directly across the power socket.

The capacitor types specified in the components list should be adhered to, and it is certainly not advisable, under any circumstances, to employ ceramics instead of polystyrene or polyester in the filter stages. Finally, the case employed to house the filter must be screened, and aluminium is probably the easiest material to work with (remember that it will be necessary to cut slots in the front panel for the controls of RV1 and 2). Details of a suitable commercial enclosure are given in the components list.

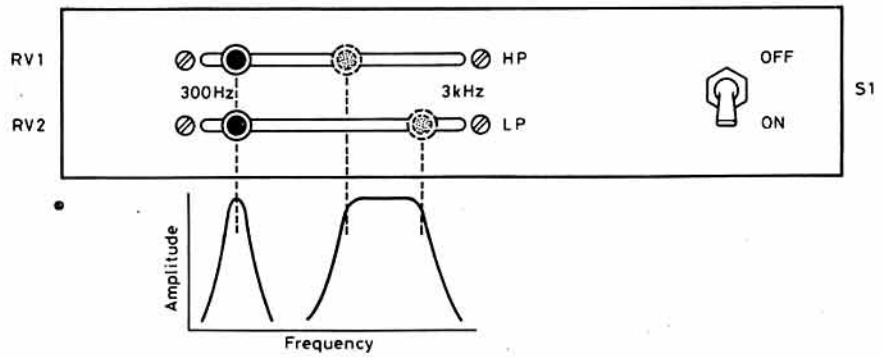


Fig 6. Recommended front-panel layout showing how the slider potentiometers give visual indication of the many response curves obtainable

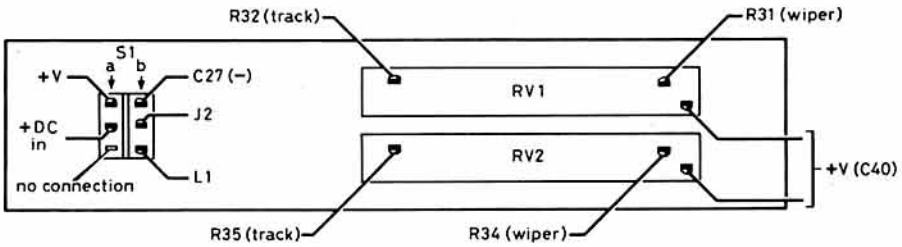


Fig 7. Control panel wiring

Testing and calibration

Constructors who either possess, or have access to, reliable test equipment —including an af signal generator, ac millivoltmeter and oscilloscope— may, of course, employ such items to aid calibration. However, as many amateurs are forced to get by with little more than a multimeter, a simplified commissioning procedure will now be outlined.

(1) A 13·8V psu is coupled to the power socket and, with S1 in the "on" position, the presence of rail voltage at the power pin of each ic is confirmed using a dc voltmeter. A reading of approximately 6·9V, ie, half rail, should be obtained at the junction of R14 and 15.

(2) With R29 set at mid-travel, a dc voltage reading of around half the rail potential at pin 3 of IC9 indicates that the clock oscillator is almost certainly functioning correctly.

(3) A short length of hook-up wire is temporarily connected to pin 3 of IC9. An hf receiver placed alongside the versafilter can now be used to monitor the harmonics generated by the clock oscillator (it may also be necessary to couple a make-shift wire antenna to the receiver). Use the lowest frequency range available and check the spacing between the harmonics by tuning through successive zero beats. The nominal clock frequency required is 32kHz, so R29 must be adjusted to obtain a harmonic spacing close to this. In practice, anything between 30 and 33kHz is perfectly acceptable.

(4) The dual monostable (IC10) is now checked as follows. The presets R31, 32, 34 and 35 are initially set at mid-travel, and a dc voltmeter is connected to pin 6 of IC10. Adjustment of RV1 should cause large fluctuations in the reading obtained—this serves as an indication that the mark/space ratio is indeed being controlled by RV1. The meter is now connected to pin 10 of IC10 and the same test repeated for RV2.

(5) If everything appears satisfactory, the audio output of the station receiver should be coupled to the versafilter input jack, and a loudspeaker connected to the filters' output. Tune the receiver to a busy frequency, ensuring that its af gain control is fairly well advanced. With S1 in the "off" position, the audio will be unaffected. Furthermore, disconnecting the power supply from the filter should make no difference. However, leaving the psu disconnected and flicking S1 to the "on" position will silence the loudspeaker. If this does not occur, check the wiring of J1, J2 and S1.

(6) Reconnect the psu and check that S1 remains in the "on" position. Set RV1 to the extreme left of its travel (300Hz position) and RV2 to the extreme right (3kHz).

The versafilter is now operational, and it should be possible to monitor signals passing through the filter. However, as the presets associated with RV1 and 2 have yet to be trimmed, the intelligibility of phone transmissions may well be affected.

Moving RV2 from right to left will cause a distinct reduction in the level of high frequencies, making the sound very muffled and indistinct.

Returning the control to the extreme right and then moving RV1 from left to right should produce the opposite effect; ie, a progressive and very marked attenuation of low audio frequencies.

(7) It will not be possible to achieve precise calibration of the filter unless an audio signal generator is available. This is not really important, however, and the fact that the frequency range finally obtained may differ from the nominal 300Hz–3kHz is of little consequence. Nevertheless, fairly accurate tracking between RV1 and 2 is desirable so that when both controls are set at the same position (see left-hand setting illustrated in Fig 6) the filter cut-off frequencies coincide, thus producing the expected narrow, bandpass response.

The following procedure enables the versafilter to be aligned subjectively. First, set RV1 to the extreme left and RV2 to the extreme right. Switch S1 "off" so as to by-pass the filter, and tune the receiver to a strong ssb transmission which has good quality audio. Now bring the filter into operation by flicking S1 "on". R31 facilitates adjustment of the highpass minimum cut-off frequency, and this should be set to a point that provides a reasonable low frequency response. Aim for good intelligibility here but expect a noticeable loss of the lower, "bass" sounds, especially if a large loudspeaker is being used. It should be noted that if the combined resistance of R30 and 31 falls below approximately 1kΩ the monostable (IC10) may "lock-up" and produce a constant dc output. This condition can be detected with a voltmeter connected to pin 6, or by listening to the sudden change in audio quality that results if R31 is advanced beyond the critical point; this comment also applies to R34.

Having settled on an adjustment for R31 we can proceed to set R35, which determines the lowpass maximum cut-off frequency. Listen to the high-frequency content of the speech and trim R31 so that there is just a slight attenuation of these upper frequencies. The by-pass facility provided by S1 may, of course, be employed to make instant comparisons between the direct and filtered speech. Finally, R34 (lowpass minimum cut-off frequency) and R32 (highpass maximum cut-off frequency) are set to the same positions as R31 and 35 respectively.

The tracking of RV1 and 2 may be checked by tuning the receiver to a stable cw transmission and peaking the signal in a narrow bandpass response obtained by moving the hp and lp controls in tandem. Using the receiver tuning knob to shift the pitch of the cw enables a check to be made at various frequencies. If the tracking is poor at low frequencies, try adjusting R34. Conversely, use R32 to correct for any irregularities at high frequencies.

NB. The dc voltage readings at pin 3 of IC9 and pins 6 and 10 of IC10 referred to in sections (2) and (4) must be made with an analogue, moving-coil voltmeter/multimeter.

Conclusion

There are so many potential uses for the versafilter that a comprehensive "operators guide" would probably take up as much space as this article.

If you are utilizing a home computer to decode rtty, data or cw (shame on you if it's cw!) the versafilter may be employed to clean-up noisy, QRM-infested signals before they are presented to the interface/terminal unit, thus reducing errors quite significantly. To avoid the effects of agc pumping when there are strong adjacent-channel signals, try reducing the receiver's rf gain—this can sometimes work wonders.

Although the provision of an accurate tuning scale is a difficult task and requires test equipment, constructors may wish to consider the use of markers for important frequencies. For instance, rtty enthusiasts could use a small sticker to indicate the mid-point between 1,275 and 1,445Hz. The correct position is found, initially, by feeding the output of the rtty tone generator into the versafilter and then peaking RV1 and 2 for maximum response. As the filter input impedance is only 16Ω it will probably be necessary to add a series resistor to prevent loading the tone generator excessively.

Although I might be accused of taking liberties if I were to try and describe this design as "simple", it is certainly far less complex than some other fully tunable audio filters. Furthermore, painless construction of this project is made possible by the availability of a high-quality, pre-drilled printed circuit board.

The versafilter pcb, plus accompanying layout diagram, may be obtained from: FAW Electronics, "Four Seasons", Straight Road, Battisford, Stowmarket, Suffolk IP14 2LZ. The price, including VAT and p&p is £12.50.

References

[1] "The G4BWE cw filter". *Rad Com* March 1983, pp226–9.

[2] "The G4BWE tunable cw filter". *Rad Com* September 1984, pp755–8.

[3] "Direct-conversion cw transceivers", *Rad Com* January 1986, pp26–31 and 33. □

A "SPROGGY" HUNT

N D N Belham, G2BKO*

IT ALL STARTED when a neighbour stopped me in Evesham and, looking at my RSGB badge, said, "So you are G2BKO. I listen to you each Monday morning, in fact you wipe out Radio 2 vhf fm on my transistor set." Aghast, I hastened home to listen on a transistor set for myself and found that there was a indeed a signal on 89·3MHz, even when the transmitter was only putting out a third of a watt. So the hunt began.

My 144MHz transceiver is a "black box" which, fortunately, had been supplied with a comprehensive handbook. Fig 1 is a very much simplified block diagram to show how the transmitter frequency is generated. The modulated output from a 10·7MHz crystal oscillator is added to that from a voltage-controlled oscillator which is variable between 133·3 and 135·3MHz. This variation is limited to 10kHz steps by a phase-locked loop.

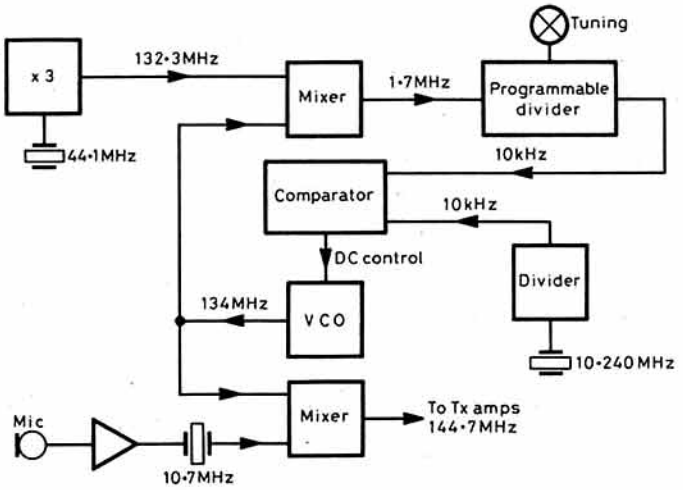


Fig 1. Simplified block diagram of "black box" frequency generating system

Part of the vco output is mixed with the tripled output from a 44·4MHz crystal oscillator to produce a difference frequency between 1 and 3MHz. This difference frequency is reduced by a programmable divider chain set by the tuning control. A comparator stage compares the phase of the two 10kHz signals. The first derived from a 10,240kHz crystal oscillator by a fixed divider chain, and the second from the vco. The comparator supplies the control voltage for the vco.

Thus, when the transmitter is tuned to 144·7MHz, the following frequencies are present in the transmitter: 10kHz, 1·7MHz, 10·24MHz, 10·7MHz (modulated), 44·1MHz, 132·3MHz (3×44·1), 134·0MHz (vco) and 144·7MHz, as well as harmonics, summation and difference frequencies!

Could any combination of these produce a modulated signal on 89·3MHz? One could, I suppose, ask a computer, but a little thought and a few simple experiments can limit the possibilities to be considered. Although the i.f of my transistor set was 10·7MHz, direct pick-up from the modulated 10·7 crystal oscillator was ruled out since the unwanted signal was not received all over the band.

The next thing to do was to search for any spurious emission from the transmitter on 89·3MHz, or one having harmonics on that frequency. A Heathkit dip meter was available which consisted of a set of interchangeable coils, a calibrated tuning capacitor and a fet voltmeter (which could be made into an oscillator). A tremendous response was obtained on 144·7MHz when the dip meter was placed near the dummy load (with the transmitter on low power) but none at all on 89·3 or 44·65MHz.

It must be admitted that a dip meter is not as sensitive as a receiver. A more sensitive device was therefore constructed, consisting of a ganged pair of tuned circuits followed by a broadband integrated circuit amplifier. The circuit is shown in Fig 2. The output from the amplifier is rectified by the fet acting as a peak voltmeter. Before any signal is applied, the 5·6kΩ and 4·7kΩ variable resistors are set so that both the 100μA and the voltmeter are reading zero; ie the fet is at cut-off. The peak voltage of the signal applied is then read on the voltmeter by adjusting the 4·7kΩ variable to cut-off

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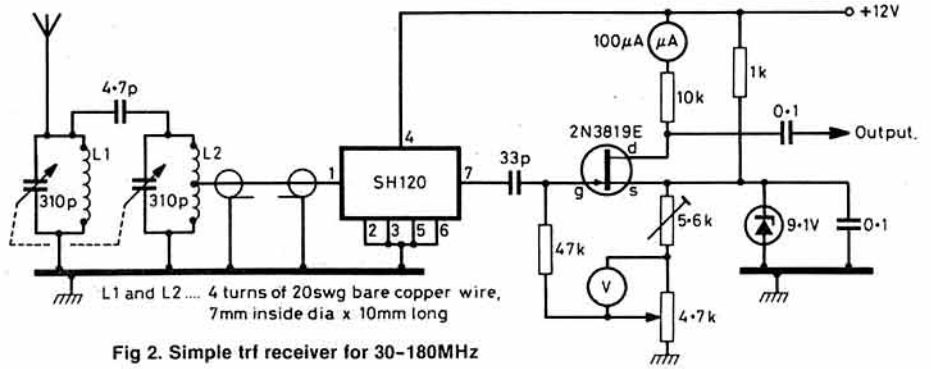


Fig 2. Simple trf receiver for 30–180MHz

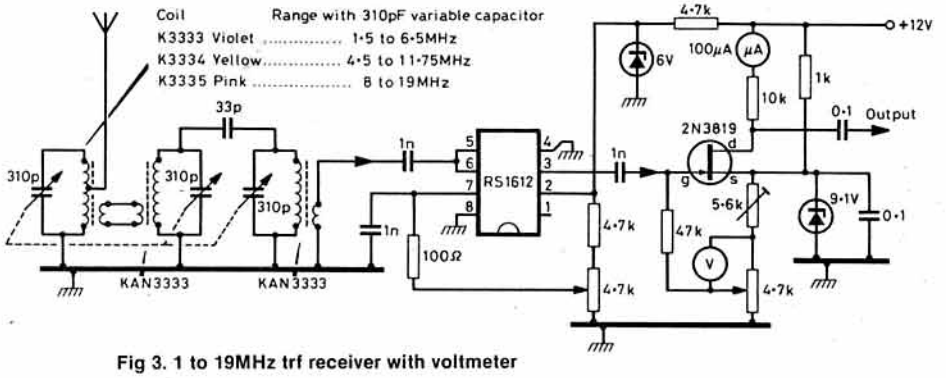


Fig 3. 1 to 19MHz trf receiver with voltmeter

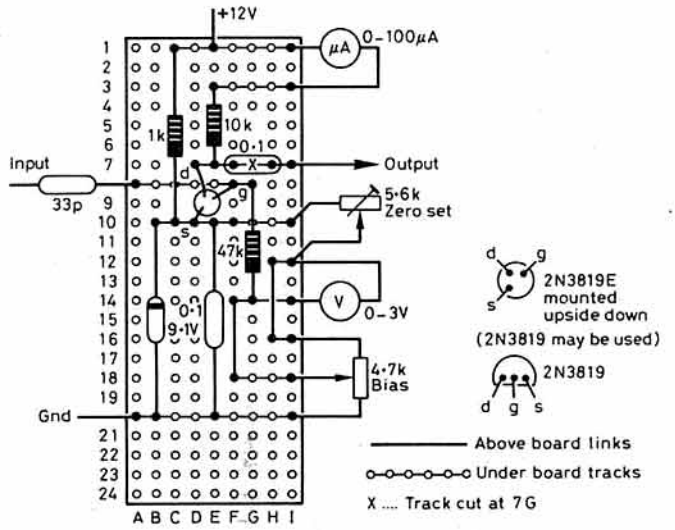


Fig 4. Voltmeter circuit Veroboard layout

conditions once again. An audio amplifier can be connected to the drain output if required. The voltmeter used needs to be a high resistance type reading down to 1V full scale on its lowest range. The device just described detected no emissions within its range, other than the expected 144·7MHz, from the transmitter, although the integrated circuit amplifier had a gain of at least 17dB.

Another broadband integrated circuit amplifier is the RS1612C, but its response falls by 3dB at 15MHz. However, its gain is over 30dB. The circuit for a test rig, using this device, is shown in Fig 3. Using Toko coils it will cover the range 1 to 19MHz. (Birkett of Lincoln supplied the three-gang 310pF capacitors.)

With the failure to detect any significant spurious transmissions from the 144MHz transmitter, attention was turned to the transistor receiver which covered the usual vhf fm range. Direct pick-up at 10·7MHz was already ruled out as the unwanted signal was tunable. Using the dip meter in its oscillating mode, it was shown that the receiver not only responded to a signal on 89·3MHz but also to one on 44·65MHz. Radio 2, on 88·02MHz was not wiped out on my transistor receiver.

When the transistor receiver was tuned to 89·3MHz, its local oscillator must have been oscillating at 89·3 ± 10·7MHz, ie 100MHz or 78·6MHz; the first turned out to be the case. The local oscillator was then disabled by clipping a load across its tuning capacitor. With the receiver tuned to Radio 2, and an external "local oscillator" injected, the programme was received as normal when the "local oscillator" was tuned to 98·02 or 77·32MHz.

The receiver was then tuned to 89·3MHz, and the transmitter turned on. The unwanted response was obtained when the "local oscillator" was tuned to 100MHz but not when it was tuned to 78·6MHz. There was no longer any doubt that the unwanted signal on 89·3MHz was being manufactured in the receiver! In the 78·6MHz case the unwanted response would be expected to take place outside the vhf fm band.

Perhaps the simplest possible explanation would be that the difference frequency between 144·7 and 100MHz is 44·7MHz, and double this is very near 89·3MHz! Since it had already been shown that the receiver, when tuned to 89·3MHz, responded to a signal on 44·65MHz, this is most likely what takes place. It also suggests a reason why Radio 2 was wiped out on my neighbour's set, but not on mine. His i.f was not quite tuned to 10·7MHz and his selectivity not quite so good as mine.

If the mechanism suggested is correct, a great many more transistor radios, spread over a wide area, could manufacture a sproggy near Radio 2 and Radio 3 from a 10W transmission on 144MHz. Short of all their local oscillators being retuned to the "low" position, there seems nothing to be done. Unless, of course, you know better!

Appendix

Proposed definition: "Sprog"—a gremlin who specializes in unwanted receiver responses as distinct from his cousins, the spurii, who are more concerned with unwanted emissions from transmitters. Both belong to the genus "Spoof".

BUYING ELECTRONIC COMPONENTS BY MAIL ORDER

J D Harris, G3LWM*

THE AUTHOR conducted a survey of components suppliers last year by sending the survey form below to 32 companies, of whom 25 replied. It is hoped that the information obtained will encourage more amateurs to construct equipment, and thus gain much enjoyment and knowledge.

SURVEY FORM

(1)	Will you supply individuals?	YES	NO	
(2)	If the answer to (1) is NO, *DO NOT CONTINUE*			
(3)	Will you supply catalogues?	YES	NO	
(4)	Do you charge for catalogues?	YES	NO	
		Amount:		
(5)	Will you supply detailed data sheets of the products you offer?	YES	NO	
(6)	If the answer to (5) is YES, are these data sheets free of charge	YES	NO	
		Amount:		
(7)	Do you have a minimum order charge?	YES	NO	
		Amount:		
(8)	Do you charge post and packing?	YES	NO	
		Amount:		
(9)	Will you accept payment by the following methods?	Cash/cheque/credit cards		
		(a)	(b)	(c)
(10)	Will you accept telephone Credit Card Orders?	YES	NO	
(11)	Will you obtain products not shown in your catalogue?	YES	NO	
(12)	If an item is not in stock when you receive an order will you			
	(a) Cancel outstanding items and return balance of payment?			
	(b) Place on back order and advise customer?			
(13)	Do you have a retail/trade counter?			
	Store?	YES	NO	
(14)	If you have a retail/trade counter is it open on Saturdays?	YES	NO	

*21 Waltham Way, Frinton-on-Sea, Essex CO13 9JE.

RESULTS OF SURVEY

Name of company	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Additional information
Anglia Components	Yes		Yes	£2·50	No		£10	No	Yes (a) (b) (c)	Yes	No	(b)	No		Wide range of components. Discrete semiconductors and ics
Barrie Electronics	Yes		Yes	9 by 4in sae	No		£5	Yes, at cost	(a) (b)	No	Yes	(a)	Yes	No	Semiconductors and ics
Beta Devices	Yes		No		Yes	Free	No	Yes, at cost	(a) (b)	No	Yes	(b)	Yes	No	Wide range of components. Discrete semiconductors and ics
C R Supply Co	Yes		Yes	No	No		No	20p. Free over £5	(a) (b)	No	No	(b)	Yes	Saturday morning	Economically priced components and discrete semiconductors
Cirkit	Yes		Yes	£1·50	Yes	Kits etc. FOC ICs at £0·40	No	Yes, 70p incl VAT	(a) (b) (c)	Yes	Usually minimum quantity 100. Depends on item	(a)	Yes	Yes	Kits specifically for radio amateurs. Toko coils. Wide range of many other items. Very informative catalogue
Compex UK	Yes		Stock list. Yes	No	No		No	Yes, at cost	(a) (b)	No	No	(b)	Yes	No	Wide range of semiconductors, includes some difficult-to-get items
ECM Electronics	Yes		Yes	No	Yes	FOC	£10	£3·50	(a) (b)	No	Yes	(b)	No	No	Up-to-date active and passive components. Wide range of crystals and filters
Electromail	Yes		Yes	£2·50	Yes	5 pcs FOC	No	£2 + VAT	(a) (b) (c)	Yes	No	(a)	No	No	Total RS range now available to individuals. Detailed catalogue and data sheets available
Electrovalue	Yes		Yes	No	Yes	£0·30 ea	No	Yes, 50p if order value under £5	(a) (b) (c)	Yes	If possible	Customer's choice (a) or (b)	Yes	Yes, till 1300	Two retail stores
Farnell Electronics	No														
Garex Electronics	Yes		Yes	No	Yes	Free	Yes, £1·50 incl p&p + VAT	Yes, 50p min	(a) (b) (c)	Yes	Yes	(b)	No. Callers by appointment		Many ex-equipment pcbs and components of all sorts. Available at many rallies
Jermyn Distribution	No														
Langrex Supplies	Yes		Yes	No	Yes, if available	Free	No	50p min	(a) (b)	No	Yes	Customer's choice (a) or (b)	Yes	No	Valves, ics etc, many obsolete types
Maplin Electronics	Yes		Yes	£1·45 + p&p	Yes, IC only. Catalogue is detailed	£0·40	Yes, £0·50 on orders under £5	50p	(a) (b) (c)	Yes	Trade quantity only	Customer's choice (a) or (b)	Yes	Yes	Large detailed catalogue. Kits also available. Heathkit products
On Line Distribution	Yes		Yes	No	Yes	Free	£25	£2	(a) (b)	No	No	(b)	No	No	Franchise distributor for Mullard, Texas, ITT, Cannon, Harwin etc
P M Components	Yes		Yes	No	Yes	£0·10 per page	No	£1	(a) (b) (c)	Yes	Yes	(a)	Yes	No	Wide range of valves and ics, many obsolete types
Quardon Electronics	Yes		Yes	No	Yes	Free	£5	No	(a) (b)	No	Yes	(b)	Yes	No	Exceptional range of ics. Mullard, Plessey, Raytheon, Texas
R R Electronics	No														
Rapid Electronics	Yes		Yes	£1	Some	Varies on application	£5	70p on orders under £20	(a) (b) (c)	Yes	No	(b)	Yes	No	Selected range of many active and passive components. Specially prepared component kits of great use
Semiconductor Specialists	Yes		Yes	No	Yes	Free	£5	£3·50	(a) (b)	No	No	(b)	Yes	No	Discrete semiconductors and ics. Plessey, Thomson
Semiconductor Supplies	Yes		Yes	£2	Yes	Free if goods are purchased	£5	Yes, at cost	(a) (b) (c)	Yes	Yes	(b)	Trade counter	No	Large range of both active and passive components
STC Electronic Services	Yes		Yes		Yes	Some free, others at cost	No	Yes, varies	(a) (b) (c)	Yes	No	(b)	No	No	Very large range of all types of components
TMP Electronics	Yes		Yes	No, sae	Yes	Sae	£2	Yes, 75p	(a) (b) (c)	Yes	No	Customer's choice (a) or (b)	Yes	Yes	Stockist of Amidon toroidal cores. Often specified in American circuits
Technomatic Ltd	Yes		Yes	No	No		£5	50p	(a) (b) (c)	Yes	No	(b)	Yes	Yes	Very wide range of most types of integrated circuits
Verospeed	Yes		Yes	No	Yes	Free	No	No	(a) (b) (c)	Yes	No	(a)	Trade counter. Yes	No	Selected range of semiconductors and ics. Many interesting interconnection products

Names and addresses of firms listed

Anglia Components Ltd, Burdett Road, Wisbech, Cambs PE13 2PS.
Barrie Electronics, Unit 211 Stratford Workshops, Burford Road, London E15 2SP
Beta Devices Ltd, 6 Sun Street, Waltham Abbey, Essex EN9 1EE.
The CR Supply Co, 127 Chesterfield Road, Sheffield S8 8RN.
Cirkit Distribution, Park Lane, Broxbourne, Herts EN10 7NQ.
Compex UK Ltd, Burnhope Road, Washington, Tyne and Wear NE38 9NX.
ECM Ltd, Penmaen House, Ashington, West Sussex RH29 3JR.
Electromail Ltd, PO Box 33, Birchington Road, Corby, Northants NN17 9EL.
Electrovalue Ltd, 28 St Judes Road, Englefield Green, Egham, Surrey TW20 0HB.
Farnell Electronics, Canal Road, Leeds LS12 2TU.
Garex Electronics, 7 Norvic Road, Marsworth, Tring, Herts.
Jermyn Distribution, Vestry Estate, Sevenoaks, Kent.
Langrex Supplies, Climax House, Fallsbrook Road, London SW16 6ED.
Maplin Electronics Supplies Ltd, PO Box 3, Rayleigh, Essex SS8 8LR.
On Line Distribution, St Martin's Way Ind Est, Cambridge Road, Bedford, MK42 0LF.
P M Components Ltd, Selectron House, Springhead Road, Gravesend, Kent DA11 8HD.
Quardon Electronics, Stack Lane, Derby DE3 3ED.
RR Electronics, St Martin's Way, Cambridge Road, Bedford MK42 0LF.
Rapid Electronics, Hill Farm Ind Est, Boxted, Colchester, Essex CO4 5RD.
Semiconductor Specialists UK, Carroll House, 159 High Street, Yiewsley, West Drayton, Middx UB7 7XB.
Semiconductor Supplies Int Ltd, Dawson House, 128/130 Carshalton Road, Sutton, Surrey SM1 4RS.
STC Electronic Services, Edinburgh Way, Harlow, Essex CM20 2DF.
TMP Electronic Services, Unit 27, Pinfold Workshops, Pinfold Lane, Buckley, Clwyd, N Wales CH7 3PL.
Technomatic Ltd, 17 Burnley Road, London NW10 1ED.
Verospeed Ltd, Boyatt Wood, Eastleigh, Hants SO5 4ZY.

Equipment Review

THE YAESU MUSEN FT767GX HF TRANSCEIVER

Peter Hart, G3SJX*

Introduction

Three years passed between the launch of the FT757GX and Yaesu's next hf transceiver introduction during the summer of 1986, the FT767GX. This new addition is based heavily on the architecture and circuitry of its predecessor, but is packaged as a base station in a larger case with many additional features including optional coverage of 50, 144 and 432MHz. The result is a 12-band hf/vhf/uhf multimode transceiver incorporating general-coverage hf receiver, built-in mains psu and virtually every facility available on a modern-day transceiver. The review transceiver was equipped with the 144MHz module.

Principal features

The FT767GX comprises a 100W fully-solidstate transceiver covering the hf amateur bands, a general-coverage receiver tuning 100kHz to 30MHz, and up to three optional vhf/uhf modules which extend all the features of the transceiver to cover 50–54, 144–146 and 430–440MHz. The transmitter power on the vhf/uhf modules is nominally 10W. LSB, usb, cw, a.m and fm modes are provided, and also a position labelled fsk (see later comments). A mains power supply is built-in; there is no provision for external dc battery input.

Very comprehensive facilities are provided for setting the frequency as follows:

(1) Rotary knob or tuning from the microphone in steps of 10Hz at 10kHz per revolution, or in steps of 1kHz at 100kHz per revolution.

(2) Bandchanging in steps of 500kHz for general-coverage mode or amateur bands including vhf/uhf when fitted.

(3) Direct keyboard frequency entry to 10Hz resolution.

(4) User-programmable tuning step sizes using up/down keys above the rotary tuning knob or from the microphone. Different step sizes may be stored for each mode.

(5) Twin vfos storing both frequency and mode operating independently over the entire frequency range of the equipment. These vfos may also be synchronously tracked and operated split.

(6) Ten memories storing both frequency and mode. Repeater offsets are also stored in memory, and are separately programmable for the different vhf/uhf bands.

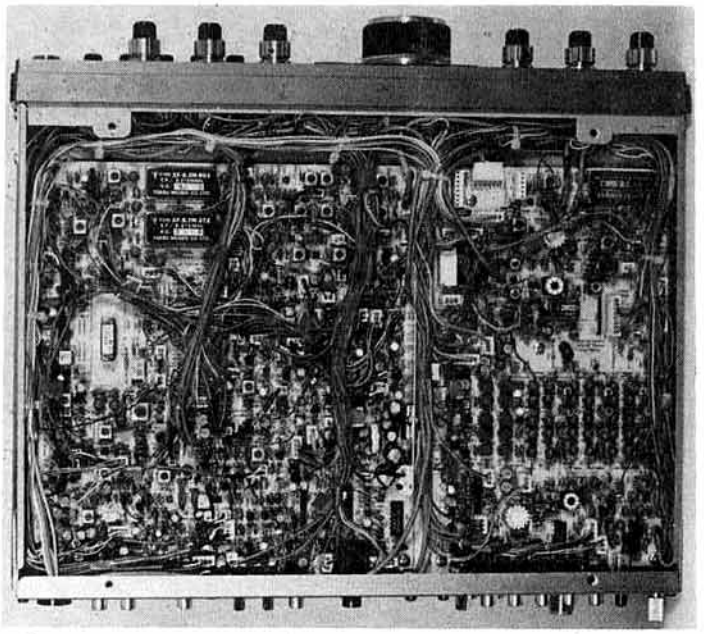
(7) Clarifier (irt) operating over the entire frequency range of the equipment.

(8) Scanning between any two frequencies or through the 10 memories with stop on squelch tripped.

The memories and vfos are battery-packed using a lithium battery located to the rear of the local unit board. This battery may be switched off when the transceiver is stored for an extended period. A second battery backs up the atu memory and is located within the atu. Although both batteries should last several years, they will need replacement eventually and this entails major dismantling of the equipment. This is not described in the instruction manual. A blue fluorescent display provides readout to 10Hz resolution and a number of annotations. This display may also be used to give a digital readout of vswr directly or transmitter power in watts on any band including vhf/uhf. A three-position dim switch reduces the intensity of the already not overbright display.

Receiver functions include switchable rf amplifier and attenuator, three-speed agc plus off, adjustable noise blanker, i.f notch and audio peaking filters and all mode squelch. Fast agc is automatically selected when tuning (autospeed agc). Optimized bandwidths for each mode including a narrow cw filter are fitted as standard. An i.f shift control is provided but there is no variable width.

Transmitter functions include rf speech processor, vox, full cw break-in (except on vhf/uhf), built-in iambic keyer and selectable 1,750Hz toneburst on fm. A cw pitch control allows the received cw note to be varied to suit individual preferences. The transmit sidetone also varies similarly. The transmit audio response on ssb may be tailored to suit individual microphones using the TX SHIFT control which operates much like the receiver i.f shift facility. A monitor control with variable level allows the



Bottom view of the FT767GX with cover removed

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transmit audio to be monitored after shifting and processing, and this function also provides cw sidetone. A ducted-flow cooling system with thermostatically operated fan similar to that of the FT757GX is used. Metering of pa current, supply voltage, alc, compression level and relative power output is available on transmit, and S-meter or fm discriminator tuning on receive.

Serial control of all frequency and mode functions from an external computer at 4,800 bits/s is provided. The data transfer protocols are very similar to the FT980 (see [1] for details). An automatic antenna tuner is built-in, enabling the transmitter on hf to deliver optimum power output with vswrs up to 3:1 (2:1 on 1·8 and 3·5MHz). The most recently used settings for each amateur band are stored in a battery-backed memory and recalled initially whenever that band is reselected.

The rear panel carries no less than 30 presets, switches and connectors. Separate antenna sockets for hf and each vhf/uhf module are provided, sockets for external hf receiver and external antenna for the hf receiver, linear amplifier switching both normal and QSK, alc, low level rf output, ptt, various af inputs/outputs, band data for FL7000 linear, computer control, speaker and key. The key uses a common 0·25in three-contact stereo jack for both internal and external keyer units. A two-contact mono jack must not be used.

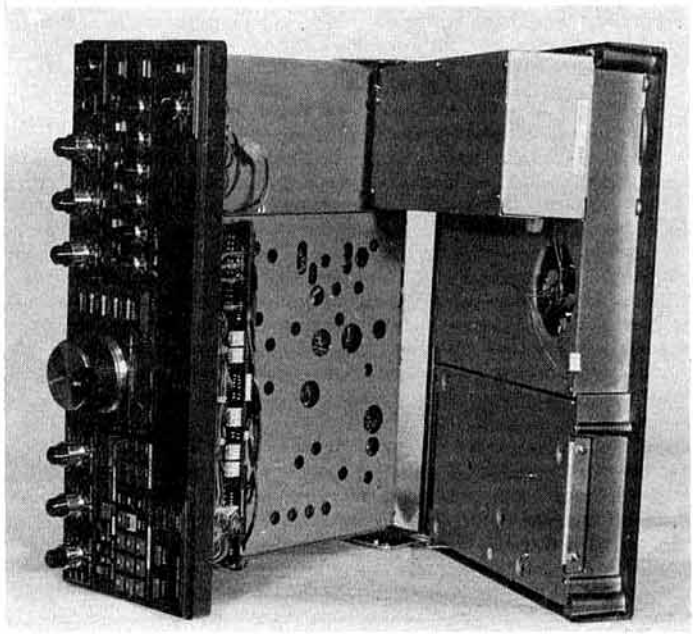
The vhf/uhf modules are easy to fit and may be added at any time. It is not even necessary to remove the case. After unclipping the relevant cover on the rear panel, the module is inserted and anchored with two screws provided. Band selection for the module is automatically enabled. The photograph of the rear panel was taken before the 144MHz module was fitted.

Operation of the equipment is described in the 36-page instruction manual. Block and circuit diagrams are given but no other technical information.

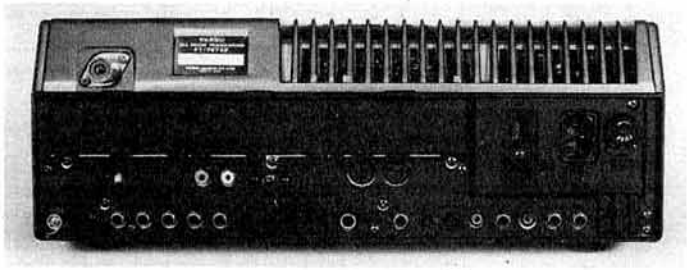
Description

The FT767GX is of base station size, measuring 36·8 (w) by 12·9 (h) by 29·5cm (d) and weighs 13·5kg without the vhf/uhf modules. The equipment is constructed as two mechanically-separate units which are bolted together in a manner similar to the FT757GX. The upper unit is a diecast assembly with integral heatsink and fan containing the mains psu, transmitter power amplifier, lowpass filter bank and auto-atu. This unit also contains the upward-facing 7cm-diameter speaker, and all assemblies in the upper unit are fully screened. The lower unit comprises three large circuit boards on a steel chassis and the steel front panel overlaid with a plastic moulding containing the controls and displays. The vhf/uhf modules fit between the upper and lower units plugging into the lower unit. All the boards are interconnected with plug and socket leads and, although the unit is highly complex, accessibility is not as difficult as may be imagined.

An examination of the block diagram of this transceiver shows it to be very similar in both architecture and circuitry to the FT757GX. In the interests of space, I have not included the usual block diagram; the reader



Interior view of the FT767GX with upper and lower units separated



Rear view of the FT767GX

is referred to [2] for more details. The receiver is triple conversion with i.fs of 45.03MHz, 8,215kHz and 455kHz. More front-end and i.f filters are used than with the FT757GX. On transmit, ssb is generated at 8,215kHz and mixed via 45.03MHz to final frequency. The pa uses a pair of MRF422 devices operating from 24V, which is why the transceiver cannot be used from a 12V supply. However, 24V power amplifiers generally produce a cleaner signal than their 12V counterparts. In the FT757GX, audio speech processing was employed. However, a superior system is adopted in the FT767GX using the 455kHz i.f filter in an rf-based processor. The vhf/uhf modules transvert the 45.03MHz i.f to the relevant band.

The frequency synthesizer is virtually identical to the FT757GX. Two phase-locked loops generate the first local oscillator signal in steps of 1kHz. The second conversion oscillator is shifted in 10Hz steps over a total range of 1kHz to interpolate between the 1kHz steps of the main synthesizer.

Four microcontrollers are used. All have mask programmed rom and sufficient internal ram (battery-backed where necessary) to avoid the requirement for memory external to the microcontrollers. The main cpu is an HD6305 derivative used in conjunction with a custom gate array device. The other microcontrollers are a TMS2370 used to drive the display, a four-bit processor type TMS1751C for the keyer and a μPD7507C to control the atu.

Receiver measurements

Performance measurements, confined to the amateur allocations only, are given in detail in the accompanying table. For the measurement procedure the reader is referred to [2–5]. Additional comments are as follows:

Sensitivity

The measurements indicate a noise figure on hf of 4 to 8dB with the preamp in circuit, which is very sensitive, or 14 to 17dB with the preamp out of circuit. The a.m and fm sensitivities are also very high. The input attenuator reduced the sensitivity figures by 20dB. On 144MHz a noise figure of 5dB is indicated.

S-meter calibration

The S9 level is about right with the preamp out of circuit, and somewhat optimistic with the preamp switched in. However the S-meter linearity and range are improved with the preamp switched in circuit due to the effect of age on this stage. Note that with very large signals, above S9 + 40dB, the S-meter reading actually drops when the preamp is switched on. At these signal levels, the preamp gain is negative due to the high level of age.

Spurious responses

Image and first i.f rejection figures are adequate but not as high as some other top-price models. On bands above 18MHz, a response at half the first i.f (22,515kHz) could be obtained at a level around −80dB. Rejection of the 8,215kHz i.f was better than 90dB. A number of weak internally-generated spurious signals were found mainly on the higher bands but all were less than S1. Several other spurious responses were found, some only occurring over a very limited range of tuning. In particular, a close-in reponse at ± 10kHz, 40 to 50dB down on the wanted frequency for a tuning range of 2 × 1kHz every 50kHz. This also occurred on transmit. (See transmitter spurious outputs for more details). A similar response at ± 5kHz was also observed on certain bands. This is a frequency synthesizer problem.

AGC performance

The age attack time of 25ms is not really fast enough and can cause distortion on transients. The decay time varied with signal level, which is normal.

Selectivity

Reciprocal mixing limited measurements to about −60dB. There are basically three bandwidth settings used between the different modes. The ssb filter is about optimum and has a good shape factor. The narrow cw filter exhibited some spurious responses at about −55 to −60dB on the hf side. The fm bandwidth is ideal for 25kHz channelling on 144MHz but too wide for 10kHz channelling on 29MHz or 12·5kHz channelling on vhf.

Reciprocal mixing

The results were obtained at 21·4MHz and are poor compared with other

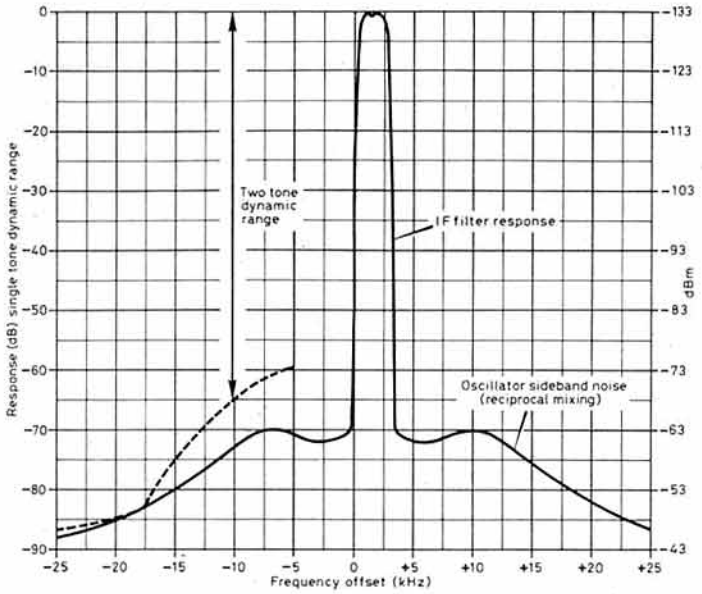


Fig 1. FT767GX effective selectivity curve on usb

transceivers currently available. Note the inverted noise spectrum close-in which is also mirrored in the transmitter noise spectrum. This is a classic symptom of poor synthesizer loop design. Although no measurements were made, the performance on 144MHz appeared to be far worse than at hf.

Blocking

The front-end blocking performance is good. Due to the action of front-end agc, the blocking performance improved with higher on-tune signal levels. It was not possible to measure close-in blocking due to the overiding effects of reciprocal mixing.

Third order intermodulation

The input intercept and dynamic range with signals outside the first i.f filter is very good with the preamplifier switched out. However, the preamplifier noticeably degraded performance, particularly at the lower frequencies. The close-in intermodulation performance degraded severely as with all up-conversion receivers. However, there are a number of receivers around now with substantially better performance. The in-band linearity assessed with 200Hz signal spacings is a big improvement over the FT757GX.

Transmitter measurements

Spurious outputs

Measurements were made with the atu switched out. The harmonic output is reasonable, although a little high on 144MHz. The general level and number of other spurious outputs is rather high, particularly on the higher frequencies. Of particular note is a pair of sidebands which appears at ± 10kHz at a level between 40 and 50dB down on the main signal whenever the frequency is set to 19, 21, 69 or 71kHz repeating every 100kHz throughout the tuning range of the transceiver. These also give spurious receive frequencies. On 144MHz there are additional frequencies which generate such sidebands at levels as high as – 32dB as shown in Fig 2.

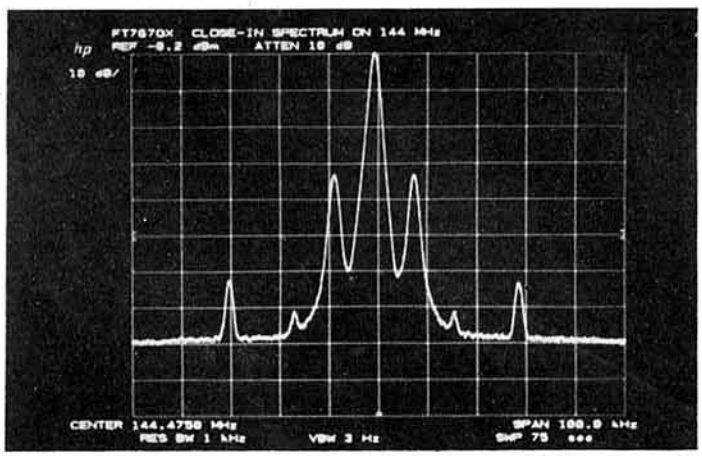


Fig 2. Close-in spectrum on 144MHz. Vertical scale 10dB/division. Horizontal scale 10kHz/division

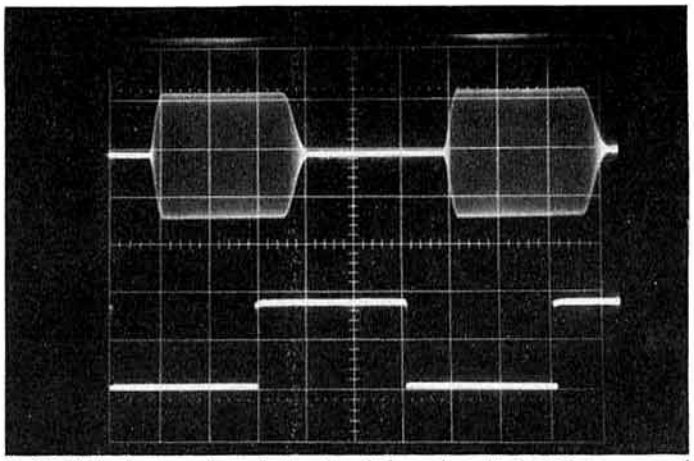


Fig 3. CW keying waveform (bottom) and rf envelope (top) at 40wpm normal mode. Horizontal scale 10ms/division

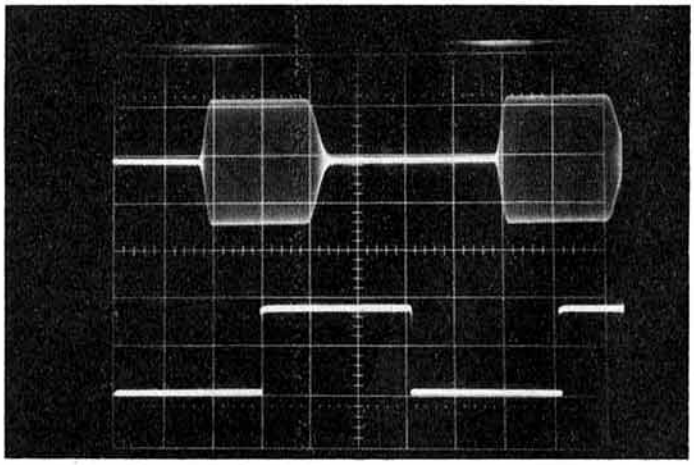


Fig 4. CW keying waveform (bottom) and rf envelope (top) at 40wpm full break-in mode. Horizontal scale 10ms/division

SSB distortion

Third- and fifth-order intermodulation products on the hf bands were very low, particularly on the lower bands. The 144MHz performance was not so good. Intermodulation products at ± 10kHz were – 60dB and at ± 20kHz were – 80dB. The speech processor introduced additional in-band distortion products.

CW keying performance

Figs 3 and 4 show the cw keying waveforms using external keying at 40wpm. Fig 3 is for normal operation and Fig 4 for full break-in. These are a big improvement on the FT757GX. Rise and fall times are a little sharp. There is negligible distortion for normal operation but some character shortening results with full break-in at this speed. The internal keyer gave similar results.

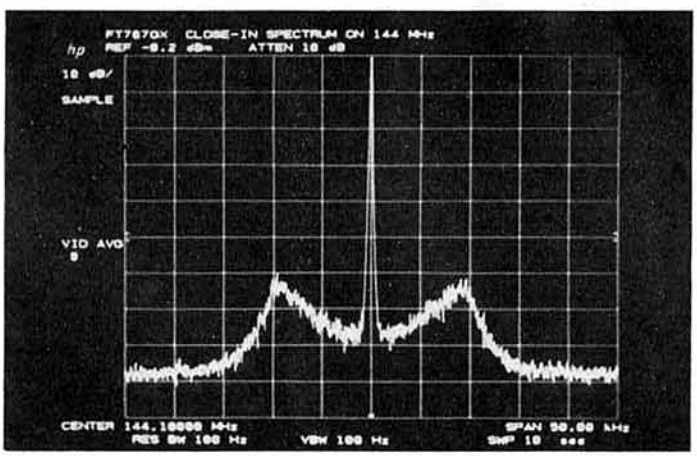


Fig 5. Transmitter noise sidebands on 144MHz. Vertical scale 10dB/division. Horizontal scale 5kHz/division

Power meter accuracy

The built-in digital power meter was accurate to within 10 per cent between 50 and 100W. At lower power levels the meter became progressively less accurate, reading 5–6W on a 10W carrier. On two-tone waveforms, the meter indicated about 20 per cent low at 100W output. The power meter was less accurate on 144MHz, and on that band could indicate vswrs up to 3:1 on a good quality 50Ω load.

Transmitter noise output

This was measured at 21·4MHz. Rather high close-in levels were measured with an inverted noise spectrum, as reported for the receiver reciprocal mixing measurement. The noise output on 144MHz was particularly high and is shown in Fig 5.

Operation into mismatched loads

The power levels obtained into 2:1 and 3:1 vswrs were all measured with the auto-atu switched out and at 28MHz. At 2:1 vswr, the auto-atu could restore the output power to above 80W, but occasionally would get it completely wrong and deliver about 40W. At 3:1 vswr, there were many situations when it would fail to produce a match.

Low-level rf output

In order to use the low-level rf output to drive external transverters or amplifiers, it is necessary to disable the internal pa. This is not possible via the connectors provided on the rear panel, although this is done internally when the vhf/uhf modules are selected. It is necessary to access the pa control line and route to the rear panel if it is required to use the low level rf output for purposes other than straight monitoring. This is an omission on the part of Yaesu. The measurements shown were made with the pa enabled and delivering power into a separate load. Yaesu have since proposed a modification to SMC Ltd to disable the pa when the RX ANT switch is in the external position.

YAESU MUSEN FT767GX MEASURED PERFORMANCE

RECEIVER MEASUREMENTS

Frequency	Sensitivity on ssb for 10dB S+N:N Preamp in	Preamp out	Input for S9 Preamp in	Preamp out	Image rejection	45·03MHz i.f rejection
1·8MHz	0·11μV (–126dBm)	0·35μV (–116dBm)	11μV	35μV	75dB	72dB
3·5MHz	0·1μV (–127dBm)	0·32μV (–117dBm)	8μV	32μV	83dB	75dB
7MHz	0·1μV (–127dBm)	0·32μV (–117dBm)	10μV	35μV	83dB	74dB
10MHz	0·13μV (–125dBm)	0·45μV (–114dBm)	16μV	50μV	85dB	72dB
14MHz	0·11μV (–126dBm)	0·35μV (–116dBm)	16μV	35μV	87dB	75dB
18MHz	0·11μV (–126dBm)	0·32μV (–117dBm)	18μV	35μV	93dB	80dB
21MHz	0·16μV (–123dBm)	0·4 μV (–115dBm)	20μV	40μV	88dB	77dB
24MHz	0·16μV (–123dBm)	0·45μV (–114dBm)	32μV	50μV	85dB	84dB
28MHz	0·13μV (–125dBm)	0·35μV (–116dBm)	25μV	40μV	86dB	87dB
144MHz	0·11μV (–126dBm)		7μV		75dB	90dB

AM sensitivity: 0·22μV for 10dB s+n:n 30% mod depth **FM sensitivity:** 0·2μV for 12dB SINAD 3kHz pk deviation

Tone spacing (7MHz band)	Third-order intercept	Two-tone dynamic range
5kHz	–48dBm	59dB
10kHz	–40dBm	65dB
25kHz	–5·5dBm	88dB
50kHz	–4dBm	89dB
100kHz	–3dBm	89·5dB

Frequency (50kHz tone spacing)	Third-order intercept Preamp in	Preamp out	Two-tone dynamic range Preamp in	Preamp out
1·8MHz	–5dBm	+14dBm	87dB	93dB
3·5MHz	–5·5dBm	+16dBm	88dB	95dB
7MHz	–4dBm	+16dBm	89dB	95dB
14MHz	+1dBm	+18dBm	91dB	96dB
21MHz	+2dBm	+16dBm	90dB	94dB
28MHz	+5dBm	+17dBm	93dB	95dB
144MHz	–8dBm		85dB	

Frequency offset	Reciprocal mixing for 3dB noise	TX noise with respect to carrier in 2·5kHz bandwidth
3kHz	72dB	
5kHz	71dB	–68dB
7kHz	70dB	
10kHz	73dB	–69dB
20kHz	85dB	–83dB
50kHz	97dB	–94dB
100kHz	106dB	
200kHz	115dB	

Selectivity response	Bandwidth SSB/CW-W/AM-N	CW-N	AM/FM
–6dB	2·53kHz	540Hz	7·30kHz
–60dB	3·68kHz	1·46kHz	16·5kHz

S-reading 14MHz	Preamp in I/P signal	Rel increase	Preamp out I/P signal	Rel increase
S1	0·8μV		4·5μV	
S3	1·1μV	3dB	5·6μV	2dB
S5	2μV	5dB	7μV	2dB
S7	4μV	6dB	11μV	4dB
S9	16μV	12dB	35μV	10dB
S9+20	200μV	22dB	280μV	18dB
S9+40	2mV	20dB	1·8mV	16dB
S9+60	22mV	21dB	14mV	18dB

AGC threshold: 0·5μV approximately
120dB above threshold for +2·3dB audio output
AGC attack time: 25ms (F) 25ms (M) 25ms (S)
AGC decay time: 0·25-0·5s (F) 0·6-1s (M) 1·5-2·5s (S)
Min signal level for max audio output: 0·18μV
Max audio before clipping: 2·4W into 4Ω at 1% distortion
Blocking at 50kHz offset: Preamp in –6 to +4dBm
Preamp out +10 to +13dBm
Inband linearity: input level <900μV ips <–40dB
input level >1·4mV ips –30dB
Drift: not measured
Dial calibration: within 60Hz at 28MHz

TRANSMITTER MEASUREMENTS

Frequency	CW power output	Harmonics	SSB power output (pep)	Intermodulation products Third order	Fifth order	Spurious outputs
1·8MHz	104W	–56dB	118W	–40dB	–50dB	2 at –40dB
3·5MHz	98W	–59dB	108W	–42dB	–44dB	2 at –40dB, 2 at –70dB
7MHz	96W	–57dB	104W	–42dB	–42dB	2 at –45dB, 4 at –70 to –80dB
10MHz	96W	–56dB	103W	–40dB	–40dB	2 at –48dB, 3 at –70 to –80dB
14MHz	97W	–57dB	100W	–30dB	–42dB	6 to –55dB, 6 at –70 to –80dB
18MHz	98W	–50dB	101W	–32dB	–42dB	2 at –42dB, 10 to –75dB
21MHz	97W	–57dB	104W	–32dB	–42dB	4 at –42dB, several –70 to –80dB
24MHz	100W	–58dB	106W	–36dB	–40dB	4 to –46dB, several –70dB
28MHz	104W	–52dB	108W	–34dB	–34dB	2 at –45dB, several –75dB
144MHz	13W	–45dB	13W	–20dB	–36dB	2 at –33dB, 1 at –60dB

Carrier suppression: –50 to –60dB. **Sideband suppression:** –60dB at 1kHz.
Transmitter noise: See table above.
Transmitter af response –6dB: 400-2,750Hz (lsb) 530-2,950Hz (usb).
Transmitter af distortion: 0·1% at 10mV input.
Microphone input sensitivity: 0·5mV for full output.
Low level rf output: –10dBm cw, –8dBm pep at –40dB ips.
FM peak deviation: 4·4kHz.
T/R switching speed: mute-tx 30ms, tx-mute 12ms, mute-rx 40ms, rx-mute <2ms.
Power into load mismatch: 2:1 vswr 46-96W, 3:1 vswr 20-52W.

Note—All signal input voltages given as pd across antenna terminal. Unless stated otherwise, all measurements on ssb, preamp in. All two-tone transmitter intermodulation products quoted with respect to either originating tone.

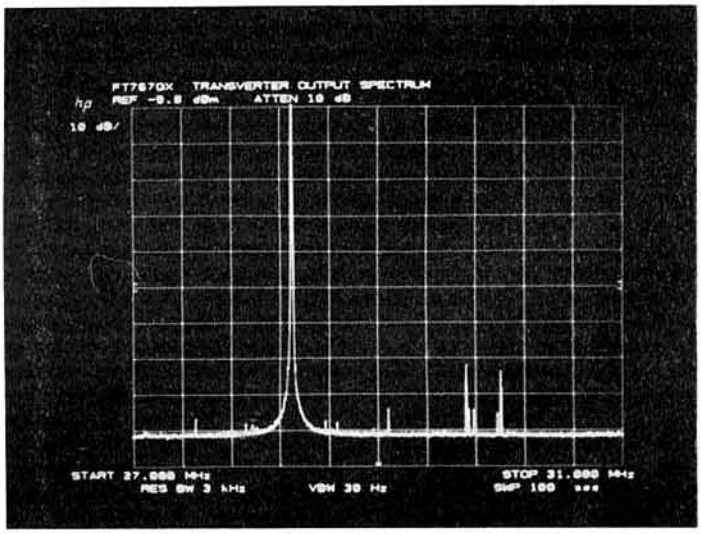


Fig 6. Low-level rf output spectrum on 28MHz. Horizontal span 27 to 31MHz. Vertical scale 10dB/division

Transmit-receive switching speed

The times taken for the receiver and the transmitter to return from the muted to the active condition in ssb mode are both too long for effective Amtor use.

On-the-air performance

This transceiver was used extensively over a period of about two months, including a serious onslaught in the 7MHz CW Contest by G3UFY and in the Commonwealth Contest. Ergonomically the equipment is well thought out and easy to use. It is remarkable how many controls have been squeezed onto the front panel yet they are all easily accessible. The rubber/skirted 50mm diameter tuning knob has an extremely light action and is weighted. Although auto-speedup is not incorporated as in the TS930/940 or IC751A, frequency changes of several hundred kilohertz are effortlessly accomplished at 10kHz per revolution, a big improvement over the FT757GX. However, the very free action of the tuning knob makes it vulnerable to movement.

Programmable step sizes for different modes are very useful. For example, it is possible to set 50kHz steps on ssb for rapid changes in frequency, together with 25kHz steps for 144MHz fm and 9kHz steps for medium wave a.m channelling. The keypad and memory functions are very comprehensive, although I was constantly turning to the manual to remember how to use some of the lesser-used operations. Some of these functions are not implemented conveniently and involve several keystrokes. For example, recalling duplex frequencies from memory for repeater operation. There are 10 memories available, which is not really sufficient for a transceiver covering so many frequency bands. It would have been a good feature to incorporate paged memories, allowing a different bank of memories to be used on each band. The clarifier operates over the entire tuning range of the transceiver. It is easy to forget when it has been left selected, and unwittingly tune to other frequencies or bands only to discover later that the transmitter is still tuned to the original frequency. There is no facility to transfer clarifier frequency to the vfo.

On the quieter bands the receiver generally performed well. On the noisier lower frequency bands, careful use of the attenuator and/or rf preamplifier was required for optimum results. Apart from on 28MHz, use of the rf preamplifier was not often necessary. On lively bands the receiver sounded rather noisy, and this is attributable to the poor reciprocal mixing and degraded close-in intermodulation performance. This was most noticeable on strong local stations. For example, in the Commonwealth Contest, local station G6LX was audible as keyed noise up to 50kHz either side of his transmit frequency. On a Ten-Tec Corsair, the transmission was clean and relatively narrow. Tuning close to strong carriers, the frequency synthesizer exhibited clicks every 100Hz, and on cw the synthesizer had a somewhat unsteady sound to the tuning characteristic. The poor reciprocal mixing on adjacent channels was also plainly observed. The agc attack time was not sufficiently fast, and this could result in distortion on transients and strong ssb. Reducing the rf gain control helped greatly. A longer decay time would also have been preferred. These comments on the synthesizer and agc are very similar to those I made concerning the FT757GX [2]. The audio peaking filter, notch filter, and i.f shift were all very effective. The narrow cw filter offset in frequency by the i.f shift control was particularly useful for copying weak rtty signals. The i.f shift control lacks a centre ident position. The a.m quality on broadcast stations was excellent, a big improvement over many other rigs and the fm quality on 144MHz was also very good.

The transmit performance on ssb was evaluated using the MH-1B8 handheld microphone. The audio quality and intelligibility were good, and the speech processor effective in adding extra punch. Some slight hum was reported by local stations and this was also audible on cw. Local stations also reported key clicks up to a few kilohertz off frequency, and the spurious outputs and adjacent noise emissions described in the measurements were also audible. CW break-in operated effectively at quite high speeds and the sidetone sounded excellent. The fully-adjustable sidetone level and adjustable pitch were also excellent features. The internal keyer operated well, with a speed range of about 10 to 40wpm.

Although, according to the manual, the equipment is rated for 30min at full output, the heatsink on the top of the case would become very hot during an extended session of cw contest operation. There were no other signs of distress.

In order to control an external linear or other items via a ground on transmit line, internal switch S2002 must be in the "on" position. This is mentioned in the manual, but it fails to describe where to locate it. The equipment was delivered from the suppliers with this switch in the "off" position. After removing the bottom cover, a little detective work located S2002 on the rf board immediately in front of the PO ADJ rear panel control.

The mode labelled FSK is in reality lsb with the passband shifted to encompass the high rtty tones used outside Europe. Audio input tones are applied via the PATCH IN socket which is in parallel with the microphone. The microphone should be removed on rtty to avoid spurious modulation noises. Note that by using lsb, the tones are inverted according to the international standard.

The auto-atu functioned effectively and took between 1s and 10s to tune. Although during bench measurements it was found possible to confuse the atu, no problems were experienced in matching the reviewer's antennas.

Conclusions

Undoubtedly the chief attraction of this transceiver is the ability to combine in one unit a complete hf/vhf/uhf multimode station, a general coverage receiver and a host of supporting features. There are no serious compromises in this approach. At the flick of a few switches it is possible to jump, for example, between ssb on 3·5MHz, repeaters on 144MHz, rtty on 14MHz, packet radio on 432MHz etc. To the average user the performance will be entirely satisfactory and the facilities most impressive. However, for the serious dx and contest enthusiast, the poor performance of the frequency synthesizer in terms of noise and spurious outputs will be most apparent when attempting to work weak dx in the presence of strong competition. Frequency synthesizer spectral purity is an area where substantial performance improvements have been made in recent years, largely by manufacturers other than Yaesu. It is an area which Yaesu needs to seriously address. Another parameter which becomes important for serious dx working is close-in dynamic range. In this respect the dynamic range and gain balancing of the circuitry associated with the second mixer is most important. There is considerable margin for improvement in this area with this transceiver. The front-end dynamic range, however, is very good, particularly with the preamplifier switched out. The level of spurious transmitter products is excessively high. This reflects directly on the frequency synthesizer.

The basic price of the FT767GX is around £1,550, with the 50 and 144MHz modules an additional £169 each. The 432MHz module is priced at £215. These prices include VAT and were current in April 1987.

Acknowledgements

I would like to thank G3UFY for critical comments, and South Midlands Communications Ltd for the loan of the equipment.

References

[1] "The Yaesu Musen FT980 hf transceiver", P J Hart, G3SJX. *Rad Com* September 1984, pp761-5.

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[3] "The Icom IC720A hf transceiver", P J Hart, G3SJX. *Rad Com* February 1982, pp129-33.

[4] "The Yaesu Musen FT102 hf transceiver", P J Hart, G3SJX. *Rad Com* January 1983, pp32-36.

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Technical Topics

by Pat Hawker, G3VA

A RECENT international conference on antennas and propagation (ICAP87, IEE Conference Book No 274) included a noteworthy paper by Prof A D Olver (Queen Mary College, University of London) on "A century of antenna development", reminding us that it is now 100 years since Heinrich Hertz began a series of experiments to verify the existence of the electromagnetic waves which had been postulated by the Scot James Clerk Maxwell. This brilliant mathematician predicted that all changes in electric and magnetic fields cause waves to be propagated in space and that visible light is just one form of such electromagnetic waves. Maxwell published his ideas in 1862, although what are now known as the basic Maxwell Equations are the later simplified versions of Hertz and Oliver Heaviside.

Hertz's early experiments involved generating radio waves at vhf and uhf and, as the paper notes, the early "microwave-optics period" that came between the work of Hertz and Marconi included the development of the first microwave horn antennas (then called "collecting funnels") by the Indian scientist Bose, in Calcutta, working at frequencies up to 60GHz with a laboratory bench set up. In Russia, Professor Popoff, for his work on detecting lightning discharges, was the first to use elevated wire antennas at low frequencies (1896 publication). Marconi was quick to adopt the idea (or possibly arrived independently at the same conclusions) for his pioneering work on exploiting the use of Hertzian electromagnetic waves for practical communications. By 1899 he was commenting on the need for high antennas when he claimed that "the distance over which it was possible to signal with a given amount of energy varies approximately with the square of the height of the vertical wire and with the square root of the capacity of the plate, drum or other form of capacity area which may be placed at the top of the wire".

In his paper, Dr Olver pays tribute to the role of radio amateurs and the Wireless Society of London (which became the RSGB in 1922) pointing out that "no story of the development of antennas would be complete without an acknowledgement to the considerable contribution which has been made in the practical development of antennas by amateurs".

For 100 years, antennas have remained the key to progress in radio communications. In recent years the computer has had an enormous impact on design theory although virtually all the basic designs stem from pre-computer days. In professional design, as Dr Olvey shows, a major advance has stemmed from the "Moment Method" using computers that enable the current distribution in small antennas to be predicted with much better accuracy than was practicable in the years bc (before computers). But it is worth stressing that the validity of the results obtained from computer calculations depends on both the quality of the software "modelling" and the quality of the information fed to the machine. Given half-a-chance, a computer will respond to slipshod work with silly and misleading answers; by no means all of the published computer predictions of antenna parameters stand up to the cold light of practical application.

Yet, as Dr Ambrose Fleming put it in 1909, and quoted in 1987 by Dr Olver: "The antenna is, so to speak, the mouth or ear of the (radio) station, by which it speaks through the ether, or by which it hears the etherial whispers coming from other stations."

Antenna basics

In compiling *TT*, in order to provide members with information that will be fresh and interesting to the majority, it is necessary to assume that most readers will already have absorbed and understood the basics of established technology, either as the result of studying for the RAE or (more importantly) as part of their practical activities, using the basic handbooks and manuals such as the long-established *A Guide to Amateur Radio*. It would be tedious in the extreme if every *TT* item had to be based on the idea that readers had little or no practical or theoretical knowledge of radio communication engineering!

However, one becomes increasingly aware that the practice of absorbing technical information from books appears to have declined, possibly due to the pervasive influence of other media; including television, which in general does not lend itself to serious study unless accompanied by note-taking, revision and practical projects. The value of amateur radio as an enjoyable form of self-training has always pre-supposed the combination of book-study with do-it-yourself projects.

Antennas and transmission lines are prime examples of areas of radio technology where some knowledge of fundamentals beyond that required for the RAE is necessary. AC theory has never been a requirement of the RAE, yet some understanding of terms such as reactance, impedance, radiation resistance etc is vital to understanding antennas. So this month we include a very brief rundown on just a few of the basic terms that so often seem to give rise to misunderstandings. If you find such definitions tough going, this may be an indication that you need to refer back to one of the established handbooks. Familiarity with these terms is essential to understanding articles on antennas at other than the most elementary level.

Radiation

Energy is conveyed away from a conductor carrying a periodically varying current by means of the electromagnetic field which is set up in the surrounding space. This field has two components: an electric wave with vectors in the same plane as the conductor; and a magnetic wave having vectors at right-angles to the electric wave. Both sets of vectors are perpendicular to the direction in which the energy travels.

If two conductors are placed close together and carry equal "go and return" currents, the electric and magnetic fields are cancelled at all distant points by the fields due to the reverse current in the other conductor. Thus no energy is conveyed away (radiated) from the pair which constitute a transmission line; all the energy remains in the electric and magnetic fields in the space between the conductors. But if the conductors are moved apart and placed end-to-end the fields no longer cancel at distant points in space. Energy is conveyed out of the conductors by the electric and magnetic fields; and these two fields form the electromagnetic field.

When the conductors are in series or parallel resonance at the frequency of the generator—that is, of an electrical length one-half of c/f (where c is the velocity of propagation of electromagnetic waves, and f is the frequency of the generator, so that c/f is the wavelength), a standing wave of current is set up on the conductors. In these circumstances, the input impedance is purely resistive, and all the input power, apart from any rf ohmic losses, is radiated. In the series resonant form the magnitude of this resistance is called the *radiation resistance*, or perhaps more correctly as "the radiation resistance referred to the loop current I_o" so that: R_r equals P/I_o^2 where the term I_o is the maximum value of the standing wave of current on the conductors and R_r is assumed to be located at the point where I_o is flowing. Two conductors in series resonance form what is termed a "half-wave dipole". This is the fundamental form of resonant antenna comprising a single conductor with an electrical length equal to half the wavelength of the working field.

Radiation intensity

The power per unit area in the field of an antenna is termed the power density. If this power density is multiplied by the square of the radial distance from the antenna, the product is the power per unit solid angle, and is called the **radiation intensity.**

Free space fields

In the equatorial plane of a half-wave dipole, the field in free space is $7{\cdot}02\sqrt{(P)}/d$ V/m, where P is the transmitted power in watts out of the dipole and d is the distance in metres. With an output of 1,000W (1kW) the field is $222/d$ V/m.

Polarization

The polarization of an electromagnetic wave is defined in relation to the electric field; thus a vertically-polarized antenna is one that radiates a vertical electric field, and a horizontal magnetic field. A vertically-polarized wave will be radiated when a generator is connected between a vertical wire and earth, in which case the field strength of the wave will be due to the combined effects of the wire and its image in the surface of the ground (earth) plane. Antennas with either vertical or horizontal polarization, or at some angle between, are termed **linearly-polarized antennas**. If the antenna responds to two orthogonal field components (ie components at 90° to each other) having time phase between these components, the antenna is termed elliptically polarized. In the one particular case where the magnitudes of the two orthogonal components are equal and the phase angle is ±90°, the antenna is said to be **circularly polarized.**

Reciprocity

In reference to antennas, the term reciprocity means that the directivity and characteristics of an antenna are the same for receiving as for transmitting.

Gain

The gain of an antenna is the ratio of power required at the input of a reference antenna to the input of the given antenna needed to produce, in a given direction, the same field at the same distance. It is usually given in the

logarithmic representation in decibels (dB). Basically the gain equals (maximum radiation intensity)/(maximum radiation intensity from a reference antenna with the same power input). Normally such gain is along the main lobe of radiation. It should be noted that the gain of an antenna may be specified in decibels with reference to an isotropic antenna (dBi), or to a half-wave loss-free dipole isolated in space and the equatorial plane of which contains the given direction (dBd), or to a perfect vertical antenna, much shorter than λ/4 placed on the surface of a perfectly conducting earthplane (dBv).

Isotropic radiator
An imaginary (hypothetical) antenna which is assumed to radiate equally in all directions. Compared with an isotropic antenna, a half-wave dipole has a gain of 1·64 times (2·15dBi); an elementary dipole (an imaginary point source much shorter than a half-wave dipole) has a gain of 1·5 times (1·76dBi); a short vertical has a gain of three times (4·76dBi); a quarter-wave monopole has a gain of 3·28 times (5·15dBi): see Table 1.

Effective radiated power (erp)
This is the power supplied to the antenna multiplied by the relative gain of the antenna in a given direction. For "omnidirectional" vertical antennas the more common term is ermp (effective rdiated monopole radiated power). The term eirp (effective isotropic radiated power) is also used.

Beamwidth
The beamwidth of a directional antenna is generally specified as the angle subtended by the major lobe between the points at which the power has fallen to one-half of its peak value. At these points, field intensity is 0·707 (−3dB) of its maximum value.

Array
A group of radiating elements spaced some distance apart and with the current in each element having a particular amplitude and phase is termed an array. An array of several dipole elements will, in some direction, produce a maximum field strength *K* times that of a single dipole carrying the same current at its centre as each dipole in the array. The term *K* is used to denote the array factor.

Front-to-back ratio
The ratio of power radiated in the forward direction of an antenna to that radiated in the opposite direction.

Endfire antenna
An endfire source has maximum radiation along the linear axis; a representive endfire array is the Yagi-Uda antenna.

Broadside array
A broadside source has maximum radiation normal to its axis. A representative broadside array is the horizontal array of dipoles as used for hf broadcasting or, say, a colinear array of dipoles.

Driven element
An element which is connected to the transmitter/receiver via a transmission line. A driven array is one in which all the elements are driven elements.

Parasitic element
An element which is not connected directly to the transmitter/receiver via a transmission line, but receives its energy by the coupling due to the proximity of other elements. In any parasitic array (eg Yagi-Uda antenna) there will be one or more parasitic elements, but at least one element must be a driven element.

Radiation resistance
An antenna has distributed inductance, capacitance and resistance. When the inductance is very much greater than resistance per unit length, the current along the radiation portion varies sinusoidally and the radiation resistance is considered as lumped at the position of maximum current. Where an antenna is less than λ/4, radiation resistance is considered as being located at the feedpoint. For a resonant half-wave dipole, the radiation resistance is at the centrepoint, and since it is purely resistive it is *in this case* the same as the antenna input impedance and feedpoint impedance. In free space the radiation resistance of a half-wave dipole is approximately 73Ω, neglecting losses and assuming that the dipole length is infinitely greater than its width. In these circumstances radiated power equals the square of the feed current times the radiation resistance.

In practice the centrepoint impedance of a half-wave dipole will be affected by its height above earth, being roughly 73Ω at λ/4, λ/2 and 3λ/4 etc, but rising to about 100Ω at 3·5λ/10 and falling to about 60Ω at 6·7λ/10. The presence of additional parasitic or driven elements will tend to reduce the impedance significantly; a reflector placed 1·5λ/10 behind a dipole will reduce its impedance to roughly 25Ω; a three-element close-spaced Yagi array may have a feedpoint impedance of only about 10Ω. The impedance of points equidistant on either side of the centrepoint of a dipole rises with the electrical distance from the centre and, theoretically, at the ends would be infinity; in practice, the ends may have resistive impedance of the order of 2,000 to 5,000Ω, the actual value depending on the losses.

In non-resonant antennas, the input impedance is the vector sum of the effective radiation resistance and the resultant reactance. $Z = \sqrt{(R^2 + X^2)}$, where *R* is the effective radiation resistance (ie, radiation resistance plus loss resistance) and *X* is the resultant reactance (ie, the difference between the inductive and capacitive reactances).

Bandwidth
The current taken by a resonant antenna, and hence the radiation, falls off as the frequency is varied away from resonance. There will be two frequencies, one above and one below resonance, at which the power will be reduced by half. The difference between these frequencies is termed the **bandwidth** of the antenna. For example, a half-wave dipole having a length/diameter ratio of 10,000 will have a bandwidth, expressed as a percentage of the resonant frequency, of the order of eight per cent. With a length/diameter ratio of 100 this increases to about 15 per cent. Bandwidth of multi-element Yagi arrays may well be less than five per cent, unless the designer has taken steps to increase this figure.

Folded dipole
A dipole antenna may be made in the form of one or more narrow loops so that, although the overall length is still an electrical half-wave, the antenna current flows through two or more paths. If the conductors are identical, equal and in-phase currents will flow, and the total radiation will be the same as from a simple dipole. But since the currents have been divided equally between the two conductors, the centre feedpoint impedance will be four times as great although the radiation resistance remains the same; thus 4 × 73Ω, nominally taken as 300Ω. As the number of wires in which the current flows increases, the feedpoint impedance increases by the square of the number.

Thus a two-wire folded dipole has four times, a three-wire dipole nine times, and a four-wire dipole 16 times the feedpoint impedance of the single wire dipole. This assumes that the currents divide equally between the wires; in practice a wide range of impedance transformations can be obtained by varying the ratio of diameters and spacings. For example, in practice a two-wire folded dipole using different diameter conductors may have a feedpoint impedance from roughly 2 to 12 times that of the single-wire dipole. It is thus possible to arrange for, say, a multi-element Yagi array with a folded driven element to match accurately a 52Ω coaxial or, preferably, a balanced transmission line.

An important characteristic of the folded dipole is that it will have a bandwidth significantly greater than that of a simple dipole.

Table 1. Maximum (theoretical) gains of lossless basic antennas

Type	Location	Max gain (dBi)	Max gain (dBd)	Direction of max gain
λ/2 dipole	Free space	2·15	0	Plane perpendicular to axis
λ/4 vertical monopole	Over perfect ground	5·15	3	On horizon
λ/2 vertical dipole	Centre λ/2 above perfect ground	8·2	6.05	On horizon
λ/2 horizontal dipole	Immediately above perfect ground	9·1	6.95	Straight up
λ/2 horizontal dipole	λ/4 above perfect ground	7·4	5.25	Straight up
λ/2 horizontal dipole	λ/2 above perfect ground	8·2	6.05	Plane perpendicular to axis, 30° above horizontal
λ/2 horizontal dipole	3λ/5 above perfect ground	9·2	7.05	Plane perpendicular to axis, 24·6° above horizontal

(Adapted from *HF Communications Data Book*, Rockwell-Collins)

Notes. In practice, the gain and direction of maximum gain of vertical antennas are affected very much more by ground losses than are horizontal antennas. A power gain of about 5 to 6dBd is usually the most that can be achieved in practice with an hf three-element close-spaced Yagi beam (theoretical 7·5 to 8·5dBd). About 4 to 5dBd (theoretical maximum 5·2dBd) can, with care, be obtained from two elements. Better overall results may often be achieved by raising a (lightweight) two-element Yagi than by increasing the number of elements at a lower height. Field strengths over a long, low-angle path when compared to an antenna at λ/5 height are roughly × 2 at 2λ/5, × 3 at 3λ/5, × 4 at 4λ/5 and × 5 at 1λ. 1λ loops give roughly a 1dB gain over dipole elements (ie gain of two-el quad can be up to about 6dBd). At vhf, height gain in the range 3 to 10m can amount to about 5·5 to 6·5dB for each doubling of the height in rural areas, 8 to 9dB in urban areas on paths up to 50km, and about half these gains for distances exceeding 100km (source ICAP87). +1dB = × 1·4 the power, +3dB = × 2, +4dB = 2·5, 5dB = × 3·2, 6dB = × 4, 7dB = × 5, 8dB = × 6·3, 9dB = × 7·9, and 10dB = × 10.

The folded dipole and monopole

The notes above underline the very useful features of using folded elements, though this form of antenna seems to be less commonly used than a few decades ago. Like so many other important developments, the folded dipole came from the fertile brain of Dr John D Kraus, W8JK, whose work has spanned and influenced both professional and amateur radio communications over several decades.

The folded dipole provides roughly twice the bandwidth and, for a given weight of copper, only half the rf ohmic losses of a single-wire dipole. Multi-wire dipoles are, in effect, narrow loop elements and can be implemented with an overall span of λ/2 or alternatively 3λ/4 or 3λ/8 as shown in Fig 1. In each case the antenna current flows through two or more paths, and the nominal feedpoint impedance shown is that for equal wire

conductors. A remote high-voltage switch can be used to provide a two-band antenna: Fig 2.

As noted below, recent interest has been centred on folded monopoles but, before reporting this work, it may be worth drawing attention to a

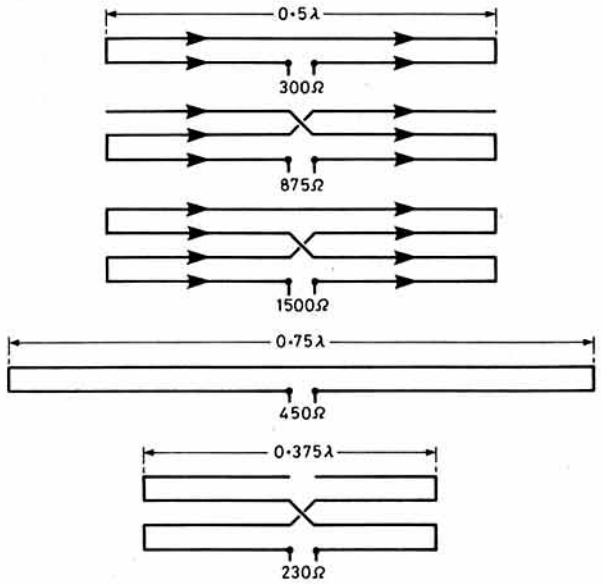


Fig 1. Basic folded twin and multi-wire dipole antennas showing nominal feedpoint impedances (resistive) when used as a single element with equal-diameter wires forming the folded elements

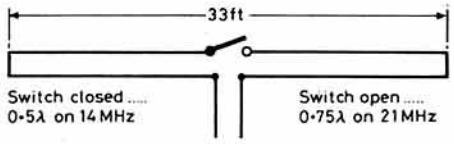


Fig 2. Two-band folded dipole for 14 and 21MHz. Could be scaled for 21/28MHz operation. Best used with open-wire transmission line and atu to accommodate feedpoint impedances of about 300Ω on 14MHz and about 450Ω on 21MHz

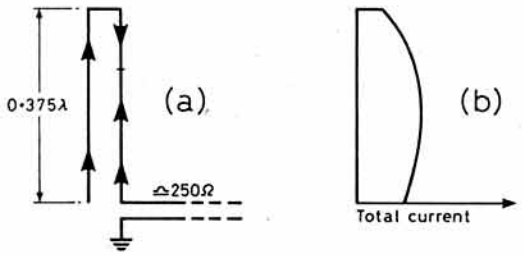


Fig 3. The 3λ/8 vertical folded antenna working against earth. Feed impedance about 250Ω. Current distribution is similar to that of a vertical top-loaded single-conductor antenna

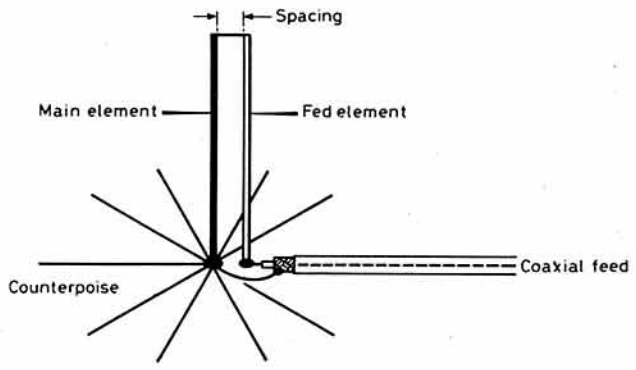


Fig 4. Form of the folded monopole antennas thoroughly investigated by K8CFU and his team. A selection of just six of the 13 variations used on 14MHz is listed in Table 2. Similar exhaustive investigations were carried out on all pre-WARC hf bands from 1·8 to 28MHz. The final detailed report has not yet been published.

Table 2—Provisional dimensions for 14·2MHz folded monopole as in Fig 4

Base impedance	Height of elements	Main element diameter	Fed element diameter	Spacing
50Ω	15·1ft	0·25in	1·75in	3·0in
			2·75in	4·0in
			4·0in	6·0in
75Ω	15·1ft	0·25in	1·25in	14·25in
			1·75in	16·25in
			2·75in	22·5in

relatively little-known 3λ/8 vertical folded antenna working against ground. Fig 3 shows this arrangement together with the total current distribution (vector sum of currents in both wires). The terminal feedpoint impedance is about 250Ω. As W8JK puts it in *Electronics Manual for Radio Engineers:* "An interesting property of this antenna is that due to the multi-wire construction, a current distribution is produced which is similar to that of a vertical top-loaded single-conductor antenna." It can also be assumed that the higher feedpoint impedance, not at the current node, means that earth losses would be less than for a conventional vertical monopole.

Quarter-wave folded monopoles

Arch Doty, K8CFU, a retired professional engineer, recently kindly sent me a long, detailed report of an extensive study made by himself; John Frey, W3ESU; and Harry Mills, K4HU, and with an input from Dr George Brown, made during 1985-6. This covers the characteristics of λ/4 folded monopole antennas used in conjunction with a 64-radial counterpoise (Fig 4). This work followed on previous investigations into the use of counterpoise and ground-screen "artificial ground" systems as originally reported in *TT* (February 1983).

The final report runs to some 48 pages and includes suggested dimensions of 50Ω and 75Ω folded-monopole antennas for the 1·8, 3·5, 7, 14, 21 and 28MHz bands (the 1·8MHz monopole calls for elements up to 115ft high!) The feedpoint impedance, by using different diameter elements, is designed to match directly into 50Ω and 75Ω coaxial cables without any requirement for an antenna tuning unit. An unexpected, but potentially important, finding was the discovery of the existence of "capacitance bottom loading".

As with the counterpoise study (which involved making some 20,000 measurements) this new study has involved taking thousands of measurements. The detailed report is not intended for publication and has resulted in a patent for land mobile antennas based on these principles. While K8CFU sent his report to prove that not all of the older amateurs are afflicted with neophobia (*TT* March 1987), I have abstracted (Table 2) just a tiny part of the massive amount of data collected by K8CFU.

It is interesting to note that early on in this investigation, the three doughty experimenters (whose combined ages come to 215 years) found that the base impedance of a groundplane monopole is much lower than the oft-published figure of 35Ω. It may be recalled that attention was drawn to this point by G6CJ in *TT* where it was shown that 19 to 21Ω is a typical range, with a few raised horizontal radials. The American team measured the base resistance of λ/4 vertical antennas over a 64-radial counterpoise at between 21 and 33·5Ω, the value decreasing with larger-diameter unipole elements.

Folded normal-mode helix vertical

Iain Morris, ZC4IM, has been using some limited spare time to investigate a novel form of folded monopole that shows considerable promise, though it still calls for the type of thorough investigation undertaken by K8CFU and his team of "Old men of the mountains". ZC4IM writes:

"I have been playing about with an antenna idea which looks very promising but I am being beaten by the fact that I have to work! I wonder if those with the time and/or test equipment could take it a stage or two further.

"It concerns the normal-mode helix short elements which, as noted in the April *TT*, have a lot of potential. They also have at least three disadvantages. The first two, restricted bandwidth and low radiation resistance, are common to all loaded antennas. The third, and the reason why the helix element has never really taken off, is the pain and strain of winding the beast, particularly if you want a tapered pitch. That's my opinion, anyway.

"One way of raising the radiation resistance of an antenna is to fold it. But a folded helix sounds as though it would be even more strain and pain to wind. That was my reaction, too, when the idea first crossed my mind. My limited technical library did not mention such a process. So, I folded a vertical helix with four radials and tuned it for 28·5MHz. The reflectometer revealed that not much power was being reflected when fed with 75Ω coaxial cable. The bandwidth between the 2:1 vswr points was

400kHz. Drooping the radials raised the vswr so they were left horizontal. A Chinese copy was made and installed at ZC4AB, the local 28MHz expert. His pet HB9CV antenna had obviously suffered during the winter, and signal reports on the folded helix were about two S-points up. The HB9CV was given a good going over and then showed about an S-point-and-a-bit up on the vertical helix; the trial continues.

"The fuss was taken out of winding the helix elements by using 300Ω ribbon shorted at the top. Just over a λ/2 of ribbon was wound single-spaced by using two lengths of ribbon and then taking one away. The former was a plastic water pipe (32·5mm pvc) and the ribbon was anchored using pvc tape. In the tuning process one of the good points of this format showed itself. Naturally enough, in pruning the ribbon I took a little too much off. It was easy just to uncoil a little of the helix and this put matters right. In fact *The ARRL Handbook* recommends a linear portion at the end to lower the *Q*. The size reduction factor was 0·4 using single spacing.

"The system clearly works. But there are at least two avenues to be explored. The first is the use of this principle for shortened verticals for the lower hf bands. At 7 and 3·5MHz, there should be an increase in radiation efficiency as it would put more power into the antenna and less into the earth resistance. A 7MHz groundplane antenna would be only about 13ft in height. It would be nice to raise this into more-open space, although the 28MHz prototype clearly did not like drooped radials so they must remain horizontal. This is a limitation because, while the radiator has shrunk, the radials remain full size. The next step might be the use of a single radial folded back on itself in a circle. (Or possibly the G6XN form of inductance and capacitively loaded counterpoise?—*G3VA*.) The radius of such a circle would be close to 1/16th wavelength and such a compact radial could probably be mounted above head height, allowing the lawn to be mowed and stopping anyone from coming into contact with points at high rf. With ribbon helix elements one might need to think of the current capabilities of the ribbon, but since the current would be shared they would be lower than the traditional loaded vertical. Certainly there was no sign of ZC4AB's antenna melting.

"The other use for such helix-wound elements might be for shortened beams, which is how this project started. Believe it or not, I was looking for a beam that would have no forward gain (I am a confirmed 1W QRP man with 90 countries worked) but a good front-to-back ratio. A folded helical dipole works and gives me the required 'no-radiation-off-the-ends and no-real-directivity-anywhere-else' characteristics so I never progressed to an array. I can now work Africa and Japan without attracting the attention of large numbers of strong-signal European stations!

"There are still a number of questions. Can the turns be touching? Could I run two or three different-length ribbons in parallel, just like the old three vertical wires taped to one bamboo? I have a modern version of this on the aforementioned pvc pipe on top of a lightweight aluminium mast and it works a treat. If such a three-band vertical was erected at any height, the horizontal radial system might be three concentric circles. Variation of radiation resistance with spacing and/or diameter could do with looking at. There's plenty of scope for further experimentation. But if I go down in history as the man who folded the helix (rather than squaring the circle) I will try not to let it go to my head!"

Anyone with queries or results could write to Major J Morris, ZC4IM, c/o the ZC4 QSL Bureau.

Simple nanofarad meter

If an instrument for measuring resistance is called an ohmmeter it would seem logical to call a "capacitance meter" a picofarad or nanofarad meter. It's just a thought that comes from seeing the description by Gabriel Rivat, F6DQM (*Radio-REF* April 1987, pp32,34) of a simple analogue capacitance meter capable of measuring, at least roughly, all those unmarked or indecipherable capacitors with values from about 2·5pF to 3μF. F6DQM points out that the high accuracy provided by expensive digital capacitance meters is seldom required in practice. His unit (Fig 5) is based on a design that appeared in *Ham Radio* (March 1980) though I have not been able to check back to compare the two designs.

His unit comprises two 555 ic devices, IC1 forming an astable multivibrator running at about 1kHz, while IC2 is a triggered monostable whereby the mark/space ratio and hence the average height of the pulse train is varied to suit the capacitance range required. In effect, the principle consists of measuring the average voltage of a train of pulses of fixed frequency where the average height of the pulse is a function of the unknown capacitor connected across X. For such a measurement to be possible the monostable pulse height must always remain less than the rate at which the monostable is triggered, if I have correctly understood the French text.

Because F6DQM used a 1mA fsd meter calibrated 0 to 30, he made his ranges suit. However, he provides alternative component values for a more typical 0 to 1 calibration.

PIN diode rf attenuator

The use of an rf attenuator in front of any receiver having limited dynamic range has become established practice. This can vary from the simple ganged-potentiometers as used for the two-valve regenerative-detector receiver, *TT* April 1987, to quite elaborate arrangements. There are also now many transceivers in which the signal-frequency amplifier can be switched out to reduce the signal applied to the front-end mixer.

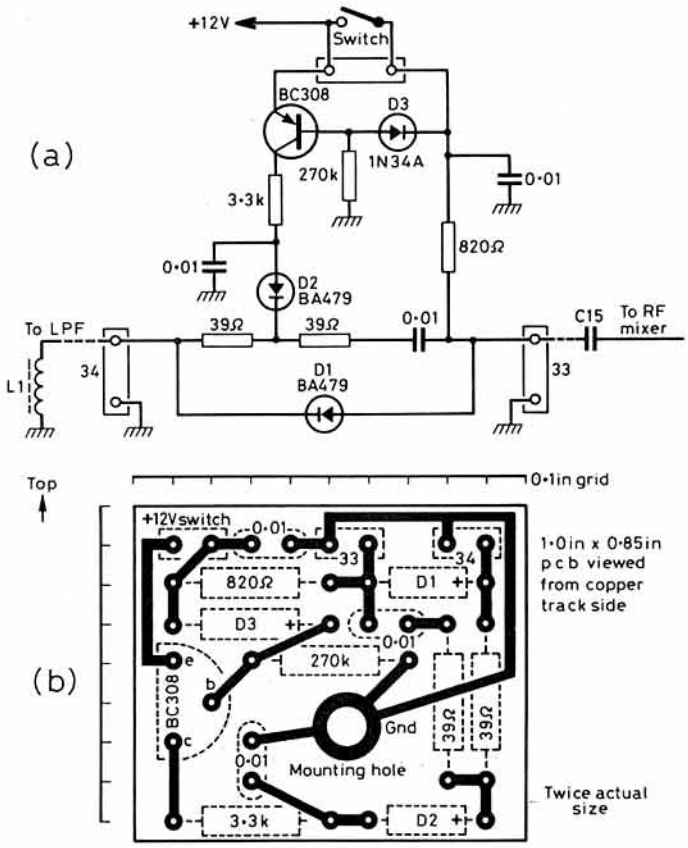
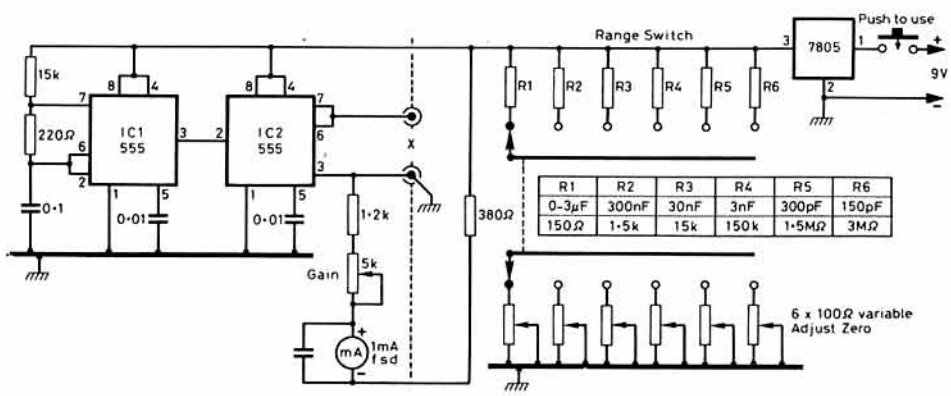


Fig 6. (a) Circuit diagram of the pin-diode attenuator used by G0FAH on his Ten-Tec Argosy rig but suitable for most receivers that are overloaded by strong signals. Designed to avoid the need for permanent modifications of the Argosy. (b) The pcb layout. On the Argosy, L1 is on the lowpass filter board, C15 is on the rf mixer board. Switch is on the af gain control. Mount board with screw through "hole"



R1	R2	R3	R4	R5	R6
0-3μF	300nF	30nF	3nF	300pF	150pF
150Ω	1·5k	15k	150k	1·5MΩ	3MΩ

Fig 5. Simple wide-range capacitance meter described by F6DQM in *Radio-REF*. For ranges of 10μF, 1μF-100pF, R1-6, progresses from 47Ω, 470Ω. . . . .4·7MΩ

Bill Wright, G0FAH, a QRP enthusiast, recently prepared an article for the G-QRP Club magazine *Sprat*, describing a pin diode attenuator arrangement he uses for his Ten-Tec Argosy transceiver but equally applicable to other equipments. He considers the Argosy a very fine transceiver, especially for cw, but finds that the first mixer can be overloaded by the strong signals found at night on 3·5 and 7MHz. He was anxious to use an attenuator that would not require any enclosure drilling for potentiometers or switches. His modification avoids working on the pcb boards or hole drilling, since pin diodes need not be located near the switch that controls the attenuator.

In practice, the existing push-pull switch on the af gain control is used to place a 20dB attenuator between the lpf unit and the rf mixer board. This switch is normally used with the Ten-Tec for power on/off, but for this purpose the switch located on the psu may be used instead, since the two switches are simply wired in series.

Fig 6 shows his circuit arrangement, with two BA479 pin diodes and a BC308 series voltage regulator. Constructional details are given in the *Sprat* article.

Electrostatic discharge can kill cmos

David Hollander, N7RK, in an article "The hidden dangers of electrostatic discharge—esd" (*QST* March 1987), reminds us that one of the major problems plaguing modern electronic components is damage from static electricity, more correctly known as electrostatic discharge or esd. It is important that anyone building or modifying or servicing electronic equipment using mosfets, cmos and similar devices, either in discrete or integrated form, should appreciate that esd can cause not only complete component failure (particularly when the components are not safely wired into equipment) but may also result in performance degradation that is difficult if not impossible to detect without detailed laboratory tests. ESD continues to be a major concern to the semiconductor industry.

N7RK lists a number of ways in which to combat esd:

(1) Use a workbench with an earthed metal top or an earthed sheet of metal as the work surface.
(2) Earth all soldering irons or solder/desolder stations.
(3) Use an earthed wrist strap in contact with the skin.
(4) Place all mos devices on an earthed bench surface *prior* to handling them as you may be electrostatically charged with respect to the bench surface.
(5) Check all power supplies for voltage transients. Connect low-impedance equipment to mos devices only after the equipment is powered up and disconnect before power is turned off.
(6) Never insert or remove a mos device from a circuit with power applied.
(7) Use anti-static bags for storing or transporting assemblies.
(8) Never exceed the device maximum ratings as shown in the data sheet.
(9) Keep the workbench free of objects such as paper, cigarette ash, plastics etc.
(10) Never use brush or spray cleaners to remove flux from a pcb.
(11) Observe all the above precautions when replacing a mos device during repair.

Remember that in low humidity, static electricity up to about 35,000V can be generated just by walking across a carpet; in conditions of high humidity this may still amount to some 1,500V. Static electricity is produced when any two non-conductive materials are rubbed together. A power mosfet may be susceptible to as little as 100–200V esd; cmos devices to 250–2,500V.

The super-gainer receivers

Recent *TT*s (April, May) have described the merits, and some demerits, of the high-gain regenerative detector. But so far it has been assumed that this is for use in direct-conversion trf receivers such as the classic detector/af amplifier (0-v-1) and rf amplifier/detector/af amplifier (1-v-1) "straight" receivers. However, it should not be forgotten that a fixed-tuned regenerative detector can also make a most effective "second detector" for simple superhet receivers, as an alternative to diode or product detectors. In the late 'thirties, regenerative detectors were used to make possible the design of superhet receivers using only three valves; the later arrival of dual triode-pentode af valves reduced this to "two-valve" designs.

I first became conscious of this "super-gainer" technique in the pages of *The Radio Handbook* (9th edition, 1942) where it was used for "a simple three-tube superheterodyne" (6K8 frequency converter, 6SJ7 regenerative detector, 6V6 audio output) and also for an "economical five-tube superheterodyne (6K7/6K8/6SK7/6SJ7/6F6). Both designs used 1,500kHz i.f transformers with a few-turn "tickler" coil wound between the windings to provide regeneration. Soon afterwards, I had an opportunity of trying a three-valve super-gainer built by Roy Wilkins, G2ALM. The use of 1·5MHz rather than 455kHz for the i.f significantly reduced the problem of "image" reception, even on a design having no tuned signal-frequency amplifier.

I was so impressed that in 1946 I adopted the technique, although this time with 465kHz i.f, for a receiver based on the pre-war Tobe-Deutschmann tuner and triple-tuned i.f transformers; this had a tuned rf amplifier but, even so, on 14MHz needed an additional tuned-input/tuned-output preamplifier to reduce image reception to an acceptable level. Later I added three 465kHz crystals, one in each of the two i.f stages and one in the regenerative detector stage, to provide sharp cw-only selectivity. The high-gain detector meant that up to this stage the gain of earlier stages could be kept low. This receiver remained in operational use for some 25 years, finally being retired because the Tobe tuner covered nothing higher than 14MHz so that external converters were needed for 21/28MHz.

Malcolm Healy, G3TNO, recalls that, as a schoolboy, he built a very simple superhet receiver using only two valves from a design that he believes appeared in *Practical Wireless* possibly in the 'fifties. He writes:

"From Fig 7 you can see it uses only two valves. The first is a conventional ECH81 frequency changer with an output at 455kHz. The second is an ECL82 with the triode section forming a regenerative detector and the pentode as audio output stage. L1 and L2 were Denco plug-in coils selected to cover the required frequency ranges (mine was bandspread for 3·5, 7 and 14MHz). L3 and L5 are the primary and secondary of an intervalve i.f transformer (455kHz). L4 is an additional winding on the same former as L3 and L5 to provide 'reaction' (regeneration) which is controlled by VC1 (500pF). The 'sense' of L4 has to be correct for positive feedback. (One used a rule-of-thumb that a winding ht/anode should be in the same sense as grid/filament—*G3VA*.)

"In operation, VC1 is adjusted so that the detector is just oscillating and provides Q-multiplication and also bfo action. I remember hearing a lot of dx using this very simple superhet receiver, both on cw and eventually, when people began using it, ssb."

As the earlier *Radio* design showed, for amateur-band reception there is really no need to gang together the tuning of L1 and L2, simply bandspread tuning the oscillator only. I remain convinced, however, that "image" reception could be usefully reduced by raising the i.f at least to 1·6MHz if you can find or make a suitable ift. Whether there is any useful role for regenerative detectors for solidstate receivers is a question that might be worth exploring. It has been pointed out by Wes Hayward, W7ZOI, in *TT* that "simple" in this context does not necessarily meaning using a minimum number of transistors.

Rewelding broken valve filaments

Berj N Ensanian, K13U, in *QST* (January 1987, pp34–5) contributes a timely item on rewelding broken filaments of high power transmitting valves. This is based on his experience with 100TH triodes, but similar techniques might well prove successful for other expensive (directly-heated) high power valves; and if the technique fails, well the valve was already unserviceable and "beyond repair". The technique is suitable in cases where the filament has broken or fused in just one spot, rather than shattered, and where emission is still good.

First, an ohmmeter is connected across the broken filament pins, and the envelope lightly tapped at various points with the plastic handle of a screwdriver while watching the meter. It is likely that the needle will flick

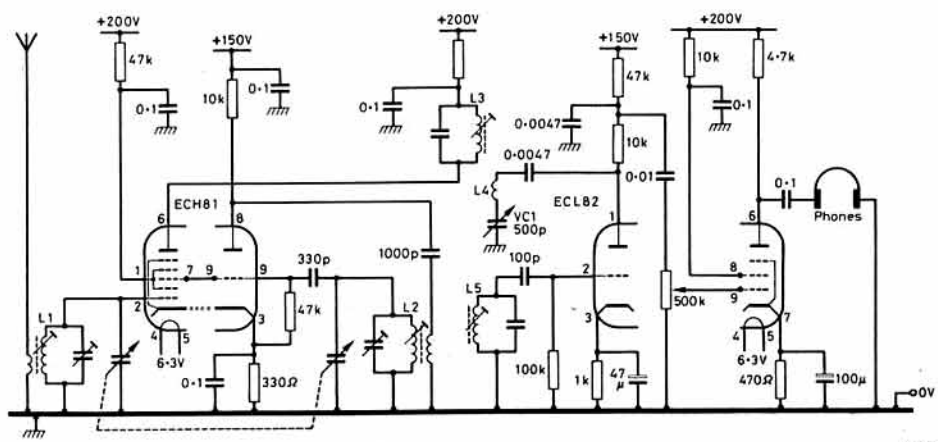


Fig 7. Two-valve "super-gainer" type superhet receiver built by G3TNO while a schoolboy, using the triode-section of the ECL82 as a high-gain regenerative detector. Image reception could be reduced by using a higher i.f (eg 1·6MHz)

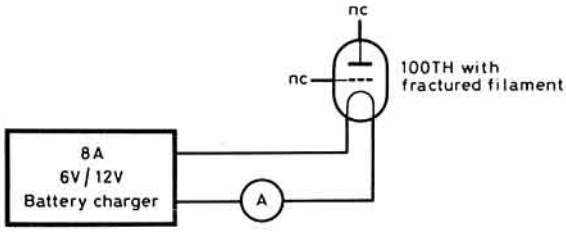


Fig 8. KI3U's set up for repair of broken high-power valve filaments such as those of the 100TH high-power triode

up occasionally denoting that the vibration is bringing the broken ends of the filament into contact. KI3U then marks the spot where the tapping has proved most effective with a felt marker.

Then he uses the arrangement shown in Fig 8 to effect the actual repair. A switchable 12/6V battery charger and ammeter is connected across the heater and the tapping resumed: "As I began tapping the tube envelope with the screwdriver handle, bluish-white sparks appeared at the top of the filament. With increased tapping frequency, the filament suddenly lit brilliantly, drawing more than 8A. I immediately switched the charger to 6V and the current dropped to a steady 5·75A. After a few seconds, 12V was again applied for about one second, then I switched again to 6V and about 5·75A. After 35mins, I replaced the charger polarity (current had stabilized at 5·6A). *In reversing the polarity the filament experienced its first shutdown since the reweld.* Power was removed after five minutes at reverse polarity. Using a variable ac transformer, I applied power until the filament drew its rated current of 6·3A when rms ac voltage across the filament was 4·0V. Nine minutes after applying power, I raised the voltage to 5·0Vrms, the rated value. The current then read 7·0A (rated 6·3A)."

For the next 30 days, KI3U ran the filament at 6·3A for 1·5h daily. The measured inter-electrode capacitances were slightly up, but the 100TH had been restored to life as an effective high-power valve.

While some readers may question whether it is worth attempting to reweld a broken filament in this way, it is worth noting that the 100TH is still manufactured but costs around $200 in the USA. KI3U also believes that the filaments of some modern directly-heated valves experience similar premature breaks. The technique of short over-voltage "flashing" can also sometimes prove effective where the filament or heater of a valve has not broken but emission has fallen due to the cathode or filament becoming poisoned.

If only someone could come up with a way of similarly restoring rf power transistors, the world's fastest-acting fuses!

No bulldog clips on sun visors!

C Edwards, RS27222, writes from bitter personal experience to warn against using bulldog clips on sun visors as a means of mounting "hands-free" microphones for mobile operation (G8DPS's method in the April *TT*). Such clips can prove very dangerous in the event of an accident. He writes: "I was taken from the scene of an accident by ambulance for *just that*—an injury caused by a bulldog clip on my sun visor used to hold notes. Modern sun visors are designed not to cause injury in an accident situation." Perhaps I should have remembered that *TT* (July 1984, p579) drew attention to the EEC regulations on car radio installations "intended to ensure that a driver will not be cut by any part of a radio, will not get his hands stuck nor receive any electric shocks. Equipment must be easy to operate and with rounded, recessed controls. . . ."

That dummy load resistor mystery

Dr A F Webb, G4LYF, has come up with an intriguing, if complex, explanation of G5RV's oil-immersed dummy-load resistor mystery (*TT* February, p112). This is based on the possibility that the current flow between the individual particles of "carbon black", separated by only a few atomic diameters, may involve the wave-mechanical "tunnelling" effect, and that polymerisation by the vegetable oil could result in the oil being chemically bonded to the carbon surfaces, thus increasing the resistance. G4LYF adds the suggestion that if indeed the tunnelling effect is involved in current flowing in composition resistors, there may exist the possibility of producing a "negative resistance" effect under certain conditions, as in the Esaki tunnel diode, thus conceivably opening the way to an oscillating resistor.

Louis Varney, G5RV, who posed the original query, reports a further development. He writes:

"In August 1986, a new 50Ω dummy load was constructed using four 50Ω 3W carbon resistors connected in series-parallel and immersed in vegetable oil. However, these ex-junk-box resistors are completely covered by the original green body paint (with black tip and dot indicating 50Ω value). On completion, the dc resistance was measured as 50Ω, and the vswr on 14MHz measured as 1:1. In October 1986, the oil was removed from the glass jar and the dummy load packed ready for my annual visit to Uruguay where, in early November, it was re-filled with vegetable oil. Resistance and vswr were measured and found correct. Monthly checks were made and no change in resistance or vswr found. Now (April 1987) shortly before returning to the UK, further checks show *no change* after eight months. It would appear to be necessary, if unpainted carbon resistors are to be used for a *vegetable* oil-immersed dummy load, to give the resistors a coat or two of paint or clear varnish before immersing them in the oil."

The Telefunken "B-2" and British Mk123

Recently, while using a British Mk123 on 10·1MHz (as mentioned in the December *TT*) I had a couple of cw contacts with OZ5MA who was using a genuine B-2 at the Danish War Museum in Copenhagen. The Mk123, possibly the last of the series of paramilitary/clandestine *valve* models to be designed and produced in the UK for some years from about 1956, remains a notable example of the degree of miniaturization possible with valve technology (the only transistors were an OC71 as a side-tone oscillator and a separate ac/dc converter unit for operation from 12V batteries). The two-stage (5A/163K, 5B/254M) transmitter, for which a simplified circuit diagram was given in *TT*, June 1983, page 513, runs at up to 40W input (about 20W rf output) and the receiver (Fig 9) is based on sub-miniature (B_9D base) valves, types EF72 and EF73. The complete unit, including the

The British Mk123 transmitter-receiver with built-in mains psu which was originally developed about 1956 and which remained in service for paramilitary operations for nearly 20 years. Still provides a usable cw rig on 3·5/7/10/14MHz amateur bands. Shown here with some of the associated accessories including spare EF92/EF93 sub-miniature valves, mains-plug and crystal-holder adaptors, "reel" antenna as well as 100ft of antenna wire, neon-tester to indicate whether 110 or 220V mains, ac or dc. There is a built-in morse-key (right-hand bottom corner) but also a socket for use with an external manual or high-speed auto-keyer. *Photo: Wendy Gilles, IBA*

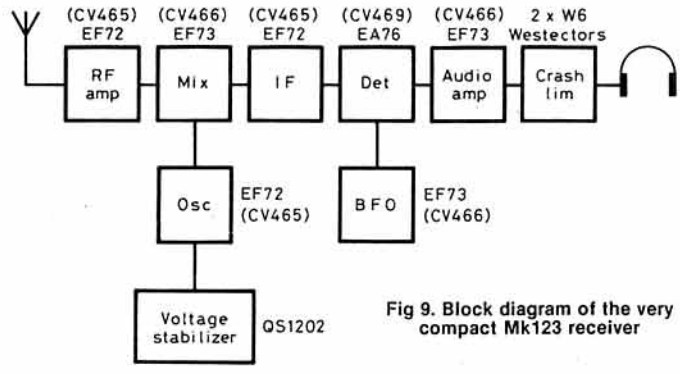


Fig 9. Block diagram of the very compact Mk123 receiver

mains psu, and built-in key, weighs under 8lb (3·5kg) and measures 11·38 by 3·3 by 5·38in (29·9 by 8·5 by 13·6cm). It covers 2·5 to 20MHz in three wavebands. Apart from the lack of a crystal filter and electrical bandspread needed for amateur radio applications, it is an excellent and very stable receiver. □

NEWS BULLETIN

50 70 MHz

Good Es openings in first week.....

including an opening to USA—see late flash

Well, we couldn't produce an aurora a few days after the release of the 50 and 70 MHz bands to Class B licensees this year - sorry about that - but even so the new bands seem to have got off to a fine start. On opening night there seemed to be a large number of Class B licensees active on 50 MHz, and we also heard lots of Class As on welcoming newcomers to the band. At least one Class B portable was out and seemed to be dishing out good reports to all and sundry. From the comments we've been hearing in the couple of weeks between opening time and our press time, many more stations are planning to come on the band in the course of the next few weeks.

The sporadic-E season on 50 MHz seems to have opened this year on 19 April; DL7YS worked EI6AS and G4VXE crossband. On the following day the band opened to Spain and Portugal for several hours - EA1MO, CT1WW and CT4KQ were worked from the UK, and CT1WW reported working about 70 stations in G, GW, GM, GI and EI. Since then, the band has been open on many days.

What's also been very interesting is the increase in crossband 28/50 MHz working that's taken place recently. As you know, not very many countries within range of the UK at the current state of the solar cycle have an amateur band at 50 MHz; however, the whole world has a 28 MHz amateur band and if there's sporadic-E propagation at 50 MHz there's almost certain to be ditto at 28 MHz. Ergo, transmit from the UK on 50 MHz and receive on 28 MHz. In practice, this means listening on or around 28 885 kHz for someone calling "CQ crossband, listening 50.115" or words to that effect - or sometimes you make initial contact on 28 MHz and then QSY to 50 MHz. When the skip is very short - i.e. when you start hearing Scottish or Irish stations in London, or vice-versa - it might be a good move to switch on the 144 MHz rig as well, since there might be enough Es about to produce some good DX on that band as well. There was a good example of this on 28 May this year. Stations in the south-east of England were working GM on 50 MHz at S9 via Es during the late afternoon, and at the same time there was a good 144 MHz Es opening. In other words, when 50 MHz sounds like 7 MHz it's time to listen on 144 MHz.

As we went to press there had only been a couple of 144 MHz openings - the one we mentioned above and one at the very late time of 2015 GMT on 6 June, when some Italian and Yugoslav stations were heard in brief spasms. There was also one at lunchtime on 7 June, with Italian stations very loud in various parts of the UK. Remember that there's a good peak in the probability of 144 MHz openings during the period betwen the 13th and the 19th of July. Also, there have been trans-Atlantic openings on 50 MHz during the first and third weeks of July. The best time for these seems to be between about 2130 and 2230 GMT. So - keep those rigs on and do tell us what you've worked and when you worked it.

A quick reminder to those who haven't worked 144 MHz sporadic-E before. Keep the overs very short and snappy - just callsign, report and locator. Don't woffle on about your name, the rig, the antenna, how pretty your local village is and your granny's date of birth - if you do, about a hundred other stations will write your callsign down in the margins of their logbooks with various naughty words appended and quite right too.

Dear RSGB....

"May I send my congratulations to RSGB HQ on the 50/70MHz changes"

"Well done on latest new band negotiations. Nice to see a thoroughly good outcome and a boost for the Society. This month's RadCom excellent too."

"Good news on 50/70 MHz, take a pat on the back all those who were involved - see you on 50 MHz"

"Congrats to all on getting us on 50 and 70 MHz plus the extensions to the bands. ..... Well done."

"Many congratulations on the new allocations and many thanks for all the hard work. Be assured of my continued support both on and off the air."

"50/70 MHz brill! Congratulations, I applaud your achievement."

"I would ... offer yourself and all Society staff, officials and committee members sincere thanks for all the hard work you have undertaken on our behalf to achieve access to these bands by class B licensees & indeed to expand their bandwidth. In particular, the gains in regard of the 70 MHz band are most significant ..... Once again, thanks & congratulations for the gains made at 50 & 70 MHz."

"Just a short note to say a big thank you for all your work in getting the 4m and 6m bands for the class B licensees."

"That's all very well, but where's my bl**dy RadCom!"
(anon, on the answerphone)

Apart from him, you certainly seem to like the changes to the licensing conditions relating to 50 and 70 MHz - we've reproduced some of the comments received at Headquarters on the subject, and there were loads more. Over 250 people logged on to the RSGB DataBox or PRESTEL to read the 50/70 MHz feature, within the first few days of its inclusion, which incidentally makes it the single most popular item accessed since we started the service!

CROSSBAND LADDER

50/28 MHz crossband working is tremendous fun - your scribe was hoping to have a bash but by press time he hadn't managed to persuade his home-brew transverter to generate more than about two picowatts at 50 MHz (plenty of power at various other frequencies - curses, why can't I have a spectrum analyser for my birthday instead of more socks.....) and had to listen to everyone else having a grand time. Just to help things along a little, from now on we're going to start a little "crossband ladder" in the Bulletin. We'd like you to send to us each month a list of the countries you've worked via 28/50 MHz crossband, and each month we'll print details of the top ten, meaning the stations who have worked most countries crossband. It'll be cumulative, of course, so you'll need to send in something each month if you want to stay in the list. Just write your callsign and a list of the countries on a postcard and send it to David Gough at HQ, starting as soon as you like - and the top of the heap on 31 December 1987 will receive an RSGB book token. One word of warning though - if you work more countries than the Bulletin editor, something very peculiar might happen to your 50 MHz rig...!

Lastly, an apology.

We were hoping to cram an article on a home-brew 50 MHz transmitter filter into this month's Bulletin but it's slipped off the bottom because of shortage of space - as have several other items. Every time the Bulletin grows some more pages, there seems to be even more news and features to put in them....

POWER LEVELS

No apologies whatsoever for mentioning power levels once again this month. PLEASE don't forget for one millisecond that 50 MHz is still allocated to the broadcasting service in a large number of countries within range of the UK. If we cause interference to the broadcasters, the inevitable result will be that our nice new 50-52 MHz amateur band will disappear overnight. We're not kidding. Any editors or VHF columnists on other amateur radio magazines who happen to be reading this feature might also care to ponder this point and include some words about the importance of observing power limits in their own output....

Remember that the power limits at 50 MHz are 14 dBW carrier and 20 dBW ERP. If you can't relate to dBW (no, neither can I), that's 25 watts of anything other than SSB and 100 watts peak envelope power on SSB. BUT - that doesn't mean you can run 25 or 100 watts out of your transmitter unless you're using a dipole. The power limits relate to "effective radiated power" (that's the "ERP" bit in the schedule) which takes into account antenna gain and feeder loss. From what we've been hearing on the air, and also to judge from the number of letters and telephone calls received at Headquarters, there's still some confusion about exactly how to calculate your ERP - so here's a run- down on how to go about it.

The first thing to do is to establish the gain of your antenna with respect to a dipole. If it's a dipole, it obviously won't have any; if it isn't, it will (or should, at any rate) have some and you need to find out what it is. If it's a commercial antenna, the manufacturer should have quoted a figure either in his advertising or in the literature which tells you how to put it together. Look for a gain figure in "dBd". If the figure is quoted in "dBi", subtract 2.15 to arive at a dBd figure. If you've built your own, you should be able to estimate its forward gain from first principles.

When you've done that, the next job is to establish the feeder loss in dB for your particular installation - again, either from the manufacturer's data or some other source. See last month's edition for some loss figures for various feeders, or look at pages 153-155 of the RSGB "Radio Data Reference Book".

Armed with these two figures, take a look at the "Erpogram" nomograph on page 419 of the June 1987 edition. If you follow the instructions printed on it, you should be able to establish the maximum output power you can run before hitting the limit. If you can't cope with nomographs but you have a calculator with log functions available, here's another way to do it. Take your antenna gain figure (units in dBd, remember) and subtract from that your figure for the feeder loss at your station (units in dB). Call that figure the "antenna factor" in dB and write it down somewhere. Whilst you have the paper and pencil to hand, make a note of the maximum output power of your transmitter in the modes you want to use.

The next bit is for anyone like those of us who took about a million attempts to pass "O" level maths and are secretly terrified of anything that looks like an equation - Great Brains and Senior Wranglers can slide on a couple of paragraphs. To get from plain and simple watts to "dBW", all you need to do is to ask your calculator for the log of the watts figure and multiply it by 10. For example, suppose you want to know what 62 watts is in dBW. The log of 62 is 1.79239 according to our little Sharp EL-509A (a bargain at £8.95 and just the job for all sorts of electronic-type calculations, we find) and if we multiply that by 10 the result is obviously 17.9239. So you can say that 62 watts is tantamount to 17.92 dBW. Getting from dBW to watts is just as easy. Divide the dBW figure by 10, take the antilog and you're there. Let's take the case of the power limit for carrier at 50 MHz, which is 14 dBW. Divide by 10, which makes 1.4. Take the antilog (marked 10 to the power 'x' on many calculators) and it'll say 25.118864. In other words, 14 dBW corresponds to 25.118864 watts - in practice, call it 25 watts.

So - knowing all that, how do we establish whether or not the station is legal? Let's take the example of the 50 MHz set-up at GB3RS. Up on the roof at Potters Bar we have a three-element antenna which, according to the manufacturers, has a gain of 6 dB over a dipole (i.e. 6 dBd). In a fit of enthusiasm we actually measured the loss in the 50 MHz feeder last year and it turned out to be 1.7 dB - just as the Radio Data Reference Book had predicted for that length of UR67. The 50 MHz rig at GB3RS has an output of 10W on FM and CW and 15W PEP on SSB. The question is, can we run the transmitter at its maximum power or do we need to wind the wick down when we go on the band and call CQ?

Well, our "antenna factor" is 6 minus 1.7, which is 4.3 dB. Converting the transmitter output to dBW by the method aforesaid, we find that we have 10 dBW on FM and CW and 11.76 dBW on SSB. If we add the antenna factor to the transmitter output in dBW, we can see whether or not we're OK. Let's take FM and CW first. 10 plus 4.3 is 14.3, which is 0.3 dB above the legal limit. What about SSB? 11.76 plus 4.3 is 16.06, which is slightly less than 4 dB below the legal limit.

In other words, if we go on the air at GB3RS on FM or CW, we must reduce the transmitter power by 0.3 dBW. What's that? Pass the calculator - divide by 10 and take the antilog - 1.07 watts. In practice, a needle-width on the power meter. On SSB, of course, there's no problem - we could legally run an antenna with a little less than 4 dB more gain, or run a transmitter with a shade less than 4 dB more power.

Anyway, after all that, the main thing is to be sure to keep an eye

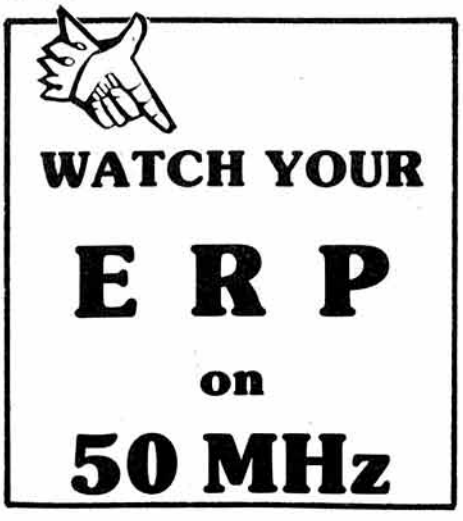
on your ERP - whether you use the methods above or just plug the figures into the Erpogram. The other thing is to get into the habit of winding the power down when you've established contact. When we're ragchewing we generally turn down the power until the other station gives us something like an S7 or S8 report - in other words, plenty for comfortable communication but not so much that we're bending his S-meter because he's only three streets away or not so little that he misses one word in every ten because of fading or QRN.

MOBILES HAVE PRIORITY.....

The Society is justly proud of the UK repeater network, and it's very popular. Too much so, in fact, with base stations. We hear far too much operation through repeaters in which one base station talks to another when the pair of them are within easy simplex range - and this at times when mobile and portable stations are waiting to be able to use the machine! This is selfish, thoughtless and generally lid-like.

Please note that ALL repeaters are principally for use by mobile and hand-portable stations and that they should be given priority. If you really must use a repeater from your base station, please make a habit of finding out whether you can hear the person you want to talk to direct by listening on the repeater's input frequency - if you can, leave the box to other users and QSY. It would also be a good move to use a directional antenna and the lowest possible power, so that you don't tie up other repeaters which you might not be able to hear but which can hear you all right.

Better still, avoid repeaters altogether unless you're signing /M or /P.



MORSE TESTS

The following list shows the dates and locations of all the available test centres from the end of July to the begining of September, as we went to press. Because of space limitations, we cannot print a complete list of all the test centres notified to us, but these can be found on the application form itself. If you want to take a test and any of the centres shown is within striking distance, send for an application form immediately. Completed applications will be dealt with strictly on a first-come first-served basis.

Morse tests will be carried out in groups of three and will be of half an hour's duration. Details of the test, the venue and how to get there will be sent to you as soon as your application has been processed and your place confirmed.

COUNTY	TOWN OR LOCATION	DATE
Lothian	Edinburgh ARC	29/07/87
Hertfordshire	North Watford	31/07/87
Derbyshire	Clay Cross, Chesterfield	03/08/87
Guernsey	Guernsey ARS, St Martins	06/08/87
Dumfries & Galloway	Stranraer	08/08/87
Hampshire	Winchester	08/08/87
Derbyshire	near to Derby Rally venue	09/08/87
Staffordshire	Uttoxeter	09/08/87
Somerset	Burnham-on-Sea	09/08/87
Suffolk	Ipswich	13/08/87
West Sussex	Horsham	16/08/87
Greater London	Wood Green, N22	19/08/87
Northamptonshire	Tiffield, Northampton	20/08/87
Strathclyde	Glasgow	24/08/87
Grampian	Aberdeen	27/08/87
Leicestershire	Wigston Magna, Leicester	29/08/87
Hereford & Worcester	Malvern	29/08/87
Cleveland	Billingham	02/09/87
Nottinghamshire	Mapperley, Nottingham	05/09/87
Co.Armagh	Armagh	07/09/87
Lincolnshire	Louth	08/09/87
Central	Stirling	08/09/87
West Yorkshire	Spen Valley ARS	10/09/87
Isle of Wight	Binstead ARS, Ryde	12/09/87

We receive notification of new centres almost daily and the application form gives a full list of these as far ahead as January 1988, as we went to press. Currently there are around 100 centres taking advance bookings for Morse tests.

***LATE FLASH - 50 MHz opens to USA**
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There was a very brief opening to the USA on 50 MHz during the afternoon of 7 June. Paul, G4IJE heard weak signals from K1TOL at 1422 GMT but got no response to his calls. However, at 1425 Paul heard WA1OUB calling CQ on CW; he went back to him on SSB and received a 5 and 7 report, after which the signal disappeared. There were several American stations audible on 28 MHz at the time. Paul thinks that at least one Scottish station also worked the USA but we weren't able to confirm that by press time.

Several G stations worked 9H1 on 50 MHz and there were cross-band contacts to many European countries including Italy and Austria as well as the Faroe Islands.

Before and after that there were nice 144 MHz Es openings. The first was mainly to Italy - I8TUS in particular was a massive signal in many parts of the UK - and the second was to YU, LZ and HG.

G4IJE also worked ZC4VHF/5B4 on 50 MHz at 1600 GMT on the same day. Signals from Cyprus were not strong but were consistently audible in the UK. It's understood that GI8YDZ also worked the ZC4 group, which is a very long-distance contact indeed.

More next month and on GB2RS when we have it.

Around the Groups

30 YEARS OF RADIO SCOUTING

In 1957, a Scout amateur radio station was established at the Jubilee Jamboree in Sutton Coldfield, England. The first Jamboree-On-The-Air (JOTA) was held in May of 1958. Each year, the event attracts a growing number of participants and now there are around 300,000 involved in over 100 countries, making it the largest 'gathering' of Scouts and radio amateurs in the world.

This year's event - the 30th Jamboree-On-The-Air - takes place over the weekend of 17/18 October and each year we're inundated with requests for special event GB callsigns.

In order to give our GB calls man a chance to have a lunch break during September, we would greatly appreciate receiving your JOTA Special Event Station applications as soon as possible. Forms are available from the Membership Services Dept at RSGB HQ, and remember that if you held a GB call for last year's JOTA, you will have first option on it again. However, you'll still have to fill in a form.

If you're applying for the first time, it helps if you can check with us first whether the suffix you require is available. A quick telephone call to Sid Clark in MSD will speed things up no end.

Special Event GB Calls are valid for operation at the nominated location for a maximum period of 28 days. Bearing that in mind, you may like to give your local scout group an opportunity to practice log-keeping or incorporate the station in some other scout activity prior to or after the JOTA weekend.

The closing date for JOTA Station applications is Friday 11 September. NO applications can be accepted after that time.

As usual, we will be compiling a full list of Special Event JOTA stations - if you'd like one, please send us a large (A4) sized stamped addressed envelope marked 'JOTA LIST'. The lists will be sent out around the first week of October.

NOTE: Next month we'll be giving details of the 16th World Jamboree. This will be held in Australia from 30 December 1987 to 10 January 1988 to coincide with the Australian Bicentenary.

AMSAT-UK NEWS:

Ron Broadbent, G3AAJ, informs us that it now looks certain that Leonid Labutin, UA3CR will be attending the AMSAT-UK Colloquium later this month. As we said last month, Leonid is the designer of the Russian amateur satellites and it is expected that he will have an enormous amount to contribute to the event. Delegates from Czechoslovakia, Yugoslavia, France, Germany, Belgium, Switzerland, Netherlands, Sweden, Norway, Australia, South Africa, New Zealand and USA have all confirmed their attendance. Ron is still awaiting final confimation from the Italian, Malaysian and Pakistani delegates.

Two special stations will be active during the AMSAT-UK Colloquium at the University of Surrey on 18/19 July. GB2SAT will be looking for satellite contacts and GOAUK/A will be looking for terrestrial contacts, hopefully on all bands. Anyone who has not yet decided whether they want to attend the Colloquium is advised to telephone Ron as soon as possible. There may be a few places left, or if not there might just have been a cancellation. The telephone number is 01-989 6741.

A limited edition illustrated booklet on the history of AMSAT-UK will be published soon - watch this space for further details. AMSAT members will receive details in a future issue of OSCAR News.

And finally, Ron informs us that AMSAT-UK is now on FAX. If you'd like to use this means of getting your news to the AMSAT office, telephone Ron on 01-989 6741 and tell him that you have a FAX to send. Each A4 sized page takes about 13 seconds of transmission time.

RAYNET NEWS:

ISLE OF MAN:

The Isle of Man Group was asked for the first time to provide communications links over two stages of the Manx TT Races. Cover was required for an extended period during practice and race days. Congratulations go to the group for this mark of confidence in them by the Chief Constable, and in particular to the Group Controller, Stan Ellis, who joined the official communications control team.

CHESHIRE:

Raynet groups in the county of Cheshire have been reformed recently into a single County Group as a measure to consolidate the efforts of members and to improve liaison with User Services. Former members interested in these developments are invited to contact Philip Bagguley, G4HUF on 061-928 5281 for further details.

WEST MIDLANDS:

The Raynet Zonal Representative for the West Midlands is:-

Charles Bottoms, G4PIP
Treboro House
Ullenhall
Solihull
Warks B95 5NN

FURTHEST NORTH VHF NFD STATION?:

The Lerwick Radio Club will be entering this year's VHF NFD with a station located on Ronas Hill in the Shetlands. This is believed to be the most northerly UK station to have participated in the contest (and if they don't have a contact with the Bulletin editor, who hasn't worked Shetland on 144 MHz yet, their entry is highly likely to get lost in the post....)

If weather permits, the station will be running 100W to a 4x14 element Yagi array for 144 MHz, and they'll also be operational on 430 MHz. The club callsign, GM3ZET will be used. Full details from Colin, GM0AVR, who advises that visitors will be most welcome.

BARTG NEWS:

The spring edition of "Datacom", BARTG's quarterly journal, features an article about adding an AMTOR facility to the popular ST5 terminal unit. There is also a list of the software available from BARTG and, to make life even easier, BARTG sells the necessary connecting leads for use with the radio, terminal unit and micro. Datacom is sent free to all members of BARTG and full details of membership can be obtained from:-

John & Pat Beedie
GW6MOK & GW6MOJ
"Ffynnonlas"
Salem
Llandeilo
Dyfed SA19 7NP

(over)

ST. COLUMBANUS AWARD:

The Bangor & District ARS club station, GI3XRQ/P, will be on the air between Sunday 2 August and Sunday 4 October to promote the St. Columbanus Award, named after the founder of Bangor, Co.Down. A special certificate will be awarded to stations contacting GI3XRQ/P and six other GI stations. A total of 11 points are required for the award - five for working the club station and one for each other GI station worked. Participants may use all bands and all modes but contacts via repeaters will not be valid. Claiments should send a log extract together with £2 or the equivalent in IRCs to:-

Dr Harry Squance, GI4JTF
24 My Lady's Mile
Holywood
Co.Down
Northern Ireland.

TELSTAR 25TH ANNIVERSAY:

The Holmdel ARC in New Jersey, USA, will be running a special event station to commemorate the 25th anniversary of the launch of the "Telstar" communications satellite. The club will use the callsign K2DR and will be active from 1500z to 2200z on 11 July, and from 1500z to 2000z on 12 July between 14.225 and 14.250 MHz. It's also worth a listen between 28.300 and 28.325 MHz at 15 minutes past the hour.

A certificate is available for contact with the station or for reports from SWLs. Claimants should send a QSL card and a self addressed envelope together with 2 IRCs to:-

Holmdel ARC
PO Box 205
Holmdel
NJ 07733
USA

ISLE OF ARRAN DX-PEDITION:

The Dunstable Portable Amateur Radio Group, in conjunction with the Dunstable Downs Radio Club, will be undertaking a DX-pedition to the Isle of Arran next month. The group will be active in the HF and VHF bands from Sunday 16 August to Thursday 20 August using the callsigns GM4DDC/P and GM0DPR/P from WAB Square NS02. Skeds can be arranged by contacting Tony, GOCOQ on Luton 508259.

SIGNING ON TO PRESTEL:

Quick tip - if you're on Prestel and key "*RSGB#" (i.e. star, RSGB, hash) you'll find you're automatically at page 81070.

"AN EVENING WITH THE RSGB":

On Tuesday 4 August, the President of the RSGB, Mrs Joan Heathershaw, G4CHH, along with David Evans, G3OUF, Chief Executive of the RSGB, and Julian Gannaway, G3YGF, the RSGB Council Member for Zone D, will be in Reading as guests of the Reading and District ARC, for a meeting entitled "An Evening with the RSGB". All local clubs have been invited to attend the meeting but those of you who are local to Reading but not members of a club may not have been informed.

The meeting will be held in the Kennet Room of the Reading Civic Centre, which is in the town centre itself, and starts at 8pm prompt. The room will hold about 120 so places will be limited. Coffee will be available for those of you who require it. There is ample car parking nearby and talk-in will be provided by G3ULT/M.

For further details please contact Stephen Coleman, G4YFB, the Secretary of the Reading & DARC on Reading 867820.

COUNCIL (MORE) BRIEF:

The last meeting of Council took place on 21 May 1987, and we should have published our regular "Council Brief" feature in this month's Bulletin - unfortunately it just missed the deadline and has therefore been held over until next month.

One point emerging from the meeting, however, is that Council has now approved the appointment of two more staff for the Society's Membership Services Department - which will take the staffing level of this important area from three to five. The increase is considered necessary in order to improve MSD's performance and throughput; the Department is the first line of contact for the majority of members who contact Headquarters with queries and requests for assistance, and it's vital to get this part of the service right.

We therefore now have vacancies for two Membership Services staff. If you're an amateur or short-wave listener, probably in your early twenties, capable of dealing with a wide range of questions and problems and with flexible and accurate responses under pressure, we might just have a terrific job for you. Interested? Write to the Headquarters Manager, Mr M Blood; give him details of your past experience and tell him why we ought to interview you for the position. A very competitive salary is available for the right person for each post.

NEW MEMBERSHIP CATEGORY:

A new category of membership of the Society is now available for prospective members who are older than the "state pensionable age", which is over 65 for men and over 60 for women. This new category has the effect of making a reduced subscription available for those who have not yet achieved five years of membership but who have, as the saying goes, more turns on the tank coil than the state minimum. The new rate will apply to both existing members and new prospective members and is £14.50. Note that the existing rate of £11.10 for those with more than five years' membership and the requisite seniority still exists.

Both need to be applied for, and we need to see proof of age by a copy of your birth certificate.

HQ STATION IN IARU CONTEST:

Members have been asking whether the RSGB will be supporting the IARU HF World Championship Contest again this year by activating the HQ station. The answer is yes.

During the weekend of 11/12 July, the RSGB HQ station will be on the air using three separate callsigns, GB5CC in the 160m and 80m bands, GB5HQ in the 40m bands, and GB6HQ in the 20m, 15m and 10m bands.

PACKET UPDATE:

Packet radio in the UK is all go at the moment and message-forwarding is taking place in a big way via mailboxes linking many parts of the country. GB3CD in Chester can now link to GB3HQ and to the south of England including the GB3UP and GB3KP mailboxes. Packet radio can now be used to send messages to the Australian and American packet networks via the Surrey University satellite UoSAT II.

By mid-June GB3HQ at Headquarters had passed the 2,500-message mark. GB3CD, GB3UP and GB3KP had also handled well over 1,000 separate messages.

For those keen to dip a toe into the fascinating waters of packet radio, take a look at our four-page special feature in next month's Bulletin entitled "Don't miss the mail" - you'll never want to work Top Band DX again.....

QSL BUREAU - AWFUL WARNING

Don't forget that the Bureau will be closed between 1 August and 23 August inclusive. Please do NOT send cards to G3DRN during this period unless you want to be cursed bell, book and candle.

GB2RS NEWS SERVICE:

We need at least one additional GB2RS newsreader for the 144 MHz FM London area service, which is transmitted at 10am local time on Sunday mornings.

A good coverage of London and approximately an area bordered by the M25 is required. Potential readers should be able to deliver the broadcast in a clear and concise manner and be prepared to devote at least half an hour to the job on Sunday mornings. As a reserve reader, the successful applicant will not be expected to read the news every week but occasionally may be called upon by the main reader at short notice.

If you are interested in becoming a GB2RS newsreader, please write to David Gough, G6EFQ, Senior News & Information Officer at RSGB Headquarters. He'll send you an application form, a sample news script and a cassette tape for audition puposes.

WATCH YOUR CHANNEL!:

We've received a number of complaints recently from members experiencing interference to their local GB2RS news broadcast. It seems that some operators are moving "up one" from the calling frequency and causing interference to GB2RS transmissions. This problem is likely to get worse as we move into the summer months (well, theoretically it's summer - we'll believe it when we see it) and 144 MHz tropo propagation conditions get a bit better (chance would be a fine thing). So even though your local news broadcast may be over, you could still cause interference to a more distant broadcast. Perhaps the best thing to do would be to avoid using S21 on Sunday mornings, at least throughout the summer months, if at all possible. We appreciate that neither the Society nor anyone else has a God-given right to use S21 exclusively, but the GB2RS news service is provided for the benefit of all radio amateurs in the UK and occasionally it's the fastest means of getting urgent or important news of any changes to licensing conditions out to amateurs (e.g. the release of the 50 and 70 MHz bands to class B licensees).

GB2RS news broadcasts are transmitted at various times throughout Sunday - mostly in the morning - using the following frequencies; 3650 kHz SSB in the 80m band, 7047.5 kHz AM in the 40m band, and 144.250 MHz SSB and 145.525 MHz (S21) FM in the 2m band. The broadcast schedule appears in the current UK Callbook.

BOOK NEWS

WORLD AT THEIR FINGERTIPS:

This illustrated 307-page book, written by the late John Clarricoats, OBE, G6CL - who was Secretary of the RSGB from 1930 to 1963 - covers the embryonic days of amateur radio in the UK and the birth of the Radio Society of Great Britain. Many famous names can be found within the pages of this fascinating book. It is a unique insight into how the early experimenters in radio led the way by inventing the thermionic valve, providing the first "Empire Broadcasting Service" (the forerunner to the BBC's "World Service"), achieving 2-way communication to all parts of the globe and forming one of the oldest national amateur radio societies in the world.

World at Their Fingertips is a thoroughly good read and is available at £7.33 for members and £8.62 for non-members (incl p&p).

A new book, which continues the story, is planned to be published in time for Christmas to coincide with the the start of the RSGB's 75th Anniversary celebrations. Watch this space for more details.

CALLBOOK:

No apologies for plugging the current UK Call Book again - we still have lots of them sitting in the basement, just pining for good homes and nice warm shacks to sit in. The Call Book is a full list of all the UK and Eire amateurs who are currently licensed, together with over 40 pages of invaluable information on various aspects of operating an amateur radio station and getting the most out of your hobby. The UK Call Book costs £5.49 for members and £6.46 for non-members (incl p&p). Don't forget that after 1 July you can order your copy by simply ringing us up and telling us the number of your credit card, your name and the expiry date of the card. While you're on the phone, you can order any other books which might take your fancy - we've got stacks of different titles in stock, as you can see from the list at the back of the magazine, and they're just the thing to read whilst you're waiting for the sporadic-E to turn up or that VK9 on 7 MHz.

We've had some limited response to our offer of 'personalised' callbook entries but we'd still like to see more of you taking up one of the options we've offered (see page 344 of the May issue of Radio Communication). Our aim is to make the Callbook an even more valuable source of information for such things as WAB squares and book numbers, Maidenhead locators, contact telephone numbers and meeting places of local clubs, membership of affiliated groups like AMSAT, BARTG, RNARS, RSARS, RAFARS, and so on.

If you'd like to take up our offer, read the item in May's Radio Communication again and let us have your 'personalised' entry as soon as possible. We'll be starting work on the Autumn issue of the Callbook around the end of next month.

COMING SOON:

The Society has a number of new books in the pipeline. As well as the continuation of the story of the early days of amateur radio, refered to above, we're working on the Microwave Manual, the VHF/UHF DX Handbook, and books on Morse code for beginners and HF wire antennas. Also coming soon is an updated edition of the popular Awards Book. Again, watch this space for more details.

IMPORTANT NOTICE:

The prices of a number of our publications are due to rise on 1 August, due to several factors beyond our control. If you are thinking of buying any of our amateur radio books in the near future, you would be advised to order them now!

IARU REGION 1 CONFERENCE 12-17 APRIL 1987

A report by G3GVV, with contributions from G2UK, G3AEZ, G3PSM, G3VZV, G3ZAY, GM4ANB and G6LX

How does the Conference function?

The morning of the first day is the occasion of the official opening plenary. This is followed by the election of delegates to short-duration commitees. The afternoon sees the start of meetings of working groups. During subsequent days the conference functions under two main groupings.

Committee A:

Deals with administrative and operational matters - these include HF, HF contests, bandplans, amateur radio direction-finding, common licences, the IARU Monitoring System, electromagnetic compatibility, the promotion of amateur radio in developing countries, the amateur satellite service, European Radiotelegraphy Championships, material for handicapped amateurs, the International Beacon Project and propagation studies.

Committee B:

Deals with VHF, UHF and microwave matters; amongst its concerns are the amateur satellite service, propagation studies, packet radio, locators, bandplans, contests, operating procedures, technical standards and awards.

Committees A and B met simultaneously. They set up working groups to examine and make recommendations on specific topics. On the final day of the conference the reports and recommendations of the committees are received at the Final Plenary.

Committee C should also be mentioned. This examines the credentials of proxies, delegates and observers and is also concerned with finance. It meets as required.

Who attends?

Region 1 comprises the continents of Africa and Europe, together with the Middle East and the whole of the USSR. Each of the 58 countries which are members of IARU Region 1 is entitled to be represented; at this conference the attendance was the largest ever, with some 180 delegates from 40 societies. The chairman and secretary of IARU Region 1 are PA0LOU and G3FKM respectively.

Region 2 comprises North and South America. It was represented by its president, YV5BPG, and secretary, HK3DEU. The president of ARRL, W4RA, attended as observer.

Region 3 is composed of the rest of the world and was represented at the conference by its secretary, JM1UXU, and one of its directors, ZL2AMJ. The President of the Korean Amateur Radio League also attended.

The administrative council of the International Amateur Radio Union was represented by its president, vice- president and secretary - W1RU, WOBWJ and K1ZZ respectively.

The RSGB delegation was as follows;

Malcolm Appleby, G3ZNU;
Martin Atherton, G3ZAY;
Dain Evans, G3RPE;
David Evans, G3OUF (obs'ver)
Keith Fisher, G3WSN;
Pru Glaisher, G4RWW (obs'ver)
Ron Glaisher, G6LX;
John Greenwell, G3AEZ;
Tim Hughes, G3GVV;
Arthur Gee, G2UK;
Graham Shirville, G3VZV (ob)
Petra Suckling, G4KGC;
and Colin Thomas, G3PSM.

Each delegate had a special area of responsibility - G3ZAY, hf matters; G6LX, HF contests; G3AEZ, EMC; G2UK, amateur satellite service; G3PSM, monitoring service; G3ZNU and G3WSN, VHF and UHF; G3RPE and G4KGC, microwaves; G3VZV, amateur television. G3GVV was delegation leader and was particularly involved in administrative matters. G4RWW and G3VZV attended at their own expense. Other observers included representatives of the licensing administrations of Algeria, Austria, the Federal Republic of Germany, San Marino and Turkey. The Deputy Minister of Communications of the USSR attended as a delegate. Alan Taylor, G3DME, attended in an IARU Region 1 role as convenor of the International Beacon Project.

How did the conference progress?

At the opening plenary the chairman of Region 1, PA0LOU, greeted all who were present, particularly M.Tipguep, the Deputy Secretary-General of the International Telecommunication Union and other guests of honour. Speeches of welcome were made by the Mayor of Noordwijkerhout, Mr F Winkel, and

the president of VERON, Mr J Hordijk, PAONE. These were acknowledged by W1RU, who outlined the different facets of amateur radio and went on to remind delegates of the responsibilities of their national societies in relation to their individual licensing authorities.

In his opening address M Tipguep spoke of the extreme difficulties affecting his own continent of Africa, in spite of which amateur radio was a growing force. There were now 16 African amateur radio societies in Region 1. He reaffirmed the links between IARU and the ITU, mentioning that at the forthcoming World Telecommunication Exhibition a stand would be made available for the display of amateur radio equipment. Of special interest are the following direct quotations from M Tipguep's speech;

> "I should like to pay a particular tribute to the International Amateur Radio Union as a whole, not only for its contribution to the work of the ITU, in particular through the CCIR, but also for the assuidity with which it supports and defends the interests of radio amateurs....Furthermore, Region 1 being the first to operate and...in view of its active participation in...the work of the European Conference of Postal and Telecommunications Administrations.... your competence is undeniable and widely acknowledged. But far beyond this experience and competence, the IARU also enjoys world-wide renown for the results it has obtained in technical administrative areas, and also for the fraternity and spirit of mutual co-operation which it has fostered and maintained among all its members".

Mr C Wit, Director-General of the Netherlands PTT, spoke of technical changes and the consequent challenges they bring to radio amateurs. He went on to say;

> "Without orderly use of the ether, the amateurs cause interference to each other or to other radio services. Considerable pressure is being exercised by these services to obtain more frequency bands because the ether is playing a continually more important role in society. The fact that roughly 8% of the total frequency spectrum has been reserved for the amateur service for conducting experiments is not always understood by others".

After mentioning that the CEPT amateur licence had now been acepted by ten European countries, Mr Wit formally declared the conference open.

Why does administration feature prominently in the conference discussions?

For any organisation to function efficiently, whether it is one of our affiliated societies, the RSGB, IARU Region 1 or the IARU as a whole, it must be adaptable, flexible, logical and up-to-date. To meet these and opher requirements a number of wide-ranging proposals have to be discussed.

Early in the next decade a World Administrative Radio Conference is likely to be held. As in 1979 and previous years, frequency allocations will be reviewed. The conference was urged to commence preparations for this in order that a unified approach could be adopted.

The Administrative Council of the IARU, at its meeting in Buenos Aires, made a resolution "Concerning guarantee of the exclusive right of a member society to represent the IARU to its government". The statement following the heading consisted of two long sentences of eight and six lines respectively. Neither the meaning nor the implications of this resolution was obvious; accordingly it was referred back to the Administrative Council for clarification.

A discussion document entitled "Financing for IARU" had been prepared by the chairman of Region 1, PA0LOU, which showed that a contingency could occur making it necessary for the IARU International Secretariat to be both independent and self-supporting. For many years the International Secretariat had been financed by the American Radio Relay League (ARRL), giving the latter the right to nominate the president and vice-president of IARU as well as appointing the secretary. Following an extended discussion, during which warm tributes were paid to the generous provisions which had been made by ARRL, a majority of the societies voted in favour of the principle of a fully independent organisation (there were two societies against and four abstentions). A further discussion centred on the principles by which the funding might be achieved. These views will be considered by the Administrative Council. It must be emphasised that this is merely a concept, to be reconsidered at future conferences of all three Regions.

A new draft constitution for the IARU (i.e. the world organisation) had been prepared by its Administrative Council; comments were invited from each of the three Regions. At the Region 3 conference, a working group chaired by G3GVV had produced both general and specific comments, together with a proposed revision. These comments had been discussed and were then reviewed at the Region 1 conference, when certain proposals were accepted; they will be considered by the Administrative Council and further modification will then take place. The rules and regulations concerning the running of IARU have now been examined by all Regions, ensuring that wide consultation has taken place.

For Region 1, the Executive Committee had prepared a draft proposal for a new constitution and by-laws. These were circulated in 1986 to member societies with a request for comments. Early in the conference it was agreed that a working group be set up to examine proposed amendments already received, to identify principal items and to formulate proposals based on these items. The working group, which was chaired by DJ7ZY, included PA0LOU, SP5FM and I1RYS from the Executive Committee, together with representatives from 15 other societies. The RSGB was represented by G3GVV. The working group met four times, after which the Committee decided that an editorial group chaired by G3GVV should consist of OH5NZ, DJ7NY, SP5FM and I1RYS. This latter group, which was joined frequently by PA0LOU, was in session from 0830 to 2330 on the penultimate day of the conference - after which the Region 1 office staff had the task of producing the final draft for every delegate! To the relief and delight of the chairman of Region 1, the new constitution was approved at the Final Plenary and thereby replaces a modest document produced and issued a quarter of a century ago.

What was discussed on specific topics?

The Monitoring System

(report by G3PSM)

The Report and Recommendations of the IARU Special Working Group which met in Geneva during 1985, and which I had attended as an observer on behalf of the RSGB, was ratified by the conference without dissent. This paper, which was submitted by the IARU Administrative Council, had already been ratified by the Region 3 conference in Auckland and the Region 2 conference in Buenos Aires. The document now constitutes official IARU policy and paves the way to pursuing the primary objective of official recognition of the IARU Monitoring System by the International Telecommunication Union through the International Frequency Registration Board (IFRB). As a step towards this goal the international co-ordinator, ZL1BAD, has already been invited to submit reports to the IFRB on a test basis, with the full backing of the New Zealand telecommunications administration NZPO. The results of this action will be followed with great interest by all concerned. This is an important first step and it is again an indicator of the seriousness with which the work of the Monitoring System and participating radio amateurs is taken by the governing bodies.

A statement made by the RSGB delegation to the effect that it was shortly hoped to re-activate the RSGB Monitoring System (Intruder Watch) was greeted with enthusiasm, not only from the Region 1 societies but also from observers representing Regions 2 and 3. In addition, the RSGB was asked to advise both the Italian society ARI and the Yugoslav society SRJ on the setting-up of organisations within their respective societies.

A liaison visit to the monitoring station of the Netherlands PTT was also undertaken by a number of delegates, including myself, and great interest in the work undertaken by the station was shown. The facility was very similar to that of the DTI's Radio Monitoring Station at Baldock as far as the HF spectrum was concerned, although the Netherlands facility also took considerable interest in VHF and UHF monitoring. The very close co-operation which existed between the Dutch national society VERON and the PTT was clearly evident, and a number of PTT employees admitted to holding amateur radio licences!

As far as the Monitoring System itself is concerned, although there is input into the office of the Region 1 co- ordinator from VERON, DARC, SRAL and SSA it was stressed most strongly that participation from the RSGB was not only encouraged but was positively expected. Maximum effort is being called for in view of the imminence of the next WARC, which is scheduled for 1992. This is especially true in view of Resolution 641 (Revised), which was one result of the 1987 HFBC WARC. This calls for the removal of all broadcasting stations from the 7 MHz exclusive amateur allocations. We have been informed that the ITU Secretary-General has already acted on this Resolution and that letters have been sent to all administrations.

The work of the IARU Monitoring System is followed with interest by administrations as well as the International Telecommunication Union, and this work should be supported by as many national societies as possible - including RSGB.

HF matters

(report by G3ZAY)

Future HF beacon networks were discussed in considerable detail. The International Beacon Project (IBP) co-ordinator, G3DME, is working closely with the Northern California DX Foundation to establish world-wide time-division chains on 21150 and 28200 kHz which are similar to the one which already exists on 14100 kHz; the beacons for the three bands may in fact be located at the same sites to enable exact propagation comparisons to be made. On 28 MHz the beacon band will be reduced at the end of 1989 from the present allocation of 28200-28300 to 28190-28225 kHz. The portion between 28190 and 28199 kHz will be used for regional chains, 28200 will carry the main global chain and 28201-28225 kHz will be used for continuous-duty beacons. Beacon frequency spacing will be 1 kHz.

Considerable progress was made with band-planning matters. A new plan for the 1.8 MHz band was agreed, showing CW up to 1840 kHz, CW and SSB between 1840 and 2000 kHz and RTTY between 1838 and 1842 kHz. On 3.5 MHz, 3624 kHz was adopted as a meeting frequency for meteor scatter enthusiasts. Policy with regard to the 10 MHz band was left unchanged but the IARU Region 1 HF Committee will examine the situation in more detail next year. At 14 MHz the RTTY section was designated as 14070-14099 kHz. FM repeater experiments in the 28 MHz band were given the green light under the supervision of the IARU HF Committee, with the provision that the experiments would be terminated by the end of 1988. Norway, Sweden and Cyprus announced plans for such repeaters. The 28 MHz satellite sub-band will be re-examined next year, following requests from Regions 2 and 3 to see whether it can be reduced slightly. Input on this topic is awaited from the USSR, whose satellites have been the only recent users of this band.

There was some discussion about the possibility of automating QSL bureaux, and the German society DARC will be investigating the feasibility of automatic callsign recognition and QSL sorting. In the meantime, anyone ordering a lifetime's supply of cards would do well to leave a lower margin of at least 15mm on the front or back to enable callsigns to be encoded in machine-readable characters.

Conference reaffirmed the principle that Morse code should be retained as a requirement for operation below 30 MHz. The USSR announced that its own "no-code" HF licences were being withdrawn, with existing holders being given one year to learn the code.

The spread of packet radio across the HF bands, particularly in the form of unmanned bulletin boards, gave rise to concern and it was agreed that 300 baud packet should be confined to the RTTY sub-bands.

There was a strong move towards the simplification of the awards-issuing process, with a recommendation that QSL cards should be checked as far as possible by national societies rather than having to be sent round the world. It was also recommended that, where QSLs are not required, a simple statement from the applicant that the conditions of the award have been satisfied should suffice.

A new category of "reserved operating frequencies" was created in the HF band-plan to protect the 14, 21 and 28 MHz beacons and the satellite sub-band.

A proposal to encourage meteor scatter experimentation at 28 MHz was strongly supported.

Finally, objectives for additional HF spectrum at the next WARC were agreed.

HF contests

(report by G6LX)

The procedures for dealing with HF contest matters at IARU Region 1 conferences was covered in the "Cefalu" report which appeared in the September 1984 edition of Radio Communication. There has also been mention of these procedures in the subsequent reports of the Lubeck and Vienna meetings of the Region 1 HF Working Group.

The HF Working Group (renamed the HF Committee during the conference) was formed during the 1981 Brighton conference. It has the responsibility of dealing with all HF matters, including contests, which are of common interest within Region 1. Recommendations made by this body are passed to the tri-annual conference for ratification or modification as decided by the delegates. The chairman is elected at each conference and is currently DJ6TJ, who took over the post from G3FKM in 1984. Contest maters within the HF Committee have been co-ordinated by LA5QK, who has had the almost impossible task of steering member societies towards the common objectives agreed at the tri-annual conferences.

Not only does the HFC have a very full agenda for its meetings, which limits discussion, but there is an additional difficulty that a number of societies do not send their contest representatives to either the HFC meetings or to the conference itself. This has resulted in some very strange decisions having been made, which have needed a great deal of further discussion and modification before they can be implemented. Typical of these was the multi-mode Field Day ruling at Cefalu which, despite being raised at two separate HFC meetings and having had provisional rules agreed, still attracted a further five papers at the 1987 conference. This is only one example. Prior to the present conference there was a number of other contest mattters - some going back to the 1981 conference or even earlier - which still remained to be resolved.

A number of societies have been concerned about this lack of progress and also the procedures which allow non-contest representatives to make unworkable decisions. Whilst LA5QK has made great efforts, his problems have been aggravated by the need to follow established procedures. In 1985 the RSGB, with the help of LA5QK, began to correspond directly with other societies on matters relating to contests and a good working relationship has now been established with the contest managers of a number of the Region 1 societies. These links resulted in Italy, the USSR and others taking part in the 1986 NFD contest for the first time. They also proved useful during both the Vienna HF meeting and the 1987 conference, since the contest representatives who were present were able to put forward proposals which had been agreed beforehand, thus saving valuable meeting time.

During the conference the Hungarian national society MRASZ and the RSGB, with the support of LA5QK, proposed that these links should be extended and made more permanent by the setting-up of a special contest group within the HF Committee. This was adopted unanimously by the conference, which appointed your scribe as its first chairman. The group will take over the work previously done by LA5QK (now elected to the Executive Committee) and will additionally operate under terms of reference which were agreed by the conference. These include co-ordination of all contest matters within Region 1, the implementation of decisions made at previous conferences such as the reduction of contest weekends by merging events which are alike and the limiting of contest periods to a maximum of 24 hours or less. The group will also provide a link between the contest managers in Region 1 and between Region 1 and Regions 2 and 3.

The group met twice during the conference. The first meeting was attended by DJ6TI, DK2BI, F9LT, HA6NN, HB9AGA, HB9DX, I1ZCT, K1ZZ (IARU secretariat), LA5QK, OE3REB, OK1ADM, ON6JG, OZ5DX, PA0INA, SP9ZD, UW3AX, Y21TL, YT3AA and representatives of RSGB. After dealing with the Terms of Reference and the proposed method of working, the group reviewed Field Day events. It was recognised that although there was a real desire to agree common rules, there were still some wide differences between societies, both for the CW event (NFD) and SSB FD. Rather than attempt, once again, to harmonise these differences (scoring, power, antennas and sections), the group unanimously decided to recommend to the conference that the Region 1 CW FD (NFD) should revert to its pre-Cefalu format allowing each participating society to operate under its own local rules. Dates and times will be common; the first full weekend of June, 1500 GMT - 1500 GMT. All societies will be encouraged to support Field Day and to include 1.8 MHz operation where permitted by local licensing conditions.

The proposal by Switzerland to change the date when there was a clash with the Continental Whitsun holiday weekend did not receive widespread support and was withdrawn. A number of societies were keen to have some form of common listing of results, although it was realised that because of the differences in the rules a points comparison would be meaningless. It was agreed that the group would produce a "league table" of the leading stations from each participating country based on the number of QSOs achieved.

The previous recommendation that the SSB FD event should become a National Field Day with common dates and times was also reviewed in the light of further proposals which had been made by several societies. In particular, concern was expressed about the clash with the IARU Region 1 VHF contest and with the LZ International DX contest, both of which take place during the first full weekend of September. Alternative dates in July were proposed, but since these clashed with the well-supported IARU HF World Championship event and others - including the Region 1 VHF NFD - it was decided to keep to the September weekend. A set of guide-lines for Field Day organisers, previously prepared by LA5QK, was revised to take account of the proposed changes. All the Field Day decisions were subsequently submitted to the conference and were accepted as Region 1 policy. From the standpoint of RSGB members who support the two Field Day events, these were excellent decisions.

The contest group also examined a number of other proposals including the standardisation of contest log-sheets, 1.8 MHz events and other similar matters. Several societies had put forward their ideas about log-sheets. However, it was agreed (and subsequently accepted by the conference) that the draft prepared by G3NKS before the 1981 Brighton conference and subsequently used by the RSGB was satisfactory and should be adopted as the standard. It is possible that a new form of cover sheet may be needed, but this will be a matter for future discussion. It was noted that despite previously agred conference decisions to limit international contests to 24 hours, some societies were still using a 36- or 48-hour time span. The societies concerned were requested to review the position and take up the 24-hour period as soon as possible. It was also noted that not all societies were using the agreed contest operating frequency segments in their rules and it was decided that these must be adopted for all contests.

There was a second meeting of the group, which was attended by representatives of 19 societies. This meeting dealt with a number of contest-related matters, including the problem of those who cheat by "bending" the rules, use excessive power or include in their entries contacts which had not taken place. Over half those present reported on this problem and it was agreed that societies must take a tougher line on these malpractices. Various actions - including publicity, exclusion from future contests and other penalties - were agreed and will be implemented whenever necessary by the organising societies within Region 1. The group also discussed contest exchanges (i.e. serial numbers, postcodes, zones, etc) and it was agreed that there was a need to establish standards since this would ease the merging of contests.

Much of the future work of the HF Committee contest group will be carried out by means of regular exchanges of correspondence between the persons responsible for contests within the participating societies. RSGB members will be kept fully informed on all matters of interest via Radio Communication, and the Society's various other news outlets such as GB2RS and the DataBox.

The amateur satellite service

(report by G2UK)

The amateur satellite service came up for consideration in both Committee A and Committee B, which necessitated some quick shuffling between them by your scribe. There were three papers put forward for discussion by the conference - one from the Italian society ARI, one from the RSGB and one dealing with matters which had arisen from recent IARU conferences in Regions 2 and 3.

Over the past few years, two quite distinct difficulties have arisen within the satellite world. The first is that the builders of amateur radio satellites are a quite different breed from the users, and communication between the two is poor. The second is that involvement in amateur radio satellite activity amongst radio amateurs as a whole has not been so great as was expected. There are some very expensive pieces of machinery flying around in space and not nearly enough use is being made of them.

The Italian paper, entitled "The desirability of more involvement of member societies in the amateur radio satellite service" expressed the problem exactly in its title. The recommendation which was proposed to help the situation was that member societies should make continuous efforts to publicise satellite techniques in order to encourage their use and that articles aimed at beginners should be encouraged in the amateur radio press.

The recommendation also drew attention to the present tendency towards the construction of very high-tech satellites which have become more difficult to use, particularly by newcomers to the satellite scene.

A lesser problem which has caused difficulties at times is the delay in the promulgation of orbital data, launch times, operating frequencies and so on. Very often one has to wait until several orbits have taken place before even the most basic information has become available, and this from ground station observations and not from the satellite's operators. The recommendation in respect of this problem was that amateur radio satellite operators should be invited to supply - in adequate time - basic information concerning their satellite to all IARU Region 1 societies via the IARU Region 1 satellite co-ordinator and the IARU Region 1 office. Thjis recommendation was also to be passed on to Regions 2 and 3 for their information.

Matters relating to interference with frequencies within the amateur satellite service were contained in an RSGB submission. A proposal for a geostationary 10 GHz satellite produced some interesting discussion, which resulted in a proposal for a feasibility study to be carried out within the next few months.

Amateur television

(report by G3VZV)

There were four papers relating to the use of amateur television at 430 MHz. It was agreed that the Brighton recommendation, that "....ATV operators should be encouraged to move to higher bands" should be modified to read;

> "ATV operators should be encouraged to use the microwave allocations where available but continue to use the 430 MHz band where permitted by their licensing authority. In cases of interference between ATV and the amateur satellite service, the amateur satellite service should have priority".

The Belgian paper proposing an IARU Region 1 ATV contest was agreed and a draft set of rules was approved. This contest will take place in September each year.

It was agreed that the provisional bandplans for the microwave bands would encompass ATV under the heading "all modes" but that defined ATV allocations should be established as soon as possible, as it was noted that the actual presence of ATV in the microwave bands could be useful in the defence of these allocations.

EMC Working Group

(report by G3AEZ)

Under the chairmanship of SP9ZD, this working group consisted of representatives of ARI, CRCC, DARC, EDR, RSGB, USKA and SSA together with JM1UXU and ZL2AMJ.

The recent coverage of EMC topics in Radio Communication, which also appeared as a conference paper, was welcomed, as was the presence of G3AEZ as the RSGB representative at the conference and a member of IARU Region 1's EMC Working Group. G3AEZ supplied additional press cuttings on EMC problems in the UK; he also met the amateur liaison officer of the Netherlands PTT and has subsequently received some relevant publicity material from him. G3AEZ is currently collating information to send to members of the Working Group.

Committee B

(report by GM4ANB)

This committee considered matters affecting frequencies above 30 MHz. C. van Dijk, PA0QC, again performed his usual excellent job as Chairman. GM4ANB acted as minutes secretary.

According to the timetable Committee B met for about 22 hours over the first three days of the Conference. What actually happened was that early in the first session sub-committees were set up to look into contest rules, packet radio, meteor scatter procedures and microwave bandplans. These kept most delegates occupied well past the official close of business each day, often into the small hours of the next morning.

Throughout the meetings, the RSGB was well represented by Keith Fisher, G3WSN (vhf manager), G3ZNU (VHF Committee chairman), G3RPE (microwave manager) and G4KGC (Microwave Committee). Also present as observers were Graham Shirville, G3VZV (BATC) and Arthur Gee, G2UK (AMSAT).

What follows is a summary, in no particular order, of the recommendations made by Committee B and ratified at the final plenary meeting, with particular emphasis on matters immediately affecting operation in the UK. For brevity, the term "VHF" is used to mean "VHF/UHF/Microwaves".

BANDPLANS

Relax, the bandplans have not been torn apart! However a few clarifications and minor adjustments have been made.

A word of explanation is in order here. The official IARU Region 1 VHF bandplans are all organised into two columns. The left hand column is the bandplan proper. It indicates division of the band into sections for fundamentally incompatible modes. For example, SSB and FM are generally kept to different parts of the band. They cannot easily communicate with each other, and keeping them separate means less interference for everyone.

The right hand columns are labelled "usage". These are frequencies or bands of frequencies recommended for specific purposes. They are not reserved frequencies, but places where certain activities tend to take place. Usually they reflect usage that amateurs themselves have established, rather than being pulled out of thin air by IARU. For example, 432.350 MHz has for a long time been recognised as being used for microwave talkback. An entry in the "usage" column does not mean so much "everyone else keep out" as "if you do this, here is a particularly good place make QSOs".

50 MHz

Starting with the lowest band in the Committee B remit, the 50 MHz bandplan in Table 1 was adopted following an RSGB proposal. Unlike most VHF bands, the beacons are at the bottom. This is to take advantage of the great sensitivity to frequency displayed by some propagation modes around 50 MHz. For the same reason, the very bottom 20 kHz has been left available for CW to allow the best of the propagation to be used for communication.

144 MHz

On 144 MHz the only significant change for the UK is the designation in the "usage" column of 144.625 to 144.675 MHz as "Digital Communications". This mainly means packet radio.

There was quite a long discussion on the 144 MHz beacon sub-band, which at present runs from 144.845 to 144.990 MHz. Several Societies, including RSGB, think that this is too much. In the end no change to the beacon sub-band was made. However, Societies will be getting together over the next year or so to try to find an agreement about whether it should be reduced, and if so by how much. This topic is certain to be raised again at the 1990 Conference in Spain.

430 MHz

Moving up to 430 MHz, the following frequencies were designated in the usage section as "Digital Communications" - packet radio again:

430.600 to 430.800 MHz
432.625 to 433.657 MHz
438.025 to 438.175 MHz

It was thought a good idea to have more than two frequency bands for digital communications at 430 MHz to allow simultaneous transmission and reception from the same site; ie packet repeaters and split frequency network access points. The 430 MHz section was added to avoid interference from ISM in some countries.

There were two changes to the recommendations for ATV on 430 MHz. Neither will change the way ATV operates in the UK, but they do give it a little more recognition.

The first concerns carrier placement. Practices in different countries have varied in the past, some putting the carrier at the top of the band, and others putting it at the bottom. You can now officially do either. The exact wording of the recommendation is that "ATV transmissions in the 430 MHz band should take place in the segment 434 to 440 MHz. The video carrier should be below 434.500 MHz or above 438.500 MHz. National societies should provide guidance on the exact frequencies to be used, with due consideration to the interests of other users." In the UK ATV has for a long time used 439.250 MHz, which complies with this recommendation.

The second concerns the future of ATV on 430 MHz. At the Conference in Brighton in 1981 it was recommended that ATV should be encouraged to move to higher bands. The reasoning was that satellites would be making greater use of 430 MHz, and that mutual interference would occur. In the event, the interference has been much less than even the most optimistic estimates. With the backing of RSGB, the Brighton recommendation has been toned down. However, a caveat has been added. The full IARU recommendation now reads:

> "ATV operators should be encouraged to use the microwave allocations where available, but continue to use the 430 MHz band where permitted by the licensing authority. In the case of interference between ATV and the Amateur Satellite Service, the

50 MHz band plan — Region 1 (Table 1)

	Usage	
50.000		
CW only	50.020 to 50.80 50.090	*Beacons* *Centre of CW activity*
50.100		
All narrow band modes	50.200 50.300 50.350	*Centre of SSB activity* *CW MS* *SSB MS*
50.500		
All modes		
51.000		
Pacific DX window		
51.100		
All modes		
52.000		

1240 to 1300 MHz bandplan — Region 1 (Table 2)

	Usage	
1240.000		
All modes		*Digital communications*
1241.100		
ATV		
1251.500		
All modes	1258.150 to 1259.350	*R20 - R36 repeater output*
1260.000		
Satellite service		
1270.100		
ATV		
1286.000		
All modes c)		
1291.000		
Repeater input	RMO ⋮ RM19	*25 kHz spacing*
1291.475		
1291.500		
All modes	1293.150 to 1294.350	*R20 - R36 repeater input*
1296.000		
CW	1296.000 – 1296.025	*Moonbounce*
1296.150		
SSB / **Narrow band DX a) segment**	1296.200	*Narrow-band centre of activity*
	1296.500 1296.600	*Linear transponder input*
	1296.600 1296.700	*Linear transponder output*
1296.800		
Beacons exclusive b)	1296.500 1296.600 1296.700	*SSTV* *RTTY* *FAX*
1296.990		
1297.000		
Repeater output	RMO 1297.500 ⋮ RM19	*FM centre of activity* *25 kHz spacing*
1297.475		
1297.500		
FM simplex d)	SM20 ⋮ SM39	
1298.000		
All modes		*Digital communications*
1298.500		
1300.000		

Notes on the 1240 to 1300 MHz bandplan

1. **IARU Region 1 bandplan**
The following notes are part of the provisional IARU Region 1 bandplan, adopted at the IRAU Region 1 Conference in Cefalu (1984), and all member societies should strongly promote adherence to the recommendations made in these notes.

1.1. Footnotes
a. CW is permitted over the whole narrow-band DX part of the band; CW exclusive between 1296.000 to 1296.150 MHz.
b. Regional planning by the Beacon Co-ordinator only for beacons with more than 50 Watts ERP (see section IX).
c. DARC draws attention to the fact that in order to avoid interference to/from primary users the use of 1286 to 1291 MHz for ATV will be continued in The Federal Republic of Germany.
d. In countries which do not have access to 1298 to 1300 MHz (e.g. Italy) the FM simplex segment may also be used for digital communications, if necessary.

1.2. Miscellaneous agreements
At the IARU Region 1 Conference in Warsaw (1975) it was recommended that France, after their loss of the upper part of the band to other services, adopt the portion 1238 to 1240 MHz for narrow-band operations in the same way as the rest of Region 1 uses the 1296 to 1298 MHz segment of the band.

2. **Usage**
The following notes are referring to the Usage column in the bandplan. As already set out in the introduction to section IIc, in the right amateur spirit operators should take notice of these agreements which are made for operating convenience, but no right to reserved frequencies can be derived from a mention in the Usage column or from the following notes.

2.1. During contests and bandopenings local traffic using narrow-band modes should operate between 1297 to 1298 MHz.

Satellite Service should have priority." Note that in IARU language, "microwave" means "1 GHz and above".

1,296 MHz

Until now there has only been a provisional IARU Region I bandplan for 1,296 MHz. It is now definitive (Table 2). There are only a few changes from the provisional plan. Most significantly, the lower ATV segment has been move up by 1 MHz, retaining the same bandwidth, to allow an all modes section to be slotted in at the bottom. In addition the all modes sections at the top and bottom of the bands are now noted as being used for digital communications - packet radio etc.

HIGHER BANDS

The provisional bandplans for 2.3, 3.4, 5.6, 10, 24 and 48 GHz shown in Table 3 were adopted.

CONTESTS

One new IARU Regional contest - where amateurs throughout the Region compete on equal terms - has been added to the calender. From 1988 the IARU Region I ATV contest will take place during the second weekend in September. The first contest will be organised by the Belgian Society, UBA, and the second, in 1989, by RSGB. Look out for the full rules nearer the time.

(cont p.515)

2320 to 2450 MHz bandplan — Region 1

	Usage	
2300.000		
Sub-regional (National bandplans)		
2320.100		
CW exclusive	2320.000 2320.025	*EME* *(Moonbounce)*
2320.150		
CW & SSB	2320.200	*SSB centre of activity*
2320.800		
Beacons exclusive		
2320.990		
2321.000		
Simplex & repeaters (FM)		
2322.000		
All modes	2322 to 2355 2355 to 2365 2365 to 2370 2370 to 2390	*ATV* *Digital comms* *Repeaters* *ATV*
2390.000		
		EME (Moonbounce)
2392.000		
All modes		
2400.000		
Amateur satellite service		
2450.000		

Notes on the provisional 2300 to 2450 MHz bandplan

a) In countries which do not have access to the ALL MODES against 2322 to 2390 MHz, the FM SIMPLEX & REPEATER segment 2321 to 2322 MHz may be used for digital data transmissions.

b) In countries where the narrow-band segment 2320 to 2322 MHz is not available, the following alternative narrow-band segments can be used:
2304 to 2306 MHz
2308 to 2310 MHz

10000 to 10500 MHz bandplan — Region 1

	Usage	
10000.000		
All modes (ATV, data transmission, FM simplex, duplex and repeaters)		
10368.000		
Narrow-band CW/EME/SSB/ Beacons	10368.200	*SSB centre of activity*
10370.000		
All modes		
10450.000		
Amateur and amateur satellite service (all modes)		
10500.000		

Notes on the provisional 10000 to 10500 MHz bandplan

In those countries where the narrow-band segment 10368 to 10370 MHz is not available, the segment 10450 to 10452 MHz is suggested as an alternative narrow-band segment.

3400 to 3475 MHz bandplan — Region 1

	Usage	
3400.000		
All modes		
3456.000		
Narrow band CW/EME/SSB	3456.250	*Centre of activity*
3458.000		
All modes		
3475.800		

24.0 to 24.25 GHz bandplan — Region 1

	Usage	
24000.000		
Amateur satellite service	24125.000	*Preferred operating frequency wide-band equipment*
24050.000		
All modes		
24192.000		
Narrow-band CW/SSB/Beacons	24192.000	*Centre of activity*
24194.000		
All modes		
24250.000		

5650 to 5850 MHz bandplan — Region 1

	Usage	
5650.000		
Amateur satellite service (up-link)		
5670.000		
All modes		
5760.000		
Narrow-band CW/EME/SSB	5760.250	*Centre of activity*
5762.000		
All modes		
5830.000		
Amateur satellite service (down-link)		
5850.000		

47.0 to 47.2 GHz bandplan — Region 1

	Usage	
47000.000		
	47088.000	*Centre of narrow-band activity*
47200.000		

(cont from p.513)

There have been two changes to the way the winner of the IARU UHF/Microwave contest in October is determined. Note that these changes only apply to the IARU event; for RSGB contests the rules will be set by the RSGB VHF Contests Committee.

The first change is in the way the results from all the bands are combined to give the contest winner. From 1988 the overall winner will be calculated by the "adaptive multiplier" scheme. This sounds horrendous, but if you look closely it turns out to be exactly the same as normalising the scores on each band, as is already done for many RSGB contests. It is generally agreed that this gives a fairer result, as it automatically applies the same weight to each band, without the use of arbitrary multipliers. This is a welcome step forward, and one which the RSGB has been recommending for some time.

The 3.4 GHz band is unfortunately not available in all countries in Europe, which puts entrants from those countries at an obvious disadvantage when it comes to the October contest. In recognition of this, from now on the results from 3.4 GHz will not be taken in account in calculating the overall contest winner. There will still be a separate results table and band winner for 3.4 GHz.

As well as full regional contests, IARU also serves to make national contests more interesting by making them take place on the same date thoughout the region, so giving lots of opportunity for working dx. It was agreeed that from 1988 microwave contests (1,296 MHz upwards) should be organised to take place during the first weekend in June each year.

The topic of contest date co-ordination was also raised for QRP. The RSGB QRP contest has been popular since its inception, and simlar events in other countries are also well supported. Although there is as yet no single co-ordinated date for a QRP contest covering the whole of Region I, it was agreed that neighbouring countries would get together to try to arrange similar contests on the same day. Some early discussions to this end between RSGB and the Belgian society, UBA, started at the conference.

Finally on contests, IARU has now decided how big the Earth is. No, not a fit of megalomania, but a means to ensure that contest scores are all calculated on the same basis. There are various figures for the average radius of the earth used in computer programs to calculate distances, and it was time to settle on one. It does not greatly matter what value is used, so long as everyone uses the same. So from now on the figure to remember is 111.2 km/degree. This is equivalent to an earth radius of 6371.2907 km.

Most contest scoring computer programs calculate the angular distance between the stations in radians and multiply by the radius of the earth to get the equivalent distance in kilometres. So to make your program fit with the IARU standard, find where the radius of the earth is defined - it should be a value between 6360 and 6380 - and replace it by 6371.2907.

Note that this value is only intended to bring everyone together for scoring contests. It is not intended for other purposes, such as dx records, where more accurate calculations are needed.

PACKET RADIO

As well as the frequencies for packet radio, Committee B also looked at the transmission standards that should be used. The recommendations are as follows:

> For 300 baud fsk, use a frequency shift of 200 Hz.
>
> For 1200 baud afsk, use audio frequencies of 1200 and 2200 Hz. (This is in effect the Bell 202 standard).

It was recognised that in the future higher data rates will be achievable through the use of different modulation methods. It was agreed that in all cases the bandwidth used between a user (ie an amateur in the shack) and a network access point should not exceed 12 kHz. For links between packet network nodes higher data rates and larger bandwidths may be used. For such high speed (greater than 1200 baud) links, FM AFSK is now preferred.

What didn't happen?

The subject of FM channel spacing on 144 MHz came up once again. With the pressure on this band, especially in central Europe, there is a strong movement towards adopting 12.5 kHz spacing, instead of the current 25 kHz.

It has not happened yet, but at the last three conferences the pressure for a change has been greater each time. Given that many commercial services now use 12.5 kHz spacing, a similar switch by amateurs looks distinctly possible some time in the future.

Don't worry too much about it right now - but if you are buying an FM rig that you intend to keep for a long time, maybe you should consider whether a 12.5 kHz option would be a wise investment.

Between now and the next Conference there will be an exchange of views and data between Socities on the implications of a change. One important consideration will be the cost of converting existing equipment.

OVERVIEW

On the whole, the UK can be satisfied with the outcome from Committee B. Most of the ideas put forward by the RSGB were accepted, and where differences arose compromises acceptable to everyone, the UK included, were found.

There were no revolutionary changes to the way amateur radio will operate, above 30 MHz, but several agreements that should let most of us get at least a little bit more out of the hobby.

Most importantly, the IARU represents Amateur Radio in the international forum. By its very existence it demonstrates that amateurs will unite to strive to defend their bands, and for the next few years this is going to be very important above 30 MHz.

How was the conference organised?

There are two main organisers in different areas; the "host society" and Region 1.

VERON was the host society. It arranged the venue (a purpose-built conference centre), transport, a ladies' programme, a visit to the Delta Project and many unseen but important details. Tributes to VERON - and to its President, Jan Hoek, PA0JNH, were made at the Final Plenary; all who attended were most impressed by the friendliness and efficiency of our Netherlands colleagues.

Region 1 Secretariat had for many months been engaged in planning details and in the compilation and circulation of some 170 documents to each delegate. The Region 1

Secretariat consists of John Allaway, G3FKM, and Audrey Jefcoate, who is the office manager. At the conference they were joined by Rosemary Evans, Angelika Vos, GOCCI, Heather Norman and John Morris, GM4ANB. The two last-named also acted as secretaries for Committees A and B respectively. The Secretariat functioned morning, noon and most of the night; more than 50,000 sheets of A4 reports and minutes were produced on time, accurately and carefully.

Who will form the Executive Committee of Region 1 for the next three years?

The chairman, PA0LOU, vice-chairman, SP5FM, secretary, G3FKM and treasurer, I1RYS, were elected unopposed. The other members elected were YT7MM, LA5QK and 7X4MB. The election committee consisted of G3GVV (chairman), PA0AD and UW3AX.

What happens at the Final Plenary?

On the last day of the conference the work of the three main committees is received, discussed and accepted, amended or rejected. Every society therefore has the opportunity to express its views on a wide range of topics, and in so doing to let its opinions be known to other societies.

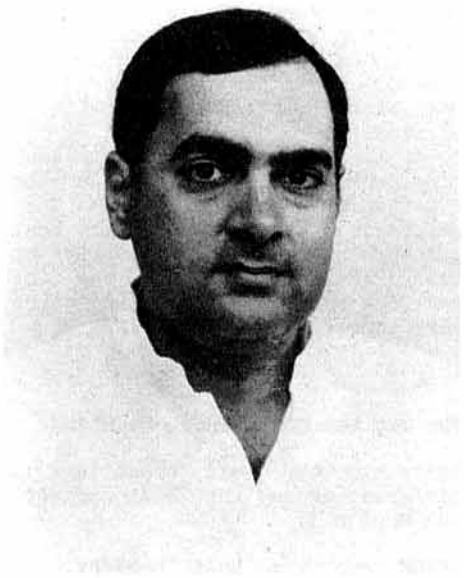
A number of presentations are made. The Roy Stevens Award was presented by Audrey Jefcoate to ZL2AZ (received on his behalf by ZL2AMJ) and to DL1FL. LX1JW received the IARU Region 1 Medal. DL1FL and G3FKM received the PZK Honorary Medal. The President of IARU presented G3FKM with the CQ Hall of Fame award for his outstanding contribution to DX work.

Final-final

This was a successful conference. Its recommendations will now be discussed and implemented by the relevant RSGB committees.

It was an arduous conference. The scheduled meetings between 0830 and 1730 were followed by working groups which met until midnight or later.

It proved - if proof were necessary - that personal contact can achieve so much; that no society can function in isolation; and that the work of the RSGB is significant in Region 1 and the rest of the world.



PRIME MINISTER MEETS NIAR OFFICERS:

Prime Minister Sri Rajiv Gandhi, VU2RG, received two officers of the National Institute of Amateur Radio (Hyderabad) at his residence earlier this year.

The Deputy Director, Miss Bharathi, VU2RBI and Administration Officer, Mr K Rama Rao, called on Prime Minister Gandhi to present a memorandum giving details of the developments taking place at NIAR. Miss Bharathi made a special request to the Prime Minister to see that assured funds are released as soon as possible and to extend help to the 20-member NIAR team to go on the Andaman and Nicobar Islands DX-pedition. Miss Bharathi pointed out that the DX-pedition project had received the agreement of both the Ministry of Defence and the Ministry of Communications following representations by NIAR.

The National Institute of Amateur Radio (Hyderabad) is a prominent radio club in India but is not a member of IARU.

DTI NEWS

UK AMATEURS ON THE INCREASE:

We've recently received from the DTI the latest figures for the numbers of current Amateur Licences in the UK as at the end of April. They are as follows:-

Class A - 30,242
Class B - 27,166
Total - 57,408

This represents an increase of just under 2.4% over the last 12 months.

It's interesting to note that the number of Class B licences has risen very little and that almost all of the increase is in the number of Class A licences. This may be due to several factors, not least of which is the increase in the number of Morse Test Centres and the halving of the test fee since the Society took over Morse testing on behalf of the DTI last year. There is still a steady stream of candidates taking and passing the RAE and this appears to correspond to the number of licensees transferring from class B to A after having passed the Morse test, indicating a steady flow of upgrading. The number of people skipping the class B stage - by taking and passing both the RAE and Morse test before applying for a licence - does not seem to be increasing very noticeably.

MORE PROSECUTIONS:

The number of prosecutions for offences under the Wireless Telegraphy Act for the first quarter of 1987 was 111.

BEACON NEWS:

BEACONS OFF THE AIR:

The GB3CTC beacons on 70, 144 and 430 MHz are off the air until further notice to allow for a change of mast and the replacement of feeders. More news as we get it.

CHANGE OF BEACON CALLSIGN:

Following the installation of a new transmitter, the callsign of the Martlesham Heath 1.3 GHz beacon has been changed from GB3BPO to GB3MHL. The frequency remains unchanged at 1296.830 MHz.

Events Diary

Mobile Rallies

This is a list of all rallies, exhibitions and conventions notified to HQ (as at press date). Items are given in detail for the next three months inclusive and in brief thereafter. Please send detailed information, including contact callsign and telephone numbers direct to HQ and marked 'Bulletin'.

12 JULY

*Sussex Mobile Rally - Brighton Racecourse. Usual trade and club stands. *RSGB Stand*. Free mini-bus to the Brighton sea-front for children and families. Refreshments and bar. Talk-in on S22. Details G4HUJ, tel: 0903-200572 evening.

*Widnes & Runcorn ARC Radio Rally - Queens Hall, Victoria Road, Widnes. Rally opens at 10.30am (10am for disabled). Trade stands, bring & buy stall, licensed bar & refreshments, ample car-parking. Details from G1AWW tel: 051-424 8116.

*Worcester & DARC Droitwich "Strawberry" Rally - High School, Droitwich. Opens 11am. Usual trade stands, family entertainment, free transport to local strawberry fields (weather permitting). Free parking, free entrance, talk-in on S22. Morse tests bookable via RSGB. Details Steve, G0AOC.

17/18/19 JULY

*AMSAT UK Colloquium - University of Surrey, Guildford. Series of lectures and demonstrations by leading lights in the amateur satellite field. Social events, Delegates Dinner and tours of UoSAT control station. *RSGB STAND*. Remote Imageing Group, BARTG, AMRAC and many other groups will be present. Details Ron, G3AAJ, tel: 01-989 6741. NOT UNIVERSITY OF SURREY.

19 JULY

*Cornish Mobile Rally - Camborne College of FE. Opens 10am, usual traders. Talk-in available. Details G1AJB.

*McMichael '87 Rally - Haymill Youth & Community Centre, 112 Burnham Lane, Slough. Opens 10.30am (10.15am for disabled visitors). Usual traders, real ale bar, something for the whole family. Car-boot sale, ATV demo, HF Special Event Stn GB4MR. Talk-in on S22 and SU8 by G6WIR - Burnham Beeches RC. Details G0BTY, tel: High Wycombe 29868.

*Anglian Mobile Rally - High Woods Sports & Leisure Centre, Severalls Lane, Colchester. Opens 10am, all usual traders, bookstall, raffle, bring & buy, home catering. Talk-in on S22 by G4CRA. Details G6HQI tel: Colchester 862403.

26 JULY

*Scarborough ARS Rally - The Spa, Scarborough. Open 11am, usual traders, right on the beach so ideal for the family. Talk-in on S22, SU8 and via GB3NY. Details Ian G4UQP, tel: 0723-376847.

2 AUGUST

*Rolls-Royce ARC Mobile Rally - Rolls-Royce Sports & Social Club, Barnoldwick. Easy access from A59 and A56 between Burnley and Skipton. Opens at 11am and all the usual traders. Bar & refreshments. Talk-in on S22. Details, G4ILG, tel: 0282 812288 or 0282 813271 (day).

*RSGB MOBILE RALLY - Woburn Abbey, Woburn, Bedfordshire. Usual traders, *Large RSGB Stand*, House & Gardens for family, cafeteria and shop, open spaces ideal for picnics, wildlife park nearby. Details from RSGB HQ.

9 AUGUST

*30th Derby Mobile Rally - Lower Bemrose School, St Albans Road, Derby. Usual traders, flea market & monster junk sale. Details Martin G3SZJ, tel: 0332 556875.

*Hamfest '87 & Craft Fair - Flight Refuelling Club, Merley, near Wimbourne, Dorset. Opens 10am, usual traders, bring & buy stall, craft stalls, family entertainment, refreshments. Details Ashley G0CDY, tel: 0202 872503.

16 AUGUST

*Red Rose Rally - Bolton Sports & Exhibition Centre. *RSGB Stand*. Opens at 11am (10.30 for disabled visitors - ALL ON PAVEMENT LEVEL). Usual traders, bring & buy stall, raffle, refreshments & bar seating area. Talk-in on S22 by GB2RRA. Details Dave, G1IOO tel: 0204-24104 (evenings).

30 AUGUST

*Torbay ARS Mobile Rally - STC Social Club, Brixham Road, Paignton. Opens 10am, usual traders, bring & buy stall. GB2NJA demonstration station also providing talk-in on S22. Details G3KZJ, tel: 08045 51995.

*BARTG Rally - Sandown Park racecourse, Esher, Surrey. Opens at 10.30am. Usual traders, everything for those interested in RTTY/AMTOR/Packet communication under one roof as well as general amateur radio equipment and components. Car-boot sale, full catering facilities. Ample car parking and talk-in on S22. Details Peter G8VXY (QTHR).

31 AUGUST

*Doncaster & Dist Raynet Rally - Bircotes Sports Centre, Waterslack Lane, Bircotes, Doncaster. Opens 11am (10.30am for disabled visitors). Usual traders, bring & buy, refreshments. Talk-in on S21 by G4YRD.

6 SEPTEMBER

*Preston ARS 20th Annual Rally - Lancaster University. Details G3DWQ, tel: 0772 53810.

*Bristol Radio Rally - Hareclive Youth & Harecliffe Community Centres, Hareclive Road, Harecliffe, Bristol. Opens 10am, usual traders, bring & buy stall, bar & refreshments. Talk-in on S22 by GB2BRR. Details Len G4RZY, tel: 0272 834282.

*West Kent Amateur Radio Rally - Angel Centre, Tonbridge, Kent. Opens 10.30am, usual traders, bring & buy stall, club stands, Stamp Fair. Talk-in by GBOWKS on S22, SU8 and 29.500 MHz FM. Details G4KIU, tel: 0892 515678.

12 SEPTEMBER

*Ballymena Mobile Rally - Ballee High School, Ballymena. Details GI4HCN.

13 SEPTEMBER

*Lincoln Hamfest - Lincolnshire Showground, Lincoln. 4 miles north of Lincoln on A15 Lincoln to Scunthorpe road. Opens at 10.30am. All usual trade stands, *RSGB Stand*, bring & buy, refreshments both inside & outside of hall, real ale bar. Lots of attraction for the whole family including raffles, flypast by WW2 Spitfire, helecopter rides (hopefully), model cars & model aircraft displays. Morse tests bookable via RSGB. Caravan welcome. Talk-in on 2m & 70cm. Details G8VGF, tel: 0522 25760

*Scottish AR Convention - The Magnum Sports & Leisure Centre, Irvine, Ayrshire. Usual traders, *RSGB Stand*.

*National Amateur Radio Car Boot Sale - Old Warden Aerodrome, Biggleswade, Beds. Opens 10am, trade and private stands (over 250 last year), restaurant and cafe, The Shuttleworth Collection Aircraft and Motor Museum. Talk-in on S22 by GB4SC. Old Warden Aerodrome is well signposted from the A1. Details Wendy, tel: 0582 451057.

*Telford Mobile Rally - Telford Racquet & Fitness Centre. Arrive via M54 (junc 5) or A442 from north or south. Opens 11am (10.30am for disabled visitors). Usual traders and attractions. Lecture by MAXPAC, G3RZP/G4FNC and G3SEK. Talk-in by GB4TRG on S22 and SU8. See advertisment in August issue of Radio Communication. Details G3UKV on Telford 55416.

20 SEPTEMBER

*Peterborough R & ES Rally - Wirrina Sports Stadium, Peterborough. Details G4PNW.

*Trafford Rally & Components Fair - Lancs CCC (Old Trafford), Talbot Road, Stretford, Manchester. Opens 10.30am (10am for disabled visitors all on ground floor) Talk-in on S22. Details G1IJK, tel: 061-748 9804.

*Vange ARS Rally - Nicholas School, Leinster Road, Laindon. Opens 10am. Talk-in by GB4VMR. Details Alan G4OJN, tel: 02774-4386.

27 SEPTEMBER

*RSGB HF CONVENTION - Belfry Hotel, nr Oxford. *DATE CORRECTED FROM LAST MONTH'S ISSUE*. Opens 10am, comprehensive lecture programme, awards presentations, competitions, stands by special interest groups, refreshments & bar. Special B&B and Weekend rates available from the Belfry Hotel. FCC Examinations will take place at the hotel on Saturday 26 September.

*Harlow Mobile Rally - Harlow Sports Centre. Details G4KVR, tel: 0279 22365, daytime or G3UEG, tel: 0279 27788, evenings.

IN BRIEF - More details later.

4 OCTOBER

*Welsh Amateur Radio Convention - Oakdale Community Centre, Blackwood, Gwent. Details Brian GW3KYA, tel: 0495 225825.

*Wakefield Mobile Rally - Details G4RCH, tel: 0532 536633.

*Great Lumley AR & ES Rally - The Comunity Centre, Great Lumley, Chester-le-Street, County Durham. Details G4MSF, tel: 091 469 3955.

10 OCTOBER

*RSGB MIDLANDS VHF CONVENTION - Madeley Court Centre, Telford, Shropshire. Details Peter G3UBX.

11 OCTOBER

*Armagh & Dungannon District ARC Mobile Rally - Drumshill House Hotel, 2 miles from Armagh on Moy Road. Details GI0ADD.

23/24 OCTOBER

*Leicester Amateur Radio Exhibition - Granby Halls, Leicester. Details Frank G4PDZ, tel: 0533 553293.

1 NOVEMBER

*Carmarthen ARS Exhibition & Rally - Leisure Centre, Johnstown, Carmarthen. Details GW3GUE, tel: 026 783 460.

7 NOVEMBER

7th North Devon Radio Rally - Bradworthy Memorial Hall, near Holsworthy. Details G8MXI (QTHR).

7/8 NOVEMBER

*North Wales Radio Rally - Aberconwy Conference Centre, Llandudno, Gwynedd. Details Derrick Watts, tel: Colwyn Bay 530041.

15 NOVEMBER

*Bridgend Rally - Bridgend Recreation Centre, Angel Street, Bridgend. Details GW1OUP, tel: 0656 723508.

22 NOVEMBER

*West Manchester RC Winter Rally - Pembroke Halls, Walkden. Details G1IOO, tel: 0204-24104.

6 DECEMBER

*Verulam Christmas Rally - St Albans City Hall. Details Hilary G4JKS, tel: 0727 59318. Trade: Watford 52959.

13 DECEMBER

*Leeds & District ARS Christmas Rally - Pudsey Civic Centre, Dawsons Corner, Pudsey, nr Leeds. Details G4WYD, tel: 0274-658039.

31 JANUARY

*26th NARSA Exhibition - Norbreck Castle Exhibition Centre, Blackpool. Details Peter G6CGF, tel: 051-630 5790.

OTHER EVENTS

12 JULY

*RAIBC Romsey Picnic - Broadlands, Romsey, Hants. Details John G4COM, tel: 0703-693017.

19 JULY

*Microwave Bands Assembly and Dinner - The Dunstall Suite, Dunstall Racecourse, Wolverhampton. Details F T Smith G6FK, tel: 0902-343746.

23 AUGUST

*Newbury & Dist ARS Radio Car Boot Sale - Acland Hall & Recreation Ground, Cold Ash, Newbury. Details G3VOW.

30 AUGUST

*Galashiels & District ARS Open Day - Focus Centre, Livingstone Place, Galshiels. Details John GM0AMB, tel: 0896-55569.

*SMC Open Day **(CHANGE OF DATE)** - Chandlers Ford Industrial Est, Eastleigh, Hants. Opens 10.30am, talk-in on S22 by G4SMC. Richard Diamond (SMC), tel: 0703-255111.

8 SEPTEMBER

*Rugby Amateur Transmitting Society Auction & Barbecue - Cricket Pavilion, BTI Radio Station, Hillmorton, Rugby. Details Kevin G8TWH, tel: 0788-77986 (eve).

GB Calls

The list below shows **ALL** the special event stations licensed for operation during July and early August - **(as at press date)**

It is taken direct from the GB Calls file on the HQ computer. These callsigns are valid for use from the date given but the period of operation may vary from 1 to 28 days. There's now no need to send details direct to the editorial office.

1 JULY:

GB0IOW - ISLE OF WIGHT: Royal Needles Hotel Complex, Alun Bay, IOW. Details G3FWE.
GB1CDE - COASTAL DEFENCE "E": Fort Purbrook, Grid: SU 678 064. Details G6OTY.
GB1CDT - COASTAL DEFENCE "T": Fort Nelson Site. Grid: SU 607 071. Details G8POQ.
GB2DJ - DIAMOND JUBILEE: Elvaston Castle Country Park, nr Derby. Details G4XPE.
GB2ERD - GB CLUB CALL (Derby & DARS): Elvaston Castle Country Park, nr Derby. Details G4HDP.
GB2ICD - INTERNATIONAL CO-OP DAY: Recreation Ground, Old Heath Rd, Colchester. Details G3FIJ.
GB2OFS - OXFORDSHIRE FIRE SERVICE: Thame Fire Station, Thame, Oxon. Details G4ADR.
GB2RF - ROSE FAIR: Wisbech, Cambridgeshire. Details GOFHM.
GB2USA - UNITED STATES OF AMERICA: RAF Chicksands, nr Shefford, Beds. Details GOABW.
GB2WLC - WHITEHAVON LIONS CLUB (CALA): St.Bees Foreshore, Cumbria. Details GOBWF.
GB2WRF - WISBECH ROSE FAIR: St.Peters carpark, Church Terrace, Wisbech, Cambs. Details
GB2WSI - WIDNES SPIKE ISLAND: Waterloo Rd, Widnes. Details G4YNJ. G4ODH.
GB4AR - AMATEUR RADIO: Hesketh Bank, Preston. Details G4XFA.
GB4BGC - BEECHGROVE GARDENS: BBC House, Beechgrove Terr., Aberdeen. Details GM4GXD.

Events Diary

GB4EHS - EARLSHEATON HIGH SCHOOL: Dewsbury, West Yorks. Details G4MLW.
GB4JLY - 4TH JULY: Sharrow, Ripon, N.Yorks. Details G0CLY.
GB4JUL - 4TH OF JULY: Darley, Harrogate, N.Yorks. Details GOFWG.
GB4RCT - ROYAL CORPS OF TRANSPORT: Leconfield, Beverley, N. Humberside. Details G4EJP.
GB4RRA - RED ROSE AWARD: Bolton, Gtr.Manchester. Details GOFRL.
GB4WMS - WYKE MANOR SCHOOL: Wyke, Bradford, W.Yorks. Details G4PHR.
GB5SO - ST OLAVES (SCHOOL): Clifton, York. Details G3YZR.
GB8OFS - OXFORDSHIRE FIRE SERVICE: Thame Fire Station, Thame, Oxon. Details G8NRR.

2 JULY:
GB2RCC - RADIO CARAVAN CAMPING (CLUB): Weedon, Grid: SP 675 591. Details G4EPN.
GB2SVL - SPEN VALLEY LIONS: Royds Pk., Cleckheaton. Details G4PHR.

3 JULY:
GB0NEC - NORTH ESSEX CENTRE: Essex Show Ground, nr Chelmsford. Details G4MIS.
GB0SCA - SUNSHINE COACHES APPEAL: Sywell, Northampton. Details GOFQA.
GB2ALD - ALDERSHOT & DIST SCOUTS: Tweseldown Racecourse, Church Crookham. Details G4UEL.
GB2BAE - BRITISH AEROSPACE: Hatfield, Herts. Details G4LWV.
GB2DTS - DAGENHAM TOWN SHOW: Central Pk., Dagenham. Details GOGFZ.
GB2IRC IPSWICH RADIO CLUB: Copleston High School, Ipswich. Details G4IFF.
GB2NTS - NATIONAL TRUST FOR SCOTLAND: Brodick Castle, Brodick, Isle of Arran. Details GM3MTH.
GB2PSC - PELSALL SUMMER CARNIVAL: Pelsall Common, Walsall, W.Mids. Details G4FAJ.

4 JULY:
GB0CDX - COASTAL DEFENCE "X": Golden Hill Fort, Freshwater, IOW. Details G3RJK.
GB0LAS - LEWES AMBULANCE STATION: Lewes, E.Sussex. Details GOCPR.
GB0MRC - MIRFIELD RADIO AND CARNIVAL: Mirfield Community Centre, Lea Village, Birmingham. Details GOFIX.
GB2GJR - GRAND JUNCTION RAILWAY: Grid: SJ 708 554. Details G4GNQ.
GB2RAM - RAMSEY: Ramsey, Isle of Man. Details GD4BEG.
GB4CMC - CARCROFT MIDDLE SCHOOL: Carcroft, Doncaster. Details G4ZWQ.
GB4HHS - HAILSHAM & HEATHERFIELD SCOUTS: Horam, E.Sussex. Details G4YJW.
GB4MSC - MANPOWER SERVICES COMMISSION: Tigers Rugby Club, Hathersage Rd, Sheffield. Details GOEWI.
GB4SJW - SIR JOSEPH WHITWORTH: Whitworth Inst., Darley Dale, nr Matlock. Details GOFQB.
GB4WRF - WITHYCOME RALEIGH FAYRE: Burnside, Exmouth. Details G4YRM.
GB4WRT - WEDNESBURY ROUND TABLE: Brunswick Pk., Wednesbury, W.Mids. Details G4ZAD.

5 JULY:
GB1BCW - BELFORD CARNIVAL WEEK: Belford, Northumberland. Details G1GIT.
GB4WYP - WEST YORKS POLICE (ANNUAL COMMUNITY DAY): Nostel Priory, nearL Wakefield. Details G4IEJ.

6 JULY:
GB2IAT - INTERNATIONAL AIR TATTOO: Fairford Airfield, Glos. Details G4ZAZ.
GB2LDS - LATTER DAY SAINTS: Bishops Frome, Herefordshire. Details G4TVA.
GB6NVC - NICOLSON VICTORIA CROSS: Millbrook, Southampton. Details G6LOB.

10 JULY:
GB0ARR - AMATEUR RADIO ROCHFORD: Hawkwell, Essex. Details G4TUO.ESSEX. G4TUO
GB0DAN - DANSON PARK SHOW: Danson Pk., Bexley Heath, Kent. Details G3TAA.
GB0YSC - YOULBURY (NATIONAL) SCOUT CAMP: Boars Hill, Oxford. Details GOAGJ.
GB2CCR - CONWAY CARNIVAL: Conway, Gwynedd. Details GW4UWI.
GB2DOG - GUIDE DOGS FOR THE BLIND: Wokingham, Berks. Details G4CCC.
GB2HEC - HYMATIC ENGINEERING COMPANY: Redditch. Details G4WXG.
GB4SPC - SANDWELL PHAB CAMP: Dartmouth Pk., West Bromwich. Details GOBZP.
GB5DX - 'DX' (DARLEY ARC): Darley, Harrogate, N.Yorks. Details GOCQW.
GB8SI - SHAINT ISLANDS: Eilean An Tighe Island, South island of Shaint Island Group. 49deg 58'N, 6deg 3'W. Details GM3MTH.

11 JULY:
GB1CDO - COASTAL DEFENCE "O": Southsea Castle, Southsea, Portsmouth. Deatils G1UWB.
GB1RDH - RIPPLE DOWN HOUSE: Ringwold, Deal, Kent. Details G6BJR.
GB1SWC - SOUTH WINGFIELD CARNIVAL: South Wingfield, Derby. Details G1SFR.
GB2BBC - BRITISH BROADCASTING CORP: Motspur Pk., New Malden, Surrey. Details G2BCI.
GB2BCF - BROUGHTON CARNIVAL FORTNIGHT: Broughton County Primary School, nr Chester. Details GW4IEQ.
GB2FS - FESTIVAL OF STAMFORD: Stamford Meadows. Details G4OZM.
GB2SRH - SUE RYDER (HOME) FETE: Snettisham, Kings Lynn. Details G4DCJ.
GB2YRS - YORK RADIO SOCIETY: Tollerton, York. Details G3TMN.
GB4COS - CLACTON-ON-SEA CLACTON (COUNTY HIGH SCHOOL): Clacton-on-Sea. Details G4ZYB.
GB4DX - "DX": Red Lodge, nr Bury St Edmunds. Details G4BWP.
GB6DF - DARRINGTON FAYRE: Grid: SE 486 203. Details GOAAO.
GB8BBC - BBC (CLUB ANNUAL FESTIVAL): Motspur Pk., New Malden, Surrey. Details G2BCI.

12 JULY:
GB2MF - MINSTHORPE FESTIVAL: High School, S.Elmsall, Pontefract, W.Yorks. Details GOAAO.
GB2IDC - IRVINE DEVELOPMENT CORPORATION: Magnum Leisure Centre, Irvine, Strathclyde. Details GMODWH.
GB2SMR - SUSSEX MOBILE RALLY: Brighton Race Course. Details G3WR.

14 JULY:
GB0BHS - BANKFIELD HIGH SCHOOL: Widnes Halton, Cheshire. Details GOGQX.

15 JULY:
GB0DFS - DERBYSHIRE FIRE SERVICE: Fire Service HQ, Littleover, Derby. Details G4LPZ.
GB2KSB - KINGS OWN SCOTTISH BORDERS: The Barracks. Details G3BRA.

17 JULY:
GB2HCT - HOME COUNTIES TELEVISION: The Haymill Centre, Slough, Berks. Details G4CRJ.
GB2RCC - RADIO CARAVAN CAMPING (CLUB): Rutland Water, Grid: SK 921 052. Details G4EPN.
GB2SAT - AMSAT-UK COLLOQUIUM: University of Surrey, Guildford. Details G3AAJ.
GB4HWR - HERITASE WILDLIFE RESCUE: Kendal Show Ground, Cumbria. Details G4XBL.
GB4MR - MCMICHAEL RALLY: The Haymill Centre, Burnham, nr Slough. Details GOBTY.
GB4PCP - PEMBREY COUNTRY PARK: Pembrey, Dyfed. Details GW4XLK.

18 JULY:
GB0BHF - BRITISH HEART FOUNDATION: Wanstead, London. Details G4WRU.
GB0FPF - FISHBOURNE PLAYING FIELD: Fishbourne, Chichester. W.Sussex. Details GOCHK.
GB2MOP - MAYOR OF PEMBROKE: The Town Hall, Pembroke. Details GW4WMK.
GB2SRG - SURREY RAYNET GROUP: Haslemere, Surrey. Details G4BCY.
GB2WAB - WORKED ALL BRITAIN: Pilling Sands, Lancs. Details G4UHI.
GB4PB - PARKWOOD BIRTHDAY: Parkwood Community Centre, Gillingham, Kent. Details GOAMZ.
GB8RRA - RED ROSE AWARD: Bolton, Lancs. Details G1IOO.

20 JULY:
GB1BSF - BURNTWOOD SCHOOL FESTIVAL: Burntwood Ln., London SW17. Details G8CYE.
GB6RRR - RED ROSE RALLY: Hindley, Wigan. Details G6MEZ.

22 JULY:
GB2NMR - NETLEY MARSH RALLY: Netley Marsh, Southampton, Grid: SU 335 132. Details GOERI.

23 JULY:
GB1CDL - COASTAL DEFENCE "L": Lumps Fort, Grid: SZ 647 980. Details G6XJR.

24 JULY:
GB0CDT - COASTAL DEFENCE "T": Fort Nelson, Grid: SU 628 069. Details GOGIA.
GB2HWW - HOTEL WHISKY WHISKY: York. Details G3FTS.

25 JULY:
GB0BRM - BUTTERLEY RAILWAY MUSEUM: Butterley Station, Ripley, Derbys. Details GOGHD.
GB1BRM - BUTTERLEY RAILWAY MUSEUM: Butterley Station, Ripley, Derbys. Details G1SFR.
GB2KR - KIDNEY RESEARCH: The Brittania Inn, St Austell, Cornwall. Details G4TRV.
GB4SJB - ST JOHN (AMBULANCE) BRIGADE: Elmfield Pk., Doncaster. Details G4ZWQ.
GB4TCC - TWIN CITY CAMP: Ballawillyn Farm, nr Peel, IOM. Details GD4OEL.

26 JULY:
GB2MLB - MARGATE LIFE BOAT (STATION): Margate, Kent. Details GOCHN.

27 JULY:
GB0CDC - COASTAL DEFENCE CARISBROOKE: Carisbrooke Castle, nr Newport, IOW. Details GOCWX.

28 JULY:
GB0CDB - COASTAL DEFENCE "B": Fort Brockhurst, Gosport, Grid: SU 597 020. Details G4LIK.
GB1CDB - COASTAL DEFENCE "B": Fort Brockhurst, Gosport, Grid: SU 597 020. Details G1TOS.

29 JULY:
GB1CDT - COASTAL DEFENCE "T": The Fort Nelson site, Grid: SU 607 071. Details G8POQ.
GB2WAD - WESTON AIR DAYS: Beach Lawns, Weston-super-Mare. Details G4SIY.
GB4BGG - BEECHGROVE GARDENS: BBC House, Beechgrove Terr., Aberdeen. Details GM4GXD.

31 JULY:
GB2RCC - RADIO CARAVAN CAMPING (CLUB): Broughton Castle, Banbury. Details G4EPN.

1 AUGUST:
GB0CST - CARDIFF SEARCHLIGHT TATTOO: Highfields Day Centre, Cardiff. Details GW0GAI.
GB0WIE - WELSH ISLANDS EXPEDITION: Grassholm Is. WAB Sq: SM70. Details GW0FJE.
GB1CDE - COASTAL DEFENCE "E": Fort Purbrook, Grid: SU 678 064. Details G6OTY.
GB1CXI - 111 SQUADRON (ROMAN NUMERALS): RAF Leuchars, Fife, Scotland.
GB1PRA - PURBECK RALLY AUTOJUMBLE: Ridge Farm, Wareham, Dorset. Details G1NCG.
GB2WIE - WELSH ISLANDS EXPEDITION: Skomer Is. WAB Sq: SM70. Details GW0FJE.
GB4WIE - WELSH ISLANDS EXPEDITION: Skokholm Is. WAB Sq: SM70. Details GW0FJE.

3 AUGUST:
GB6NVC - NICOLSON VICTORIA CROSS: Millbrook, Southampton. Details G6LOB.

5 AUGUST:
GB2MRI - MARCONI RATHLIN ISLAND: Mount Grand, Rathlin Is., N.Ireland. Details GI4HCN.

RAE Courses

This is a list of all RAE courses notified to RSGB HQ (as at press date). It is given in alphabetical order of town or area.

BRISTOL
Brunel Technical College, Ashley Down, Bristol BS7 9BU. Monday evenings - Radio Amateur Theory. Tuesdays - Morse. Thursdays - Practical. All courses commence September. Enrolment 8/9 Sept at college. Tutor Phil Brouder, G3ZJH. Details Dept of Aerospace & Radio Communication Engineering, tel: 0272-41241 ext 2164.

HALESOWEN
Halesowen College, Whittington Road, Halesowen, West Midlands, B63 3NA. 30-week course on Thursday evenings 7-9pm, commencing 24 September. Enrolment 8/9 Sept at college. Details Colin Prior, G6OTT tel: 021-550 1415.

RHONDDA
Rhondda College of Further Education, Llwynpia, Tonypandy, Mid Glamorgan CF40 2TQ. 30-week course, probably Monday evenings commencing September. Enrolment 7 Sept, early application advisable. Details from college on 0443-432187.

PS

Don't forget the RSGB HF Convention at the Belfry Hotel, nr Oxford Sunday 27 September 1987.

We're sorry that some of the regular features are missing from this month's Bulletin, but we didn't want to split the IARU Conference over two months.

NEWS & VIEWS

HF

*John Allaway, G3FKM**

THE IARU REGION 1 CONFERENCE is now past and seems to have been a valuable forum for the 44 national societies represented—out of a possible total of 58. Decisions particularly affecting hf users were few and full details will appear next month. A decision to make the rtty segment on 14MHz extend from 14·070 to 14·099MHz is of immediate interest and the question of fm repeaters on 29MHz was addressed with a concluding recommendation which says:

'Region 1 societies should be permitted to conduct experiments, under the supervision of the HF Working Group, to establish the degree of interest in 29MHz fm repeaters in their countries, the range enhancements obtainable under practical conditions, and the associated QRM problems. Because of returning sunspots, all 29MHz repeaters in Region 1 should cease operation on or before 31 December, 1988.'

I would like to point out that the paragraph headed **HF beacons** in the March column was in fact written by Alan Taylor, G3DME. As a member of the Administrative Council it would be rather odd if I referred to it as 'they'!

Dave Lawton, G0ANO, has received QSLs for contacts on 14 and 21MHz ssb. He is infrequently on hf and mostly on 3·5MHz ssb with occasional 29MHz fm forays.

G2BZQ is also suffering from the piracy of his callsign. The pirate uses G2BZQ/QRP and seems to prefer the vicinity of 3,560kHz on cw but has also been on 7MHz G2BZQ suggests that he might prefer to use G9ABP/QLF!

The WARC bands

A listing from IARU HQ of the member societies which have reported to the International Secretariat the availability of 18 and 24MHz in their countries and dated 14 April 1987 shows the following:

18MHz—Algeria, Andorra, Antigua & Barbuda, Argentina (18,073-18,0765, 18,0835-18,0895, 18,0965-18,1085, 18,1215-18,149, and 18,1515-18,1675kHz), Australia (less 18,071-18,079, 18,101-18,109, 18,121-18,134, 18,141-18,149, and 18,156-18,164kHz), Austria, Bahamas, Bahrain, Belgium Botswana, Brunei, Cayman Is, China, Colombia, Costa Rica, Cyprus, Czechoslovakia, Denmark, Djibouti, El Salvador, Faroe Is, France, Gabon, German Dem Republic, Fed Rep of Germany, Grenada, Honduras, India, Ireland, Israel, Italy, Kuwait, Luxembourg, Malaysia, Mauritius, Monaco (less 18,103-18,116, 18,129, 18,135, and 18,165kHz), Netherlands, Netherlands Antilles, New Zealand, Nigeria, Norway, Oman, Panama, Peru, Portugal, San Marino, Senegal, Sierra Leone, Singapore, South Africa, Sri Lanka, Sweden, Switzerland, Syria, Tonga, Trinidad and Tobago, Turkey, United Kingdom, Vanuatu, Yugoslavia and Zambia.

24MHz—Algeria, Andorra, Antigua & Barbuda, Argentina, Australia (less 24,896-24,904kHz), Austria, Bahamas, Bahrain, Belgium, Botswana, Brunei, Cayman Is, China, Colombia, Costa Rica, Cyprus, Czechoslovakia, Denmark, Djibouti, El Salvador, Faroe Is, France, Gabon, German Dem Rep, Fed Rep of Germany, Grenada, Honduras, India, Indonesia, Ireland, Israel, Italy, Kuwait, Luxembourg, Malaysia, Mauritius, Monaco, Netherlands, Netherlands Antilles, Nigeria, Norway, Oman, Panama, Papua New Guinea, Peru, Portugal, San Marino, Senegal, Sierra Leone, Singapore, South Africa, Sri Lanka, Sweden, Switzerland, Syria, Tonga, Trinidad & Tobago, Turkey, United Kingdom, USA, Vanuatu, Yugoslavia, and Zambia.

Plenty to work here—so how about some more activity?

Operation Raleigh

Gannet dated 24 April confirms that the *Sir Walter Raleigh* was due to arrive back in Hull on 30 June. There the ship will be decommissioned and will take no further part in Operation Raleigh. Quite simply the reason for the premature return is one of cost and participation. The day to day running of a 2,000 ton ship, whether actively engaged in expedition duties or not, absorbs a great deal of the available cash. As a great many of the future planned expeditions will be land based, in some cases hundreds of miles from the sea, the ship would have had no active part to play. The sponsorship monies saved by the decision to finish with the ship will be put to good use by allowing many more people to participate in future phases.

Where Operation Raleigh is active in a country with few licensed amateur radio enthusiasts available, a requirement will always exist for an amateur to join the staff in the field. An involvement with all aspects of expedition life and in particular the communications side will be expected. The latter includes instructing the Venturers in the use of the radio equipment combined with general maintenance and repair where necessary.

In those countries where the amateur radio scene is active and well populated it has been found that local groups are more than willing to assist with the expedition communications. A particularly successful operation has recently concluded in New Zealand where some amateurs even gave up their annual holidays to become involved. A similar situation should exist in Japan, the radio hams there being numerous, enthusisastic and willing to participate.

Between Chile and Fiji some 6,500 QSOs were made and the 7,000 should have been reached by the time the ship reached Cairns. Conditions were poor and only on cw was a respectable number of contacts possible. G4AAL gives the number of QSOs made by him as follows: Robinson Crusoe Is-24, Alexander Selkirk Is-32, Easter Is-52, Henderson Is-900, Pitcairn Is-163, Cook Is-713, US Samoa-677, W Samoa-1,149, Tonga-842, and Fiji-453.

Direct requests for QSLs should be sent to G4AAL, QTHR, and must include sufficient ircs, US dollars or other currency to cover return postage. UK stations need send only an sae of course.

The site for the OH0MA expedition to Market Reef

DX news

The *Long Island DX Bulletin* says that SU1ER joins several nets on 14MHz daily after 1400 and that he also alternates between Packet (on 14,103kHz) and rtty (on 14,090kHz) between 1600 and 1800. The Egypt Amateur Radio Society has recently applied for IARU membership.

FR5AI/T and FR5ZU/T may be on Tromelin Is now. They were due to commence their activity in early June and were due to be there for a month.

Latest information on the projected expedition to the Saharan Arab Democratic Republic is that it will take place during the first two weeks of August and that there will be four operators, one of whom will be EA2JG. Ten days of operation are planned and the callsign might be S0RASD though this has not yet been confirmed.

There will be an expedition to Market Reef planned to begin on 25 July and continue until 2 August. The callsign will be OH0MA but OH0MA/OJ0 may be used, Operators will be OH0NA, G4JVG, G4EDG, GM3YOR, and SM5AQD and it is hoped to run two stations simultaneously, 24h daily, on cw and ssb with the possibility of some rtty, on all bands 1·8 to 28MHz. There may be some operation en route from the Aaland Is with the operators using their own callsigns preceded by OH0/.

DX News Sheet has listed currently active Chinese stations. These include BY1s PK,QH and SK; BY4s AA, AOM, CZ, RB, RN and SZ; BY5s HZ, RA, RF, QA and QH; BY7s HL and KT; BY8s AA and AC; BY9GA and BY0AA. These stations are often operated by visitors and it is important to note the correct QSL information.

Correct documentation has now been submitted to ARRL by A61AB and his QSLs are being accepted for DXCC credit.

* 10 Knightlow Road, Birmingham B17 8QB

KH6GLU is now on Nauru and using the callsign C21FS. He should remain there for up to four years and he has been worked in the UK around 1230 on 14MHz ssb.

DX News Sheet reports that K6KH is organizing a major dxpedition and wildlife safari to Kenya to take place from 29 June to 14 July and including the IARU HF World Championship Contest.

Overseas news

VK5DI/G3JDD has supplied a comprehensive list of VK0 stations active from Australian Antarctic bases this year. Macquarie Is has Graham Currie, VK0GC, Doug Speedy, VK0DS, and Mark Loveridge, VK0ML. Mawson has Mark Spooner, VK0AQ, Alan Jeffrey, VK0AJ, and Andy Crammon, VK0ZA. Davis has Frank O'Rourke, VK0DA, David Rasch, T Lloyd, VK0TW, and Ray Clark, VK0RC. Finally at Casey is P Marsh (VK0PM). VK0ML was trying to be on 3,510, 7,010, 10,110, 14,010, 18,110, or 21,010kHz each Thursday between 0600 and 0800 depending on conditions.

Ross Forbes, WB6GFJ, will return to Tahiti this month and will be on the air as FO0FB. He has mentioned 14,114, 14,180, and 14,240kHz as likely places to find him. As previously QSLs should go to his home call (see QTH Corner).

Robin Francis, (G3RWU) (ex-ZK1AC et al), is at present in Saudi Arabia. He draws attention to the 'geographical inexactitude' of the expression North Cook Is—and there isn't a Cook Is either! The Cook Isles are politically and geographically one group but locally islands north of the island of Aitutaki are referred to as the "North Cooks" and those south and east of Aitutaki as the "South Cooks". The main inhabited islands in the North Cooks are Penrhyn, Manihiki, Pukapuka, Rakahanga and Nassau and these stretch from 150 to 750 miles north from Rarotonga (21S 159W). The Southern group are located in a quadrant around Rarotonga from south-east through east and round to Aitutaki and most have been activated at some time. When Robin left last year Aitutaki and Mauke, together with Rarotonga, had active stations.

G3FZW telephoned me to say that Radio Australia is now transmitting ionospheric data four times each day, at 0825, 1225, 1625 and 2025. He mentioned three frequencies which may be suitable depending on the time of day of course. These are 6,035, 7,205, and 9,665kHz.

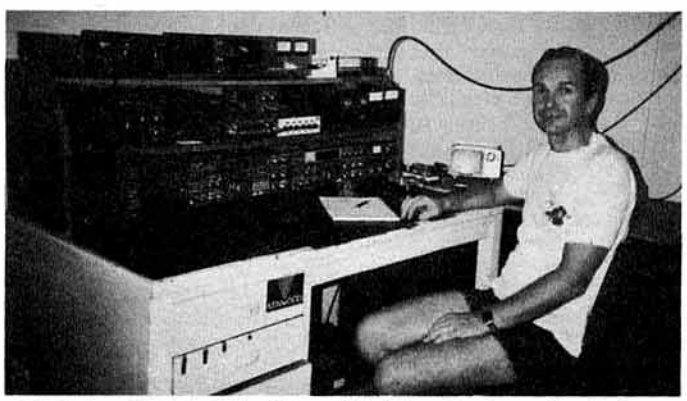
Bob Parkes, P29PR, left Papua New Guinea at the end of May and returned to the UK where he is G3REP. QSLs should now be sent to him QTHR. In four years he only ever worked six Europeans on 1·8MHz but did very briefly hear G3SZA in 1985 and G3RPB in 1987. P29PL is still there and mostly operates on cw and his rather similar call has caused confusion from time to time. Numbers are slowly declining but Bob says that P29s LB, DN, FG and JM are likely to stay for a few more years. P29AR will leave in September.

Welcome . . .

. . . to the following who joined the Society during April: DK6UG, F6HHR, FE6CNW, LA2RR, PA0FOF, PA3EBG, VS6XYJ, VU2YW, WP2ADC, YT3AA, ZL3TLB, and G D Gopal (VU), and M Laborde (F).

Contests

Venezuelan Contest
0000 4 July–2400 5 July (ssb)
0000 25 July–2400 26 (cw)
1·8 to 28MHz. Single operator single or multi-band, and multi-operator single and multi-transmitter. Exchange RST plus serial number (starting from 001). QSOs between stations in different countries count two points, in the same country no points but these are valid for multiplier credit. The multiplier is one for each YV call area, US call area, and each country (including own) worked on each band. Use separate log sheet for each band and indicate each multiplier in a separate column the first time it is worked. Include a summary sheet giving scoring, name and address in block capitals, and the usual signed declaration. Post before 15 September (for ssb) or 15 October (for cw) to Radio Club Venezolano, Concurso Independencia, PO Box 2285, Caracas 1010-A, Venezuela. Certificates will be issued to those who (in Europe) work at least 10 YVs and 10 countries, and in the cw section five YVs and 10 countries.



Bob Parkes, P29PR, at his station at Port Moresby, Papua New Guinea

1987 ALL BAND TABLE No 2

	1·8MHz	3·5MHz	7MHz	14MHz	21MHz	28MHz	Total
GM3YOR	43	43	82	32	17	-	217 (cw)
4X4F'	-	9	29	44	67	33	182
G4OBK	48	43	57	23	9	1	181
G0FYD	1	4	41	35	20	2	104
G4GOF	7	13	13	18	9	0	60

Next deadline—scores **to reach G3GIQ by 8 July** please.

10MHz COUNTRIES TABLE

	All-time	1987
G3PJT	93	46
G4YWG	62	41
G4VDX	71	37
G4UZN	87	31
G4OBK	55	30

28MHz COUNTRIES TABLE

G4JBR-79	GM4CHX-10
G4XAH-44	GW4TEJ-8
G4VPM-30	G4NXG/M-12
G4MUW-29	G0FYD-2
G3XQU-21	G4OBK-1

Colombian Independence Contest
0000 18 July to 23.59 19 July
CW and phone, mixed or single mode. Only one signal band category, and that is 14MHz complete. Copies of rules available from me (sase please).

YL/OM Summer SSB Sprint
1800–2200 1 August
All may enter. HF bands only. Copies of rules also available from me (sase please).

Awards

RANTS Award
This is the Radio Amateur National Trust for Scotland Award. Unfortunately details were not received until after the closing date for June issue. The Mid-Lanark ARS in conjunction with the National Trust for Scotland has organized some events which are being carried out by teams of four club members who have already visited Culzean Caste, Souter Johnnies Cottage and Greenbank Gardens. Their remaining schedule will be as follows: Brodick Castle (Arran) 4-5 July, Culzean Castle (Maybole, Ayrshire) 8-9 August, and the island of Iona 26-28 September. The callsign used is GB2NTS and operating times 0900 to 2100 and frequencies 3,650–3,660kHz or 3,710–3,720kHz with further activity on 7MHz, between 14,150 and 14,200kHz, and on 21 and 28MHz. The award is issued to licensed amateurs and listeners who have contacted at least four of the locations. Culzean Castle may be counted twice if worked during the two different periods. Send a self addressed envelope (A4 or foolscap size) plus four QSLs or log extracts to GB2NTS, PO Box 20, Motherwell. The award is free.

All Japan Districts (AJD SWL-AJD)
For confirmed contacts/reception reports with/from all districts JA1-JA0.

Worked All Japan Prefectures (WAJA, HAJA)
As above but with each of the 47 Japanese prefectures. A list of QSLs must be submitted arranged in order of WAJA reference number.

Japan Century Cities (JCC, SWL-JCC)
As above with at least 100 cities. JC-200, 300, 400, 500 and 600 are also issued. List in order of city reference number.

Japan Century Guns (JCG, SWL-JCG)
As JCC with cities replaced by "guns" (a regional congregation of towns and villages). Only QSOs/reports since 29 July 1952 may be counted and each claim must include a list giving full details and a signed statement by two licensed amateurs or a national society that the applicant has the relevant QSL cards and that they are correctly listed. Each award costs eight ircs and certificates will be sent by air if an extra two ircs are enclosed. All correspondence should be sent to: Japan Amateur Radio League-Award Section, 1-14-2 Sugamo, Toshima, Tokyo 170, Japan. (A list of cities and guns, plus Asian countries, is available from JARL for three ircs.)

The Golden Wings Award
Details of this award were given a few months ago. The rules have now been changed slightly and it is no longer necessary to get the application countersiged by a RAFARS member. The fee is still £1·50 for inland applicants but overseas applicants may now send the equivalent in ircs (this would seem to be seven).

The Sindbad Net Award
Since 2 June, 1987 there is a net every Tuesday between 1200 and 1400 on 14,200kHz called the Sindbad Net. An award is available to anyone who works five different A4X stations on five different days in the net. Send QSO details and 10 ircs or equivalent to: The Awards Manager, ROARS, PO Box 981, Muscat, Sultanate of Oman.

The 40th Anniversary Pakistan Award
The Pakistan Amateur Radio Society has sponsored an award to commemorate the 40th Anniversary of Pakistan on 14 August 1987. Special award certificates and gifts will be sent to all amateur stations who make five contacts with different AP2 stations on any bands/modes between 1 and 31

QTH CORNER

SM2DWH/BT0	SK4NI, Swedish Radio Supply, Box 208, S-65102 Karlstad, Sweden.
BV0AE	via JA1UT, Yoshi-O Hayashi, 4-20-2 Nishi-Gotanda, Shinagawa, Tokyo 141, Japan.
C21FS	D. L. Miller, G4UCB, 1 Talbot Hill Rd, Talbot Park, Bournemouth, Dorset BH9 9JT.
FO0ZA	via OH1ZAA (see ZK2KY).
H44DL	Box 6, Honiara, Solomon Is.
HZ1AB	Leo Fry, K8PYD, 5740 N Meadows Blvd, Columbus, Ohio, 43229, USA.
KL7LF/KH3	via KL7VZ, 1631 Wolverine Lane, Fairbanks, Alaska, 99701, USA.
KX6AZ	Annabel Lyman, PO Box 1768, APO San Francisco 96555, Cal, USA.
P29PR	G3REP (QTHR).
RA1ODS	via UB5KW.
TA1E	Aziz Sasa, Box 794, Istanbul 34435, Turkey.
TA2AD	PO Box 68, Zonguldak, Turkey.
ZF2KY	Jan Hubach, OH1ZAA, Mantyluodonkatu 1, SF-28880 Pori, Finland.
ZF2KZ	via OH1ZAA (see ZF2KY).
ZK2ERY	Z Murdzia, VK2EKY, Box 73, Teralba 2284, NSW, Australia.
4X50OO	4X6DK, Ami Shami, 40 A Levin Epshtein, Rehovot 76461, Israel.

August 1987. Special QSLs will be issued by AP operators during this period, and operators will also use their own callsigns with a /40 suffix. Send a certified copy of log details together with five ircs to: The Secretary, PARS, Box 65, Lahore, Pakistan, to arrive no later than 30 September 1987.

West Sussex Award

Issued by Haywards Heath College ARS to those who have worked stations in West Sussex. Class 1 needs at least 20 including at least two from each of the seven district council areas. Class 2 needs 25 points-in this case QSOs with G1VIC or GB4HHC count five point each, with past or present members of the club three points, and with other W Sussex stations one point. Send lists of stations worked with QSO details, certified by two other licensed amateurs or a club official, plus £1 to Clyde Hinton, G1TCH, Awards Manager HHARS, c/o Haywards Heath College, Harlands Road, Haywards Heath, Sussex, RH16 1LT.

RSGB QSL Bureau

A plea from Ted Allen, G3DRN, for members to note that the Bureau will be closed from 1 to 23 August inclusive. Ted would be most grateful if we could all please refrain from posting anything to him during this period.

W1AW

W1AW is the offical station of the American Radio Relay League, and its many useful functions include the transmission of various interesting data including slow morse. On Mondays, Wednesdays and Fridays, transmissions are beamed towards Europe between 1300 and 2100gmt on 14,070, 21,080 and 28,080kHz on cw, on 14,095, 21,095, and 28,095kHz on rtty, and on 14,290, 21,390, and 28,590kHz on ssb. On Fridays a dx bulletin replaces the regular bulletin transmissions. Slow code is transmitted towards Europe at 1300-this is at 5, 7·5, 10, 13 and 15wpm, and code at 35, 30, 25, 20, 15, 13 and 10wpm is sent at 2000. The practice texts are taken from *QST* and the source is given at the beginning of alternate speeds. Teleprinter transmissions are 45·45baud Baudot, 110baud Ascii, and 100baud Amtor, fec mode. Baudot, Ascii, and Amtor transmissions are sent in that order during all 1500 transmissions.

CW bulletins (at 18wpm) go out at 1400 and teleprinter at 1500.

Band reports

Rather more encouraging news from G8KG this month. "Smithy" writes: "Uncertainty regarding the transition from Cycle 21 to Cycle 22 continues up to the time of writing (mid-May), though the balance seems to have tipped slightly towards the minimum having occurred in the autumn of 1986. Solar activity in March was fairly typical of the minimum phase, but there was a sharp increase in April with SIDC's provisional sunspot number rising to 39·3. Daily numbers peaked at 80 on 11 April with solar flux reaching 100sfu on 9-11 April.

"At the same time April saw the quietest geomagnetic conditions for many years, with only six days having an A-index above 10, so that hf conditions during the month were generally good and stable when account was taken of the seasonal decline in mufs in the northern hemisphere.

"The effect of this sudden upsurge on the smoothed monthly values was to cause a small rise as between September and October 1986, pointing to

HF F-layer propagation predictions for July 1987

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 a 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 000001111122 024680246802	24MHz 000001111122 024680246802	21MHz 000001111122 024680246802	18MHz 000001111122 024680246802	14MHz 000001111122 024680246802	10MHz 000001111122 024680246802	7MHz 000001111122 024680246802	3.5MHz 000001111122 024680246802
** EUROPE								
MOSCOW	.....	.....	.....1...22.	...112211451	1.3456545885	756554445789	764222222468	43.....45
MALTA	.....	.....	.....23.	...122211561	2.1466555896	845655555789	986422223578	++4.....24+
GIBRALTAR	.....	.....	.....2.	....11...24.	1..154333685	632665555799	987543233578	++42.....24+
ICELAND	.....	.....	.....	.....1.	1...13222364	633455555678	776543333456	4542.....23
** ASIA								
OSAKA	.....	.....	.....	....11111...	..1233223132	1..121112463	241	.....
HONGKONG	.....	.....	.....1...1..	...11211122..	..1233234633	2...11112465	253	.....2.
BANGKOK	.....	.....	....11...11..	...12321331.	1.1223335653	31...1112477	1.....255	22
SINGAPORE	.....	.....	...111.....	..122321....	1.1234332...	31..11112331	2.....245	23
NEW DELHI	.....	.....1..	...1111.13..	..122321362.	112223335773	521...112477	41.....256	24
TEHERAN	.....	.....21.	...11211254.	..1333224771	214333335786	7431..112578	731.....256	4.....24
COLOMBO	.....	.....	...112112...,	..1224224...	.1222333511.	421..1112465	51.....256	2.....24
BAHRAIN	.....1..	.....1...21.	...12211353.	..1333325762	214322335787	753...112578	741.....257	4.....24
CYPRUS	.....11.	....11..133.	...233223661	..1456545884	525655566898	876433334689	8731...11367	54.....35
ADEN	.....	.....1..11..	...1122244..	...323346722	413322345767	8641...12478	751.....257	42.....24
** OCEANIA								
SUVA/S	.....	.....	.....	.....1.	..12221..242	.1342111.442	..11.....11.	.....
SUVA/L	.....	.....	1	22	2112.....54	11241....142	..12.....12.	.....
WELLINGTON/S	.....	.....	.....	.....1.	1.221.....53	22342..11.63	..11.....131	.....
WELLINGTON/L	.....	.....	.....	1.....2	321.....5	3332.....33	.122.....131	.....
SYDNEY/S	.....	.....	.....	...12.....	1.3541..11.3	212421.12335	...1.....242	.....2.
SYDNEY/L	.....	.....	.....	2.....2	41.1.....5	3214.....35	...2.....42	.....
PERTH	.....	.....	...121.....	..1342.....	1134531.....	4222211.123.	2.....253	24
HONOLULU	.....	.....	.....	.....11.	..1222..2321	.1342111231.	..12.....	.....
** AFRICA								
SEYCHELLES	.....	.....1...	...111224...	...3224462..	..33223455..	.131...12451	541.....256	42.....24
MAURITIUS	.....	....11.1...	...1232231..	...3344453..	..3434345621	2.42.1.12466	712.....257	43.....24
NAIROBI	.....1..	.....122..	...1112355..	...3224467..	..352234573.	3.52...12475	743.....257	54.....24
HARARE	.....11..	.....1123..	...1123356..	...33345681.	1.1543345742	7.5311.12477	7541.....257	54.....24
CAPETOWN	.....	.....11....	....21231...	....1434431..	....4533354..	.1.421.1242.	5611.....253	542.....24
LAGOS	.....13..	.....1251.	....2.23584.	...24134687.	22.552235782	77542...2477	7752.....157	542.....24
ASCENSION Is	.....2..	.....142.	....21.1375.	....4312588.	53234784	2...31..2478	61.....156	551.....24
DAKAR	.....22.	.....1144.	21123671	1...42234793	521353223688	885431...378	7752.....146	552.....24
LAS PALMAS	.....1.	.....13.	22121472	1..154344785	621476566799	9866543333589	886321111267	++3.....35
** S. AMERICA								
Sth SHETLAND	.....	.....1...	.....231..	.....1454..	.....23564.	1.1..1.12464	6541.....146	552.....24
FALKLAND Is	.....1..	.....12..	.....12353.	.....34576.	.....133568.	1121.1.12464	6652.....136	552.....3
R DE JANEIRO	.....12.	.....24.	1122572	3344785	41...4333588	862.11.11258	774.....36	552.....3
BUENOS AIRES	.....1.	.....24.	122472	2....1234685	621..3334578	8851.1.11258	7752.....26	452.....3
LIMA	.....	21	111143	2.....222366	72.121332247	87443111..15	7752.....2	442.....
BOGOTA	.....	11	.....11.133	2....1221255	72.113332236	87432111..14	67521.....1	342.....
** N. AMERICA								
BARBADOS	.....	21	1111143	2....3222266	72.114322257	8744211...25	7752.....3	442.....
JAMAICA	.....	.....	22	2.....121135	61...2322236	7742.11....3	47521.....1	242.....
BERMUDA	.....	.....	12	2....2121135	61...3322246	7742211...14	57521.....1	242.....
NEW YORK	.....	.....	1	1.....111.14	51...2222135	66411111..13	37421.....1	.42.....
MEXICO	.....	.....	11	1.....1.123	41....232123	4642..11...1	1542.....	.22.....
MONTREAL	.....	.....	1	1.....111.13	51...2222235	66422111..13	36421.....1	.42.....
DENVER	.....	.....	.....	1	31....111112	3542111111..1	14421.....	..2.....
LOS ANGELES	.....	.....	.....	.....	2111...12112	24531..12...	.242.....	.....
VANCOUVER	.....	.....	.....	.....	21111..11112	235321112111	.242.....	.....
FAIRBANKS	.....	.....	.....	.....	1.1211111111	223421112211	..12.....	.....

The provisional mean sunspot number for April 1987 issued by the Sunspot Index Data Centre, Brussels, was 39·3. The maximum daily sunspot number was 80 on 11 April, and the minimum was 10 on 3 April. The predicted smoothed sunspot numbers for July, August, September and October 1987, are respectively: (classical method), 23, 25, 26 and 27; (SIDC adjusted values) 28, 29, 31 and 33.

A URE special event station set up in a shopping area in Santa Cruz, Tenerife, for one week to promote amateur radio. *Photo:* G3WSN

September as the possible minimum month—but there have been two "false minima" during 1985-6, so a few more months of data will be needed before it is clear whether the trend is now firmly upwards. SIDC have adopted this most recent minimum and are currently forecasting a rather low maximum (80 ± 15) for Cycle 22. More of this later, but a rough assessment using the method of H H Sargent (*Rad Com* May 1978 p405 and March 1979 p223) which was so successful with Cycle 21 seems to point to a very much higher maximum."

An excellent selection of logs this month supplied by the following (to whom, many thanks): G2HKU, G3YY, G5JL, G3BDD, GM3CSM, GJ3EML, G3s GVV, JCL, KSH, LPS, PJT, PXT, YRM, GM4CHX, G4EHQ, G4JBR, GW4KGR, G4s LRS, MUW, NXG/M, UZN, VPM, XAH and G0HGA.

As usual, stations listed in italics were using A1A.

1·8MHz. 2200 *IK2GXK, 9H1GG.* 2300 *EW3T, UA9YHZ.*

3·5MHz. 0100 *PY2DP, TF1PSK.* 0500 *HK1KXA, KH6s AQ, EC, YN3EO.* 0600 *ZL1AIZ.* 2100 YC6GR.

7MHz. 0400 *W6-W7* (to 0700), *WL7K.* 0500 ZL2AAG. 0600 CP6OF, *VP8BNO, ZL2-ZL4, 8P6SL.* 0700 *VK2ZL,* YN3EO. 0800 *FM5ES, KH6LE.* 0900 *VP2VI.* 1800 *JH3RRA, VK8MQ.* 1900 *DV1ANV, JA4-JA6, UA0KAE, VK8AV, VP2MDY.* 2000 *JA2, JA5, TR8JJC, 5A0A.* 2200 *FY7AN, UA0UB, ZC4EE, 5T5CJ, 9L1GG.* 2300 *HZ1HZ, KP2J, TA1C, UA0AJP, UD, UL, VK6RZ.*

10MHz. 0500 *N0AX.* 0600 *VK7TM/P. ZL1.* 0700 *RB5BE, VK2-VK7, VK0ML.* 0800 *VK6AKG, ZL3.* 1000 *W2FJ.* 1300 *EU6D.* 1700 *FT8WA, TR8JJC, UA0AG, VK3NC, 9M2FP.* 1800 *TL8MEF, ZS1VP.* 1900 *OY1R, UA0AG.* 2000 *RA9JA.* 2100 *VE3. W3, 6, 8. 6Y5SG.* 2200 *K5HK/KP2, V47KJI, ZD8CW.* 2300 *TA2AD.*

14MHz. 0500 A92EM. 0700 *BY1PK,* BY5QA, FO4NJ, *FO5BI,* KL7KF/KH3, KH6, *KL7, KX6BU, VK9NS,* VK0s DS, GC, VY1CO, *ZK1AK,* ZK2ERY, *ZL,* 5W1FT. 0800 FO5JP, HL, JA, *KC6MX,* KH2CK, KH6, KL7, VR6TC, ZK1DD. 0900 FO4LU, 1000 SU1ER. 1400 HL1IE, JT1BG, *KL7GU.* 1500 *BV2DA.* 1600 FR5DB, JT1BU, KL7XD, V85RM. 1700 KH6CD. 1800 ET3PG, JA7AD, JW5E, VS6CR, *WB6EKD,* YI1BGD, *K1ST/6W1, 4K0AAD,* 4S7NB, 9M2KY. 1900 AP2MQ, EP2DL, FP5HL, J37AH, JA, KH6, S92LB, TJ1DL. 2000 *TR8JJC.* 2100 *NL7GP,* PZ2AC, W6. 2200 HH2RJ, W6, 5V7SA, *9L1GG.*

18MHz. 0800 *DL, G, SM.* 1100 *OK2PBM, YU3AN.* 1300 *I, LU5DJO, OK, OZ.* 2000 *LA3FL/MM* (nr. PY), *PY2NZP.*

21MHz. 0700 OD5SF, YK1AO. 0800 *BY5AR, JA,* JY5DL, *YC6IO, 3B8FQ.* 0900 JA, G3VIE/Z2. 1000 A61AB, FT8XD, H44DL, JA, H5AQ, VP8BGX, VS6IC, VU2GI. 1100 *G4DUW/DU1,* JA, P29NGW. 1200 DV1AAR, VK8PT, VS6BL, VU2ZAP, XU1SS, 5A0A. 1300 YC7JUL. 1400 JY5CO, *VU2ZAP,* 9M2RI, 9V1WN. 1500 JA, TU2QZ, VP8BKK, 7Q7LW. 1600 *S79WHW.* 1700 A71BK, OE8HFL/YK, 7P8DP, *9Q5KI.* 1800 CN32FIC, KP2AH, 5A0A, 5N0WRE, 5T5NU, 5X5GK. 1900 TA2AH, ZD7AL, 3G8PAX. 2000 P43HM, W1-W6, 8, 9, 0, ZL, 9Q5NW. 2100 WI-W0, XQ5CFR, ZL. 2200 CE0FDL, FM4DN, KP2J.

24MHz. 1300 *DJ10J, SM7AST/CT1, F, SM.* 1500 *KV4AD, ZS6AVM.*

28MHz. 1000 YI1BGD. 1100 VU2GI, Z21GH, 4X50OO. 1200 J28EM, OD5AS, 7Q7LW, 9K2DZ. 1300 5H3RB. 1400 *YB4FNN,* ZB7BJ. 1500 ZB2AZ. 1600 OH0/DL7ANR, TL8CK, TR8JLD, TZ6VV. 1700 A22BW, S79CW, TJ1CH. 1800 A71BK, *TU4CN,* ZS3BI. 1900 C53CR, CN8LI, CX2AAL, XT2ZK, 3G8PAX. 2000 5T5NU. 2100 LU, PY, YV6CAX. 2200 CE0FQV, HH2MC, LU6ADZ, NP2CC. 2300 HK0HEU.

Thanks also to the following for information: *DX Report* (VK9NS), *DX News Sheet* (G4DYO), *The Ex-G Radio Club Bulletin* (GI3OEN/W6), *Long Skip* (VE3IPR), *Lynx DX Group Bulletin* (EA2JGO), *DX Family Newsletter* (JH1KRC), *DX'press* (PA3CXC), *CQ Magazine* (W1WY), *DXNL* (DL3RK), and the *Long Island DX Bulletin* (W2IYX).

Closing date for receipt of material for **September** issue is **July 10.** □

VHF/UHF

*Ken Willis, G8VR**

Some early sporadic-E

In the past, I can recall John Branegan, GM4IHJ, reproaching me for commenting that we could expect the Es "season" to start in June. This was because I tended to relate it only to the 144MHz band, whereas John habitually checks vhf/uhf frequencies over a much wider part of the spectrum, and observes sporadic-E very much earlier in the year on frequencies lower than 144MHz. This was amply demonstrated by an early onset of this mode on 50MHz and lower frequencies this year. EI6AS received good copy from a test-card on West German Band 1 tv as early as 7 April, and again from this country, plus Poland, on 14 April. On neither occasion was he able to raise anyone on the 28,885kHz crossband frequency during these openings, presumably because most operators felt it rather early for this mode of propagation to appear. However, by 19 April the word must have been passed around, for at 1432gmt EI6AS worked DL7YS crossband 50/28 at 59 both ways. Next day he worked CT1WW two-way on 50MHz and heard EA1MO and many G stations via back-scatter on the same day.

The report is taken up by Jeremy, G3IMW, who noted his first Es opening of the year on 20 April, when CT1WW was worked and heard for several hours working G stations two-way on 50MHz. CT1WW is reported to have worked 60 to 70 UK and EI stations in the event. Jeremy also worked CT4KQ and EI9Q, the latter via back-scatter. Finally he had a contact with EA1MO on 50MHz, the Spanish station claiming to have received a permit from his local administration to operate on this band. Another report, this time from Paul, G41JE, tells a similar story. At his location the event lasted nearly three hours, and he worked much the same as G3IMW. Paul commented: "It was amazing hearing all the G stations that appeared from nowhere—many I had never heard before!" Monitoring 28,885kHz can be very useful, even if you are not yet able to use the 50MHz band, since a sustained opening on the lower frequency may well point to the development of one on 144MHz starting somewhat later.

Operation from Greenland

Jeremy, G3IMW, received a telephone call from OX3LX with news that his 50MHz six-element Yagi had been destroyed in gales. He is awaiting new parts, but hoped to be active again soon and, since this was late in April, he may well be QRV now. He intends to stay in Greenland until 1989, though he planned to return to Denmark from the end of May until sometime in July. His problem with QRM to local cable tv when operating on 50MHz should be resolved soon by the installation of a new uhf tv transmitter in the area. Further information from Greenland is that the 50MHz beacon remains as previously reported and now sends "OX3VHF GP60QQ". The 144MHz beacon feeds two five-element Yagis beaming east and north. One was aimed at the USA but, since the beacon frequency is occupied by repeaters in the USA, this antenna was turned to the north. However, there are plans to change the beacon frequency.

Meteor scatter

Two letters received by the same mail provided interesting information on some less-popular meteor showers. The showers were the Lyrids (19 to 25 April) and the Eta Aquarids (2 to 10 May). The Eta Aquarids and the Orionids (2 October to 7 November) are both associated with Comet Halley, one being due to the 'upward' path of the cometary tail, and the other the "downward" or descending node.

John Hoban, G0EVT (Wakefield), listened on 144MHz during the Lyrids and "didn't hear a thing!" The peak of this shower is never easy to predict, since its activity is spread over five or six days, while the listed ZHR is low, a mere 12. The radiant is not all that unfavourable, and compares reasonably well with the more popular Quadrantids shower, so one wonders whether lack of activity during the shower was more to blame than its ability to provide reflections.

David Farries, G4VBG (Gateshead), who was featured last month as the (so far) unchallenged 144MHz auroral record holder, was active during the Eta Aquarids and commented: "Is this shower under-estimated!" For him it proved to be a very good one, with long and strong reflections. David arranged 11 skeds, seven on cw and the remainder on ssb. Only one failed to be completed; his successes being EB5EHX (ZZ) on 26 April, EA3MD

*6 Lerryn Gardens, Broadstairs, Kent CT10 3BH

(AC), I6WJB (HC), OK2PZW (IJ) and OK2KZR (IJ) on 4 May, F1CCM (ZD) on 5 May, F6DRO (AD), IK0BZY (GB) and YU3TS (HF) on 6 May and I3LDP (FF) on 7 May. This gave David seven new squares. The contact with OK2KZR took only 7min to complete on sideband with a maximum burst of 40s. That with F6DRO, also using ssb, took just 8min with a maximum burst of 60s. David then proceeded to work IK0BZY during a single 40s burst while the Italian was working G1GEY, and there was time to send him a 59 report. A 2min burst at S9 plus was received from UP1BWR (MO) at 0530 on 7 May when he was working G3UTS. Despite regular checks, the only station heard on random frequency was SM2CEW, and David is convinced that many more contacts would have been possible if more stations had been active. The Eta Aquarids shower is listed as having a ZHR of 50 (the much-favoured Perseids is only 80), but the radiant looked most unattractive which perhaps is the reason that few operators were active during the shower. G4BVG's equipment included an FT290 with 100W amplifier and a 17-element Tonna fed from 100ft of cable.

LYRIDS. MAX 22 APRIL. ZHR 12. RADIANT AT RA 272, DEC 33

Time	Az	El	N/S	NE/SW	E/W	SE/NW
0000	88	43	XXXXXXXXXX	XXXXXXX		XXXXXXX
0100	100	52	XXXXXXXXX	XXXXXXXX	XX	XXXXXX
0200	117	61	XXXXXXXX	XXXXXXXX	XXXX	XXX
0300	141	68	XXXX	XXXXXXX	XXXXX	X
0400	177	72		XXXX	XXXXXX	XXXX
0500	215	69	XXXX	X	XXXXX	XXXXXXX
0600	240	62	XXXXXXX	XX	XXXX	XXXXXXXX
0700	258	53	XXXXXXXXX	XXXXX	XX	XXXXXXXX
0800	270	44	XXXXXXXXX	XXXXXXX		XXXXXXX
0900	281	35	XXXXXXXXX	XXXXXXXX	XX	XXXXX
1000	292	26	XXXXXXX	XXXXXXX	XXX	XXX
1100	302	17	XXXXX	XXXXX	XXX	X
1200	312	10	XX	XXX	XX	
1300	323	3	X	X	X	
1400	335	−2				
1500	347	−5				
1600	360	−6				
1700	12	−5				
1800	24	−2				
1900	36	3	X		X	X
2000	47	9	XX		XX	XXX
2100	58	17	XXXXX	X	XXX	XXXXX
2200	68	25	XXXXXXX	XXX	XXX	XXXXXXX
2300	78	34	XXXXXXXXX	XXXXX	XX	XXXXXXXX
2400	89	43	XXXXXXXXX	XXXXXXX		XXXXXXX

Lyrids shower computer predictions

ETA AQUARIDS. MAX 3 to 5 May. ZHR 50. RADIANT AT RA 336, DEC −1

Time	Az	El	N/S	NE/SW	E/W	SE/NW
0000	72	−15				
0100	84	−6				
0200	96	3	X	X		X
0300	108	13	XXXX	XXXX	X	XX
0400	121	21	XXXXXX	XXXXXXX	XXX	XX
0500	135	29	XXXXXX	XXXXXXX	XXXXXX	
0600	152	34	XXXX	XXXXXXXX	XXXXXXXX	XXX
0700	170	37	XX	XXXXXXX	XXXXXXXX	XXXXXX
0800	189	37	X	XXXXXX	XXXXXXXXX	XXXXXXX
0900	207	35	XXXX	XXX	XXXXXXX	XXXXXXXX
1000	224	29	XXXXXX		XXXXXX	XXXXXXX
1100	238	22	XXXXXX	XX	XXXX	XXXXXXX
1200	251	13	XXXX	XX	X	XXXX
1300	263	4	X	X		X
1400	275	−5				
1500	287	−15				
1600	300	−23				
1700	315	−31				
1800	331	−36				
1900	350	−39				
2000	10	−39				
2100	28	−36				
2200	45	−31				
2300	60	−23				
2400	73	−15				

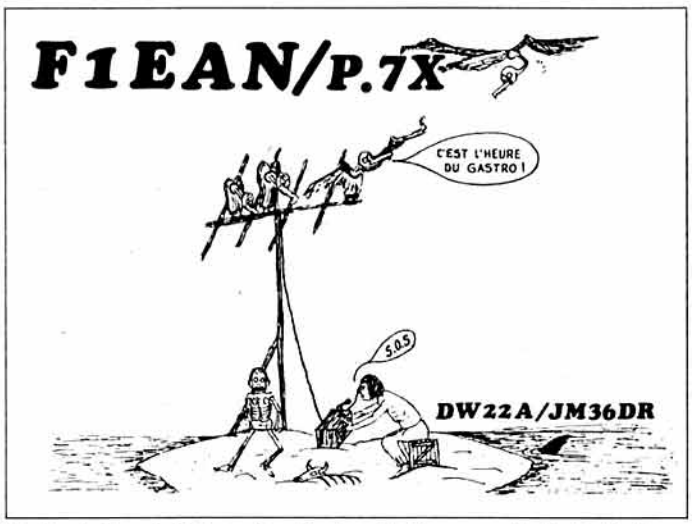
Eta Aquarids computer predictions.
Note radiant below horizon for much of the day

Armed with these two reports, I thought it would be interesting to see what a computer would predict for these showers. Using the MSCALC5 program developed by Paul, G4IJE, the printout for each shower was obtained, and both are shown. As might have been expected, the computer showed that the Lyrids, with its positive declination (33°) should provide better reflections than the Eta Aquarids (declination -1) since the radiant of the Eta Aquarids would lie below the horizon (negative values in the elevation column) for much of the 24h. Any contacts made outside the period 0200 to 1300gmt would therefore almost certainly be due to sporadic meteors, not the shower. G4BVG's log showed contacts with F6DRO and OK2KZR between 0800 and 0900gmt, which could have been predicted for the OK but be more marginal for the north-south path to France. The long burst from the UP station heard at 0535gmt is more consistent with the computer figures. John Hoban, G0EVT, heard a long burst "G4??? IK0BZY 292929" a couple of times at 1034gmt, which again is consistent with the predictions for a north-south path at this time.

These computer programs should only be used as a guide, but when the elevation column shows the radiant to lie below the horizon it is probably best to avoid trying to make contacts at those times. Having said that, there is always the chance that some sporadic meteors will turn up to confound the experts!

VHF operation from Algeria

In *VHF/UHF* December 1986, Michel Monteil, F/G6WDK, gave some information on vhf operation in North Africa. He has now received a card, depicted here, for a 432MHz contact he made with that country from his home location in Montpelier (JN13). The distance was approximately 500 miles, and he considers it "not too bad because I was running 1W into a nine-element portable Tonna". As he mentioned last December, operation on 144MHz is forbidden in Algeria, but since no mention is made of 432MHz in official Algerian documents which define facilities available to radio amateurs, this provided a "loophole" for stations F1EAN and F6BZA who used the band while visiting the country. Michel says that he has never seen any mention of this operation from Algeria, which took place during June 1986, in any radio journal or publication. Possibly the two French amateurs who operated there chose the illustration on the QSL card to suggest the fate which might await anyone caught activating the 7X prefix on vhf in the future, but if you intend to have a go, please let me know so that I can beg a sked.



The front side of a QSL card confirming what is assumed to be the first-ever 432MHz contact between Algeria and France (see text). *Courtesy* F/G6WDK

Repeater news

Alan Wills, GM4IZY, editor of the *Speyside Repeater Group Newsletter,* pointed out that I had my typewriter ribbon in a twist when, in the May issue, I attributed the group with operating rather more repeaters than are in their care! They are currently responsible for GB3SS (R0) Knockmore, near Elgin, with a licence pending for a 432MHz repeater GB3KM on the same site. The others I mentioned—GB3GN, PD, BI and OC—are all in the general area and accessed from time to time by members of this group when conditions permit. Alan says that "he only wishes the group were responsible for all of them", but maintaining that lot in a part of the country where weather conditions can be so severe would surely be no sinecure. A copy of the latest issue of the *Speyside Newsletter* June 1987, Volume 3, accompanied Alan's letter, and it contains much of general interest as well as news of the group's activities. One problem being encountered by the group is that the mast on which the repeater antenna is located is "filling up with antennas from other services" so that a very clean signal from the repeater is essential to avoid interference. Their present system suffers desense from a Band 2 vhf radio transmitter producing 30kW of erp some 30ft from their antenna! This group would welcome new members, and Alan GM4IZY, QTHR, the treasurer, is the one to contact in this connection.

The East Kent Group Newsletter No.48 May 1987, is also to hand. This is a busy group with seven repeaters to operate, GB3RE Chatham, RB11, having at last received its licence.

Maidenhead revisited

I have been criticized for giving publicity to details of contests sponsored by *Dubus* magazine, since those responsible for that journal refuse to accept the world-wide locator system and demand the old "European" locators to be exchanged for a contact to count for points. IARU has

accepted "Maidenhead", as the "official" locator system, and while not all operators agree with it, the majority use it in all of their contacts. However, there is nothing in our licence conditions which requires the exchange of any specified information during a QSO. This being the case, any organization setting contest requirements is free to demand any information exchange it likes, assuming that nothing is encouraged which might invalidate our licence conditions. Since we are free to make a personal decision whether or not to enter a contest, it seems to me that anyone feeling strongly about the matter can simply abstain.

Still on the subject of locators, you will note that I tend to use both systems apparently indiscriminately in my text. This is because I try to make as few alterations as possible to copy which is sent to me by readers, so I endeavour to print what they have written. It is no secret among those who know me that on balance I prefer the European system, though I use the new one. But then I am rather an old-fashioned codger who would sooner drive a Model-T Ford if I could only find one. Incidentally, I do drive a 1929 car, which perhaps proves the point.

Expedition information

The Eire expedition planned by the combined Newbury and BBC Ariel groups from 17 July to 10 August was mentioned in the May *VHF/UHF*. Some further details have now come to hand, as follows. Callsigns issued are EI4VBM (G3UAX), EI4VBC (G4VSQ), EI3VVU (G1AWD), EI3VVV (G6HUN) and EI3VVW (G6IBI). Operation is planned on hf, and on 70, 144, 432 and 1,296MHz. The group may be joined on site by EI7AYB, EI9FK, EI5FK and EI2CA, so there should be plenty of operators available. They plan to be in UL (IO1041) and VM (IO52) from 17 to 31 July; the time spent in each square being dependent on site suitability and availability. From 1 to 10 August there will be continuous operation from VL (IO51) from a coastal site 1,400ft asl, and this period includes various contest dates, so the team should be much in demand. Frequencies on which to look for them (including hf) are 3,645 and 28,567kHz ssb, 28,670kHz fm, 28,885kHz crossband, 70·234, 144·234, 432·234 and 1,296·234MHz. So far no 50 or 70MHz licences have been issued to the group, but EI9FK has 70MHz equipment and in any case they will be prepared to work crossband. Although not mentioned in their programme no doubt the 14MHz European vhf net will be a means of setting up meteor scatter skeds. This well-equipped expedition offers a great chance of working some very rare EI squares.

July looks like being a busy month, since some Dutch amateurs are returning to a very good location in Austria from 2 to 10 July. They will be on Mount Hochkar, HH25a (JN77KR). Callsigns (all preceded by OE/) will be PA3CNX, PA3CDO, PE0GWA, PE1F0D, PE1JIZ, PE1JSI, PE11WS, PE1CMO, PE1GWY and PE1EVX. Operation will be on 144 and 432MHz, plus microwave bands to 2·3GHz. They will also be equipped with receivers for 70 and 50MHz for crossband, and be QRV daily from 0500 to 2300gmt. Skeds outside these hours can be arranged over the vhf net. Their calling channels will be 144·240, 432·240 and 1,296·200MHz, plus fm activity on 145·525MHz if conditions allow. They will even be open for 432MHz eme skeds, and invite any amateurs visiting the area during their stay to take the main road between Goestling/Ybbs and Eisenerz, where a large sign will indicate the turn-off to Mount Hochkar which has "beautiful scenery and a good restaurant".

At the beginning of July, dates unspecified, Michel Monteil, F/G6WDK, plans to reactivate his GJ callsign and possibly "make a hop to Guernsey". He expects to be in location YJ70b (IN89) during NFD (IN89) with 100W on 144MHz, 18W on 432MHz and 100W on 1·3GHz. Frequencies are 144·219, 432·219 and 1,296·219MHz, plus the usual calling channels as required.

Looking ahead to next month, the Derbyshire Hills Contest Group plans to visit VN, UN and UO squares between 2 and 14 August. Operation will be primarily from VN square, with portable operation from the other squares. They plan to be active on 70, 144, 432 and 1,296MHz, and permission has been requested for a 50MHz permit. If this is not forthcoming, the group will be equipped for 50MHz reception for crossband working. At the time of writing, the callsign EI2VPX was known to be available to the group, but confirmation of other calls was awaited. The VHF Net will be used for setting skeds. Frequencies for this expedition will be: fixed station (VN)—70·220, 144·144 (cw ms), 144·220 (tropo), 144·444 (ssb ms) plus 432·220 and 1,296·220MHz; portable station (UN,UO)—70·180, 144·084 (cw ms), 144·180 (tropo) and 144·484MHz (ssb ms). Operators will include G4FRE, G4VVZ, G4XUM, G4YUZ and G8ROU. For further information, including skeds, write to David, G8ROU,QTHR, or phone 0629 732620. The group would be particularly interested in meteor scatter skeds on 432MHz during the peak of the Perseids shower.

Also in August, Clive, GW4VVX, and his colleague GW6TGX, with their families, have rented a cottage in IO78 (XS) square, 600ft asl. They should be there from 8 to 22 August, and have with them 200W to a 13-element on 144MHz, plus 10W (and possibly a linear) on 432MHz. They will look for contacts on 144·222MHz, holiday activities permitting, and during the Perseids will call on ssb, with 1min periods, on the ssb random frequency. The call will be GB2XS, except for the period 15/16 August, when they mount a special event station signing GB0LCS for the Large Crofters Show. This will be Clive's fifth year of operation from XS. He knows of no active vhf operators living in the area, though one of the locals is interested but deterred because his nearest RAE class is 60 miles distant!

From here and there

Chas Lawson, G3JCL, visited Gibraltar in April, and on his return sent some fascinating first-hand information on the 50MHz beacon, ZB2VHF. Apparently it shares its new location on the top of the rock with certain rodents, because Chas reported: "Sorry to tell you that rats nested in the equipment, and survived, but the gear did not!" Maybe it will be back on again by the time this appears, since Chas confirmed that repairs were in the most capable hands of ZB2AB. Chas also noted that activity in the western Mediterranean was "at a low ebb, except for some EAs and a few CTs and CN8s". Some of those CN8s would be most welcome if they will remain active throughout the 144MHz sporadic-E "season".

Jan, OH1ZAA, was active as ZF2KZ on 50MHz from Grand Cayman during May, and with a call like that no doubt gave goose-pimples to USA vhf dx chasers. He commented, however, that there was no local activity on 50MHz from that area. The Finnish QSL manager, OH2BJW, was with Jan, operating as ZF2KY.

A new Cue-Dee antenna, the VHF-Duo 6/5 appeared at Sandown Park this year. It combines five elements on 50MHz with six elements on 70MHz, all on the same boom. Jeremy, G3IMW, has used a homebrew antenna of this general type for some time, details of which have been given in *VHF/UHF*.

Following the report last month that the Cornish beacons were threatened with closure due to lack of funds for new antennas, Jeff Holland, G3GHS, telephoned to say that the beacons were now QRT and would remain so unless funds were received. If just a few hundred of us were to send only 50p to G3GHS, QTHR, this useful service could be re-instated. Postal orders please, not stamps, if you wish to contribute.

Still on the subject of beacons, 50MHz users will be pleased to learn that Canadian beacon VE6SIX should now be back on 50·088MHz, beaming towards Europe with 50W to a four-element Yagi.

Andrew Jeffery, G8SIG (Cheshire), and his wife Margaret, BRS 45172, would like to hear from any stations in their vicinity operating on 70MHz.

John, G0EVT, reminds us that LA1EKO is a good one to look for in square BQ37g, a 'wet' square since he is on the Ekofisk oil rig, and active on 144MHz.

David, G4VBG, says that LA6QBA monitors the random channel, 144·100MHz for ms contacts at 1800gmt, 2·5min periods, while activity from OK/HG/OE can be found at 2100 on the same frequency.

Stop Press: G4UPS, operating as F/G4UPS from Fumel, north of Toulouse, copied beacon SZ2DH at 0630gmt on 20 May on 50·015MHz.

SWL

*Bob Treacher, BRS32525**

As we get further into summer, the news tends to dry up. We have a mixed bag this month, but the number of contributors mentioning that gardening has cut their listening time has grown considerably. First, a timely mention that the outgoing QSL Bureau is closed from 1-23 August. Please do not sent your cards to G3DRN during this period. Also, do not forget the Society's SWL Contest on 11 and 12 July. Full rules were in *Contest News* in May. I look forward to receiving a bumper entry on behalf of the HF Contest Committee.

Golden Jubilee Award

I must note here my disappointment that the ARRL's DXCC Golden Jubilee Award is not available to swls. Many amateurs are chasing dx in 1987 to qualify for this special award, but unfortunately the ARRL do not appear very keen to encourage swls to work for the award, saying that DXCC is for amateurs only. I applied, and I know of at least four other swls

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who would have claimed it, but with the "amateurs only" stance, we are to be denied. My view is that as the number of swls likely to claim the award would be in the minority, it would have put the ARRL in a better light if they had simply sent back the desired certificate and turned a blind eye to their "amateur only" policy. As it stands, the swl is to be the loser and it appears from this that the ARRL are rather anti-swl—something we certainly cannot say about this Society.

UBA challenge

The results of the UBA's 1986 competition are now available. As usual there are a few UK listeners listed in the results. There were 57 entries to the phone section, with the highest placed G listener, BRS87156, occupying 19th place. Other British entrants were BRS28198, RS87865 and G1VOW. The cw section attracted 22 entries, with BRS52868 taking a creditable third place. BRS84869 was also listed. On rtty, BRS28198 was listed 14th. The leading stations in each country received a certificate, but all entrants received a commemorative QSL card, which were all sent via the RSGB Bureau.

White Rose results

Also to hand are the results of the White Rose Society's seventh Lower Frequency Bands Contest. Sixteen entries were received for the ssb section and 6 for the cw section. This is slightly down on previous years. The ssb event was won by NL8722, J Martin was second, Arthur Miller BRS88969, was third, Tony Blackburn, BRS87156, was fourth, and David Whitaker, BRS25429, was fifth. Four other G listeners were placed. In the cw leg, Dick Stanbridge, BRS31879, was first, with Don Piccirillo, BRS52868, second.

The White Rose Society were grateful for the entries, but they are to have a close look at the rules for 1988, especially the multiplier system. The dates are being changed too. The ssb leg will still be in the middle of January, but there is a possibility that the cw leg will be moved to the end of the month. Any comments will be welcomed, to G3XEP, PO Box 73, Leeds, LS1 5AR.

Cray Valley Contest

The Cray Valley Society have advised your scribe that their swl Contest will be back in the calendar this year. Full details will appear in due course, but the event will coincide with the SAC transmitting contests later in the year. G4DFI will be running things and the Society hope for a good turn out. Cray Valley were the forerunners of the swl contest and have enjoyed good support in each of the years the event has taken place.

Overseas news

It is some time since Stan Porter, ORS45992, wrote from Malawi. Stan has moved QTH. He is now situated on the Shire River in the Liwonde Game Park. There is a pub 200m away! and 12 houses in a cul-de-sac, but the area is rife with hippos and the inhabitants are all very fast runners! Mountains in the distance affect his receive capabilities, but at least Stan has now heard his 300th country all-time. CQWW provided his best catch in the shape of OH1RY/CT3 on 1·8MHz—very good dx from Stan's outpost in 7Q7.

Stan told of his trip to SV, 5B4 and 4X4. He visited the Tel Aviv HQ (4X4HQ) and was afforded great hospitality. 3A7E is certainly genuine, QSL via F9RM. Stan referred to the difficulties of obtaining a QSL from A71AD (see last month's column), and VE3FXT who failed to respond even following a landline call. Stan will be in the UK in September and back home for good in 1989.

VHF news

David Whitaker also noted a poor vhf season to the time of his letter. He has been rather lax with the QSL chores of late, still having to catch up with the fine openings in September and October last year. However, cards continue to come through the bureau and his latest vhf confirmations were from F6HEO (BG06b), F1ADT (ZE40a) and FC1HHE (ZF28c), all for 432MHz taking him to 76 squares confirmed on the band. On 144MHz, IK2EAD (FF43f) provided square No 148. He has decided to give 50MHz a miss for 1987. He is hopeful that in 1988 there might be wider use of the band. While on the subject of 50MHz, conditions were so poor to early May that no further reports of dx have been received.

HF news

An update from David Whitaker first. He added six new countries during the winter on 1·8MHz, and seven on both 3·5 and 7MHz. David was looking for a small hf beam to replace his TA32. He found it had little gain on 14MHz compared to a dipole, but was very good on 21 and 28MHz. It seems that I erred with his final 1986 countries score. His total was 750, which would have kept him in third place. Best confirmation was a rather old one from 6Y5NR/KP1 for No 240 on 3·5MHz.

Brad Bradbury, BRS1066, is up to 93 on 1·8MHz, but is dissappointed that conditions were not better during the winter season to push him nearer the magic figure. However, he has 83 confirmed which is a good strike rate. VK9YS provided confirmation No 267 all-time, while C21DD provided country No 298 all-time heard.

Martin Parry, BRS52543, is the latest swl to get the magic 100 on 1·8MHz. CO, 9L, ZP and CE, taking him from No 96.

Finale

Having filled the available space for this month, all that remains to be said is that news, comments, and table scores for inclusion in the September issue, should reach me by 30 June, with late copy by 8 July. □

MICROWAVES

*Mike Dixon, G3PFR**

Technical item

Now that the 10GHz portable season is in full swing with the cumulatives well underway, several people have asked about path calculations. This appears to be a perennial question among newcomers, although plenty of information has been published in the *Microwave Newsletter* and elsewhere. For instance, manual methods using a pocket calculator were described in early issues of the *Newsletter* and in *Practical Wireless* in 1982. Many of the more experienced operators will carry out calculations at home, well in advance of portable operation, and then go out armed with this information. The calculation is made easier and faster by the use of a home micro. A program has been devised which is one possible solution to easy calculation of lat/long, eastings and northings in kilometres, locator, path length and bearing in degrees magnetic, all derived from two national grid references. It does not use spherical trigonometry and is thus likely to be inaccurate over very long paths, but is of sufficient accuracy for most purposes on the kind of paths usually worked, for instance on 10 and 24GHz. It is written for the BBC micro but will run, with a few simple modifications, on many other machines. The listing is unfortunately too long for publication here, but copies can be obtained by sending a stamped self-addressed envelope to the editor at RSGB HQ.

The introductory screen page explains what it does. Line 1690 is peculiar to BBC Basic: it formats the bearing and distance to be printed to one decimal point. If the line is omitted, the only result is that these figures are printed to many (meaningless) decimal points. The screen layout is suitable for the BBC computer in Mode 7 and may need some rearrangement for other machines. Note also that in lines 1640, 1650, 1660 and 1670, a "mid-country" magnetic variation figure of 7·5° is used. For greater accuracy, the user can substitute the local figure, obtained from the local OS map.

Operating and other news

Sam, G4DDK, reported briefly on a number of matters. First his observations on the Dutch 10GHz beacon, PA0QHN. In 1985 it was first heard on 19 April and in 1986 on 20 April. His prediction of 21 April for this year was one day early, on 22 April! Does this suggest that there is a fairly definite "opening" to the season around this time each year? If so, does it coincide with a seasonal change in tropospheric conditions or does it relate to a steady increase in sea-surface temperature leading to the formation of a super-refractive duct, or do both phenomena play a part? Only persistent observation and records will give the answer, but this observation certainly points-up the usefulness of such beacons.

Operating in the contest on the weekend of 2/3 May, he found conditions none too good, although there was evidence of 1·3 and 2·3GHz, late on the Saturday night, of a minor North Sea lift. The usual early morning lift around sunrise occurred, although the dx worked was far from spectacular. Serial numbers heard on 1·3GHz were generally in the thirties and on 2·3GHz in the twenties: the Sheppey Group were heard passing numbers in the mid-sixties on 1·3GHz, their contacts including OZ and HB. Some activity was also reported on 3·4 and 10GHz. On the latter band G0BPU is understood to have worked G3LQR and the Sheppey Group. Sam's second observation was that at least 50 per cent of stations heard were using both locator and QRA. The majority were exchanging locator then QRA, a minority using QRA then locator. Even some of the European "antis" appeared to be using locator exclusively!

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Sandown VHF Convention appears to have been a success (I was away in Egypt and so missed it), with a wide variety of talks, most of them very well attended. Sam, G4DDK, stood in for Dave, G4FRE, and delivered Dave's talk on the middle bands: Dave, although present, was convalescent from an abdominal operation and we all wish him a speedy recovery. There has been a great deal of interest aroused by the 1,152MHz source described in this column, and we were fortunate to take delivery of ready-prepared (tinned, drilled and slotted) pcbs on the day before the convention. Well over half the initial stocks were sold there, thus establishing the need for such a design.

The next two microwave events for your diary are the Microwave assembly & dinner at Wolverhampton Racecourse on 18 July (details from G6FK, QTHR) and the Microwave round table at Winchester on 19 July (details from G3JHM or G4ELM, both QTHR). Round tables are planned at both Sheffield and Martlesham, dates to be announced, in November.

At the more local level, Dave Ward, G1HFH, QTHR, has asked whether there would be interest in setting up a microwave net/group in the Manchester area, based on the North Cheshire Club. Initially he has expressed an interest in setting up a microwave net on 144MHz, either fm or ssb, time and frequency to be agreed between those interested. I know that there are several groups of operators in the area who are active on, or building for, 1·3, 2·3 and 10GHz, including an interest in atv. As the FM Group (Western) also has interests, Dave says, "It might be a good idea to form a user group in order to exchange ideas and solve problems". Anyone interested is invited to contact him with a view to participation. □

RAYNET

*Geoff Griffiths, G3STG**

A cry for help

The Kent Raynet Group has had very little contact with their County Constabulary on a regular basis, and I suppose that this is true of many Raynet groups in the UK. Police forces are required to maintain communication systems to very high standards of readiness and capacity, and they do not see the potential for assistance from the amateur community under normal circumstances.

It therefore came as a surprise to Peter James, the Kent county controller, when on 7 March, when the *Herald of Free Enterprise* disaster dominated the media, he received a telephone call from the coroner's officer asking for assistance in providing a communication link to Zeebrugge in order to provide additional capacity between the Belgian and Kent police. It is much to the credit of Raynet members in Kent that the link was set up in a very few minutes, and that it was efficiently maintained for the weekend, despite the chaos and confusion reigning at the scene of the disaster. Thanks are also due to G4ZAW, who made his 3·5MHz antennas available to the group at very short notice, and to the other amateurs who helped keep the frequencies clear for this operation.

Incidentally, the actual contacting of the group worked in the way I described, but, in addition, a 3·5–144MHz link-up meant that I was contacted with a request for Raynet assistance, despite the fact that I had just arrived at a Zone 3 Meeting at Kettering! It just goes to show, you never know how the next call for help will arrive.

Anyway the moral of the story is clear. I wonder if your group would be able to respond so quickly and efficiently?

Oops

My apologies to G3KWO who was deluged with requests for video tapes and other information after the April *Raynet* column was published. Requests for this material should of course be addressed to: Trevor Emery, G3KWU, "Wilverley", Old Lyndhurst Road, Cadnam, Southampton SO4 2NL, who is Raynet's public relations specialist.

NEC

It was good to see so many friends at the Raynet stand at NEC this year. There was plenty to see and talk about, with the Shropshire Raynet Group's caravan providing not only a centre-piece for the display, and an example to other groups, but also a haven of peace and quiet for those discussions which seem to need a corner in which to sit.

The packet demonstrations provided a real centre of interest and discussion, with a number of working packet stations on display. Particularly impressive was the portable self-powered station packed into a briefcase, with obvious implications for emergency operations. The development of the "Cairo" interface for Raynet installations also attracted much attention, and full details of this recommended standard for interfacing and remote operation are now available in the form of a leaflet giving much practical advice (Contact G8CQH or HQ).

The whole stand would not have been possible without exceptional assistance from members in the West Midlands, and once again the Raynet Committee is in their debt.

Meanwhile, back at the ranch . . .

While this was going on, Raynet members in Northumberland were having to cope with their own little emergency while their county controller was in Birmingham. The weekend of the show was marked by atrocious weather, which had ramifications for the inhabitants of Seaton Sluice, where the abandoned mine workings in the area began to give off large quantities of carbon dioxide and carbon monoxide which normally lie safely locked into the rock strata beneath. Members of Northumberland County Raynet were called out to provide communications for teams of British Coal scientific advisors as they monitored gas levels. The work was carried out as part of a large team drawn from many services, including the local police, welfare and rescue services, and fortunately large-scale evacuation of the local population did not eventually prove necessary. Well done lads.

Meanwhile, in Norfolk, high tides caused by the same depression brought the threat of flooding. Once again, the standing arrangements between Norfolk Police and the county's Raynet teams swung into action, with flood control communications centres being manned around the county. The ability of Raynet in Norfolk to provide 80 strong teams to do this work is now so well practised as to be almost routine and hardly worth of comment, but this level of proficiency and service does not happen by accident! It requires continual training and practice by all concerned, as well as a readiness to serve the community at short notice for periods which may turn out to be very short or very long.

You can't be effective if you are prepared to turn out "when you really need me", but not prepared to train with your fellow members regularly.

Medivac 1

Anyone listening to 144MHz on 26 April will no doubt have been surprised when at 2pm the band suddenly filled up with signals from Raynet groups from Cornwall to the Scottish borders, including Wales and the Isle of Man. This was a result of the latest devilish scheming of the Raynet Committee. It was some time since a nationally-organized exercising of Raynet's long-distance capability had been arranged, so this event was set up as the first of an on-going series of activities of this type.

The objective of the operation was to bring to controllers' attention the likely problems which would be encountered during a period when Raynet needed to pass a large quantity of message traffic across the boundaries between groups, between counties and, indeed, between different regions of England and Wales. Each participating group was invited to set up one well-sited base station, and required to concentrate mainly on getting its traffic through on vhf by whatever mode could best serve.

The briefings deliberately did not specify in great detail the frequencies to be used or the way in which inter-group and inter-zonal traffic was to be structured, since the essence of the task was to learn about how the net would operate in an event which came with very little warning or pre-planning. Groups obviously learned a great deal about the size of the problems which would be encountered, and the special difficulties imposed on some groups by geography and topography became very obvious.

The exercise was seen as a great success by the planners, since it certainly highlighted problems which need urgent planning attention in order to ensure that a real life disaster could be coped with much more effectively. The scenario looked at the communications needs imposed during the falling to earth of large quantities of debris from the decay of a satellite from orbit, and the possible demands of servicing the needs of police and regional emergency committees. This provided plenty of scope for challenging traffic, and proved to be a popular script.

Not all reports are yet to hand (early May), but the concensus of opinion seems to be that all enjoyed the challenges presented. Some 123 groups took part, and many chose to mount more than one station in order to cope with the predicted traffic loads. Probably 10 per cent of the total national membership was involved in some way or another, and all this on a weekend with a workload of normal support for the user services which meant that some groups could not participate, and with many of the London groups involved in supporting the VHF Convention. The importance of packet communications between groups suitably equipped became very obvious.

The planning of Medivac 2 is well advanced, and I promise that it will be different and will present a new set of problems. □

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DATA COMMS

*Ian Wade, G3NRW**

Comments on the Amtor Mk-II board

In response to the piece about the G3PLX Amtor Mk-II controller board in May's *Data Comms*, Ted Hatch, G3ISG, writes: "I have been active on Amtor for more than 18 months now, and I wonder if the set-up for this board needs to be as complex as shown? For instance, I know from my own experience that the level converter interfaces ahead of both the magnet driver and tone generator are not necessary, as both may be driven at ttl levels.

"Also, is there any reason why the teleprinter contacts should not be connected to 0V and 5V, thus dispensing with an interface at this point (although I do realize that to use 5V successfully on the contacts of a 444 teleprinter does depend on reliable contact operation)? Presumably, too, if an fsk demodulator operating at 5V were used, the remaining interface would not be necessary.

"I suspect that the reason for so many level converter interfaces is because the existence of the ST5 terminal unit is assumed, but that need not be the case. As it happens, although I have a G3PLX board built-in to my terminal unit for use with a 444, I also have a BBC computer with the G3WHO Amtor program. Because I am retired and have plenty of time, and to exercise my ingenuity, I have devised a switching system that enables me to ring the changes in several ways. This includes a choice of 444 or BBC keyboard, and it is possible to use the G3PLX Amtor on the vdu by using the G3WHO rtty program in the BBC—this option entails either manual transmit/receive changeover of the BBC, or keeping the BBC on transmit with the 444 on receive.

"Another thing. I have often wondered why the BBC clock should be too inaccurate for Amtor. I notice that there are two crystals in the BBC, and I am unaware of their functions, but would it not be relatively easy to add a capacitor trimmer to pull the appropriate crystal onto the correct frequency? It would be preferable to using an external clock, and I have never heard reference to this requirement in connection with the Commodore 64 when used on Amtor."

To comment on these points, I believe that the level converter interface for the Mk-II board was indeed originally designed for use with the ST5 terminal unit; certainly, the schematic for the level converters (in BARTG's *RTTY The Easy Way*) refers to ST5 pin numbers for the interconnections. But if the voltage levels at the teleprinter and demodulator/tone generator interfaces are already suitable for ttl, then there is obviously no need for any further level conversion (although protective diodes on the signal lines might be a good idea, to lessen the risk of blowing up the Mk-II board).

As for the accuracy of the Amtor clock, there is in principle no reason why an existing clock inside the computer could not be used. One approach is to sample the clock by software, as in the Commodore system, and any final timing adjustments are made by keyboard commands which make small up/down changes to a counter limit.

The approach adopted in the G3WHO system, however, is to use an external clock, as described in May's column. This way, the clock can be set up accurately on frequency once and for all, and there is then no need to make any internal modification inside the computer. A suitable external clock for the G3WHO Amtor system is obtainable from Johnny Melvin, G3LIV.

Connect International update

To bring you up to date on the latest issues of RSGB's packet newsletter *Connect International*, the March 1987 issue contains two major articles on network and transport level software. The first describes the NET/ROM package which runs on TNC-2 clones, and is now operational in several areas of the United States (including via a satellite link between Washington DC and San Francisco).

The second article summarizes the NET.EXE system developed by Phil Karn, KA9Q, using the industry-standard TCP/IP protocol. If you are already a Unix user, you will instantly recognize commands like "telnet", "ftp" and "Mail" to handle conversations and mailbox operations. In principle with this software it should be possible to connect not only to other packet radio stations, but also into any computer network running TCP/IP (and there are a lot of them about!).

* 7 Daubeney Close, Harlington, Dunstable, Bedfordshire LU5 6NF.
Prestel Mailbox 219999743

As an aside, I have just re-read what I have written above, and it makes the mind boggle! If you will allow a personal reminiscence, I first got involved with the design of commercial packet networks way back in 1976, and remember thinking then how exciting it would be if amateurs could set up similar systems linking computers via satellite. But no, I thought, this could never happen. With packet switches based on Digital PDP-11s costing around $20,000 each, and satellite links costing thousands of dollars a year to rent, this was strictly a game for the big boys.

How wrong I was! If nothing else, the one lesson I have learned in life is never to say that something is "impossible" (after all, Chernobyl could never happen, could it?). In 1987, amateur packet is here with a vengeance, and we are now taking part in what is probably the most significant development ever in amateur radio.

But I digress (it's so easy to get carried away when talking about packet!). Another interesting contribution in the March issue of *CI* is an article by John Cowie, GM6KJD, describing how he has connected his FT290R discriminator direct to a G0BSX tnc, and how he has modified the tnc to work successfully on hf as well as vhf. He also includes a simple bargraph tuning indicator, essential for copying packets on the hf bands.

Moving on to April's *CI*, there is another tuning indicator design, even simpler than John's, for use with the AM7910 modem chip used in several of the tncs available today. There are also details for connecting the G3RUH psk (phase shift keying) modem to the PK-64, PK-232 and TNC-220 tncs. Originally designed for communication via the Japanese FO-12 satellite, this modem is also being used with great success in terrestrial links, where under weak signal conditions it performs very much better than the usual fsk modem found in standard tncs. More details on the G3RUH modem from Ron Broadbent, G3AAJ, at AMSAT-UK (sae as usual, please).

To reinforce the claims made for psk, April's *CI* also has a report by Tom Clark, W3IWI, on tests he has carried out on 28MHz using the TAPR psk modem. Even when the effective transmitter power was reduced to only a few milliwatts, bit error rates were still better than 1 in 10,000, and packets were copied error free with signals only 6-8dB above the noise level. Tom concludes his report by proposing that as no standards exist yet for 28MHz or 50MHz, and as these bands hold the greatest promise for meteor scatter work, and as psk works so well with weak signals (pause for breath), we should adopt psk as the packet standard for these bands.

On a more general front, the number of people subscribing to *CI* has been steadily increasing month by month, and I must thank all of you for your many suggestions. However, would new subscribers please note that I am unable to supply copies of back issues; any subscription enquiries should be sent direct to: The Circulation Department, RSGB HQ.

Sinclair/Amstrad Radio User Group

Yes, SARUG has changed its name (but conveniently retained its initials) by adding the Amstrad range of machines to its scope. The April/May 1987 newsletter still concentrates on the Spectrum, but it will only be a matter of time before the balance changes to include more information on the Amstrads.

Spectrum 128K Plus Two owners will be interested to see how to fit an EAR socket to their machine; unlike earlier models, the standard Plus Two does not have an EAR socket, making it impossible to input audio direct from a radio, for software decoding of cw, rtty, UoSat or sstv signals. Fitting the socket seems to be a simple job.

Also in the newsletter, G4NWB makes a very important point about overdriving the microphone input on the radio. Not the usual plea to avoid over-modulation, but a very practical comment about burning out the microphone amplifier! He says that when driving his TS-430 with a Spectrum, he noticed the mic gain control was getting very hot, so after a panic switch-off he consulted the TS-430 circuit diagram and found that it was the integrated mic amplifier immediately following the gain control that was cooking! The output from the Spectrum can peak to 3V, whereas the rig is only expecting an input of a few millivolts. He solved the problem by inserting a 2·7kΩ resistor in the live side of the input lead from the Spectrum, and a 50Ω resistor in the earth connection. As G4NWB rightly says, other rigs may have similar circuitry, so it will be as well for users to look at the circuit diagram before transmitting.

To take this point further, it is always wise to check the voltage levels before connecting any computer equipment to the radio. For example, my hf radio is an old FT-200, full of valves and high voltages. There is no fear of burning out the mic amplifier, but the ptt line rises to + 50V on receive, which could cause problems with any transistor circuitry connected to it. Because of this, I have to use an isolating relay on the ptt line between the radio and my packet tnc, as the ptt switching transistor in the tnc has a maximum Vce rating of only 15V. □

Contest News

HF CONTEST TROPHIES

The trophies manager would like to remind all those members who currently hold RSGB HF contest trophies that they must be returned to RSGB HQ on or before 18 August, 1987.

28MHz Phone & CW Cumulative Contest 1987 rules

1. The general rules for RSGB HF Contests as published in the "Operating guide" supplement, *Rad Com* January 1987, will apply.
2. **Dates and times.** Each session starts at 2000 and finishes at 2200gmt. CW sessions: 28 September, 6 October, 14 October, 22 October and 30 October 1987. Phone sessions: 2 November, 10 November, 18 November, 26 November and 4 December 1987.
3. **Sections.** Single-operator, multi-operator and swl. All entrants, including each operator of a multi-operator entry must be fully paid-up members of the RSGB. Portable or A entries are acceptable but entrants must operate from the same location for all sessions.
4. **Frequencies.** CW 28·0-28·2MHz, phone 28·5-28·7MHz. Entrants are asked to spread out within the specified segments.
5. **Exchange.** RS(T), number (starting at 001 for each session) and RSGB county code (see "Operating guide"). For QSOs with overseas countries, RST and serial no (when given). SWL section, see rule 11 below.
6. **Scoring.** Each session is scored separately and the sum of the three highest scoring sessions to count. Each completed contact is worth three points. Additionally, a bonus of five points can be claimed for the first contact in each session with a new county or country (outside of the UK). SWL entrants score on the same basis as transmitting entrants, but see rule 11.
7. Single log for each mode covering all sections entered. This to show: date of session, call, RS(T), serial no sent and received, county code, points and bonus claimed. Logs must be fully scored and totalled and should also show the county code sent. A separate list of counties/countries worked in each session **must** be included. RSGB HF contest log sheets should be used (or equivalent). Incomplete logs will not be accepted. A standard RSGB declaration must be completed and included with the entry. This must show the county code sent.
8. Entries should be sent to HF Contests Committee, c/o Mrs R L Glaisher, G4RWW, 279 Addiscombe Road, Croydon, CR0 7HY.
9. Entries should be postmarked not later than Monday 9 November 1987 for the cw section and Monday 14 December 1987 for the phone section.
10. **Awards.** Certificates will be awarded to the leading three entrants in each section for the phone and cw contests, subject to a minimum of 10 entries being received in the single-operator and five in the multi-operator and swl sections.
11. **SWL section.** Rules as transmitting section, except as detailed below:

(a) Entrants. British Isles RSGB members only, who do not hold a Class A transmitting licence.

(b) Logs must be headed date, time, call heard, call of station being worked, report, number and county code of station heard, points and bonus (where applicable). **Note:** The call of the station being worked may only appear once in every three contacts logged, unless it is a new country/county for bonus. A list of these bonus countries/counties must be included.

Low Power Contest 1987 results

A disappointing number of entries this year, due in part to the contest falling on Easter Sunday (the third weekend in April is allocated by the IARU for QRP Fixed). This year, 7MHz was considerably more lively, with over half the entries showing contacts on that band.

Equipment used by the leading stations. G4ARI: Sugiyama F850 with half-wave dipoles at 40ft. G3YDV: IC735 with a VN66 outboard pa and a 3·5/7MHz trap dipole as an inverted-V apex at 60ft. G5LP: FT101Z with half-wave dipoles. The leading 1W entry, G0CBD, used a TS940S with a W3DZZ antenna! G3UFY was the highest-placed entrant using a home-brew station with a half-wave end-fed antenna.

OK1DKW heard no trace of Gs on 7MHz but was surprised by the good conditions on 3·5MHz. He says he "heard seven stations in the contest but only one heard me (G3JKS). Congratulations on his receiver." In comparison, G6ZY/EA6 heard no G QRPers on 3·5MHz but on 7MHz G3KDB was the strongest signal.

Congratulations to Tim, G4ARI, who will receive the 1930 Committee Cup for this year. *G4JKS*

SECTION A

Posn	Callsign	Input Power(w)	QSOs 3·5MHz	QSOs 7MHz	Points 3·5MHz	Points 7MHz	Total
1	G4ARI*	5	73	17	1,015	255	1,270
2	G3YDV*	5	66	16	965	240	1,205
3	G5LP*	5	74	2	1,085	30	1,115
4	G3JKS/A	5	53	13	785	195	980
5	G3GC	5	66	—	965	—	965
6	G4MQC/A	4	65	—	950	—	950
7	G4HZV	5	44	18	645	270	915
8	G3UFY	5	61	1	885	15	900
9	G0BVZ	5	52	9	765	130	895
10	G4SXE	5	46	9	680	135	815
	G0CBD†	1	59	—	815	—	815
12	G3KKQ	3	41	12	605	180	785
13	G2HLU	5	32	17	470	245	715
14	G3KDB	3	35	9	525	135	660
15	G3AWR	5	35	10	515	140	655
16	G2DAN	3	42	—	605	—	605
17	G4GLC	5	39	1	570	15	585
18	G4KLQ	5	31	7	460	105	565
19	G8QM	4	33	—	485	—	485
20	GM4YLN	5	34	—	480	—	480
21	G3GMS	2	30	—	450	—	450
22	GM4EWM	5	25	6	360	85	445
23	G4MIJ	5	27	2	405	30	435
24	G4JJN	3	27	—	390	—	390
25	G4ZME	5	27	—	375	—	375
26	G3BPM	1	23	—	340	—	340
	G4TJE	4	24	—	340	—	340
28	G4HSO	5	15	—	215	—	215
29	G0AEO	3	11	—	165	—	165
30	G4PVB	3	6	—	90	—	90

SECTION B

Posn	Callsign	Input Power(w)	QSOs 3·5MHz	QSOs 7MHz	Points 3·5MHz	Points 7MHz	Total
1	DJ6FO*	4	4	18	60	270	330
2	G6ZY/EA6*	5	—	15	—	200	200
3	OK1DKW*	3·5	1	—	15	—	15

*Certificate winners
†Certificate for highest scoring 1W input or less
A checklog was received with thanks from G4UOL

Contests Calendar

In response to popular demand, the "Contests Calendar" has now been restored to its logical location and in its full form

RSGB HF CONTESTS

11, 12 July	SWL (Rules in May issue)
12 July	DF Qualifying, S Manchester (Rules in July issue)
19 July	Low Power FD (Rules in June issue)
2 Aug	3·5MHz Hopscotch (Rules in June issue)
2 Aug	DF Qualifying, Salisbury (Rules in July issue)
17 Aug	DF Qualifying, Colchester/Chelmsford
30 Aug	Ropoco 2
5, 6 Sept	SSB FD (Rules in June issue)
6 Sept	DF Qualifying, Slade
20 Sept	DF National Final, Mid-Thames
Sept-Oct	28MHz CW Cumulative (Rules in July issue)
11 Oct	21/28MHz SSB (Rules in May issue)
18 Oct	21MHz CW (Rules in June issue)
24 Oct	DF Treble Night, Mid-Thames
Nov-Dec	28MHz Phone Cumulative (Rules in July issue)
14, 15 Nov	2nd 1·8MHz

RSGB VHF CONTESTS

4, 5 July	VHF NFD (Rules in April issue)
12 July	10GHz Cumulative (Rules in April issue)
8 Aug	144MHz Low Power & SWL (Rules in June issue)
9 Aug	432MHz Low Power & SWL (Rules in June issue)
23 Aug	1·3/2·3GHz (Rules in June issue)
5, 6 Sept	144MHz Trophy & SWL (Rules in June issue)
5, 6 Sept	IARU Region 1 VHF & SWL (Rules in June issue)
13 Sept	10GHz Cumulative (Rules in April issue)
20 Sept	70MHz Trophy & SWL
3, 4 Oct	IARU UHF/SHF & SWL (Rules in June issue)
3, 4 Oct	432-24GHz
8 Oct	432MHz Cumulative
16 Oct	1·3/2·3GHz Cumulative
24 Oct	432MHz Cumulative
25 Oct	70MHz Fixed
1 Nov	1·3/2·3GHz Cumulative
7, 8 Nov	144MHz CW
9 Nov	432MHz Cumulative
17 Nov	1·3/2·3GHz Cumulative
23 Nov	432MHz Cumulative
3 Dec	1·3/2·3GHz Cumulative
6 Dec	144MHz Fixed & AFS
11 Dec	432MHz Cumulative
13 Dec	70MHz CW
19 Dec	1·3/2·3GHz Cumulative

OTHER CONTESTS

4, 5 July	YV DX Phone
11, 12 July	HF World Championship CW/Phone (Rules in June issue)
18, 19 July	Colombian Independence (Rules in July *HF*)
25, 26 July	YV DX CW
1 Aug	YL/OM Summer SSB Sprint (Rules in July *HF*)
1, 2 Aug	YO DX Phone
8, 9 Aug	European DX CW
15, 16 Aug	Remembrance Day CW/Phone
	Seanet Phone
22, 23 Aug	All Asian DX

GT Peck Memorial Trophy DF Event results

Sixteen teams met at Peppard Common for the start of the 1987 GT Peck Memorial Trophy Event which is run under national rules. Good signals were heard and the competitors set off in excellent weather.

Station A was located in a large patch of rhododendrons on Ashley Hill near Maidenhead and caused most teams a considerable amount of trouble. The easy way to go through rhododendrons is to crawl along the ground. Unfortunately the transmitter operators had made a nest in the top of the bushes about 10ft off the ground and were treated to an enormous range of expletives from horizontal competitors beneath them. Some teams spent over an hour within sight of the station.

Station B was also in a rhododendron bush in woods at Bear Lake near Wokingham: the obvious approach being up a fairly steep hill along a track paved with clinging mud. Several competitors looked into the bush, failed to see the operators in the gloom and went to explore other places.

One competitor was adopted by a stray dog which followed him everywhere but was of no help in finding the transmitter, but being a kind hearted sort of fellow he decided to return the dog to the address on its collar. During the journey the dog vomited on our hero, and he was then told by the owner that it was always running off into the woods and it always came home!

The event was won by Alan Simmons of Mid-Thames who managed to travel between the stations in only 30min. He was closely followed by Mike Hawkins of Colchester. Tea was provided by Doreen Pechey and Lorraine Metcalfe at the Scout Hut at Crays Pond and was enjoyed by all those present.

			Time of arrival	
Posn	Name	Club	Stn A	Stn B
1	A Simmons	Mid-Thames	1534.45	1504.00
2	M Hawkins	Colchester	1537.15	1459 00
3	P Lisle	Mid-Thames	1537.44	1434.20
4	R Shepherd	Mid-Thames	1552.25	1434.34
5	B Bristow	Mid-Thames	1556.20	1458.30
6	D Newman	Slade	1447.00	1603.51
7	R Witney	Chelmsford	1455.50	1605.51
8	T Gage	Mid-Thames	1448.20	1606.50
9	C Merry	Dartford Heath	1506.14	1609.35
10	P Larbalestier	Colchester	1511.20	1616.00
11	C Plummer	Mid-Thames	1617.09	1459.45
12	A Malbon	Mid-Thames	1622.30	1504.22
13	I Butson	Colchester	1622.50	1504.50
14	G Whenham	Coventry	1511.15	1624.22
15	F Mepham	Mid-Thames	1552.40	—
16	G Taylor	Ariel	1630.00	—

South Manchester Quad Night DF Results

This year's event attracted a record number of entries, with 16 teams assembling at the start, the weather being unusually mild for the time of year.

All transmitters but one were audible at the start, the remaining one bursting into flames at the first test df. Fortunately a spare was available. Competitors appeared to disperse fairly evenly between the four transmitters.

Station A, G3WFT/P, was located in a small wood approximately seven miles southwest of the start. The operators expected to be found quite easily but a long antenna led several teams in the wrong direction. One passed within 5ft of the operators without seeing them!

Station B, G3FVA/P, was located less than two miles west in scrubland, using a QRP transmitter which deceived competitors into believing that the transmitter was many miles away. Once in the area, teams soon located the transmitter. One team encountered a suspicious character with a large bundle of timber, who immediately dropped his booty and fled when they shone their torches on him!

Station C, G3UHF/P, was situated at Bramhall Park, six miles to the east of the start. The operators had hidden themselves on a small island with a suitably swampy and fetid access track. The various antennas had been placed to ensure the most unpleasant conditions for those foolhardy enough to follow them!

Station D, G3ZDM/P, was placed halfway up a hill some 13 miles southeast of the start. The operators had hidden in an enormous rhododendron on an otherwise barren hillside! Several competitors approached from the wrong side of the hill, necessitating some mountaineering in addition to df techniques!

After the event 45 weary people enjoyed a Lancashire hot pot.

The South Manchester Club would like to thank all who took part, operated (and provided the supper afterwards!) and looks forward to the 1988 event.

				Time of Arrival		
Posn	Name	Club	Stn A	Stn B	Stn C	Stn D
1	G Whenham	Coventry	2059	—	2200	2348
2	C Plummer	Mid-Thames	2351	—	2053	2229
3	B Bristow	Mid-Thames	2353	—	2227	2152
	C Wells	S Manchester	2058	—	2227	2353
5	A Simmons	Mid-Thames	2146	—	2330	2358
6	D Yorke	S Manchester	2104	—	2255	—
7	D Newman	Northampton	2104	2315	—	—
8	C McKenzie	S Manchester	2105	2316	—	—
9	J Drakeley	Slade	—	—	2136	2343
10	N Woodley	Mid-Thames	—	—	2148	2356
11	K Chan	S Manchester	2354	—	2052	—
12	T Gage	Mid-Thames	2355	—	2137	—
13	I Morrison	S Manchester	2057	—	2358	—
14	G Foster	Stratford	2058	—	—	—
15	C Barham	S Manchester	2146	—	—	—

One competitor failed to locate any transmitter

DF Qualifying Event—South Manchester

Date: 12 July 1987
Map: OS Sheet 118 1:50,000 series, The Potteries.
Assembly: 1300bst for start at 1320bst.
Location: Lay-by on A534 approximately 1km ENE of Crewe station, ngr 721553.

Competitors requiring tea should notify Mr D Holland, 32 Woodville Drive, Sale, Cheshire M33 1NF; tel 061-973 1837 (home) or 061-224 5650 (work) not later than 5 July 1987.

DF Qualifying Event—Salisbury

Date: 2 August 1987
Map: OS Sheet 195 1:50,000 series, Bournemouth and Purbeck.
Assembly: 1300bst for start at 1320bst.
Location: Two miles SE of Fordingbridge, ngr 179129.

Competitors requiring tea should notify Mr A Newman, 74 Victoria Road, Wilton, Salisbury. Wilts SP2 0DY; tel 0722 743837 not later than 26 July 1987.

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 plus basic unchanged information on other affiliated organizations which was last published in the Jan 1987 issue. Basic unchanged information on affiliated organizations will be published again in Jan 1988.

RSGB affiliated organizations are requested to report all programmes and new items to their regional representatives regularly. Information for inclusion in the **October** issue should reach them by **10 August** and for the **November** issue by **12 September**.

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 (North-west Repeater Group)—Third Thursdays of the month, 8pm. The Globe Bowling Club, Willows La, Accrington. Sec G0DTI.

Barnoldswick (Rolls-Royce ARC, G3RR)—Wednesdays, 7.30pm. The Rolls-Royce Sports & Social Club, Barnoldswick. Sec G4ILG, tel 0282 812288.

Barrow (South Lakeland ARS)—First and third Thursdays of the month, 8pm. The Norweb Sports & Social Club, rear of Ormsgill Hotel, Barrow-in-Furness. Sec G4VKE, tel 0229 65359.

Blackburn (East Lancs ARC, G3NTJ/G1ELC)—Meetings twice monthly, 7.30pm. Conservative Club, Cliff St, Rishton. Details G6LXU, tel 0254 887385.

Bolton (BARC)—Tuesdays, 7.30pm. The Dean Sports Complex, New York, Junction Rd, Bolton. Sec G1AEQ.

Bolton (B&DARS)—Meetings 8pm. Horwich Leisure Centre, Victoria Rd, Horwich. Sec G4TQL, tel Bolton 55092.

Burnley (B&DARC)—Second and fourth Tuesdays of the month, 7.30pm. The Adult Education Centre, School La, Burnley. Sec G0BQC, tel 0282 39765.

Bury (BRS G3BRS)—14 Jul (Surplus equipment sale). Tuesdays, 8pm. Mosses Community Centre, Cecil St, Bury. Details G1VQE.

Carlisle (C&DARS)—Mondays, 7pm. The Scout HQ, Trinity School, Carlisle. Sec G3XWA, tel 0228 27463.

Chester (C&DARS G3GIZ/G8GIZ)—14 Jul (tba), 21 ("Receivers part 2", G3WEZ), 28 (Your questions answered). 8pm. Chester RUFC, Hare La, Vicars Cross, Chester. Details G6IFA, tel Chester 336639.

Chorley (Leyland Hundred ARG)—Second and fourth Mondays of the month, 7.30pm. The Astley Park Sports Club, Chorley. Sec G4YSU, tel 0772 600239.

Congleton (CRC)—First Wednesday of month, 8pm. The Library, Congleton. Sec G6OKN, tel Crewe 765005.

Crewe (SCARS G4LVR/G6TWB)—Second Monday of the month, 8pm. LMR Sports Club, Goddard St, Crewe. Details G1PUV, tel 07816 73185.

Darwen (DARC, G4JS)—7 Jul (Fox hunt). 7.30pm. Highfield WMC, Ratcliff St, Darwen. Sec G2AKK, tel 0254 73767.

Eccles (E&DARS, G3GXI/G8GXI)—Tuesdays, 9.30pm. Duke of York Hotel, Church St, Eccles. Sec G8KRG, tel 061-773 7899.

Ellesmere Port (EP&DARS, G3CSA)—Alternate Tuesdays, 7.30pm. The Grosvenor Hotel, Ellesmere Port. Details G4STZ, tel 061-339 7201.

Fylde (FARS)—7 Jul ("Roll of radio in modern BT network", G3NOM). 7.45pm. The Kite Club, Blackpool Airport. Sec G8GG, tel 725717.

Isle of Man (IoM ARS)—Mondays, 8pm. The Howstrake Hotel, Harbour Rd, Onchan. Details GD4GWQ, tel 0624 22295. Additional local meetings are held at The British Legion, Douglas St, Peel, on Thursdays, and Perwick Bay Hotel, Port St Mary, on Fridays.

Kendal (Westmorland RS)—Meetings 8pm. The Strickland Arms, Sizergh, Nr Kendal. Details G1IIE, tel 0539 28491.

Leyland (Central Lancs ARC)—First and third Mondays of the month, 8pm. The Priory Club, Broadfield Drive, Leyland. Details G4OBK, tel Chorley 74451.

Liverpool (L&DARS, G3AHD/G8WCL)—7 Jul (Junk sale), 14 ("Experiences in the RAF", G1VEH and G4COY), 21 (Fox hunt), 28 (Quiz), 4 Aug (Minute waltz). 8pm. The Churchill Conservative Club, Church Rd, Wavertree, Liverpool. Sec Lynn, tel 051-728 8811.

Liverpool (L Raynet Group G1KOP)—Details G4GHS, tel 051-428 5442.
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). Details G1KNM, tel 051-724 2522 or 3878.
Macclesfield (M&DARS, G4MWS/G1MWS)—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 (South MRC G3VFA/G3UHF)—3 Jul (Preparations for VHF NFD and discussion), 10 ("Avionics"), 17 ("The fun, care and feeding of lead acid batteries", G6MOQ), 24 (Morse contest), 31 ("The early days of radio", G2AKR). 8pm. Sale Moor Community Centre, Norris Rd, Sale. Details G2AKR.
Manchester (WMRC)—Wednesdays, 8pm. Astley & Tyldesley Miners Welfare Club, Meanly Rd, Gin Pit Village, Astley, Tyldesley, nr Manchester. Details G1IOO, tel 0204 24104.
Maryport (Solway RC G4BBX)—Wednesdays, Maryport Educational Settlement, High St, Maryport. Details G0AFP, tel Cockermouth 826461.
Merseyside Raynet—Details from county controller, G8RXB, tel 051-638 5879.
Morecambe (MBARS)—Tuesdays, 7.30pm. Trimpell Sports & Social Club, Outmoss La, Morecambe. Morse classes alternate Tuesdays. Details G4ZJL, tel 0524 52042.
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 the month, 8pm. Ormskirk Community Centre. Details G1KDF, tel 0695 74868.
Penrith (Eden Valley RS)—16 Jul (Barbecue at G3CUC's QTH). 7.30pm. The Ullswater Centre or The Crown Hotel, Eamont Bridge. Sec G4FUI, tel Penrith 66728. Club net on non-meeting Thursday, 7pm, and on GB3EV or S22 on Sundays 11am.
Preston (PARS)—Alternate Thursdays, 8pm. Lonsdale Club, Fulwood Hall La, Fullwood, Preston. Sec G3ZXC, tel 0772 718175.
Rossendale (RARS)—Wednesdays, 8pm. The Huntsman, Burnley Rd, Loveclough, Rossendale. Sec G4VVK, tel 0706 214076.
St Helens (SH&DARC)—Details G1GNS, tel 092 572 6891.
Skelmersdale (S&DARC)—Thursdays, 8pm. Details G4ZPY, tel 0704 894299.
Southport (S&DRC)—Meetings fortnightly, 8pm. St Marks Church Hall, Scarisbrick. Sec G4YYV, tel Southport 79825.
Southport Raynet (G1SRG)—Details G4RQX, tel Southport 25172.
Stockport (SRS)—Wednesdays, 8pm. The Blossoms Hotel, Junction of Bramhall Rd and A6. Sec G4FFW, tel 061-224 7880.
Tarporley (Mid-Cheshire ARS)—1 Jul (VHF NFD preparation), 8 (Conversion of transistor radios to 1·8MHz for fox hunt), 15 ("ATUs and QRP", G4XUV), 22 (Fox hunt). 7.30pm. The Cotebrook Village Hall, Cotebrook, nr Tarporley. Details G1SIB, tel 0928 88153.
Thornton Cleveleys (TCARS)—6 Jul ("Fire prevention in the shack", Fire Prevention Officer), 13 ("Raynet"), 20 ("Amtor"), 27 ("Computer fraud", G6KOE), 3 Aug ("Amateur tv"). 7.45pm. 1st Norbreck Scout HQ, Carr Rd, Bispham, Blackpool. Club net Sundays 11am, G4ATH on 1·865MHz. Details G4BFH, tel 0253 853554.
Warrington (WARC, G4CDA/G6WRC)—7 Jul (RSGB film: "JARL visit to China"), 14 ("Language labs", G0CBN), 21 (Open forum), 28 ("Find the buffet", G6AWD), 4 Aug (Film: "Junction transistors"). 8pm. Grappenhall Community Centre, Bell House La, Warrington. Details G0BCN, tel 0925 814005.
Wigan (Douglas Valley ARS, G3BPK)—First and third Thursdays of the month, 8pm. Standish Conservative Club, School La, Standish, nr Wigan. Details G4GWG, tel Wigan 211397.
Wigan (W&DARC)—Wednesdays, 7.30pm. Poolstock Cricket Club, Poolstock La, Wigan. Club net on 144MHz Mondays. Sec G0DTY, tel 0942 47416.
Wilmslow (North Cheshire RC)—Details G4WCE, tel 061-980 5173.
Wirral (WARS)—First and third Wednesdays of the month, 8pm. Club Room, Ivy Farm, Arrowe Park. Sec G3VEB.
Wirral (W&DARC)—Meetings 8pm. Irby Cricket Club, Mill Hill Rd. Details G6CGJ, tel 051-677 7376.
Wirral Raynet Group—Details G6FNF, tel 051-653 4067.
Woodford (RATEC)—British Legion Club, Moor La, Woodford, nr Bramhall, Cheshire. Details G4SFU, tel 061-485 3912.
Wyre (WARS)—Second and last Wednesdays of the month. Breck Squash Club, Breck Rd, Poulton. Sec G4UHI, tel 0253 854745.

If the above information is incorrect, please advise me in writing. I am still receiving information too late for publication. Check dates at top of "Club News". *RR1*

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 and Morley
P Goben, G4BVV . . . . . Maltby
M J Valentine, G4ANP . . . . . Mexborough
G R Wilkinson, G4YKO. . . . . Scarborough
R Sterry, G4BLT . . . . . Wakefield
K R Cass, G3WVO . . . . . York

Barnsley (UK FM Group Northern G8KRM)—5 Jul (Monthly meeting). 7.30pm. Royal Hotel, Barnsley. Details G4UNA.
Denby Dale (DD&DARS G4CDD)—Wednesdays. Pie Hall. Details G1MOZ, tel 0484 686573.
Goole (GR&ES G0GLE)—12 Jul (Natter night and log fill), 17 (HF operating), 24 (Visit), 31 (Social evening). 8pm. West Park. Details G0GLZ, tel 0405 69968.
Halifax (H&DARS, G2UG)—21 Jul (Open forum). Running Man ph. Details G0DLM, tel 0422 202306.
Halifax (Northern Heights ARS G4NOK)—1 Jul (Treasure hunt), 15 (HF night on the air). Bradshaw Tavern, Halifax. Details G3UI, tel 0422 60574.
Hornsea (HARC, G4EKT)—Wednesdays. The Mill. Details G4YTV, tel 0401 62498.
Hull (H&DARS, G3AMW)—Meetings at club room, Walton St. Details G1RVS, tel 0482 845326.
Hull (Operation Raleigh ARC GB4ORH)—Daily operation on all bands during the expedition. Details G1TFT, tel 0482 28217.
Humberside Repeater Group—Details G4NJP.
Keighley (KARS RS 84851)—14 Jul (Informal), 28 ("Data transmission", G4XGN). Victoria Hotel. Details G1IGH, tel 0274 496222.
Leconfield (RCTARS, G4GGD)—9 Jul (Open day preparation). Normandy Barracks. Details G4EJP, tel 0401 50397.
Leeds (L&DARS)—Mondays. Yarbury RUFC. Details G0ETL, tel 0532 784080.
Leeds (White Rose ARS, G6XEP)—Wednesdays. Moortown RUFC, Moss Valley, Kings La, Leeds. Details G4ATZ, tel 0937 842790.
Maltby (MARS, G4SKM)—3 Jul (Activity night), 10 (Three in a row mini-talks), 17 (Home projects night), 24 (Amateur radio open forum), 31 (Junk sale). Hellaby Community Hall. Details G1PQW, tel 0709 814135.
Mexborough (M&DARS, G4BTS)—Fridays. Harrop Hall. Details G1BJB, tel 0709 586329.
North Ferriby (NFUARS, G0ECR)—Fridays. Ferriby FC. Details G1LSZ, tel 0482 493777.
Pontefract (P&DARS, G3FYQ)—Results of the draw at the components fair: First prize, a digital multimeter was won by Mr D Benson. Second prize, a wavemeter kit was won by Mr G Parkin. Meetings at Carleton Community Centre, Pontefract. Details G6OJX, tel 0977 83792.
Ripon (R&DARS, G4SJM)—Thursdays. Air Raid Shelter, Ripon. Details L Bulman, The Lodge, Lister House, Sharrow.
Scarborough (SARS G4BP)—Mondays, Scarborough Cricket Club. Details G4ZNZ, tel 0723 514767.
Sheffield (SARC)—Mondays. Firth Park Pavilion, Sheffield. Details G8ZHG, tel 0742 395287.
Spen Valley (SVARS, G3SVC)—2 Jul (Swindon Cup), 16 (Closing night on the air, straight key cw). 8pm. Old Bank WMC, Mirfield, W Yorks. Details G4PHR, tel 0924 499397.
Todmorden (T&DARS, G4WYT)—6 Jul (Police dog handler), 20 (Natter night). Queen Hotel. Details G1GZB, tel 0706 817572.
Wacral (G3NJB)—Worldwide Christian friendship and fellowship through amateur radio. Details G3AGX, tel 0482 82276.
Wakefield (North Wakefield ARC G4NOK)—2 Jul ("Basic logic", G4RCH and G3ZXZ), 9 (Visit to gas control centre), 16 (Barbecue and fox hunt), 23 ("Satellite tv", G4APV), 30 (Monthly meeting). White Horse ph, Wakefield. Details G4RCH, tel 0532 536633.
Wakefield (W&DRS, G3WRS)—7 Jul (Talk by G3WWF), 11 (Barbecue at G4VRY), 14 (Debate), 21 (Annual pitch and putt), 28 (Erecting club hf beam antenna). 8pm. Ossett Community Centre. Details G4VRY, tel 0532 820198.
York (YARS, G3HWW)—Fridays, 7.30pm. United Services Club, Micklegate. Details G3WVO, tel 0904 422084.
York (YRCA, G4YRC)—14 Jul (Club night), 28 Jul (Repeater night). 7.30pm. Ashcroft Hotel, York. Details G3WQM, tel 0904 793672.

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

Area representatives
N Read, G8CXL . . . . . Warwick
I Hopwood, G0EDT . . . . . Stratford
M Henley, G3OQO . . . . . Rugby
B Jones, G8ASO. . . . . .Worcester
L Craven, G4EQI. . . . . .S Birmingham
J K Harvey, G4IVJ . . . . . .SW 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. Sec G1OBA, tel 021-353 6233.
Ariel Radio Group—Club for BBC personnel only. Details G3DEF or G3PGG.
Atherstone (AARC)—Second and fourth Mondays of the month. Upper School, Long St, Atherstone. Sec G6YQU, tel Chapel End 393518.
Birmingham (Aston University ARS)—Monday lunchtimes and Thursday evenings. Introductions via admissions tutor or G6VWA. Sec G6VWA, tel 021-359 3611 ext 5115.
Birmingham (Midland ARS)—Jul 12 (Visit to Droitwich) 21 (Treasure hunt). Monday, construction night. First Tuesday, committee meeting. Second Tuesday, computer night. Third Tuesday, lecture. Fourth Tuesday, Raynet group meeting. Wednesday, morse and natter night. Thursday, night on the air. Friday, RAE class. Weekends, contests. Unit 5, Henstead House, Henstead St (off Bromsgrove St). Sec G8BHE, tel 021-422 9787.
Birmingham (Mirfield ARC)—8 Jul ("Antennas for small gardens", G3BA). Mondays, hf and construction. Tuesdays, slow morse tuition. Wednesdays, chat night. Thursdays, RAE tuition. Fridays, morse class. 7pm. Mirfield Centre, Lea Village, Birmingham. Sec Ms K Field, tel 021-783 5898.
Birmingham (Slade RS)—First Friday of the month, 7.45pm. Community Centre, 75 Kingsbury Rd. Erdington, Birmingham. Sec G4FGF, tel 021-770 3474.
Birmingham (South BAARS)—Wednesdays, vhf operating evenings; Thursdays, hf operating evenings. First Wednesday of the month is a formal meeting. 8pm. Hampstead House, Fairfax Rd, West Heath, Birmingham. Sec G6KOA, tel 021-458 1941.
Birmingham (B University RS)—Various activities for students and visitors. Meets daily 1pm. Friday, club night. Tuesday, RAE classes, 7.30pm. Club Room, 2nd Floor, Union Buildings, (Midland Bank entrance and follow the signs). Sec GW4YEG.
Bridgnorth (Severn RS)—Sec E Churchyard. 11 Greenfields Drive, Birmingham.
Bromsgrove (BARS)—Second and fourth Tuesdays of the month, 8pm. Aston Fields WMC. Sec G4XQW, tel Bromsgrove 33959.
Bromsgrove (B&DARS)—Alternate Fridays, 8pm. Thursdays, club net 144·575MHz, and morse tuition. Avoncroft Arts Centre, Bromsgrove. Sec G4NYH, tel Bromsgrove 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 ARS)—Thursdays. Ex-Service Centre, Bank St, Cheadle. Sec G4OUG, tel 0538 756323.
Coventry (CARS)—3 Jul (Morse tuition), 10 (144MHz df contest), 17 (Night on the air). 8pm. Scout HQ, 121 St Nicholas St, Radford, Coventry. Sec G3UOL, tel 414684.
Coventry (C Tech ARS)—Mondays, 7pm. Room E17, Wynfray Building, Tech College, Coventry.
Coventry (Warwick University ARC)—Wednesdays, 1pm and 7.30pm. "The Cholo". Sec G1NFR, tel Coventry 503702.
Droitwich (DARC)—Second and fourth Mondays of the month, 8pm. Scout HQ, Droitwich. Sec G4HFP, tel 02993 3818.
Dudley (DARC)—Mondays, 7.45pm. The Allied

Centre, Greenman Alley, Tower St, Dudley. Sec G4NRA, tel 0384 278300.
Evesham (ERAC)—2 Jul (10 and 24GHz demo, G0DJA). Details G4UXC, tel Evesham 831508.
Evesham (BBB Contest Group)—Private club. Contest working only. Sec G4WAD, tel 0386 6246.
Halesowen (Midlands ES&SC, G4MEB)—14 Jul (Microwave evening), 28 (General meeting). 8pm. MEB Social Club, Mucklow Hill, Halesowen. Sec G4RWH, tel 021-747 8784.
Hereford (HARS)—8pm. Civil Defence HQ, Gaol 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)—14 Jul (Surprise lecture). Second Tuesday of the month, 8pm. Red Lion Inn, St Anne's Rd, Malvern. Sec G4BVY, tel 06845 66822.
Much Wenlock (MWARES)—Second and fourth Mondays of the month, 8pm. Raven Hotel, Much Wenlock. Sec G3ZSL, tel 07462 861332.
North Staffs (NSARC)—8pm. Harold Clowes Community Centre, Dawlish Rd, Bentilee, Stoke-on-Trent. Sec G6MLI, tel 0782 332657.
Oswestry (O&DARC)—First Tuesday of the month, 8pm, Gobowen. Third Tuesday, 8pm. Bell Hotel, Oswestry. Sec GW0DLW, tel 0691 831023.
Redditch (RARC)—8pm. WRVS Centre, Ludlow Rd, Redditch. Sec G3EVT, tel 0789 762041.
Rugby (RATS)—21 Jul (DF competition), 28 (Home-brew evening). 7.30pm. Cricket Pavilion, B entrance, Rugby radio station. Sec G8TWH.
Sandwell (SARC)—13 Jul (QRP on the air). Mondays and Thursdays. Wednesday, morse classes. 7.30pm. Broadway, Oldbury, Warley. Sec G4UMY, tel 021-422 1554.
Shrewsbury (Salop ARS)—2 Jul (Natter night), 9 (DF hunt), 16 (Natter night), 23 (Visit from Air Traffic Control), 30 (HF on air night). 8pm. Old Bucks Head, Frankwell, Shrewsbury. Sec G0EIY, tel 0743 67799.
Solihull (SARS)—Third Thursday of the 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.
Stafford (SARS)—Tuesdays, 8.30pm. Coach & Horses, Pasturefields, Staffs. 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.
Stone (British Telecom ARS)—British Telecom staff and students only. Tuesdays, 7.30pm. The College. Sec G8ATB, tel (works) 0785 762593.
Stourbridge (S&DRS)—20 Jul (Talk by G4CVU). First and third Mondays of the month, 8pm. Robin Woods Centre, School St, (off Enville St), Stourbridge. Sec G3ZOM, tel 0384 288900.
Stratford-upon-Avon (SuO&DRC)—13 Jul (Technical topics), 27 (Members project competition). 7.30pm. Baptist Church, Payton St, Stratford-upon-Avon. Sec G8OVC, tel S-o-A 750584.
Sutton Coldfield (SCRS)—Second and fourth Mondays of the month, 7.30pm. Public Library, Sainsbury Centre, Sutton Coldfield. Sec G3CNV, tel 021-354 4369.
Tamworth (TARS)—Mondays, 8pm. Rugby Club, Cotton Green, Tamworth. Sec G4SRI, tel 0827 68137.
Telford (T&DARS)—1 Jul (VHF NFD planning), 8 (Committee meeting, night on the air, and constructors evening), 15 (HF NFD debriefing), 22 (Fox hunt and portable night), 29 (VHF NFD debriefing). 8pm. Dawley Bank Community Centre, Dawley, Telford. 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)—14 Jul ("What's your antenna?"), 28 (Natter night). 8pm. St John Ambulance HQ, 61 Emscote Rd, Warwick. Sec G6VHI.
Wells (Krautkramer ARC)—Private club. Details G4WKK.
West Bromwich (WBARC)—Sundays, 8pm. Hop and Barleycorn, Dartmouth St, West Bromwich. Sec, 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 Police RC—Sec D Mytton, tel 021-458 3236.
Willenhall (W&DARS)—Wednesdays, 8.30pm. Mondays and Thursdays, morse tuition. Cross Keys, Willenhall. Sec G4LWI, tel 0902 782036.
Wolverhampton (WARS)—Tuesdays, 8pm. Electricity Board Sports Club, St Marks Rd, Chapel Ash, Wolverhampton. Sec K Jenkinson, tel 0902 24870.
Worcester (W&DARC)—Meetings 8pm. Oddfellows Club, New St, Worcester. Sec G4RBD, tel 641733.
Worcester (W Moonbounce Society)—Sec P Crosland, tel 0905 620041.
Wordsley (WRC)—Meetings 8pm. Vine Inn, Camp Hill, Wordsley. Sec G4VJU.
Wythall (WARC)—7 Jul (Committee meeting), 28 (Night on the air). 7.30pm. Community Centre, Silver St, Wythall. Sec G0EYO, tel 021-430 7267.

Thanks to all those club secs who have sent me information. We still need more if this list is really going to reflect what is going on in the area. *RR3*

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

Alfreton (A&DARC)—20 Jul ("RSGB", G3SZJ). 8pm. ECP Social Club, Carnfield Hill, Alfreton. Sec G1SFR.
Bolsover (BARS)—Wednesdays, 8pm. Black Bull Hotel, Bolsover. Sec G1GNC, tel Chesterfield 824061.
Buxton (BARS)—Second and fourth Wednesdays of the month. Haddon Hall Hotel, London Road, Buxton. Sec G8YHX, tel Buxton 6800.
Bourne (BARS)—Second and fourth Wednesdays of the month. Edenham Village Hall. Sec G1TRT.
Derby (DADARS)—1 Jul (Junk sale), 8 ("DX tv", Keith Hamer), 15 ("Light railways", G0FWI), 22 (Night on the air), 7.30pm. 119 Green Lane, Derby. Sec G3KQF, tel Derby 772361.
Derby (NHARG)—Fridays, 7.45pm. Nunsfield House, Boulton Lane, Alvaston, Derby. Sec G4PZY, tel Derby 767994.
Glossop (GADARG)—Last Tuesday of the month, 7.30pm, Nags Head Hotel, Charlestown, Glossop. Sec G4GNQ.
Grantham (GRC)—Third Tuesday of the month, Shirley Croft Hotel, Harrowby Rd Grantham. Sec G8WWJ, tel Grantham 65743.
Grimsby (GARS)—Thursday, 8pm. Cromwell Social Club, Cromwell Road, Grimsby, Sec G3RGC.
Heanor (SE Derbyshire ARS)—Tuesdays during term. South East Derbyshire College of Education, Ilkeston Road, Heanor. Sec G8RZM.
Hinckley (HARES)—Second Wednesday of the month, 7.30pm. John Clevelans College, Butts Lane, Hinckley. Sec G8STX, tel Hinckley 63778.
Leicester (LRS)—Mondays, 8pm. Gilroes Cottages, Groby Road, Leicester. Sec G4PDZ, tel Leicester 871086.
Leicester (Wigston ARC)—Fridays, 7.30pm. Wigston Reformed Church, Wigston, Leicester. Sec G6HAJ, tel Leicester 403105.
Lincoln (LSWC)—Wednesdays, 8pm. City Engineers Club, Waterside South, Lincoln. Sec G4STO, tel Gainsborough 788356.
Loughborough (LADARC)—Tuesdays, 7.30pm. Hind Leys College, Forest Street, Shepshed, Loughborough. Sec G0FTT.
Loughborough (WAB)—Worked All Britain Awards. Detail G4IAR.
Louth (LADARC)—Wednesdays. Sec G1TZB, tel Marshchapel 595.
Mansfield (MARS)—First Friday and third Tuesday of the month, 7.30pm. Victoria Social Club, Mansfield. Sec G4AAH, tel Mansfield 642719.
Marlpool (Notts & Derby Border ARC)—Tuesdays, 7.30pm. Marlpool United Reformed Church, Chapel Street. Marlpool. Sec G4UFC, tel Ilkeston 302990.
Market Harborough (Welland Valley ARC)—Mondays, 7.30pm. Welland Park College, Market Harborough. Sec G3LSL, tel Market Harborough 880746.
Melton Mowbray (MMARS)—St John Ambulance Hall, Asfordby Hill, Melton Mowbray. Sec G3NVK, tel Melton 63369.
Newark (NADARC)—First Thursday of the month, 7.30pm. Worthington Simpson Sports & Social Club, Balderton, Newark. Sec G1SCF, tel. Southwell 81541.
Nottingham (ARCON)—Thursdays, 7.30pm. Sherwood Community Centre, Woodthorpe House, Mansfield Road, Nott'm. Sec G4EKW.
Nottingham (Plessey ARS)—Thursdays, 8pm. Plessey Communication, Beeston, Nottingham. Sec G4VFK, tel Nottingham 226321.
Nottingham (All Saints AR&EC)—Information from All Saints Church.
Scunthorpe (SADARC)—Tuesdays. Grange Farm Hobbies Centre, Franklin Cres. Scunthorpe. Sec G4ZGJ, tel Scunthorpe 732268.
Sleaford (SADARC)—Last Sunday of the month, 8pm. Hale Magna Village Hall, Great Hale. Sec G2HHK, tel 0529 304454.
Skegness (SADARS)—First Friday of the month, 7.30pm. White Swan, Burgh le Marsh. Sec G1ONN.
Spalding (SADARS)—3 Jul (DF hunt). 7.30pm. The Ship Albion, Albion Street, Spalding. Sec G4NBR.
Stamford (SADARC)—First and third Wednesdays of the month, 7.30pm. The Rugby Club, Hampleton Drive, Stamford. Sec G4OZM, tel Stamford 54433.
Worksop (ARS)—Alternate Tuesdays, 8pm. Woodhouse Inn, Woodend, Rhodesia, Worksop. Sec G4ZUN, tel Worksop 486614.

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

Bedford (B&DARC)—First and third Thursdays of the month, Allen's Club, Hurst Grove, Queens Park, Bedford. Sec G4VHF, tel 0234 751763.
Bedford Modern School ARC—Address for correspondence, G1BYT. This club is run for the boys of Bedford Modern School.
Mid-Beds Contest Group (G4MBC)—Details G4BWP.
Cambridge (Cambridge University Wireless Society)—Sec G6OQA, Selwyn College.
Cambridge (C&DARC)—Fridays, 7.15pm. Coleridge Community College (visual arts room), Radegund Rd, Cambridge. Sec G4TRO.
Daventry (DARC)—Wednesdays. St John Ambulance Brigade Rooms. Sec G0DPA.
Dunstable (DDRC)—4, 5 Jul (VHF NFD on Dunstable Downs), 10 (Junk sale). Alternate Fridays, 8pm. Room 3, Chews House, High St, South Dunstable. Sec G6EES, tel 0582 607623.
Leighton Buzzard (LLRC)—Mondays. Duncombe Arms ph, Great Brickhill. Sec Debbie Jones, tel 0908 649238.
Luton (Kent Process Controls Ltd ARC)—The club call, G4KPC, is held by G3DOT.
March (MADRAS)—Tuesdays, 7.30pm. Neale-Wade Adult Education Centre, Station Rd. Sec G3PWK.
Milton Keynes (MK&DARS)—First Monday of the month. The Meeting Place, Hodgelea, North Milton Keynes. Sec G0ERE, tel 0234 750629.
Nene Valley (VRC)—Wednesdays, 8pm. Prince Wales ph, Well Street, Finedon, Northants. Sec G6UWS, tel 0933 71189.
Northampton (NRC)—2 Jul (Visit to Pitsford), (Discussion evening). Thursdays. 8pm. Kingsthorpe Community Centre. Sec G8EUX.
Peterborough (GPARC)—Fourth Thursday of the month, 7.30pm. Southfield Junor School. Sec G1UGA.
Peterborough (PRES)—Third Friday of the month. Brook St Institute, Brook St, Peterborough. Sec G4PNW.
Shefford (S&DARS)—2 Jul (VHF NFD final briefing). Thursdays, 8pm. Church Hall, Ampthill Rd, Shefford, Beds. Sec G4PSO, tel Hitchin 57946.
Texas Instruments ARC—Thursday and Friday evenings. Open to employees of Texas Instruments. Details G1JKE.
Wisbech (WARC)—Thursdays, 7.30pm. RAFA Club, Astral House, Old Market, Wisbech, Cambs. Sec G4ODH.

Secretaries, please keep the news coming. Even my postman complains about the lack of mail! *RR5*

REGION 6—RR N P Taylor, G4HLX, 87 Hunters Field, Stanford in the Vale, Faringdon, Oxon SN7 8ND. Tel 03677 503.

Abingdon (Contest club)—G4UHF enters all major vhf/uhf contests, details from G4PSU.
Aylesbury (A Vale RS)—First and third Wednesday each month, 8pm. Hardwick village hall, 3 miles north of Aylesbury. Sec G6SIB.
Aylesbury (A Vale Repeater Group—Enquiries about GB3VA, GB3AV, GB3BV or group membership, contact G8BQH, tel 0296 641783.

Chesham (C&DARS)—Wednesdays, 7.30pm. Stable Loft, The Bury Farm, Pednor Road, Chesham. Sec G0ETU, tel 09278 3911.
Chilton (Rutherford Appleton Lab (ARC)—For details contact G4XRJ, tel Abingdon 446114.
Didcot (Vale of White Horse ARS)—First and third Tuesdays of the month, 7.30pm. The Waterwitch, Cockroft Road, Didcot. Some meetings held jointly with Harwell ARS. Nets 28·750MHz Thursdays, 7.30pm; 145·2MHz Sundays, 8pm. Sec G4SYL, tel Didcot 816845.
Halton (RAF Halton ARECC)—Thursdays, 7.30pm, Building 168, RAF Halton. Visitors are requested to book in at Main Guardroom. Details Sqn Ldr Ted Turk, RAF IPTM, RAF Halton, tel 0296 623535 ext 561; Sqn Ldr Tony Gilchrist, tel 01-430 7277; or G4MXG.
Harwell (HARS)—Third Tuesday of the month, 7.30pm, some jointly with VOWHARS. Harwell Lab. Social Club. Also informal meetings every Tuesday. Sec G6LNU, tel Wantage 68453.
High Wycombe (Chiltern ARC)—8 Jul (/P informal event), 22 ("Radio Control", G0AZV). 8pm. Second and fourth Wednesdays of the month. Sir William Ramsay School, Rose Ave, Hazelmere. Details G4XVP, tel 0494 35275.
Maidenhead (M&DARS)—2 Jul (VHF foxhunt). First Thursday and third Tuesday of the month. 7.30pm. Red Cross Hall, The Crescent, Maidenhead. Sec G3VTS, tel Maidenhead 25443.
Newbury (N&DARS)—Second Thursday of the month, 7.30pm. Newbury Technical College. Sec G3VOW, tel Newbury 43048.
Oxford (O&DARS)—Second and fourth Wednesday of the month, 7.45pm. Oxford Civil Service Sports Association Club, Govt Buildings (entrance through gates marked "Driving Tests"), Marston Rd, Oxford. Sec G4PUU.
Oxford (Oxfordshire RAFARS)—Meets for natter night on third Wednesday odd numbered months, 7.30pm. Civil Service Club, Oxford. Monthly net 3,710kHz, second Sunday, 11.30am. RAFARS area rep G6ZH.
Reading (R&DARC)—28 Jul (Annual boat trip). Alternate Tuesdays, 8pm. White Horse ph, Emmer Green, Reading. Net 145·325MHz Mondays, 7pm. Details G4YFB, tel Reading 867820.
Slough (Burnham Beeches RC)—6 Jul (Preparation for McMichael '87 rally), 19 (rally), 20 (tba), 3 Aug (foxhunt). First and third Mondays of the month, 8pm. Haymill Community Centre, 112 Burnham Lane, Slough. Details G6EIL, tel Maidenhead 25720.

Remember the *McMichael '87 Mobile Rally* in Slough on 19 July from 10.30am (talk-in S22). I shall be there with some RSGB books for sale, and look forward to meeting many members from Region 6. Please come and introduce yourself.
RR6

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 Road, Croydon. Sec G3SJX, tel 01-656 9054.
Ashford (Echelford ARS)—6 Jul (tba), 30 ("Standing waves", G3MCK). 8pm. The Hall, St Martins Court, Kingston Crescent, Ashford, Middx. Sec G4VAZ, tel Sunbury 783823.
Bexleyheath (North Kent RS)—First and third Tuesdays of the month, 8pm. The Pop-in-Parlour, Graham Road, Bexleyheath. Sec G4DIB.
Biggin Hill (BHARC)—21 Jul (tba). 7.30pm. The Victory Social Club, Kechill Gardens, Hayes. Sec G3UMI, tel 01-462 2689.
Couldsdon (CATS)—13 Jul (Construction contest), 30 (Informal). 8pm. St Swithuns Church Hall, Grovelands Road, Purley, Surrey. Sec G6HC, tel 01-684 0610.
Cray Valley (CVRS)—2 Jul (Show planning), 16 (Natter night). 8pm. Progress Hall, Admiral Seymour Road, Eltham SE9. Details G3TAA.
Croydon (SRCC)—6 Jul ("CB conversions to 28MHz", G4XRU). 8pm. TS Terra Nova, 34 The Waldrons, South Croydon, Surrey. Sec G8IYS, tel 01-657 0454.
Crystal Palace (CP & DRS)—Third Saturday of the month. 8pm. All Saints Parish Room, Upper Norwood, SE19. Sec G3FZL, tel 01-699 6940.
Dorking (D & DRS)—14 Jul (Informal at The Falkland Arms), 28 (144MHz portable at Devils Dyke, Brighton). Sec G3AEZ, tel 0306 77236.
Farnham (VHF Group)—Second and fourth Mondays of the month, 8pm. Farnham Central Club, Farnham, Surrey. Details G4EPX.
Guildford (G & DRS)—Second and fourth Friday of the month, 8pm. Model Engineers HQ, Stoke Park, Guildford. Sec G4PLO.
Kingston (KDARS)—15 Jul ("EMC", G3AEZ). 8pm. "Alfriston", 3 Berrylands Road, Surbiton. Details G3IMK, tel 01-397 6924.
New Cross (Clifton ARS)—Fridays, 8pm. Telegraph Hill Community Centre, Kitto Road, New Cross SE14. Sec R Hinton, 42 Sutcliffe Road, Welling, Kent.
Redhill (RATS)—21 Jul (Members evening). 8pm. Constitutional and Conservative Club, Warwick Road, Redhill. Sec G8JXV.
Surbiton (308 ARC)—Last Tuesday of the month, 8pm. The Coach House, Church Hill Road, Surbiton. Details G0CFH.
Sutton and Cheam (S & CRS)—17 Jul ("Wire antennas for the dx bands", G4FKA). 8pm. Downs Lawn Tennis Club, Holland Avenue, Cheam. Sec G4FKA, tel Epsom 21349.
Thames Valley (TVARTS)—First Tuesday of the month, 8pm. Thames Ditton Library, Watts Road, Giggs Hill, Thames Ditton. Sec G3ENI.
Wimbledon (W & DRS)—10 Jul (Camp planning meeting), 31 (General activity). 7.30pm. St Andrews Church Hall, Herbert Road, Wimbledon SW19. Sec G3DWW, tel 01-540 2180.

REGION 8—RR M Elliott, G4VEC, 20 Haysel, Sittingbourne, Kent ME10 4QE. Tel 0795 70132.

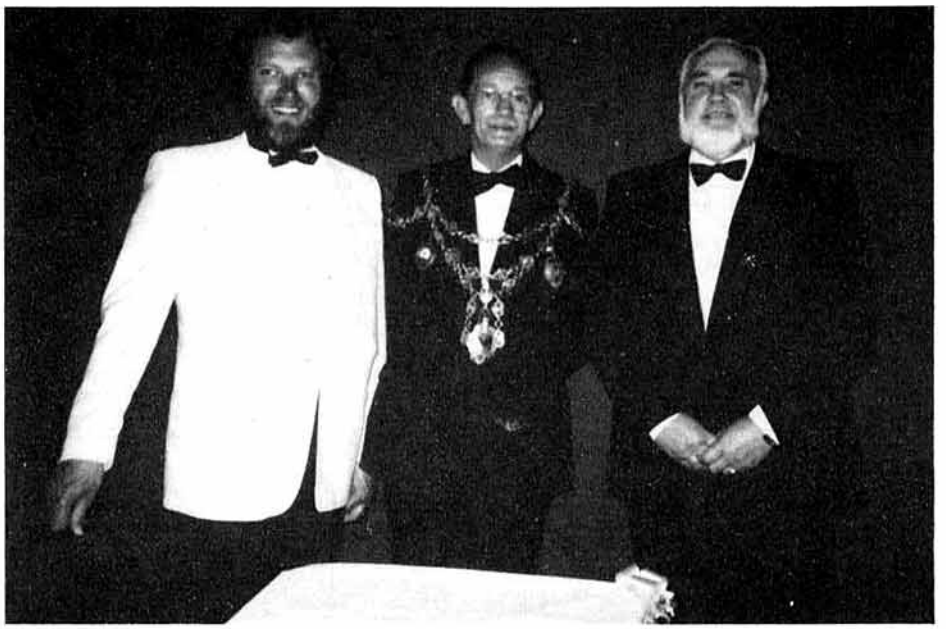
Area representatives
S D Reeks, G4WCP . . . . . Hastings
J Brooker, G3JMB
Horsham, Crawley & Mid Sussex
G D Edy, G4AXD. . . . . .Maidstone & District
D Axford, G4LHU . . . . . Medway Towns
B A Hancock, G4NPM . . . . . .Swale
B E Pearson, G0CBY. . . . . Thanet
F J W Perry, G8ZXC . . . . . .West Kent
S G Williams, G3LQI . . . . Worthing & District

Brighton (BADARS)—First and third Wednesdays of the month, 8pm. The Seven Furlong Bar, Brighton Racecourse. Sec G4IIL, tel Brighton 607737.
Burgess Hill (Mid-Sussex ARS)—2, 16 Jul (Informal evening), 4/5 (NFD VHF), 9 (Bring and buy sale), 12 (Sussex mobile rally), 23 (Club shack closed), 29 (Club closed). Thursdays, 7.45pm. Marle Place, Leylands Road, Burgess Hill. Sec G0GNV, tel 04446 41407.
Canterbury (UOKARS)—Tuesdays, 7.30pm. Radio Shack, beside Oast House, by Parkwood residences. Details G4SAY.
Chichester (CARC)—7 Jul (Special open club meeting for public with demo of amateur radio for Chichester 912 Festivities), 12 (Sussex mobile rally). First and third Tuesdays of each month, 7.30pm. North Lodge Bar, County Hall, Chichester. Sec G4EHG, tel Chichester 789587.
Crawley (CARC)—Fourth Wednesday of the month, 8pm. Crawley Leisure Centre, Haslett Ave. Sec G4IQM, tel Crawley 882641.
Dartford (DDFC)—5 Jul (Club hunt, Dartford Heath 2.30pm). Pre-hunt meetings on Tuesday after 9pm. Horse & Groom ph, Leyton Cross, Dartford Heath. Details G8DYF, tel 0322 844467.
Dover (SE Kent YMCA ARC)—Wednesdays, 8pm. Dover YMCA, Godwynehurst, Leyburne Road, Dover. Details John Dobson, tel Dover 211638.
Eastbourne Electronics (EEARC)—Sundays, 8pm. Shinewater Community Centre, Milfoil Drive, Langney, Eastbourne. For details, phone above centre (Sundays 8-10pm), Eastbourne 768614.
Eastbourne (Southdown ARS)—6 Jul (Barbecue). First Monday of the month, 7.30pm. Chaseley Home, Southcliff, Bolsover Rd, Eastbourne. Also, Tuesdays and Fridays each week at Hailsham Leisure Centre, Vicarage Lane, Hailsham. Sec G4VOS, tel Heathfield 3168.
Edenbridge (EARS)—Second Wednesday of the month, 8pm. The Scout Hut, High St, Edenbridge. Sec G8VCH, tel East Grinstead 24748.
Gillingham (Bredhurst R&TS)—2, 16 Jul (Construction and natter night), 9 ("Trip to Dayton Hamvention, Ohio", G3VTT), 18 (Special event station, GB4BP, celebrating 10th anniversary of Parkwood Community Association). 8pm. Parkwood Community Centre, Parkwood Green, Wigmore, Gillingham. Details G0AMZ, tel Medway 376991.
Gillingham (MARTS)—3 Jul (Natter night and preparation for VHF NFD), 10 (RSGB presentation by RR8), 24 ("Long wire antennas", G3BDQ), 31 (Natter night). 7.30pm. Matthews Riding School, Lower Rainham Rd, Gillingham. Sec G1MSS, tel 0474 814874.
Gravesend (GRS)—Mondays, 8pm. The Windmill Tavern, Shrubbery Rd. Sec G0DYX.
Hastings (HERC)—4 (Barbecue, Fairlight Helipad), 15 Jul ("Operation Raleigh"). Main meetings third Wednesday of the month, 7.30pm. Various activities other evenings. West Hill Community Centre, Croft Road, Hastings. Details G4NVQ, tel Hastings 420608.
Herne Bay (East Kent RS)—2 Jul (VHF fm rigs tested by G3VJF and G8FEZ. Explanation of Thanet's test equipment; test your own rig). First and third Thursdays of the month, 7.30pm. Cabin Youth Centre, Kings Road, Herne Bay. Details G4RIS, tel 0227 262042.
Horsham (HARC)—2 Jul (VHF NFD briefing). First Thursday of the month, 8pm. Guide Hall, Denne Road, Horsham. Sec G4UDU, tel Worthing 60695.
Kent (Kent Repeater Group)—Responsible, GB3CK, GB3EK, GB3KN, GB3KS, GB3NK, GB3RE, GB3SK. Details G4RVV, tel Orpington 27050 ext 91, office hours.
Lewes (L&DARC)—First and third Tuesdays of the month, 7.30-m. Bridge View Community Centre, Lewes. Details G4PZU, tel 07916 3239.
Maidstone (MYMCAARS)—3, 10 Jul (tba), 17, 24, 31 (Natter night with RAE, cw and antenna working). 8pm. YMCA Sportscentre, Melrose Close, Maidstone. Details G0BUW, tel 0622 30544.
Margate (Radio Club of Thanet)—27 Jul (Special event station, GB2MLB—Margate Lifeboat). Second and fourth Tuesdays of the month, 7.30pm. Grosvenor Club, Grosvenor Place, Margate. Sec G1HWG, tel 0843 42480.
Meopham (MPRC)—Second Sunday of the month, 7.30pm. The Clubhouse, Vigo Rugby Football Club, Vigo Village, Meopham. Details G6TXP, tel 04352 2403.
Sittingbourne (Swale ARC)—Mondays, 7.30pm. Ivy Leaf Club, Dover Street, Sittingbourne. Details G1JQH, tel Minster 876091.
Sussex (Sussex Repeater Group)—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)—10 Jul ("Air band reception", D Laurence). Fridays, 8pm. Adult Education Centre Annexe, Quarry Rd, Tunbridge Wells. Sec G3XPX, tel 0892 48575.
Worthing (W&DARC)—Wednesday, 7.30pm. Lancing Parish Hall, South Street, Lancing. Details G4SWH, WADARC, PO Box 599, Worthing, BN14 7TT.

Please inform me if any of these club entries need updating. *RR8*

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

Axminster (Axe Vale ARC)—3 Jul (Fox hunt on 144MHz). Details G3VW, tel Lyme Regis 5282.
Dartmouth (Brittania RC)—Brittania RN College Dartmouth, Devon TQ6 0HJ. Details G4LUF, tel Dartmouth 2141, ext 371.
Exeter (EARS)—13 Jul (Construction judging and RSGB video). Details G3YBK, tel 0392 78 710.
Exeter University (EUEARS)—Details G3XEU, tel 0392 77 911 to leave message.
Exmoor (ERC)—Details G4SSS.
Exmouth (EARC)—1 Jul ("Video cameras", G0ETX), 15 (Barbecue), 29 (Open night). Details G1GZG.
Newquay (N&DARC)—Details G4ADV, tel Newquay 874 640.
North Cornwall (NCRC)—Details G0DBD.
Plymouth (Plymouth CFE Students Union ARC)—Details G4VKQ, tel Plymouth 264 714.
Plymouth Polytechnic (PPARC)—Details G3TCP, tel Plymouth 264 650.
Plymouth (PRC)—Details M Hibbit, tel Plymouth 44 104.
Poltair School (PSARC)—Details G8RPC, tel St Austell 75 721.
Redruth (CRAC)—2 Jul (General meeting and talk), 13 ("Geoff's bytes—a miscellany", Geoff Kitts), 16 (Constructors club). Details G4ZUI, tel Stithians 860 572.
Saltash (S&DARC)—3 Jul (SADARC sausage sizzle). Details G0AKH, tel Saltash 3277.
Sidmouth (S&DARS)—Details G0AXC.
St Austell (English China Clay RC)—Details G4MXB, tel 0726 850 576.
St Ives (SI Comprehensive School RS)—Details G3NPB.



Councillor Reginald Lloyd, GW4IQA, has recently been elected Mayor of Newport, Gwent. Pictured here at the Mayor's Ball are members of the Newport ARS. L to r: John Iliffe, GW8SVN; GW4IQA; Royston Williams, GW4EZW

Tavistock (Kelly College ARS)—Details R Hooper, tel Tavistock 3231.
Tiverton (TRC)—Details J Barber, PO Box 3, Tiverton, Devon EX16 6RS.
Torbay (TARC)—Details G4SBH, or J Dart (Sec) tel 0803 51 995.

REGION 10—D H Phillips, GW4KQ, 17 Pentre Gardens, Grangetown, Cardiff CF1 7QJ. Tel 0222 35648.

Area representatives
C J G Laws, GW0CUM.....Cardiff
A F Dowling, GW3GUE.....Carmarthen
R Bray, GW4ESV.....Port Talbot

Abergavenny (A&NHARC GW4GFL)—Thursdays, 7.30pm. Pen-Y-Fal Hospital. (Above male ward "C") Morse classes on club nights. Sec GW4XQH, tel 0873 4655.
Aberporth (Dyfed ARS GW4SZV)—Wednesdays, 7pm. Building 17, The Airfield, Aberporth. Sec GW0DDR, tel 023 987274.
Aberystwyth (A&DARS)—Second Tuesday of the month, 7.30pm. Bay Hotel, (on sea front opposite the bandstand). Sec GW4JXB, tel 0970 828446.
Barry (BCoFERS GW4BRS, GW6BRC, GW3VKL)—Thursday, 7.30pm during school terms. Annexe, Weycocks Cross, Barry. Sec GW4NBY, tel 0656 62867.
Barry (RAF St Athen ARC GW3CKB)—Wednesdays, 7.30pm. RAF St Athen. Details GW0FJW, tel 0446 750277.
Blackwood (B&DARS GW6GW)—Fridays, 7.30pm during school terms. Oakdale Comprehensive School, Oakdale, Blackwood. Sec GW6YYR, tel 0495 243858.
Bridgend (B&DARC GW4LNP)—First and third Wednesdays of the month, 7.30pm. Bridgend Town AFC Clubhouse, Coychurch Road, Bridgend. Sec GW1OUP, tel 0656 723508.
Bristol Channel Repeater Group—,(GB3BC). Sec GW6MBU, tel 0446 711146.
Cardiff (British Rail ARS, RS37562)—Contact Mr Owa Wade, 1 Lomond Crescent, Cyncoed, Cardiff.
Cardiff (CRSGBG, GW5BI)—13 Jul (Quiz). 7.30pm. Pant Mawr Hotel, Tyla Teg, Pant Mawr Estate, Whitchurch, Cardiff. Sec GW0CUM, tel 04463 3212.
Cardiff (Highfields ARC GW4LFO, GW1LFO)—Thursdays, 7.30pm. Highfields Centre for the Physically Handicapped, Allensbank Road, Cardiff. The club also run RAE and morse classes on club nights. Sec GW6ZHM, tel 0222 750315.
Carmarthen (CARS GW4YCT)—Second and fourth Fridays of the month, 7.30pm. West Wales Hospital Social Club, The Quay, Carmarthen. Details GW3GUE, tel 026 783460.
Chepstow (C&DARS GW4LWZ)—Tuesdays, 7.30pm. Leisure Centre, Chepstow. Sec GW1FJI, tel 02912 2808.
Cwmcynon (CARS GW3FFE)—First and third Wednesdays of the month, 7.30pm. Cefn-Pennar Hotel, Mountain Ash. Sec GW4UAJ, tel 0685 879938.
Fishguard (F&DARS GW0AQC)—Wednesdays, 7.30pm. Radio Shack, FE Centre, Ropewalk, Fishguard. Sec GW3DWY, tel 0348 872671.
Haverford West (Pembrokeshire ARS GW0EJE)—Alternate Thursdays, 7.30pm. FE Centre, Tower Hill, Haverfordwest. RAE and morse classes are held. The club is a morse test centre. Sec GW1TUA, tel 0348 82346.
Merthyr (Hoover ARC GW3RDB)—Mondays, 7.30pm. Hoover Sports Pavilion, Hoover Ltd, Pentrebach, Merthyr Tydfil. Sec GW3RNC, tel 0685 5196.
Swansea (International Listeners Assoc RS88763)—Sec GW4OXB, 1 Jersey Street, Hafod, Swansea.
Llanelli (LARS RS87700)—Second and fourth Mondays of the month, 7.30pm. Disabled Drivers Association Hall, Albert Street, Llanelli. Sec GW1MGW.
Tredegar (LCRRC GW4IYD)—Tuesdays, 7.15pm. MIM Factory, North Ave, Tredegar. (Portacabin just inside the gates). Sec GW1EXF, tel 049525 6560.
Newport (NARS GW4EZW, GW1NRS)—Mondays, 7pm. Brynglas Community Centre, Brynglas Road, Newport. Morse classes on club nights and a varied programme. The club is also registered as a Morse test centre. During 1 to 8 Aug club members will activate GB4WIE from Skokholm, GB2WIE from Skomer and GB0WIE from Grassholm. Skeds can be arranged via Sec GW6ZUQ, tel 02912 6867. Or write to NARS, PO Box 33, Newport, Gwent. An award is available for contacting all three islands or three different operators irrespective of callsign. The cost of the award will be £1 to help towards the costs of the expedition.
Pembroke (P&DARC GW2OP)—Last Wednesday of the month, 7.30pm, and also on the second Sunday at 2pm. 33 Dimond Street, Pembroke Dock. RAE classes are held on Tuesday nights at 7pm. Sec GW6EHC, tel 0646 686532.
Pontypool (PARS GW3RNH)—Tuesdays, 7pm. "The Settlement" Rockhill Road, Pontypool. Sec GW4RJA, tel 06333 72110.
Port Talbot (British Steel ARS GW3EOP)—Thursdays, 7.30pm. BSC Sports Social Club, Port Talbot. Sec GW4IGR, tel 0639 720416.
Powys (PARC GW4HVN)—Thursdays, 7.15pm. Cricket Pavilion, Lynmore Park, Montgomery. Sec GW4DWX, tel 0938 2068.
Red Dragon Contest Group (GW8GT)—Details GW3KYA, tel 0495 225825.
Rhondda (RARS GW2FOF)—9 Jul ("Human machine as radio operator"). 23 (Night on the air). Thursdays, 7.30pm. NUM Club, Tonypandy. Sec GW4BUZ, tel 0443 432542.
Royal Signals ARS (South Wales)—Nice to see visitors and members at the recent Barry mobile Rally. Look out for our stand at the Blackwood Convention and the Bridgend Rally. Help to man the stand is appreciated. Our thanks also go to the rally organizers for the space at their events. Details GW4XKE or GW4VMF.
South East Wales Repeater Group (GB3SG)—Thanks to all who attended the AGM. Subs now due. Sec GW6CUR, tel 0222 487176.
South Glamorgan Raynet Group—Meet Wednesdays, 7.30pm. Civil Defence Building, Cyncoed Road, Penylan, Cardiff. Details GW4MOZ.
Swansea (SARS GW4CC)—First and third Thursdays of the month, 7.30pm. Lecture room "N", Applied Sciences Building, Swansea University, Swansea. Sec GW0BBO, tel 0792 818100.
Swansea (SRACC GW4UNV)—Fridays, 7.30pm. RAE classes Wednesdays. 3 Gloucester Place, Swansea. Sec GW0BUA, tel 0792 588760.
Swansea (UCoARS GW3UWS)—Sec Mr M T Bowen, GW3KGI, c/o Electrical Engineering Department, University College, Singleton Park, Swansea.
West Wales Repeater Group (GB3WW)—Details 7 Crofton Drive, Baglan, Port Talbot.

I would like to say thank you to the South Glamorgan Raynet Group, Swansea ARS and Rhondda ARS for the hospitality on my recent visits. Congratulations also to the Newport ARS with one of their members, Reginald Lloyd, GW4IQA, becoming the town's mayor. I am saddened to report that the Loughor club has been disbanded. If your club or group is missing or the details are incorrect ask your club secretary to contact me. *RR10*

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

Area representatives
R H Tyson, GW6HUV.....Conwy Valley.
A Evans, GW4HDR.....Rhyl and District.
P E W Allely, GW3KJW.....Pwllheli.

Bangor (Dragon ARC)—First and third Mondays of the month, 8pm. Four Crosses Hotel, Pentraeth Road, Menai Bridge, Gwynedd. Sec GW0EGF, phone contact via GW0ABL, tel Llanfairpwll 713647.
Colwyn Bay (Conwy Valley ARC GW6TM)—9 Jul (Foxhunt), 13 Aug (Talk by G3XSN). Second and third Thursdays of the month, 8pm. Green Lawns Hotel, Bay View Rd, Colwyn Bay. Sec GW4KGI, tel 0745 823674.
Deeside (Alyn & DARS)—12 Jul (DF hunt). Alternate Tuesdays, 8pm. Shotton Social Club, Shotton Lane, Deeside. Sec GW1ILZ.
Deeside (RAF Sealand ARC GW4RAF)—E E Hewins, OIC, Radio Wing No 30 MU, RAF Sealand, Deeside, Clwyd, CH4 2LS.
Dolgellau (Meirion ARS)—First Thursday of the month, 7.30pm. Dolserau Hall Hotel, 2 miles from Dolgellau off the Bala Rd. Sec GW4GKZ, tel 0341 422 447.
Holyhead (H & DARS)—Alternate Sundays, 8pm. Foresters Arms, Kingsland, Holyhead. Sec Mrs B Anziani, tel 0407 50577.
Porthmadog (P & DARS)—23 Jul (Foxhunt start at the Ffestiniog Railway Station). Fourth Thursday of the month, 8pm. Harbour Cafe, Ffestiniog Railway, Porthmadog. Sec GW1EGQ, tel 0766 2684.
Rhyl (R & DARC GW4ARC)—First and third Mondays of the month, 7.30pm. 2nd Rhyl Scout HQ, Vale Road, Rhyl. Sec GW1PLI, tel Llandegla 621.
Wrexham (WARC)—Alternate Wednesdays, 7.30pm. Technical College, Wrexham, Clwyd. Sec GW4IGF, tel 0244 570212.
Welsh Language Group—Every Wednesday at 1115gmt on 3·750MHz. Join the net for various discussions in the Welsh language, net controller GW2HFR.

REGION 12—RR M R Hobson, GM8KPH, 17 Well Brae, Pitlochry, Perthshire PH16 5HH Tel 0796 2140. Prestel 107962140.

Area representatives
Grayham Brooks, GM4NHX.....Caithness
Alf Low, GM4UZP.....Dundee
Malcolm Bannerman, GM3ZXE.....Forfar & D
Norman Baird, GM4JNB.....Fort William & D
Ewen Crawford, GM4GUQ.....Inverness & D
Ron Adam, GM4ILS.....Moray & D
Bill Wright, GM3IBU.....Orkney
Ron Grant, GM4DQJ.....Perth

Aberdeen (ARC)—3 Jul (Junk sale), 10 (Beachgrove preparations), 12 (Special event station; Beachgrove Garden open day), 17, 25 (Work night),

31 (Beginners night), 7 Aug (Junk sale). 7.30pm. 35 Thistle Lane, Aberdeen. Sec GM4GXD, tel Pitcaple 251.
Caithness (ARS)—Second Wednesday of the month, 7.30pm. Loch Watten Hotel, Watten, (between Thurso and Wick). Sec GM1VGZ, tel 084 782632, Prestel 1084782632.
Dundee (Kingsway Tech ARC)—Tuesdays, 7.30pm. Kingsway Technical College Annexe, Grayham Street. Sec GM1KJE, tel Dundee 646673.
Elgin (Moray Firth ARS)—First Wednesday of the month, 7.30pm. Spey Bay Hotel, Fochabers. Remaining Wednesday in the society's room, Moray College of Further Education. Sec GM4IZY, tel Elgin 41549. Correspondence should be sent to the sec QTHR and not to the college.
Grampian RG—Sec GM6VGL, tel Aberdeen 702228.
Invergordon (ARC)—Fridays. Sec GM4KJW.
Inverness (Black Isle RG)—Sec GM4OIJ, tel Inverness 791122.
Inverness (ARC)—Thursdays, 7.30pm, Cameron Youth Club, Planefield Road, Inverness. Sec GM1GFX, tel 0463 242463.
Kirriemuir (Strathmuir & Dist ARC)—Mondays, 7.30pm. 46 High Street, Kirriemuir. Sec GM3ZXE.
Kirkwall (Orkney)—First Wednesday of the month. Sec GM3IBU, tel Kirkwall 3273 (day).
Lerwick (RC)—4, 5 Jul (VHF Field Day: GM3ZET/P from Ronas Hill. Visitors welcome). Thursdays, at 7pm. Islesburgh Community Centre, King Harrold Street, Lerwick. Sec GM4ZET, tel 0595 72393.
Orkney Caithness (RG)—c/o C G Gee, Brinnafea, Orphir, Orkney.
Perth (P&D ARC)—Tuesdays, 7.30pm. Perth City Sports and Social Club, Leonards Street, Perth. Sec GM4YXK, tel Perth 37121.
Yell (ARC GM4YEL)—Thursdays, 6pm. North Isles Motel, Yell, Shetland. Sec GM4FNE.
Unst (RC)—Sec GM3STU.

Some clubs do not meet during the summer months so visitors are advised to check with the appropriate secretary. If your club is missing or the details are incorrect please ask your club sec to contact me. *RR12*

REGION 13—RR A J Scott, GM0HNX, 2 Manderston Grove, Duns, Berwickshire TD11 3PP. Tel 0361 83221.

Berwick-upon-Tweed (Border ARS GM0BRS)—3-5 Jul (VHF NFD), 17 (Roundup), 7.30pm. St John Ambulance Hall, Berwick-upon-Tweed. Sec GM1IRN, tel 0289 82491.
Dunfermline (DRS GM3IDS)—Thursdays, 7.30pm. Sec GM0DYD, tel 0383 413440.
Edinburgh (E&DARC GM4HAM)—Details GM4YNA.
Galshiels (G&DARC GM4YEQ)—Wednesdays, 7.30pm. Focus Centre. Sec GM0AMB, tel 0896 55569.
Glenrothes (G&DARC GM4GRC)—Wednesdays and third Sunday of the month, 7.30pm. Provost's Land, Leslie, Fife. Sec GM0GUU, tel 0592 744672.
Kelso (KARS GM4KHSA)—Mondays, 7.30pm. Abbey Centre. Sec GM4UPX, tel 0835 62656.
Lothian (LARS GM3HAM)—Second and fourth Wednesdays of the month, 7.30pm. Harwell House Hotel, Ettrick Rd, Edinburgh. Sec GM1CQC.
Leith (Nautical College AR&EC GM4AXG)—Details GM4SGB, c/o 24 Milton Rd East, Edinburgh EH15 2PP.
Scottish Borders Repeater Group (SBRG)—Group runs GB3BT, GB3SB, GB3HK. Site change of GB3SB to Selkirk (Lindean) expected in Aug. Sec GM4EZJ, tel 0875 53450.

The fourth Anglo-Scottish Rally (Kelso) on 3 May again attracted many followers, and the organizers appeared to be very satisfied. Tom Wylie, RR14, did sterling work on the RSGB bookstall, while I managed enough courage to sit the morse exam! Would club secs please give me a note of their agm dates to facilitate quick updates of personnel changes? *RR13*

REGION 15—RR R Parsons, GI3HXV, 27 Mandeville Avenue, Stratheden Heights, Newtownards, BT23 3XA. Tel 0247 818191.

Armagh (A&DD ARC GI4ADC)—Second Wednesday of the month, 8pm. County Armagh Golf Club, Newry Road, Armagh City. Sec J A Murphy, tel 0861 522153.
Ballyclare (East Antrim ARC GI4KKK)—Second Tuesday of the month, 8pm. Fairview Primary School, Ballyclare. Sec GI4BTG, tel 023 13 49277.
Ballymena (BRC GI3FFF)—Thursdays, 8pm. 70 Nursery Road, Grace Hill, Ballymena. Morse classes held. Sec GI4HCN, tel 0266 3044.
Bangor (B&DARC GI3XRQ)—First Friday of the month, 8pm. Bangor Rugby Club. Sec GI4OCK, tel 0247 454049.
Belfast (C of B YMCA RC GI6YM)—Tuesdays, 7pm and Saturdays, 2.30pm. Club Room, 4th Floor, YMCA, Wellington Place, Belfast.
Belfast (RSGB Group)—Third Wednesday of the month, 8pm. 90 Belmont Road, Belfast. AR GI6ATZ, tel 0232 795307.
Enniskillen (Lough Erne ARC)—Third Monday of the month, 8pm. Railway Hotel, Enniskillen. Sec GI4NRE, tel 0365 24905.
Gilford (Mid-Ulster ARC GI3VFW)—Second Sunday of the month, 3pm. The Guide Hall, Castle Hill, Gilford, Co Down. Sec GI1BIW.
Larne (L & D ARS GI4PHA)—First Wednesday of the month, 8pm. Curran Bowling Club, Curran Road, Larne. Sec GI4CPP, tel 0574 75407.
Lisburn (Lagan Valley ARS GI4GTY)—Second Monday of the month, 8pm. Harmony Hill Art Centre, Harmony Hill, Lisburn. Sec GI4TCS, tel 0846 682474.
Londonderry (North West of Ireland ARS GI3CFH)—6 Jul ("Natter night"). First Monday of the month, 8pm. Prehen Municipal Boathouse, Victoria Road, Londonderry. Sec GI4OUN, tel 0504 84529.

Most clubs do not meet during July and August. Contact secs for details. *RR15*

REGION 16—RR A Owen, G4HMF, 102 Constable Rd, Ipswich, Suffolk. IP4 2XA.

Basildon (Marconi ARS)—First Monday of the month, 8pm. The Shack, GEC Avionics Social Club, Gardiners Way, Basildon. Details, G8PKM, tel 0245 323323.
Bishop Stortford (BSARS)—Third Monday of the month, 8pm. Royal British Legion Club, Windhill, Bishops Stortford. Details Peter Cartwright, tel 0279 812096.
Braintree (B&DARS)—First and third Mondays of the month, 8pm. The Community Centre, Victoria Road, (next Bus Station) Braintree. Details G1NBV, tel 0376 44908.
Brentwood (BARC)—First and third Tuesdays of the month, 7.30pm. The Hermitage, Shenfield Road, Brentwood. Details G8WYM, tel Basildon 403153 (daytime).
Bury St Edmunds (BStEARS)—21 Jul ("RSGB", G4HMF). 7.30pm. County Upper School, Beetons Way, Bury St Edmunds. Details G1FUU, tel 0359 50271.
Canvey Island (SEARS)—Wednesdays, 7.30pm. The Paddocks, Long Road, Canvey Island. Details G4FMK, tel 0268 683805.
Chelmsford (CARS)—7 Jul (Talk by G4ZMQ). 7.30pm. Marconi College, Arbour Lane, Chelmsford. Details G4KQE, tel 0376 83094.
Colchester (CRA)—13 Jul (Social), 27 (Quiz). 7.30pm. Colchester Institute, Sheepen Road, Colchester, CO3 3LL. Details G3FIJ, tel 0206 851189.
Felixstowe (F&DARS)—Alternate Mondays, 8pm. The Scout Hut, Bath Road, Felixstowe. Details G4YQC, tel 0473 642595.
Great Yarmouth (GYRS)—Alternate Thursdays, 8pm. Drill Hall, York Road, Great Yarmouth. Details G3NHU, tel 0493 721173.
Harlow (H&DRS)—Tuesdays 8pm. Mark Hall Barn, First Ave, Harlow. Details G4PGB, tel 0279 722612.
Haverhill (H&DRS)—Fridays, 7.30pm. Copse Hall Farm, Bumpstead Road, Haverhill. Details G4MVK, tel 0440 61207.
Ipswich (IRC)—8 Jul (ESWR report) 29 (DF hunt and carnival planning). 8pm. Rose and Crown ph, Norwich Road, Ipswich. Details G4IFF, tel 0473 44047.
International Police Assoc RC (IPARC BRIT G4IPA)—Details G4TRE, tel 0277 231077.
Kings Lynn (NORCAT ARC)—Thursdays, 7.30pm. Morse on Fridays. r/o St James Boys School, Hospital Walk, Kings Lynn. Details G4OZG, tel 0553 768701.
Leiston (LARC)—7 Jul (Visit to Gt Yarmouth Coastguard Station). 7.30pm. Sizewell Sports & Social Club, King George's Avenue, Leiston. Details G0CJX, tel Saxmundham 3222.
Loughton (L&DRAS)—Alternate Fridays, 8pm. Debden Community Centre, Loughton Hall, Rectory Lane, Loughton. Details G4FKI.
Lowestoft (LD&PYEARC)—In abeyance. Details G4KDL, tel Lowestoft 66289.
Martlesham (MRS)—Occasional first Wednesday of the month, 7.30pm. British Telecom Research Labs, Martlesham Heath, Ipswich. Details G4SYG, tel 0473 88663. Work 0473 643317. Visitors must book in advance with secretary.
Norwich (NARS)—Wednesday, 8pm. Valley Drive Community Centre, 79 Plumstead Road, Norwich. Details G4RKK, tel Wymondham 606979.
Rochford (RDRC)—Second Monday of the month, 7.30pm. Civil Defence Building, Rochford. Details G3FGC.
Saffron Walden (SW&DRAS)—Third Wednesday of the month. 8pm. G6KDW, tel 0799 22715.
Southend (S&DARS)—Fridays, 7.30pm. Rocheway Centre, Rocheway, Rochford. Details G3YOA, tel 0268 781126.
Stanford Le Hope (SLH&DARC)—Mondays, 8pm. St Joseph's Parish Rooms, Scratton Road, Stanford le Hope. Details G4LTH, tel 0375 674301.
Stowmarket (S&DARS)—In abeyance.
Thurrock (TARC)—First and third Tuesdays of the month, 8pm. Grays Park Hall. Details G3KMD.
Vange (VARS)—Thursdays, 8pm. Barstable Community Centre, Basildon. Mrs D Thompson, tel 0268 552606.

REGION 17—RR T Emery, G3KWU Wilverley, Old Lyndhurst Road, Cadnam, Southampton SO4 2NL. Tel 0703 812435.

Amateur Radio and Computer Club (AMRAC)—3 Jul (Open night). Sec G6DLJ, tel 0703 847754, Prestel 703847754.
Andover (ARAC)—First and third Wednesdays of the month, 8pm. Wolversdene Club, Andover. Club net, 8pm Tuesdays S18—G0ARC/A. Sec G0AMO, tel Andover 51593.
Basingstoke (BARC)—6 Jul (Members computer evening). 7.30pm. Forest Ring Community Centre, Sycamore Way, Basingstoke. Sec G1OQV, tel 0256 59644.
Binstead IOW (BARS)—Mondays, 7.30pm. Brickfields Horse Country Centre, Newnham Road, Binstead, Isle of Wight. Sec G4VJF, tel Ryde 66298.
Blackmore Vale (BVARS)—14 July ("EMC: causes and cures"), 28 (Project night). 7.45pm. The Bell and Crown, Zeals, (on the A303). Sec G4YXX, tel 0963 32389.
Bournemouth (BARS)—First and third Fridays of the month, 8pm. Kinson Community Centre, Kinson, Bournemouth. Sec G4DJG, tel 0202 526793.
Chippenham (C&DARS)—Tuesdays, 7.30pm. Chippenham Sea Cadet HQ. Sec G4GFJ, tel 02214 4190.
Devizes (D&DARS)—Fridays, 8pm. Devizes Town FC, Nursteed Road, Devizes. Sec G4VUO, tel 0249 651471.
Eastleigh (Itchen Valley ARC)—10 Jul (Junk sale), 23, 26 (Special event station, GB2NMR at Netley Marsh Steam Rally). No meetings in August. The Scout Hut, Brickfield Lane, Chandlers Ford, Eastleigh. Sec G1IPQ, tel 0703 736784.
Fareham (F&DARC)—1 Jul ("10 fm the easy way (GHz)", G8VOI), 8, 22 (Natter nights), 15 ("Low cost measurements", G4XZL), 29 (Portable planning). 7.30pm. Portchester Community Centre, Portchester, Hants. Sec G3CCB, tel Fareham 288139.
Farnborough (F&DARS)—8 Jul (tba), 22 (Field Day autopsy), 31 (Beer and skittles night). 8pm. Railway Enthusiasts Club, Access Road, off Hawley Lane, Farnborough. Details M C Graffius, The Paddock, Diamond Ridge, Camberley Surrey, GU15 4LB.
Gosport (Rowners & DARS)—Every alternate Wednesday, 7.30pm. Searles Products, Newgate Lane (opposite HMS Collingwood). Sec G6NUD.
Guernsey (GARS)—Tuesdays and Fridays, 8pm. The Lodge, La Corbinerie, Oberlands, St Martins, Guernsey. Sec GU0FYR, tel 0481 26392.
Horndean (H&DARS)—2 Jul ("Visit to radar simulator at College of Maritime Studies). 7.30pm. Murchiston Hall, London Road, Horndean. Sec G4RLE, tel 0705 755274.
Isle of Wight (IOWARS)—Fridays 7.30pm. Unity Hall, Wooton Bridge. Sec G4RGE.
Jersey (JARS)—Fridays, 8pm. Sundays 10am. Le Hocq Tower, St Clement. Sec GJ4TXB, tel 24328.
Jersey (JAEC)—Club HQ, Belmont Road, St Helier. Details GJ4IGD, tel 0534 77067 (day), 26788 (night).
Liphook (Three Counties ARC)—8 Jul (Computer night), 22 ("Forty technical years", G3AAG). 8pm. The Railway Hotel, Liphook. Sec G0BTU, tel Petersfield 66489.
Lymington (L&DARS)—Next meeting in September. Sec G2AIV, tel Lymington 72844.
New Forest Repeater Group (GB3NF)—For in-

RSGB President Mrs Joan Hethershaw, G4CHH, with John Fell, G0API, chairman of the Flight Refuelling ARS at the official opening of the society's new headquarters at Merley, near Wimborne, Dorset. *Photo* **Roger Holman**

formation or to join the group and help support the repeater, contact G6DLJ, tel 0703 847754.
Plessey (Christchurch ARS)—Second Thursday of the month. Plessey Social Club, Grange Road, Christchurch. Sec G1PFX.
Poole (PARS)—Last Friday of the month, 7.30pm. Commanders House, Constitution Hill Road, Poole. Sec G4XYX.
Portsdown Hill Repeater Group (GB3PH)—For information or to join the group and help support the repeater, contact Mr A L G Price, tel 0329 281852.
Portsmouth (Marconi EARS)—Last Tuesday of the month, 8pm. Broad Oaks Canteen, Portsmouth Airport. Sec G3FWE.
Portsmouth (South Hants ITS)—Thursdays, 7.30pm. The Community Centre, Malins Road, Portsmouth. Sec G3JZV.
Salisbury (SRES)—2 Aug (RSGB df qualifying event). Tuesdays, 7.30pm. Grosvenor House Centre, Churchfields Road, Salisbury. Sec G4LDR, tel 0980 22809.
Southampton (SARS)—1 Jul (Antenna siting for Southampton Show station), 3-5 (Special Event station at Southampton Show). 5 Aug (Foxhunt from Sainsbury's car park, Lordshill). Meeting first and third Wednesdays of the month except August. Morse classes available each club night. 7.30pm. Millbrook Community School, Green Lane, Southampton. Sec G4VKB, tel 0703 737892.
Southampton (SUARS)—Wednesdays, 1pm and 7.30pm. 65 University Road, Southampton. Details G0ERI, tel 0703 559122 ext 2137 (day).
South Dorset Repeater Group (GB3SD and GB3DP)—For information or to join the group and help support the repeaters, please contact G3VPF.
Swindon (S&DARC)—Thursdays, 7.30pm. Oakfield School, Marlowe Avenue, Swindon. Sec G4YQZ.
Trowbridge (T&DARC)—8 Jul ("Bee Keeping on amateur radio", G4YXS), 22 (Natter night). 8pm. Territorial Army Centre, Blythsea Road, Trowbridge. Sec G0GRI, tel 0380 830383.
UK FM Southern Repeater Holding Group (GB3SN)-For information or to join the group and help support the repeater, please contact Mrs Jan Steele, tel Fleet 613311.
Waterside (WSWC)—Fourth Tuesday of the month, 7.30pm. Community Centre, Blackfield, Southampton. Sec G0BPA, tel 0703 8983937.
Weymouth (SDRS)—First Tuesday of the month, 7.30pm. Civilian Mess, Army Camp, Camp Road, Wyke Regis, Weymouth. Sec G0FIT, tel Dorchester 67596.
Wimborne (FRARS)—Sundays, 7.30pm. Flight Refuelling Social Club, Merley, Wimborne. Sec G0CDY.
Wimborne (Wessex AWC)—Alternate Wednesdays, 8.15pm. The Cricketer's Arms, Park Lane, Wimborne, Dorset. Sec G1HBF, tel 0202 895100.
Winchester (WARC)—Third Friday of the month, 8pm. Durngate House, Winchester. Sec G1XCT, tel Winchester 880605.

REGION 18—RR Ian Gibbs G4GWB, 61, The Gables, Widdrington, Morpeth, NE61 5QZ. Tel 0670 790090.

Shildon (Aycliffe & Shildon ARC G4ZKZ)—Tuesdays, Scout HQ 4, Cross St, Shildon. Sec G4OHZ, tel 0325 314638.
Berwick (Borders ARS G0BRS)—First and third Fridays of the month. St John Ambulance Brigade Hall, Church St, Berwick. Sec GM1IRN, tel 0289 82491.
Bishop Auckland (BARAC G4TTF)—Mondays and Thursdays. Travellers Rest ph, Evenwood. Sec G0ACY.
Blyth (BARC G4VKY)—Wednesdays. Community Centre, Warwick St, Blyth. Sec G1JFW, tel 0670 353069.
Cambois (Wansbeck ARA RS88861)—The Antenna Farm, Colliery Baths, Cambois, Blyth. Details G4NAX, tel 0670 818442.
Consett (Derwentside ARS G4PFQ)—Mondays. Consett Assoc FC, Belle Vue Park, Consett. Sec G3KMG, tel 0207 504198.
Darlington (D&DARS G4ZVH)—Fridays, 7.30pm. Hurworth Grange, Hurworth, nr Darlington. Sec G6PRV, tel 0325 460528.
Durham (DARS)—Fridays. Rowing Club, Green Lane, Durham City. Sec G4WJV, tel 0783 853552.
Durham (University of Durham R&ES G4DUR)—c/o Mr Puddephat, Grey College, South Rd, Durham City.
Easington (EARS G4APN, G6APN)—Tuesdays and Thursdays. Village Inn, Easington Village. Sec G4RXR, tel 0783 867735.
Great Lumley (GLR&ES G4EUZ)—Wednesdays. Community Centre, Great Lumley. Sec G4MSF, tel 091 4693955.
Hartlepool (HARC)—Mondays. Grange Road, Methodist Church Hall, Tankerville Street entrance. Sec G4SHJ, tel 0429 67419.
Hetton le Hole (Houghton le Spring ARC G1NMD, G3NMD)—RAE and morse classes in progress. Wednesdays. Hettondowns Hotel, Hetton. Sec G0ABF, tel 091 5844673.
Middlesbrough (Post Office ARC G8GPO)—Thursdays. 6 Lytton St, Middlesbrough. Details G4ZML, tel 0642 244501.
Morpeth (Northumbria ARC G4AAX, G6AAX)—Thursdays. Old Telephone Exchange, Cresswell Rd. Ellington, Morpeth. Sec G0EVV, tel 0670 513026.
Newcastle (NER & CC G4YPT)—Mondays. Village Hall, Hazelrigg, Newcastle. Sec Mr T Chilton, tel 091 2855107.
Newcastle (Tynedale ARC G4ONQ)—First Tuesday of the month, 8.30pm. French Arms ph, Throckley, Newcastle. Sec G0DZG, tel 2651718.
Newcastle (Tyneside ARS G3ZQM)—1 Jul ("Computers in radio"). 8 (Informal), 15 ("Test equipment and measurement", G0BEV). 22 (Forum on operating procedures), 29 (Social evening). Scout Centre, Harbottle St, Byker, Newcastle. Sec G4KOT, tel 091 2341148.
Redcar (East Cleveland ARS G4CRS)—Fridays. RAFA Club, Newcomen Tce, Redcar. Sec G1GMF, tel 0642 474769.
South Shields (South Tyneside ARS G3DDI)—Mondays. Marine & Tech College Club. South Shields. Sec G4XWR, tel 0632 543955.
Stockton (S&DARG G4XXG)—Wednesdays. Billingham Community Centre. Sec G1NOY, tel 0325 310058.
Sunderland (SARS G4LPK G6BXJ)—Monday and Thursday evenings and Sunday mornings. Sec G0ASM, tel 091 5288079.
Teeside (RG GB3TS)—Sec G8MBK.
Tyne & Wear (RG GB3TW)—Sec G8YWK, tel 0385 45425.
Washington (W&DARC G4YGW)—Sundays. Oval Community Centre, District 12, Washington. Sec G6EPS, tel 091 4168648.

REGION 19—RR R J C Broadbent, G3AAJ, 94 Herongate Road, Wanstead Park, London E12 5EQ. Tel 01-989 6741.

Barking (B&DARS)—Mondays, Tuesdays, Thursdays. Westbury Centre, Ripple Rd, Barking, Essex. Morse classes are held. Sec 01-594 0291.
Borehamwood (BEARS)—Third Monday of the month, 7.30pm. The Organ Hall Club, Bairstow Close, (off Theobold St), Borehamwood. Details G0DDJ, 01-207 3809.
Cheshunt (C&DARC G4MGC)—Wednesdays, 8pm. Church Rooms, Church Lane, Wormley, Herts. Secs G4VMR and G4VSL, tel 0920 84250 (evenings). Morse classes held. Club net on 144MHz at 2000.
Chiswick (ABCARC)—21 Jul (Modern atu techniques, discussion), 7.30pm. Chiswick Town Hall, High Rd, Chiswick, W4. Sec G3GEH, tel 01-992 3778.
Ealing (E&DARS)—Tuesdays, 8pm. Community Centre, 71a Northcroft Rd, Ealing, W13 9SS. Sec A Berg, tel 01-997 1416.
Edgware (E&DSRS)—Alternate Thursdays, 8pm. Community Centre, 145 Orange Hill Rd, Burnt Oak, Edgware. Sec G4IUZ, tel Hatfield 65707. Club net on 1,978kHz at 2200 bst.
Feltham (Thorn EMI ARC)—Meets fortnightly. Sports and Social Club, Mono Lane, Feltham, Middx. Details Dave Austin, tel 01-890 3600 ext 2617. Open to public.
Grafton (GRS)—10 Jul (tba), 24 (Junk sale). 8pm. TS Wizard, White Hart Lane N17. Details G4PSH, tel 01-267 1000.
Havering (H&DARC)—Wednesdays, 8pm. Fairkytes Arts Centre, Billet Lane, Hornchurch, Essex. Sec G0BOI.
Paddington (PARS)—Club meets at Paddington College of Further Education.
Southgate (SARC)—Meets at Holy Trinity Church Hall (upper), Green Lanes, Winchmore Hill N21. Details G4YLL, tel 0992 30051.
Stevenage (S&DARC)—7 Jul (Open meeting. Display at Sitec Ltd), 14 (144MHz df hunt), 21 (Radio quiz), 2 Aug (Picnic at Woburn Rally). First and third Tuesdays of the month, 7.30pm. Sitec Ltd, Ridgemond Park, Telford Ave, Stevenage. Details G3OVT, or G6EDA, tel Stevenage 724991.
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. For donations and details, G3CWB.
St Albans (Verulam ARC)—14 Jul (Activity evening), 28 (Antennas for dx, RSGB matters, G3BDQ). 7.45pm. RAFA HQ, New Kent Rd, St Albans. Club nets held on Wednesdays 7.30pm on 145·350MHz, Sundays 1030am on 3·522MHz. Details G4JKS, tel St Albans 59318.
Welwyn and Hatfield (WHARC)—20 Jul (Fox hunt), 3 Aug (EMC). First and third Mondays of the month, 8pm. Morse classes on Thursdays. Nets on Monday, 8pm, on 145·375MHz. Details G4WLG, tel 0707 335162.
Westminister (Civil Service ARS)—6 Jul ("Test gear equipment", G4RFC), 20 (Lunch time natter), 12.30pm. Civil Service Rec Centre, Monck St, Westminster SW1. Sec G6IMM, tel 01-698 4437.
Westminster (New Scotland Yard ARS)—Not open to the public, but the club station is active from time to time using G4NSY and G6NSY. Sec, Room 99, New Scotland Yard, Broadway, SW1.

Members' Ads

The Conditions of Acceptance are published below the Member's Ad form circulated with every issue of *Radio Communication.*

The current rate is £2.30 for 40 words or less: advertisements containing more than 40 words will cost an additional £2.30 for every additional 40 or less words. Each advertisement must be accompanied by the correct remittance, either as a cheque or postal order made payable to Radio Society of Great Britain.

FOR SALE •••••••

FT480R YAESU 2m multimode mobile c/w mounting brkt desk stand, mic, manual etc, £290; also Jaybeam C5/2m glass fibre shrouded colinear, £35; tel: Harlow (0279) 22365 before 7pm.

TRIO TR9130, 2m multimode tcvr, used little and in ex condx, memory backup, mobile brkt, handbook and orig boxes, £360; 2m aerials 5/8 whip and magmount £15; 7/8 whip, £10. G4IZL, QTHR tel: Sileby 050981 3498 (Home) OR Loughborough 0509 263131 extn 355 (Work).

MINT 757GX TCVR, £650; FC757AT auto tuner, £225; SP102 with filters, £50; little used, no offers but £850 for lot, buyer to collect. G1ICL, NOT QTHR, tel: 01-789 7210 evenings.

BNOS AMP 70cm LPM 432-3-50 50W, £185; Tonna stacking frame 20014 contest use only, £35; Tiny Tim 12V petrol generator in running order, batt start 15A, £10, buyer arranges collection last 2 items. G3NVO, QTHR, tel: 0635 63692.

YAESU FT101ZD Mk3 fitted cw filter and fm, little used, silent key sale, £460; also Trio TS700 all mode 2m base stn, £200. Peter, G3WYK, QTHR, Bourne End, tel: 06285 26819 after 7pm OR Beaconsfield 04946 6676 office hours.

CONVERSION UNIT FOR DX 31 TODX 33, £65; FT2100 linear, £240. G3MTB, QTHR, tel: 0652 635310.

FT290 CHGR CASE COMP MOBILE STN with mount, mint condx, £300; dc dx morse trainer as new, £60; SEM iambic keyer c/w twin paddle, £40; CBM64 rtty morse transceive program, all software/hardware, £20. G4PCV, QTHR, tel: 0858 65609.

ICOM IC251E 2m multimode tcvr c/w muTek front-end as new condx, £400. G3XKN, QTHR, Bedfordshire, tel: 05255 2207.

G4MH MINIBEAM, £85; Sony ICF 2001 hf/vhf fm synth rx, £130; xtal calibrator for 19 set, £5. G3BDK, QTHR, tel: Towcester 52309.

FT708R 70cm fm h/h soft case helical handbook spkr mic, £175; NC-8A base stn psu with quick standard and trickle charge, £35; Spectrum comms TRC6-10 tvtr with preamp for low o/p hf rigs cased tidy, £55. G3BDK, QTHR, tel: Towcester 52309.

FT730R 70cm not used on transmit, boxed, £195. G1JMV, QTH, Bolton, tel: 0204 26684.

STRUMECH 30ft MAST, auto braked winch, rotator bearing, Kenpro KR2000RC heavy duty rotator, TET 3-ele mini hf beam HB33SP, 16-ele Tonna, 48-ele 70cm, all with H100 coax, as new, £780. Stan, G6KMK, QTHR, tel: 0283 790296.

ALDA 103 80/40/20m solidstate ssb/cw single conversion rx, 150W tx adjustable pwr o/p c/w handbook, mounting brkt and G-whip for mobile, £230 ono; also components SC600, ICS, filtered, etc. GW4ABX, QTHR, tel: 0633 400995.

ICOM IC271E preamp, £650; Trio TS120S tcvr, £350; Kenwood VFO120 vfo, £30; Trio R1000 rx, £245; AR2001 scanner rx, £250; all ex condx; Clarbrook pneumatic telescopic mast 9ft-39ft, buyer collects £100. G3JDO, QTHR, tel: 091-4898239 evenings.

FT290R boxed, ex condx, toneburst/piptone circuit, 2.2Ah nicads, helical, soft case, constant current chgr, £250; Coutant 12V computer-grade psu, £15; Slimjim, £5; HB9CV, £5; "G3LIV" Amtor/rtty tu with G3WHO Amtor/rtty ROM for BBC micro, £75. G4IAC, QTHR, tel: 06755 2745.

MICROWAVE MODULES MMT432/144R tvtr, £98; MML144/100-S 100W linear 10W i/p, £115; both items in ex condx. G1HEW, QTHR, tel: 0909 565443.

ICOM 720A with ICPS15 psu, boxed, mint, rarely used on receive only, £650 ono; SP420 Welz swr pwr meter 2m/70cm, new £55. G1CNN, tel: Tamworth 60098 OR 01-993 4946.

YAESU FT-1, all options gen/cov tcvr with MD1 base scanning mic, £995. G4NYC, tel: 0529 21327 after 9pm.

KW2000A c/w Shure 201 ptt mic psu manual, gwo and condx, £175. G3CQK, QTHR, Halesowen, WM tel: 0384 61971.

SELLING UP: Yaesu FT101ZD fm vgc, £350; Daiwa CNW418 atu, £75; Mosely tribander, £50; unused Standard C5800 2m multimode, £300 ono. Tel: Eastbourne 0323 29214.

Eagle IFT and coil kit H-402, £3;mini amplifier 2W UK195 kit, £5; radio control rx kit UK310, £5; valve amplifier 2XEL34 heavy, £5; 1/6hp motor+ pulley, £4. Lindars, tel: 01-647 6157.

ICOM IC551 6m base stn multimode fitted fm and pbt units, £595; Kenwood TR8400 70cm fm with PS10 psu, £250; Icom IC245E 2m multimode, £200. G3ZSS, NOT QTHR, tel: 0932 63552 evenings.

TS830S, MIC, SERVICE MANUAL, £700; Datong UC/1 rx cvtr 0.1MHz-30MHz to 144MHz or 28-30MHz, £60; Eddystone 840A gc rx, £60; Amtor pcb use with teleprinter for Amtor, £30. G4LOO, tel: Hitchin 811591 evenings.

KAYPRO 2 MICRO, c/pm 2.2, 64k RAM, twin 180k floppies, parallel and series ports with following software: Perfect writer, Perfect filer, Profitplan, MBask, c/pm 2.2, Wordplus spelling checker, £300. G4CEV, QTHR, tel: 0225 832156.

TRIO TS711E 2m multimode, variable pwr 2W-25W rf, £620; Kenwood SP230 spkr with filters, £45; Diamond CP4 trap vertical with radials, 40m-10m, £60; Dressler D200S 2m linear, £700. G4CUS, QTHR, Battle, tel: 04246 3205.

HEAVY DUTY STEEL LATTICE TOWER in 12ft sections, £25 ea OR £80 for four, buyer collects; Honda EC1500E 1.2kVA, 230V generator, vgc, £215 ono. Bob G6HUN, QTHR, tel: Woolhampton (Berks) 713640.

PSUs SWITCH MODE 100A @ 12/13.8, several available tested, fully wkg, £50 inc post; Avo 8 cased, gwo, £39, poss p/exch, WHY? IBM golf-ball printer c/w i/face, £15. G4XOX, tel: 0245 324555.

TRIO 430S, inc filters, fm, extras, £750; PS430, £100; AT230, £120; MA5 hf mobile antenna plus mounting brkt, £90; MM144/28 tvtr, £75; ELH230 2m linear, £25; Shure 444, £30; DK210 keyer, £35; Vibroplex Standard paddle, £40; rtty stn comprising Dragon 64k, CTU20 terminal unit etc, £100; LF30A lowpass filter, £15. John, G4PFZ, QTHR tel: 0603 409632 OR 505674.

HF BEAM YAGI 4-ele, 4-band, incl 40m dipole, virtually brand new, £180. Ian, G4GWB, QTHR, tel: 0670 790090 evenings.

£200 COMPLETE rtty/cw stn, Commodore 64 vdu MP64 which can be converted to Amtor, 2m linear, £10. Can be seen wkg. G4XQX, NOT QTHR, tel: 0705 862796

FDK 700EX 2m 25W mobile, hardly used, as new, £150 Trio 430S, as new, used at home only, £685 ono. Tony, G4VTC, QTHR Dorking, tel: 0306 885533.

HEATHKIT HA14 linear amplifier with HP24 pwr supply, 10/15/20/40/80m bands, gwo, tubes only 6mths old, £200. GM4WZY, tel: 0324 483299.

MICROPATCH MP64 for Commodore 64 computer, morse code Baudot rtty ASCII MBA-TOR xmit buffer QSO buffer, 10 message buffers, 3-way split screen, £110 ono. G4TCF, QTHR, tel: Codsall 2131.

FT708 70cm fm handheld, £165; AX-25 packet radio TNC, £70. Trevor Tugwell, 3 Westbury Close, New Milton, Hants BH25 7AZ, tel: 0202 486344 extn 2223

FLDX400 5-band tx 150W cw/ssb, recent overhaul by prof eng, new PA, driver £100; Shure 444 mic, £35 both in gd condx. G3OCA, Derby, tel: 0332 662818.

GEM QUAD 2-ele, new and unused in orig pkg, £200. G4DRI, QTHR, tel: 0707 338425 evenings.

ICOM IC720A hf gen/cov tcvr, ICPS20 psu, ICSM5 desk/mic, £685; Amtech 300 atu, £35; Tono 2m-50W linear, £75. All boxed and manuals, no mods. G6XFP QTHR, tel: 01-958 5201.

SURPLUS TO REQUIREMENTS: 2m antennas, 6-ele quad and quarter wave ground plane. Offers around £20 the pair, buyer collects. Brian, G1VSP, QTHR, tel: 021-559 5882.

HF SSB TCVRS FT401 80m thru' 10m, £245 ono; FT101B with am and 160m, looks new, £265 ono; 12V/240V rf 3100L gen/cov tcvr fm/ssb, offers? FDK 2m 25W fm and 12-ele Yagi, £145. G0FDV, Luton, tel: 0582 423495 anytime.

ADMIRALTY RXs B40/D, mini-valves, perfect order, £75 with circuits; top cover for BBC.B Micro, £5; brand new 5V/12V psu, ideal disc drives, £5 ea; brand new Storno vhf/2m pwr amplifier 24V/35W, easily converts to 12V, £10; several unused binders for Micro and Acorn user mags, £2.25 ea; five Nixie tubes, £4; push-button car radio, perfect, £8; large qty spares for B40/62B range rxs, except valves, All items post extra. Paul, tel: 0843 61448.

YAESU FT101ZD FV101Z SP901, vgc, £575; muTek TVH230C, £275; hf 100W linear, £100; Arthur, GM0ALZ, QTHR, Cumnock, tel: 0290 22676.

DRESSLER D200 2m/amp 350W pep, Daiwa MR750PE h/duty rotator with extra fitted motor. Equip all in ex condx, looking for £400 for amp and £200 for rotator. tel: 01-299 2888 anytime.

SONY ICF 2001D super portable rx, cost £330, only had 3hours use, sell £270 ono. G3NJP, QTHR, Cranbrook, Kent, tel: 0580 714482.

FIVE 813, £18 ea; pair 805, £13 ea; six 866A, £10 ea; seven 807, £1 ea; 803 £6; 829B £6; pair 211, £10 ea; also bases. Offers for pairs TY3-250, PT15 four KT66, three 833, others. Professor, tel: 01-764 5940.

APPLE2 EUROPLUS 64k, two half-height floppies, 10mByte sider hard-disk, tons software, CP/M rtty, sstv, Wordstar, M80,L80 Z8E, etc, all manuals, 12" green screen 80 column, £400; computer etc, £400; hard disk. G3RRA, QTHR, tel: 0276 25040.

SONY ICF 7600D digital rx, covers 153KHz to 30MHz am and ssb, also vhf fm broadcast band, as new, £120. GW1FKY, tel: 0222 708336.

ICOM R71E communications rx, about 2yrs old, fm board, cw filter, showroom condx, boxed; Sony ICF 7600A multiband rx, any reasonable offer accepted. Peter, tel: Maidenhead 28940.

ICOM 490E 10W 70cm multimode, incl mem backup £395 Kenpro Elevation rotator KR500 £95; Linear microwave modules 100W 70cm 10W drive, £195; Icom SM5 mic, £29; Fortop tv tcvr TVT435/R, £125. G0AGC QTHR, Tyneside, tel: 091-460 9411 office hours.

ICOM 245E 2m multi with RM3 keypad and mains psu £200; Heathkit tower, galvanised, 30ft, buyer collects, £100. G3PXX, QTHR, tel: 051-336 4452.

GEN/COV RX, DX300 digital readout, 200KHz-30MHz, synthesized, as new, boxed, £95; Codar T28 rx 160/80m, £15; tvtr for 160m, used with FT200 for top band, gd wkg condx, £45, tel: 0925 35330 Cheshire.

ALINCO ALM203 HANDHELD, as new, still under warranty+ chgr, £180; Lowe SRX30, ex condx, £70; Spectrum 48k, £40. WANTED: FC707 atu. G1PQA, QTHR, tel: Tamworth 57742.

KW2000A AC PSU 6146BS handbook, £139; Jaybeam 2m quad, £14; Lafayette KT340 rx (similar Trio 9R59) dial peeling 550KHz-30MHz, £59; Teletype 35 innards+psu, £49; FT227R with G8EWU scanner fitted £169; Adler typewriter, £75; all buyer collects. G3HVP, tel: Maidenhead 72397.

FT290R muTek nicads, £255; 30W linear amp, £40; 20A psu, £60; SP200 swr pwr meter 1kW, £50; colinear, £10; SEM Tranzmatch atu Ezitune, £65; colinear, £10; DX302 digital rx, £85; BBC.B 32k with rcdr, £150; DX200 rx, £45. G6VVP, tel: 01-989 3471.

EDDYSTONE 880/4 communications rx, high quality professional rx in ex condx, 0.5MHz-30MHz in 30x1MHz ranges, selectivity 200Hz/14KHz, am/cw/ssb £265, BUYER MUST COLLECT. G3MOE, QTHR, Glos, tel: 0242 524217.

PMR EQUIP vhf high-band, Storno 700FM mobile, Pye Olympic am, Dymar 25WFM boot mounted mobile, Dymar 5CH handheld, all £10 ea ono, buyer to inspect/collect. Ian Burns, G0AFH, QTHR Meopham, Kent, tel: 0474 814809 evenings only.

HALLICRAFTER HT-37 tx, gwo, 100W, £150 ono. G3SQV QTHR, tel: 050981 4762.

ICOM IC02E 2m handheld, rubber duck, two battery packs, manual, boxed, Icom IC04E 70cm handheld, rubber duck, chgr, two battery packs, manual, spkr/mic, both immac condx, £195 ea ono. G1UWI, QTHR Harpenden, tel: 05827 61393.

TS530SP, vgc, hardly used, c/w VF0240, £595. G4YSN Coppull, Lancs, tel: 0257 793872 evenings.

FDK MULTI-700EX, 2m/fm tcvr, 0-25W variable, perf condx, any trial, £95; scan and memory facilities also microwave modules MML 144/40 10W i/p, £50. Alex, G6HBF, QTHR, tel: 0706 875300.

MMT 1296/144G 2W o/p checked at makers, now surplus to requirements, £200pp. G8AAP, QTHR, tel: 06582 2557.

ATTENTION FT290R OWNERS: MML144/100LS lin/amp 100W £100; MMT432/144R 70cm tvtr with 6dB attentuator, £120; Tonna 19-ele 70cm Yagi, latest model, £25; AP5 speech processor, £25; 2m 5/8 over 5/8 colinear, £12. John, G0GDU, tel: Newark 830687 w/ends only.

FIVE FOOT DIA PARABOLIC DISH made by Harrisons of London to Petal design, unused, £65; also commercial tubular resonator for use at Meteosat freqs, made in Germany by UKW-Technik, not used, £65. Abandoned Meteosat project, tel: Bolton 40629

SWAP FT290R with muTek board, nicads, chgr, carrying case, listen on i/p and a microwaves modules 30W amplifier with preamp FOR any mobile hf tcvr TS120 etc OR sell £350. Graham, G4VOE, QTHR, tel: 061-740 4126 anytime.

PYE A200 LINEAR AMPLIFIER, suitable mods 2m/4m/6m £20; Jaybeam 8-ele 2m quad, gd condx, £20. G3HNT, QTHR, tel: 061-794 2807.

FT290, muTek, nicads, mobile brkt, £210. G4ZWP, QTHR, tel: 0992 442794.

COLLINS S Line 75S-3, 32S-3, narrow cw filters, fitted, ex condx, separates, or transceive, c/w mic, leads, pwr supply, manual etc, £425. WANTED: h/duty rotator. G4SDP, QTHR, Hevingham, Norfolk, tel: 060548287 anytime.

MAPLIN MATINEE ORGAN 16mths old, 2x49-note keyboards, 13-note pedalboard, 30 rhythms, drawbars, preset voices, auto-chords, memory, reverb, manual, £375 OR exch FRG7700 with memory, active ant, atu, must be vgc. Stan, G4OPG, QTHR Bedford, tel: 0234 771549.

MMC 144/28 cvtr, £20; SLNA 50S muTek preamp, £30; 6146A, £5; Kenpro KS-065 stay-bearing, as new, £16 WANTED: Address of Mike Stringfellow, AA4KU in Atlanta, Georgia (ex-Z56BUF), any info? Dave Newman, G4GLT, QTHR.

TR9130, £330, also Bencher paddle chrome type, mint, £55. GW4YLF, QTHR, tel: 0443 730492.

50MHz 4-ele antenna, £10; 2m 8-ele antenna, £10; 12 and 24 foot x 2in aluminium poles with coupler and brkts, £20; MTV7000 rotator, £25. R Hensman, G1RWV, QTHR.

QTH SOUTH WIRRAL CHESHIRE: det bungalow, lge gdns, facing fields, 2 entertain rooms, 3-beds+ shack, £72,000; 5-ele hf Yagi rotator, offers? Multi U11 tcvr, vgc, £80; colinear for 70, £8. G4WLI, tel: 051-327 4280.

MUTEK TVVF 144A 2m tvtr, immac condx, boxed, £190; also 14-ele MET, used for 2mths, £30. Chris, G1UZJ, QTHR, tel: Shorne 3797.

FT902D CW FILTER KEYER, £525; FC902, £120; HK708 key, £10; MK705 paddle, £18; YD148 mic, £16; ZA-1A Balun, £7; Reyco traps 15m/20m, £7/pr; Commodore C64, £35; 1541 needs alignment, £25, buyers collect or carr extra. G4BGE, QTHR, tel: 0344 421502.

1980 VIKING FIBRELINE 10'6" caravan radio shack h/c water, heating, fridge, toilet, spare wheel, awning etc, all in gd condx, £1,450; oscilloscope Calscope Super 6, £95; Sony rx ICR-4800, £30. Tel: 0903 724805.

BIRD43 PLUS 1kW VHF, 500W uhf elements very new, £210; also two 4Cx1000 tubes, EIMAC, metalwork, eht txfmr, heater txfmr, data for 1.5kW 144MHz linear plus 4Cx100A coaxial base, offers? G6HKS, QTHR; tel: 0723 362 492.

LINER2, MIC, PSU, vgc, £80; Pye Cambridge mic psu, £35. G4NRP, QTHR, tel: Lapworth (05643) 2702.

SSB, German, LSM24 1269cm tx/mixer unit for Oscar 10, £175; EME 13cm 3-pole filter, £38; TET HB23M 2-ele hf beam, new, £110; Kenpro KR500 elevation rotator, mint, £99; vhf communications 2m antenna polarisation switcher, £34. Paul, tel: 0293 515201

TRIO TS930S am filter, 2off 500Hz cw filters, £950 WANTED: Robot 800. Paul, G4HPS, QTHR, tel: 091 5226883.

YAESU FT102 fitted am/fm board with mic, little used, £500, prefer buyer collect, spare set valves £25; SP102 spkr, £35; Hanson pwr meter FS50HP 20/2kW, £45; 2m tvtr, MMT144/28 4mths old, £65. G3IJL, QTHR, tel: 01-749 1454.

JIL SX400 SCANNER 26-520MHz, boxed with manual, £450 ono. Dave, G1WXC, West Sussex, tel: 0903 755898 after 8pm.

TOWER COMPLETE Versatower tiltover 40ft c/w K2500 h/duty winch and K1500 winch, both in lieu of standard type, also new KS065 stay bearing, £700 new - yours for £275, you transport. Ken, G1CPC, Harlow, tel: 0279 26647.

MIC YAESU MD1B8 wired for Trio TS930, boxed, as new, £40; vhf cvtr FRV 7700, £20. G3XRJ, tel: 0736 87 285.

JOYMATCH ATU WITH METER Model 4RF 400W pep, £10; KH Hi-Z adaptor type PE220 suitable AVO8, £7.50; Eddystone 750 rx, vgc, £85; Heath 'scope OS-1, gd condx, £25, all ono. Lindars, tel: 01-647 6157.

COMMODORE 128 WITH 1570 disk drive, data rcdr, joystick and software, £325 ono. G0DZK, QTHR, tel: 0282 52561.

HEATHERLITE 2m Explorer 4Cx350A valve, £450, with warranty. G1HOW, QTHR, tel: Bourne End 21131.

LATTICE TOWER, almast, three 10ft sections incl rotator mounting, tiltover base and built-in ladder, ex condx, £150 ono. G3FNT, NOT QTHR, tel: 0263 712372.

FT101ZD PLUS FC700 atu, both boxed as new, workshop manuals, spares etc, £475; Commodore 'Pet', 3032, twin disk drives, printer and vast range software, £250; Brother M1009 printer ser/par unopened, £75. G4PXP, QTHR tel: 0603 35842

RACAL RA117 steel case, spare film, scale manual, vgc, £125. G3SHW, QTHR, tel: 061-483 5129.

FT290R C/W NICADS, chgr, case, strap, boxed, Alinco ELH260 50W linear with rx amp, £280; Trio gen/cov rx 9R59D, £65; Pye observation system tv monitor and camera, £70, all ex condx. John, G0GUL Coventry, tel: 0203 450476.

FT77 HF TCVR fm fitted, £350, can demonstrate over air QSO, will deliver London area. G3HMO, QTHR, tel: 01-701 2224 office OR 01-639 5147 evenings.

MM LINEAR 70 or 50MHz 10/80W, £75; Shinwa CP80 dot matrix printer, Centronics i/p, suits BBC etc, £125; Sony mains/batt 9-band radio vhf/fm lw/mw+5 short waves, airband, BFO, ideal for general sw listening, £75. G3WCS, tel: 0606 891913.

MUTEK TVVF 144A 2m tvtr, £160; BNOS LPM3-180 2m linear, £160; Daiwa MT20 2m handheld with SD-1 mobile adaptor, £110; books: "Q+A manual", "Programming the 6809", "Introducing Spectrum m/c" "Basic Computer Games", £5 ea. Mark, G0CBD, tel: 01-300 7323.

ICOM IC-25E 144MHz fm tcvr, ex condx, £200. GM4AWA QTHR, tel: 0738 51412.

TS780 2m/70cm 10W trans as new with ASP Datong speech processor, £750 ono; TW4000A 2m/70cm fm only 25W o/p, £350 ono, mint; FRG7700 rx and atu and Daiwa AF606K filters, £350 ono, mint; BBC.B DFS fitted, disk drive+ data rcdr+ software, £350 ono, mint; VF0230 for TS830/530 etc, £200, mint; MC85 base/mic, £65. G1UMK, QTHR, tel: Southwell 814541.

FT707 HF TCVR, £350; SX200 scanning rx, £180; Pye Westminster W15fm suitable for 50MHz, £35; Yaesu FRG7 gen/cov rx, £120; Pye PMR boards for 60W/10m fm tcvr, £35; all vgc to immac, all ono. Dave, Warks, tel: 0926 57976.

RACAL RA117 rx, RA218 ssb adaptor/fine tune unit, RA37 lf unit, MA168B diversity switching unit, gd condx, lovely rx but too big for my shack. Offers? or WHY? 70cm ssb. Rupert, Chesham, Bucks, tel: 0494 783557.

101ZD SIX-BANDS FAN MIC, handbook, pristine condx, spare set valves included, one owner updating stn, demo arranged, £435 ono; collect/deliver locally; Sony 2001 c/w nicads, psu/chgr, service handbook, "confidential frequency list" free, £100. G3IES, tel: Bristol 500742 anytime.

COMPUTER: Acorn Atom, fully expanded plus toolkit ROM and many other extras, also qty 5.25" disks, both ss/sd and ds/dd. Offers? WANTED: Anything aeronautical, charts, instruments, manuals, etc. Godfrey, G4GLM, 63 The Drive, Edgware, Middx HA8 8PS, tel: 01-958 5113.

BARGAINS GALORE! Printers, BBC ROMs, disks, Einstein software, computers, vdus, 813s, meters, books, ribbons, tcvrs, cases, boards, valves, txfmrs, photomultipliers, crts, manuals, new components, and much, much more! All must be sold. Something for everyone. Simon, G8POO, tel: 0661 842389 or sae.

FDK 750E 2m mult 10W, little used, £170 ono. Paul, G6XXT, tel: 0272 697408.

YAESU FT726R, 2m, 70cm sat unit, SP102, MD1, immac condx, boxed, leads, manuals, etc, £975; NAG 144XL 2200 4Cx350 linear amp, vgc, £250; Kenpro KR400RC, £75. G6YAF, QTHR, tel: 03727 29448.

ICOM IC490E 70cm multimode, ex condx, 1yr old, £450 no offers, will p/exch/swap for PA+ preamp for 70. 00V0320A+ base, £5; 0Y5-3000A, offers? or have you a base+ info? WANTED: Manual for Hatfield Instruments freq counter type 7707. Martin, G1GYC, QTHR, tel: 061-483 2330.

HQ1 MINIBEAM+ balun, AR40 rotator to suit with instrs, all boxed, £120. George, GM4XEQ, tel: 0292 268055.

FT101ZD FC902 Katsumi keyer, 5-ele hf beam, TET KR 600RC, 480R, 10m fm, lcl tcvr, all vgc and wkg, offers? Det bungalow, 4-beds, Wirral, Cheshire, £72,000; Multi U11 fm tcvr, £80. G4WLI, tel: 051 327 4280.

TRIO R1000 gen/cov rx, gd condx, £200 incl delivery. Colin, G4ERO. QTHR, Ely, tel: 0353 5869.

TRIO TS530S, mint condx, all hf bands, little used £650, tel: Lindfield 3828 evenings.

KW2000A TCVR, mic, valves, £160; Ferrograph 722 stereo tape rcdr, £95; two mic stands with booms, £15 ea; two Reslo dynamic mics, £15 ea; Spectrum 48k upgraded keyboard, £55; green screen monitor, £12; prefer buyers collect. G4LOX, QTHR, tel: Bristol 424246.

ICOM IC202S 144MHz ssb/cw tcvr, 3W o/p, all Dubus mods, BF981 rf amp, tx/rx relay, BNC o/p socket etc, c/w mic, manual and orig box, £125 ono. May p/exch for 50MHz tvtr. G0EVT, Wakefield, tel: 0924 825443.

OPPORTUNITY TO ACQUIRE HOT-FOIL PRINTING MACHINE. Less than 1/3 new price, incl typeface, cabinet, coloured foils to produce stylish business cards, embossed gifts ie key-fobs, pens, pencils, etc. Sacrifice at £425! OR exch tx/rx or WHY? G4HBU, QTHR, tel: Bristol 611093.

EDDYSTONE 770R Mk2, 990S rxs, manuals, valves gd condx, £200 ono. Will split, buyer collects. Tel: 0326 280606 after 5pm.

ICOM IC505 50MHz tcvr, approx 1yr old, in mint condx, £260 ono incl Securicor. Jon Jenkins, G4LJW tel: Bristol 732211 extn 2250 work OR 741974 home.

FT77, 100W c/w mic and mobile aerials for 80m/20m and 15m, £465. GW4RER, QTHR, tel: 04465 3482.

IC290E 2m 10W multimode, gd condx, £300 ono; Seif 13.5V 3A psu, £15; Boots CR325 cassette rcdr, £10. Jonathan, G4MPN, Leyland, Lancs, tel: 0772 435316.

LAMBDA REGULATED pwr supplies 12-13.5V adjustable 9.4A, i/p 105-132V, £35; two 5-6.5V adjustable 8A, i/p 105-132V, £15 ea series two for cheap supply cost £341 and £268 ea respectively; Hi-gain TH2 Mk3, £100; Barco 17" colour monitor, £20. Tel: 095389 8376.

1981 MARCONI H2540 hf gen/cov rx ssb filts 1.2KHz FSK 500Hz cw fitted sub octave FSK demod options, superb mint condx readout to 1Hz, £1,350. Can export at cost. G3YFK, tel: 0743 884858.

KENWOOD B09, £10; Telequipment scope S51B, £30;

MMC 70/28 LOBNC, unused, £12; Variac 240/0-270/4A £15; inverter 12Vdc-240ac 200W, £20; inverter 12Vdc-240SQ 180W, £10; Heath dipmeter HD1250, £15 KM4000 memory keyer, £20; Burns FMD1 fm detector 430-500KHz, £5; Datong RFC/m, £6. Small items plus post, others collect, North Yorkshire, tel: 0677 22316.

SHACK CLEAROUT: Yaesu FT207R handheld, £100; YM24A spkr/mic, £12; FIF232C computer cat i/face, £45; Datong morse tutor, £35; Trio TR2300 with mobile mount, £100; MMC 432/28 rx cvtr, £20; all items ono. G6BKX, QTHR, tel: 021-526 6850.

YAESU FT757GX with mic and box, £575. May p/exch with good gen/cov rx. G1NVV, QTHR, tel: 0582 68648

FT290R, NICADS, CHGR, soft case, carry strap, manual, boxed, £245 ovno; Maspro 7/8 wave+ gutter mount, £10; h/duty magmount, £10; YT3 swr bridge, £5; Airmec headset and boom mic+ homebrew speech processor, £20; homebrew mic and control box (suit FT290), £15; Collins rx type COL-46159 (TCS-12 unit) wkg, tatty, hence £25; valve linear bits box (QQOZ06-40) etc, £15; Drae wavemeter, £10. Terry, G6MLJ, Basildon, tel: 0268 557443 after 6pm or w/ends.

YAESU FT480R 2m multimode, vgc, in box with manual £290. David, G1OYW, tel: 04868 28915.

10V REGULATED FROM 10.5V i/p? Rad Com Feb 1975 tells how! Get more from Rad Com: technical index archive contains 1800 entries, 1969-1987 incl "Technical Topics": runs on unexpanded Sinclair QL micro, £5. Microdrive exch from G3ROZ, QTHR, Sandy Beds.

G3DOG GOING QRT ON HF: selling eveything except honor roll plaque. TS830S, incl YK33C 500MHz filter and VFO230, boxed, £1,000. Ham IV rotator, used only indoors, plus cable, £200; TH3Mk3, fitted BN86, sound, £120. 12AVQ, used only indoors £50. Yaesu 200/1000/2000W pep, swr/meter, 60MHz, £50. KW108 monitorscope, reads ssb patterns, £65. Yaesu FP12, 12/15V regulated, 12A pwr supply with integral spkr, £55. CMOS iambic keyer, £20. Avo 8, £20. All supporting manuals. Buyer collects or carr extra. G3DOG, QTHR, tel: 0932 226076.

ICOM 471H 70cm base as new, accept 490E mobile and/or 50/100W linear p/exch; also Adonis 503 compressor/mic, £40; Commodore 64+ 128HD psu+ cassette, £90; Datong rf processor D75, £40. Ring and haggle! G6SJU, QTHR Tyneside, tel: 091 4385812

TRS80 COMPUTER and expansion i/face, software and books, £35; Video Genie computer and expansion i/face with RS232, software and books, £35. Tel: Scunthorpe 840237.

30FT 3-SECTION FIBREGLASS lattice tower, £100; Ten-tec Century 22 QSK hf tcvr cw BNOS psu for above, £300. G4UWG, QTHR, tel: 0768 88680.

SEAVOICE 550 DIGITAL MARINE RADIO, perfect condx, £200. Tel: 04712 594.

FULL BASE AND MOBILE FT290R, Heatherlite, MM30W with preamp, variable 7A psu, 5/8+7/8 mobiles, mounts, 5/8 over 5/8 base, 5XY, rotator, poles, quality switched 1000W pwr swr meter antenna splitter, £425 ovno. Might split. G1MNB, tel: 0602 784990 after 5pm.

MML 432/100 70cm 100W linear, used once, mint cond boxed, £290 ono; Kenwood atu 200, £90. G4IGT, QTHR tel: 091 5843563.

ICOM IC2E 2m handheld+ spkr/mic+ ICDC2, case and chgr and pwr pack, vgc, £150, no offers. GW4NOS, QTHR, tel: 0443 436655.

DRAKE TR7 GEN/COV hf tcvr plus PS7 h/d psu, fitted fans, noise blanker, cw filters etc, vgc, operator and workshop manuals available. Excellent value at £700. WANTED: Marconi Marine Oceanspan. G4YXX, QTHR, Wincanton, tel: 0963 32389 evenings.

KENWOOD TS440S HF GEN/COV tcvr reviewed as one of today's best hf rigs, 4mths old, c/w box, service workshop manuals, £895; Lynx 96k computer, never used, still in sealed box, £45. G4GPL, QTHR, tel: 01-953 9021 work OR 01-953 6921 home.

YAESU FTONE SUPERB GEN/COV hf all-mode tcvr, most filters fitted, incl Curtis keyer and fm, excellent example and performer, £895; Newbrain computer, boxed as new, £45 incl some programs. G4GPL, QTHR, tel: 01-953 6921 home OR 01-953 9021 work.

JVC 'U'MATICS semi-pro video rcdr, sell £250 or exch for BBC.B or Apple 2E or FTY707 plus 2m handheld. G0DIM, QTHR, Bedford, tel: 0234 766360 late evenings or w/ends.

YAESU FT690 PLUS FL6010, 6m tcvr and 10W linear, wkg order c/w manuals, leads, mic, etc, £200 ono. G4BAL, QTHR, tel: 01-302 4062 anytime up to 7.30pm

YAESU FT230R 2m mobile tcvr c/w mobile mounting brkt and magmount whip, £210. Chris, G6LRY, QTHR Wantage, tel: 023 57 2205.

FT707 TCVR, FC707 atu, Drae psu 24A, all perfect condx, £435 ono. E K McDermott, RS88981, 18 Weaver House, Ribble Road, Gateacre, Liverpool L25 5PS, tel: 051 428 1114.

SEM TRANSMATCH with Ezitune, as new £75; DNT40 10m plus repeater shift, £35; Andrews Heliax 12m, £25 (unused) magmount, £10; Goodmans 110 rx, £40. Peter, GOBAG, Portsmouth, tel: 0705 595739.

EDDYSTONE 840C rx, gc, £65 ono; DOZ domestic valve radios, mostly post-war; 2-vol Admiralty handbook wireless telegraphy, good home still offered for telescopic tower. G4XMK, NOT QTHR, Surrey, tel: 0342 893065.

FT726R 50mcs, 144mcs, 430mcs, sat unit as new, £1,000; Eddystone coil formers, 2.5" 6 TPI, new, £10; atu with built-in swr bridge, 2m f/r, £45; nine valve radios, complete, wkg, £10 ea. G3OXV, QTHR, tel: Daventry 702265.

YAESU FT726R with 2m, 70cm, 10m, 12m, 15m, sat unit (full Duplex cross-band), 600Hz cw filter, mains and dc leads, SP102 external spkr with audio filter, freq coverage 143.5-148.5, 430.0-440.0, 26.0-30.0, 24.5-25.0, 21.0-21.5, 2m linear BNOS LPN 144-10-180 hf linear CP163X-II, immac condx, £1,295; Yaesu FT709R 70cm handheld with FNB3(3W), FNB(4W) and spkr/mic, £250; Yaesu FT2700RH 2m/70cm mobile dual-bander (full Duplex cross-band) incl Welz duplexer, £335. Bruce, G4WVX, QTHR, tel: 06286 64415.

HQ1 MINIBEAM, £50. G4PWD, QTHR, Rugeley, tel: 08894 78981.

TH41E 430 HANDHELD c/w nicad-chgr, as new, only £150. Brian G4DIO, QTHR, tel: Wolverhampton 733185

SX200 SCANNER, £190; Transcendent 2000 music synth £95; Marconi TF801D 10-470MHz sig/gen, £60; Airmec 858 0-30MHz sig/gen, £25; 2N3055, 5 for £1; equip carrying cases 7x11x13, £8; mechanical run-back timers 60min, £3; 4-digit 12V impulse counters, £2 G4BXT, tel: 0322 77401.

ICOM 251E muTek front-end SM5 desk/mic, gd condx, £410. Prefer buyer collects. G6BJP, QTHR, tel: 0284 4649.

YAESU FC700 ATU, as new £85; FTV 901R tvtr, 2m module and internal pwr supply for 220/240V, wkg £135. Joe, tel: 0625 20835 anytime before 11pm.

TOYO T430 pwr/swr meter, 2m and 70cm with N connectors, £25; Global AT1000 atu (receive only), £25; Datong morse tutor, £15; 2m half-wave whip with BNC plug, £10; all in ex condx. Martin, tel: 01-590 5490.

SCARAB MPTU1 rtty unit, vgc, only £30 plus Datong gen/cov receive cvtr, £70 in excellent new condx Pse contact 01-854 6422 or QTHR. Can be posted to your QTH! John Rivers, GOGCQ.

SUPERB PAIR YAESU SEPARATES FR101 21-band rx digital readout matching FL101 tx, mint condx and rarely used, c/w manuals and plastic covers, £500; also MK701 keying paddle, £15 new. GW3CBA, QTHR, tel: 0446 741520.

TELEREADER COMMUNICATIONS COMPUTER SYSTEM (685E), £550; Microvitec 14" standard colour monitor, £120 IRCs £218; BBC/TRS80 hardware/software, ssae lists Maplin 300 baud modem kit incl case, £20; ASCII keyboard console, £15; RAMS, ROMS, digital ics, enquire. A1, G4CVZ, QTHR, tel: 051 220 5470.

SAVE OVER £100: AR2002 vhf/uhf scanner, mint condx in orig box, £350 plus p&p. G4DYO, QTHR, tel: 0734 732393.

ALUMAST THREE-SECTION 30ft aluminium mast, £110; AR40 rotator barely used, £75; Mosley TA32 10/15/20m 2-ele beam, £40; CP5 5-band vertical, £80. GM4CUX, QTHR, tel: 031-339 5092.

ICOM ICR7000 Discone remote control, mint, £850; Trio DM81, £90 mint; Tandy CTR-70 cassette rcdr, £35; Koss PRO/SLC stereo phones, £15; Welz AC38m atu, mint, £70; Binatone for 28MHz, £10; Philips rcdr, £15; Murphy valve rx, £25. G4YDM, QTHR, tel: 091 4162606.

RACAL RA317 and Plessey PR155G professional hf rxs in ex condx with manuals. Originally vastly expensive but now £300 each. Inspect and collect. Mike O'Beirne, G8MOB, QTHR, tel: 01-405 7554 daytime.

VHF GEAR FT290R, 100W linear, 14-ele beam with pole and cable plus extras. Complete sale, no splits, £425 ono. Sale due to other commitments. Tel: Deeside (Clwyd) 822798.

COMMODORE 3032 business computer with green screen 1mB disk drive, printer, twin cassette decks, 100+ items of software, lots of manuals, Spacemark ST6 rtty i/face, £250. Buyer to collect. All the above in mint condx. Tel: Rhyl 2859.

TAV ANTENNA TUNER SPC3000, 3kW pep, fitted with swr and pwr meters with instrs mint/boxed. Rarely offered, £285; 70cm linear/preamp 432/50W, few hours use, £90. G2FZU, QTHR Notts, tel: Southwell 813847.

PALOMAR ENGINEERS (USA) RX noise bridge, mint with instrs, XcXL&R controls, quality instrument, die-cast, £45; Juki-6100 daisywheel printer, mint/boxed, instrs, BBC cable etc, £220; word processor foc to buyer. G2FZU, QTHR Notts, tel: Southwell 813847.

TS530S IMMAC fitted narrow ssb and cw filters; AT230 antenna tuner, SP430 spkr, MC50 desk/mic, all perfect boxed condx, also 2m tvtr, cables etc Ambit kit approx 5W o/p, excellent quality, cased, £750 only. Brian, G4RKF, Oxford, tel: 0865 66466.

TRIO 830S, mint condx, little use, orig pkg, etc, any trial, £785. WANTED: PAC comm 200. Mervyn Collicott, GOBNT, QTHR, tel: 0752 777777 evenings.

DETACHED BUNGALOW near sea, New Forest, Hants; 3 beds, lounge, kitchen, dining-room, sep toilet, bathroom with shower, garage, c/w 60ft tiltover tower and planning permission, excellent vhf/hf location 5mins sea, £85,000. G4TMI, QTHR, tel: 0425 618749.

MOSLEY ELAN 3-ele beam, 21/28MHz, £45; BC221 mains charts, £15; HRO rx, 10 coil packs, £15; HRO dial and drive assy, new, unused, £5; roller coaster with counter, £7. Collect only (South Hants), G8FR QTHR, tel: Emsworth 376177.

ICOM 720A with Icom PS15 pwr supply and SPC 3000 atu Sommerkamp YS200 swr and wattmeter T200 dummy load antenna c/o switch G-whip antenna with coils, all boxed, unused, £800. G1KLO, tel: 0524 751214 after 6pm.

YAESU FT101Z, mic, 'phones, fan, dummy load, 6-band, £345; atu FC902, £95; FT208R 2m YM24A mic, 5/8-whip, NC9C/PA3 chgrs, £145. All boxed with manuals. Also hi-mound key HK-710, marble base, £20. All mint. G4PIC, QTHR Southampton, tel: 0703 893249.

TRIO TS130S, with cw filter, £425; BNOS 25A pwr supply, £125; Kenwood PS20 pwr supply, £35; digital multimeter, £20; "DX edge" hf operating aid, £10. All vgc, with instr manual and orig pkg. G3BFR, tel: 045 36 3994.

YAESU FRDX400 rx with fm cw marker 2m cvtr options spare valves and handbook, £110 ono; Cossor CD513 5MHz oscilloscope (valved), £40 ono. G8DKK, QTHR, Luton, tel: 0582 424809.

WPO 2M FM TX/RX 1W, neat size, as new, £45; Type A adjustable Reed headphones, collectors piece, never used, £30; Erichson headphones, high impedance circa 1947, £5; microwave modules 70cm atv cvtr, £18. G3KZU, QTHR Oxford, tel: 0865 63000

PARK AIR ELECTRONICS 360-chann airband monitor, vgc, £125. G4VEW, QTHR, Kidsgrove, tel: 07816 5020

HF STN COMPRISING: Trio TS830S tcvr, external spkr SP230, tuner/pwr meter AT230, mic MC50, dummy load DL1000. All perfect, £700 the lot to a good home. Buyer collects. G4NDE, QTHR, Cheltenham, tel: 0242 526571.

TEMPO 2002 144MHz amp 2X 8874, TS120V hf tcvr 10W o/p, VFO120, 10-ele Cue dee 144MHz ant, 4off, never used. Offers? Ian, G4YUZ, QTHR, tel: 0992 463478.

TRIO R2000 rx, fitted cw filter, new 1986, £395. Tel: 04712 594.

TRIO TH21E 2m HANDY, £165; Akai colour camera/rcdr £250; Pye: PF2UB 3-chann mobile mount £70, PF3UH 3-chann £50, PF2FM 70.41MHz £30, PF5 SU8 £25, uhf Europa 5-chann £70, vhf Europa 4-chann £70. All xtalled and wkg. G4JQP, tel: 0749 840468.

FT101E, recent professional overhaul, new PA valves, covers 160 - 10m fm discriminator, £350; TS520 immaculate, cw filter, £325; Canon A1 plus lenses, winder, case, £300. Will p/exch any of above for vhf/uhf gear. G4FAT, tel: 06845 64854.

CAREFUL G4 PREFERS VHF/SHACK CLEAROUT. FT980 c/w brass key and MC85 processing mic, £900 mint; Datong FL3, £100 mint; FL2100Z, £450 mint; FC102 £125 mint; TET 4-ele tribander and G5RV weathered! £100, buyer dismantles; KR400RC rotator and controller, £100,vgc; Trio TR2500 c/w chgr, £120 vgc. Boxes and instrs for major items. G4YXZ, QTHR tel: Cawood (075 786) 267.

ALL MODE 10m RADIO, £70; 100W linear, £70; 2m 7/8 wave mobile aerial, £10; radio control racing sand buggy, Tamiya, mains chgr 12V chgr, spare nicad batteries, £120. G0FKK, QTHR Maidstone, tel: 0622 27078 after 6pm.

ICOM IC4E, £185; IC2E, £125; both with leather cases, in orig pkg; Pye M15 am LB, £25; Storno 600 fm hb, £25; Pye Olympic M212 uhf, £35. Dave, G8EPR QTHR Bewdley, tel: 0299 403773 after 7pm.

23CM PA, 60W 70CM PA, 50W 1kV pwr supply and three 2C39 valves, all works, £100 the lot; also 40-chan 10mfm tcvr, £40. Jim, G4XRU, tel: 0903 690415.

ICOM IC251E fitted muTek front-end, orig pkg, manual, ex condx, £395; Yaesu FT790, mint condx, orig pkg, manual, £295; Quartz 16 fm mobile rig c/w 35W linear, gd condx, £120; 17-ele Tonna, gd condx, £25. G1EGL, QTHR Norfolk, tel: Wymondham (0953) 604019.

COMPLETE HF EQUIPMENT includes FT102, FC102, FV102 SP102, £850 ono. No splits. GOBNB, QTHR, tel: 0829 40662.

FTONE WITH FM and all optional filters, desk/mic MD1, reluctant sale, 7N 100% wkg order, would cost over £2,000 new today with these options - accept £1,200. G6VVK, QTHR Norfolk, tel: 05088 752.

SIGNAL R-528 AIRBAND pocket 6-chann scanner plus 19 xtals, case, nicad, boxed, £75; AOR AR-22 140-150MHz, nicads, chgr, synth, £55; Elkey DA-1, £10; Kenwood MA-4000 vhf/uhf mobile ant, £10; CRT 946V, £5. Lockwood, G3XLL, QTHR, tel: Mellis 596.

ICOM SM10 equalised mic, £60; Yaesu FTV901R 430MHz module, offers? TET 10/15m 3-ele Yagi HB32SP, £90; BNOS 2m 100W linear with preamp, £100; Sony ICF2001 digital hf/vhf rx, £120.
WANTED: 70cm/SAT726 modules for FT726. Mike, tel: 0224 743344.

TRIO TS930S g/c c/w service manuals, £950; Dk'tronics keyboard for ZX81 computer, £25. WANTED: TR7, TR7A+ PS7. G4SSX, QTHR, tel: Ruislip 630627.

FLDX400, FRDX400 in gd condx, sold together, will not split, £250. GM4HRL, QTHR, tel: 0383 418993.

BIRD RF directional wattmeter model 43, rf sampler element, 100W 2-30MHz, 10W 100-250MHz, 400-1000MHz elements, Bird carrying case, Termaline load 25W, cost new £620 - price £400, mint condx; MET 2m 19-ele Yagi, £4; SVL 27-ele quad loop 70cm, £45, both never used; Datong rf speech processor ASP £40 mint. Offer on all items or p/exch any above for hf linear amp. Dave, GOFYQ, Halifax. Tel: 0422 842243 evenings after 7.45pm or w/ends.

SAIT VHF MARINE tx/rx, new unused, PLL synth 156-162MHz, 25W fm converts 2m with circuit diagram, front panel missing, hence, £60; CTVR40, 46MHz, 40-chann PLL synth, 5W fm converts 50MHz, £60. Tel: Watford 224752.

PRO2001 SCANNER, manual, £140 ono; BS5 Panadaptor for SM220 using TS500 series txers, £40; Mizuho KX-2 atu, £25; LAR noise bridge unused, £30; WS19 variometer mark3, £10; 813 valve, £15. G4PNC, QTHR Tel: Crewe 0270 666702 Sundays.

WANTED••••••••••

RADIO COMMUNICATION HANDBOOK Vol 1 hardback, any other radio books, WHY? Steve, G4EGY, QTHR, tel: 0602 263142.

UEGENTLY REQUIRED: cw filter YG3395C for Trio/Kenwood TS520SE hf rig. Please ring 0532 609456 with price wanted. I will pay postage or collect. COCKY, QTHR.

OPERATING HANDBOOK FOR KEYER AEA type MM1. Buffham, Fir Tree House, Northgate, Pinchbeck West Spalding, Lincs, tel: Pinchbeck Bars 464.

IMPOVERISHED AMATEUR seeks circuits/info for any of the following: Solartron Klystron psu type AS562, Solartron dual psu type AS1416, HP uhf sig/gen type 612A, Airmec deviation meter type 210 Marconi deviation meter TF791D, Marconi video oscillator TF885A/1. All your costs refunded. Please check your files and if you can help, contact GOBTA, QTHR, Lincoln, tel: 0522 792495.

EARLY WIRELESS AND XTAL SETS: particularly WW1 sets or parts, early valves, horn spkrs, bound volumes "Wireless World", catalogues, prewar tv, also interested tinplate trains and good hf tcvr. Jim Taylor, G4ERU, 5 Luther Road, Winton, Bournemouth, tel: 0202 510400.

VACUUM VARIABLE/fixed capacitors, module 11 for Plessey PR1551 rx, Bird Thruline equip, CDE rotator with/out control unit, Drake hf equip for repair/rebuild, vacuum relays, tel: 03306 613 after 7.30pm and w/ends.

ICOM 251E with muTek f/end, 4m tvtr 28MHz i.f. FOR SALE: TR7500 2m/fm 10W synth rig in orig pkg c/w workshop manual, £175, tel: 040372 2444 evenings.

RACAL ATU any condx, any user comments on Racal 1218; any information on Israel-made "Elmac" solidstate oscilloscope, circuit diagram urgently required, model Elmac 4810 or any non-working models of above. Please help! Also band spread coils for HRO. G6XNC, QTHR, tel: 01-462 4461.

XF30C CW XTAL, 600Hz, for FT101E. G3NSU, QTHR, tel: Leeds 630661.

YAESU FC902 atu, tel: 0481 24930 evenings OR 0481 711221, extn 337 daytime.

MANUAL OR COPY FOR ET4336 tx full data for 2C34/VT224 ATP100/4069A and two fivepin US bases for latter valve. G3JCL, QTHR, tel: 01-647 7373 evenings.

TRIO TX310 and SP10, any condx. Taylor, G8DYK, tel: Tadcaster 835989 evenings OR Leeds (0532) 813737, extn 239 daytime.

EDDYSTONE 990S; desperately required Icom 40Z as driver for 57GHz system - condx immaterial bust! is OK. G6KOA, QTHR Birmingham, tel: 021-458 1941.

KW VESPA in gd condx, for club use. G3ADJ, QTHR Wokingham, tel: 0734 734882.

EITHER FT101ZD, TS520, TS530, TS120S, must be in gwo with manuals, accessories welcome.
Tel: Aylesbury 748383 extn 362 evenings OR Aylesbury 395000 extn 371 'Superan section' (work) ask for Andrew.

CW FILTER AND MARKER BOARD for FT77; copy of solidstate basics for the radio amateur (ARRL), 10m 20/25W, linear 12V amp for 10fm mobile. Your price? also all postage paid? Keith, GOFDJ, QTHR, Essex, tel: 0268 680638 after 2pm.

HELP! Have you got any of these valves? TY2-125, CV1924, TB2-5/300, AX9900, SRS361, RS1046, RS613, as G4MSF has gone QRP due to linear going 'fut'! Keith, G4MSF, tel: 091-4693955 after 6pm or on answerphone before 6pm.

URGENT! Has anyone a manual or instruction booklet for TS520? Your price paid. Reg, G6WI, NOT QTHR, tel: 774147 after 6pm.

ACORN PLUS 1 and leads to connect to Olivetti Compact 60 typewriter. G5HX, QTHR tel: 0203 412397

EDDYSTONE BATTERY RX EB or EC series, preferably gd condx, but anything considered. Richard Baker, tel: 021 5563324 weekdays, daytime or evenings.

TS830S or T430S with mains pwr supply. G2DTQ, QTHR near Wolverhampton, tel: 0922 415048.

16MM BELL AND HOWELL GSAP gun camera WW2 ex-govt 50ft Kodak mag load, any condx; also 16mm N9 coaxial load USA forces camera, 16mm Bolex or similar film outfit considered. Tel: Bath (0225) 706795.

AERIAL ROTATOR medium or preferably h/duty, monoband beam for 10m or 15m, prefer 4-ele, control cable also. Will collect at realistic prices, Burton upon Trent, tel: 0283 840667.

KW2000B, must be in first class condx, plus atu and KW manual. Tel: 05435 72920 evenings.

10X TYPE XTALS for cw end of hf bands. Can anyone help me locate some of these? I want to get my old cw rig going again. G3KVT, QTHR, tel: 0603 860452.

I COLLECT AND RESTORE old wireless equip from 1914 to 1945, therefore will pay good prices for your unwanted valves WW2 surplus and earlier radios. Please write giving details, condx and price required to Rod Burman, G4RSN, QTHR.

I.F STRIP USING PLESSEY SL-Series chips after G4CLF design for tx/rx ssb. GM4DGT, QTHR, tel: 0259 217385.

CHEAP 2m mobile tcvr, possibly xtal controlled and a 70MHz tcvr. Both items must be fully operational Also Yaesu FT690R. GODPT, QTHR, tel: 01-529 4657 between 7pm-10pm.

NEMS-CLARKE 1037, 2074 vhf rx, any other equip or manuals for DEI, CEI, Stoddart, Astro, Electrometrics, Polarad, Singer, Watkins-Johnson, WHY? Allan Langer, G6EII, 1 Moss Side Lane, Moore, nr Warrington, Cheshire WA4 6XA, tel: 0925 572332.

ELEKTOR DIRECT coupled modem pcb or complete for use with AM7910. Other AM7910 direct modem considered. G8NTH, Guildford, tel: 0483 34954.

WIRELESS SENDER no.76, with supply unit rectifier no.14 and psu no.18; R109 A/B, connector cables etc/WS(CDN) no.29, particularly connector psu 'B'set; Racal RA117 in cabinet etc. Taylor, G3UCT, 1 Harewarren Close, Wilton, Salisbury SP2 0LY, tel: 0722 744133.

JVC 'U'MATICS semi-pro video rcdr, sell £250 or exch for BBC.B or Apple 2E or FTY707 plus 2m handheld. GODIM, QTHR, Bedford, tel: 0234 766360 late evenings or w/ends.

3-ELE, 10/15/20 BEAM, or 10m monobander with fittings. Will p/exch Fritzel 14/21/28 ground plane, GPA30, brand new in box. G4HSA, QTHR, tel: 0761 414169.

EXCHANGE TR9130 vgc Durst 601 enlarger with three lenses, vgc plus timer Nikon FE2 camera body, unused, boxed FOR good 2m multimode base stn tcvr, WHY? G1LRS, QTHR, tel: 01-394 0249.

TENTEC ARGONAUT 515; Drake R2B or R2C; Marconi type 889A or 966A pwr units with plugs and cables; aerial plug am type 161 (10H/184). G4FUY, tel: Reading 733633.

DRAKE LOW-PASS FILTER 1kW, Yaesu MD1 desk/mic, Yaesu SP10Z extension spkr. Derek, Tel: 0241 72273 after 2pm.

RAIBC MEMBER would gratefully appreciate any information on amateur radio software and compatible peripherals for a CBM PET 2001-32N computer. Tnx you. Doug, GOAEJ, 23 Trent View, Keadby, Isle of Axholme, South Humberside DN17 3DR

PROFESSIONAL COMMUNICATIONS RX, wkg or not, anything considered but no Jap boxes please. Cash waiting. G3YFC, tel: 0254 823305.

PROBES FOR BIRD THRULINE for 144MHz band. Prefer 50W and 500W, but open to offers. Paul, tel: 0277 653561 after 6pm.

COPIES OF AMATEUR, POPULAR, Practical Wireless prior to amalgamation or cessation of publication. E A Bovey, RS19530, 1 Chapel Lane, Dartmouth, Devon TQ6 9BL.

COLLECTOR REQUIRES Eddystone equip, components, manuals and literature. Any age or condx.
Tel: 021-556 3324 NOT WEEKENDS.

ALL MEMBERS' ADS RECEIVED UP TO 26 MAY

HAVE BEEN INCLUDED IN THIS ISSUE

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HAM GEAR PART EXCHANGE WELCOME!

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SP420 SPECIAL OFFER!

140-525MHz Power/VSWR 0-4W/20W/200W average power or PEP. VSWR sensitivity 4W F.S.D.

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£15 off list price! whilst stocks last

WELZ-DIAMOND D130 DISCONE 25-1300MHz

The new D130 from Diamond offers complete coverage from 25-1300MHz. No other antenna can offer this value for money! And an added bonus is that it can be used for transmit on all amateur bands between 50 and 1300MHz. (You cannot use 50MHz vertical polarization in the UK). Constructed of stainless steel and alloy, it comes complete with mast clamps and 50ft of coaxial cable

£85.00 p&p £3.00

NEW

FABULOUS SONY AIR-7

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

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

SONY 2001D

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

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

3 BEST SELLING BOOKS

NEW 1987 EDITION (1·6MHz-30MHz)
UK LISTENERS CONFIDENTIAL FREQUENCY LIST

A completely updated version of our famous frequency list that covers everything between 1.6MHz and 30MHz. You won't find better value anywhere! Includes broadcast, marine, press, civil and military aircraft, embassy, naval and army, land based links, space frequencies etc. Full mode details are given eg. AM/USB/RTTY + baud rates/FAX. The marine and aviation section has been considerably expanded with many details supplied by our readers. If you have read our previous issues you will want to get this latest copy! If you have never seen this publication before then you should really invest in a copy. Tremendous value at a bargain price. Order the new 1987 edition today. **£5.95** plus 95p p&p

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26-2250 MHz

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Frequency:	10-15-20 metres
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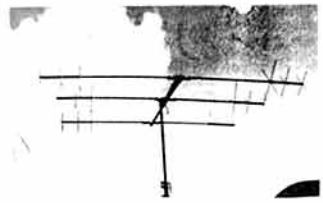
	2.2:1 (20m)
VSWR (Res)	1.1:1 All bands
Gain:	6dB 10m
	5dB 15m
	4.5dBd 20m
F/B ratio	12dB
Length:	16ft
Boom:	9'9"
Turn. Rad.	9'3"
Weight	33lbs



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25 WATTS
£199 FREE DELIVERY
AZDEN PCS5000

Here's a chance you won't get again. 25 watts of FM with a host of features including scanning, 20 memories etc. 144-146Tx (rx 140-150MHz), complete with mic and mounting bracket at 1970 prices. Strictly first come first served on this one!

WELZ AC200 ATU

This new ATU fro Welz forms the basis of a complete matching system for the HF bands. It will handle up to 200W PEP and will match any coax fed antenna in the bands 80 to 10m. True RF power measurement is possible together with VSWR and the unit may be instantly switched out of circuit. Until the end of April we are also offering a free coaxial switch so that you may permanently connect two antenna systems to the unit. That's value!

VISA

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Lee Electronics

NEW HANSON SWR METERS

		P+P
SWR3	3.5-30MHz 200 Watts/50-150MHz 50 watts	34.00 (1.50)
SWR50	3.5-150MHz 1KW PEP with back light facility	34.00 (1.50)
FS500H	This peak reading meter has RMS/PEP with follow/hold facility in the range 1.8 to 60MHz-20/200/2KW	75.00 (2.00)
	Still Available	
SWR15	Single meter SWR/Field Strength 3.5-150MHz	9.77 (1.50)
SWR25	Twin meter SWR/Power/Field Strength 3.5-150MHz	19.00 (1.50)
UH74	SWR Power meter switchable HF/2M/432MHz (10W) with remote head	24.95 (1.50)
T435	VHF/UHF Twin Meter 2/20/120W	52.50 (1.50)

WELZ PRODUCTS

SP330	1.8-500MHz 200W Dash Mount	95.00 (1.50)
SP600	1.6-500MHz 20/200/2kW	169.00 (1.50)
SP825	1.8-1.3GHz 2/15/150W	169.00 (1.50)
SP10X	1.8-500MHz 200W Pocket Size	34.00 (1.00)
AC38	3.5-30MHz Coax ATU 200CW/400C PEP	95.00 (1.00)

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EK150	Semi/Fully Automatic Electronic keyer with Built-in Monitor, Transistor or Relay Output 240VAC/120VDC	90.00 (1.50)
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AR1002	Automatic Antenna Rotator	45.00 (3.25)
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The program comes with an adapter board which plugs into the Spectrum expansion port and accepts the interface or T.U. It will work with any 48k/128 Spectrum, including the +2. Tape + adapter £35. Users of our CW QSO program can upgrade for £25. **BBC** and **CBM64** programs £20 tape, £22 disc.

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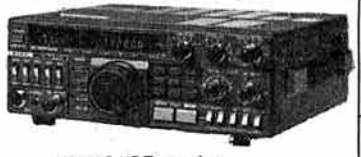

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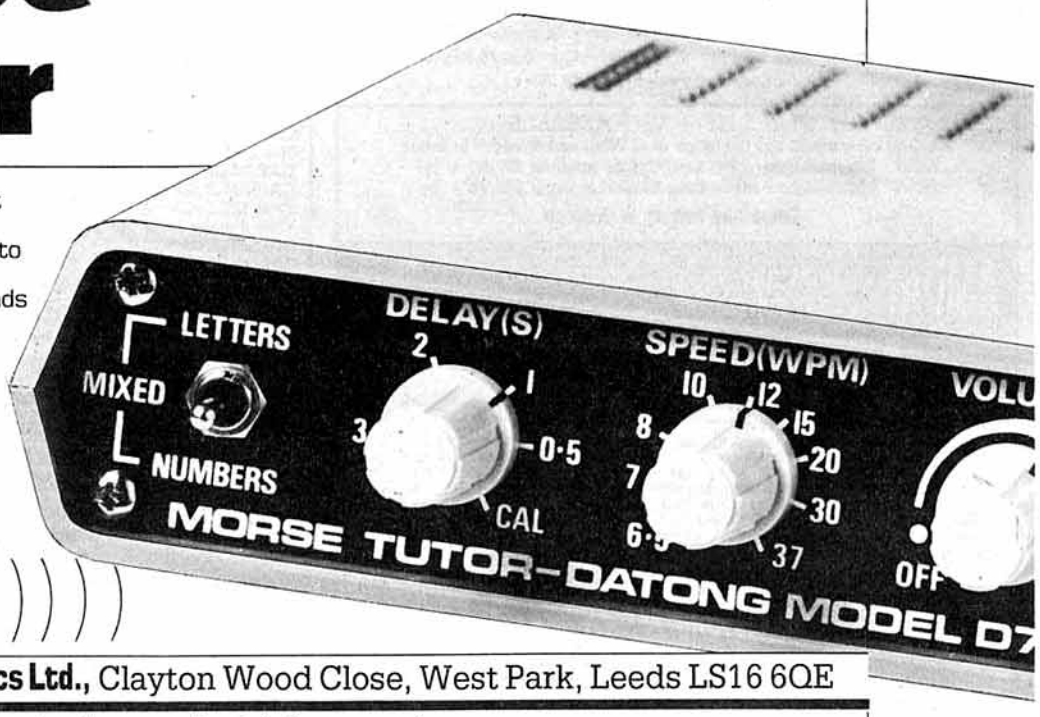

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