RADio COMmunication

January 1987

£ What price membership?
What price the Radio Spectrum?

Journal of the Radio Society of Great Britain

RSGB

Why you must buy YAESU equipment from us!

Read the reviews, study the features/benefits and you'll soon be convinced (if you're not already) of the 'giant-leap' recently made by YAESU engineers, with their latest products.

But, why buy YAESU from us?
A good question — read on and we'll give you a good answer!

YAESU's total dedication and patience in harnessing of advanced technology have produced equipment of such brilliant, innovative design, using the highest quality professional engineering standards that one '**almost**' hesitates to just call it 'amateur-radio'.
We have spent hours studying, discussing, and reading the manuals and talking with the YAESU people. We also operate the equipment regularly so we've gained first-hand experience of its performance and most important, its versatility.
It's our pleasure to pass that information on to you with our 'Hands-on' product 'teach-in'. We want you to derive the maximum benefit from the equipment. We've put it 'through its paces' and we'd like to sit down and answer **any** questions you may have about what these remarkable new radios are capable of.
Take the FT 767 GX for example. We'll give you easy to understand 'how', 'what', 'when' and 'why' explanations of its 6 **unique features** (viz **TX Shift, Tone Encoder, Twin VFO's with auto-tracking, RF Amplifier, HF/VHF/UHF/ coverage,** and **Auto SWR/Power Meter**), and don't feel embarrassed because the RAE doesn't cover some of these breakthroughs!
If you wish we'll go through in detail, one by one, the no less than 71 buttons, switches, knobs, plugs or controls on the front panel and the 25 on the back!
The same 'Teach-in' service **applies to the entire YAESU range or for that matter all equipment in stock**, but while we're on the subject of YAESU – here are the other latest additions to the family:

FL 7000 — The Shape of Things to Come
A new concept in convenience, control and reliability
1.2kW P.E.P. HF Solid State QSK Linear
- Weight only 30kg (66lbs)
- 160m through 10m
- Auto tuning and band changing
- Integral P.S.U.

The Linear with everything

YAESU's super portable twins FT 290 & FT 690 Mk II
- **2 metres • 6 metres**

. . . destined for even greater success — available now!
- 'New look' front panel
- Completely new rig with optional 25W p.a. for mobile use, and lots, lots more!
- Super new additions and changes to the world's biggest ever selling amateur transceiver.

FT 727 R Dual Band Handie . . . YAESU's experience and patience pays off — they succeeded where others failed
- **2m and 70cms FM Handie**

— Hit 'hard-to-reach' repeaters with a punchy 5W plus a wealth of CMOS microprocessor controlled commands
- 20 keys/40 channels
- CAT system • Liquid Crystal meter

FULL IMPORTER WARRANTY ON ALL YAESU PRODUCTS.

The Staff of Amcomm-ARE and Amateur Electronics wish you a Prosperous New Year . . . with YAESU of course!

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All contributions and correspondence concerning the content of *Radio Communication* should be addressed to:

The Editor
Radio Communication
Lambda House
Cranborne Road
Potters Bar
Herts EN6 3JE

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

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

Tel 0707 59015

Business hours: 1000 to 1600

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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.

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

a new general coverage receiver, the R5000.

The R5000 is a new general coverage receiver. It offers the dedicated short wave listener and radio amateur a receiver that will match the performance of the best transceivers available today.

The R5000's frequency range is continuous from 100 kHz to 30 MHz and its modes of operation are USB, LSB, CW, AM, FM and FSK. An optional VHF converter (VC20) extends the frequency range to include 108 to 174 MHz.

The R5000 uses 2SK 125 junction-type FETs in the high sensitivity direct balanced first mixer resulting in outstanding two signal characteristics and a substantially improved noise floor level.

Operating from either 12 V DC or 240 V Ac the receiver can be used both in the home or whilst out in car, caravan or boat.

The receiver has two rates of tuning for each mode selected by a front panel switch. The frequency increments for SSB/CW/FSK are 10 Hz and 100 Hz, for AM 100 Hz and 1 kHz and for FM 2.5 kHz and 5 kHz.

Both low (50 ohms) and high (500 ohms) aerial connections are provided on the rear panel of the R5000. The required aerial can be selected by means of a front panel switch. Information on which aerial to be used with a stored frequency can also be held in memory.

The R5000 has 100 memory channels which store frequency, mode and which of the two aerial connections has been selected. Information is easily transferred from one VFO to the other, from memory to VFO and in order to quickly access your favourite station, from VFO to any of the memories. Both memory scan and frequency scan (between frequencies in memories 8 and 9) are included in the receiver. Halt on an occupied channel whilst scanning can either be timed or until the signal drops. The entire one hundred memories can also be quickly scrolled to check the data held and to find the location of an empty channel.

To enhance reception, IF shift and a tunable notch filter are part of the R5000 receiver. Filter selection according to mode is automatic when the front panel selectivity switch is set to AUTO. This selection can, of course, be overridden. Additionally, the introduction of optional SSB and CW filters (YK88SN for SSB and either YK88C or YK88CN for CW) will improve the already excellent signal to noise ratio and selectivity. The optional YK88A-1 AM filter will improve the shape factor and enhance reception even further.

The R5000 general coverage receiver also has keyboard frequency entry, dual mode noise blanker, two 24 hour clocks with timer, option VS1 voice synthesizer and CW tone mode indication for the blind operator, a large 100 mm diameter top mounted speaker, switchable AGC (fast or slow), RF attenuation (10, 20 or 30 dB steps) and a F.LOCK switch which protects against frequency shift if the VFO knob is accidentally moved.

R5000 General Coverage Receiver **£895.00** (carr. £7.00)

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LOWE ELECTRONICS LTD.

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station accessories

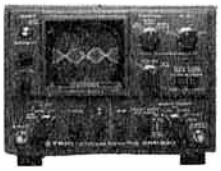
TL922 HF amateur band linear amplifier

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 . . . **£1350.00** 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 . . . £286.35 inc VAT, carriage £7.00
BS8 . . . £72.05 inc VAT, carriage £1.50

amateur band transceivers

TS830S HF amateur bands transceiver

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

TS830S . . . £981.59 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 . . . £849.82 inc vat, carriage £7.00

send for the **TRIO** general catalogue

amateur band plus general coverage transceivers

TS940S HF transceiver with general coverage receiver.

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

TS940S . . . £1895.00 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 TRIO TS930S is the ideal rig for today's crowded bands.

TS930S . . . £1595.00 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 . . . £998.00 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 . . . £867.6 inc vat, carriage £7.00

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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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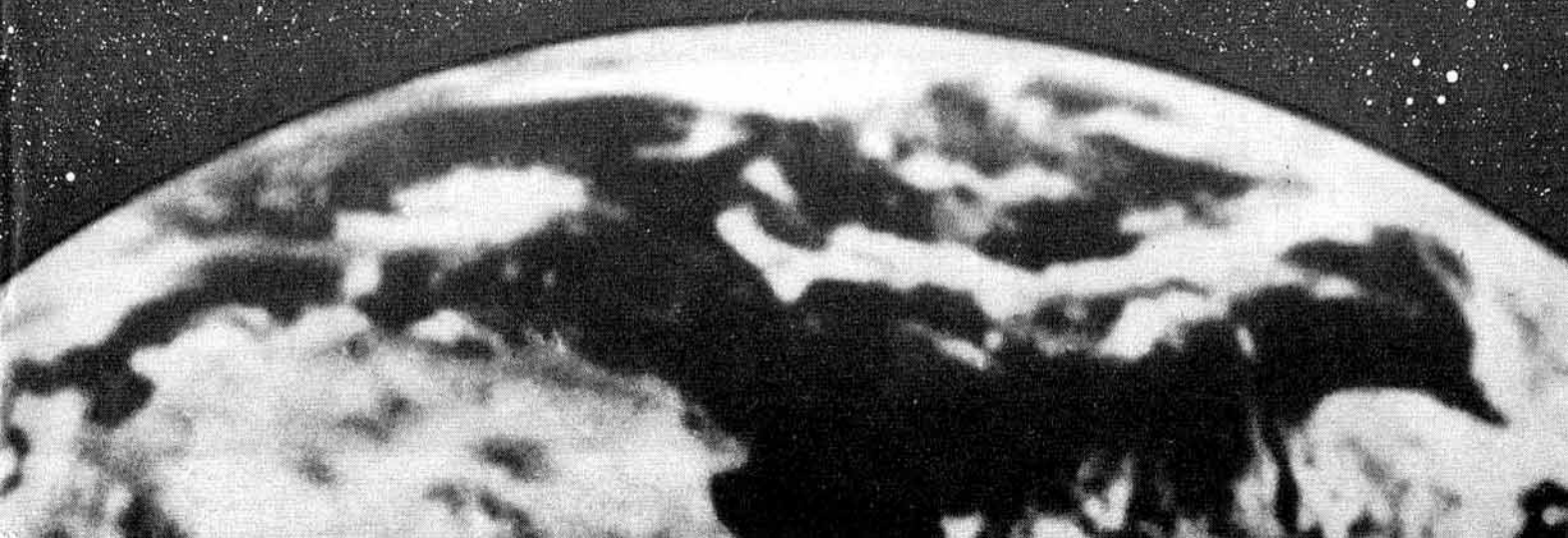
'Amateur' is not the right word.

Since the very beginning, ICOM has actively pursued the developemnt of new products designed to meet the needs of Ham Radio operators throughout the world. The result of this development is a constantly expanding range of professional Amateur radio communication equipment utilising today's latest technology.

Improved technical capabilities and higher quality have earned ICOM the reputation as one of the worlds leading communication equipment manufacturers.

With just a single call sign you can communicate around the world, increasing you circle of friends to wherever radio waves can reach. To satisfy even the most demanding operators ICOM has developed a comprehensive range of base, mobile and compact handportable units all complemented with many options and accessories.

To conclude, we would offer some worldly advice ... communicate on ICOM radio equipment, the Amateurs' *professional* friend.



The Amateurs' Pr

1. IC-2E. 2 metre FM Handportable.
1.5 watts with standard nicad pack. Thumbwheel frequency entry.

2. IC-MICRO 2E. 2 metre FM Handportable.
1.5 watts with standard pack. 2.5 watts possible. Toggle switch frequency entry, LCD display, 10 memories.

3. IC-02E. 2 metre FM Handportable.
2.5 watts with standard nicad pack, 5 watts from 13.8 volts DC. LCD display, keypad frequency entry, 10 memories, scanning.

4. IC-28E. 2 metre FM Mobile.
25 watts, 21 memories, scanning.

5. IC-27E. 2 metre FM Mobile.
25 watts, 9 memories, scanning.

6. IC-290D. 2 metre Multimode mobile.
25 watts, 5 memories, scanning.

7. IC-275E. 2 metre Base station.
Multimode operation, 25 watts power output. New DDS system, 99 memories, high sensitivity and dynamic range. Ideal for PACKET and AMTOR.

8. IC-271E. 2 metre Base station.
Multimode. 10 or 25 watt models. IC-271H 100 watt model also available. 32 memories, scanning.

9. IC-3200E. Dual-band FM Mobile.
2 metre and 70 cm operation. 25 watt on both bands. 10 memories, scanning.

10. IC-SP3.
External base-station loudspeaker, 8 ohms.

11. IC-1271E. 23 cm Base station.
10 watt power output. 1240MHz-1300MHz. Multimode operation. 32 memories, scanning.

12. IC-PS55. External power supply.
Styled to match IC-735. 20 amp rating.

13. IC-735. HF Transceiver.
Amateur bands 160-10 metres, general coverage receiver from 100 kHz to 30 MHz. CW, SSB, AM, FM modes. 100 watt power output. 32 memories.

14. IC-AT150. Automatic antenna tuner.
Styled to match IC-735. 100 watt power rating.

15. IC-GC5. Station world clock.

16. IC-AH2a. HF Mobile antenna tuner.
IC-AH2b mobile whip and mount also available. Fully automatic when used with IC-735 HF transceiver.

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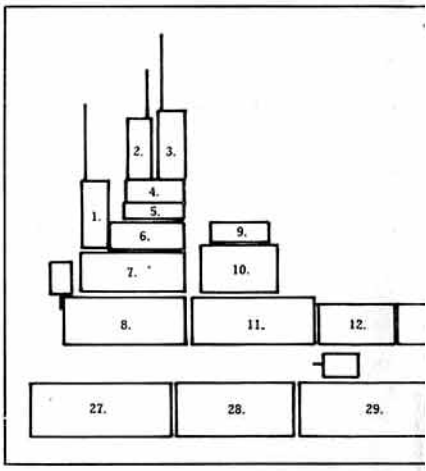

17. IC-505. 6 metre Portable or Base station.
50-54 MHz, CW/SSB/FM (optional). 10 watt power output from 13.8 volts.

18. IC-551. 6 metre Base Station.
50-54 MHz, CW/SSB/FM (optional). 10 watt power output. A.C. mains PSU standard. IC-551D 80 watt model also available.

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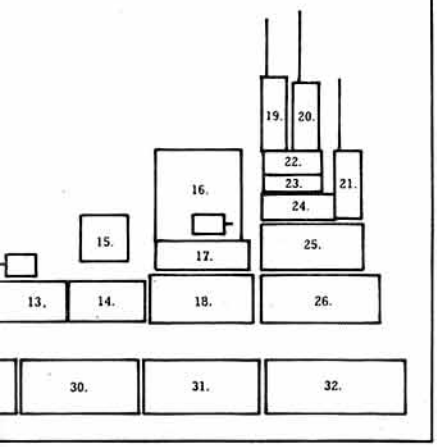

19. IC-12E. 23 cm. FM Handportable.
1260-1300 MHz. 1 watt with standard nicad pack. Keypad frequency entry. LCD display. 10 memories, scanning

20. IC-04E. 70 cm. FM Handportable.
2.5 watts with standard nicad pack, 5 watts possible. Keypad frequency entry, LCD display, 10 memories, scanning.

21. IC-4E. 70 cm. FM Handportable.
2.5 watts with standard nicad pack. Thumbwheel frequency entry.

22. IC-48E. 70 cm. FM Mobile.
25 watt, 21 memories, scanning.

23. IC-47E. 70 cm. FM Mobile.
25 watt, 9 memories, scanning.

24. IC-490E. 70 cm. Multimode Mobile.
10 watt power output. 5 memories, scanning

25. IC-PS30. System power supply.
25 amp. rating, fully protected. Up to 4 ICOM units may be connected

26. IC-471E. 70 cm. Base station.
Multimode. 25 watts power output. IC-471H 75 watt model also available. 32 memories, scanning.

27. IC-R71E. 70 cm. Receiver.
100 kHz-30 MHz CW/SSB/AM/RTTY/FM (optional). Direct frequency entry. 32 memories, scanning. Remote control option. 12 volt DC. option.

28. IC-AT100. Automatic antenna tuner.
100 watt power rating. Also available is IC-AT500 with 500 watt rating. Autoband switching with ICOM HF transceivers.

29. IC-751A. HF Transceiver.
Amateur bands 160-10 metres. General coverage receiver from 100 kHz to 30 MHz. CW/SSB/AM/RTTY/FM modes. 100 watt power output, 32 memories.

30. IC-2KL. HF 500 watt Linear amplifer.
Automatic band switching with ICOM HF transceivers. 2KLPS power supply is required. Solid state broadband tuning.

31. IC-2KLPS. AC. Power supply.
For use with IC-2KL. Regulated voltage of 40 volts DC. and metered current of 25 amps.

32. IC-R7000. VHF/UHF Continuous coverage receiver.
25 MHz-2000 MHz. FM/AM/SSB modes. Direct frequency entry. 99 memories, scanning, remote control option.

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If you are a licensed Amateur or short wave listener ICOM have a complete product range from HF to Microwaves to suit your needs. Should you have difficulty in locating your nearest ICOM stockist contact Thanet Electronics Ltd., at the address shown at the bottom of this page.

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140–525MHz Power/VSWR 0–4W/20W/200W Average power or PEP. VSWR sensitivity 4W F.S.D.
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CH20A "professional" coax switch DC-900MHz VSWR 1·1(500MHz) 1·15(900MHz) Isolation 70dB(200MHz) 50dB(900MHz) Power rating 1kW
£29.50 "N" version rated 1300MHz **£49.00**

WELZ-DIAMOND D130 DISCONE 25-1300MHz

The new D130 from Diamond offers complete coverage from 25-1300MHz. No other antenna can offer this value from 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.

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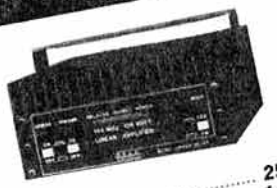

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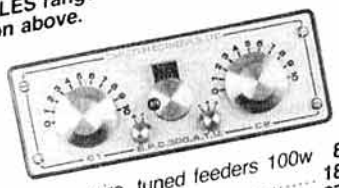

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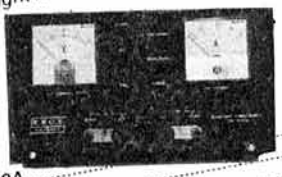

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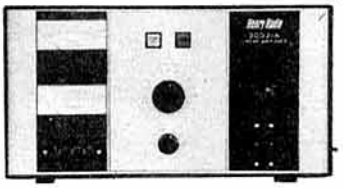

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PATRON: HRH PRINCE PHILIP, DUKE OF EDINBURGH, KG

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

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WHAT PRICE MEMBERSHIP?

The discussion of the Society's finances at the annual general meeting on 6 December proved the most constructive for many years. Although the reappearance of a surplus was welcomed, a number of members expressed their concern at what they considered was the low level of reserves. This was highlighted in the context of the Society having to face any legal battles.

The Society's policy towards subscriptions has always been to keep them at the lowest level possible consistent with providing the essential benefits—such as DTI liaison, a monthly magazine etc—and what is judged to be an adequate service. In practice, subscriptions tend to be put up only when necessary, after inflation has bitten, and usually with some reluctance; even then the full benefits of an increase are not felt for 12 months.

The question was raised at the agm: "Is this a wise policy?". Like any domestic budget, a high proportion of the Society's income is spent simply on maintaining the existing machinery of operation, with only a relatively small "surplus" available for the unexpected; a small increase in income can have a dramatic increase on the proportion that can be spent on goodies.

What was suggested at the agm was that the Society should give examples of what additional benefits it could offer with an increased subscription at several different levels, and for this to be presented in *Radio Communication* for the reactions of members—a most interesting exercise in itself.

Two other points from the agm. One member noted that when he joined the Society in 19??, the subscription would buy 50 pints of beer. In 1986 that figure has dropped to less than 20 pints! Put another way, far less than the cost of a daily newspaper or one packet of cigarettes a week.

The second point was the suggestion that when members paid their subscription they should be given the opportunity of making an additional contribution to the Society's funds if they wished. This seems an excellent idea.

Whatever value you place on your membership, please remember that the more members we have the better. More members mean economies of scale as well as demonstrating to the licensing authority and others that the hobby is of value. If every licensed radio amateur in the UK were a member, just think what would be possible.

David Evans, G3OUF

A message from the Society's President

Advancing technology, the environment in which we live and the aspirations of our members continually widen the scope of amateur radio. Each year calls for renewed efforts on behalf of the Society by officers and staff. This year will be no different, except that financially it might well prove more demanding than most.

It is the Society's staff and volunteers who work tirelessly, in their own spheres, to defend the interests of amateur radio and to increase its potential. This year, barring any surprises, we will have our work cut out for us. On the licensing side, among much other work, we are to start a major review of the licence and call for less restrictions on our new 50MHz band. In today's environment, with increasing pressure on the radio spectrum, it is as important as ever for national societies to work closely together to create the best worldwide environment for amateur radio. Our attendance at major international amateur radio discussion forums is therefore essential. This year's Region 1 triennial conference in the Netherlands will be attended by national societies from all over Region 1, consisting of the USSR, Africa and Europe. A record number of societies will be present, and again it is expected that the RSGB will play a major role.

On the home front, the Society is determined to strengthen its field activities—the strengthening of its links between the Council, staff and officers and its affiliated clubs, groups and societies. After all, so much depends on how well clubs function at local level. We will also be continuing to seek economies so that we might invest more of our limited funds in tangible benefits and services for our members.

It would be remiss of me not to mention that in 1988 the Society celebrates its 75th Anniversary. This will be a very special year and one which could provide considerable benefit to amateur radio; much of the planning will take place during 1987.

Having served as President in 1985 I am very much aware of the honour and responsibility associated with a second term of office. I know that my experience can be put to good use, and that everyone associated with the operation of the Society will do everything in their power to make 1987 another successful year.

Joan Heathershaw, G4CHH

PRESENTATIONS AT SCOTAM '86

RSGB Council member Frank Shaw, GM8BZX, presenting RSGB Trophies at the Scottish Amateur Radio Convention in September 1986. *Photos:* GM4TCW

Drew Givens, GM3YOR, receives the Jack Wyllie Trophy

The Milne Trophy to Jim Johnston, GM3LYY

GM4SID and GM3VEY received Scottish NFD trophies on behalf of the Aberdeen ARC

RSGB COUNCIL ELECTION RESULT

The result of the ballot to fill three vacancies on Council from 1 January 1987 was as follows:

Candidate	Callsign	Votes
R G Barrett	GW8HEZ	2,080
N G Brinkworth	G3UFB	2,264
P L Crosland	G6JNS	1,710
G R Jessop	G6JP	2,941
M J Matthews	G3JFF	1,774
B O'Brien	G2AMV	2,688
L W Ross	G8MWR	1,904

Messrs N G Brinkworth, G R Jessop and B O'Brien were accordingly elected to serve on Council for the three years 1987-9.

VHF TROPHIES REMINDER

The trophies manager would like to remind all those members who hold an RSGB VHF Trophy, presented at the VHF Convention at Sandown Park in March, that they are due to be returned to RSGB HQ on or before 3 February 1987.

PARDON OUR MISTAKES

"Transmission lines as impedance transformers"

The author of this article, published in our October 1986 issue, apologises for an error in equation 12 on page 704. This should read:

$$XIN = RO\frac{RL^2 + (XL + RO0)^2}{(XL + RO0)(RO - XL0) - RL^20} \quad .(12)$$

Computing, October 1986

John Morris, GM4ANB, advises that three lines of Program 3 on page 718 are incorrect and should be amended as follows:

```
 50 ON T GOSUB 60,80,100: GOTO 20
 90 MOVE 0,K*4: DRAW 1279,K*4: NEXT K,J: RETURN
100 GOSUB 60: GOSUB 80: RETURN
```

The Year in Review, November 1986

In the list of members of the Education Committee on page xi, the callsign G4FZZ should read G4FXH*. We apologise to both gentlemen for any embarrassment this typographical error may have caused them.

FEEDBACK

The Editor

Sir—I enjoyed John Case's article on the home construction of psus very much. However, may I suggest an improvement to his arrangement for remote voltage sensing. With the circuit shown, if the sense lead were to become detached, the output voltage would at once rise to the supply voltage of 20V, damaging the equipment being supplied. I would recommend the addition of a 100Ω resistor between the +13·5V and the sense terminals. Thus, when the sense terminal is connected the much smaller resistance of the sense lead will "override" the 100 Ω resistor, but when the lead is absent, the voltage will be regulated to 13·5V at the output terminal.

J S Linfoot, G0CPP

John Case comments:

I am indebted to Mr J S Linfoot, G0CPP, for his letter and modification to the circuit of the power supply shown in Fig 14 of the article "Power supplies on a shoe string" in the August issue. Mr Linfoot correctly observes that if the supply is switched on without the sense terminal being linked to 13·5V, the output would rise to the supply voltage (always supposing that no overvoltage protection was in use, in which case the fuse would blow). The presence of a 100Ω resistor between the 13·5V output and sense terminals will in no way effect the operation of the power supply, and normally the 100Ω will be in parallel with a lead resistance of 1Ω or less.

My thanks also to Mr Ken Smith, G4CNC, who sent me a full report on his success in rebuilding two large transformers. He suggests that a useful addition to the wire tables would be information on the length of wire/lb to make it easier to order the correct amount. He offers the following:

Gauge swg	Length (yards/lb)	Gauge swg	Length (yards/lb)
19	68·66	14	17·16
18	47·66	13	13·00
17	35·00	12	10·23
16	26·86	11	8·16
15	21·23	10	6·67

I am also grateful to Mr G A Ross, G4IEI, who pointed out in a letter to the editor that old and unused electrolytic capacitors are liable to explode when put into service again; a very valid hint worth remembering.

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.

OPERATING MALPRACTICE

Sir—I am writing concerning an operating malpractice which seems to be currently in use by mainly new licensees using the 144MHz band.

I am referring to the technique of "breaking" into a current QSO. During a recent "lift" on the 144MHz band I had many pleasant ssb and fm contacts with several amateurs whom I had never talked to before. However, about 90 per cent of these contacts were spoiled by mainly new G1 callsigns "breaking" into an established QSO for the sole intention of calling for a contact with myself—rather than waiting until the end of the existing QSO and then calling. During my four years of operating on the 144MHz band, I have never had my QSOs broken into simply because another amateur wishes to butt-in and have a contact with me.

Below is my own interpretation of "breaking" into an established contact between two or more amateurs.

A QSO can be broken into if:

there is a matter of some urgency, ie an emergency, or an amateur is suspected of being the cause of some form of interference;

there is a net in operation, and you feel that you would like to join in (provided you consider that the other amateurs will welcome you joining-in)

you are a personal friend/regular contact with one or more of the amateurs in QSO, and you feel that they will be pleased to receive you into their conversation.

It is poor operating and bad manners to break into a QSO in order to establish a contact with one of the amateurs just because you need his/her country/QSL/QTH square etc—you must wait until the end of the QSO and then call the amateur in question.

There seems to be an awful lot of this "breaking" going on in the south-west of England at the moment—I only hope that it has not spread all over the country. Some of our new licensees will have to learn that dx stations will soon catch on to what is happening, and will probably just turn their beams or go QRT on the spot.

My advice to all new licensees is to listen to the operating technique of the G8, G6 or G2-G4s, rather than an amateur who may have only been on the air a few months himself.

Neil Martin, GU4XGU

MOBILE OPERATING

Sir—May I make a suggestion for further amplification of the new mobile regulations. I am a disabled operator, and consequently short of cash, and I hear that some of the commercially-available headsets/tiepin mics are not very well built and are not, therefore, worth buying. I appreciate that you are limited in what you can say publicly in *Radio Communication*, but it would be very helpful if someone who has experience of these matters could make some recommendations and comparisons of the methods available.

Perhaps you could help in this way, as I would like to comply with the regulations, but can't afford trial and error!

D I Wicker, G1IEG

SLOW MORSE

Sir—I would like to express my thanks through *Radio Communication* to the band of dedicated radio amateurs who run the slow morse transmissions in the north-west: G3AVJ, G3PER, G3ZQS, G4ILD, G4DAL, and to G4WYH and G4OTN for the many hours of practice under the Class B variation. Special thanks to G3ZRZ who runs the morse class at Thornton Cleveleys ARS. Keep up the good work.

T S H Edwards, G0FPJ (ex G1GYW)

PARTICULARS WITHHELD

Sir—I have followed the recent correspondence on "particulars withheld" with great interest and, having considered the debate from both points of view, strongly support Mr B Russell's original argument.

The compromise suggested (Name + nearest town or city area) is certainly the minimum amount of information required to justify an entry in the callbook.

A full address certainly is most helpful for those wishing to exchange correspondence (QSLs), but is far less important than the need to ensure every licensed amateur is prepared to stand up and be counted. To be responsible for the quality and content of his transmissions, guard against piracy, provide a quick and reliable validation/comparison of signal reports particularly for swls and vhf/uhf operators.

I doubt that the criminals in our communities include the latest addition of the *Callbook* as essential reading to pinpoint the planning of their next crime, and I consider the advantages of a full and up-to-date listing now made possible by computer outweighs this possibility.

W Ross Threapleton, G4PEL

AMSTRAD PROGRAMS

Sir—I have been the owner of an Amstrad CPC464 computer since they first appeared on the market. I am not experienced in computers in any sense of the word (being an "analog man") and indeed this was my first excursion into this field. However, I found the Amstrad to be very useful for amateur radio (the prime basis for buying it in the first place), and it finds involvement in cw, rtty, tv, technical design/calculation and, of course, correspondence.

Since I work for a semiconductor company that supplies Amstrad with many of its ics, I can vouch for the high numbers of Amstrad computers sold. And yet after all this time I continue to be frustrated at the apparent lack of technically-based software for amateur radio for the Amstrad computers. Not that there isn't any, but simply that many items of software on the market for Sinclairs, Beebs etc do not seem to be translated for Amstrads. Am I really to believe that all those Amstrad computers sold have gone to owners other than amateur radio enthusiasts? With the flexibility and power of the Amstrad range (and also the excellent value for money) I find that difficult to believe.

I would be interested to know how many other amateurs actually own Amstrads and use them for amateur purposes. Maybe they are all smarter than me at programming and write all their own software!

Nigel B Pritchard, G8AYM

QSL BUREAU

Sir—I would just like to make a point if I may regarding the QSL Bureau (run by members of the RSGB). On and off the air I have heard many hams grumbling about its service, and I would just like to say that I take my hat off to the various managers. As a (BRS86845 swl) I had a wonderful service, and as GW1SSQ I have had just the equal 100 per cent service.

Once again many thanks to these various people and their service.

Bev West, GW1SSQ

"/A", "/M" AND "/P"

Sir—I operate exclusively on cw and, since my retirement a few years ago, I have had the opportunity to enjoy many contacts when away from home. An increasing number of amateurs (not all of whom have been licensed recently) seem unaware that "dah-di-di-dah-dit" is an oblique stroke. My call, G3SB/A, has been read as G3SBA, G3SBX and G3SBF. When told: "Your call cannot be read, please send only the third letter", there is an obvious difficulty. One enterprising contact asked me to spell the third letter phonetically. I replied "STROKE" whereupon he told me that the correct word for "S" was "SIERRA".

I have also been accused of being a pirate because my QTH differed from that shown in the *Call Book*!

No doubt other cw operators suffer in this way, and a little publicity may save long explanations over the air.

Charles Bryant, G3SB

A GENERAL-PURPOSE ANTENNA TUNING UNIT

M J Grierson, G3TSO*

MOST AMATEUR STATIONS have a number of antennas available, some resonant and others of random dimensions, all of which may require some degree of impedance transformation before they can be connected to the station transmitter. In my case there was a requirement to match end-fed antennas, balanced antennas and the occasional resonant antenna for operation on all bands from 1·8 to 28MHz.

The tuning unit to be described is one version of the popular "transmatch" featured for many years in the *ARRL Handbook*. Other features have been added to permit the selection of different antennas as well as the facility to ground all inputs when the station is not in use.

The transmatch design

Anyone who has seen several editions of the *ARRL Handbook* will be aware that the "ultimate transmatch" has, over the years, undergone a number of circuit changes. The original design, Fig 1(a), used either a differential or a split stator input capacitor. The differential capacitor is less common than the split stator and has one section at a maximum capacitance while the other section is at minimum capacitance. This has the effect of providing a synthetic sliding tap on the inductor L, whereas the split-stator capacitor tunes the inductor L, but maintains the tap centrally. The use of a dual-type input capacitor for harmonic suppression lost all credence some years ago and the circuit was amended to the simpler T-match of Fig 1(b). This circuit is that of a highpass filter and provides no suppression of harmonics. More recently the "SPC" transmatch has emerged with a dual-output capacitor and is supposedly capable of providing a degree of harmonic suppression. In any event all three designs perform the task of matching a range of impedances quite successfully.

With the advent of ssb and linear amplifiers and, more recently, solidstate transmitters with built-in lowpass filters, harmonic suppression is not the problem it was when using Class C a.m power amplifiers. It was therefore decided in the interest of simplicity to adopt the T-match variant of the transmatch in this general-purpose antenna tuning unit (Fig 2).

Component selection

New components suitable for use in antenna tuners are not readily available, so the use of surplus components is the most economical answer. Fortunately the values of capacitors required are not too critical, and almost any high-quality wide-spaced variable capacitor can be put to use. Ideally a value of between 200pF and 400pF is suitable, and a number of surplus Johnson and Eddystone 390pF units have been seen over recent years. These units have ceramic end plates and are tested to 2000V dc working. If in doubt, aim at a plate spacing of at least 1·5mm between the stator and rotor plates; this is necessary to cope with the high voltages which can be developed when matching high-impedance long wire antennas.

Inductors can be either fixed with a number of taps selected by a rotary switch, or variable such as the roller coaster which allows maximum flexibility in matching. Roller coasters come in a variety of different shapes and sizes, but in general are not available in other than small numbers and one-offs.

All switches used are of the "Yaxley" type and use ceramic wafers; large numbers of this type of switch can often be found in junk boxes at rallies for a few pence, and several switches can be broken down and reassembled to achieve the desired configuration. Paxolin wafers can be used, though they are not as good as the ceramic type.

The antenna selector switch uses a double-spaced switch unit giving six stops/revolution rather than the usual 12. Wafers are modified by removing alternate contacts, reducing the likelihood of arcing between them.

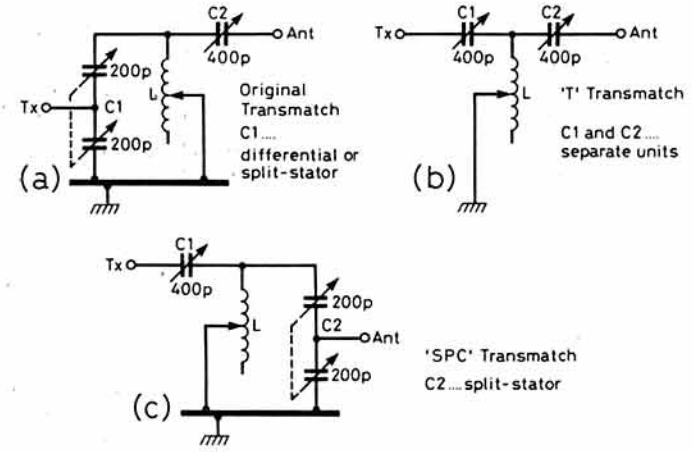
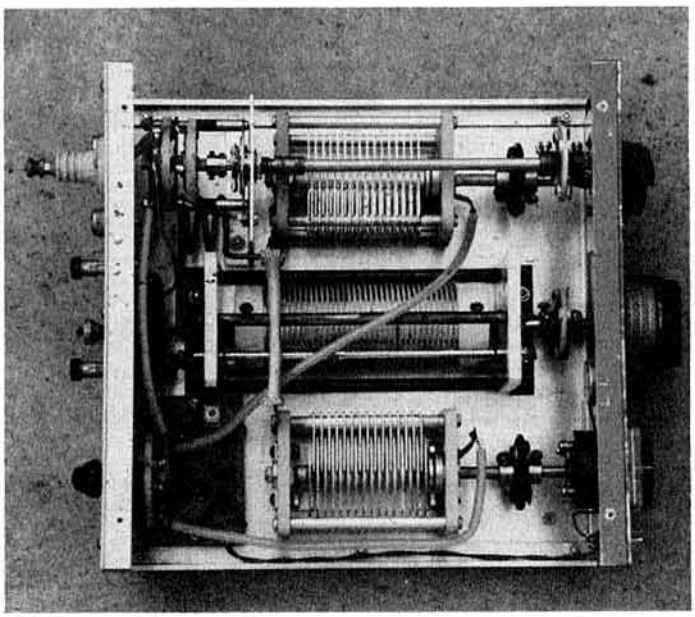


Fig 1. Variations of the "Ultimate transmatch". (a) Original transmatch: C1 differential or split stator. (b) T-transmatch: C1, 2 separate units. (c) SPC transmatch: C2 split stator



Internal view of the tuning unit using a roller-coaster

Mike Grierson was born in 1945 and took up amateur radio in 1958 constructing small crystal and battery valve receivers. After a period of self-tuition he passed the RAE at the age of 15 and was subsequently licensed in 1964. He has followed a simple rule of not operating on any amateur band without first constructing homebrew equipment for that band. Over the years he has constructed numerous receivers, transmitters and items of ancillary equipment for all bands from 1·8 to 144MHz. With no formal training or professional qualifications in electronics, he pursues amateur radio strictly as a hobby.

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

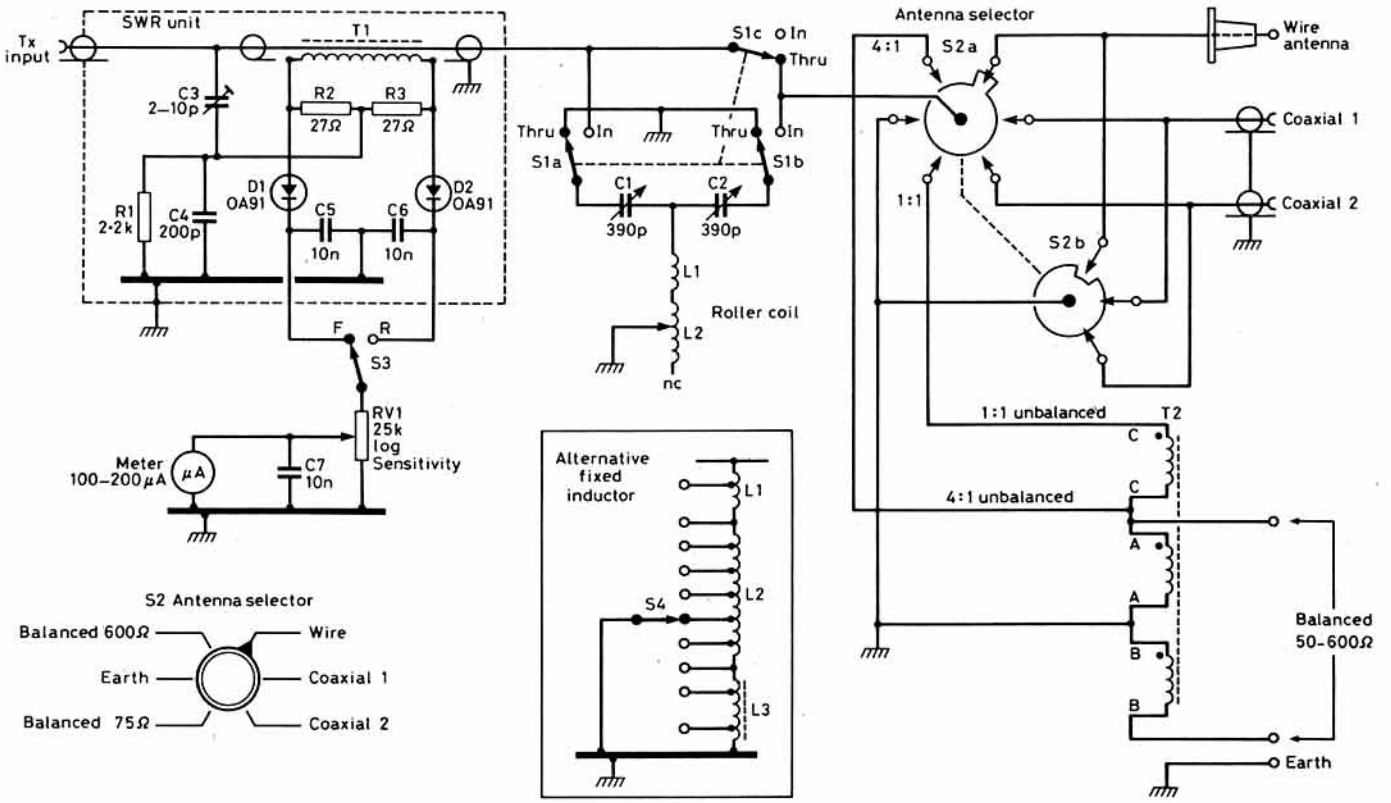


Fig 2. Circuit diagram of the unit

Balanced input

As the T-match is an unbalanced antenna tuner, some type of balun transformer must be incorporated if it is to be used successfully with balanced feeders. While a balun transformer provides a very simple solution for coupling a balanced feeder to an unbalanced tuning unit, it is not likely to be as efficient as a properly-balanced atu. On the other hand it is almost impossible to build a balanced atu to cover the wide frequency range required, so the use of a transformer makes an acceptable compromise. Many published designs, as well as a few commercial antenna tuners, commonly use a 4:1 balun either inside or fairly adjacent to the unbalanced tuner to provide a balanced input for impedances in the range 150 to 600Ω. However, if a low impedance feeder from either a G5RV or W3DZZ type of antenna is connected to a 4:1 balun, significant losses may occur. For this reason it was decided to use a 1:1 balun which, if fitted inside the tuning circuit, can easily be switched to 4:1 by use of the antenna selector switch. This now provides a range of balanced inputs from about 45 to 600Ω without introducing too many losses into the system.

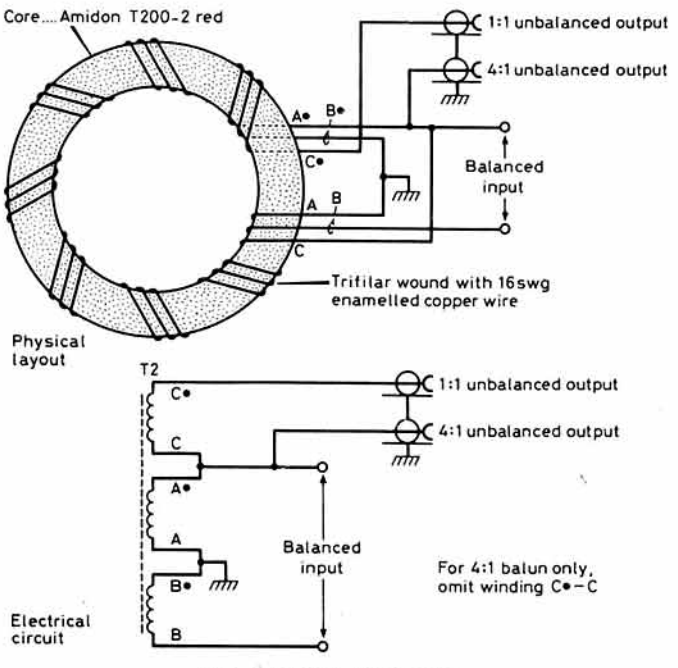


Fig 3. The balun transformer

Balun construction

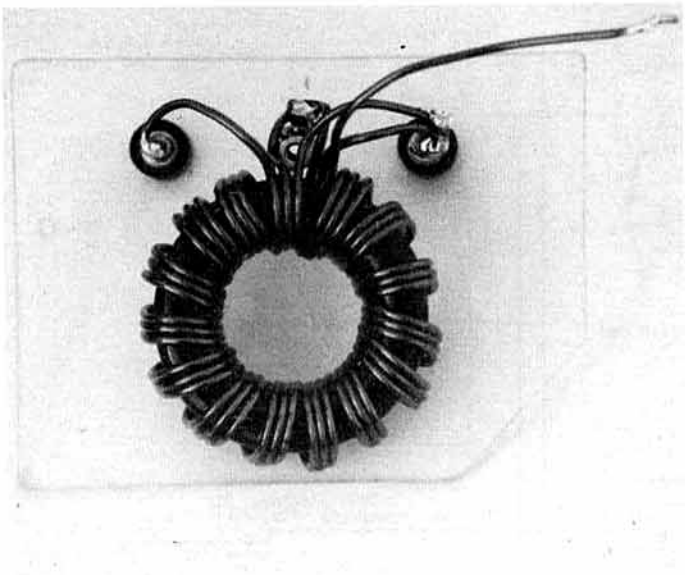
The balun transformer is wound on a single Amidon T 200-2 powdered-iron core, colour coded red. For sustained high-power operation, 400W plus, two such cores can be taped together by using plumbers ptfe tape, which can also be used to provide an added layer of insulation between the core and the windings.

Balun construction is simple, but a little cumbersome, some 14 turns of 16swg enamelled-copper wire have to be wound trifilar fashion onto the toroidal core. That is to say, three identical windings are wound on together. Care must be taken to ensure that the windings do not overlap or cross one another and that neither the core nor enamel covering is badly scratched during construction.

Fourteen turns will require approximately 38in of 16swg wire, so cut three equal lengths of 16swg wire slightly longer than required and pass all three wires through the core until they have reached about half way. This now becomes the centre of the winding and it is easier to wind from the centre to either end rather than from one end to the other which involves passing long lengths of wire through the toroid. The T200 size core will accommodate 14 turns trifilar without any overlapping of the start and finish of the winding. Close spacing will occur at the inside of the core, and a regular spacing interval should be set up on the outside. A small gap should be left where the two ends of the winding come close together.

Connection of the balun is a little more tricky and it is necessary to identify opposite ends of the same windings, which can be done with a continuity meter, with some form of tagging or colour coding being worthwhile. On the circuit diagram a dot is used to signify the same end for separate windings. It is essential that the various windings are correctly connected if the balun is to work properly. Fig 3 shows details of how the balun transformer is wound and connected. In my tuning unit, the balun is supported directly by soldering to the balanced input terminals which are spring loaded connectors. A sheet of $\frac{1}{16}$in Perspex is then used to insulate the balun from the aluminium case.

Construction of a 4:1 balun only is slightly simpler and only requires two (bifilar) windings.



The balun transformer

SWR measurement

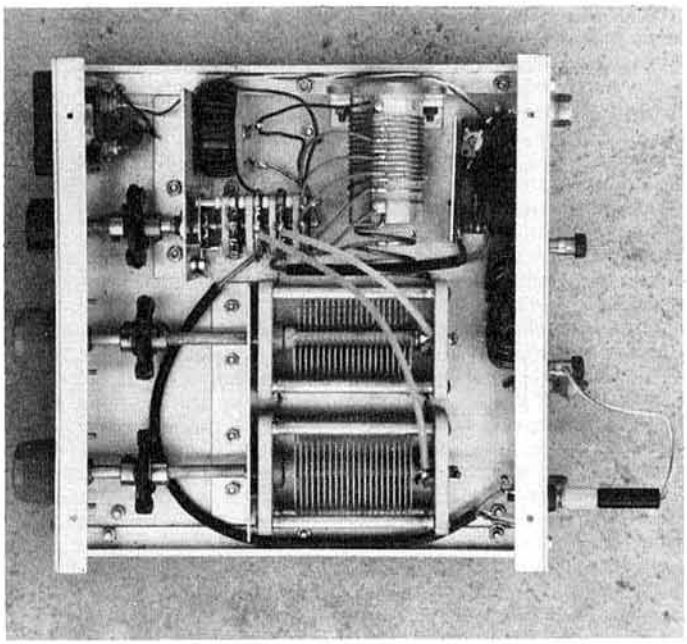
It is often convenient to be able to connect the antenna tuner directly to the transmitter without the need for extra cables and external swr bridges, so a built-in swr bridge has been included in the design. The circuit is fairly conventional and is of the current-sampling type of bridge which, unlike the voltage sampling stripline type of bridge, is not frequency conscious.

The current transformer T1 uses a small ferrite ring of about 0·5in diameter, and while the size is not critical, the grade of ferrite is. Ferrite having an A1 value of at least 125 should be used, and the Amidon FT50-43 ferrite core is ideally suited to this application.

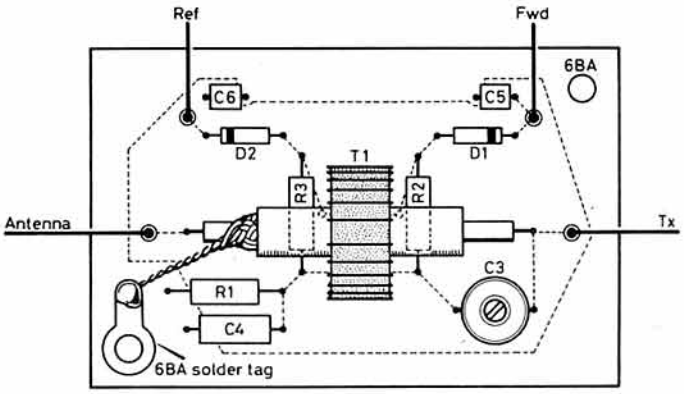
A short length of coaxial cable is passed through the ferrite core to form the primary after the 18 turn secondary has been wound on, the braid of the cable can be earthed at one end to form an electrostatic screen, but on no account should both ends of the braid be earthed or it will form a shorted turn.

The diodes D1 and D2 should be a matched pair of germanium diodes which can be selected from a number of similar type diodes by comparing their forward and reverse resistances. While this is best done with a high frequency signal, adequate matching can be achieved by using a simple multimeter.

Fig 4 gives a suggested layout and pcb track. The size is not at all critical, but a symmetrical layout should always be attempted.



Internal view of the portable version of the tuning unit with switched inductor



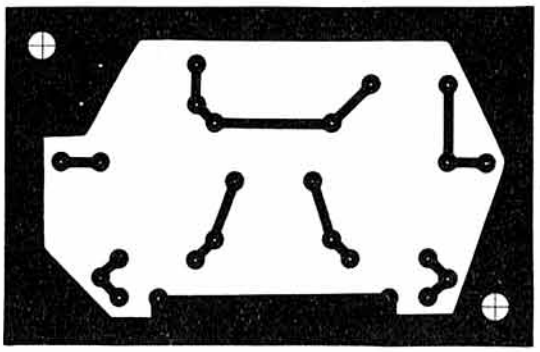


Fig 4. PCB and layout for swr bridge

The completed swr bridge should be tested away from the antenna tuner by placing it in line between a suitable transmitter and a 50Ω dummy load. The trimmer capacitor is adjusted to produce a zero-reflected reading with the forward reading at full scale. By connecting the bridge the reverse way around, some check of the diode balance can be judged by comparing the meter deflections in both directions. The forward and reverse switch selection will be reversed if the signal source is reversed through the bridge. It is advisable to check that the bridge balances on a number of different bands, as C3 may be more sensitive at the higher frequency end of the operating range.

The sensitivity of the bridge is very dependent upon the resistance of the meter used. Comparison with a calibrated swr bridge will enable a simple calibration of 1·5:1, 2:1 and 3:1 to be made, and in most cases a mental note of where these occur is the only calibration required, unless you wish to dismantle the meter in order to recalibrate the scale.

Construction of the antenna tuner

The complete tuner is illustrated in Figs 5 and 6. It is advisable to collect all the components and lay them out on a sheet of paper before committing oneself to a particular size. Layout is not over critical, but a sensible approach is needed to minimize lead lengths and unnecessary stray capacitance which could render 28MHz operation impossible. Cases can be purchased, or prefabricated using 16 or 18swg aluminium sheet bent into two interlocking "U" shapes. Half-inch aluminium angle provides stiffening as well as a means of joining the sections together. Roller coaster connections should be arranged so that minimum inductance is located at the end closest to the connections, ideally the rear of the unit. A small heavy-duty coil, L1, is included for ease of 28MHz operation and is more efficient than half a turn on the roller coil. Alternative arrangements to the roller coaster are shown in Fig 2(a) where a switched inductor is used. The switch should be of the ceramic type with substantial contacts. A third toroidal inductor is included to permit operation on 1·8MHz, and it is recommended that the bottom end of this could be shorted to ground to prevent the build-up of high voltages which could arc over.

The capacitors C1 and C2 are electrically above ground and must be mounted on insulators, a problem greatly reduced if the capacitors are constructed using ceramic end-plates. Ceramic pillars or even Perspex may be considered for mounting capacitors with metal end-plates. Additionally the shafts of the capacitors must be insulated, and the use of Eddystone spindle couplers is recommended. To ease the rather sharp tuning characteristics that can be encountered on 21 and 28MHz, slow-motion drives were tried but they made tuning on the lower frequencies rather

Components list

ATU

C1, C2	390pF 2,000V dc wkg, ceramic end-plates Eddystone or Jacksons
L1	3t 10swg, 1in id 1in long
L2	Roller coaster 36 turns, 1·5in dia, 16swg
T2	Amidon T200-2 (red) 14 turns trifilar 16swg enam
S1	Three-pole two-way ceramic Yaxley
S2	One-pole six-way double-spaced ceramic Yaxley One-pole six-way shorting wafer (one pole open)

ALTERNATIVE CIRCUIT

L1	2·5t 14swg 1in id tapped at 1·5t
L2	14t 16swg 1·25in id tapped at 0, 1, 3, 6, 9 and 14t
L3	Amidon T157-2 31 t 18swg enam tapped at 6 and 27t
S4	One-pole 11-way ceramic (three wafers to include S1 function)

SWR BRIDGE

R1	2·2kΩ
C3	2-10pF trimmer
C4	200pF mica
C5, C6, C7	10nF disc ceramic
R2, R3	27Ω
RV1	25kΩ log
D1, D2	Matched OA91 etc (germanium diodes)
T1	18t 22swg 0·5in dia ferrite ring (Amidon FT50-43, Fairite 26-43006301). Primary: 1·5in coaxial cable, braid earthed one end only to form electrostatic shield.
Meter	100-200μA
S3	SPCO miniature toggle.

Hardware to suit individual requirements
Amidon cores are available from Cirkit Holdings, Bonex and GW3TMP Electronics.
Suitable roller-coaster inductances and variable tuning capacitors are available from: CAPCO Electronics, Skelmersdale.

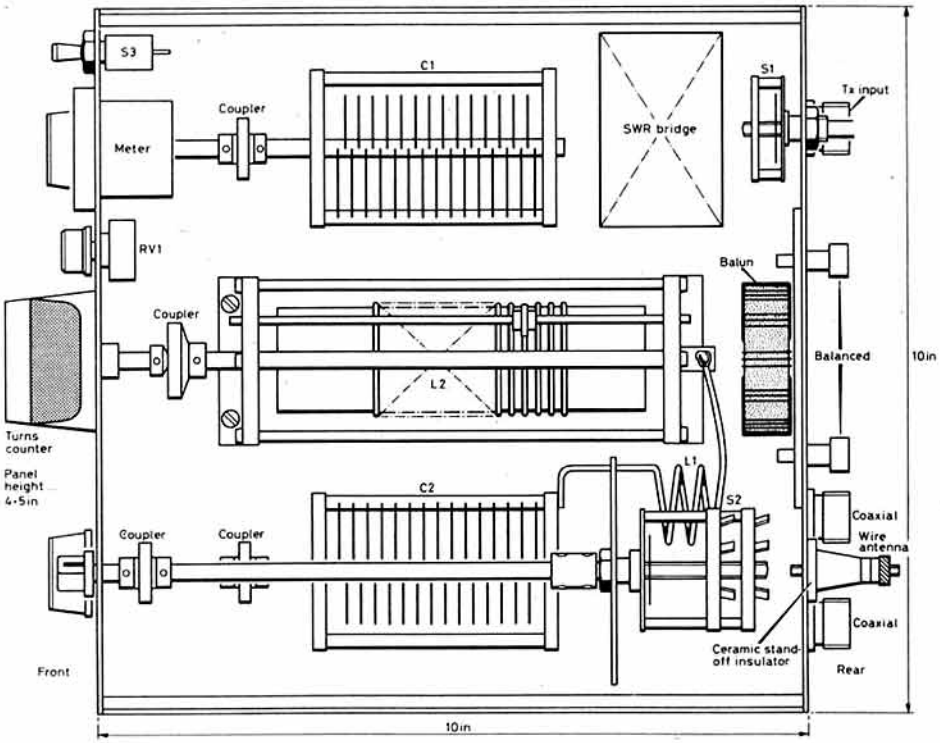


Fig 5. Antenna tuning unit layout

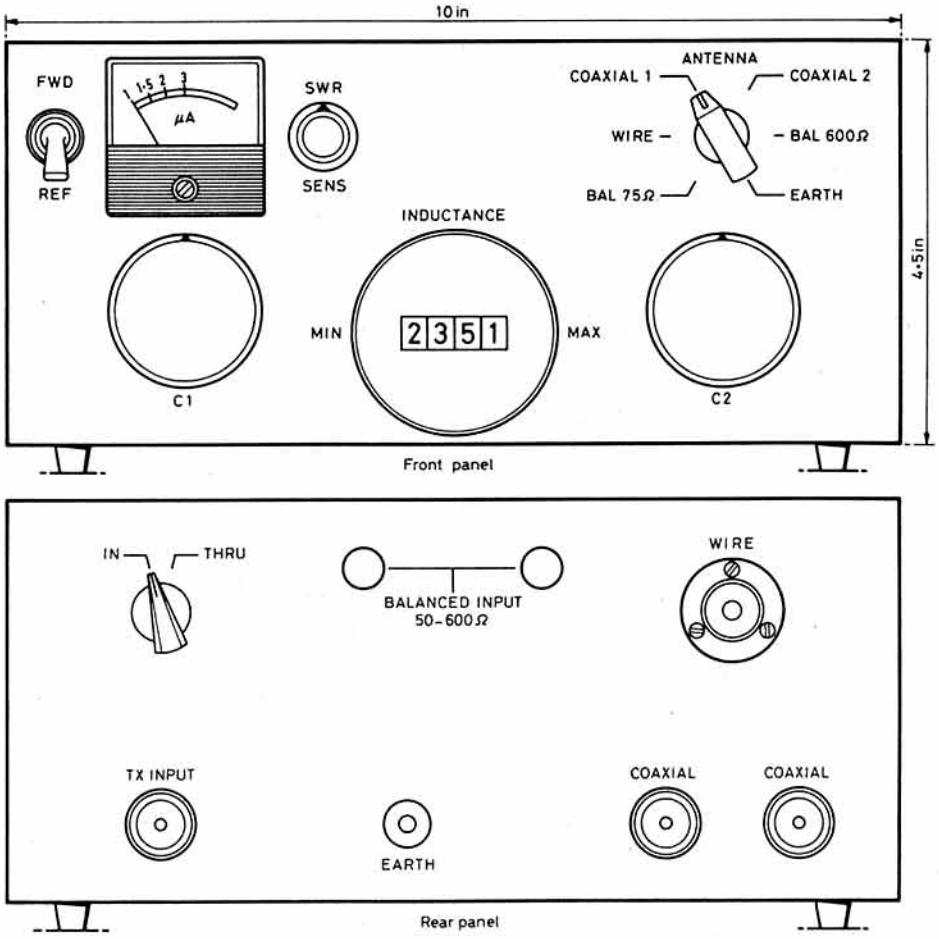
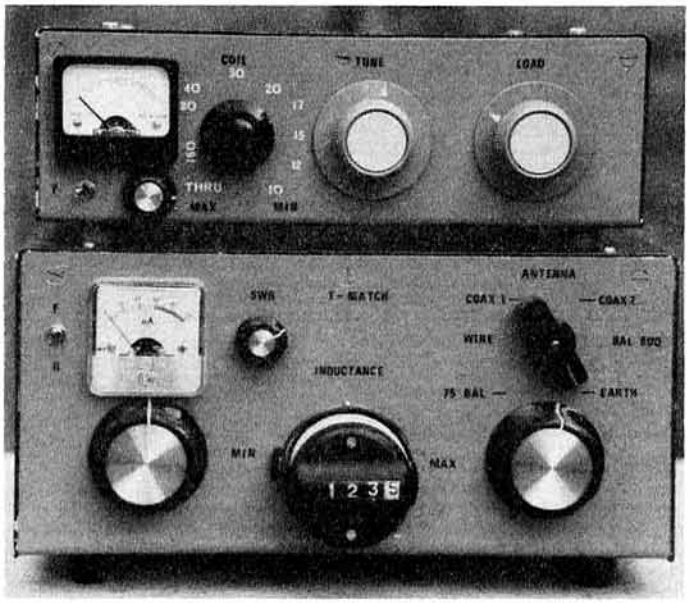


Fig 6. Front and rear panels of the unit

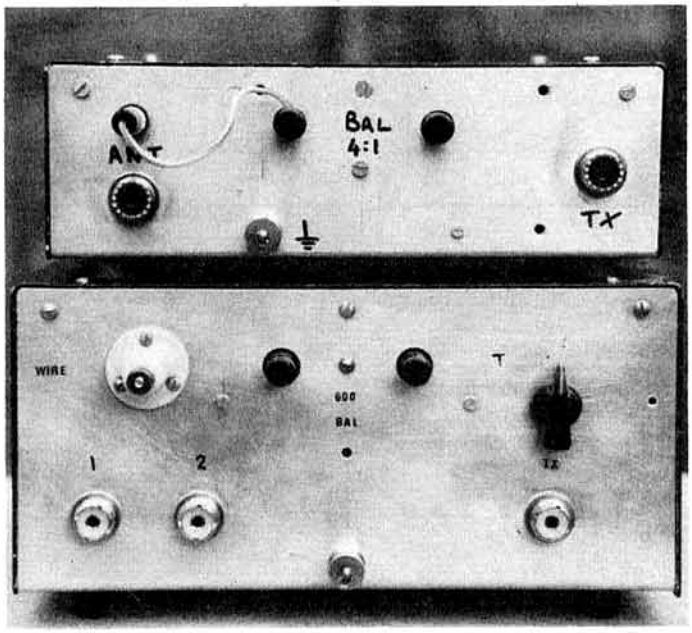


Base station and portable versions of the tuning unit

laborious and their use is not advisable. A turns counter on the roller coaster makes for much simpler operation, and may be as simple as a slot in the cabinet with a Perspex window for monitoring the position of the jockey wheel or a more sophisticated geared or direct-drive counter.

Antenna switching can introduce excessive lead lengths as well as stray capacitance, and for this reason the antenna selector switch is located on an extension shaft at the rear of the unit adjacent to the antenna inputs and the balun transformer. The wiring of the antenna switch is done strictly to achieve minimum lead lengths rather than to provide front-panel selections in any logical order. A separate IN/THROUGH switch enables the tuner to be bypassed and the antennas routed directly to the transmitter. It is located on the rear panel adjacent to the input socket to minimize lead length, and is only intended for occasional use. It is necessary to ground the tuning components in the THROUGH position to minimize capacitance effects.

Wiring of the tuner should commence after the mounting of all components, and fairly heavy wire such as 16swg tinned wire, coaxial cable inner or braid or copper strip should be used. It has not been found necessary to screen the swr bridge, but it should be located directly adjacent to the transmitter input socket and all meter leads kept away from tuning components.



Rear view of base and portable versions

The antenna selector switch has two wafers made of ceramic and is arranged so that every other contact is removed to give a double spacing. The second wafer is used for shorting and provides a ground for all unbalanced inputs when not in use, and is largely to prevent capacitative coupling to other antennas. The balanced input is grounded to dc through the balun. Balun switching is simply achieved by either taking the input from one side of the balanced input, giving a 4:1 ratio, or by selecting the third winding, giving a 1:1 ratio. An earth position enables the transmitter input to be grounded to prevent static discharge into the receiver.

Operation of the antenna tuning unit

Operation of the atu is straightforward but can occasionally baffle the uninitiated, so a simple procedure should be adopted until you are familiar with the operation of the unit. If the swr bridge is included in the design it should be checked and balanced independently of the atu, using a dummy load, and ideally be compared and calibrated against another swr measuring device of known accuracy.

To use the antenna tuner, select the required antenna and ensure that the THROUGH/IN switch is in the IN position. Set both C1 and C2 to halfway positions, adjust the inductance for maximum signal on receive, and one at a time adjust C1 and C2 for maximum receive signal. Using a small amount of carrier, further adjust C1, C2 and the inductance to eliminate any reflected readings. All tuning controls are interdependent, and settings may need to be adjusted several times before minimum swr is achieved. In addition, more than one setting may give a matched condition, in which case the settings requiring the highest value of C1 should be used. Once the transmitter is matched on low power, increase to the operating power for any final adjustments. Never attempt to tune the atu initially on full power or with a valve power amplifier that has not been tuned up.

Generally, the higher the frequency the lower the value of inductance required, but exceptionally high impedances may require more inductance than expected. Capacitance values may vary considerably, and it is not uncommon on the higher frequencies for one capacitor to be very sharp and require a minimum value while the other is flat and unresponsive. Using the components recommended it is possible to match a wide range of impedances from 1·8 to 28MHz, but operation on 1·8MHz may become impossible if lower values of capacitance are used; however, fixed silver mica capacitors may be switched across C1 and C2 to compensate. Higher values of capacitor will almost certainly prevent operation on 28 and maybe 14MHz.

Conclusion

The antenna tuner described is not new or revolutionary in design, but probably represents the ultimate in flexibility. Performance is good, and probably better than many of the commercial atus currently available, and it is not inhibited by a lack of balanced input or restricted to a very narrow range of low impedances. The power handling capability of the tuner will to a large extent depend upon the impedances encountered and the spacings of the capacitors. As a rule, very high impedances should be avoided, as arcing can occur in the switching and the efficiency of the unit may well suffer. Adjustment of antenna or feeder length can remove any exceptionally high impedances that may be encountered. I use a 180ft doublet fed with an unknown length of 300Ω slotted ribbon feeder and am able to tune it to give a 1:1 swr on all amateur bands from 1·8 to 28MHz. Using Eddystone capacitors of the type recommended, the tuning unit should be capable of handling 100W into a fairly wide range of impedances up to several thousand ohms, and the full 400W into impedances up to 600Ω.

I have built two versions of the tuner using the same basic circuit, one for base station operation using a roller coaster coil, and a smaller portable version using a range of switched inductors. The portable version has a slightly different layout, largely as a result of trying several other designs, and combining the IN/THROUGH facility on the inductor switch has necessitated several wafers. The balun used in this version is also the simpler 4:1 type and is connected with a flying lead.

For those who wish to adopt the new "SPC" circuit, the value of C2 should be made approximately 200pF, and an additional similar value capacitor should be ganged to C2 and connected between the antenna side of C2 and ground. Both capacitor rotors should be connected together and the stator of the new capacitor should be grounded.

The construction of the described antenna tuning unit should be well within the capabilities of most newly-licensed amateurs, and it can represent a considerable financial saving when compared to the commercial alternative. It represents an ideal project for commencing home construction and, if necessary, the swr bridge, the balun and the switching can be omitted and the basic tuner can be built on a piece of wood, preferably varnished. □

A VERTICAL ANTENNA FOR 21 AND 28MHz

J Stebbings, BSc(Eng), G4BTV*

Introduction

Following the acquisition of a 16ft ex-WD tank whip, it was decided to use it as a vertical radiator on two bands as an alternative to the station's normal G5RV. Since extensive excavation for earthing plates or radial wires was out of the question, a counterpoise was employed. The method had previously proved successful with a quarter-wave vertical for 28MHz developed from the suggestions of L A Moxon, G6XN [1]. This is shown in Fig 1, and will be referred to later in the article.

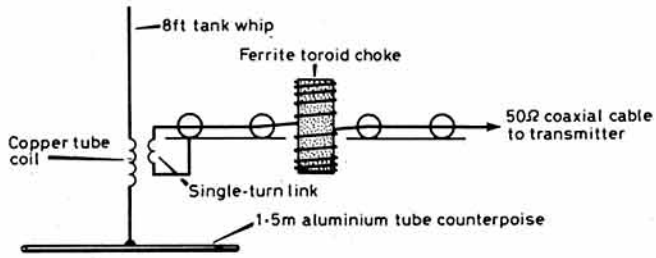


Fig 1. Matching arrangement of λ/4 vertical on 28MHz

Early experiments

The 16ft (4·9m) whip is clearly nearly a half wavelength on 28MHz, and about one third of a wavelength on 21MHz. The first matching circuit tried is shown in Fig 2(a). This was to get the feel of the adjustments. It worked, but required three settings for each band—capacitance, the coil tap, and the antenna tap. These adjustments were reduced to two by the circuit of Fig 2(b) whereby the inductive reactance of the whip at 21MHz was cancelled by the series capacitor, the value of which was found by trial and error.

G4BTV is a retired chartered civil engineer who started, while still at school, constructing wireless sets in the days of crystal sets. Later he became a short-wave listener, and adapted war surplus equipment for radio and tv.

He obtained a Class A licence in 1973, and still makes most of his own gear; at present he is adapting a telescope for the observation of sunspots. Active mainly on 21, 28 and 144MHz, he prefers to chat rather than collect QSL cards, and does not enter contests.

* 16 Maylings Farm Road, Fareham, Hants PO16 7QU.

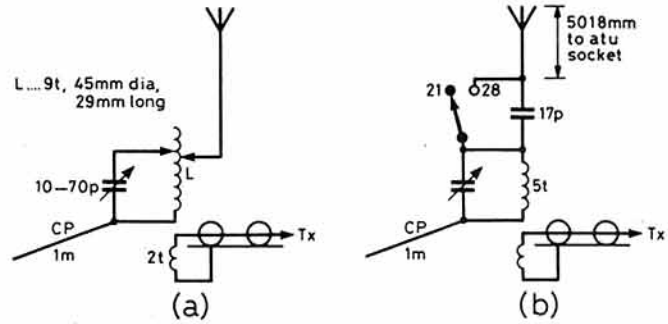


Fig 2. The original parallel-tuned circuits: (a) needs three adjustments, (b) requires only two

From my point of view the atu had a serious disadvantage in the narrow bandwidth for an swr of 1:1·2. This may not bother many amateurs, particularly those with valve power amplifiers. My TS120S does not like an swr much greater, and shows its displeasure by drastically reducing power.

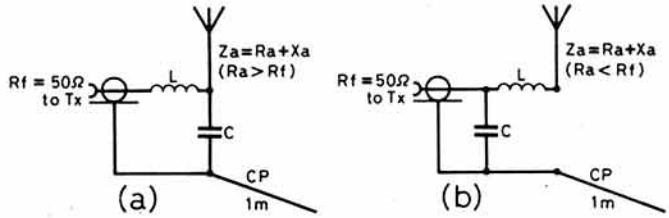


Fig 3. The basic L-match

The Q of the circuit was thus too high, and thoughts were turned to the simple L-network as outlined in Fig 3. This posed a bit of a problem since the counterpoise would now be connected to the coaxial cable shield which was earthed only at the shack some 25m away. The question arose—would it be effective?, or would an earth under the whip be required? In Fig 1 the toroidal rf choke was found to be necessary in order to get an swr of 1:1·0. So it was argued that, if this choke were again used close to the coil, the 25m of coaxial shield would be isolated at rf and the counterpoise could again do its work. In practice it seems to do so, since disconnecting it upsets the swr considerably.

The final circuit

Throughout these experiments, reference was made to Laport [2] who provides much information on vertical antennas which is sadly lacking in most amateur handbooks. Curves are given showing the resistance and reactance of various vertical radiators of differing length/diameter ratios. The appendix shows the method for estimating the inductance and capacitance required for each band. This was done for 28, 21, 14 and 7MHz, but the atu was made for the two highest frequencies only (Table 1). The other figures might be of interest to others wishing to experiment on the lower frequency bands. The calculated values are only a guide as to what may be required, and will need adjustment during setting up to secure a proper match.

Table 1.

f(MHz)	Ra	Xa	I(deg)	λ	X_l	X_o	$L_{\mu H}$	C_{pF}
28·5	1,200	0	168	0·47λ	240	−250	1·34	22
21·2	170	+270	125	0·35λ	166	−558	1·24	13
14·2	30	0	84	0·24λ	24	−61	0·27	184
7·05	6	−430	41·5	0·11λ	446	−18	10·07	1222

Components list

Coil	1·75m (45mm) dia, 8t, 16swg 50mm long, tapped every turn (6t actually used)
Toroidal rf choke	Two FX1588 ferrite rings wound with 12t of RG174U miniature coaxial cable
Relay	12V dpco suitable for rf use
RFC1, 2	1mH rf chokes
C1, 2, 3	High-voltage ceramic or 500V silver mica (see text). C1, C2 values found by experiment. C3 = 0·01μF.
Counterpoise	16mm od aluminium tube 1m long with clamp for terminal and insulated support bracket
Whip	16ft four-section tank antenna with two insulated bases
Case	Waterproof plastic kitchen freezer box 140 by 100 by 80mm

Fig 4 shows the final arrangement of the atu. The input socket leads to the toroidal rf choke consisting of 12 turns of miniature coaxial cable wound on a pair of FX1588 ferrite rings. The series coil has six of its eight turns in use, with a tap at five turns for 21MHz. RLA1 effects this changeover. The parallel capacitor C2 is in circuit on 21MHz and the capacitance is reduced on 28MHz to about 14pF by switching C1 in series with it by means of RLA2. Fortuitously, this was a convenient way of getting the required value on 28MHz: but, of course, a single capacitor could be used on each band if preferred.

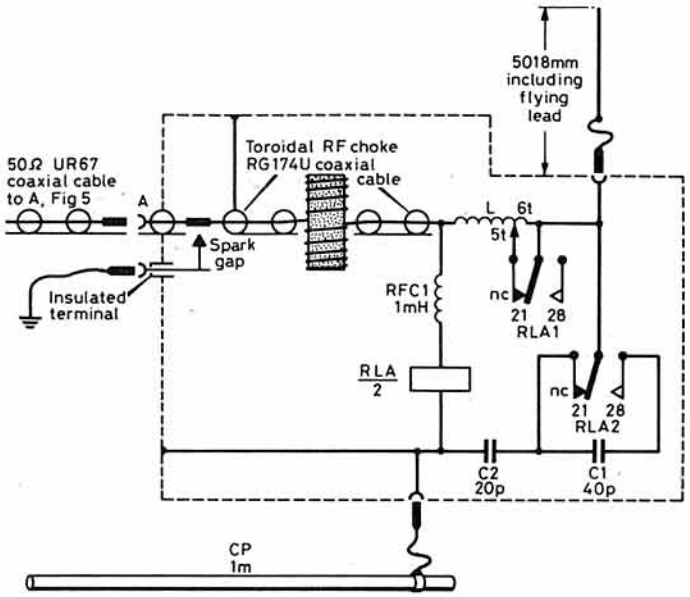


Fig 4. The final atu circuit with remote switching by relay supplied with 12V via the coaxial cable centre wire. See components list for details

RFC1 isolated the relay RLA1 from rf. This is operated by a +12V supply fed to the coaxial cable centre wire in the shack. Fig 5 shows the modifications to the shack antenna changeover switch so as to provide the +12V supply. A dc blocking capacitor, C3, was necessary to isolate the coaxial cable centre since, towards the transmitter, a short circuit to earth by coils existed in a lowpass filter and in the transmitter itself.

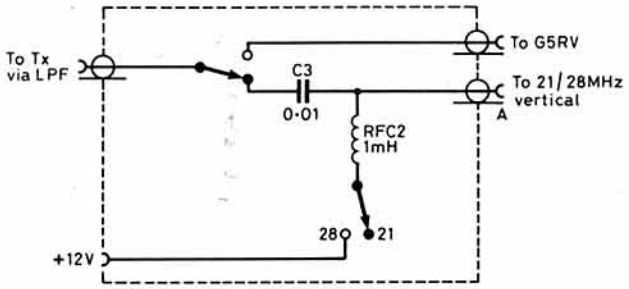
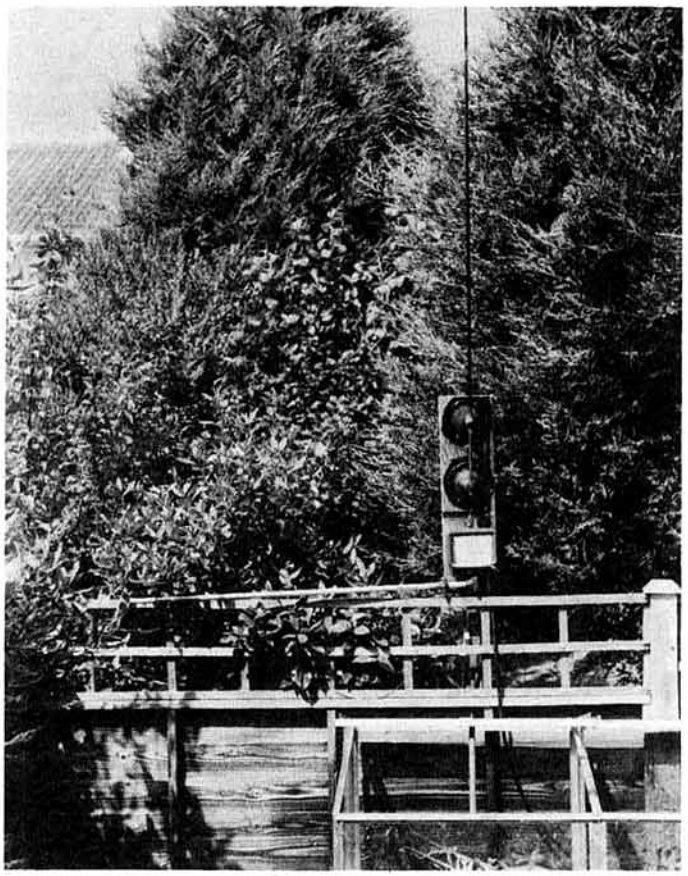


Fig 5. The antenna changeover switch in the shack with switched 12V supply for the atu relay

The photograph shows the whip supported on two base insulators bolted to a hardwood board on which the atu box is also mounted together with the counterpoise bracket. The board was bolted to a wooden stake driven into the ground. For good measure, an earth spike of 0·5in copper tube provided for a spark gap in case of high static build-up during heavy rain or thunder storms. A terminal was provided on the side of the atu box and, on the inside, a brass strip provided a gap of 3mm to the end of the SO239 input centre pin. Alternatively a radio frequency choke could be used to provide a dc path to earth. Like the tip of the antenna, the counterpoise could have high voltages on it. Suitable precautions should be taken.

Adjustments

For the initial adjustments the capacitors C1 and C2 were disconnected and a variable capacitor 10–70pF was temporarily clamped to the side of the box and wired between the antenna and counterpoise terminals. An swr meter was connected at the input to the atu and, by means of long flex to the



The antenna supported on two base insulators with the atu box below. The aluminium tube counterpoise is supported on an insulating bracket and projects to the left

shack, the key was shorted out. Of course, frequent rapid visits were made to the shack to listen on the frequency and transmit "Test de G4BTV"! When the required setting of the variable capacitor had been found for one band, it was carefully removed so as not to disturb the setting and its value was measured on a home-brew CR bridge. The capacitors actually used were recovered from an ex-WD hf transmitter and are transmitting type HV ceramics; 500V silver mica would be a suitable substitute for a power output up to 100W cw. No adjustment of the length of the whip was made but, if necessary, this could most easily be done by varying the length of the flying lead to the atu socket. Testing was done at less than 10W output, since the variable capacitor did not have wide plate spacing and flashed over at higher powers.

The edges of the box, all plugs, sockets and terminals were covered with Sylglas tape to keep out moisture. A messy job but it seems to last for years. The aluminium backed variety should obviously not be used.

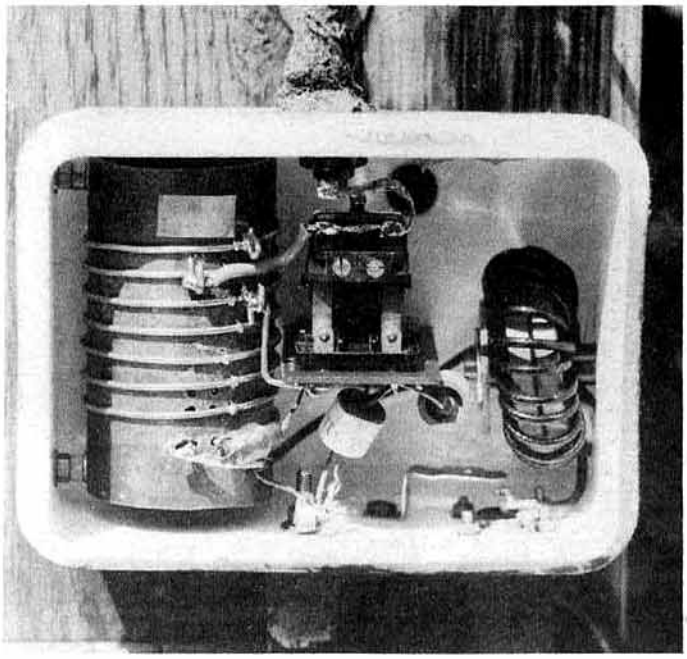
Conclusions

The first thing that will be noticed from the photographs is the close proximity of a conifer tree nearly as high as the whip. The effect of this is not known, but G6XN advocates building horizontal antennas *into* trees. However, he does not distinguish between coniferous and deciduous! The xyl decreed that any position in the clear was ruled out.

In operation the whip has been very encouraging. It is difficult to make definite comparisons with the G5RV since that antenna will not have an omnidirectional polar diagram. There are many other factors involved, such as the distant station's polarization, vertical angles of take-off for a particular path, polarization changes, not to mention trees, fences and houses.

On reception, however, one benefit was immediately apparent. It picked up less noise (QRN) which was at first worrying, since it might have been due to lack of sensitivity. It does seem, though, that the location at the bottom of the garden is less noisy than the house over which part of the G5RV extends to a mast on a chimney. This in spite of the bad reputation of verticals for picking up domestic rubbish.

The S-meter readings are sometimes as much as four S-points better than with the G5RV, and on other occasions the reverse may apply: or there may be no difference at all. Many such comparisons may be made rapidly when



The antenna tuning unit. On the left is the series coil. In the centre the relay and switched capacitors. The toroidal choke formed with coaxial cable is on the right

receiving and, when transmitting, the same sort of reports are being received. Perhaps the final verdict will have to wait until ZL and VK contacts become commonplace again.

The design, as always, could be improved with a view to reducing losses. A better coil would have thicker wire and perhaps be self-supporting. Coaxial relays would not be suitable for the job, but a careful choice of ordinary relays might produce one with good insulation at radio frequencies, short contact springs, and no surplus metal connected to the contacts. Such relays may be found in vhf pmr rigs.

Provided losses can be kept within reasonable limits, a short vertical should prove effective down to 7MHz or so, when they start to become unavoidable. The coil in particular, due to its greater inductance, will have losses due to resistance and shape. However, with these reservations all the power supplied to it will be radiated and, since it takes up little space, could be the solution for those lacking space for a wire antenna.

Judging by the reviews and comments in *Technical Topics*, interest in short verticals and end-fed half-waves has increased enormously over the past few years. Reference [4] is a selection of items having a bearing on this article.

References

[1] *HF Antennas For All Locations*, L A Moxon, G6XN. RSGB, 1982.
[2] *Radio Antenna Engineering*, E A Laport. McGraw-Hill, 1952.
[3] *Radio Communication Handbook*, 5th ed, Vol 2. RSGB, 1977 p12.40.
[4] *Technical Topics*, P Hawker, G3VA. In the following issues of *Radio Communication*: Feb 1986; April, June 1985; June 1984; Feb, May, Dec 1983; Jan, Aug 1982; Mar, July, Nov 1981; June, Sept 1978. □

APPENDIX

Calculations for L-matching network

(1) The 16ft whip three-eighths inch dia has a length/diameter ratio of 512 From Laport [2] p113 the curves show that when X = 0 the length l is 168°.

At 28·5MHz l in metres $= \frac{300}{28{\cdot}5} \times \frac{168}{360} = 4{\cdot}9\text{m}$ (16·1ft)

At any other frequency the length in degrees

$$= 4{\cdot}9 \times \frac{f}{300} \times 360$$
$$= \text{ie } 1° = 5{\cdot}9f \quad \ldots\ldots(1)$$

(2) Using Ref [3] p12.40, it is required to match a 50Ω feeder, Rf, to the complex antenna impedance Ra in series with reactance Xa (Fig 6). In this diagram Xa is assumed to be positive (inductive). If capacitive, a negative sign would be used.

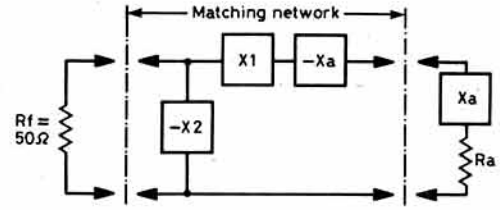


Fig 6. Reference Appendix 2

(a) Cancel Xa with a network reactance − Xa.
(b) It is now necessary to match the unequal resistances Rf and Ra with series and parallel reactances X1 and X2.

(c) let $p = \frac{Rf}{Ra}$ ……(2a)

p must be > 1 ∴ Rf must be > Ra

X1 points towards the smaller resistance.

$X1 = \pm Ra\sqrt{p-1}$ ……(3)

$X2 = \mp \frac{Rf}{\sqrt{p-1}}$ ……(4)

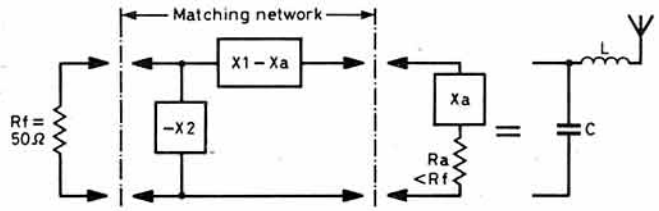


Fig 7. Reference Appendix 2(d)

We want X1 to be positive (inductive) and X2 negative (capacitive).
(d) Add X1 and the Xa (in the network) with due regard to signs and the sign of the original antenna Xa (Fig 7).

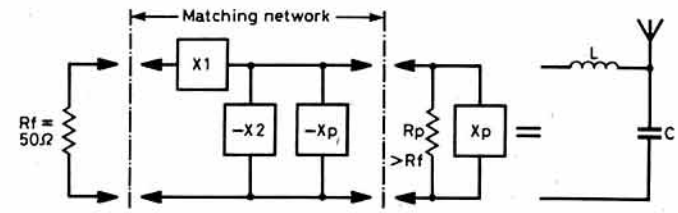


Fig 8. Reference Appendix 2(d)

If Rf < Ra and we simply interchange them in equations (3) and (4) we will end up with one coil and two capacitors which cannot be combined. This problem can be overcome by converting the antenna series Ra and Xa into their parallel equivalents (Fig 8).

$$Rp = Ra\left(1 + \frac{Xa^2}{Ra^2}\right) \quad \ldots\ldots(5)$$

$$Xp = Xa\left(1 + \frac{Ra^2}{Xa^2}\right) \quad \ldots\ldots(6)$$

(e) Cancel Xp with − Xp in the network.
(f) Match Rf and Rp with X1 and X2.

$$p = \frac{Rp}{Rf} \quad \ldots\ldots(2b)$$

$$X1 = \pm Rf\sqrt{p-1} \quad \ldots\ldots(7)$$

$$X2 = \mp \frac{Rp}{\sqrt{p-1}} \quad \ldots\ldots(8)$$

(g) Add X2 and the Xp (in the network) with due regard to signs and the sign of the antenna Xp.
(3) Values of Ra and Xa may be found in [2] p113, and a table such as Table 1 may be compiled. □

A SIMPLE SWR METER FOR QRP USE

Derek Guy, G3IBH*

Introduction

Some sort of meter to indicate forward and reverse relative power is almost essential for QRP working. With dc inputs of only a few watts, one cannot afford losses due to poor matching of transmitter to antenna. This article describes a simple but very effective swr meter which I have had in use for some years. Sensitivity will vary with frequency and is about 5W rms fsd on 3·5MHz.

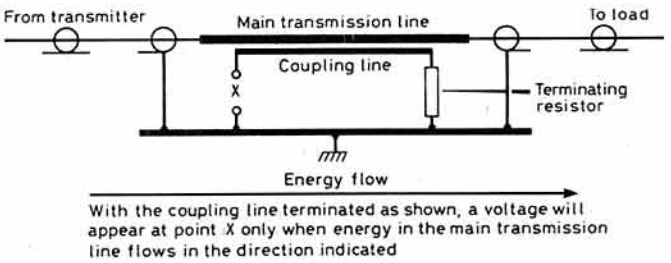


Fig 1. The coupled-line directional coupler principle

Design

The design is based on the coupled-line directional coupler principle. Fig 1 shows how this is configured. Basically it consists of a short length of line coupled to the main transmission line. A voltage will be induced into this line when energy flows in the main transmission line. However, if the coupling line is terminated at one end then the voltage is induced only when energy in the main transmission line flows in the direction of the terminating resistor. The interruption of the transmission line to introduce the coupling line will not upset the performance provided that the length of the disturbance is kept small in terms of wavelength.

For practical purposes, two lengths of coupling line are required—terminated at alternate ends. One will detect forward power; the other will detect reverse power. (Note that the actual voltage induced into the coupling line will be proportional to the square root of power).

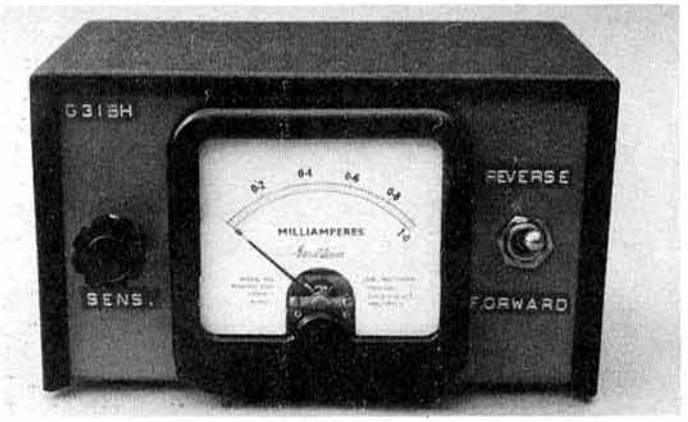
Fig 2 is a complete circuit diagram of the swr meter. The design embodies the principles described above with additional components to enable the voltages to be rectified, decoupled and fed to the moving-coil meter. The value of the terminating resistors will depend upon the value of the load impedance into which the device is to operate. I have used small skeleton carbon potentiometers so that the value can be adjusted precisely.

Components list

RV1, RV2	390Ω skeleton potentiometer
RV3	22kΩ lin. potentiometer
D1, D2	OA91
C1, C2	0·01μF ceramic
S1	Two-way.
Sk1, Sk2	Belling-Lee coaxial
M1	100μA fsd*
Veroboard	
Case to suit	

* Note that the meter which I have used is a 1mA fsd meter from which I have removed the internal shunt. This results in an actual fsd of 90μA.

*12 Broadmead, Hitchin, Herts SG4 9LU



The completed swr meter

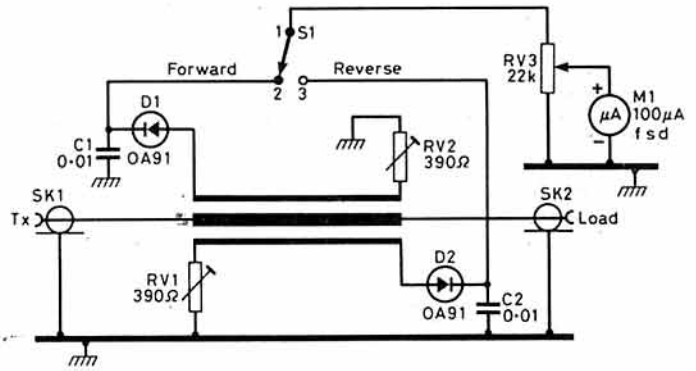


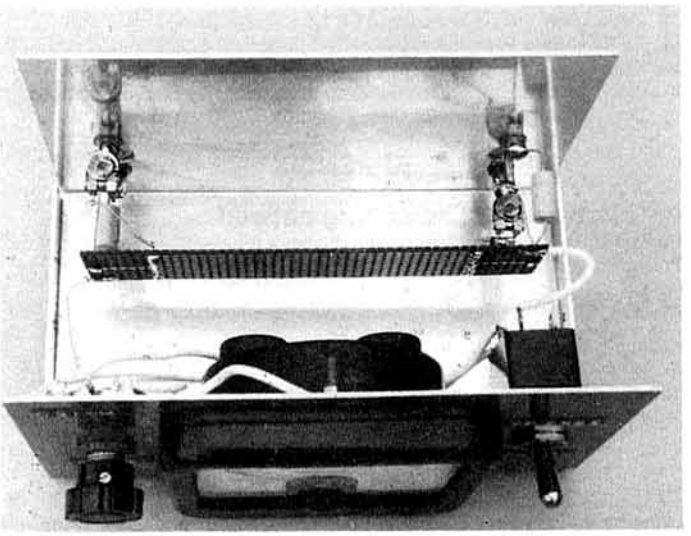
Fig 2. Circuit diagram of swr meter

Construction

There are many ways of constructing the section of line but a strip of Veroboard seemed to offer the tidiest solution. I used a strip of 2·5mm pitch board 127mm long and nine tracks wide. The middle five tracks carry the signal through the device while the outer pairs of tracks are the pick-up or coupling lines. Fig 3 shows the layout of the Veroboard. This form of construction is quite suitable for the lower hf bands but accuracy is likely to deteriorate significantly above 7MHz. It is unsuitable for vhf.

The swr meter is built into a 155 by 85 by 80mm two-piece aluminium box. The Veroboard is supported by 20swg copper wire soldered directly to the coaxial input and output connectors. The terminating resistors and decoupling capacitors are also grounded directly to these connectors.

(Continued on page 32)



Interior view, showing the Veroboard and connections to the meter etc, and to the rf input and output connectors

Technical Topics

by Pat Hawker, G3VA

ONE PHRASE that has crept into common usage is "state-of-the-art". Applied to amateur radio it conjures up visions of the latest all-singing, all-dancing hf and vhf transceivers, automated computer-controlled "packet" networks, digital control of voice synthesizers and the like. As someone who struggles to keep abreast of what is going on not only in our field but also in the wider world of professional and defence electronics, communications and broadcasting, I would not wish to suggest that technological progress, in general, is other than a good thing. But increasingly it is becoming clear that the trend of development does pose problems for those of us who have been attracted by and have thoroughly enjoyed the traditional concept of amateur radio as a unique and friendly hobby that brings together both technical and operating practices and skills producing that now rare animal who can, if only crudely, design, build, maintain and operate a radio communications station.

Open at your own risk

The modern miniaturized factory-made transceiver with its many built-in facilities is a wonder to behold. But unfortunately it is now way beyond the understanding of most of us and requiring specialized skills to modify or repair. In his recent article on a hands-free microphone, G1SJU (December 1986, page 847) wrote: "The second (method of connecting the microphone to a mobile transceiver) is more complicated and involves opening up your rig. **This should not be attempted unless you have the knowledge and the skill to carry out the modification. Blowing up your rig may be a very expensive exercise.**" Sound and excellent advice but it must make some of us wonder where the hobby is heading when we are cautioned against even opening our rig!

Les Moxon, G6XN, licensed for 58 years yet still developing new antennas (see later) and other innovative work, has been a confirmed "home brewer" for most of that time. He admits to having built, for example, at least 15 ssb transmitters but was always so eager to incorporate new ideas and second thoughts that few passed beyond the prototype stage. But he found that he was spending a lot of time on construction once it became accepted that transmitters should always incorporate band-change switching. He stresses the great difference in building a monoband equipment with only the barest essentials and equipment that has the facilities and extras now found in even the least ambitious of current factory rigs—particularly in terms of the time involved in construction.

One result was that he finally succumbed to the black boxes. Yet he confesses that the experience has left him somewhat disillusioned. His main problem has been getting factory equipment put right when inevitably something goes wrong, while knowing that if he gets going inside the box its secondhand value will rapidly drop to zero.

His experiences with having others doing the servicing has a familiar ring. A black box taken back to the suppliers with two faults was deemed beyond their ability, and the rig was returned to the importers. It took nine weeks to get it back, allegedly cured, but in reality with the faults persisting. One subsequently turned out to be a recognized design fault in early production, curable—as G6XN had already discovered—by the use of an external high-pass filter. An earlier fault, intermittent vfo instability, took some three years before it was finally corrected.

Nor are these exceptional cases. His mobile rig, subjected to the usual rough life and accidental damage, was twice deemed "not repairable"; once because of "no spares" and in the second case because of the estimate of what the repairs would cost. In practice, d-i-y heavy-handed methods have kept it going, though modified to the extent that even the manufacturers might have difficulty in recognizing their offspring!

Nor is it clear that all operators really want or need some of the features now built into rigs, although many would like features that are seldom provided. Do we really need a costly tuning dial *plus* frequency readout? Is a good slow-motion drive essential when there is "bandspread" in the form of a speech clarifier? Not everybody wants to store frequencies in large memories. Do we have to be able to switch bands in a matter of microseconds?

When will it be recognised that some have no wish to participate in contests or spend their entire "hobby-time" in chasing squares or exotic dx? A simple monoband rig can teach one far more about hf or vhf propagation than is likely to be learned from constantly jumping from band to band. Why have we not taken advantage of the simplified home-construction potential of integrated-circuit devices (or for that matter thermionic devices)?

But then, it needs to be asked, have we as a body ceased to be interested in using amateur radio, in the phrase beloved by British broadcasting organizations, to educate, inform and entertain ourselves?

More on zener protection for relay switching

The November 1986 *TT* (page 779) included information from Peter Hart, G3SJX on the use of a zener diode in series with the usual protection diode that provides protection from the high back-emf transients generated when a circuit containing an inductor is suddenly switched. In practice the inductor often takes the form of a relay solenoid. G3SJX showed how the use of an extra zener diode can significantly reduce the pull-in time of a protective circuit; an important consideration when the relay is used, for example, as a keying relay.

Richard Golding, G3VZG suggests that G3SJX's circuit can be usefully improved by connecting the zener diode across the switching transistor's base-collector as shown in Fig 1.

In this arrangement the transistor then clamps the relay back-emf to a voltage equal to $V_{zener} + V_{be} - V_{supply\ volts}$, G3VZG points out that this has two advantages:

(a) It saves a diode (conforming to the 'kiss' principle of keeping it simple).
(b) The switching transistor takes the strain, thus reducing the zener wattage requirement.

This arrangement is apparently standard practice in automotive electronics in order to achieve the fast "switch-off" of ignition coils and fuel-injector solenoids, etc.

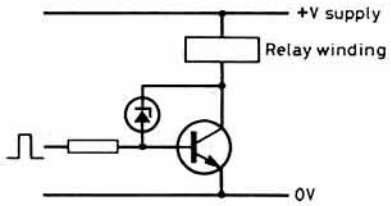


Fig 1. Zener protection for relay switching as used in automotive electronics, as reported by G3VZG

Compact multiband delta loop

Alasdair Fraser, GM3AXX, is pleased with the performance of a compact four-band delta loop antenna that can be fed directly from coaxial cable without an atu yet fits into a small garden. Since inductive loading is required only on 10MHz the efficiency is reasonably good and the only snag would appear to be the need to pop out to the switch box when changing bands, though even that could be overcome with the aid of a high-voltage remote-controlled three-position switch.

The theory is extremely simple; a full-wave on 14MHz is approximately the same physical length as a half-wave on 7MHz or 1·5λ on 21MHz: Fig 2. Originally, when 10MHz was released, GM3AXX fitted a small loading coil to his 14MHz delta loop antenna and found this to work remarkably well. Since then he has modified the loop as shown in Fig. 3 to include also 7 and 21 MHz operation. This arrangement has been used successfully by a number of local and English amateurs who report it to be ideal for small gardens. If the 10MHz facility is not required it would be possible to use a larger loading coil for 3·5MHz operation although inevitably this would have the effect of greatly lowering the radiation resistance, increasing the *Q* (thus narrowing the bandwidth) and significantly lowering the efficiency on that band; 1·8MHz loading is not recommended, but might put you on the band.

GM3AXX describes construction and adjustment as follows:

(1) Make up a 14MHz delta loop using two 33ft lengths of wire. Suspend the loop at its apex about 20 to 25ft above ground. Connect coaxial cable to apex (with or without balun) and run the cable (any length) to an swr bridge/transceiver. The base corners are connected via insulators to a

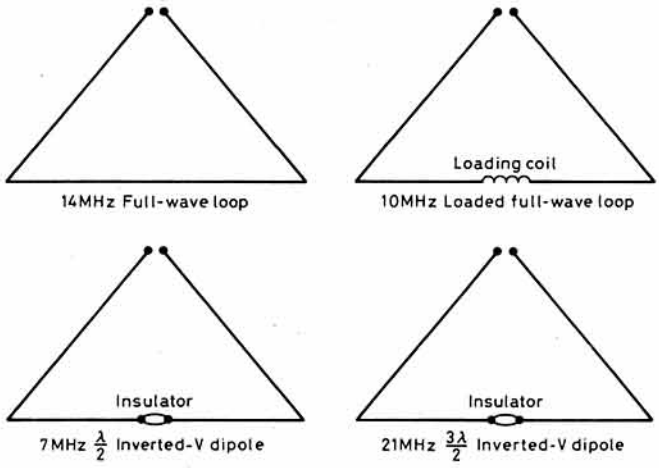


Fig 2. How a 66ft delta loop antenna can be configured for 14, 10, 7 and 21MHz to form the basis of GM3AXX's four-band antenna

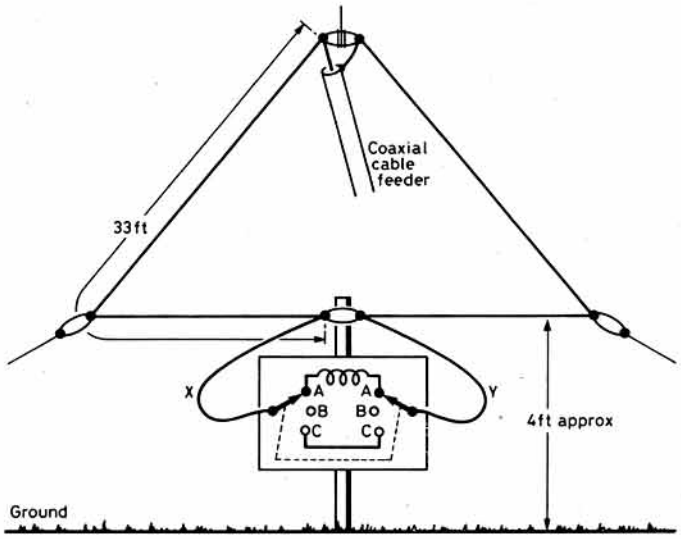


Fig 3. Practical construction of the GM3AXX's four-band antenna but note that having the base wire only 4ft above ground would breach safety recommendations except when used for very low power transmissions

convenient garden fence, etc, so that the base section is about 4ft above ground (*Note:* it needs to be higher if there is any risk of people touching wires at high rf—*G3VA*).

(2) Make up a ground post with insulator at the top and the switch box near the top. The insulator separates the two sections of the loop.

(3) With switch in position 'C' adjust lengths of stubs X, Y until loop resonates (ie shows low swr) at 14,050kHz (cw operation), 14,250kHz (ssb), or 14,200kHz (both).

(4) Then, and only then, with switch in position A, adjust the loading coil until loop resonates (low swr) at 10,125kHz. It is important that operation (3) is carried out before attempting (4). GM3AXX's coil is 20 turns on a 2in diameter former but a start should be made with 30 turns, then remove turns one at a time until the loop resonates.

The switch box should be waterproof and contains the two-pole, three-way switch (which needs to withstand high rf voltages except for really low-power operation). Switch positions are A for 10MHz, B for 7 and 21MHz and C for 14MHz.

I feel that it should be stressed that, except on very low power, the wires X and Y connected to the switch will be at high rf voltage, particularly on 7 and 21MHz, and that this needs to be taken fully into account where there is any possibility of anyone else, especially young children, having access to these wires.

The "Claw Mark 4" antenna

TT (March 1985, pp180-1 and a brief note in February 1986, page 107) provided information on a new form of loaded folded-dipole element for use in multiband arrays that has been under development over the past two years by Les Moxon, G6XN. The innovatory design, while remaining basically the same, has progressed through various detail changes in an effort to retain the advantages while eliminating problems in achieving repeatability and equally good performance on different bands, etc.

This has led to a Mk4 version, Fig 4, and G6XN has recently outlined the background to this development. He writes: "I remarked previously (*TT* March 1985) that the Mk3 version appeared to have no vices. However I later realized that on 10·1 MHz, whereas the Mk2 elements had been undercoupled, those of the Mk3 were seriously overcoupled. The neutralizing capacitances became so large that it became virtually a driven array. As indicated in my *HF Antennas for All Locations* book this meant that tuning and matching became difficult on this band, although with patience reasonable performance could be obtained.

"For Mk4 I have reverted to the earlier Mk2 arrangement in which the bent-over ends of the multi-wire section are brought down the expanding arms. Although the elements are shorter, the radiation resistance is not reduced and the effective height is increased. Coupling is satisfactory at 10MHz and current distribution in the loop is improved at 28MHz, removing any tendency for the radiation pattern to break up as well as providing a better match to 600Ω line. Planar loading has been discarded in favour of conventional helical (inductive) loading; replacement of metal by fibreglass has allowed the helices to be wound on 1in diameter tube at the lower end of the fishing rods. The number of wires in parallel has been reduced to two, simplifying construction.

"Another development is the discovery that for three-band operation it is not essential to use resonant feeder lines. For 14/28MHz a 50Ω feeder can be connected directly through a 4:1 balun. For 21MHz it is necessary to switch in another quarter-wave impedance transformer using a relay (a typical small relay proved successful) though no linear amplifier was used on 21MHz. Coaxial feeders, however, reduce the flexibility of the 'poor man's log periodic' feature."

Developed initially as a two-element multiband antenna G6XN has also tried it as a three-element array. While performance was improved on 28MHz, it is difficult to justify the extra complexity on other bands, and G6XN continues to stress that a two-element array can often be raised higher above ground than a heavier three-element antenna. He does not recommend using the extra element.

A small version of the "Mk4 Claw" has also been tested. The two outer elements (18ft span) from the three-element array were used. Arm lengths were increased to 16ft by means of 3ft 6in alloy extensions (for 28MHz this amount of metal should not be exceeded) and spacing reduced to 8ft to improve performance on 28MHz. Although not intended for 10MHz, this proved successful despite a calculated loss of 3dB relative to full size monoband performance. Feeders were short enough (about 40ft) to permit all tuning, matching and coupling adjustments to be carried out from the operating position, the loops being resonated only roughly prior to erection. Helical loading was distributed along the lower halves of the elements in contrast to the central loading of the basic Mk4.

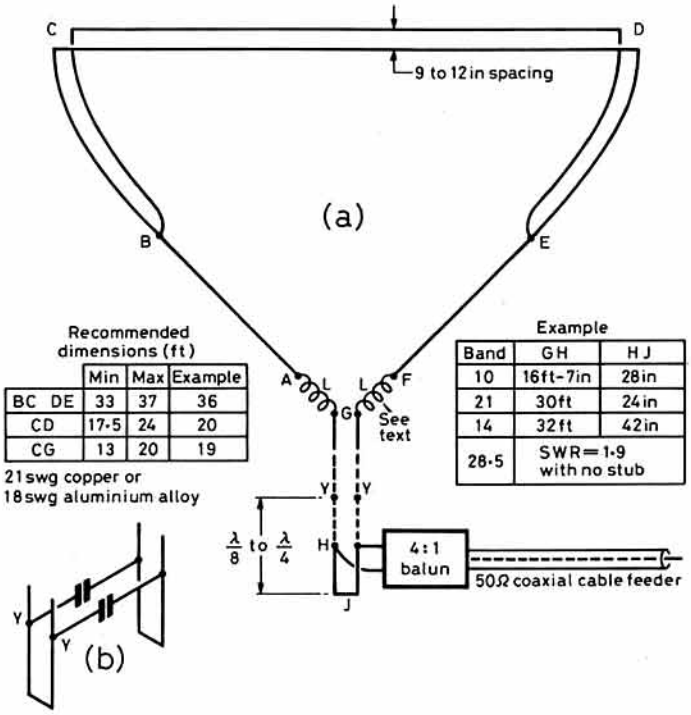
Constructional notes for the Claw Mk4

Reference should be made to the notes on the earlier "Claw" elements in *TT*, March 1985 and February 1986. The "example" dimensions shown in Fig 4 refer to a simulated loop laid out horizontally six feet above a lawn for investigation of current distribution, etc. The lower dipole (BGE) may be helically wound along the entire length or end-loaded as shown with short helices (10ft of wire in helix is roughly equal to 6ft straight). The stub dimensions for 600Ω line or other feeder systems could be calculated from the figures given, though these are intended only as rough guide-lines. An atu in the shack is usually all that is needed (ie *no* stubs) with 600Ω line except on 10MHz and, if long feeders are used, on 21MHz. To match on 21MHz (at ground level) feed with 600Ω line and find point of "zero" current. Insert 10pF capacitors in series with each wire at a point 3ft closer to the antenna. In two cases this met the requirements for 21MHz also (about 17pF at 5ft should give approximate match to 50 ohms via 4:1 balun). Antenna resonances checked with gdo should be in-band if feeder is shorted on the transmitter side of the capacitors.

For a two-element beam, a loop spacing of 12ft at top (lower ends at mast head) is recommended if 10MHz facility is required; otherwise 8ft spacing is sufficient. The semicircular shape shown in Fig 4 is believed to be optimum. This shape is readily achieved with glassfibre fishing rods tapering down to about ¼in diameter and suitably angled. Metal extensions at the lower ends of fishing rods may be used but a total horizontal metal dimension of one-fifth wavelength at the highest frequency band should not

be exceeded. Helices may be wound on the fishing rods or on any glass-fibre struts but *not* on the metal extensions.

The use of two feeders in order to allow beam reversal from the shack (see previous notes in *TT* etc) is very strongly recommended by G6XN. It is highly desirable to make the elements and especially the electrical length of the feeders *identical* (use gdo) so that nulling for one direction holds for the other and there is no need to readjust the atu. It is easy to provide reflector tuning at the operating position. Reflectors need to be tuned only slightly lower (typically 1 per cent) than the operating frequency. Tune for signal nulls. Should the nulls not be reasonably deep, coupling needs adjusting (eg by fixed capacitors, in or out of phase) between feed lines; see Fig 4 (b). Two element arrays as described tend to provide deep nulls on most bands but with the Mk4 element G6XN obtained only about 10dB on 21MHz. In such cases the coupling needs adjusting, for example, by capacitors between points on the feeders where there is significant rf voltage. The correct phase can be determined by observing the current in the reflector relative to the driven element, or more easily by trial and error. Points such as Y-Y on the diagram are ideal for a coupling adjustment (in-phase connection to increase coupling). In practice, a single small trimmer just inside the shack sufficed to give an "infinite" null depth.



Recommended dimensions (ft)

	Min	Max	Example
BC DE	33	37	36
CD	17·5	24	20
CG	13	20	19

21swg copper or 18swg aluminium alloy

Example

Band	GH	HJ
10	16ft-7in	28in
21	30ft	24in
14	32ft	42in
28·5	SWR=1·9 with no stub	

Fig 4. G6XN's improved Mark 4 element for "The Claw" multiband beam array. (b) Use of small capacitors to vary the coupling and so to improve the depth of the nulls on some bands

Anchoring towers to stay up

TT (November 1984, pp 965-6) drew attention to the safety problem of power-cables, gas mains and possible damage to other utility services including drains buried in the ground. At that time David J Reynolds, G3ZPF also gave advice on the preparation of mast and tower bases in order to ensure that the pressure that spreads downwards from underneath the base does not surcharge any drains, manholes or other surfaces. He noted that even a small lightweight mast should not be set up above a facility service since this involves the risk that you could be saddled with the blame for any subsequent damage; "Even if your base pressure does not, in fact, cause any damage, subsequent 'natural' faults of any kind will tend to be attributed to its presence by local authorities etc who will gleefully present you with the bill for repairs—and they may need to dig up your base in order to carry them out."

Rather different aspects of installing "anchors" for towers are touched upon by James H Hayes, W4XS, in a letter to *QST* (September 1986, pp49, 50); "More towers fail because of improperly installed anchors than for all other reasons combined. The most common sin involves a complete misunderstanding of the concrete anchor.

"Most amateurs use a posthole digger to sink a round hole for the tower anchor rod. They then fill the hole with concrete. Thus, the concrete takes the form of the hole—a cylindrical plug aligned with the axis of the guy. When guy tension is applied to the rod, it tends to remove the plug and all

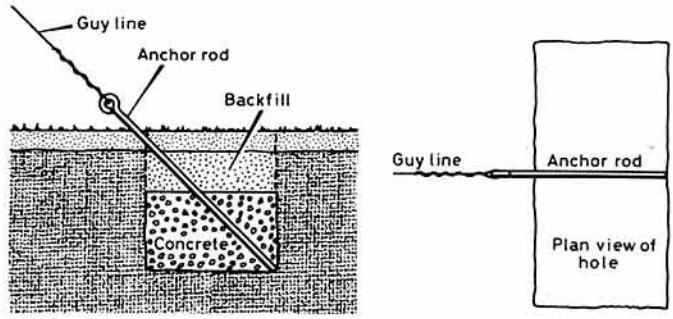


Fig 5. A cross-section of the form of secure anchor for antenna towers recommended by W4XS

too often succeeds. The unhappy amateur laments because he was sure he had enough concrete in the hole.

"The holding quality of a tower anchor is more dependent on the shape and position of the concrete than most of us realize. Here are a few hints for safe anchors:

The anchor hole should be dug in a rectangular shape and oriented perpendicular to the plane of the guy wires (see Fig 5). A backhole with a small (12in) bucket makes an ideal hole. The end of the guy rod should rest on the floor of the hole and touch the rear wall.

The anchor-rod eye should rest on the top lip of the hole, in line with the guy wire and exit the hole at about 45°. In order to assure the rod-eye position during the pour, drive a small wooden stake in the earth near the eye and securely wire the eye to the stake. The rod should not be bent. The tower manufacturer should specify the amount of concrete for each anchor. Be sure the rod remains in position during the pour and that part of the rod is covered with concrete.

In most installations, it is neither necessary nor wise to completely fill the hole with concrete. A 1- or 2ft block around the rod foot is usually specified. After the pour, backfill the hole and allow the concrete to cure before applying tension to the rod.

"After understanding this method, you can easily imagine how strong the anchor is. Any forces tending to pull the anchor from the ground must drag a small wall of concrete through undisturbed soil. When the rod is not bent or covered with concrete near the top of the hole, it is free to flex and not likely to fracture.

"The only anchor worse than a round concrete anchor is an earth anchor —and the only thing worse than an earth anchor is no anchor at all."

Early use of pi-networks

It is often forgotten that every circuit idea that today we accept as standard practice had to be thought of and implemented by one or more engineers. Hartley, Colpitts, Clapp, Gouriet, Vackar were/are all real people and similarly for the hundreds of circuit ideas that have never been called by the name of their originators.

At the recent 'History of Television' conference at the IEE, Dr Eric White (one of the early Marconi-EMI team that developed the 405-line system) described some of the many electronic circuits that were introduced in the 'thirties during the development of electronic tv in the UK and the USA. Today they are used (often in the form of integrated circuits) in all branches of electronics. But he confessed that he has never been able to track down the origin of the cathode-follower (emitter-follower) configuration although he recalls that the arrangement was much used in EMI research laboratories by 1933, especially as an amplifier output stage able to handle the stray capacitance of a length of screened cable connecting to the next panel, or to form a matched termination to such cable.

There is often considerable difficulty in pin-pointing the first use of a particular circuit configuration, particularly since, as in the case of the Clapp-Gouriet oscillator, two different engineers may develop the same circuit quite independently of each other. In the November *TT* I was rash enough to state: "To the best of my knowledge the first person to conceive and put into practice the idea of using the pi-network as an unbalanced output circuit for the final stage of a transmitter was John Brown, G3EUR for the 3 Mk1 ("B-1") suitcase transmitter-receiver of 1941-42."

This has resulted in a letter from S F Brown, G4LU showing that this technique dates back well before WW2. His letter has also enabled me to track down pi-networks used in this way in a 90/100W rf output transmitter for 7 and 14 MHz and in a 600W amplifier. G4LU writes: "Readers will be interested to know that the single-ended pi-network, as a tank circuit, was shown on page 82 of the 1938 edition of *Radio Handbook* as 'a simplified pi antenna coupling system' but strange to say it did not figure in any of the constructional equipments described later in the book (but see below).

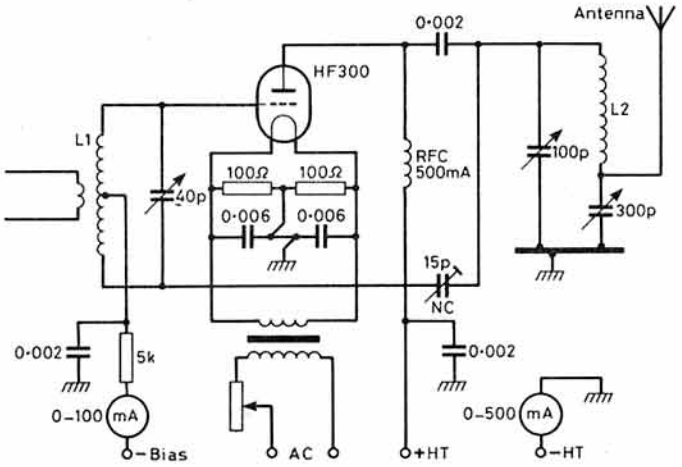


Fig 6. Grid-neutralized high-power amplifier using a shunt-fed pi-network tank circuit as published in the 1936 edition of *Radio Handbook*. Amplifier designs with this configuration had however virtually disappeared from the 1938 edition!

"As a matter of history, the circuit in its push-pull form goes back much further in time. It was used in a STC 60kW transmitter installed at Rugby Radio Station in 1929 for the telephone service to the USA and also in a Post Office-built transmitter of the same period for the South American service. In the PO transmitter the output capacitance was variable but the input capacitance, made up of the grid-anode capacitances and the associated cross-connected neutralizing capacitors. Tuning was accomplished by varying the reactance of the inductive branches by means of series capacitances which, in some conditions, could flash-over on the dsb modulation peaks. This could mean panic stations all round to restore the transmitter to traffic!

"Another interesting feature of the circuit was that ht was fed to the valves by tapping into the coil at the nodal voltage point; this was found by using a "stick voltmeter" which in one tragic case proved to be lethal. This instrument was simply an insulated rod with a metal stud in the end. The stud would pull an arc from points at high rf potential; no arc no volts!"

G4LU's reference to the pre-war *Radio Handbook*, resulted in my checking the even earlier 1936 edition in the IBA Library. Pages 122-3 describe and illustrate two versions of a "90W cw transmitter" for 7 or 14MHz using two of the then popular "210" power triodes in the power amplifier. The first version has a "grid-neutralized final amplifier" in which the choke-coupled tank circuit indisputably forms a pi-network coupler.

The same basic grid-neutralized, shunt-fed pi-network circuit is also shown on page 95 of the 1936 *Radio Handbook* for a 600W cw amplifier based on the HF-300 power triode; Fig 6. This emphasized that shunt-fed tank circuits call for efficient rf chokes which have no resonances near any of the bands on which the amplifier is to be operated. This important piece of advice was often overlooked in the first post-war decade when pi-network tank circuits came back into favour. *Radio Handbook* pointed out that many types of rf chokes could fail in service when used on 3·5MHz but

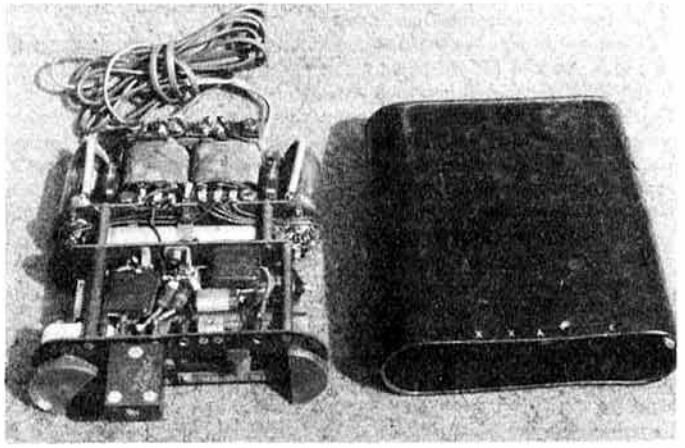


Photo 1. The Type 51/1 miniature transmitter providing about 3W rf output, introduced during 1945

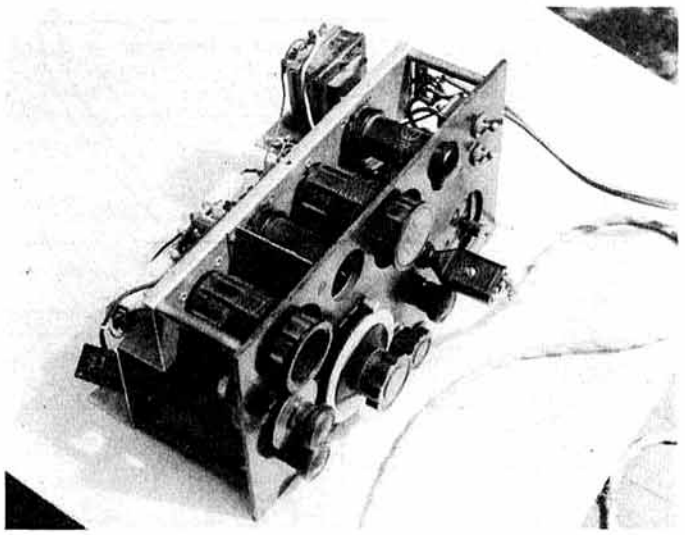


Photo 2. Mains-operated 1-v-1 hf receiver. This appears to be an early version of what developed into the MkXV receivers made in considerable numbers for British Intelligence Signals at Whaddon near Bletchley from about 1939. Almost certainly it would have originally been fitted in a wooden cabinet. Photo by G4HHZ. The receiver still brings in weak signals. The contrast with the Type 51/1 unit shows how the wartime need for very compact equipment speeded miniaturization

stood up satisfactorily when used on 7 and 14MHz, adding: "If the rf choke becomes quite warm after a few minutes of operation, it is proof that power is being lost in the choke and a replacement should be made by a more suitable type. The plate-blocking capacitor should be mounted at least 1in from the metal panel in order to minimize the capacitance to ground." Still extremely useful advice 50 years on!

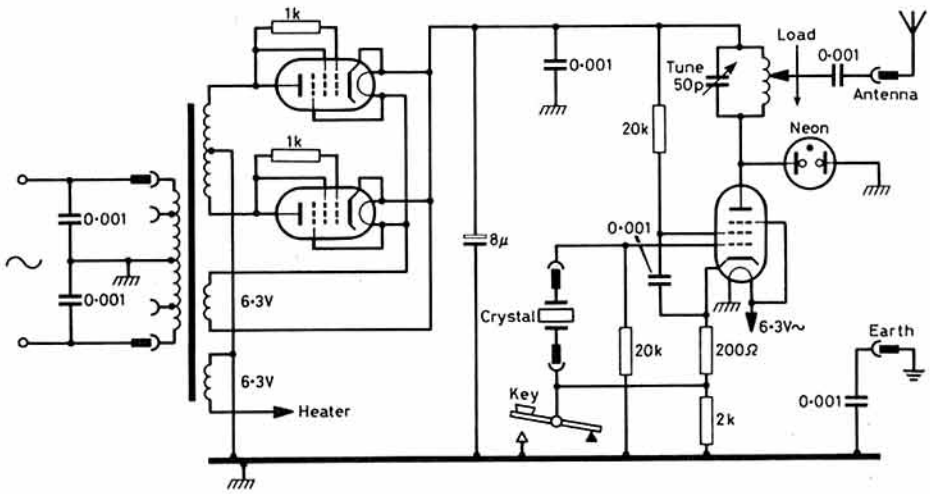


Fig 7. Circuit diagram of the 3W SOE "pocket transmitter" as introduced in 1945 and possibly the smallest hf transmitter of WW2. Three similar valves type CV136 (EL91 etc) were used as power oscillator and full-wave rectifier. The outer case measured only 5¼ by 4½ by 1¼ inches and weighed about 1lb 11oz. Component values include some modern replacements in the example held by John Lawrence, GW3JGA

It is curious that amateurs were using the pi-network tank in the mid-'thirties but the idea then dropped out of sight until G3EUR resurrected it for some of the wartime suitcase sets. The American OSS organization based their SSTR-1 suitcase radio on G3EUR's B-2 so it may well be that the idea went back to the States as an SOE export!

Every time I mention the portable wartime clandestine radios there are always readers anxious to identify sets they have acquired (Pierre Lorain's *Secret Warfare* book is an excellent source of information). Photo 1 and Fig 7 show SOE's 51/1 pocket transmitter that was used on a limited scale in the final months of the war. This had an associated pocket "straight" receiver (53/1) using three 1T4 miniature valves. Photo 2 shows an early (and comparatively heavy) mains-operated 1-V-1 regenerative "straight" receiver with three metal 6SK7 valves built for the British Intelligence Service at Whaddon. I recently had a chance to try out this very lively receiver which belongs to an IBA colleague Tony Harwood, G4HHZ. It still brings in plenty of signals (unfortunately not always one at a time) on 3·5, 7 and rather less effectively on 14MHz. The old valve "straight" sets were much better than many younger readers might suspect, with sensitivity often better than early superhets and (at least on cw) with the selectivity improved by regeneration and sometimes by an audio filter.

Safe operations

In September 1984, *TT* sadly reported the deaths of two professional broadcast engineers (using an ob vehicle) and two citizen's band operators all of whom were electrocuted while attempting to erect antennas close to overhead power lines. It was stressed that the risk of a metal pole or antenna coming into contact with high-voltage power lines is "undoubtedly the single greatest potential hazard in field operation and antenna erection". Since there is always a risk that a metal pole may bend or become out of control during its installation or erection, a very wide berth indeed should always be given to power lines. As a correspondent later pointed out this is advisable not only on grounds of safety but also due to radiation of interference from high-voltage overhead power lines.

Sadly, the American magazines have reported the death during the 1986 Field Day of Mike Mankey, WB0TEE, an ARRL section manager. Apparently the group were using an unfamiliar site and failed to spot power lines hidden behind trees. A tragic reminder of the ever-present danger from power lines whether high voltage, 480V three-phase, or standard 240V or (in North America) 117V.

TT has previously re-printed the RSGB safety code; for a change here is the ARRL code as published in *QST* (September 1986, pp88–9):

"There are reasons for accidents involving radio gear, but never *good* reasons. Take no chances with electricity. Even a low-voltage shock can be serious—sometimes fatal.

"Heed the ARRL safety code; While there's no reason for you to be involved in a ham-related accident, that possibility always exists if you are not thinking safety. Following the ARRL safety code will make your ham experience more enjoyable. Read it and practice it.

(1) Kill all power circuits completely before touching behind the panel or inside the chassis or the enclosure.

(2) Never allow anyone else to switch the power on and off for you while you're working on equipment.

(3) Don't troubleshoot in a transmitter when you're tired or sleepy.

(4) Never adjust internal components by hand. Use special care when checking energized circuits.

(5) Avoid bodily contact with grounded metal (racks, radiators) or damp floors when working on the transmitter.

(6) Never wear headphones while working on gear.

(7) Follow the rule of keeping one hand in your pocket.

(8) Instruct members of your household how to turn the power off and how to apply artificial respiration. (Instruction sheets on the latest approved method can be obtained from your local Red Cross office).

(9) If you must climb a tower to adjust an antenna, use a safety harness. Never work alone.

(10) Do not install antennas at levels that permit humans or animals to come in contact with them. Not only might the victim sustain a severe rf burn, he or she could run into the antenna and be injured.

(11) Do not operate high-power uhf or microwave gear that has inadequate shielding against radiation. Similarly, do not look into or stand near microwave antennas when transmitter power is being fed to them.

(12) Do not install antennas near electrical power lines.

(13) Don't drink alcoholic beverages when working on equipment or installing antennas.

Take time to be careful. Death is permanent."

Parallel resistance nomograph

In these days of home computers and pocket calculators the use of nomographs, a form of analogue computer, has greatly diminished, yet for many purposes they remain simple and convenient, often providing entirely adequate accuracy. A nomograph that is new to me appears in *QST* (September 1986, page 50) republished from an item by James V Smith, KD4YD in the Manalee ARC bulletin.

This provides an easy way of finding the resistance of two resistors in parallel or alternatively convenient resistor values to provide a required value when connected in parallel. It simply consists of three intersecting lines, the outer two at 120° bisected at 60° with a third line all linearly calibrated to the same scale; see Fig 8.

To find the combined value of two resistors, plot the value of one on line R1, the second on line R2. Then the value of them in parallel is represented where a line joining the two points intersect. To find a combination yielding a given value, then, if that point is plotted on RT, any line passing through that and crossing R1 and R2 will show a possible combination.

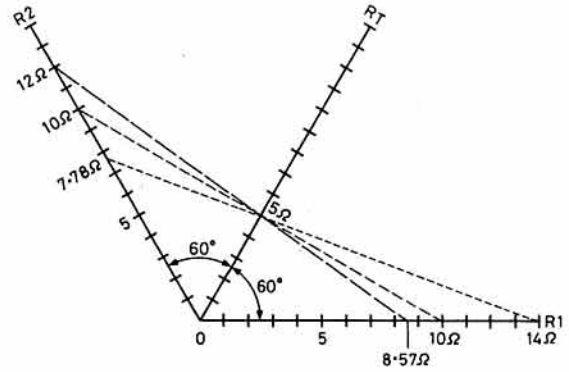


Fig 8 KD4YD's simple nomograph for two resistors in parallel

Lightning protection

In the November issue (page 781) I quoted the letter from David Jones, N4JED, originally published in *QST*, in which he warned against using coaxial switches as a lightning protection switch. It is only fair to note that Don Tyrrell, W8AD of Alpha Delta Communications has commented (*QST* October 1986, page 50) as follows: "With regard to the letter from David Jones, I believe a clarification is in order since Mr Jones made his assumption based on only one type of station configuration. His letter describes a ground at the antenna and another at either the rig or through the ac line.

"If a coaxial switch is inserted exactly as he described, with no other grounds installed, his assumption is correct. In that case, the lightning surge current would be shunted from the coaxial centre conductor to the shield through the switch and to the rig. However, an internally gounded coaxial switch is a mechanical crowbar when in the grounded position, and can serve as an effective lightning surge protector (for near misses, not direct hits) when the station arrangement is changed as follows:

1. Attach a separate, external ground wire to the switch itself and run the wire to the station ground system (not the chassis).
2. Ground the coaxial cable shield to an external ground where the cable enters the building. Since our line of Transi-Trap coaxial surge protectors and our DELTA-4 gas-tube-protected coaxial switches are electronic crowbar devices, we list the same precautions in our installation sheets. It is true that *no* protector or switch should be tied back to the equipment chassis or depend on the chassis ground wire only to provide a proper surge-current return path. In so doing, a chassis can be raised many hundreds of volts above ground, causing serious component and equipment damage.

"Most equipment damage comes from lightning-generated surge voltages from distant, out-of-sight storms, so a good protector has a definite place in a communications station. (Italics added). During nearby thunderstorms, however, it is always good practice to disconnect all cables."

In the November *TT* I mentioned the problem with the unprotected front-ends of AR88 and HRO receivers of the antenna coils being burnt out by static or local rf pick-up. This has prompted Jack Maling, G5JL, to comment that some time ago his old Dynatron vhf/fm broadcast receiver, connected to a fairly high outside antenna mounted on the chimney, twice, in about two years, lost its front-end coil, presumably due to static. Since the total cost of repair amounted to some £50, he claimed on his "house contents" insurance policy that covers lightning damage. On each occasion the company paid up without comment. It is, however, questionable

whether claims would be successful for transceivers etc which might not be considered as "domestic" equipment unless separately covered. There might also be difficulty in proving that the damage was due to lightning and not your own tranmissions!

As George Jessop, G6JP, indicated a few years ago (*Radio Communications*, December 1982, pp1042–46) gas discharge tubes (gdt) can provide useful protection; these are often called "gas filled surge arrestors".

AC mains transient protection

As noted by W8AD above and in the December *TT*, surge voltages can be generated on the ac supply lines both from distant lightning and from switching operations. Such voltage transients can induce costly faults in radio communications equipment and consumer-electronics appliances. Jerry Hinshaw, N6JH, in "AC line transient protection" (*Ham Radio* April 1986, pp59–61) describes how he put his video cassette recorder out of action with his lawnmower. "One day as I was trimming the weeds in my front lawn, my electric lawnmower blew a motor field rectifier and began to draw a heavy current from the ac line. The situation was quickly, but not instantaneously, corrected by the house circuit breaker tripping and breaking the circuit, as it should do.

"The electric fields in the motor collapsed, producing a large back emf on the now open-circuit ac supply cord. Unfortunately this cord connected the mower to the house circuit on which my vcr was awaiting the start of a tv programme.

"The vcr, like much modern equipment, including most transceivers and home computers, does not like high voltage spikes coupled into relatively fragile cmos ic devices. On a computer, line spikes or transients can cause data drop-outs, "soft" errors in the ram memory etc. In my vcr (luckily still under warranty) the unusually hefty transient fried some component on the microprocessor board."

N6JH notes that in the USA a number of "clean" outlet boxes are marketed that have built-in protection against voltage spikes. These units normally fit one or more small metal oxide varistor (mov) devices to provide transient suppression. The mov is a form of fast-acting voltage dependent resistor that is rather like a pair of back-to-back zener diodes. For this type of domestic application an mov is effective and tends to cost less than the "breakover diode" (form of back-to-back thyristor) described in the December *TT*.

A mov device can absorb, for its modest size, a surprisingly high energy transient lasting a matter of microseconds.

In the UK there are various "clean" sockets usually fitted with mov devices on sale; there are also rather lower cost 13A plugs fitted with presumably similar surge suppressors. N6JH however notes that in the USA the special outlet boxes cost at least $25 whereas on a diy basis he reduces the cost to about $5 per outlet box, using General Electric (US) metal oxide varistors type V130LA10A. GE devices are available in the UK, though I cannot find any listed in the latest trade catalogue of RS Components. But remember that you cannot use a V130 device on 240 mains (USA 117V) and you would need a V250 or V260 type of device. The V number indicates the voltage at which the resistance of the device begins to fall rapidly.

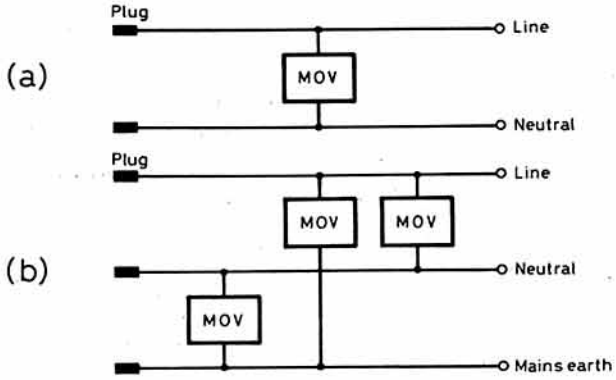


Fig 9. Schematic diagram show how metal oxide varistors (mov) can be installed to protect equipment from power line transients. (a) Two-wire system with single mov. (b) Use of three mov devices to protect fully a three-wire system

Fig 9(a) shows a single mov used to protect a two-wire appliance, but for the more usual (and recommended) three-wire equipment and appliances it is advisable to use three devices as in Fig 9(b). But, of course, make sure that the outlet box or plug is put together so that there is no possibility of any hazard to you, your family or your pets!

The break-over-diode is intended primarily to protect telecommunications equipment where present practice is to use gas discharge tubes (gdt) at the interface to the outside world. The use of a gdt alone is not considered satisfactory as the residual voltage resulting from the relatively slow switch-on and high firing voltage can damage semiconductor devices. BT have been adopting a distributed two-stage protection strategy to protect against (a) surges due to lightning, (b) induction from adjacent power lines, and (c) accidental direct contact between power lines and telephone cables. It seems likely that the bod may become established in this area.

Tips and topics

Brian Bower, G3COJ adds to the 6L6 saga by recalling a story told to him by J B Gunn, the Englishman who was later to give his name to the Gunn-diode oscillator while working for IBM in Switzerland. As a schoolboy he was evacuated to the USA during WW2 and later became a member of the Cambridge University Wireless Society where G3COJ knew him. While in the USA he came across an American amateur who ran no less than 250W input to a pair of 6L6 valves. This involved soldering two large tin cans to the metal valves and filling them with water! With the aid of this improvised heat-exchanger, heat-sink, water-cooling system, call it what you will, it proved possible to run two 6L6s in a quarter-kilowatt transmitter. □

A SIMPLE SWR METER FOR QRP USE

(Continued from page 26)

My version uses a single switched meter because that's what I had in the junk box. If you want to make a twin-meter version then this should present no problem but you will need a two-ganged sensitivity potentiometer and will not need the FORWARD/REVERSE switch.

Setting up

The only setting up required is to adjust the values of the terminating resistors to suit the load impedance. To do this, connect a 50Ω dummy load (or non-inductive resistor) to the LOAD connection and a low power transmitter to the TX connection. Switch to FORWARD and adjust transmitter power for approximately full-scale deflection on the meter. Now switch to REVERSE and adjust RV1 for minimum on the meter. Reverse the TX and LOAD connections and repeat the procedure but this time adjusting RV2. Return the connections to normal and the swr meter is ready for use. □

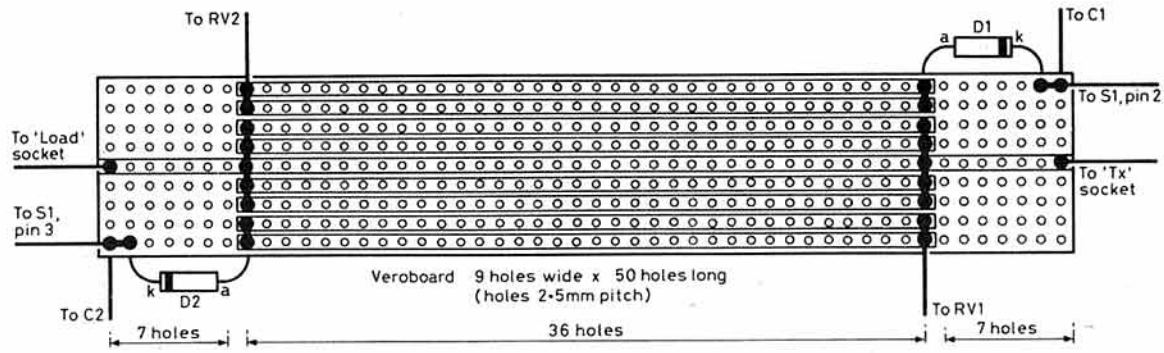


Fig 3. Veroboard layout

NEWS BULLETIN

What Price the Radio Spectrum ?

As we were going to press, the management consultancy CSP International was due to present its final report to the DTI, which was expected to recommend wholesale adoption of "spectrum pricing" - i.e. handing over the radio spectrum to market forces instead of licensing individual users and frequencies as at present. This idea was considered by the Merriman report on the future of the radio spectrum three years ago and CSP was appointed to study the implications and possibilities, as reported in RadCom. The Society did contribute to the CSP review and made various points about the nature of amateur radio.

It is understood that the CSP report proposes that the Government should relinquish detailed control of most of the radio spectrum not used by the military to independent Spectrum Management Licensees (SMLs). Each SML would control a block of radio frequencies and "sell" them to users. It is likely that some SMLs would be existing large-scale radio users, such as the BBC, IBA and British Telecom; however, the majority are likely to be private-sector companies known as Frequency Planning Organisations (FPOs). These are expected to be divisions of existing companies in the field of radio engineering and are likely to be chosen by competition. The report is understood to draw an analogy between this method of choice and that used to select Racal-Vodafone and BT/Securicor as operators of cellular systems. FPOs would be responsible for frequency allocation, the maintenance of technical standards and administration. It is understood that FPOs will also be responsible for monitoring and preventing abuse of frequencies allocated to them.

It appears that amateur radio will not be subject to these arrangements, and the SML/FPO system will not apply. According to a source close to CSP International, amateur radio was thought to fall well outside the possible terms of reference of the new recommendations and no proposals were formulated. We should have full details of the report in next month's Bulletin.

The photo above, taken at the recent Liverpool & DARS party shows David Evans, G3OUF, RSGB Secretary, beating the drum for RSGB again!! He is accompanied by Basil O'Brien, G2AMV, Council Member, on piano and Bert Donn, G3XSN, RR1, on bass guitar. The trio has no intention of playing at this year's Presidential installation.

ALL CHANGE FOR WEST GERMANY

On the first page of last month's Bulletin we set out the details of the unilateral agreement the UK has with West Germany which permits British visiting amateurs to operate without a reciprocal licence. Unfortunately, it's all changed. In a telex dated 4 December 1986 the DTI gave us the following bad news:

> "....(We) regret that we have just been informed by the West German authorities that they are no longer prepared to continue with the informal arrangement which they offered....whereby UK amateurs have been permitted to operate their stations in West Germany without first obtaining a reciprocal licence. You will recall that West Germany has adopted the CEPT recommendation TR 61/01 (asking for a common CEPT licence document to be adopted by member countries) and that as an interim measure they were prepared to allow UK amateurs into their country on the basis of a UK licence and a letter of introduction from this administration. More recently the German authorities have come under pressure from German amateurs to withdraw this concession because the UK authorities are unable to reciprocate the arrangement. The German authorities are, therefore, unable to extend this informal arrangement, especially since the UK is not intending to adopt CEPT TR 61/01 for some time yet.
>
> "Until further notice UK amateurs will have to revert to obtaining reciprocal licences under our existing agreements when visiting West Germany and the rest of Europe"

In other words, as you were. We've dug out the software we put away last month and we're sending out the same letter as we used to - so if you're planning to operate in West Germany, forget what we said in the last Bulletin and drop us a line.

50 MHz Reporting Group

With the general release of the 50 MHz band to class A amateurs in February 1986, the 50 MHz Research Project - which involved 100 permit-holders - came to an end. Both the VHF Committee and the Propagation Studies Committee are keen that the work started by the permit-holders be continued, and they are therefore setting-up a "50 MHz Reporting Group".

The aim of the Group will be to collect information about propagation phenomena and associated techniques at 50 MHz, to collate the information and to publicise the results, both to other group members and - via Radio Communication - to other amateurs. The Group will also send regular reports to the DTI, who are keen to monitor the development of the band.

The Group will be run by the VHF Committee, which has appointed Ray Cracknell, G2AHU, as co-ordinator. It is expected that the Group will have about 50 members, although the number will be reviewed from time to time depending on the number of applicants and their level of activity.

Members of the Group will be asked to produce reports of their activity, in mainly anecdotal form, from which the co-ordinator will produce a colated report for circulation. Members won't be required to produce great volumes of written work or complete log extracts, but it will be important for them to report regularly.

If you're currently active on 50 MHz and want to make a real contribution to the research programme, please write to Ray Cracknell, G2AHU, who is QTHR, indicating your willingness to take part. He will send you a copy of the Group's terms of reference and other details. When you write, please add a brief description of your station.

NEC date change

Having had a think about the way the last few NECs have worked out, we've decided to open on Friday/Saturday this year instead of Saturday/Sunday to see how things work out. If you'd like to take out your nice new 1987 diaries and write in them:

NEC - 27 March 1987 1000-1800
28 March 1987 1000-1800

..... we'd be amazingly grateful.

VK6 America's Cup Award

Perth, Western Australia, the current home of the America's Cup, is presently defending its right to hold on to the coveted trophy - don't worry, this isn't a bit out of the script of Howard's Way, read on..... To mark this important event the Western Australia Division of the Wireless Intitute of Australia (the oldest Society in the world) is offering the "VK6 Cup Award".

Australia took the America's Cup from the USA in September 1983 when Australia II raced home to victory, and the 1987 America's Cup Challenge is the biggest sporting event ever held in Perth. For the first time in the 135-year history of the Cup, a special amateur radio station is operational, using the callsign VK6CUP. 14 yacht clubs from six nations are currently battling it out off the coast at Fremantle for the right to challenge the Royal Perth Yacht Club in February. The station will be active until the end of the final race when the operators will close down - no doubt hoping to celebrate retaining the Cup.

To obtain the VK6 America's Cup Award, stations must obtain 4 points. This can be done either by contacting the special station, VK6CUP (worth 4 points) or by contacting 4 licensed amateurs in VK6 (worth 1 point each). The same rules apply for short wave listeners. (Incidentally, the four points represent the four defending Australian syndicates.) So, if you'd like the award here are some of the frequencies and times where you might find VK6CUP:-

1,825kHz - 09-15h UTC - J3E
3,525kHz - 11-15h UTC - A1A
3,585kHz - 10-17h UTC - J3E
3,620kHz - 10-17h UTC - J3E
7,012kHz - 06-16h UTC - A1A
7,080kHz - 06-16h UTC - J3E
10.137MHz - 01-10h UTC - A1A
14.052MHz - 08-12h UTC - A1A
14.068MHz - 08-12h UTC - F1B
14.167MHz - 03-16h UTC - J3E
14.187MHz - 03-16h UTC - J3E
14.220MHz - 22-01h UTC - J3E
21.065MHz - 01-12h UTC - A1A
21.180MHz - 01-04h UTC - J3E
28.512MHz - 01-07h UTC - J3E

Applications should be sent together with 4 IRCs to:-

Cup Award (VK6XV)
WIA VK6 Div.
PO Box 10
West Perth, 6005
Western Australia

Thanks to John Brown of Western Australia House, London, for his help with this story.

The photograph above shows Krishna Khatry, 9N1MC, Chief Engineer at the Ministry of Communications in Nepal. Krishna is active on 10, 15 and 20 metres from 0900-1400 UTC and he tells us that there are just three licensed amateurs in Nepal - 9N1MM, 9N1RN and 9N1MC. A special station, 9N1HCK was licensed to operate from 30 July to 4 August 1986.

SYLEDIS & MOULD

Sharing the 430 MHz band - who, why and where

As everyone knows, the amateur and amateur satellite services share 430 MHz with other users - in fact we had a piece a few Bulletins ago which laid to rest a few of the myths about losing the 430 MHz band to the Ministry of Defence. We thought it was about time to expand on that a little, since there still seems to be the occasional amateur who doesn't quite have the picture.

First of all, a bit of background. The International Telecommunication Union, which is an agency of the United Nations, publishes two large and heavy tomes with red covers called the Radio Regulations; after you've spent the best part of a week finding your way around them you're in a good position to find out almost anything that's been internationally agreed about radio frequency spectrum allocation. A good part of Volume 1 is taken up with something called an Analytical Table, which sets out how almost every country in the world has agreed to use the spectrum between 9 kHz and 400 GHz. We've reproduced the part applying to our 430 MHz band so you can see what it looks like, and you'll note that in Region 1 (which includes the UK, of course) 430-440 MHz is allocated to the Amateur Serice and to Radiolocation. Both are written in capitals, which means that both are what is known as "primary services" (as opposed to the other possible categories, "permitted" and "secondary"). Essentially, the distinctions are that primary and permitted services have equal rights except that the primary service has first choice of frequencies over the permitted service. If you have "secondary" status, three things apply; you mustn't cause interference to stations with primary or permitted status, even if they arrive on the scene after you; you can't claim protection from interference from primary or permitted users; but you can claim protection from other secondary users who came after you.

When you look at the relevant pages of the Radio Regulations, you'll also see a string of numbers underneath the allocation details. These are called "footnotes" and refer the reader to spcial conditions which apply in certain countries. Practically the only one which applies to the UK is No.653, which states that 420-460 MHz is also allocated on a secondary basis to the aeronautical radionavigation service for radio altimeters - although to the best of our knowledge the Royal Air Force ceased using rad.alts. in that part of the spectrum some years ago.

So - amateur radio shares the 430 MHz band with something called "radiolocation". What's that? Well, the Radio Regulations have a definition of it - it's "the determination of the position, velocity and/or other characteristics of an object, or the obtaining of information relating to these parameters, by means of the propagation properties of radio waves (but not navigation)". Which brings us nicely to one of the things we share 430 MHz with - SYLEDIS.

This isn't the place to go into the technical characteristics of SYLEDIS (actually the VHF Committee is working on an article to do just that for a future RadCom), but here's a general outline. SYLEDIS is a French system (in fact the word is a French acronym, but we won't tell you what it's an acronym of because it'll answer one of the Christmas Quiz questions...!) which uses an extremely clever and complex pulse transmission system to determine the precise position of things like oil pipelines, oil rigs and what-have-you. It's also used for positioning various types of vessel used in the oil industry to the order of accuracy they need, typically metres. SYLEDIS is one of a category of radiolocation systems which are known as "trans-horizon systems" by the DTI, and over the years it's proved very popular indeed with the oil industry - basically because it's relatively cheap and simple and it does the job. It was first used extensively during the period when exploration of the North Sea was becoming big business, and since then it's been used for all sorts of seagoing survey tasks where it's important to know either where you are or where something else is to a high degree of accuracy.

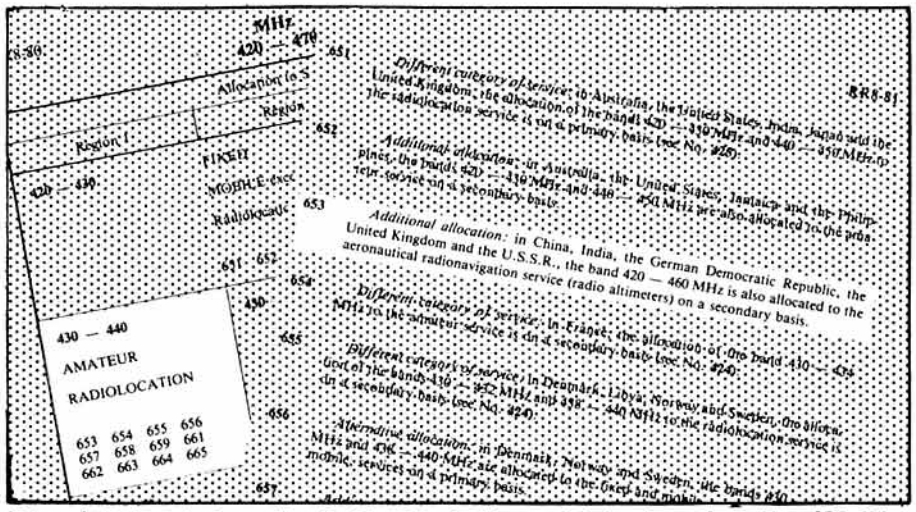
The reason it's in the UHF part of the spectrum is that it gives operators the range and accuracy they need; the reason it's in 430-440 MHz, at least around the UK, is that - officially at least - it's the only place it could go. Unfortunately, the penalty paid for the accuracy and range of SYLEDIS is that, in engineering terms, it's exceedingly spectrum-inefficient because of its broadband nature. That's why, if you're on the South Coast or there's a good opening at 430 MHz, large sections of the band are apt to disappear underneath the characteristic raspy clatter of a SYLEDIS system. It uses a lot of spectrum - which would be all very well if it was operating at several GHz or, from our point of view, not sharing our band!

To be blunt about it, SYLEDIS has every right to be where it is and, certainly for the next few years, we simply have to put up with it. The DTI has always viewed the oil industry as vital to Britain's well-being, and the oil industry has always said that it's very happy with what SYLEDIS offers it. What will probably happen in the future, however, is that newer systems - especially those using satellite navigation techniques - will take over from it. However, there is another variable to take into account - which is the other system we share 430 MHz with, the Ministry of Defence's MOULD.

But wait! We just said that the Radio Regulations allocate 430-440 MHz to amateurs and radiolocation - what's another system doing in the band? Well, there's another side to the Radio Regulations. The Regulations simply set out what the various administrations which administer radio in their countries have agreed to do internationally. However, they're not binding - in other words, they don't have the force of law - and it is universally agreed worldwide that, provided they don't thereby cause interference to the services of other countries, individual administrations can do whatever they want in their own countries. A case in point is the amateur 50 MHz allocation in the UK. You won't find anything covering amateur operation at 50 MHz in Region 1 (in the UK or Western Europe anyway - Footnote 559 says that 11 African countries in Region 1 have 50-54 MHz allocated to the amateur service on a primary basis, lucky them) in the Radio Regulations because it hasn't been agreed by all countries that amateurs may do so - as we said about a year ago, the DTI went out on something of a limb by opening it up to Class A licensees and probably got more than a few rude telexes from administrations in other countries who were concerned about possible interference.

As a matter of interest, the DTI publishes a book, "United Kingdom Table of Radio Frequency Allocations" which sets out what happens in the UK (you can get a copy from Her Majesty's Stationery Office - it's ISBN 0 11 513819 6 and it currently costs £12.00). We haven't enough space to reproduce it here, but on page 143 it shows that fixed, mobile and radiolocation are primary users in the UK and that the amateur and amateur satellite services are secondary. It also shows the one-off allocation of 431-432 MHz to the land mobile (ie PMR) service - the one which is operative within 100 kilometres of Charing Cross. The fixed and radiolocation services are shown as being allocated to "Government" - fixed covering MOULD, of which more in a minute, and radiolocation covering Fylingdales and PAVE PAWS ditto.

In fact, the position in the UK is that, despite what the international ITU Radio Regulations say or don't say, our bands from



(Above) Extract from the Radio Regulations which shows how the 430 MHz band is allocated internationally. Footnote 653, mentioned in the text, is highlighted - as is the Region 1 allocation.

430 MHz up are shared with the Ministry of Defence - and as we've seen in the case of 430 MHz, MoD has primary status and we are secondary users. This means that all the comments we made about secondary users above apply to us when it comes to 430 MHz and up.

Which brings us to MOULD.

MOULD is an "area-coverage" military communications system used by forces concerned with what MoD calls "Home Defence" - it's basically intended to provide communications betwen static and mobile units. It was conceived in the early seventies, and Phase 1 cost £7 million to install. Ten regional systems using FM provide communications between Army district headquarters, GOC Rovers, Regular Army and Territorial battalions and subordinate headquarters; you could almost regard it as a repeater system like our own but one in which the hilltop sites are interlinked by VHF and UHF bearers. There's a maximum of seven "hops" between users. When it's complete there will be about 150 hilltop sites and 200 links using 227 different channels. MOULD uses Pye Pegasus equipment with Selcall selective calling: Phase 2 of MOULD has just been completed (at a cost of £3 million) and Pye FM914 equipment is used for that. The Phase 1 Pegasus equipment uses 18-channel radios with 12.5 kHz spacing operating at 68-88 MHz and the bearer links use 140-150 MHz and (which is where we get interested) 420-450 MHz. The UHF MOULD link frequencies use a 25 kHz channelling scheme which just happens to be offset from our own channels by 12.5 kHz. As a matter of fact, we'd have thought that any sensible RF engineer would know that you can't interleave two 25 kHz FM systems by 12.5 kHz just like that without the occasional problem, but let that pass....

MOULD is looked after by the four Territorial Home Defence signal regiments of 2 Signal Brigade, and in general terms it doesn't cause many problems for radio amateurs. The Society, as always, has good connections in the right places and we've been able to get the odd problem solved very quickly and amicably. Certainly it doesn't cause anything approaching the amount of angst that SYLEDIS does.

Obviously there's more to it than that, but we're not that interested in finding ourselves in court faced with charges under section 2 of the Official Secrets Act. However, to summarise;

a) we share 430-440 MHz with SYLEDIS and MOULD, and theoretically with radio-altimeters

b) SYLEDIS has every right to be there under the terms of the Radio Regulations; MOULD has every right to be there by the same thinking that allows us to operate on 50 and 70 MHz

(cont p37 col 2)

Helplines

Have you experience in the development control process and planning appeals, from either side of the fence?

Have you experience in drafting planning policies, making observations on them or on Government's draft proposals for changes in circulars, regulations, etc?

If you have either or both, would you like to help your fellow members who may be having difficulties with their Local Planning Authorities?

Council has now reinforced its organisation for assisting with this important service to members, but more volunteers are urgently needed to assist. A member with knowledge of Scottish law and practice would be especially welcome.

If you can help, please write to "The Secretary (Planning)" at RSGB Headquarters, enclosing a brief note of your experience and indicating whether you would be willing to assist members at appeals. We obviously appreciate that some potential members who could offer advice might not be able to go to appeals because of restrictions imposed by their employers.

Please help us if you can - we'd like to help members in this important area.

~

The RSGB and the DTI are shortly to embark upon a major review of the UK licence.

Input from members is welcome and should be sent to "The Secretary" at RSGB Headquarters, marking your envelope "Licence Review" in the bottom left corner. Please keep your comments clear, concise and to the point.

53rd PRESIDENTIAL INSTALLATION

The installation of the Society's President for 1987, Mrs Joan Heathershaw, G4CHH, will take place on 17 January 1987 at the Gimcrack Rooms, York & Ainsty Suite, York Racecourse - the cost per head will be £6.00 and tickets are available from Heather Norman RSGB HQ, closing date 10 January.

MORSE TESTS

The following list shows the dates and locations of all the available test centres from the begining of February to the end of March 1987, as we went to press. If you want to take a test and any of the centres shown is within striking distance, send for an application form straight away. Completed applications will be dealt with strictly on a first-come first-served basis.

If there is no appropriate centre for you please contact RSGB Headquarters in a few weeks. By this time we may well have been notified of some additional centres, one of which may be more convenient for you.

Morse tests will be carried out in groups of three and will be of half an hour'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
Co Durham	Peterlee	02/02/87
Gwent	Newport	02/02/87
Guernsey, Channel Is	St Martins	05/02/87
Cambs	Cambridge	06/02/87
Cheshire	Macclesfield	07/02/87
Somerset	Burnham on Sea	08/02/87
North Yorkshire	York	14/02/87
Nottinghamshire	Mapperley, Nottingham	14/02/87
N. Humberside	Leconfield, Beverley	15/02/87
Strathclyde	Glasgow	16/02/87
West Sussex	Horsham	22/02/87
Highland	Culbokie, by Dingwall	28/02/87
South Glamorgan	Barry Rally	01/03/87
Tyne & Wear	Blue Star Rally	07/03/87
Mid Glamorgan	Rhydyfelin, Pontypridd	08/03/87
Central	Stirling	10/03/87
Isle of Wight	Binstead	14/03/87
Strathclyde	Ayr	14/03/87
Shropshire	Telford	16/03/87
Bedfordshire	Luton	19/03/87
South Yorks	Stocksbridge, Sheffield	19/03/87
Dorset	Dorchester	21/03/87
Bucks	Bletchley, Milton Keynes	22/03/87

It is likely that more centres will have been notified to RSGB Headquarters since we went to press, so do give us a call for an application form or for further details.

(cont from p36)

c) SYLEDIS causes us a lot of problems and we must confess - despite our friends in the industry, who we talk to a lot and get on very well with - that we wish it wasn't there. It probably won't be for all that many more years. Our long-term aim is to see it moved elsewhere, whilst recognising that it performs a vital service for Britain in the wider world

d) MOULD causes us perhaps three problems a year, which are generally easy to solve - they usually happen because a MOULD repeater goes off-frequency or - as happened once - there was an intermod problem which was solved the same day.

A final thought is that "radiolocation" also includes radar - the well-known installation at RAF Fylingdales operates near the 430-440 MHz band and so will its replacement, PAVE PAWS. We'll have more about PAVE PAWS another time, but for now we don't expect many more problems with it than we've had with the antique RCA installation which preceded it - we just wish we could run as much ERP without causing the neighbours to get a bit agitated.... ●

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'.

25 JANUARY 1987
Oldham Mobile Rally - Queen Elizabeth Hall, Civic Centre, West Street, Oldham. Opens 11am (10.45 for disabled). Talk-in on S22. Details G4ZEP, tel: 061-624 7354. Morse tests must be booked via RSGB HQ.

8 FEBRUARY
Bury RS Hamfeast - Mosses Youth & Community Centre (minutes from the M66), Cecil Street, Bury, Lancs. Details G1PKO, tel: 061-764 5018.

28 FEBRUARY
Rainham Radio Rally - Bredhurst R&TS, Parkwood Community Centre, Deanwood Dr, Rainham, Gillingham, Kent. (5 mins from M2 junc 4) Talk-in on S22, GB4RRR. Opens 10am. Free car park. Admission 50p. Details G1LKE, tel: Medway 362154.

1 MARCH
Welsh Mobile Rally - Leisure Centre, Barry, S.Glam. Details GW8CMU, tel: 0446 711426.

7 MARCH
Tyneside ARS Blue Star Rally - High Gosforth Pk, Newcastle-upon-Tyne. Usual trade stands, bring & buy stall, morse tests (booked via RSGB HQ), talk-in station, free parking, bar & refreshments. Details G6VEG, tel: Tyneside 2866908 or G4KOT, tel: 2341148.

8 MARCH
Wythall RC Rally - Wythall Pk, Silver Street, Wythall. Spaces are made available at special prices for radio clubs and societies to sell of junk & surplus equipment. Details GOEYO, tel: 021 430 7267.

15 MARCH
South Essex ARS Mobile Rally - The Paddocks Community Centre, Canvey Is, Essex. Details G4FMK, tel: 0268 683805.
25th NARSA Amateur Radio and Electronics Exhibition - Belle Vue, Manchester. Details G6CGF, tel: 051 630 5790.

22 MARCH
White Rose Rally - Refectory, University of Leeds. Opens at 11am. Talk-in S22. Details GOEGM, PO Box 73, Leeds, LS1 5AR, tel: 0532 676368 (eve)

27/28 MARCH
RSGB NATIONAL AMATEUR RADIO CONVENTION - National Exhibition Centre, Birmingham. Usual amateur radio & component dealers. Talk-in & ample parking. Refreshment & bar facilities. Details Norman Miller, G3MVV (QTHR), Chairman RSGB Exhibition & Rallies Committee. Morse tests will be conducted and bookings must be made via RSGB HQ

IN BRIEF - More details later.

5 APRIL
Pontefract & DARS Components Fair - Carleton Community Centre, Pontefract. Details GOAAO, tel: 0977 43101.

26 APRIL
RSGB VHF CONVENTION - Sandown Park Race Course, Esher, Surrey. Details VHF Committee.
3rd Radio Rendezvous - Grange Farm Hobbies Centre, Scunthorpe. Details G4ATA, tel: 0724 867137.

3 MAY
BATC Rally - Crick Post House Hotel, near Rugby. Details Trevor, tel: 0532 670115.
Swansea ARS Rally - Patti Pavilion, Swansea. Details GW4HSH, tel: 0792 404422.

11 MAY
Swindon Rally - Oakfield School, Marlowe Ave, Swindon. Details Ken G8SFM, tel: 0666 89-307.

17 MAY
30th Northern Mobile Rally - Gt.Yorkshire Showground, Harrogate. Details G3CQQ, tel: 0943 602118.

24 MAY
Maidstone Mobile Rally - Maidstone YMCA Sports Centre, Melrose Close, Maidstone. Details G6FZD, tel: 0622 50709.
11th East Suffolk Wireless Revival - Civil Service Sports Gound, Bucklesham, near Ipswich. Details G4IFF, tel: Ipswich 688204.
Plymouth ARC Mobile Rally - Plymstock School, Plymouth. Details GOBNT, tel: 0752 777777.

30/31 MAY
Milton Keynes Amateur Radio Exhibition - Bletchley Leisure Centre. Details G1GOF, tel: 0234 767904.

14 JUNE
Elvaston Castle Mobile Rally - Elvaston Castle Country Pk, near Derby. Details G4PZY, tel: 0332 767994 or G4CTZ, tel: 0332 799452.
RNARS Mobile Rally - HMS Mercury near Petersfield, Hants. Details G4UJR, tel: 0703 557469.

28 JUNE
30th Longleat Rally - Longleat Park, near Warminster. Details G4FRG, tel: Portishead 848140.

12 JULY
Worcester & DARC Droitwich Mobile Rally - High School, Droitwich. Details GOAOC.
McMichael '87 Rally - Haymill Youth & Community Centre, 112 Burnham Lane, Slough. Details GOBTY, tel: High Wycombe 29868.

17/18/19 JULY
AMSAT UK Colloquium - University of Surrey. Details Ron, G3AAJ, tel: 01-989 6741.

19 JULY
Cornish Mobile Rally - Camborne College of FE. Details G1AJB.

26 JULY
Scarborough ARS Rally - The Spa, Scarborough. Details Ian G4UQP, tel: 0723-376847.

2 AUGUST
RSGB MOBILE RALLY - Woburn Abbey, Woburn, Bedfordshire.
Rolls-Royce ARC Mobile Rally - Rolls-Royce Sports & Social Club, Barnoldwick. Details, G4ILG, tel: 0282 812288 or 0282 813271 (day).

9 AUGUST
Hamfest '87 & Craft Fair - Wimbourne, Dorset. Details GOCDY, tel: 0202 872503.

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

13 SEPTEMBER
Lincoln Hamfest - Lincolnshire Showground, Lincoln. Details G8VGF, tel: 0522 25760
Scottish AR Convention - The Magnum Sports & Leisure Centre, Irvine, Ayrshire.
National Amateur Radio Car Boot Sale - Old Warden Aerodrome, Beds. Details G6EES, tel: 0582 607623.

20 SEPTEMBER
Peterborough R & ES Rally - Wirrina Sports Stadium, Peterborough. Details G4PNW.
Trafford Rally & Components Fair - Lancs CCC (Old Trafford), Talbot Road, Stretford, Manchester. Details G1IJK, tel: 061-748 9804.
Vange ARS Rally - Nicholas School, Leinster Road, Laindon. Details G4OJN, tel: 02774-4386.

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

4 OCTOBER
Wakefield Mobile Rally - Details G4RCH, tel: 0532 536633.
Great Lumley AR & ES Rally - The Comunity Centre, Great Lumley,

Events Diary

Chester-le-Street, County Durham. Details G4MSF, tel: 091 469 3955.

GB Calls

The list below shows **ALL** the special event stations licensed for operation during January and February (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 JANUARY 1987
GB8NED - GB + Club Callsign: Wisbech, Cambs. Details G8NIL.
4 JANUARY
GB3ERD - GB + Club Callsign: Derby. Details G4HDP.
9 JANUARY
GB2HHT - Harefield Heart Transplant: Harefield Hopsital. Details G4SYT.
10 JANUARY
GB4ORC - Oldham Radio Club: Oldham, near Manchester. Details G4ZEP.
GB2ALC - Accrington Lions Club: Accrington, Details G4PKD.
GB2LI - Lions International: Barnoldswick, Lancs, Details G4LWG.
15 JANUARY
GB4DC - Dewsbury College: Dewsbury, W.Yorks. Details G4XKC.
16 JANUARY
GB4SGP - South Geographical Pole: Aberdeen. Details GM4YRS.
18 JANUARY
GB2PPC - Prior Park College: Bath, Avon. Details, G3LYW.
31 JANUARY
GB2ILA - International Listeners Assoc: ILA HQ, Swansea. Details GW4OXB.
1 FEBRUARY
GB0SIX - UK Six Metre Group: Brighton. Details, G4IIL.
GB4WGG - Wellingborough Girl Guides: Wellingborough. Details G4MOP.
11 FEBRUARY
GB4RRR - Rainham Radio Rally: Kent. Details GOAMZ.
14 FEBRUARY
GB0RAG - Rag Week: Bishop Grosseteste College, Lincoln. Details G4STO.
20 FEBRUARY
GB0WGG - Wirral Girl Guides: Wirral, Merseyside. Details G4UDR.
27 FEBRUARY
GB0BSR - Blue Star Rally: Newcastle-upon-Tyne. Details G4ILW.
GB0NBL - Newcastle Breweries Ltd: Newcastle-upon-Tyne. Details G4KOT.

Contests

Listed below are the VHF and HF contests for the next quarter. More contest dates are expected very soon and these will be included in next month's listing. The full list of RSGB's VHF and HF contests for 1987 was given last month.

VHF CONTESTS 1987

1 FEB:	70 MHz Cumulative
8 FEB:	144 MHz CW
15 FEB:	70 MHz Cumulative
22 FEB:	432 MHz Fixed & AFS
1 MAR:	70 MHz Cumulative
7/8 MAR:	144/432 MHz & SWL
15 MAR:	70 MHz Cumulative
29 MAR:	70 MHz Cumulative

HF CONTESTS 1987

3/11/17/25 JAN:	7MHz Cumulatives
4/10/18/24 JAN:	3.5MHz Cumulatives
5/13/21/29 JAN:	1.8MHz Cumulatives
11 JAN:	AFS
7/8 FEB:	7MHz SSB
4-15 FEB:	1st 1.8MHz
21/22 FEB:	7MHz CW
14/15 MAR:	Commonwealth '50'
21 MAR:	Town & Country

The photo above (courtesy Notts Evening Post) shows Ian Miller, G4JAE at the controls of GB6WB operated on behalf of the 6th West Bridgford Scout Group during last October's JOTA weekend. The station made 74 contacts with Austria, Norway, Holland, Canada, the Azores, Eire and the UK. The scouts were delighted to be able to pass greetings messages to amateur stations in the UK and Canada and thanks go from them to all the local amateurs that helped to make the weekend a success.

Load cell QSYs

The Society recently received reports of the telemetry system of a crane load cell (which is basically a device for sensing the loads on a crane jib or similar structure) located at an ALCAN smelter in Northumberland operating on a frequency of 433.125 MHz. The matter was taken up with the authorities, and the device has now moved 25 MHz HF - which is where it should have been in the first place! We'll be glad to hear of any problems similar to that one.

Cover story

We've received lots of compliments on the new-style RadCom front covers, and many readers liked the sumptuous colour of the Novenber issue. Actually, we should have said that both satellite pics (the cover and that on the first page of the Bulletin) were supplied by NASDA - many thanks indeed.

This is the latest high-performance transverter from Microwave Modules - it's an all-mode 50 MHz machine with 20W output, together with ALC and a high dynamic range receive converter. It works in conjunction with any 28 MHz transceiver and complements the existing 144/50 MHz unit.

Patience please

Our hard-working QSL Bureau supremo Ted Allen, G3DRN, writes us an occasional note on the state of play down in Wimbledon. Amongst other things he's just highlighted a small problem which our more newly-licensed members might care to think about. It seems that a few who aren't yet used to the system send in a large number of cards to the outgoing Bureau - fair enough - and then shortly afterwards hound the sub-manager for their callsign series for the cards which they think ought to have arrived for them!

A couple of points for new and not-so-new licensees might be worth making in this context. First of all, it's usually several months before cards for a new callsign group begin to come through the Bureau in anything like large numbers. Although the QSL Bureau is very reliable and also very cheap compared with any other method of QSLing, we've never claimed that it's the fastest route to getting the pasteboard to and from one amateur and another - no QSL Bureau in the world is fast, although it has lots of other things going for it. Equally, we have to say that many amateurs aren't exactly prompt about sending QSL cards back to the bureau (did we hear anyone say that some amateurs aren't exactly prompt, period??) and long delays are often for that reason.

Another point is that unless you've instructed the QSL Bureau sub-manager otherwise, he or she won't post the envelope back to you until the full weight of cards for the amount of postage you've stuck on the envelope has accumulated. This usually amounts to many more cards than you'd think - so please consider what you want and then ask your sub-manager to act accordingly.

So please remember that no-one in the QSL Bureau business wants to hang on to cards for a moment longer than they have to - most QSL managers don't have enough space for the cards they get - and nothing would please them more than to get your cards in the post. But they have to have received them first! Also, sub-managers have families and jobs and they'd probably appreciate it if you could respect their privacy and not ring them at a quarter past midnight asking where your card from 3B8 has got to.....

RAYNET News

The Raynet Committee met on 22 November to discuss the appointment of a new Zone 9 Representative (Staffs, West Mids, Warks and Hereford & Worcs).

Since no nominations were received, the Raynet Committee co-opted Mr Madeley Smith, G8KVU as Raynet Zone 9 Representative. Mr Smith is happy to take on the job and takes over from John Arrowsmith, G4IWA.

PS

£150 was collected for the BBC's Children In Need Appeal at the West Manchester Radio Club's Christmas Rally held on 23 November. Thanks to all who gave so freely.

The DTI has just informed us that when the G1 callsign series has run its course, the next prefix series for class B licences will be G7.

We appear to be having problems with the delivery of some of our news letters. If you are experiencing such problems please return the envelope to us together with the date of receipt - we can then present the Post Office with the 'evidence' we need.

Large crate of 1987 Radio Amateur's Handbooks from ARRL came into Headquarters just as we went to press - no prices available before print time but ring us if you'd like one. Looked terrific on a quick glance at it, even more pages than last years'

Also, North American and International 1987 callsign listings have just arrived - despatch manager Bert's back just about recovered. No prices yet - again, ring us for details.

Raising a sixty-foot mast for portable operation

R PASCOE, G0BPS*

ONE OF THE most difficult parts of contest operating in the field is getting the antenna up in the air as high as possible. The members of the Dover club, like most others, relied on the strength of 10 good strong men to raise their 45ft mast into the air. This was a waste of time and effort, and more to the point, it was difficult getting enough operators together without the antenna problems. After a long evening of calculation, a way was found to raise a 60ft mast. Ideally it could be done with three people but even one person could manage it. The next step was to try it all out and much to everyone's amazement, up it went "sweet as a nut". So here it is to try out.

Equipment

Most of the equipment listed below is probably already in use by most contest groups. The only two extras can be purchased for less than £5:

Six scaffold poles (two are gin poles)
Four joiners
Two blocks and rope
Base plate
Guy ropes
Stakes
Two big hammers
The "web"
Two guy sleeves.

The web is made of rope and is so called because it looks like a spider's web. Fig 1 gives the outline. Make 17 grommets and join them together as shown. Each grommet is spaced to take a guy stake. This ensures that the guy stakes are an equal distance apart.

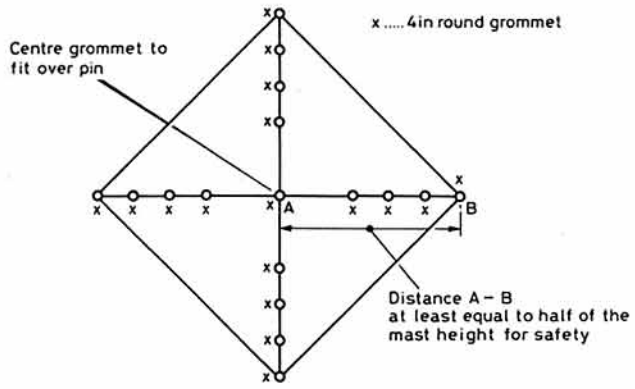


Fig 1. Outline of the web

The block and tackle are available from yacht chandlers. The two used here are single sheave and double sheave; in the single sheave the line passes through the block on a single roller, in the double sheave the line passes through the block twice on adjacent rollers. See Fig 2. These will be used to raise the antenna.

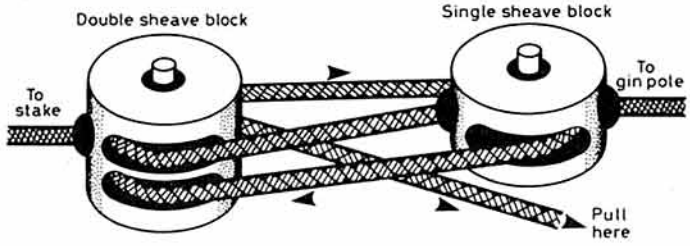


Fig 2. Block and tackle end plan

3 Limes Road, Folkestone, Kent CT19 4AU.

G0BPS first became interested in amateur radio in 1980 and was licensed in February 1984 with the call G1DGO. He took the morse test in May 1985. He took over as contest co-ordinator of the Dover club within a few weeks of getting his licence and is now the club chairman and editor of the club magazine *NET*.

Interests, within the hobby include eme, cw and computing. A member of the G-QRP club and also of MENSA, he is married with two children and has recently retired from the Kent Fire Brigade after 22 years' service.

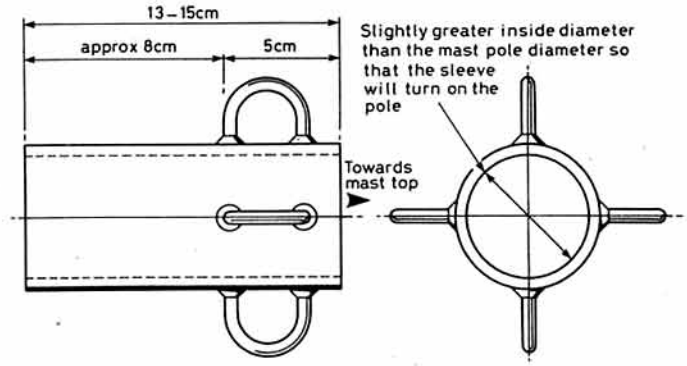


Fig 3. Guy sleeve

The guy ropes are made of polypropylene line about 0·5in diameter. Again, a yacht chandler will have something like this available.

Most groups use a base plate, and ours is the type with a spigot for the scaffold pole to sit on. The joiners are the long multi-bolt type.

The other piece of equipment allows the pole to be rotated. This is a guy sleeve made from mild steel that is slightly larger than the pole with four rings welded on it for the guy ropes. One is used at each point above the joiners and another just below the antenna (Fig 3).

Method

First select the point where you want the base of the mast to stand and drop the base plate there. Lay out the web and pull it tight. Hammer in the stakes, ensuring that the lines of stakes are straight and at 90° to each other. The web is no longer needed and can be put away until next time. Remove the base plate, marking the spot. Hammer in two more stakes at an angle towards one line of stakes. Next lay out the poles and join them together, not forgetting to put on the guy sliders. This should be done beside the same line of stakes that you used above. There should now be an area littered with stakes and a 60ft pole with guy ropes lying beside it.

The next step is to lay out the guy ropes to either side of the pole and tie them to their respective stakes. The guys that would be used as the back guys, ie those to the stakes beside the mast, are slightly longer than the others, tied off to these stakes by the mast. This is all designed so that when the mast goes up it will be supported from both sides and will lean very slightly towards the unused stakes.

Before raising the mast there is one more thing to do. Remember those two stakes at the base of the mast? If the turning handle is bolted on at the very bottom of the mast it will stop the assembly sliding along the ground

(Continued on page 44)

THE 1986 HF CONVENTION

DON FIELD, G3XTT

A packed house for the lecture "HF antennas for small gardens" by G3XTT. Photo: G3RVM

ONCE AGAIN the organizers of the HF Convention were able to lay on a perfect September day, and the level of activity indoors suggested that the menu of lectures, presentations and exhibitors' stands was also to the liking of the assembled multitude. Attendance at this year's event was up on last year, with almost 500 passing through the doors, including overseas visitors from ON, DJ, PA, VS6, VE, W and VU.

The lecture programme started with Don Field, G3XTT, giving advice on suitable hf antennas for small gardens, and about 200 early arrivals packed in to hear this. The Committee Forum also proved popular, with questions on a variety of topics. Inevitably, however, the major concern was about the DTI's current stance on emc problems. The trophy presentation led off the afternoon programme, followed by a lecture on hf receivers by Peter Chadwick, G3RZP, and the formal programme closed with the DX Forum. This last brought together a fascinating trio of speakers: G3OKQ/VR6JR, on his exploits from Pitcairn Island; G4AAL, who recently returned from the Pacific leg of "Operation Raleigh"; and VS6CT, one of the best-known signals from Hong Kong.

Outside the lecture area the mix of exhibitors was much as last year, but with the addition of a constructional area manned by the G-QRP Club. This proved to be of great interest to visitors, with live demonstrations of kit building (based on the Howes' range of easy-to-build kits) and a

Members of the EMC Committee with the RSGB President. L to r: G3UFB, G3KLH, G4IWS, G5HD, G3AEZ, G4JKS and G3VPK. Photo: G3RVM

L to r: D Andrews, G3MXJ, receives the Braaten Trophy; S Taylor, G4EDG, receives the L H Thomas Trophy; and J Bell, G0CMM, receives the Gravesend Trophy on behalf of the Stockport RS



L to r: the ROTAB Trophy to J Forward, G3HTA; the NFD Shield to the Three As Contest Group; and the Houston Fergus Trophy to J Pascoe, G4ELZ



L to r: R Western, G3SXW, receives the G3XTJ Memorial Trophy; the Three As Contest Group collect the Edgware Trophy; and L Parker, G5LP, receives the 1930 Committee Cup



L to r: the Col Thomas Rose Bowl to A Slater, G3FXB; the Bristol Trophy being collected on behalf of the Gravesend RS by D Lawley, G4BUO, and C Henderson, G4FAM; and the TE Wilson G6VQ Trophy to J Dunnington, G3LZQ



L to r: F Handscombe, G4BWP, receives the Somerset Trophy; the Mid-Beds Contest Group, G4MBC, collects the Northumbria Trophy and P Catterall, G4OBK, receives the G3QT Cup Winners Cup

Members of the HF Contests Committee. L to r: G6LX, G3SJJ, G3FKM, xyl G4RWW, G3KDB, G4JKS, G3TXF and G4BUO. Photo: G3RVM

The President presenting the Whitworth Trophy to S R Cole, GW4BLE, who also received the Powditch Transmitting Trophy

Bob Nash, G4GEE, (r) presents the WAB 80m Diamond Trophy to J Galicia, ON6JG

continuously-running video showing, in close-up, the techniques employed in simple constructional work. Unfortunately very few of the visitors were persuaded to try their hand on the spot at kit construction, but seemed to prefer to go away and practice in the privacy of their shacks!

Once again ON5NT took the honours in the DX Quiz, while G4BWP and G3SXW shared top place in the cw pile-up competition. The "Doctor DX" computer program was popular, reminding those who had a go what the bands used to sound like at the peak of the last sunspot cycle.

Having said all this, one of the prime aims of the event is to provide a medium for a social gathering of hf enthusiasts. On this score the day must be regarded as an unqualified success. Animated discussions could be heard on such subjects as country scores, band conditions, antenna systems, and much else of common interest. These continued on into the evening, as over 70 attendees stayed for the buffet supper hosted by the Chiltern DX Club.

In view of the continuing and increasing interest in this event, the Belfry Hotel has already been booked for next year, so mark 27 September 1987 in your diaries at the earliest opportunity. □

RAISING A SIXTY-FOOT MAST FOR PORTABLE OPERATION

(Continued from page 41)

when it is pulled (Fig 4). The mast is now ready for erection. To raise the mast, join up the two remaining scaffold poles and lay them out at 90° at the bottom of the mast. A rotating scaffold bracket will allow this gin pole to be raised to the vertical and a short length of line from the top to a side stake will stop it falling over.

Tie the remaining guy ropes to the gin pole, starting with those nearest the base of the mast, and as you tie the top one, pull them tight and bend the gin pole slightly. After tying the block and tackle between the top of the gin pole and a convenient stake raise the pole to the vertical and

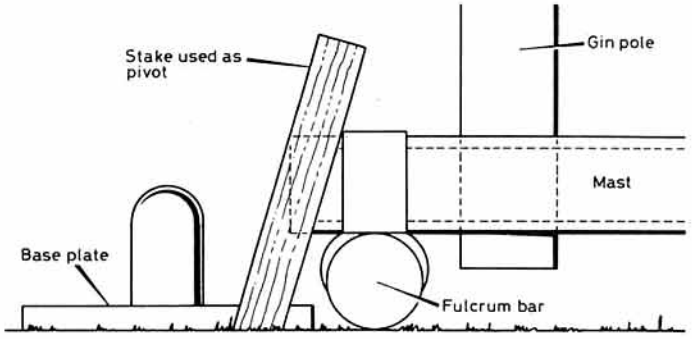


Fig 4. Use of stake on a pivot to avoid unwanted movement when mast is raised

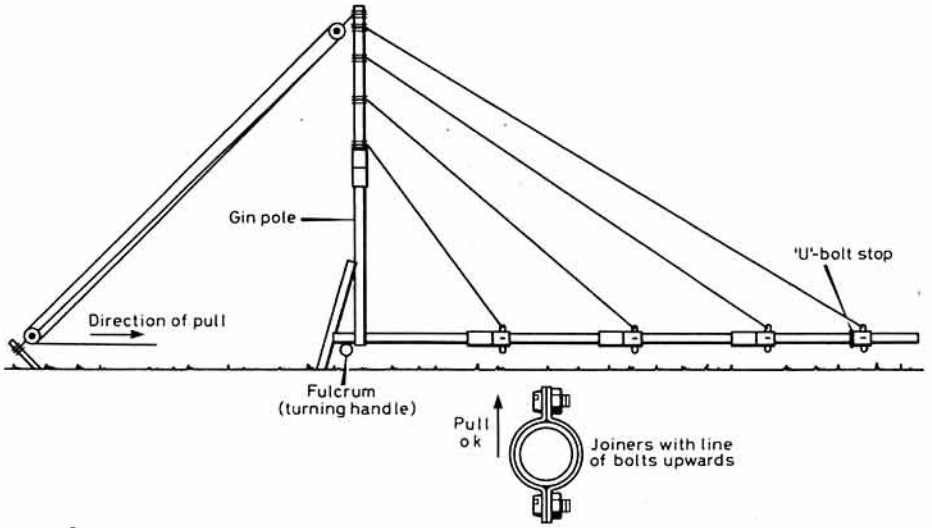


Fig 5. The entire asembly prior to erection

start pulling on the rope. **Do not fit the antenna at this stage.** (See Fig 5). It will be found that the mast will slowly rise to the vertical and it is useful for someone to hold the gin pole while the remaining guys are tied off.

Now is the time to balance all the guys to ensure that the mast is vertical and, when these are satisfactory, take it all down again! Add on the antenna and feeder and put it all back up again. Keep the guys a little slack so that the mast can be lifted to replace the base plate to its original position.

Dismantling is equally simple, just as well really which is because the number of excuses to leave the site within sight of the contest finishing seems inversely proportional to the help remaining.

Dover RC has found that this method works well and with just three workers the antenna is in the air and working within an hour. □

NEWS & VIEWS

HF

*John Allaway, G3FKM**

ANOTHER NEW YEAR, and this time I hope that the trough of the sunspot cycle may be in sight. 1986 saw several contributors to the column work well over 100 countries on 28MHz—I wonder if anyone will reach 200 in 1987?

G4WCO reports that his callsign is being used by someone else on the hf bands who says that he is called Trevor and is located in Hatfield. This is mostly on 3·5, 7 and 14MHz cw. The genuine G4WCO only operates on hf on 29MHz fm.

Due to the changing of the magazine publication dates, from now on the last dates for contributions to be received will be about one week earlier than they have been in previous years. Please try to remember this—there is nothing more frustrating than to receive an important news item one day after going to press!

White Rose ARS 28MHz propagation tests 1986

To coincide with the bottom of the current sunspot cycle the White Rose ARS organized four eight-hour 28MHz activity days during the summer of 1986, on the last Sundays of May, June, July and August. WRARS acknowledges the many reports sent to them, all of which have been sent to the RSGB Propagation Studies Committee.

This brief report will attempt to convey a general picture of conditions and band occupancy as it took place on the four set days. Hopefully, from the reports sent to the RSGB, some useful information will emerge as to the behaviour of 28MHz at this time of the sunspot cycle.

As was to be expected, the first activity day created the most interest with some 150 G callsigns extracted from logs received. Contacts were mainly local but some long-distance inter-G QSOs were noted, indicating tropo type propagation. During the afternoon it was noticeable how the inter-G activity declined to be replaced by some sporadic-E-type propagation. Stations were heard from DL, EA, F, HB and YU. Some dx stations were logged, but in the main they were difficult to work. HZ1HZ was probably the most consistent station as he was operating in a cw contest. 5H3EB was also copied, but the highlight must have been 5H3ZR which the club station, G3XEP, worked on ssb at the first call.

The second activity day found the band wide open and full of sporadic-E-type propagation. This certainly made a change from the first test, with over 300 stations reported/worked from 33 countries. Activity was spread fairly evenly over Europe. The only dx reported were two UI8 stations. From Europe OY, T7, LX and C3 were worked. With so much European activity, inter-G working seemed to become more difficult. In fact only 34 G callsigns were noted from the logs received. Beacons audible during this test were DF0AAB, DL0IGI, DK0TEN, EA3JA and 5B4CY (which was RST519 at 0957).

The third activity day at the end of July should have been called the 28MHz *inactivity* day. Only two reports were received, and both showed the band as being flat for most of the day. Even with a TH6XX at 70ft, G3XEP only worked one G. G3VMJ, in Chelmsford, did slightly better and managed to work into EA and OH, and RS29909 in Lincoln heard SP9EVP.

So we come to the last test on Sunday 31 August. Here we probably saw 28MHz as it should be in 1986—a mixture of inter-G working plus some central-European activity from DL, I, SP and UB. Fourteen countries were reported, but no dx. These conditions remained throughout the morning, but in the afternoon the band became dead and only local inter-G contacts were reported.

This summary of band conditions taken on four days does not tell the whole story. At this time in the sunspot cycle conditions change daily—we must not expect dx signals always, but take what we can when we can. There have been short openings to Africa on a few days, and rather more to Central and South America mainly in the early evening. Very little has been worked beyond the Middle East and in the opposite direction—openings to N America have been very limited this year. In spite of this it may come as a surprise that over 130 different countries have been worked from the UK during 1986, in spite of the fact that the sunspot count has been 0 during several weeks.

It is hoped that this short survey has been of some interest and will encourage amateurs and listeners to continue monitoring 28MHz. Please tell your friends that the old band is by no means dead—some say it is only sleeping and needs plenty of you to talk through the microphone and operate the key to keep it awake. Try it!

The White Rose ARS wishes to thank all who took part and sent in reports, with special thanks to G3VMJ and Dick Poppi who took part in all four tests and sent in valuable reports.

1986 ALL BAND TABLE No 5

	1·8MHz	3·5MHz	7MHz	14MHz	21MHz	28MHz	Total
G4OBK	**67**	60	83	106	**111**	**60**	487
GW4RHW	-	42	**120**	120	55	40	377
G3TXF	46	51	67	**132**	53	26	375 (all cw)
GW4OFQ	13	**141**	109	97	5	9	374
GM3YOR	48	81	108	58	43	31	369
G4ODV	47	43	71	76	80	34	351
G4GOF	4	10	28	43	35	35	155

The next deadline will be **9 February 1987.** Please send your claims direct to G3GIQ to reach him by this date. Please note that closing dates will in future be the 8th of the month and not the 15th. This is due to the bringing forward of the magazine's publication date.

DX news

VE7BC now has his own callsign BX1BC. *DX News Sheet* suggests that anyone looking for a QSO with China might try listening on the long path around 0800 on 14MHz.

According to the *Long Island DX Bulletin*, the planned Spratley Is expedition has been issued with the callsign IS1CK and its QSL manager will be KA6V. K6EDV is believed to be leaving California on 15 January to join the group in the Philippines. The operation is likely to be from the same area as that used by IS1CK, and DU1CK is said to be one of the operators in the present team.

Jean, F6BBQ, was expected to depart for Crozet Is early in November, and F6BWD was also due to depart on the same date for Amsterdam Is and St Paul Is. F6BWD has been supplied with INDEXA equipment and will use the callsign FT8ZA. F6BBQ's callsign will be FT8WA and he hopes to be active on ssb and cw on all bands 7 to 28MHz. FT8YA, on Adelaide Is, is reported to have been worked on 7MHz cw.

VK0KH has been heard on 14MHz cw in the early afternoon. This is an operator who was previously on Macquarie in 1977. VK0SJ was due to leave last month.

A51PN is reported to be active again. This seems to follow a visit by W6YO who said that he hoped to put up a 3·5MHz antenna for Prahan's use.

VK9NS's *DX Report* says that K4ADN is planning an expedition to Mellish Reef. Jim has helped to obtain a licence and the callsign VK9MW has been issued. Hopefully there will be a stopover also on Willis Is, particularly for a period of cw operation. The trip may take place in July or August.

Sue Richardson, GW0AWT/J87CD, will be returning to the UK this month, but there is a possibility that she and her husband may go back in June. Her present equipment consists of an FT1, FC707, MD1B8 and G5RV antenna, but if she returns she hopes to have a beam and linear. Please send all QSLs to the GW0 bureau c/o GW0AWT. Sue notes that from June 1987 St Vincent will have three classes of operator—Novice, General and Advanced—with the last requiring a 20wpm morse test. The J88 prefix is used by nationals and J87 by foreigners resident on the island, and all WARC bands are available.

ZC4EPI and ZC4RAF are the callsigns to be used by the RAFARS club stations in Cyprus. They will be active on Thursday evenings on 14,045kHz and/or 14,285kHz between 1700 and 2000gmt. They hope to contact other RAFARS members. In May it is hoped to have a 144MHz station operating from Mt Troodos for possibly three or four weeks. Full details will be made known as soon as possible.

In a letter to the Society, Krishna Khatry, 9N1NC, says that he has many connections with the UK and spent several years studying here. He was with Radio Nepal for many years as chief engineer and director-general, and is now chief engineer at the Ministry of Communications in charge of frequency management and licensing. Krishna founded two of the three Nepalese amateur stations—9N1RN at Radio Nepal and now 9N1MC at the Ministry.

*10 Knightlow Road, Birmingham B17 8QB

Two previous mentions of G0CJM, who should now be back in Singapore, said that he would be active on 10MHz. This seems to have been a misunderstanding as the 10MHz band has not yet been released for amateur use in Singapore.

News from the DXCC desk (via *DXNS*) is that DXCC credit is now being given for contacts with G3JKA/5A. Other information is that the ARRL DX Advisory Committee voted on possible separate country status for P4, Aruba, and voted 8-8! This means no change for the time being.

DX News Sheet

A number of readers have enquired about the *DX News Sheet* referred to at the end of the column each month. This is a weekly RSGB publication edited by Brendan McCartney, G4DYO, available on subscription from RSGB HQ. It features a summary of the previous week's best dx, news of forthcoming expeditions and contests, QSL info, propagation data and predictions, Islands on the Air (IOTA) award information, and much more of interest to the active hf operator. Plans for expansion early in 1987 include regular features on contests, propagation and awards.

Why not give it a try? One third of the Europeans in the DXCC Honour Roll are already subscribers. Can you afford to be at a disadvantage? The subscription rates from February to June are £7.50 for UK subscribers, and £8.25 for overseas.

RSGB 7MHz Contest (CW section)

As the published date of this contest would mean a clash with the ARRL WW DX Contest (cw section) the HF Contests Committee has re-scheduled the contest to take place from 1200 28 February to 0900 1 March 1987. The date by which logs for the cw section must reach the Society has also been extended by one week (ie by 27 April 1987).

Welcome . . .

. . . to the following who joined the Society during September and October: CT1DQR, DC0FG, DK5QZ, EI3FW, FD1LQZ, I2VAM, I4JEE, K8ANV, KA9P, LA2ECA, LA5SH, LA6RDA, SM5AQD, SM0COP, SM0GNU, VK4AIN, VK6AKG, W0QM, YB6MF, YU3ZM, ZF1AF, ZL1AVZ, ZL2BNJ, ZS1VP, 5B4SE, and K Goldberger (DL) and F Munari (I).

European DX Foundation

This new body was founded in August 1986, and has similar aims to those of other well-known foundations such as the NCDXF and IDXF. It will support important dxpeditions and individuals in rare countries who need equipment and other help. Efforts will be concentrated on activities of particular interest to amateurs in IARU Region 1. Its first officers are DK9KD, president; DL1LD, treasurer; HB9HT; DL3EK and OZ1LO. Membership is open to those who are members of a national society which is a member of the IARU and costs DM25 (or equivalent) per annum. Each member receives a certificate and special logo to use on QSL cards. More information is available from Dieter Loeffler, DK9KD, PO Box 620260, D-5000 Koln 60, FR of Germany.

Awards

RL 50 Jubilee Award

The RL 50 Jubilee Award will be issued by RL to celebrate its 50th anniversary in 1987. It is available to licensed amateurs and to listeners who have worked or heard Luxembourg amateurs during 1987. European applicants need 10 points and others five. A QSO with (or confirmed report from) an LX station counts one point, and if made with LX0RL or LX50RL five points. Each station may be counted once per band. Send log extract—certified by an awards manager, a club official or two licensed amateurs—together with five ircs, US$2, 100FLux or DM5 to: Reseau Luxembourgeois des Amateurs d'Ondes Courtes, Awards Manager, PO Box 1352, L-1013 Luxembourg, Luxembourg.

The Golden Wings Award

Some clarification of the rules for this certificate as published in November. It is being issued to celebrate the golden jubilee of the Cranwell Amateur Radio Transmitting Society (in 1986) and of RAFARS in 1988.

Contests

French Contest

0600 24 January to 1800 25 January (cw)
0600 28 February to 1800 1 March (phone)
QSOs should be made with France, French stations in Germany (DA1, DA2), FK, FM, FG, FO, FH, FR, FW, FY, FP, FS, FT, and the two Corsican departments 2A and 2B. All bands 3·5 to 28MHz observing band plans. Exchange RS/T plus serial QSO number, French stations will give the number of their department. One point is scored for contacts in the same continent and three points for others. The multipliers are one point for each different department and overseas department or territory worked on each band. Final score is total QSO points multiplied by total multipliers from all bands. There are single- and multi-operator categories. Please post logs to arrive before 5 March for the cw, and by 5 April for the phone section, and send them to: Lucien Aubry, F8TM, REF Contest, 53 rue Marceau, 91120 Palaiseau, France.

AGCCL-DL Straight Key Party

1600-1900 7 February
CW only, 3,510-3,560kHz. Open to all using a straight key and to listeners. Photocopies of rules available from G3FKM (sae please).

1987 CQ WW 160m DX Contest

2200 23 January to 1600 25 January (cw)
2200 20 February to 1600 22 February (ssb)
Single and multi-operator. Exchange RS/T and US and Canadian stations will give their state or province. QSOs with own country count two points, with others in the same continent five, and with other continents 10 points. Each US state, Canadian province and DXCC (or WAE) country counts as a multiplier (but W and VE do not also count as multipliers). Final score is total QSO points times multipliers. Note that one /MM station can be counted in each region. Three additional QSOs will be deducted for each duplicate, false or unverifiable contact removed from a log. A second multiplier will also be lost for each one removed by this action. Sample log sheets and summary sheets may be obtained from *CQ* by sending a large sae and ircs to CQ 160m Contest, 76 North Broadway, Hicksville, NY, 11801, USA. Other log forms may be used which have 40 QSOs per page if they have columns for utc (gmt) time, exchange sent and received, if multiplier, and QSO points claimed. A summary sheet showing scoring and the usual signed declaration that all rules and regulations have been observed must be enclosed. Mailing deadline for cw entries is 28 February, and for ssb 31 March. Post to: Donald McClenon, N4IN, 3075 Florida Av, Melbourne, Fla, 32904, USA. Please indicate "CW" or "SSB" on the envelope.

In the **1986 CQ WW 160m DX Contest, cw** UK scores were as follows: **G3SZA** (439,451), G4WQN (166,566), G3XTT (132,386), G4BYG (110,200), **GW3JI** (60,804), **GM3YOR** (57,240),**GU3HFN** (49,950), G4ARI (19,985), G3TXF (19,642), and G2CIL (6,555). Congratulations to **G3SZA** who came world second and won the K4SB Plaque. In the multi-operator category **GW3YDX** scored 552,126 points (thereby winning the N4RJ Plaque), GM3IGW 228,998, and G3FVA/P 16,380. In the **phone** section **G4OBK** scored 16,100 points, G3BDQ 7,650, and G4YWG 994. **GW3YDX** again did well in the multi-operator section with 194,432 points.

PACC Contest

1200 14 February-1200 15 February
1·8 to 29·7MHz, cw and ssb but no cross-mode. Please observe the band segments according to IARU recommendations. Single and multi-operator and listener sections. Exchange consists of RS/T plus serial QSO number (from 001). Dutch stations will give two letters to indicate their province (these are GR, FR, DR, OV, GD, UT, NH, ZH, FL, NB and LB—note that FL is a new province and replaces YP). Each QSO with the Netherlands counts one point, and a station may be worked once per band regardless of mode. The multiplier is one for each province worked per band (maximum 6 × 12 = 72). Listeners may enter and should log code groups given by both stations in contact, and each Netherlands station logged counts one point; the multiplier is as in the transmitting section. Calculate score and mark multipliers when first worked/heard only. Include the usual declaration that rules have been obeyed and post logs (no later than 31 March) to: F Th Oosthoek, PA0INA, PO Box 499,4600 AL, Bergen op Zoom, Netherlands. A certificate will be awarded to each country winner in each category, and also to the second and third if participation warrants this. Photocopies of log stationery are available from G3FKM (sae please).

In the **1986** event **G3AEZ** was top UK score with 3,649 points, followed by G0ABV (2,900), G4ISK (2,290), G3ESF (2,214), **GM3KLA** (1,792), G4IQM (1,248), **GW4BKG** (864), G4XHA (855), G4UXW (768), G4KHM (598), GM4WEW (260), G4IZB (252) and G4UZK (77). RS87156 scored 799 in the listener section.

HA DX Contest

2200 17 January to 2200 18 January
3·5 to 28MHz cw only. Single-operator single- and multi-band, and multi-operator multi-band sections. Six points for HA QSOs, three for stations outside own continent, and one for those in same continent. Exchange RST and progressive number from 001. HA stations give two-letter code to indicate their county. The multiplier is the number of counties worked per band. Separate logs for each band plus signed declaration should be sent within six weeks of contest to Contest Bureau, H-1581 Budapest, PO Box 86, Hungary.

In the 1986 event **G3ESF** came seventh with 96,516 points in the multi-band category, and G4ZFE scored 23,814. G6NK came 11th on 14MHz with 8,460 points and GM4ILS scored 4,446.

UBA Trophy

0600 24 January—1800 25 January (CW)
0600 21 February—1800 22 February (SSB)
3·5 to 28MHz. Single-operator (a) 3·5 and 7 MHz only, restricted to 2h on Sunday (0900 to 1100) plus four other hours at own choice; (b) single-operator 3·5 and 7MHz, only 12h operation; (c) single-operator all bands, 24h operation only; (d) multi-operator, single-transmitter 36h; and listener sections as (a) to (d). Exchange RS/T plus serial number from 001. ON stations will indicate province. QSOs with Belgium or Belgian Forces in Germany count 10 points, with stations in French countries one point. Multiplier is each Belgian province plus BSD and FBA, on each band (maximum 10). Submit usual information with log, and use separate sheets for each band. Post by 1 March (CW) or 1 April (SSB) to: UBA HF Contest Committee, Galicia Jan, ON6JG, Oude Gendarmeriestraat 62, B-3100 Heist Op Den Berg, Belgium. **G4IQM** led Class B in the 1986 CW event with 2,750 points.

1986 28MHz COUNTRIES TABLE

G3VOF-119	G4RAB-74	G3BXM-31 (ssb)
G4JBR-113	G4MUW/M-74 (ssb)	GD3SUW/A-27 (cw)
G3XQU-113	G0DNV-71	G4YWG-17
G0AEV-106	G4OBK-60	G4XNG/M-16
G4XAH-99	G0DXW-44	G4LZZ-5
G0AGP-84	GM4CHX-33	5B4DN-2

Band reports

Not quite the same enthusiasm this month, and at the time of writing the outlook for the cw weekend of the CQWWDX Contest does not seem to be very good.

Many thanks for logs received from G2HKU, G3JL, G6FU, GM3CSM, G3s GVV, HCT, KSH, PXT/M, YRM, G4s EHQ, JBR, GW4KGR, G4s LRS, MUW, RFE, UOL, IZN, XAH, G0sAGP, FWW, and RSs 10906 and 88639.

As usual, callsigns in italics were of stations using A1A.

1·8MHz 0000 *HG6N, UF6VBL.* **0100** TA2BK. **0200** EA9CA, N4WW. **0400** *VE1BVR, W1-W4.* **1900** *D44BC, UA9CCK.* **2200** EA9EU, *UG6GAW.* **2300** LX1GQ, *VE3WQ,* 5N26BAV, 9M2AX.

3·5MHz 0000 *FP5HL, FY4EE, UI8LQ, DL1JW/VP5, YN3EO.* **0100** *HH2CF, VP2VI,* ZB2SZ, *J6LAD/9Y.* **0200** *YS9CHE, YV1NX, 9Y4GR.* **0300** *KQ2M/VP2V.* **0400** *W7* (to 0800). **0500** *CO2PY, FY5YE, HK3RQ.* **0600** *HK0BKX, UV1OO, YN3EO.* **0700** *K0FXI7, N6RO, SU1SX, W6RA, W6TSQ, W7FU, W7WA, ZL3GQ, ZL4IE.* **0800** OY9JD. **1900** VK2AVA, *VU2TEC,* 7X2LS. **2000** JA6s BJT, BXA, YC0BAQ. **2100** W1. **2200** *JA4LXY, JA0DXG,* OX3OX, *UA9-0,* ZC4IT, 4Z4MJ, 9H1GY. **2300** *C30BBE, TF1PS,* YV5ANF.

7MHz 0000 *UD7DM.* **0500** *KL7U, LU, PZ, VP2VA, VP9HW.* **0600** *HK0BKX, JY8XX, VP2V/KQ2M.* **0700** *JA7HMZ, KC6IN, KG6GF, VK2,3,7, W7, WL7E, ZF2DR, ZL2,3.* **0800** *HK1ER, JA, W7, YN3EA, ZL2.* **0900** *FM5ES, HL1WD.* **1300** *SJ9WL.* **1600** *VK2,3,4,5, 4K1C.* **1700** *UZ3TYL/UF,* VU2s *GSM,* TEC. **1800** A71AA, *TA1C.* **1900** *OY6FRA.* **2000** *TR8JJC, DF8ZH/5B4.* **2200** *FM5BH, OA4AWE.* **2300** *FR5EM, TA4A,* TU2MA. *YI1BGD.*

10MHz 0600 *VK4, YV5AVJ, ZL1,2,3.* **0700** *JA1IPP, UA9MD, W2,3,4.* **0900** *UF6DA, YV1BVJ.* **1200** *KK7K/DU2, JH1UJG, VK3DQ.* **1500** *JH1DLJ, UL7OAF, 9M2FP.* **1600** *UM8MK, W4HDZ, 5T5CJ.* **1900** *FG5XC, N3EZK.* **2000** *J78D.* **2100** *UB, 7X2AX.*

14MHz 0600 *TR8CR.* **0700** JA, NY6M/KH2, VK, ZL, *4K1AQH.* **0800** BY4AA, BY4RN, FKs*8FZ, 8LM,* 25FU, JA, JT1AO, *TU2DD,* VK9ND, *WL7BH,* XU1SS, *ZD7AL,* ZL, 3C1MB, 3D2AA. **0900** *AL7BL,* K2BDY/DU2, FK8FI, VS6DO. **1200** AP2JZB, VK. **1300** YI0BGF, YK1AO. **1400** *KH6J.* **1500** A71BK, SU1MK, T77U, VI5QW. **1600** AL7EL, *FH/W6KG,* FR/W6QL, *VQ9QM, 4S7WP.* **1700** *FY5BO, TA1A, VU2TTC.* **1800** KH6CD, W6-W7, 5X5GK, 7Q7LW. **1900** VP8PU, ZL3MA, 3B8CF. **2000** N3JT/HK0, V3NAP, 3C1MB, 9L1IS. **2100** AZ1ARU/18, DP0GVN, J88BP, TR8RAL. **2200** V44KQ, VP2VA.

18MHz 1600 *CT4AH, PA0VG/EA5, IT9QDS.*

21MHz 0800 JA, VK, *VK9XI, ZL1, ZS1, 3B8CF..* **0900** *TA3B,* UL7FA/R, *VK4, VQ9EE, YC0BRX.* **1000** BY5QA, JA, JY7Z, P29NAC, YI0BIF, 5H3RB. **1100** FR5DX, VK3, *YC0FAD,* YU5CP/9NI. **1200** *D44BC, FR/W6QL,* FR5DX, J49A, *TA4A, VP8PTG, VU2BK.* **1300** A22TJ, J87CD, PJ1B, T50DX, VP5SL. **1400** HL6AA, 9Q5TV. **1500** A82BA, *CP6IB,* HK0HEU, VP8'sBGO, *PTG.* **1600** HC8AA, *K7ABV,* TZ6MG, VP8NX, W6-W7, 7Q7LW. **1700** *LU, PY, W7LNI.* **1800** A22CL, FM4DS, W3,4,7,8, 5X5GR. **1900** HP1XDN, W1-W4. **2000** CO7KR.

24MHz 1100 *9J2WS.* **1200** *KV4AD.* **1400** *W1,2,4,5,8.* **1500** *ZS6BMS.* **1600** *WB9SES.*

28MHz 0700 UL. **0800** VKs 2NYA, 6HD, YC1EHR, YE0X. **0900** P36P, VU2CVP, 3C1MB. **1000** EA9AM, HS0A, HA3HEJ, OD5YU, TZ2XN, VQ9GB, 4S7NMR. **1100** J40DX, SV5TS. TL8CK, YI1BGD, 3B8DB, 7P8DP, 9K2DZ. **1200** A71BJ, D68WB, HZ1HZ, TA4A, ZS3BI, 3D6BU. **1300** FR4DN, ZD7BJ, 9J2FC. **1400** A22BW, CE8DQS, W1,4,5,8, 3D6CA. **1500** W1-4, *ZS6PW.* **1600** CU2AX, OA4BCZ, TZ6FIC, VP8BGO, ZD7AL, ZF2FL, ZP5CVI, 6W1BL, 8P6DV.

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

Closing date for receipt of material for **March** issue is **15 January.** □

QTH CORNER

A35RY via OH1RY, P Kolehmainen, Kp 5, SF-21530, Paimio, Finland.
C30BBE via OH6XY, C H Ikaheimo, Tahystajankatu 5, SF-41160, Tikkakoski, Finland.
C30DAW Ted Collins, G4UPS, 27 Parklands, Hemyock, Devon EX15 3RY.
D68WB W Barnett, BP 540, Moroni, Grand Comoro.
FH/W6KG, FR/W6QL, FT8WA, FT8ZA } Yasme Foundation, PO Box 2025, Castro Valley, Cal, 94546, USA.
G3JKI/5A A Howell, 9 Tadfield Rd, Romsey, Hants.
J87CD via GW0AWT (via GW0 QSL Bureau).
JY8KL G4KLP, W G Mott, 7 Farm Way, Elm Park, Hornchurch, Essex RM12 5SR.
LX9BV DL7MAE, H Schlaffer, am Rosengarten 3, D-8059 Luess Post Neuching, FR Germany.
T50DX I2JSB, G Savini, Via delle Primula 14, I-20089 Rozzano, Italy.
VP8PTG G4PTG, 93 Ayresome St, Middlesbrough, Cleveland TS1 4PF.

HF F-layer propagation predictions for January 1987

The time is presented vertically at two-hour intervals 00(00)gmt to 22(00)gmt for each band, ie 0 = 0000, 2 = 0200, 4 = 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.

<< +

HF f-layer propagation predictions for January 1987

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	.....	.....22.....	....1552....	....3775....	....78882...	32.3766671.1	985643346667	++53....3+++
MALTA	.....	.....211....	....2544....	....57762...	....88887...	452476668522	998743346888	+++4....3+++
GIBRALTAR	.....	.....	.....232....	....15553...	....58877...	132.87667511	898664335887	++++3...25++
ICELAND	.....	.....	.....11....	.....33....	.....4774...	....277784..	442.65456742	++++42.245++
** ASIA								
OSAKA	.....	.....	.....	.....	....3.....	....62.11...	31124222	.....4+.
HONGKONG	.....	.....	....11....	....43.....	....561....	....3431....	2...11123234	.....4+4
BANGKOK	.....1.....	....13.....	....361....	....573....	....4651...	1....14333...	3....1124455	.....4++
SINGAPORE	.....11.....	....132....	....4652....	....5774....	...146661...	2...13344..1	2....1124455	.....4+4
NEW DELHI	.....1.....	....221....	....453....	....575.....	....24563...	41.113342..3	741....114468	5.....4++
TEHERAN	....121....	....243....	....5663....	...16775....	...455661...	541322345114	8741..114578	+5.....4++
COLOMBO	....121....	....2331....	....4663....	....5676....	....124662...	.2...1346114	32.....114568	4.....4++
BAHRAIN	....121....	....3331....	....5663....	...16676....	1..444662...	632311345124	973....14678	+5.....4++
CYPRUS	....2321....	....4543....	....78761...	...188883...	22.576787..1	885643457556	997411135789	++4.....25++
ADEN	....1211....	....3432....	....5665....	...155671...	1..332466...	7.22..146334	943....14788	+5.....4++
** OCEANIA								
SUVA/S	.....	.....	.....	.....1.....	.....143....	.....4442...	....321242..	.....
SUVA/L	.....	....2.....	....521....	....7521.1..	.11.8653141.	..126333552.	...231.133..	.....
WELLINGTON/S	.....	.....	.....	.....12....	.....452....	....34441...	....421241..	.....
WELLINGTON/L	.....	.....	.....1.....	....31....1..	.11.742..41.	..116432442.	...131.132..	.....
SYDNEY/S	.....	.....21.....	....253....	....4762....	....6765....	...144343...	....1112421.	.....3..
SYDNEY/L	.....	.....	.....2.....	.....41.....	....2631.21.	44333631	....2111351.	.....2..
PERTH	....121....	....2431....	....5763....	....6776....	...146672...	2...13346112	1114563	.....44.
HONOLULU	.....	.....	.....	.....	.....	......2123..	...1.111132..	....4.....
** AFRICA								
SEYCHELLES	.....11....	....1132....	....2365....	...134672...	...222466...	5.11..146334	8.1....14788	+2.....4++
MAURITIUS	....1211....	....3433....	....5566....	...155672...	1..222466...	631...146445	84.....14788	+.....4++
NAIROBI	....2221....	....3443....	....55661...	...155574...	1..332367...	7.12...36555	953.....3788	+5.....4++
HARARE	.....122....	....1244....	....34673...	....45575...	1..23225711.	7522...25765	973.....2688	+5.....4++
CAPETOWN	.....33.....	....1552....	....24675...	....44566...	2..133346311	75221..13676	8731....1489	+5.....5+
LAGOS	....13331....	....25553....	....57666....	....76567...	23..63236421	78233...3687	8874....1489	5++.....++
ASCENSION Is	.....2112....	.....4333....	....27556....	....565561..	132.64233421	788141..1476	88951....169	+++3.....3+
DAKAR	.....2322....	.....4544....	....17766....	....376572..	123.75335521	688252..2576	88963....269	+5+5.....4+
LAS PALMAS	.....1221....	.....3443....	....17776....	....488882..	122.8766762.	688475445776	989852112589	++++2....2++
** S. AMERICA								
Sth SHETLAND	.....1.....	.....112....	....12345...	....355562..	122.6654331.	3561532111122	234321.....1	.....
FALKLAND Is	.....21.....	.....1243....	....3465....	....156551..	.13.5643231.	4781631..122	467531.....1	.343.....
R DE JANEIRO	.....	.....11.1....	.....4313....	.....64342..	.13.1632231.	5782431..134	889741....15	+++5.....2
BUENOS AIRES	.....	.....1.2....	.....2324....	.....45341..	.12.2642221.	4682642...12	689741.....2	3++5.....
LIMA	.....11.....	.....222....	.....5541....	.....7652..	.....6432..	125..131...1	5886311.....1	2++5.....
BOGOTA	.....1.....	.....122....	.....454....	.....6652..	.....16432..	114.3331..11	6785411.....2	4++5.....
** N. AMERICA								
BARBADOS	.....1.....	.....222....	.....5541..	.....27552..	.....56333..	225.3431.121	7775411....14	++55.....2
JAMAICA	.....	.....21....	.....243....	.....4652..	.....6532..	.12.22321.1.	5673421....2	4++5.....
BERMUDA	.....	.....21....	.....244....	.....4652..	.....16544..	..2.13321221	6673321....14	+++5.....2
NEW YORK	.....	.....11....	.....33....	.....1651..	.....4654..	...1..134332.	55623211...13	+++5.....2
MEXICO	.....	.....11....	.....33....	.....651...	.....652..	...1..2242...	25713211.....	.5+5.....
MONTREAL	.....	.....1....	.....32....	.....1551..	.....4664..	.....134332.	456122111123	+++5.....2
DENVER	.....	.....	.....1.....	.....4.....	.....363..	.....4421.	255.21111...1	2++5.....
LOS ANGELES	.....	.....	.....1.....	.....2.....	.....62..	.....1.242..	144.22.12...	.3+5.....
VANCOUVER	.....	.....	.....	.....	.....22..	.....1541.	242.11.1321.	.4+5.....
FAIRBANKS	.....	.....	.....	.....	.....	.....23..	231.11114531	.234.....2..

The provisional mean sunspot number for October 1986 issued by the Sunspot Index Data Centre, Brussels, was 37·7. The maximum daily sunspot number was 76 on 24 October, and the minimum was 0 on 14, 15 October. The predicted smoothed sunspot numbers for January, February, March and April 1987, are respectively: (classical method), 12, 13, 14 and 15; (SIDC adjusted values) 10, 10, 11 and 11.

VHF/UHF

*Ken Willis, G8VR**

SO ANOTHER YEAR BEGINS, and with it the opportunity to wish all readers a very happy one, with neighbours buying rfi-proof televisions, local authorities recruiting Planning Officers who think that 60ft towers blend beautifully with the environment, 144MHz continually open to the USSR, and legislation enacted world-wide to make it a serious offence not to QSL. But back to reality. Last year was a reasonable one, all told, with some very good and persistent tropo in the autumn. Sporadic E was less predictable but there was enough of it for some very good contacts to be made, and at least one major aurora appeared at a point in the solar cycle when these events should be somewhat rare, particularly in the more southern latitudes. Operation on 50MHz became available to Class A operators on a 24h basis, so let's hope that by this time next year the DTI will see fit to offer similar facilities to all licensees so that Class Bs will be able to enjoy the many surprises this interesting band has to offer. Once again I am indebted to so many readers for their continued support and contributions. In the ideal world I have outlined, three or four more pages every month might be enough for everything received to be published. Sadly, this is not likely in the real world where, as Harry S Truman said: "There is no such thing as a free lunch". Anyway, please keep it all coming.

Aurora

In the November 1986 issue, I mentioned having received from Alex Zaitzev, RW3DZ, some copy in Russian related to auroras, and asked if anyone would care to translate it. I was very surprised that no fewer than three readers volunteered to help. They were John Scott of London, a technical translator who can also offer French and German translations, Scott Marshall, DA2QJ who is serving with the Royal Engineers in Berlin, and R T Glynn, G3AKZ (ex 6Y5RG) of Okehampton. Although the translation did not bring to light any mind-boggling new ideas about auroras it outlined an experiment carried out in 1983 by the USSR Academy of Sciences, and the USSR Ministry of Communications. Russian amateurs were asked to co-operate with these official departments by making observations with the aim of obtaining more accurate information on the nature and cause of auroras. Typical information required was the starting time and duration of the event, including any interruptions in auroral conditions during the event, bearing of the aurora taken from antenna headings, elevation of antenna for maximum response, locations of most northern, southern, eastern and western areas affected by the event, measurements of doppler shift, effect of polarization of signals, signal/noise measurements on received signals, checks on meteorological conditions, effect on signals received from satellites during an aurora and comparison of aurora at different frequencies, eg 144 and 432MHz. These are parameters which Charlie Newton, G2FKZ, the IARU Auroral Co-ordinator has been requesting from amateurs for years, though not all amateurs are equipped to provide some of the more esoteric data required.

Incidentally, if anyone knows of a Russian-English radio dictionary, would they please let John Scott or me know. John's address is 74 Park Avenue South, London, N8.

By one of the coincidences which seem to abound in this column, I received a letter from R J Livesey, who is Director of the Aurora Section of the British Astronomical Association. He lives in Glasgow and is kept informed of any auroral matters we print from time to time by St Andrews University Observatory staff. He is interested in any auroral data, such as that described in the Russian experiment, and conversely is a source of much information himself since he has records of all visual auroral observations from 1976, including data from overseas. He also sent a copy of the *BAA Aurora Section Newsletter* for July 1986, which I will mention again next month since it contains a wealth of information, much of it of interest to radio amateurs, especially where it comments on auroras which amateurs have used effectively for long-distance communication.

We seem to be well-served in our contacts with the astronomical side of our hobby, since in addition to the director of the BAA Aurora Section we also have Alastair McBeath, who does a similar job for the Meteor Section, as a regular reader.

Charlie Newton, G2FKZ, has sent his forecast for 1987, and it is a bit depressing. It reads: "Auroras will not be evident over the next year as we are now approaching the magnetic minimum and the 'Aurora Zone' will be at the maximum northern limit. Most of the UK will not be able to use it". Charlie is writing a book on the subject of auroras and it looks as if it could become a standard textbook on radio-auroras. Just as we have found with meteors, astronomers and radio amateurs view these events very differently since one side depends on visual observations while the other is interested primarily in what happens at wavelengths much longer than light waves. Bringing the two together can only benefit all concerned.

Stop press: There was an aurora on 26 November which penetrated to the south, and stations were heard and worked on both 50 and 144MHz.

More from Cyprus

A most interesting letter from ZC4AP/G0CAC, tells of plans for a concerted effort to establish a 144MHz link between Cyprus and the UK. ZC4AP is station manager of the recently reactivated Episkopi Radio Club, ZC4EPI, and it is hoped that Cyprus clubs from both the Eastern and Western Sovereign base areas will take part in a joint project during the last week in May and the whole of July 1987, activity being mostly confined to week-ends with the aim of making two-way contact with the UK on 144MHz. A station will be established in the Troodos mountain range, the highest point of which is around 2000m asl. Callsign is at the moment not decided, and although a full ZC4 call is hoped for, a compromise such as ZC4--/5B4 may eventually be selected, which, as ZC4AP says, would be an enticing one for the 144MHz dx-hunters. It is proposed to use cw to try to establish the path, and then to go over to ssb if conditions permit. They are looking into the possibility of getting some meteor scatter equipment, and possibly some facilities on 50 or 70MHz to provide a link and monitor band conditions. At present 70 and 50MHz operation is not permitted in ZC4, so they could only listen on these bands, but apparently by the time this proposed project is due to start, there is some hope that ZC4 amateurs will have been granted facilities for these bands. An hf band link is also planned.

The team requests information on the type of equipment they should use, particularly if this is either of a specialist nature or currently unobtainable in Cyprus. Any other information of a technical nature which might enhance their chances of success would be welcome, and they will also require a link-man in the UK to co-ordinate schedules etc. One would think that their best chance is to try to coincide with a good sporadic E opening since Greece has been worked by many UK amateurs by this mode which represents a good portion of the path, though the distance is very long for both Es and meteor scatter unless more than one hop occurs. This in itself will make the experiment very worthwhile and interesting. To catch any Es though, they should try to man the station during daylight hours, not just at weekends. As for equipment, as much power as they are allowed to use into one to four 17 element antennas or the like would seem to be a good starting point, plus a low-noise front-end giving a true nf of not more than 2dB should suffice, especially from that mountain top. Many of us have experienced what the Czechoslovakian stations accomplish from mountain peaks, so the Cyprus site proposed will be very much in their favour. Anyone wishing to make any sort of contribution to this project by way of advice, assistance or simply wanting skeds should write in the first instance to ZC4AL A L Poore, JSB, BFPO 53, London, England. When a link man has been chosen he will be able to deal with all the admin at this end.

Repeater news

As announced over GB2RS News Service, nine experimental packet radio repeaters were cleared for operation as from 22 November last. These were GB3AP (Dudley), GB3BP (Bristol), GB3DB (Honiton), GB3DC (Weymouth), GB3EP (Exeter), GB3HP (Winchester), GB3JP (Jersey), GB3NP (Norwich) and GB3UP (University of Surrey). There must be something about the air the further west you go since there is a surprising West Country bias about the list. All use vertically polarized aerials and operate on 144·650MHz using the AK25 Version-2 protocol. The experiment is a short-term one planned to finish at the end of this year. Other stations planned (and possibly operational by the time this is in print) are GB3HQ (Potters Bar), GB3KP (Kingston Upon Thames), GB3UP (Guildford) and GB3XP (New Malden), these last four being horizontally polarized. Still under consideration at the time of going to press were packet repeaters at Crewe and Harrogate, completing the list of stations included in the experiment.

Kent Repeater Group Newsletter No 46 for November 1986 indicated a healthy growth in material received by the Editor, G0AMZ. News of this group's installations revealed that GB3CK went 17kHz low during the summer due to a failure in the crystal oven, but this has been corrected. A replacement aerial feeder is still required for this rig. GB3EK is not yet on the air but is progressing well with cavities all completed which provide 22dB of notch for 0·25dB insertion loss. GB3NK "chugs along reliably with no breakdowns since the last report", but regrettably some operators are using it cross-band (presumably in duplex fashion) so that the audio

*6 Lerryn Gardens, Broadstairs, Kent CT10 3BH.

from the other station can be heard clearly through the repeater. This is a violation of licence conditions which do not permit audio being received from other stations to be relayed through one's own microphone. GB3KN is still subjected to jamming which, its managers say, will jeopardize its continued operation if not corrected. GB3KS was subjected to an antenna inspection which led to some maintenance work when, at short notice, an opportunity arose for the mast to be climbed by G6ZAA, G6ZPM and G0FAK, with the help of IBA rigger Les Castro. The SWR is now satisfactory, but future work to improve coverage into Thanet and Canterbury is planned. GB3SK has transmitted news bulletins when possible, though lack of access to the site at week-ends remains a problem. This repeater is alleged to be getting very hard of hearing (we old-timers dislike the word "deaf"), and this will shortly be investigated and a possible solution provided in the form of a hearing-aid (a high-gain colinear antenna), but this again awaits the opportunity to scale the heights. Makes my head swim just to think of it!

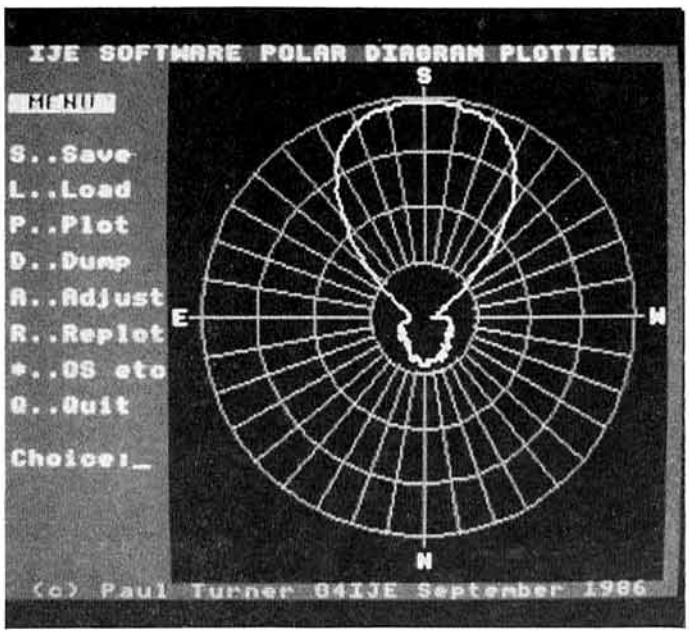
There was excellent tropo propagation on all the vhf bands during the weekend of 28–30 November as a result of a high pressure system over the UK. G6JHR (Gravesend) heard an OZ working several G stations through the north Kent uhf repeater GB3NK, mainly as a result of the input/output frequencies of the OZ/UK repeaters being reversed.

Late news; packet radio repeater GB3YP (Yorks) has been licensed for operation on 145·275 MHz using vertical polarization. At the time of writing no date had been set for switch-on.

Another micro application

The illustration shows a presentation of the polar diagram of the pair of five-element, 50MHz Tonna antennas used by Jeremy, G3NOX, taken off-screen from his video display. Paul Turner, G4IJE, has developed a program for his BBC micro which displays the amplitude of the signal received from a nearby station which transmits continuously while the receiving antenna is rotated at about 1rpm, a typical speed of commercial rotators. Back in September 1983, Jeremy's use of his micro as a plotter were illustrated in *4-2-70*, and this is an extension of that application. The display shows, in this case, the very clean polar diagram of this quite large antenna array. In using the program the separation between stations should be such that no multipath or other effects confuse the result which depends on a steady signal being received at the measuring end.

On another topic, the *Dubus* micro program for meteor shower prediction mentioned in *VHF/UHF* for November 1986 does not, as it is listed, give the histogram presentation which is illustrated also in that issue. It merely gives tabulations of figures representing the probability of reflections occurring along given paths. Again it was Paul, G4IJE, who re-wrote and improved this program so that in the new version, following the tabulation, a histogram print-out is offered similar to that shown in the November issue. Copies of Paul's program can be obtained by sending me a blank cassette tape plus return postage. Alternatively a listing can be provided if an sae is sent to me. The program will run on either BBC or Electron micros. For further information on the plotter, contact G4IJE.



Polar diagram of the G3NOX 50MHz array. Courtesy G3NOX/G4IJE

Update from Gibraltar

GW4KDP (Gwynedd) had just returned from a few weeks in Gibraltar when he wrote to give some current information on the amateur radio scene there. He says that they have started to issue Class B licences, callsigns being ZB0 plus a single letter, and they had just reached ZB0H when he left. Presumably they will soon run out of single letter calls and start to use two or more. Anyone visiting Gibraltar and wanting to operate there can obtain a reciprocal licence quite easily by sending a photocopy of the front page of the current UK licence and the receipt for the UK fee. This should be sent to The Wireless Officer, 104 Main Street, Gibraltar. GW4KDP says that the ZB licence will be posted back in good time for your visit. This avoids any problems which might be encountered when taking gear through the local Customs. In view of the recent issue of Class B licences in Gibraltar, UK Class B holders are now eligible to operate there which is very good news. The local Gibraltan radio club meets on Tuesday nights at Hamilton Ramparts, and all are welcome.

The 50MHz beacon, ZB2VHF is now at the top of the Rock at about 1000ft asl, with the 144 and 70MHz beacons sharing the site. Back in July when ZB2VHF was putting such a strong signal into the UK on 50MHz, it was located some 500ft lower, at the QTH of ZB2BL. The 50MHz beacon runs 35W and now has softer keying. GW4KDP says the keying was modified for his benefit since it previously caused so much splatter on his FT690 when he was located underneath it in the town.

Gibraltar is a country which many of us would like to work on 144MHz, so any news of increased activity there is welcome. It would be good if some of the locals could get interested in meteor scatter since this would be a useful all-year mode instead of waiting for sporadic E or an exceptional tropo opening. It is, after all, no further from the UK than some of the EA7 and EA9 stations which appear from time to time, not to mention the occasional CN8, so what about it, you chaps down there on the Rock?

70MHz

Having stirred things up in the matter of 70MHz contacts between Cyprus and the UK (see *VHF/UHF*, May and December 1986), Dave, G4FRE, now turns his attention to the 70MHz European record which he believes is currently stated to result from a contact between GJ3WMR/P and GM3WOJ/P over a path of 609km during 1978. Dave says "surely this has since been broken, and so to entice more claims, I submit the following: G4FRE/P (IO70PP) to GM4ZUK/A (IO87WB) on 21 September 1986 (a QRB of 735km) during the 432MHz Trophy Contest". G4FRE was reported to be a 57 signal throughout the contest at the QTH of GM4ZUK/A, but Dave says this is not surprising since from his Cornwall location, there was really only one way to point the antenna, and the beamwidth then covered most of the areas where there was any activity.

G4FRE says he is glad to see interest in 70MHz continuing and that not too many, he thinks, have forsaken it for 50MHz. He has been active this year from seven squares, (AL, AM, XN, ZR, YS, XK and YM), with more than 250 QSOs in his log, so he thinks quite rightly that he has "done his bit to help activity on this band during the GB4MTR year".

Anyone wanting to claim a longer path than the one quoted by Dave should let me know so that Folke Rasvall, the co-ordinator of the records can update his books.

Meteor scatter

Paul Turner, G4IJE, has drawn attention to some confusion over the micro program shown in the November issue. This was based on a program by DL5MCG, first published in *Dubus* and subsequently modified by Paul for the BBC and Electron micros. I showed a histogram print-out of "best times" for meteor reflections along given paths for the Geminids shower, followed by a further illustration based on the Quadrantids in the December issue. The *Dubus* program, which many operators may already have copied for themselves, does not give the histogram presentation but only tabulations of probability figures. G4IJE added the histogram feature to the program, and has since done further work on it so that it now gives predictions along eight paths instead of the four shown in the November and December issues.

Arthur Williams, GW8FKB (Anglesey), has managed to get the *Dubus* program running on his Amstrad 464, and finds it very enlightening, so drop him a line if you have one of these micros and need the software.

Dave Dibley, G4RGK, wrote to give his assessment of a year of ms operation. He said he has been fairly active, mainly on sporadic meteors or minor showers, and found, as previously, that the most productive month was June, with excellent reflections during most skeds. He listed 26 completed contacts which represented a score rate of only about 20 per cent, requiring many hours of operating, but among his contacts were some which fully justify the time spent, such as HV2VO (Vatican) and OH0AI/OH0. Dave said that when he worked 13LDP, 14YNO tail-ended for a

Not the heavy gang, but four founder-members of the Evesham Radio Amateurs Club, from left to right, Keith G6DZH, Peter G6JNS, Dave G4WAD and Mike G4UXC. All are also holders of ARRL VUCC certificates. G8VR is your VUCC manager, so send a largish sae for details of this handsome award

completed contact, and similarly EA3BTZ followed EA6FB; "not bad for sporadic meteors or minor showers". If more of us would look around between skeds, ms activity would surely increase.

G4IJE continues his regular 50MHz skeds with LA6QBA using ms ssb, and suggests that others should use ms procedure when calling CQ on the band, since bursts of callsign are often heard which could result in a contact if operators call for one minute with 15s breaks, and listened for a similar period.

Issue 14 of *Six News*, contains an interesting short note by Dave Butler, G4ASR on a cw interface/decoder for ms working. Aimed at supplementing rather than replacing the variable speed tape-recorder, the proposed system uses the conventional memory keyer "in reverse" so that during receive periods, cw from the receiver is fed via an interface into the keyer running at fast speed and in WRITE mode. When a burst is received, the keyer is rapidly switched to READ mode and the clock speed slowed down, when, with signals which are a few dB above noise, cw is regenerated at readable speed through the side-tone in the keyer. Perhaps Dave can be persuaded to write this up in detail with a circuit of the interface he uses.

From here and there

For those who like to check vhf conditions by listening outside the amateur bands, Jan Alblas, G4XNL (Eastbourne) has compiled an extensive list of VOR beacons in the 108–118MHz band. The listing gives the country, callsign, frequency and locator for some 300 stations, and he says that he can make copies available for those who send him an sae plus a few stamps to offset copying costs. G4XNL QTHR.

During October, Dave, G4GLT (Leics) is reported to have been checking the crossband frequency 28,885kHz when he was called by some VK stations with extremely strong signals, somewhat unusual for this point in the solar cycle. Solar activity was observed to be quite high on some days towards the end of October and the beginning of November too. Monitoring this frequency could produce some very worthwhile results.

Jan Hubach, OH1ZAA has been on his travels during which he operated as NN0Y, NN0Y/WL7, FO0ZA (Tahiti) and NN0Y/WH6 (Kuai), all a bit too remote for UK vhf signals to reach. He met several vhf types during his trip, and on his return copied beacon OX3VHF on 50·045MHz at his QTH (KP0IRO) on both 14 November (23.28gmt) and 15 November (22.04gmt). He thinks the propagation was auroral Es since tv was also received at the time from either Iceland or Greenland on channels 3 and 4. The distance of the beacon from his QTH is 3,503km, bearing 299°, comparable with a transatlantic path in some ways. Jan has asked Bo, the OX3VHF beacon-keeper whether he can increase the power of the beacon or at least improve the gain of the antenna system, possibly splitting the power between antennas pointing in different directions. He deplores the fact that the Americans have been so slow in establishing a good vhf beacon chain such as we have throughout European and neighbouring countries. He urges operators to keep watch in order to take advantage of auroral Es conditions which may occur more often than is generally realized.

Make a note in your diary for the Derby & District ARS National 144–145MHz contest, scheduled for Sunday 15 March. It is hoped that this will become an annual event. Send an sae to B A Sharp, Secretary of the club's contest sub-committee for details. His address is 119, Green Lane, Derby, DE1 1RZ.

Due to lack of space, the description of some further terms used in solar forecasts broadcast over GB2RS will be held over until next month. □

SWL

*by Bob Treacher, BRS 32525**

Top band dx

Last month I touched on dxing on 1·8MHz, and indicated that the best band conditions would be achieved in February; this month I shall try to prove this theory.

In 1985 and 1986, February brought me four new countries from the Caribbean. Early in the month, 0500-0700 proved to be the most profitable times to listen. Later in the month, 0600-0700 was best. In the last two years dx has been copied from HH, J87, KV4, PJ2, PY, V4, YV, 6Y5 and 9Y4 on ssb. No doubt the cw experts can produce an even better list of dx heard. Propagation was definitely better in 1985, so the 1·8MHz dx fraternity is hopeful of good conditions this year. Many USA and Canadian stations are also audible to swell the amount of dx on the band during the time before sunrise. For those who like to burn the midnight oil, 0200 may also be a good time. Impromptu nets run by 6Y5IC or J37AH have been known to develop at about this time, and many other sought-after Caribbean dx might be audible in Britain. At sunset, I have little experience of good dx being available. However, later in the evening much European activity can normally be heard and there is the chance of hearing VS6DO at his sunrise around 2310.

Either side of February, two ssb dx contests are held which tend to swell the amount of dx on the band: CQ WW 160 and the ARRL DX contest. In the last two years 11 new countries have been heard at my QTH during these contests. The message is therefore clear: note the best times for dx from the west, but also take a look at the band during contest activity. I hope you will be pleasantly surprised because there are plenty of Caribbean and South American countries with good signals in Europe which will, if conditions are good, boost your 1·8MHz country score.

One last thought for those top-banders who missed VU2GDG last season. Between 9 and 19 January his signals peaked with us in G around his sunrise about 0115. On some mornings, signals from India were very good and the QSL card arrived back promptly. VU is really good dx on 1·8MHz, so I am hopeful he will be on the band again this winter and that many will be able to add him into their logs.

Greyline

With all the talk of dx, readers may find it useful to note a few sunrise and sunset times (based on London) for mid-January to mid-March.

Date	Sunrise	Sunset	Date	Sunrise	Sunset
15 January	0803	1611	25 February	0658	1723
25 January	0752	1628	5 March	0641	1737
5 February	0736	1647	15 March	0619	1755
15 February	0718	1706			

As I have explained in the past, much lower frequency dx will be available at the greyline time at both sunrise and sunset. In the middle of the winter, greyline for stations at 50°N latitude is approximately ± 45min of sunrise and sunset times. From the times quoted above, it is therefore easy to predict when the best greyline conditions exist. The 3·5MHz band can produce much from the west coast of the USA and from the Pacific at sunrise, while at sunset JA, ZL and assorted Pacific stations might be possible.

There is also a narrow "window" when it is possible to hear the USA west coast at sunset, but in G the conditions have to be very good and the band very quiet. On 7MHz, sunrise will bring good copy of a never-ending stream of stations from the Pacific, thanks to the fine work of ZL2AAG, who runs his net (now 7,075, 7,077 or 7,085 QRM permitting at 0500 and 0700) with the express aim of getting European and Pacific stations in contact with each other. It is also worth mentioning last year's superb conditions from G to KL7 and JA as late as 0920 on 7MHz ssb.

DX news

One who is already aware of the dx capabilities of the lf bands is Tony Blackburn, BRS87156. In November he heard 5W1RY on both 7 and 3·5MHz, and a KH1 on the ZL2AAG net. DP0GVN (Antarctica) had also been heard and a QSL was received within five days.

The CQ WW contest certainly provided the best band conditions for many a long time. Many of our reporters mentioned some juicy dx from 28

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

to 1·8MHz. On 28MHz, stations from Australia and the Far East were good signals, while on 21MHz FR/W6QL, HL0U, YE0X (YB0), VS6DO, TL8DC and VU2Z were good copy. The 14MHz band provided the usual crop of Caribbean signals, including V22A, V31CV, FG/AA4VK/FS and VP2MU; 7 and 3·5MHz were fairly ordinary; but 1·8MHz provided the first legal LA (LA7Q), TA2BK, P36P (5B4), J49A (SV9), VP2EC and VP2MU.

Michel Monteil, F11ATZ, mentioned the IOTA Awards. Not too many swls chase these, but Michel is one who is on the Honour Roll for having confirmations from 100 islands. Anyone requiring further information on these fine awards should contact G3KMA, QTHR.

It was good to hear again from Stan Porter, ORS45992/7Q7-001. He was still in Malawi, but was expecting to move QTH at the time of his letter. He also listened in CQ WW and heard UP9A on 1·8MHz for his best dx. He mentioned that rumours are rife that 7Q7LW will be retiring home to Sussex in May, so those needing 7Q7 do not seem to have too long to make the contact. Unless Stan or John, 7Q7-002, get their licences, 7Q7 will become an even rarer country than it is now. Stan was to have spent Christmas in ZC4 and 4X4, and hoped to look up some well-known amateurs while he was there.

Robert Andrews, BRS36797, does not write too often. He had an interesting tune around the bands during CQ WW, and with only a 7ft joystick "leaning up against the bedroom wall" and a Trio 9R-59D he copied many strong signals from Europe, including a number on 1·8MHz.

Angela Sitton, BRS88639, was trying to improve her morse and had spent much time at the bottom of the bands. She can receive at 16 wpm, and had been sending a number of listener reports. She hoped to take her test this month. A B.28 receiver had been loaned to her by the Stevenage ARS, of which she is a member. It tunes 60kHz to 30MHz, and Angela uses it for 1·8MHz listening mainly. During CQ WW, she logged 24 new countries on 1·8MHz, including 5N2, so it certainly handles well.

Good to hear too from Colin Watson, BRS46598, who had also been putting an ear to the bands during CQ WW. He was rewarded by YI1BGD on 14MHz, VK2AVA on 3·5MHz and KP4YD on 7MHz.

Finale

To close, thanks are due to G4EDG for the ZL7 QSL card. No HF table this month; there were only four updates. Remember that the new tables described in last month's column are now in operation.

It is too early to make a sizeable entry yet, but I will attempt to publish all the tables in full when I have sufficient space to include them. News, views and comments for the March issue should reach me no later than 6 January 1987, with late copy no later than 13 January 1987. □

SATELLITES

*Bob Phillips, G4IQQ**

THE BEGINNING of the year is traditionally the time to review events of the previous year and to look forward to the next 12 months. First, the retrospective. With a few notable exceptions, 1986 didn't really live up to expectations as far as amateur satellites were concerned. The planned launches of the Phase 3C satellite and RS9 and RS10 did not take place and Oscar 10 suffered a major systems failure from which it has not yet recovered and may not do so. On the positive side, Uosat Oscars 9 and 11 continued to provide excellent service, all the more so as the result of the development of sophisticated diary software. RS5 and RS7 also managed to survive the year though the health of both satellites is deteriorating, primarily due to battery degradation. The successful launch of the first satellite designed, constructed and launched from Japan took place in July, and it looks as if Fuji Oscar 12 will be carrying a significant proportion of amateur traffic for quite a while.

Turning now to the future, the forthcoming year promises a great deal for the amateur satellite enthusiast. RS9 and RS10 should be in orbit in the early part of the year and assuming that the modifications to Ariane are successful, Phase 3C is expected to be launched by the end of the summer. Various other initiatives are beginning to take shape and are likely to reach the stage of more concrete proposals during the year, including perhaps one from the UK.

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

Oscar 10

I have mentioned above that, in spite of continuing attempts, there is no positive indication that the lifetime of the satellite can be extended. The November 1986 issue of the Amsat-UK journal, *OSCAR News,* carries a very interesting report of the three years of operation of Oscar 10 as seen by its mastermind Karl Meinzer DJ4ZC. Karl examines the various problems that have occurred during the period and suggests methods to avoid their recurrence in the future. On the matter of the degradation of the on-board computer memory, Karl indicates that the failure was expected, indeed it was estimated at the time of the development of the spacecraft that the memory chips would probably survive for about three years in orbit. Failures in the memory cells are caused by particle radiation and the rate of failure can be predicted by calculating the amount of time spent in those parts of the satellite orbit where particle density becomes a significant factor. The equivalent memory chips to be used in Phase 3C will have a much greater immunity to the effects of particle radiation and are therefore less likely to be the lifetime determining elements for the satellite.

Fuji Oscar 12

The digital transponder, mode JD, was activated from the beginning of November but at the time of writing, the schedule for operations had not been made known. Many operators are finding it difficult to achieve successful operation through the satellite, including in the JA mode. Last month I mentioned the problem of antenna polarization. Even if you overcome this one, a further difficulty is de-sense of the 435MHz receiver in the presence of the high level 145MHz signals. (For those that have not yet tried satellite communications it should be said that operation via satellite is generally in full duplex, ie., simultaneous transmission and reception is carried out.) The usual method for minimizing the effects on the receiver is to prevent the transmitted signals from entering the front end of the converter or pre-amplifier. To do this a low loss band-pass filter is required, designed to pass signals in the band 435 to 438MHz and, in particular to attenuate signals at 145MHz. Designs for two such filters were included in the September issue of *Oscar News* and have proved very successful in solving similar problems when mode J operation was last available, through Oscar 8. If your 145MHz transmitter generates significant levels of third harmonics, then these filters will not help you. In this case high power band pass filters will be required after the power stage of the 145MHz transmitter. Suitable designs may be found in chapter seven of the *VHF/UHF Manual.*

The above probably creates the impression that working through FO12 is difficult, but a recent letter from Mike, G6GZZ indicated that communication is possible with a fairly straightforward set-up. Mike had a two way contact with G4SNT/M with the latter using FT480R and FT790R transceivers and mobile whip antennas for both bands. A 100W power amplifier was also used at the mobile end and reports of 4,2 were exchanged. That almost sounds like a challenge for someone to do better!

RS satellites

Both RS5 and RS7 are now out of their eclipse seasons for a while and so should be providing near full time service for mode A users. As for RS9 and RS10, it now appears that the previously planned orbit height of 1500km will not be used and a value of around 1000km seems more likely. Expect the launch to take place at any time in the new year, probably with little, if any, notice.

Satellites in orbit

At present there are five amateur satellites in operational condition, all of which are in low altitude, circular, polar orbits. The major characteristics of these satellites are indicated in the table below.

Satellite	RS5	RS8	Oscar 9	Oscar 11	FO12
Inclination	82·96°	82·96°	97·6°	98·23°	50·0°
Period (min)	119·5	119·7	94·3	98·5	115·7
Avg height (km)	1674	1667	489	690	1490
Up-link Frequencies (MHz)	145·910 to 145·950	145·960 to 145·600	n/a	n/a	145·900 to 146·000
Down-link frequencies (MHz)	29·410 to 29·450	29·460 to 29·500	n/a	n/a	435·900 to 435·800
Beacon 1 (MHz)	29·331	29·461	145·825	145·826	435·795
Beacon 2 (MHz)	29·452	29·502	435·025	435·025	

Notes

1. RS7 also carries a robot transponder which enables automatic cw contacts to be made with the satellite. The nominal input and output frequencies are 145·835 and 28·341MHz, respectively.
2. Uosat Oscar 9 also carries four hf beacons but only that on 21·001MHz is active. Additionally there are beacons on 2·4GHz and 10·47GHz.
3. Uosat Oscar 11 carries an additional beacon on 2401·5MHz.
4. Fuji Oscar 12 also carries a digital, store and forward transponder with four separate up-link channels and a single down-link channel. □

DATA COMMS

*Ian Wade, G3NRW**

D-Day for digipeaters

Early on Saturday 22 November 1986, I switched on my packet station, turned the beam towards Potters Bar, and sent out a request to connect to myself via GB3HQ (can you think of anything better to do on a Saturday morning . . . ?). On the stroke of midday, the digipeater at GB3HQ sprang into life, but with a very weak and watery signal. You can imagine my chagrin when I discovered that after 10 years, in all kinds of weather, my beam rotator had chosen this moment to seize up, and I wasn't pointing towards Potters Bar after all!

So no connection was established, but many other stations did make it via GB3HQ, heralding the start of a new era in packet communications in the UK. In all, permission has now been granted to 10 of the 14 stations listed in November's *Data Comms* to operate as unattended digipeaters, and it is expected that the remaining four (GB3CD in Crewe, GB3KP in Kingston-on-Thames, GB3XP in New Malden and GB3YP in North Yorkshire) will get the go-ahead very soon.

As well as being an historic event in its own right, it is also remarkable that the licence applications were processed so quickly by the DTI—the applications were only formally submitted in August, and approved in just over three months. This must be an all-time record, and to my knowledge these are the only repeater applications of any kind that were approved in 1986.

But we have to remember that the final approval of the digipeater applications was the last, small step in a sequence of activities which started over two and half years ago, when the RSGB formed the Packet Radio Working Group (PRWG). The group held many discussions on all aspects of packet, and gradually the ideas for digipeaters and packet networks reached a state where it became appropriate for the RSGB Repeater Management Group (RMG) to take over, and the PRWG was disbanded. So there has been a lot of quiet work behind the scenes to get to where we are today, and we have to thank in particular Mike Dennison, G3XDV (RMG chairman), Martin Stubbs, G8IMB (RMG data co-ordinator), and David Evans, G3OUF (RSGB secretary and ardent data comms exponent), for all their hard work in breaking this exciting new ground.

Countries on packet

While most packet activity takes place today at vhf, the number of stations on the hf bands is also on the increase, mostly on 14MHz. John Danks, G5DS, recently sent this list of no less than 53 countries known to be active: A,N,W A4 CT DJ DU EA F G,GI,GJ,GM,GU,GW HA HB HC HK HP IJA KP4 LA LX OE OH ON OX OZ PA PJ PY ST SM SV TF TG TI VE VK VP2 YB YJ YU ZF ZS 4U1 4X4 5H 5V7 9H 9K2 9M2 9V1. Out of these, he has worked 35, and reports that G8QR is up to 39, with G3LDI just ahead at 42. Any advance on 42?

HF packet frequencies

The most common centre frequencies in use on the hf bands are: 14,101·3, 14,103·3, 14,105·3, 7,038·3 and 7,091·3kHz. Why these "odd" frequencies? Well, in the early days of packet, most stations did not have tuning aids like the Toni Tuna, and so it was not easy to tune in a packet signal accurately—remember that a packet signal is only there for a second or so, and the next packet may not appear for another 30s or more, so you have to be on the ball!

To overcome this problem, the early pioneers first established contact on phone, using upper sideband on 14,103kHz, then, when the stations were properly tuned in, they switched to lower sideband for packet. For tncs using the usual tones of 1,600 and 1,800Hz for hf working, the actual transmitted frequencies thus became 14,101·4 and 14,101·2kHz (ie 14,103 − 1·6 and 14,103 − 1·8). Hence a centre frequency of 14,101·3kHz. Some tncs such as the Kantronics KPC-1 use other tone pairs (see November's *Data Comms* for the details), but provided that the shift is still 200Hz and the centre frequency is the same, they can still communicate with other tncs.

By specifying a centre frequency, rather than a mark or space frequency (or a "carrier frequency" on the tuning dial), there is absolutely no doubt about where you will find a signal on the air. In other words, we can specify a centre operating frequency which is completely independent of the sideband, the shift and the tones in use. This is already the standard commercial practice, and paves the way for so-called adaptive modems that will automatically change speed and tone frequencies depending on conditions.

Two further points on hf packet frequencies. First, if you use 14,101·3kHz (the most common channel on this band), be sure that your signal is no lower than this frequency, and do not use a speed higher than 300bps. Otherwise you run the risk of interfering with the world-wide beacon service on 14,100kHz. Second, a reminder that the Sunday morning packet net still takes place on 3,600kHz ±QRM, starting at 1130gmt. G5DS and G8QN are regulars on this net, and will be pleased to hear from anyone else wishing to join in.

HF packet parameters

When operating packet on hf, it is necessary to set up the tnc a little differently from the usual vhf settings. This is because, instead of the nice quiet interference-free world of 144Mhz, we now have to contend with all sorts of QRM, fading, phase distortion and so on. So it becomes necessary to keep packet frames as short as possible, to lessen the chances of losing them in the noise—only one bit has to be corrupted for the receiving tnc to throw away the whole frame.

The first step is to set the maximum frame length to, say, 20 message characters (using the TNC-1/2 command "PACLEN 20", for example), rather than the more usual setting of 128 or 256 characters. Next, the number of frames which can be sent together should be restricted to one ("MAXFRAME 1"). If you use the more usual value of four ("MAXFRAME 4"), it only requires one of the four frames to be corrupted to make it necessary for the tnc to transmit all four frames again —even if three of the four had originally got through unscathed.

These tips for more effective hf packet operation are probably quite well known, but a further tip which I have never seen mentioned before is to do with the setting of TXDELAY—that is, the delay between switching to transmit and starting to send valid packet data. If the receive/transmit changeover time is long and TXDELAY is too short, you will obviously lose the front end of a packet, but having TXDELAY too long can also cause problems. This is because for the duration of TXDELAY, while the tnc is waiting for the radio to switch to transmit, the tnc is actually sending a stream of flag characters. If TXDELAY is very long, many of these flags may actually be transmitted. No problem if they are received intact, but if one of them is corrupted, it no longer looks like a flag at the receiving end and will be treated as the first data character of the frame. It isn't, of course, and the "frame" will eventually be thrown away. So it makes sense to keep TXDELAY as short as possible, just long enough to transmit a few flags at the start of each frame.

HF packet *vs* Amtor

Even the very shortest AX.25 packet frame is 152 bits long; ie leading flag (8 bits) + destination callsign (56 bits) + source callsign (56 bits) + control field (8 bits) + frame check sequence (16 bits) + trailing flag (8 bits)—and possibly more if bit stuffing takes place. A typical 20-character message in the frame increases this to 312 bits, and any digipeater callsigns in the frame would make it even longer still. As mentioned above, it needs just one of these bits to be corrupted and the whole frame will be discarded; when you watch the traffic on 14MHz you can see this happening all the time. Retry after retry after retry!

In contrast, an Amtor data block is only three characters (21 bits) long. At 100bps, it takes 210ms to send the block, whereas our 20-character packet frame needs 1·04s (ie 312 bits/300bps). That is, a typical packet takes about five times longer to send, thus greatly increasing the chances of losing it through interference. For this reason many people, including myself, have long ago come to the conclusion that Amtor is still by far the best way to send plain language text on the hf bands, where the occasional corrupted character doesn't matter.

However, I think it is still worth experimenting with packet on hf, but at higher speeds. If we send packet at 600 or 1,200bps instead of 300 (still within the bandwidth of an ordinary ssb phone signal), transmission times then become comparable with Amtor, and overall throughput should be better. This may need better modems than we have at present, to cope with the phase distortions arising from using widely-separated tones, but an interesting starting point could be the G3RUH psk modem design (available from G3AAJ at Amsat-UK). Although originally designed for packet communication with the JAS1/F012 satellite, the modem could of course also be used in terrestrial link experiments. □

*7 Daubeney Close, Harlington, Dunstable, Bedfordshire LU5 6NF. Prestel Mailbox 219999743

Contest News

1986 144MHz Trophy Contest results

The good conditions of 1984 and 1985 were not repeated in 1986, but propagation was not all that bad, especially in the South East. In general conditions were variable, with some ducting which gave southern stations the chance to work quite a few EA stations. To the east, things were not so good, and in comparison with the last two events, very few HB9's were worked.

The number of stations active within range of a well-equipped G contest station operating from a good site continues to amaze, but the best that can be achieved stubbornly refuses to move from about 900 contacts, which represents probably only 30 per cent of the stations known to be active. Why is this? The leading stations would surely have beaten a limit due to operator inefficiency by now. The answer must be that the level of QRM from other stations makes it a matter of chance whether a signal is audible at any distance. If this is so, it is instructive to consider the remarkably good correlation between the type of power amplifier in use (listed this year in place of the conventional +26dBW power figure) and position in the results table. It is clear that the greater the potential power of the amplifier, the better the results obtained. It is therefore very hard to believe that the disturbing trend to the use of very powerful amplifiers is motivated solely by the desire to produce a narrower signal at +26dBW, and contestants should ask themselves whether this is the way that 144MHz contests should go.

G4IRB and G4NTY again spent more than 100 hours each in checking logs, and receive the adjudicator's thanks. It is good to report that logkeeping is gradually improving, but some stations have yet to learn that pages with no QTH locators or times, and errors on the QTH's of well known European contest stations, are easy to find. The standard of the single operator logs is very much higher, even for an equivalent number of contacts. Further evidence, perhaps, that QRM at the typical /P site is the problem.

Certificates and congratulations to the leading stations and to the zonal winners. Many still do not enter the zonal contests. Subject to council approval, the Mitchell-Milling Trophy is awarded to Parallel Lines, and the Thorogood Trophy to LX2GB/P, (G4FDX).

G4JLG

MULTI-OPERATOR SECTION

Posn	Callsign	Points	QSOs	Loc	Amp	Ant	Best dx (km)	Best dx (prefix)
1	G4LIP/P	12,352	939	03CE	8877	100el	940	F6BDN/P
2	G4BCH/P	9,849	808	01PU	Tetr	2×16Y	1,015	SO6AUU/P
3	G4APA/P	8,974	715	94RJ	2×'250	4×17Y	990	HB9M/P
4	G3EFX/P	8,744	754	90XV	2×'250	3×17Y	877	F3TE/P
5	G4NXO/P	7,939	625	80EF	2×'250	62el.	1,303	SM6CEN
6	G8LNC/P	7,398	669	90JO	8877	2×19Y	816	F6CIS/P
7	GW4GFX/P	7,314	695	81LQ	2×'250	2×17Y	943	F6CIS/P
8	GD4IOM	7,204	643	74QD	8877	4×17Y	1,221	EA2AMU
9	GW3CKR/P	7,097	629	72PT	2×8874	87el.	1,100	EA2AZW/P
10	G4ANB/P	6,803	476	79JX	6N2	2×16Y	1,034	EA3AIR
11	G3PIA/P	5,875	677	91FN	2×'250	2×17Y	812	OZ1CTC
12	GW3OXD/P	5,834	640	82JG	?	4×9Y	845	DL6FAW/P
13	GW4MGR/P	5,644	688	83JA	2×8874	4×8Y	863	DL3LAL
14	G4CRA/P	4,940	484	01NW	Trans	2×19Y	741	Y23SB/P
15	G1KAR/P	4,848	464	00DR	1×'250	2×16Y	842	Y23SB/P
16	G8ZHP	4,696	380	92TR	2×'250	4×16Y	852	F6IOC/P
17	G6OYL/P	4,548	657	93EC	2×'250	1×14P	811	FC1LFL/P
18	G1KMI/P	4,421	422	80WO	2×'250	2×19Y	964	F6HTJ/P
19	GM0CLN/P	4,196	381	85CE	MS7727	2×14Y	768	DD1BR
20	GM4AFF/P	4,159	282	86RW	6N2	4×17Y	908	F6CTT/P
21	G0FBB	3,928	488	01EH	Mir.3016	2×19Y	726	Y37Q
22	GI4KIS/P	3,923	313	74BU	Trans	1×13Y	832	F1EVY/P
23	G0FKN	3,770	441	00EW	—	2×17Y	782	DL0EC
24	G4WET/P	3,739	533	92CA	Dres D200	2×14Y	973	F6CIS/P
25	G8ZKE/P	3,519	517	82QL	Trans	1×17Y	758	DL8GP
26	G4YGW/P	3,469	345	84XT	1×'250	1×17Y	754	FC1BQV/P
27	G8SMR/P	3,285	454	93BF	1×'250	1×14Y	916	HB9BLF/P
28	G3ISO/P	3,282	424	90OW	2SC2630	2×16Y	808	F1ANG
29	G5BK/P	3,230	425	81XU	Trans	1×17Y	841	HB9PXT/P
30	G4UHF/P	3,222	538	91LT	1×'250	12×17Y	802	F6IOC/P
31	GW6GW/P	3,028	529	81NV	2×'250	2×17Y	704	F1KSL
32	G4VAT/P	2,911	402	91TW	—	4×9Y	651	DK2LM/P
33	G1MDG/P	2,711	481	91PR	1×'250	1×14Y	809	F6BUN/P
34	G6WVG/P	2,560	—	84VB	Trans	2×17Y	820	F1KSL
35	G8EQU/P	2,373	342	93FK	1×'350	2×18Y	741	F1KSL
36	GW4WXM/P	2,227	337	83KA	—	1×17Y	684	FC1DUZ/P
37	G3IGQ/P	2,206	363	91XG	Trans	1×14Y	688	HB9CYF/P
38	G4WAR/P	2,195	359	92LM	2SC2094	2×12Y	675	DK0BN/P
39	G0CRW/P	2,082	330	01BB	Trans	2×10Y	677	FC1DUI
40	G4NWZ	1,992	292	92PG	Trans	1×14P	661	DL0WH/P
41	G4NOK/P	1,930	303	93FM	1×'250	2×17Y	802	GM8PNP
42	G0CYB/A	1,687	268	93JC	Trans	2×17Y	555	F6HMQ/P
43	G1RPA/P	1,672	244	00BT	Trans	?	692	F6BDN/P
44	G1NUS/P	1,559	254	93CC	—	2×9Y	542	F6HMQ/P
45	G3DCZ/P	1,485	302	91VH	Mir	2×14Y	1,030	PA3DMH/LX
46	G3TRF/P	1,418	226	01HH	—	4×19Y	658	GM4AFF/P
47	GIFUT/P	1,384	168	02KH	Trans	1×14P	625	FC1LFT/P
48	G0BRC/P	1,352	222	01GH	—	1×19Y	900	F6HPP/P
49	G6BSE/P	1,166	141	02HE	Trans	1×16Y	579	F6ETZ/P
50	G0FMS/A	1,122	161	92UE	—	1×10Y	703	0Z1CTC
51	G3WKS/P	1,098	202	01FC	—	1×19Y	650	HB9CYF/P
52	G3ERD/P	931	169	92GX	—	1×5Y	537	F6HMQ/P
53	G4YFB/P	832	122	91JL	—	1×9Y	561	DC8BQ
54	GM6FPX/P	816	—	75PS	1×'250	2×8Q	787	F6CTT/P
55	GM4OJR/P	808	84	85RT	—	1×9Y	702	F6KBF/P
56	G8PRH	757	112	83RO	2×CM90	1×9Y	581	F6KGT
57	G4FUR/P	528	91	91VG	—	2×8S	622	DL6EK
58	G1PNL	434	71	01EK	Trans	1×8Y	451	GD4IOM
59	G4MXB/A	394	58	70NJ	Trans	1×13Y	836	EA2AZW

SINGLE-OPERATOR SECTION

Posn	Callsign	Points	QSOs	Loc	Amp	Ant	Best dx (km)	Best dx (prefix)
1	LX2GB/P	4,091	451	JN29	2×RF2127	1×11Y	617	Y23KO/P
2	GJ6TMM/P	3,572	329	IN89	Trans	1×5Y	852	GM4AFF/P
3	G0CLP/P	3,128	379	84IG	Trans	1×8Y	812	F6BQX
4	G6HKM	2,752	318	01FT	Trans	1×17Y	646	DL4NAA/P
5	G4NBS	2,509	317	02AF	Trans	1×9Y	606	EI8EF
6	G4ARI	2,483	387	92IQ	SRF1397	1×10Y	618	F6ETZ/P
7	G3XBY	2,133	284	92DG	1×'350	2×17Y	691	DL8GP
8	G6IAT	1,769	245	91TV	Trans	2×17Y	610	DK0BN/P
9	G8PCA/A	1,593	200	01HP	Trans	1×12Y	644	DK8SG
10	G4AGQ	1,414	198	91OF	—	1×9Y	886	F6CIS/P
11	G4DFI	1,349	161	01BL	1×'350	1×9Y	583	DK0ZB/P
12	G4YFN	1,015	132	91MK	—	1×17Y	601	DF1VW/P
13	G2VJ/P	1,002	118	00CR	Trans	1×9Y	632	HB9BLF/P
14	G1DWQ	854	125	90AT	—	1×9Y	681	GM4AFF/P
15	G6KUI/P	853	131	92HT	Trans	1×8Y	686	DJ4GC/P
16	G4ULS	833	127	82TI	—	1×9Y	670	DL9GS
17	G6CSY/P	811	115	01BH	?	1×9Y	561	GI4KIS/P
18	G1GLJ	795	105	91BN	—	1×12ZL	599	GM4AFF/P
19	G1CSR	761	140	91WL	Trans	1×7Y	—	—
20	G6HXU	734	103	83RF	Trans	1×6Q	550	F1EVY/P
21	GW6VZW	695	87	81LQ	Dud valve	1×4Q	537	FC1DUZ/P
22	G8UDV/P	656	58	70UM	—	1×9Y	844	EA2AZW/P
23	G1PEF	647	79	81XI	—	1×7ZL	621	GM4AFF/P
24	G4WUS/P	644	60	94NL	Trans	1×6Q	546	F6IFL/P
25	G1SPZ	641	110	91VS	—	2×14Y	447	GM0CLN/P
26	G1CRH	631	85	92WK	—	1×5Y	523	F6HMQ/P
27	G6MXL	604	69	80XR	Trans	1×8Y	529	F6EZV/P
28	G4FVK	554	72	92VN	—	1×17Y	508	GM4AFF/P
29	G4NRJ	423	57	92UN	—	1×10Y	446	GI4KIS/P
30	G8VPE	420	42	02TP	Trans	1×9Y	559	G4ANB/P
31	G8FKP	368	89	91PQ	—	1×9Y	382	ON6JG/A
32	G8ZRE	335	47	83NE	Trans	1×8XY	514	ON4ASL/A
33	G1AMX	298	29	95FB	—	1×9Y	555	G4NXO/P
34	G2DHV	247	56	01BK	2N6082	1×7Y	336	ON4AMX
35	G8PHN	204	36	01FR	2N5642	1×5Y	377	G0CLP/P
36	G1GYC	200	21	83WI	Trans	1×8Q	562	F6HMQ/P
37	G1IIC DC/G8NMQ/P	157 157	25 19	01FW JN57	— 2SC1947	1×7Y 1/4W	— 360	— OK5A
39	G1PHJ	138	14	01EK	Trans	1×8Y	451	GD4IOM
40	GM8DOH/P	130	16	75MA	—	HB9CV	446	G3PIA/P

SWL SECTION

Posn	Callsign	Points	QSOs	Loc	Amp	Ant	Best dx (km)	Best dx (prefix)
1	32525	1,563	219	01AL	—	1×9Y	708	HB9S/P
2	25429	835	101	93FX	—	1×8Y	587	F6CTT/P
3	52543	829	105	83LT	—	1×12ZL	614	FIEVY/P
4	28198	334	46	00HX	—	2×8S	552	GM0CLN/P

Disqualified: G2XV/P, G6VAT/P, G8NJA/P, G4PUB/P General Rule 19, G1HHH/P Rule 2.

Check logs from: G1NMF, G1ITO, G8XTV

Key: —: No information given
?: Information not clear

Trans: Transistor (no other details given)

ZONE WINNERS

Zone	MULTI-OPERATOR	SINGLE-OPERATOR
A	G4APA/P	G0CLP/P
B	G4LIP/P	G4NBS
C	G4BCH/P	G6HKM
D	G4NXO/P	GJ6TMM/P
E	GW4GFX/P	GW6VZW
F	No claim	No claim
G	GM0CLN/P	No claim

70MHz Cumulative Contest rules

1000-1200gmt 1, 15 February; 1, 15 March; 0900-1100gmt 29 March 1987

The general rules published in the "Operating Guide" supplement, *Rad Com* January 1987, will apply. There will be one section for all classes of station. QTH information must be exchanged.

All entries and check logs to: VHF Contests Committee, c/o D J Robinson G4FRE, 15 Ferry Lane, Felixstowe, Suffolk IP11 8UR.

144MHz CW Contest rules

0900-1500gmt, 8 February 1987

The general rules published in the "Operating Guide" supplement, *Rad Com* January 1987 will apply. Entrants may transmit only A1A (cw) or F1A (fsk) and contact only other stations transmitting these modes. There will be one section for all classes of stations.

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

144/432MHz & SWL Contest rules

1400-1400gmt, 7-8 March 1987

The general rules published in the "Operating Guide" supplement, *Rad Com* January 1987, will apply. There will be three sections, Section S for single-operator stations, Section M for multi-operator stations, and Section L for swl entries. Single-band entries for 144MHz only will not be accepted. Single-operator entrants must use the same callsign on both bands.

All entries and check logs to: VHF Contests Committee, c/o T Melvin GM8MJV, 2 Dudley Avenue South, Edinburgh EH6 4PJ.

October UHF/SHF Contest results

As can seen from the summary, conditions for once were excellent and widespread, persisting for most stations throughout the whole contest. There was increased activity on most bands from last year but the single operator section is still lacking entries on 3·4GHz and above.

The presentation of the logs were reasonable but a few stations are still using incorrect or old cover/summary sheets. A lot of points were lost by most stations due to incorrect logging of callsign/locator, mainly on Continental stations.

GM8MJV

SUMMARY OF STATIONS ACTIVE

	432	1,296	2,320	3·4	5·7	10	24
D	564	101	47	3	—	—	—
G	432	124	40	9	2	13	4
P	187	50	21	6	—	1	—
F	78	12	—	—	—	—	—
ON	55	10	5	—	—	—	—
OK	40	6	2	—	—	—	—
GW	33	7	2	1	—	2	2
Y	22	3	—	—	—	—	—
OZ	16	—	—	—	—	—	—
GM	16	8	—	—	—	—	—
OE	12	3	2	—	—	—	—
SP	11	8	—	—	—	—	—
Others	31	4	2	—	—	—	—
Total	**1,497**	**336**	**121**	**19**	**2**	**16**	**6**

OVERALL RESULTS—SINGLE-OPERATOR SECTION

Posn	Callsign	Points	432	1·3	2·3
1	G3JXN	1,851	10	2	1
2	G6DER	1,605	12	5	2
3	G4KIY	1,000	—	1	—
	G8VHI/A	1,000	1	—	—
5	LX2GB/P	773	3	9	—
6	G4NBS	755	11	3	—
7	G6XVV	724	2	15	—
8	G8IFT	718	16	7	4
9	G3ZQU	709	—	8	3
10	G4FOH	523	5	—	—
11	G1LSB	330	6	—	—
12	G1HLT	228	7	—	—
13	G3COJ	198	14	12	—
14	G4XOM/P	190	8	—	—
15	G1KDF	160	13	14	—
16	G6CSY/P	72	17	13	—
17	G4ZNM	66	15	—	—

OVERALL RESULTS—MULTI-OPERATOR SECTION

Posn	Group	Points	432	1·3	2·3	3·4	5·7	10	24
1	Hadrabs CG	4,464	5	3	5	2	1	1	2
2	Parallel Lines	3,948	1	1	2	1	—	—	—
3	Warrington CG	2,941	2	2	1	—	—	—	—
4	Sheppey Western CG	2,215	9	10	7	3	—	4	1
5	The Windbreakers	1,895	8	6	10	—	—	3	3
6	S Birmingham CG	1,859	—	4	3	—	—	2	—
7	S Manchester RC	1,596	4	9	4	—	—	5	—
8	Norfolk VHF/UHF CG	1,460	6	8	6	4	—	6	—
9	Five Bells CG	1,238	3	5	—	—	—	—	—
10	The Hillbillies	1,094	7	11	9	—	—	—	—
11	East Coast CG	1,044	10	7	8	—	—	—	—
12	Radio Whiskey CG	443	12	12	—	—	—	—	—
13	Dunstable Down RC	383	11	—	—	—	—	—	—
14	Exmoor RC	257	13	13	—	—	—	—	—
15	Glasgow CG	10	15	14	—	—	—	—	—

432MHz MULTI-OPERATOR

Posn	Callsign	Points	QSOs	Loc	Pwr	Best dx	Dist (km)
1	G4CLA/P	319,835	624	03CE	400	OK1DTL/P	1,465
2	G4RNL/P	301,675	537	93AD	400	OK2KQQ/P	1,466
3	G8ZHP	223,924	431	92TR	400	OE3XUA	1,268
4	G3UHF/P	222,883	413	93BF	200	OK2BBS/P	1,347
5	G4PUB/P	206,629	510	01QI	400	OK1KHI/P	1,002
6	G4LOJ/A	184,811	422	02QQ	400	OK2JI/P	1,129
7	GW4THB/P	179,155	394	81LT	400	OK1DJW/P	1,348
8	G4ZTR/P	173,874	388	01PU	80	OK2JI/P	1,124
9	GW8TFIP	136,359	328	81LQ	400	OK1KEP	1,272
10	G0FPT/P	131,974	335	01QX	200	OE3EFJ	1,127
11	G4DDC/P	122,372	281	91RU	150	OK1DJW/P	1,178
12	GM4ZUK/P	109,911	130	86RW	50	OE1XA/P3	1,600
13	G4SSS/P	66,471	211	81CC	400	DL7ACG	1,175
14	G6EUO/P	22,700	56	02GJ	10	OK1AYR/P	1,134
15	GM6FPX/P	2,939	12	75OR	60	ON3YZ	869

432MHz SINGLE-OPERATOR

Posn	Callsign	Points	QSOs	Loc	Pwr	Best dx	Dist (km)
1	G8VHI/A	139,573	267	92QP	45	OK2JI/P	1,261
2	G6XVV	99,323	183	93JK	50	OK2VWK	1,306
3	LX2GB/P	85,178	256	29VU	100	OZ9FW	774
4	G6IAT	76,797	175	91TV	50	OK1KHI/P	1,124
5	G4FOH	73,013	149	92XI	5	OK1AYR/P	1,172
6	G1LSB	45,999	95	02CT	90	OK1AYR/P	1,163
7	G1HLT	31,885	64	93JD	30	OK5UHF	1,257
8	G4XOM/P	26,531	79	82UN	10	Y27JL/P	1,118
9	G3XBY	25,070	55	92DG	5	Y27JL/P	1,076
10	G3JXN	24,175	92	91UM	120	OK1DIG/P	1,001
11	G4NBS	21,224	47	02AF	100	OK5UHF	1,161
12	G6DER	17,521	37	93GN	60	SP6MLK/6	1,300
13	G1KDF	16,666	54	83NN	100	OK1DIG/P	1,194
14	G3COJ	14,099	30	91PO	100	OK1KHI/P	1,146
15	G4ZNM	9,239	51	00BS	100	FF6KPQ/P	391
16	G8IFT	5,905	15	82XJ	45	OK1KHI/P	1,237
17	G6CSY/P	4,026	25	01BH	5	F6CTT/P	391

SWL

Posn	Station	Points	QSOs	Loc	Best dx	Dist (km)
1	BRS32525	36,341	117	01AL	OK1KHI/P	1,095
2	BRS25429	36,122	70	93FX	OK5UHF	1,294
3	BRS28198	10,456	39	00HX	DH2DAE/P	535

1,296MHz MULTI-OPERATOR

Posn	Callsign	Points	QSOs	Loc	Pwr	Best dx	Dist (km)
1	G4LIP/P	118,064	256	03CE	350	SP6GWB/6	1,183
2	G3CKR/P	117,796	230	93AD	200	SP6JLW/6	1,290
3	G4JAR/P	74,740	214	01QI	250	SP9EWO	1,309
4	G8OHM/P	64,279	151	92GB	60	OK1CA/P	1,198
5	G4SIV	63,526	121	92TR	100	SP6GWB/6	1,215
6	G4VIX/P	54,758	156	01PU	80	SP6JLW/6	1,061
7	G0FCT/P	51,391	128	01QX	35	SP6JLW/6	1,056
8	G4ANT	51,343	134	02QQ	200	OK1CA/P	1,010
9	G3FVA/P	47,644	100	93BF	75	OK1CA/P	1,232
10	GW4NXO/P	41,633	104	81LQ	170	SP6PHH/6	1,359
11	GW4HWA/P	41,040	111	81LT	400	OK1CA/P	1,305
12	GM6MGS/P	11,708	15	86RW	6	DL0FM/P	1,365
13	G4JKN/P	5,835	29	81CC	100	F1EAV	575
14	GM1FML/P	9	3	75OR	8	GM1MDI/P	7

1,296MHz SINGLE-OPERATOR

Posn	Callsign	Points	QSOs	Loc	Pwr	Best dx	Dist (km)
1	G4KIY	37,975	85	92WN	50	SP6GWN/6	1,161
2	G3JXN	25,732	89	91UM	100	OK1CA/P	1,118
3	G4NBS	22,889	52	02AF	10	SP6GWB/6	1,182
4	G4PMK	21,545	39	93GT	60	OE2CAL	1,218
5	G6DER	20,967	50	93GN	80	SP6GWB/6	1,300
6	G6OYL	20,965	40	93JK	40	SP6GWB/6	1,281
7	G8IFT	13,335	39	82XJ	150	DK9HN/P	806
8	G3ZQU	7,869	26	02ME	6	OK1KSF/P	983
9	LX2GB/P	6,203	20	29VU	2	G3CKR/P	648
10	G1DGL/A	4,678	34	91QF	40	F1EAN	512
11	G8ZQB	4,435	28	92JN	40	DK0HT/P	1,131
12	G3COJ	3,684	10	91PO	15	OK1KIR/P	964
13	G6CSY/P	1,638	10	01BH	1	F1DED	319
14	G1KDF	1,540	14	83NN	10	EI6AS	220
15	G6XVV	465	7	93JK	1	G3JXN	221

2,320MHz MULTI-OPERATOR

Posn	Callsign	Points	QSOs	Loc	Pwr	Best dx	Dist (km)
1	G4CDA/P	31,474	65	93AD	20	OK1AIY/P	1,227
2	G4CBW/P	29,844	73	03CE	50	OE2CAL	1,088
3	G3OHM/P	25,033	60	92GB	25	OK1AIY/P	1,188
4	G8LQO/P	15,177	31	93BF	0·5	OK1AIY/P	1,223
5	G4FUF/P	14,990	51	01QI	30	DL1LB	650
6	G3ZIG/A	13,710	36	02QQ	50	OK1AIY/P	999
7	GW4FRE/P	11,378	32	81LQ	50	OK1AIY/P	1,296
8	G4DDK/P	6,165	21	01QX	2	OK1AIY/P	993
9	GW4XUM/P	5,845	22	81LT	30	DL4BK	823
10	G4WHZ/P	5,627	21	01PU	15	OK1AIY/P	998

2,320MHz SINGLE-OPERATOR

Posn	Callsign	Points	QSOs	Loc	Pwr	Best dx	Dist (km)
1	G3JXN	9,740	34	91UM	30	DL0HC/P	609
2	G6DER	9,033	19	93GN	4	OE2CAL	1,207
3	G3ZQU	4,886	17	02ME	0·5	OK1KIR/P	851
4	G8IFT	3,168	14	82XJ	20	DL0HC/P	733
5	G8ZQB	1,489	10	92JN	1	ON6OO	659

3·4GHz MULTI-OPERATOR

Posn	Callsign	Points	QSOs	Loc
1	G4CBW/P	3,330	10	03CE
2	G4EZP/P	901	4	01QI
3	GW0FRE/P	109	1	81LQ
4	G4PZZ/A	27	1	02QQ

Check log: G4AUC/P

5·7GHz MULTI-OPERATOR

Posn	Callsign	Points	QSOs	Loc
1	G4EZP/P	7	1	01QI

10GHz MULTI-OPERATOR

Posn	Callsign	Points	QSOs	Loc
1	G4EZP/P	392	3	01QI
2	G3OXL/P	204	3	92GB
3	G6CMS/P	106	3	01PU
4	GW0FRE/P	16	1	81LQ
5	G0AOU/P	5	1	93BF
6	G8GKQ/A	1	1	02QQ

24GHz MULTI-OPERATOR

Posn	Callsign	Points	QSOs	Loc
1	GW0FRE/P	16	1	81LQ
2	G4EZP/P	7	1	01QI
3	G6CMS/P	7	1	01PU

Listener Championship 1987 rules

1. Following the further increase in listener participation during 1986, the number of events counting towards the table has been kept at 10.
2. RSGB hf contest general rules do not apply.
3. No entries for the championship are required.
4. The championship will be decided on the basis of listener contests listed below and starting in February.
5. Points will be awarded to the leading eight UK receiving stations in the results published in *Radio Communication* as follows:

Contest	Position							
	1	2	3	4	5	6	7	8
7MHz Phone	70	55	50	45	35	25	15	5
7MHz CW	70	55	50	45	35	25	15	5
1·8MHz Town & County	50	35	30	25	20	15	10	5
Region Round-up	50	35	30	25	20	15	10	5
HF SSB (July)	80	65	55	45	35	25	15	5
HF CW (July)	80	65	55	45	35	25	15	5
21/28MHz Phone	80	65	55	45	35	25	15	5
21MHz CW	80	65	55	45	35	25	15	5
28MHz Cumulatives Phone	40	35	30	25	20	15	10	5
28MHz Cumulatives CW	40	35	30	25	20	15	10	5

7MHz CW Contest date change

As the previously published date of the above contest would have meant a clash with the ARRL CW Contest, the HF Contests Committee re-scheduled this contest to take place from 1200gmt 28 February to 0900gmt 1 March 1987. The date by which cw logs are to be received has been extended by one week to 27 April.

432MHz Fixed Station and Affiliated Societies Contest rules

The AFS inter-club competition introduced in 1985 on 144MHz is being extended to 432MHz as an experiment. Rules are similar to the 144MHz event, except that teams will consist of three stations rather than five. The contest will continue to be open to individual entries, both single- and multi-operator, as before. Individual station scores and overall team results will be separately tabulated, and certificates will be awarded to the leading stations and team in each RSGB Zone.

1. Date: 22 February 1987.

2. Time: 0900-1500gmt.

3. Teams. A society entering one team will have its placing determined by the aggregate scores of the three highest-scoring stations in its team. A society may enter more than one team, in which case the aggregate scores of the three highest scoring stations will be placed in team "A", the next three highest scoring stations in team "B" etc.

4. Eligible entrants. Operators entering on behalf of an affiliated society must be a member of that society, but need not be a member of the RSGB. Other individual entrants must be RSGB members. All stations representing a society must be operated within 50km of the normal society meeting place. No station may represent more than one society. In the case of a society with national coverage, eg RNARS, each team may define a different society meeting place, but this should be a place of recognized significance, eg a naval base. For all purposes other than the indication of affiliation, each such entry shall be regarded as entirely separate. No operator shall use more than one callsign during the contest period.

5. Sections. There will be separate single- and multi-operator sections for tabulating station scores. A team may consist of both single- and multi-operator stations.

6. Entries. Each individual entry shall conform to the general rules. Each log must be accompanied by a 427-86 cover sheet, and must show the RSGB zone that the station operated from. RSGB zones are defined on page 15 of this issue of *Radio Communication*. All entries from one society are to be sent in one package to the adjudicator. Packages underpaid and bearing postage due stamps will be returned to the sender. Each package must include a declaration signed by an officer of the society that each entrant is a member of that society, and the normal meeting place address must be given. A note stating the number of teams representing the society, and their scores, should also be included.

7. Awards. Certificates will be awarded to the following:
The leading single-operator station in each RSGB zone.
The leading multi-operator station in each RSGB zone.
The leading affiliated society team in each RSGB zone.

8. General rules. The following general rules, published in the "Operating Guide" supplement, *Rad Com* January 1987, will apply: 1, 2, 3, 5, 6, 8, 9, 12, 13, 15-23.

9. Adjudicator. All entries and check logs to: VHF Contests Committee, c/o J H Quarmby, G3XDY, 12 Chestnut Close, Rushmere St Andrew, Ipswich IP5 7ED.

Note. Although the contest now includes an inter-club element, entries from individual single- or multi-operator stations are encouraged.

RSGB Listener Contest 1986 results

The HF Contests Committee was delighted with the response to this year's SWL Contest. A total of 47 logs was received, including 20 for the British Isles ssb section. This is the best response the Society has had from swls in many years. Logs were of a very high standard; several from overseas were excellent. The large number of logs from East Germany were most welcome, and it was pleasing to receive logs from W, ZC4 and 7Q7.

For many British swls, it was their first attempt at a contest and we hope they submit entries for future events. All entrants appeared to enjoy the contest, and some managed to find good dx in among the strong European stations. VE2PAB/4U caused some problems; he was located in Syria.

Overall conditions seemed to be rather poor. Even the more experienced listeners did not manage to log 100 different countries during the event, but plenty of short-skip on 21 and 28MHz kept up the interest. Let us hope that conditions in 1987 are better and that the number of entries increases still further.

BRS32525

G-SSB

Posn	Station	Points	Multiplier	Total score
1	BRS87156*	988	210	207,480
2	BRS52543*	1,035	198	204,930
3	BRS87865*	804	144	115,776
4	BRS25429	656	163	106,928
5	BRS88917	727	135	98,145
6	G1GMZ	715	137	97,955
7	BRS88568	671	143	95,953
8	G1PUS	694	129	89,526
9	BRS88043	644	129	83,076
10	BRS87822	569	114	64,866
11	BRS87096	562	110	61,820
12	G8UYI	326	132	43,032
13	BRS88485	629	67	42,143
14	BRS88825	312	94	29,328
15	BRS88639	242	104	25,168
16	BRS20249	232	99	22,968
17	BRS28198	232	96	22,272
18	G1LSK	157	27	4,239
19	BRS86766	79	36	2,844
20	RS88736	49	22	1,078

DX-SSB

Posn	Station	Points	Multiplier	Total score
1	ONL383*	1,569	252	395,388
2	OK1-22309*	1,358	191	368,018
3	OK1-11861	1,227	195	239,265
4	Y2-17509/A58*	1,137	204	231,948
5	OK1-31484	1,228	183	224,724
6	OK1-30464	860	129	110,940
7	Y2-10884/043	578	145	83,820
8	R. Müller/DL	540	133	71,820
9	Y2-16084/M56	536	131	70,216
10	Y2-8983/F44	289	199	57,511
11	ORS45992/7Q7	402	115	46,230
12	ORS88350/ZC4	329	133	43,757
13	DE1HZF	321	117	37,557
14	OK2-31714	675	73	22,212
15	WDX3DKA	259	71	18,389
16	EA7-44-0669	162	71	11,502
17	J Kremer/W4	246	37	9,102
18	Y2-4995/J51	125	56	7,000
19	DE1GMH	18	3	54†

†28MHz only
Jeff/W5 disqualified: no callsigns of station worked given.

G-CW

Posn	Station	Points	Multiplier	Total score
1	BRS31879*	1,060	154	163,240
2	BRS48178	720	123	88,560
3	BRS87139	663	94	62,322
4	BRS88617	210	21	4,410†

†7MHz only

DX-CW

Posn	Station	Points	Multiplier	Total score
1	Y2-17509/A58*	1,279	190	243,010
2	Y2-18921/A33	507	58	29,406
3	Y2-16301/M39	464	32	14,848

*Certificate winners.

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 July 1986 issue. Basic unchanged information on affiliated organizations will be published again in July 1987.

RSGB affiliated organizations are requested to report all programmes and new items to their regional representatives regularly. Information for inclusion in the **March** issue should reach them by **6 January** and for the **April** issue by **10 February.**

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 (NWRG)—Meeting third Thursday of month, 8pm. The Globe Bowling Club, Willows Lane, Accrington. Sec G6IKK.

Ainsdale (AARC G2OA)—Meetings Tuesday fortnightly, 8pm. The Carlton Hotel, Lord Street, Southport. Sec G4YYV, tel Southport 79825.

Barnoldswick (RRARC G3RR)—7 Jan (Surplus equipment sale), 14 and 21 (Shack nights). Morse classes every Monday. 7.30pm. The Rolls-Royce Sports and Social Club. Barnoldswick. Sec G4ILG, tel 0282 812288.

Barrow (SLARS)—Meetings first and third Thursdays of month, 8pm. The Norweb Sports & Social Club, rear of Ormsgill Hotel, Barrow-in-Furness. Sec G4VKE, tel 0229 65359.

Blackburn (ELARC G3NTJ/G1ELC)—Meetings twice monthly 7.30pm. First Tuesday a lecture or demonstration. Last Tuesday Informal. Club net on Wednesdays on 145·400MHz at 9pm. PRO G6LXU, tel 0254 887385.

Bolton (B&DARS G8WY)—7 Jan (AGM), 8pm. Horwich Leisure Centre, Victoria Rd, Horwich. Sec Kevin, tel 0204 55092.

Burnley (B&DARC)—Meetings second and fourth Tuesdays, 7.30pm. The Adult Education Centre, School Lane, Burnley. Also RAE and morse classes every Monday 7-9pm. Sec G0BQC, tel 0282 39765.

Bury (BRS G3BRS)—Meetings every Tuesday, 8pm. The Mosses Youth & Community Centre, Cecil Street, Bury. PRO G0CUK, tel 0204 706191.

Carlisle (C&DARS)—Meetings every Monday, 7pm. Upperby Parish Hall, Upperby, Carlisle. Sec G3XWA, tel 27463.

Chester (C&DRS G3GIZ/G8GIZ)—6 Jan (AGM), 13 (Talk by winners of the construction contest). Meetings every Tuesday, 8pm. Chester RUFC, Hare Lane, Vicars Cross, Chester. Details G6IFA, tel Chester 336639.

Chorley (The Leyland Hundred ARG)—Meetings 7.30pm, second and fourth Mondays of each month. The Astley Park Sports Club, Chorley. Sec G4YSU, tel 0772 600239.

Congleton (CRC)—Meetings first Wednesday of month, 8pm. The Library, Congleton. Sec G6OKN.

Crewe (SCARS G4LVR/G6TWB)—Meetings second Monday of month, 8pm. LMR Sports Club, Goddard Street, Crewe. Details G1PUV, tel 07816 73185.
Darwen (DARC G4JS)—Second Wednesday of month, 7.30pm. Highfield WM Club, Ratcliff St, Darwen. Sec G2AKK, tel 0254 73767.
Eccles (E&DARS G3GXI/G8GXI)—Informal meetings every Tuesday, 9.30pm. Duke of York Hotel, Church Street, Eccles. Sec G8KRG, tel 061-773 7899.
Ellesmere Port (EP&DARS G3CSA)—Meetings fortnightly, Mondays, 7.30pm. The Grosvenor Hotel, Ellesmere Port. Details G4STZ, tel 061-339 7201.
Fylde (FARS)—6 Jan (AGM), 20 (Informal with morse), 7.45pm. The Kite Club, Blackpool Airport. Sec G8GG, tel 725717.
Isle of Man (IoM ARS)—Meetings Mondays, 8pm. The Howstrake Hotel, Harbour Rd, Onchan. Details GD4GWQ, tel 0624 22295. Additional local meetings are held at The British Legion, Douglas Street, Peel, on Thursdays and Perwick Bay Hotel, Port St Mary, on Fridays.
Kendal (The Westmorland RS)—8pm. The Strickland Arms, Sizergh, Nr Kendal. Details G1IIE, tel 0539 28491.
Leyland (Central Lancs ARC)—5 Jan (Open forum—air your views), 12 (Committee meeting), 19 (Noggin & natter), 3 Feb (AGM). 8pm. First and third Mondays every month, The Priory Club, Broadfield Drive, Leyland. Morse classes every meeting at 7.30pm by G4YWG. Details G4OBK, tel Chorley 74451.
Liverpool (L&DARS G3AHD/G8WCL)—6 Jan ("Minute Waltz", G4GHS), 13 ("Security with Baccadi", G3YBH), 20 ("Experiences of G1VYQ"), 27 ("German amateur radio part 2", G4IHS), 3 Feb (Quiz with St Helens). Tuesdays, 8pm. The Churchill Conservative Club, Church Rd, Wavertree, Liverpool 15. Sec Lynn, tel 051-728 8811.
Liverpool (L Raynet Group G1KOP)—Details G6DXF, tel 051-427 9350.
Liverpool (Riversdale ARS)—Dept Electrical & Radio Engineering, Riversdale College of Technology. Details G4DKQ, tel 051-427 1227, ext 248.
Liverpool (Sefton ARC)—Meetings every other Wednesday, 8pm. The Liverpool Prison Officers Club, Hornby Place, Walton. Details G1HDU, tel 051-525 6152.
Liverpool (University of Liverpool ARS, G3OUL/G8JUL)—Thursdays 12.30pm. The Shack, Top of the Old Union, 2 Bedford Street North, (Top of Brownlow Hill). Details G1KNM, tel 724 2522 or 3878.
Macclesfield (M&DARS, G4MWS/G1MWS)—Meetings every Tuesday 8pm. The Fermain Club, Oxford Rd, Macclesfield. Sec G1NUS, tel 0625 24534.
Manchester (Trafford ARC)—Meetings Thursdays 7.30pm. The Sea Cadet Unit, Bradshaw Lane, Stretford. Sec Graham, tel 061-748 9804.
Manchester (South MRC)—2 Jan (Mini lecture contest), 9 ("Home-brew projects", G3WFT), 16 ("Feeder impedance measurements", G4HON), 23 & 30 (tba), 6 Feb (Video lecture, W5LFL), 8pm. Sale Moor Community Centre, Norris Road, Sale. Details G2AKR.
Manchester (WMRC)—Meetings every Wednesday 8pm. Astley & Tyldesley Miners Welfare Club, Meanley Rd, Gin Pit Village, Astley, Tyldesley, Nr Manchester. PRO G1IOO, tel 0204 24104.
Maryport (Solway RC, G4BBX)—Meetings every Wednesday. RAE classes on demand. Maryport Educational Settlement, High Street, Maryport. Details G0AFP, tel Cockermouth 826461.
Merseyside Raynet—Details from county controller, G8RXB, tel 051-638 5879.
Morecambe (MBARS)—Meetings 7.30pm, Tuesdays fortnightly. Trimpell Sports & Social Club, Outmoss Lane, Morecambe. Morse classes alternative Tuesdays. Details G3PER, tel Heysham 52659.
Oldham (OARC)—Meetings Thursdays 8.30pm. The Moorside Conservative Club, Ripponden Rd, Moorside, Oldham. Sec Kathy G4ZEP, tel 061-624 7354.
Ormskirk (O&DARC)—8 Jan (Quiz evening, led by G3RCA), 5 Feb (First-Aid Demonstration by Anne Edwards. Also Contest season planning). Meetings first Thursday monthly 8pm. Ormskirk Community Centre. Details G1KDF, tel 0695 74868.
Penrith (Eden Valley RS)—15 Jan (Brains Trust, G8VYG, G4AFU, G4EXD). Meetings 7.30pm. The Ullswater School Evening Centre or The Crown Hotel, Eamont Bridge. Details G4XPO, tel Culgaith 462.
Preston (PARS)—Alternate Thursdays 8pm. Lonsdale Club, Fulwood Hall La, Fulwood, Preston. Sec G3ZXC, tel 0772 718175.
Rossendale (RARS)—Meetings every Wednesday evening. The Huntsman, Burnley Rd, Loveclough, Rossendale. Morse classes for beginners. 144MHz and hf facilities. Sec G4VVK, tel 0706 214076.
St Helens (SH&DARC)—Details G1GNS, tel 092 572 6821.
Skelmersdale (S&DARC)—Meetings Thursdays 8pm. Details G4ZPY, tel 0704 894299.
Southport Raynet (G1SRG)—Group meets on first Wednesday monthly, 8pm. The Carlton Hotel, Lord Street, Southport. Details G4RQX, tel 25172.
Stockport (SRS)—14 Jan (Natter night), 21 (Informal natter night in the bar), 28 (Contest operation). 8pm. The Blossoms Hotel, Junction of Bramhall Rd and A6. Details G4FFW, tel 061 224 7880.
Tarporley (Mid-Cheshire ARS)—Wednesdays 7.30pm. The Cotebrook Village Hall, Cotebrook, Nr Tarporley. Details G8PNL, tel Winsford 553508.
Thornton Cleveleys (TCARS)—5 Jan (Auction), 12 (Informal/club on the air), 19 ("Getting on the air for next to nothing", G0ETV), 26 (Informal/club on the air), 2 Feb (Question and answer session). 7.45pm. 1st Norbreck Scout HQ, Carr Rd, off Fleetwood Rd, Bispham, Blackpool. Details G4BFH, tel 0253 853554.
Warrington (WARC G4CDA/G6WRC)—6 Jan (Video film), 13 ("All at sea with electronics", GW3PRA), 20 ("Noise blankers", G8HLZ), 8pm. Grappenhall Community Centre, Bell House Lane, Warrington. Details Paul, tel 0925 814005.
Wigan (W&DARC)—14 Jan (Raynet visitor G1DTV). Meetings every Wednesday 7.30pm. St Judes Catholic Club, Poolstock Lane, Wigan. Club net on 144MHz Mondays. Sec G0DTY, tel 0942 47416.
Wigan (Douglas Valley ARS G3BPK)—Standish Conservative Club, School La, Standish, Nr. Wigan. Details G4GWG, tel Wigan 211397.
Wilmslow (North Cheshire RC)—Details G4WCE, tel 061-980 5173.
Wirral (WARS)—Meetings 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, Irby. PRO 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.
Once again I am asking for the whereabouts of The Region Reps Cup, The Harold Hilton Rose Bowl and The G3SMM Shield. Please contact me as soon as possible. If the details for your club are wrong, it's because I have had no up-to-date information. Remember, it pays to advertise! Wishing you all a happy, healthy and prosperous New Year. *RR1*

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

Halifax (H&DARS G2UG)—20 Jan ("QRP", G4RAW). The Running Man ph, Pellon Lane. Details G0DLM, tel 0422 202306.
Hornsea (HARC G4EKT)—7 Jan ("Using test equipment", G4IGY), 14 (ATV Video), 21 (Committee meeting). The Mill, Atwick Road. Details G4YTV, tel 0401 62498.
Hull (H&DARS G3AMW)—30 Jan (AGM). Meetings at the Clubroom Walton Street. Details G0DMP, tel 0482 862149.
Keighley (KARS RS 84851)—13 Jan (Informal), 27 (AGM). 8pm. Victoria Hotel. Details G1IGH, tel 0274 496222.
North Ferriby (NFUARS G0ECR)—9 Jan (AGM). Meetings at North Ferriby FC. Details G1LSZ, tel 0482 493777.
Pontefract (P&DARS G3FYO)—8 Jan (AGM), 15 (Film: "The Electric Mountain"), 22 (Annual junk sale), 29 (Committee meeting). Meetings at Carleton Community Centre. Details G0AAO, tel 0977 43101.
Maltby (MARS G4SKM)—2 Jan (Activity night on the air), 9 (Building a multimode transmitter for top band), 16 (Contest organization and operating), 23 (Computers in amateur radio), 30 (A simple absorption wavemeter for 144MHz & up). Meetings at Hellaby Community Hall, Clifford Way. Details G1PQW, tel 0709 814135.
Spen Valley (SVARS G3SVC)—8 Jan ("Rifle shooting", G4IPH), 22 ("Development of sound recording", G6DLA). Meetings at Old Bank WMC. Details G4PHR, tel 0924 499397.
Todmorden (T&DARS G4WYT)—5 Jan (Judging of construction competition), 19 (Chat night). Meetings at Queen Hotel. Details G1GZB, tel 0706 817572.
UK FM Group (Northern G8KRM)—4 Jan (Monthly meeting). Royal Hotel, Barnsley. Details G4UNA.
Wakefield (W&DRS G3WRS)—6 Jan (Brains trust), 17 (Annual dinner), 20 ("What am I doing in amateur radio?"). 8pm. Ossett Community Centre, Prospect Road. Details G4VRY, tel 0532 820198.
Wawne (Raynet Group G4UWE)—5 Jan (Contest with Humberside Raynet group), 19 (Training and group meeting). Meetings at EP Cell, Meaux Road. Details G4EJP, tel 00401 50397.
White Rose (WRARS G3XEP)—17 Jan (Annual dinner), 21 (Bash the committee). Moortown RUFC, Moss Valley, Kings Lane. Details G4ATZ, tel 0937 842790.
York (YARS G3HWW)—9 Jan (AGM). Meetings at United Services Club, Micklegate. Details G3WVO, tel 9094 422084.

Please note: any information for Zone 2 Raynet should now be sent to G4EJP. Many thanks to Todmorden club for their hospitality.

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

Alfreton (A&DARC)—Mondays 8pm. ECP Social Club, Carnfield Hill, Alfreton, Sec G1SFR.
Buxton (BARS)—Second and fourth Wednesday of each month. Haddon Hall Hotel, London Road, Buxton. Sec G8YHX, tel Buxton 6800.
Bolsover (BARS)—Wednesdays 8pm. The Black Bull, Bolsover. Sec G1GNC, tel Chesterfield 824061.
Derby (DADARS)—Wednesday 7.30pm. Morse classes start 20 Jan. 7pm. 119 Green Lane, Derby. Sec G3KQF, tel Derby 772361.
Derby (NHARG)—Friday 7.45pm. Nunsfield House, Boulton Lane, Alvaston, Derby. Sec G4PZY, tel Derby 767994.
Glossop (GADARG)—Last Tuesday of each month, 7.30pm. Nags Head Hotel, Charlestown, Glossop. Sec G4GNQ.
Grantham (GRC)—Third Tuesday of each month, 7.30pm. Shirley Croft Hotel, Harrowby Road, Grantham. Sec G8WWJ, tel Grantham 65743.
Grimsby (GARS)—8 Jan (Space shuttle), 15 (Project construction), 22 (How tv works), 8pm. Cromwell Social Club, Cromwell Road, Grimsby. Sec G3RGC.
Heanor (SE Derbyshire ARS)—Each Tuesday during term time, South East Derbyshire College of Education, Ilkeston Road, Heanor. Sec G8RZM.
Hinckley (HARES)—Second Wednesday in each month, 7.30pm. John Cleveland College, Butts Lane, Hinckley. Sec G8STX, tel Hinckley 63778.
Leicester (LRS)—5 Jan (Affiliated societies contest, planning), 12 (Committee meeting), 19 (AGM), 26 (tba). 8pm. Gilroes Cottage, Groby Road, Leicester. Sec G4PDZ, tel Leicester 871086.
Leicester (Wigston ARC)—Fridays 7.30pm. Wigston United Reform Church, Long Street, Wigston, Leicester. Sec G6HAJ, tel Leicester 403105.
Lincoln (LSWC)—7 Jan (CW activity night, Committee meeting), 14 ("Fire & Smoke", G1TSL), 21 (CW, RAE, activity night), 28 ("Fibre glass techniques", G4XFC), 8pm. City Engineers Club, Waterside South, Lincoln. Sec G4STO, tel Gainsborough 788356.
Loughborough (L&DARC G3RAL)—Tuesdays 7.30pm. Hind Leys Community College, Forest St, Shepshed, Loughborough. Sec G0FTT.
Louth (LADARC)—7 Jan (Chat night), 21 (Unusual noises on hf). Details from G1IZB.
Mansfield (MARS)—1 Jan (No meeting), 20 Jan ("Home security and crime prevention"), 5 Feb ("Satellites", G4CUO), 8pm. Victoria Social Club, Mansfield. Sec G1DZH.
Marlpool (Notts & Derby Border ARC)—Tuesdays 7.30pm. Marlpool United Reform Church, Chapel Street, Marlpool. Sec G4UFC, tel Ilkeston 302990.
Market Harborough (Welland Valley ARC)—Mondays 7.15pm. Welland Park College, Market Harborough. Sec G3LSL, tel Market Harborough 880746.
Melton Mowbray (MMARS)—16 Jan ("My visit to China", G4MHB). 7.30pm. St John Ambulance Hall, Asfordby Hill, Melton Mowbray. Sec G3NVK, tel Melton Mowbray 63369.
Newark (NADARC)—First Thursday in each month, 7.30pm. Worthington Simpson Sports & Social Club. Hawton Lane, Balderton, Newark. Sec G1SCF, tel Southwell 814541.

Nottingham (ARCON)—Thursdays 7.30pm. Sherwood Community Centre, Woodthorpe House, Mansfield Road, Nottingham. Sec G4PJZ, tel Nottingham 624764.
Nottingham (Plessey ARS)—Thursdays 8pm. Plessey Communications, Beeston, Sec G4VFK, tel Nottingham 226321.
Scunthorpe (SADARC)—Tuesdays 8pm. Grange Farm Hobbies Centre, Franklin Cres. Scunthorpe. Sec G4ZGJ, tel Scunthorpe 732268.
Sleaford (SADARC)—Village Hall, Great Hale. Sec G2HHK, tel 0529 304454.
Skegness (SADARS)—First Friday of each month, 7.30pm. White Swan, Burgh le Marsh. Sec G1ONN.
Spalding (SADARS)—First Friday in each month, 7.30pm. The Ship Albion, Albion Street, Spalding, Sec G4ZGT, tel Spalding 2781.
Stamford (SADARC)—Wednesdays twice monthly. SEC G4OSM, tel Stamford 54433.
Worksop (WARS)—13 Jan (Duff prezzy sale), 27 ('Solidstate home brew', G4SHU), 8pm. Woodhouse Inn, Woodend, Rhodesia, Worksop. Sec G4ZUN, tel 486614.

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

Bedford (B&D ARC)—First and third Thursday of each 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)—further information from G4BWP.
Cambridge (Cambridge University Wireless Society)—Sec G6OQA, Selwyn College.
Cambridge (Cambridge & District ARC)—Club meets at the Coleridge Community College, Radegund Road, Cambridge, in the Visual Aids Room, on Fridays 7.15pm. Sec G4TRO.
Duxford (Imperial War Museum)—This club is affiliated to the RSGB, but the holder of the special call licence does not reply to my letters.
Daventry (DARC)—This club now meet on a Wednesday evening at the St John Ambulance Brigade Rooms. Sec G0DPA.
Dunstable (DDRC)—This club meet at Room 3, Chews House, High Street, South Dunstable, Beds on alternate Fridays, 8pm. Sec G6EES, 0582 607623.
Leighton Buzzard (LLRC)—This club now meets each Monday evening at the Duncombe Arms ph, Great Brickhill. Sec Debbie Jones, 0908 649238.
Luton (Kent Process Controls ARC)—This club, although still affiliated, is in "mothballs" until suitable accommodation can be found. The club call G4KPC and licence are held by G3DOT.
March (MADRAS)—Meeting place, Neale-Wade Adult Education Centre, Station Road, March. Tuesdays 7.30pm. Sec G3PWK.
Milton Keynes (MK&D ARS)—12 Jan ("Crime prevention", G0DOW, Thames Valley Police), "The Meeting Place", Hodgelea, North Milton Keynes on the first Monday of each month. New sec G0ERE, tel Cranfield 750629.
Nene Valley (NVRC)—Meeting place, Prince of Wales ph, Well Street, Finedon, Northants. 8pm Wednesdays. Sec G6UWS, Tel 0933 71189.
Northampton (NRC)—The club meets every Thursday at 8pm in the Kingsthorpe Community Centre. 8 Jan ("Aerials and Erection", G3KLV.) New chairman G4YJP, new sec G8EUX.
Peterborough (GPARC)—Meetings held at Southfield Junior School at 7.30pm on the fourth Thursday of each month. Sec G1UGA.
Peterborough (PRES)—Meetings held at the Brook Street Institute, Brook Street, Peterborough, 7.30pm on the third Friday of each month. Sec G4PNW.
Shefford (S&DARS)—Thursdays 8pm, Church Hall, Ampthill Road, Shefford, Beds. 15 Jan ("Satellite tv", David Moore). (Practical packet radio demo) 29 (AGM). 5 Feb ("Diodes" by a Welsh poet, G8AFN). Sec G4PSO, tel Hitchin 57946.
Texas Instruments ARC—Meetings Thursday or Friday evenings. Club open to employees of Texas Instruments. Chairman G1JKE.
Wisbech (WARC)—The club meets at the RAFA Club, Astral House, Old Market, Wisbech every Thursday 7.30pm. Sec G4ODH.

I apologise for the lack of published club news and talks, but I had to go away on business before the deadline. *G3DOT*

REGION 6—RR N P Taylor, G4HLX, 87 Hunters Field, Stanford in the Vale, Faringdon, Oxon SN7 8ND. Tel 03677 503.

Abingdon (A Contest Club)—G4UHF will be entering the major vhf/uhf contests in 1987. Details G4PSU.
Aylesbury (A Vale RS)—Details from sec G1GQJ.
Aylesbury (A Vale Repeater Group)—Enquiries about GB3VA, GB3AV, GB3BV, GB3VB or group membership, contact G8BQH, tel 0296 641783.
Chesham (C&DARS)—Meetings every Wednesday at Bury Farm, Pednor Road, Chesham. Details Liz, tel 09278 3911.
Chilton (Rutherford Appleton Lab ARC)—For details of activities contact G4XRJ, tel Abingdon 446114.
Didcot (Vale of White Horse ARS)—First and third Tuesdays each month, 7.30pm. The Waterwitch, Cockroft Road, Didcot. Sec G4SYL, tel Didcot 816845.
Halton (RAF Halton ARECC)—Meets every Thursday, 7.30pm. Building 168, RAF Halton. Visitors are requested to book in at Main Guardroom. Details Sqn Ldr Tony Gilchrist, tel 01-430 7277, or G4MXG.
Harwell (HARS)—20 Jan (Construction contest), third Tuesday each month, 7.30pm. Harwell Lab Social Club. Sec G6MRP, tel Abingdon 848617.
High Wycombe (Chiltern ARC)—28 Jan (AGM), second and fourth Wednesdays each month, 8pm. Sir William Ramsay School, Rose Ave, Hazelmere. Details G4XVP, tel 0494 35275.
Maidenhead (M&DARS)—20 Jan ("Speech Processors"), meetings on first Thursday and third Tuesday each month, 7.30pm. Red Cross Hall, The Crescent, Maidenhead. Sec G8RYW.
Newbury (N&DARS)—13 Jan (meet your regional representative), meetings second Tuesday each month, 7.30pm. Newbury Technical College. Sec G3VOW, tel Newbury 43048.
Oxford (O&DARS)—Meets on second and fourth Wednesday each 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. Net second Sunday monthly, 3,710kHz, 11.30am. RAFARS area rep G6ZH.
Reading (R&DARC)—6 Jan and alternate Tuesdays, 8pm. White Horse ph, Emmer Green, Reading. Net, Mondays 145·325MHz, 7.30pm. Sunday am, monthly fox hunt. Details G3YFB.
Slough (Burnham Beeches RC)—5 Jan (Natter night), 19 (Lecture on Cellnet), 2 Feb (Surplus equipment sale) 8pm. Haymill Community Centre, 112 Burnham Lane, Slough. Details G6EIL, tel Maidenhead 25720.

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)—12 Jan (HF activity with rtty), 29 ("Selective calling systems", G3TDR). 8pm. The Hall, St Martins Court, Kingston Crescent, Ashford, Middx. Sec G4VAZ, tel Sunbury 82823.
Bexleyheath (North Kent RS)—First and Third Tuesday of each month. 8pm. The Pop-in-Parlour, Graham Road, Bexleyheath. Sec G4DIB.
Biggin Hill (BHARC)—20 Jan (AGM). 7.30pm. Downe Village Hall, 24 High Street, Downe, Kent. Sec G0AMP, tel 0689 57848.
Coulsdon (CATS)—Second Monday and last Thursday of each month. 8pm. St Swithuns Church Hall, Grovelands Road, Purley, Surrey. Sec G6HC, tel 01-684 0610.
Cray Valley (CVRS)—8 Jan ("Crime Prevention"), 22 (Natter night). 8pm. Progress Hall, Admiral Seymour Road, Eltham SE9. Details G3TAA.
Croydon (SRCC)—5 Jan (Technical forum), 2 Feb (Sid Morley Memorial Lecture, "Aerial farm"). 8pm. TS Terra Nova, 34 The Waldrons, South Croydon, Surrey. Sec G8IYS, tel 01-657 0454.
Crystal Palace (CP & DRS)—17 Jan ("ATUs and hf aerials", G3OOU). 8pm. All Saints Parish Room, Upper Norwood, SE19. Sec G3FZL, tel 01-699 6940.
Dorking (D & DRS)—Second and fourth Tuesday of each month. 8pm. Star and Garter Hotel or Ashcombe School. Sec G3AEZ, tel 0306 77236.
Farnham (VHF Group)—Second and fourth Monday of each month. 8pm. Farnham Central Club, Farnham, Surrey. Details G4EPX.
Guildford (G & DRS)—Second and fourth Friday of each month. 8pm. Model Engineers HQ, Stoke Park, Guildford. Sec G4PLO.
Kingston (KDARS)—Third Wednesday of each month. 8pm. 3 Berrylands Road, Surbiton. Sec G3ODH, tel Epsom 26005.
New Cross (Clifton ARS)—Every Friday. 8pm. Telegraph Hill Community Centre, Kitto Road, New Cross, SE14. Sec R Hinton, 42 Sutcliffe Road, Welling, Kent.
Redhill (RATS)—Third Tuesday of each month. 8pm. Constitutional and Conservative Club, Warwick Road, Redhill. Sec G8JXV.
Surbiton (308 ARC)—Last Tuesday of each month. 8pm. The Coach House, Church Hill Road, Surbiton. Details G0CFH.
Sutton and Cheam (S & CRS)—16 Jan ("Converting CB Rigs for 30MHz", G4XRU). 8pm. Downs Lawn Tennis Club, Holland Avenue, Cheam. Sec G4FKA, tel Epsom 21439.
Thames Valley (TVARTS)—6 Jan ("Pitcairn calling", G3OKQ), 3 Feb ("Receiver noise", G3ENI). 8pm. Thames Ditton Library, Watts Road, Giggs Hill, Thames Ditton. Sec G3ENI.
Wimbledon (W & DRS)—9 Jan (Social Evening), 30 ("Crime Prevention"). 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
B A Hancock G4NPM Swale
B E Pearson G0CBY Thanet
F J W Perry G8ZXC West Kent
S G Williams G3LQI Worthing & District

Brighton (BADRS)—First and third Wednesday of each month, 8pm. The Seven Furlong Bar, Brighton Race Course, Sec G4IIL, tel Brighton 607737.
Burgess Hill (Mid-Sussex ARS)—5 Jan (Visit to British Rail Signal and Switching Centre, Three Bridges). Club meets every Thursday, 7.45pm. Marle Place Further Education Centre, Leylands Road, Burgess Hill. Sec G1FRF, tel Hassocks 2937.
Canterbury (UOKARS)—Tuesdays, 7.30pm. Radio Shack, beside Oast House, by Parkwood residences. Details G4SAY.
Chichester (CARC)—First and third Tuesday each month 7.30pm. North Lodge Bar, County Hall, Chichester. Sec G4EHG, tel 789587.
Crawley (CARC)—28 Jan (AGM). 8pm. The Leisure Centre, Haslett Ave, Crawley. Sec G4IQM, tel. 882641.
Dartford (DDFC)—No hunts during January. Pre-hunt meetings, after 9pm. Horse & Groom ph, Leyton Cross, Dartford Heath. Details G8DYF, tel Greenhithe 844467.
Dover SE Kent (YMCA) ARC—7 Jan (Natter night). 8pm. Club meets every Wednesday, Dover YMCA, Godwynehurst, Leyburne Road, Dover. Details John H Dobson, tel Dover 211638.
Eastbourne Electronics (EEARC)—Sundays, 7.30pm. Archery Youth Centre, Seaside, Eastbourne. Details G1EJB, tel Eastbourne 765701.
Eastbourne (Southdown ARS)—5 Jan (AGM). 7.30pm. Chaseley Home, Southcliff, Bolsover Road, Eastbourne. Various courses held Tuesday nights, and Friday night is chat night. Hailsham Leisure Centre. Details G4XNL tel Eastbourne 638653.
Edenbridge (EARS)—Second Wednesday each month, 8pm. The Scout Hut, High Street, Edenbridge. Sec G8VCH, tel East Grinstead 24748.
Gillingham (Bredhurst R&TS)—8 Jan (Antique sound recordings, Colin Johnson from Radio Kent), 22 (Junk Sale), 23 (Dinner/Dance). 8pm. Parkwood Community Centre, Parkwood Green, Wigmore, Gillingham. Sec G0AMZ, tel Medway 376991.
Gillingham (MARTS)—Every Friday 8pm. St Lukes Church Hall, King William Road, Gillingham. Sec G4EVY, tel Medway 716463.
Gravesend (GRS)—Mondays, 8pm. The Windmill Tavern, Shrubbery Road. Sec G0DYX.
Hastings (HERC)—Third Wednesday each month, 8pm. West Hill Community Centre. Various activities other nights. Sec G4NVQ, tel 420608.

Horsham (HARC)—8 Jan (Home-brew evening), 7.30pm. Club meets first Thursday each month, The Guide Hall, Denne Road, Horsham. Details G4YFY, tel 0403 87404.
Herne Bay (East Kent ARS)—First and third Thursdays each month, 7.30pm. Cabin Youth Centre, Kings Road, Herne Bay. Sec G4RIS, tel 0227 262042.
Kent (Kent Repeater Group)—Responsible for GB3CK, GB3EK, GB3KN, GB3KS, GB3NK, GB3RE, GB3SK. Details G4RVV, tel Orpington 27050, ext 91, Office hours.
Lewes (L&DARC)—First and third Tuesday each month, 7.30pm. Bridge View Community Centre, Lewes. Details G4PZU, tel 07916 3239.
Maidstone (MYMCAARS)—2 Jan (Natter night with RAE and cw), 9 ("Testing with spectrum analyzer", G3HCH), 16 (Natter night with RAE and cw), 23 (Film Show), 30 (Natter night with RAE and cw). 8pm. YMCA Sportscentre, Melrose Close, Maidstone. Sec G0BUW, tel 0622 30544.
Margate (Radio Club of Thanet)—Second and fourth Tuesday each month, Grosvenor Club, Grosvenor Place, Margate. Sec G1HWG, tel 0843 42480.
Meopham (MPRC)—Second Sunday each month, 7.30pm. The Clubhouse, Vigo Rugby Football Club, Vigo Village, Meopham. Details G6TXP, tel 04352 2403.
Sittingbourne (Swale ARC)—Every Monday, 7.30pm. The Ivy Leaf Club, 52 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)—Fridays 8pm. Adult Education Centre Annexe, Quarry Road, Tunbridge Wells. Sec G3XPX, tel 0892 48575.
Worthing (W&DARC)—7 Jan (Ragchew evening), 14 ("Communicating with the atom", G3GZT), 21 (Ragchew evening plus contest calender '87), 28 ("Basic computer logic", G3YSW), 4 Feb (Rag chew evening), 11 ("WADARC 1986: The Video", G8VEH). 7.30pm. Lancing Parish Hall, South Street. Details G4SWH, WADARC, PO Box 599, Worthing, West Sussex BN14 7TT.

Please advise 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)—2 Jan ("Packet Radio", G1DII) 7.30pm. The Cavalier, West Street, Axminster. Club meets first Friday each month. Details, G3VW.
Barnstaple (North Devon ARC)—First Wednesday of each month at The Micro Centre, The Strand, Barnstaple at 7.30pm. Details from G4LST.
Brittania (BRC)—This club is for the use of licensed naval officers and meets irregularly. Details G4LUF c/o Royal Naval College.
Exeter (EARC)—Meets the second Monday in each month. The Community Centre, St Davids Hill, Exeter at 7.30pm. Details from G6FGS.
Exeter University (UOEARS)—Meets fortnightly during term in the Mathematics Department. Details from the Students Union.
Exmoor (ERC)—Meetings held at Club HQ, South Molton Comprehensive School, Old Alswear Road, South Molton. Details from G4JBR.
Exmouth (EARC)—Meets alternate Wednesdays at The Scout Hut, Marpool Hill, Exmouth at 7.30pm. 11 Feb (AGM).
Kelly College—Meets on Thursdays during term time in the physics laboratories at 6.15pm. Details from the college.
Mid Cornwall Beacon and Repeater Group—Details contact G3GHS.
Newquay (N&DARS)—Details from G4ADV.
North Cornwall (NCRC)—Meets first Wednesday of each month at 7.30pm.
Plymouth Polytechnic—Meet irregularly during term time. Details c/o The Students Union.
Plymouth (PARC)—Meet first and third Mondays of each month in the Plymouth Albion RFC, Beacon Park, Peverell, Plymouth at 7.30pm. Details from G4SCA.
Plymouth and West Devon Raynet—Meet over the air each Sunday at 7pm on S9 and in person at G3TGR QTH on second and fourth Mondays.
Redruth (CRAC)—Meet on the first Thursday in each month for the main club meeting, on the second Monday for the computer section and the third Thursday for the constructors evening. All meetings at the Treleigh Church Hall, Treleigh, Redruth (just off the old Redruth bypass) at 7.30pm. 1 Jan ("Fault finding in electricity cables etc", G3XFL), 12 (Computer section. Note change in venue, "MS DOS and applications" by David Dawe at Cornwall College of Further Education). 7pm. 15 (Constructors workshop).
St Austell (ECC ARC)—Meets alternate Mondays at the Pentewan Laboratories. Details from G4OKS.
St Ives Comprehensive School—Meet the first Friday of each month during term time. This is for pupils only and details from G3NPB.
Saltash (D&DARC)—2 Jan ("Air traffic control", G4ZLO) 7.30pm. Club meets first and third Fridays of each month at the Burraton Toc H Hall, Warraton Road, Saltash. Details from G0AKH.
Tiverton (SWRC)—This club is active and can be contacted via G1OYO.
Torbay (TARS)—31 Jan (TARS Contest and construction night). Meet alternate Thursdays and Fridays for a weekly meeting and additionally the last Saturday in the month for a formal meeting, 7.30pm. ECC Social Club, Ringslade Road, Highweek, Newton Abbot. Details from G4SBH.
West Devon Raynet Group—Meet over the air at 7pm on 145·225MHz every Sunday. Details from G6BJJ.

I hope that all clubs and members have a Happy New Year and ask that information be passed on to me so that other people can be notified of meetings and events in the area in plenty of time. Remember we have a lot of visiting amateurs who would like to meet us. *RR9*

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)—7.30pm. Thursday nights at Pen-Y-Fal Hospital. (Above male ward C). Morse classes on club nights. Sec GW4XQH, tel 0873 4655.
Aberporth (DYFED ARS GW4SZV)—Wednesdays 7pm. The Airfield, Aberporth, (Building 17). Contact Sec GW0DDR, tel 023 987 274.
Aberystwyth (A&DARS)—7.30pm. Second Tuesday in each month at the Bay Hotel (on the sea front opposite the bandstand). Sec GW4JXB, tel 0970 828446.
Barry (BCoFERS GW4BRS-GW6BRC-GW3VKL)—Thursday 7.30pm. The Annexe, Weycocks Cross, Barry. Sec GW4NBY, tel 0656 62867.
Barry (RAF St Athen ARC GW3CKB)—Wednesdays 7.30pm. RAF St Athen. Contact GW0FJW, tel 0446 750277.
Blackwood (B&DARS GW6GW)—Fridays 7.30pm. (during school terms) at Oakdale Comprehensive School, Oakdale, Blackwood. Sec GW6YYR, tel 0495 243858.
Bridgend (B&DARC GW4LNP)—7.30pm on the first and third Wednesday in each month at Bridgend Town AFC Clubhouse, Coychurch Road, Bridgend. Sec GW1OUP, tel 0656 723508.
Bristol Channel Repeater Group. (GB3BC)—Sec GW6MBU, tel 0446 711146.
British Rail ARS (RS37562)—Contact Mr Owa Wade, 1 Lomond Crescent, Cyncoed, Cardiff.
Cardiff (CRSGBG GW5BI)—12 Jan ("Early days of television", GW6MNC). 7.30pm. Pant Mawr Hotel, Tyla Teg, Pant Mawr Estate, Whitchurch, Cardiff. Sec GW0CUM, tel 04463 3212.
Carmarthen (CARS GW4YCT)—Second and fourth Fridays in each month 7.30pm. West Wales Hospital Social Club, The Quay, Carmarthen. Contact GW3GUE, tel 026 783 460.
Chepstow (C&DARS GW4LWZ)—Tuesdays 7.30pm. The Leisure Centre, Chepstow. Sec GW1FJI, tel 02912 2808.
Cwmcynon (CARS GW3FFE)—Sec Mr R Allwood, 7 Daniel Street, Cwmbach, Aberdare.
Fishguard (F&DARS GW0AQC)—Wednesdays 7.30pm. The Radio Shack, FE Centre, Ropewalk, Fishguard. Sec GW3DWY, tel 0348 872671.
Hoover (Merthyr ARC GW3RDB)—Mondays 7.30pm at the Hoover Sports Pavilion, Hoover Ltd, Pentrebach, Merthyr Tydfil. Sec GW3RNC, tel 0685 5196.
Highfields (HARC GW4LFO-GW1LFO)—Thursdays 7.30pm. The 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.
International Listeners Assoc (RS88763)—Sec GW4OXB, 1 Jersey Street, Hafod, Swansea.
Llanelli (LARS RS87700)—Second and fourth Mondays in each month 7.30pm. At Disabled Drivers Association Hall, Albert Street, Llanelli. Sec GW1MGW.
Loughor (LR&EC GW4HVJ)—Alternate Thursdays. 7.45pm.The Loughor Scouts Hall, Loughor, Gorseinon. Sec GW8TYS, tel 0792 893392.
Lcr Tredegar (LCRRC GW4IYD)—Tuesdays 7.45pm at the MIM Factory, North Avenue, 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 program. The club is also registered as a morse test centre. Sec GW6ZUQ, tel 02912 6867.
Pembroke (P&DARC GW2OP)—Meet on the last Wednesday in each month at 7.30pm, and on the second Sunday at 2pm in the new clubroom at 33 Dimond Street, Pembroke Dock. RAE classes are held on Tuesday nights at 7pm. Sec GW6EHC, tel 0646 686532.
Pembrokeshire (RS GW0EJE)—Club meets on alternate Thursdays 7.30pm at the FE Centre, Tower Hill, Haverfordwest. RAE and morse classes are held. The club is a morse test centre. Sec GW1TUA, tel 0348 82346.
Pontypool (PARS) (GW3RNH)—Tuesdays 7pm at "The Settlement" Rockhill Road, Pontypool. Visitors welcome. Sec GW4RJA, tel 06333 72110.
Port Talbot (British Steel Corporation ARS GW3EOP) Thursdays 7.30pm, the BSC Sports and Social Club, Port Talbot. First Thursday reserved for general meeting. Sec GW4IGR, tel 0639 720416.
Powys (PARC GW4HVN)—Thursdays, 7.30pm at the Cricket Pavilion, Welshpool. Sec GW4DWX, tel 0938 2068.
Red Dragon Contest Group (GW8GT)—Contact GW3KYA, tel 0495 225825.
Rhondda (RARS GW2FOF)—Thursdays, 7.30pm. The NUM club, Tonypandy. Sec GW4BUZ, tel 0443 432542.
South East Wales Repeater Group (GB3SG)—Sec GW6CUR, tel 0222 487176.
Swansea (SARS GW4CC)—First and third Thursdays, 7.30pm. Lecture room "N", Applied Sciences Building, Swansea University. (Please note for January 87 only! second and fourth Thursdays). Jan 8 (RTTY/AMTOR/Packet Radio, GW4WRD). Sec GW4HSH, tel 0792 404422.
Swansea (SRACC GW4UNV)—Fridays 7.30pm. Wednesdays 7.30pm RAE classes. 3 Gloucester Place, Swansea. Sec GW0BUA, tel 0792 588760.
Swansea (UCoARS GW3UWS)—Sec Mr R B Hughes, Electrical Eng Dept, University College, Singleton Park, Swansea.
West Wales Repeater Group (GB3WW)—Contact 7 Crofton Drive, Baglan, Port Talbot.
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)—Meetings on the first and third Mondays of the month at 7.30pm, Four Crosses Hotel, Pentraeth Road, Menai Bridge, Gwynedd. Sec GW0EGF, tel contact via GW0ABL Llanfairpwll 713647.
Colwyn Bay (Conwy Valley ARC GW6TM)—8 Jan (Home constructors contest). 12 Feb (Talk by GW3JGA). Meetings on the second and third Thursdays of the month 8pm. Green Lawns Hotel, Bay View Rd, Colwyn Bay. Sec GW4KGI, tel 0745 823674.
Deeside (Alyn & DARS)—6 Jan (Social evening), 20 (AGM). Meetings on alternate Tuesdays, 8pm. Shotton Social Club, Shotton Lane, Deeside. Sec GW1ILZ.
Dolgellau (Meirion ARS)—8 Jan (AGM). Meetings on the first Thursday of the month, in the Dolserau Hall Hotel. Sec GW4KDP.
Holyhead (H&DARS)—Meetings on alternate Sundays 8pm. The Foresters Arms, Kingsland, Holyhead. Sec Mrs B Anziani, tel 0407 50577.
Porthmadog (P&DARS)—Meetings on the third Thursday of the month, 8pm. The Harbour Cafe, Ffestiniog Railway, Porthmadog. Sec GW1EGQ, tel 0766 2684.
Rhyl (R&DARC GW4ARC)—Meetings on the first and third Mondays of the month 7.30pm. 2nd Rhyl

Scout HQ, Vale Road, Rhyl. Sec GW1PLI, tel Llandegla 621.
Wrexham (W ARC)—Meetings alternate Wednesdays 7.30pm. Technical College, Wrexham, Clwyd. Sec GW4IGF, tel 0244 570212.

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

Area representatives
Grayham Brooks, GM4NHX. Caithness
Alf Low, GM4UZP. Dundee
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)—Fridays, 7.30pm. 35 Thistle Lane, Aberdeen. Sec GM4GXD, tel Pitcaple 251.
Caithness (ARS)—Second Wednesday of each month, 7.30pm. The Loch Watten Hotel, Watten, (between Thurso and Wick). Sec GM1AHC, tel 0847 63638.
Dundee (Kingsway Tech ARC)—Tuesdays, 7.30pm. Kingsway Technical College Annexe, Grayham Street. Sec GM1KJE, tel Dundee 646673.
Elgin (Moray Firth ARS)—First Wednesday each month, 7.30pm. Spey Bay Hotel, Fochabers, remaining Wednesday in the society's room, Moray College of Further Education. 7.30pm. Sec GM4IZY, tel Elgin 41549. Please note correspondence should be sent to the sec QTHR and not sent to the college.
Forfar (& dist ARC)—Re-named Strathmore ARC, see Kirriemuir.
Grampian RG—Sec GM6VGL, tel Aberdeen 702228.
Inverness (Black Isle RG)—GM4UMA, tel Beauly 782106.
Inverness (ARC)—Thursdays, 7.30pm, Cameron Youth Club, Planefield Road, Inverness. Sec GM1GFX, tel 0463 242463.
Kirriemuir (Strathmuir & Dist ARC)—5 Jan (RSGB video), 12 (Practical night), 19 (Talk by GM4YAU), 26 (Practical night), 2 Feb (Talk by GM4AWA). 7.30pm. 46 High Street, Kirriemuir. Sec GM3ZXE, 19 Inver Terrace, Muirhead, By Dundee.
Kirkwall (Orkney)—First Wednesday each month. Sec GM3IBU, tel Kirkwall 3273 (office hours).
Lerwick (RC)—Thursdays, 7pm. Islesburgh Community Centre, King Harold Street, Lerwick. Sec GM3ZET.
Orkney-Caithness Repeater Group—c/o C G Gee, Brinnafea, Orphir, Orkney.
Perth (& Dist ARC)—Tuesdays, 7.30pm. Perth City Sports and Social Club, Leonards Street, Perth. Sec GM4YXK, tel Perth 37121.
Yell (ARC)—Thursdays, 6pm. North Isles Motel, Yell, Shetland. Sec GM4FNE.
Unst (RC)—Sec GM3STU.

If your club is missing or the details are incorrect ask your club sec to contact me. Happy New Year.
RR12.

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

Border (BARS GM0BRS)—16 Jan (Surplus sale). Meets first and third Fridays 7.30pm. St John Ambulance Hall, Church St, Berwick on Tweed. Sec GM1IRN, tel 0289 82491.
Galashiels (G&DARC GM4YEQ)—Club meets Wednesdays 7.30pm. Focus Centre. Sec GM0AMB, tel 0896 55569.
Glenrothes (G&DARC GM4CRC)—Club meets Wednesdays 7.30pm and third Sunday in the month. Provost's Land, Leslie, Fife. Sec GM1NTQ, tel 0592 744672.
Kelso (KARS GM4KHS)—Club meets Mondays, 7.30pm, Abbey Centre. Sec GM3VLB, tel 0573 24664.
Dunfermline (GM3IDS)—Meetings every Thursday, 7.30pm. Knockhill Radio Stn, Outh. Sec GM0DYD, tel 0383 413440.
Lothian (LRS GM3HAM)—14 Jan ("RS232", GM1CQC), 28 (Talk, GM4DIJ), 11 Feb (Call my bluff), 25 (Film night). Harwell House Hotel, Ettrick Rd. Sec GM1CQC, tel 031-332 9832.

REGION 15—RR R Parsons, 27 Mandeville Avenue, Stratheden Heights, Newtownards, BT23 3XA. Tel 0247 818191

Ballyclare (E Antrim ARC GI4KKK)—Second Tuesday in each month, 13 January (Planetarium Visit) 8pm. Fairview Primary School, Ballyclare. Sec GI4PRH.
Ballymena (BRC GI3FFF)—Every Thursday 8pm and Sunday 3pm. 10 Nursery Road, Grace Hill, Ballymena. RAE class Wednesday evenings—GI4OZT. Sec GI4HCN.
Banbridge (Mid-Ulster ARC GI4BAC)—Second Sunday in each month, 3pm. Guide Hall, Castle Hill, Gilford, Co Down. Sec GI1BIW.
Bangor (B & D ARC GI3XRO)—First Friday in each month, 8pm. Bangor Rugby Club. Sec GI4OCK.
Belfast (C of B YMCA RC GI6YM/GI6YMC)—Tuesdays 7pm and Saturdays 2.30pm. Club Room, 4th Floor, YMCA, Wellington Place, Belfast.
Belfast (RSGB Group)—Third Wednesday in each month, 8pm. 90 Belmont Road, Belfast. AR GI6ATZ.
Belfast (QUBRC GI3LLQ/GI8FQB)—Tuesdays 7.30pm. (term and vacation) 37 Fitzwilliam Street, Belfast. Operational 3·5–430MHz. Morse and RAE tuition available. Details GI4WWF, tel (0232) 661111 ext 4006.
Coleraine (North-West ARC GI4DBB)—First Tuesday in each month, 8pm. Scout Hall, The Crescent, Coleraine. (Meetings suspended) Sec GI4KIG.
Enniskillen (Lough Erne ARC)—Third Monday in each month, 8pm. Railway Hotel, Enniskillen. Sec GI4NRE.
Larne (L & D ARS GI4PHA)—First and third Wednesday in each month, 8pm. New club premises. Sec GI4CPP.
Lisburn (Lagan Valley ARS GI4GTY)—Second Monday in each month, 7.30pm. Harmony Hill Art Centre, Harmony Hill, Lisburn. Sec GI4TCS.
Londonderry (North West of Ireland ARC GI3CFH)—First Monday in each month. 5 Jan ("Satellite/Data Comms") 7.30pm. Prehen Municipal Boathouse, Victoria Road, Londonderry. Sec GI4OUN.
Moneymore (Magherafelt ARC GI4OMA)—Third Tuesday in each month, 8pm. Manor Hotel, Moneymore. Sec GI3SOO.
Moy (Armagh, Dungannon & DARC GI4FVN)—Second Tuesday in each month, 8pm. Meets Lonsdale Street, Armagh. For membership contact GI8RNX.

Happy New Year. *RR15*

REGION 16—RR A Owen, G4HMF, 102 Constable Rd, Ipswich, Suffolk. IP4 2XA.

Basildon (Marconi ARS)—First Monday 8pm. The Shack, GEC Avionics Social Club, Gardiners Way, Basildon. Details G8PKM, tel 0245 323323.
Bishop's Stortford (BSARS)—Third Monday, 8pm. Royal British Legion Club, Windhill, Bishop's Stortford. Details Peter Cartwright, tel 0279 812096.
Braintree (B&DARS)—5 Jan (Film & Video evening) 8pm. Meetings first and third Monday. The Community Centre, Victoria Road (next Bus Station), Braintree. Details G1NBV, tel 0376 44908.
Brentwood (BARC)—First and third Tuesdays 7.30pm. The Hermitage, Shenfield Road, Brentwood. Details, G8WYM, tel Basildon 403153 (daytime).
Bury St Edmunds (BStEARS)—Third Tuesday 7.30pm, Westgate Primary School, off Hospital Road, Bury St Edmunds. Details G1FUU, tel 0358 50271.
Canvey Island (SEARS)—Wednesday 7.30pm, The Paddocks, Long Road, Canvey Island. Details G4FMK, tel 0268 683805.
Chelmsford (CARS)—6 Jan (Film show) 7.30pm. Meetings first Tuesday, Marconi College, Arbour Lane, Chelmsford. Details G4KQE, tel 0376 83094.
Clacton (CARS)—New club. 14 Jan (Inaugural meeting), 7.30pm. Eldorado Club, The Broadway, Jaywick, Essex. Details Mr R Taylor, tel Clacton-on-Sea 430466.
Colchester (CRA)—Alternate Thursdays 7.30pm. Colchester Institute, Sheepen Road, Colchester. Details G3FIJ, tel 0206 851189.
Dengie Hundred (DHARC)—Second Thursday 7.30pm. Burnham Sailing Club, The Quay, Burnham-on-Crouch. G6ZSJ, tel 0621 784225.
Felixstowe (F&DARS)—13 Jan (Social). 26 (Visit to hospital radio). 8pm. Meetings alternate Mondays. The Scout Hut, Bath Road, Felixstowe. Details G4YQC, tel 0473 642595.
Great Yarmouth (GYRS)—Alternate Thursdays 7.30pm. Drill Hall, York Road, Great Yarmouth. Details G3NHU, tel 0493 721173.
Harlow (H&DRS)—Tuesday 8pm. Mark Hall Barn, First Avenue, 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)—14 Jan ("Wood Polishing", G8LBS), 28 (Talk by G4FAW). Meetings second and last Wednesdays, 8pm. Rose and Crown ph, Norwich Road, Ipswich. G4IFF, 76 Fircroft Road, Ipswich, IP1 6PX, tel 0473 44047.
International Police Association RC (IPARC BRIT G4IPA)—Details G4TRE, tel 0277 231077.
Kings Lynn (NORCAT ARC)—Meetings Thursdays, Morse Fridays 7.30pm. At rear of St James' Boys' School, Hospital Walk, Kings Lynn. Details G4OZG, tel 0553 768701.
Leiston (LARC)—First Tuesday 7.30pm. Sizewell Sports & Social Club, King George's Avenue, Leiston. Details, G0CJX, tel 3222.
Loughton (L&DARS)—Alternate Fridays 8pm. Debden Community Centre, Loughton Hall, Rectory Lane, Loughton. Details, G4FKI.
Lowestoft (LD&PYEARC)—In abeyance. Details G4KDL, tel 66289.
Martlesham (MRS)—Occasional first Wednesdays 7.30pm. British Telecom Research Laboratories, Martlesham Heath, Ipswich. Details G4SYG, tel (home) 0473 88663, (work) 0473 643317. Visitors must book in advance with the Secretary.
Norwich (NARC.)—7 Jan ("Confidence in Measurement", Datron Electronics), 14 ("Slow Scan TV", G4JLK), 21 (Contest discussion), 28 ("Development of undersea cables", Eric Clayton). 8pm. Valley Drive Community Centre, 79 Plumstead Road, Norwich. Details, G4RKK, tel Wymondham 606979.
Rochford (RDRC)—Second Monday 7.30pm. Civil Defence Building, Rochford. Details G3FGC.
Saffron Walden (SW&DRAS)—Third Wednesday 8pm. Details G6KDW, tel 0799 22715.
Southend (S&DARS)—Friday 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)—Temporarily suspended.
Thurrock (TARC)—First and third Tuesdays 8pm. Grays Park Hall. Details G3KMD.
Vange (VARS)—8 Jan (Bring & buy), 15 (Programme planning). 8pm. Barstable Community Centre, Basildon. Details Mrs D Thompson, tel 0268 552606.

REGION 17—RR T Emery, Wilverley, Old Lyndhurst Road, Cadnam, Southampton. SO4 2NL. Tel 0703 812435.

Botley (Amateur Radio and Computer Club, AMRAC)—9 Jan ("Networking", G8LWC). 8pm. Club meets first Friday in every month. Contact sec for venue. Sec G6DLJ, tel (0703) 847754.
Andover (ARAC)—First and third Wednesdays of each month, 8pm. Wolversdene Club, Andover. Club net, 8pm. Tuesday evenings S18—G0ARC/A. Sec G0AMO, tel Andover 51593.
Basingstoke (BARC)—Results of AGM, Chairman G0EWO. 5 Jan ("HF contest operating", G3TXF). 7.30pm. First Monday in each month. Forest Ring Community Centre, Sycamore Way, Basingstoke. Sec G1OQV, tel (0256) 59664.
Binstead (IOW BARS)—Wednesdays 7.30pm. Binstead Scout HQ. Sec G4VJF, tel Ryde 66298.
Blackmore Vale (BVARS)—Second and fourth Tuesday of each month, 7.45pm. The Bell and Crown, Zeals, (on the A303). Sec G4YXX, tel (0963) 32389.

G1GRG (L) being presented with the Blackmore Vale ARC Project Trophy for his advanced technology speech delay unit by Tony Nailer of Spectrum Electronics who judged the event

Bournemouth (BARS)—Results of AGM. Chairman G3VPC; Treasurer G6KSQ. First and third Friday of every month, 7.30pm. 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)—Results of AGM. President G4TIX, Chairman G1FFS, Treasurer G1OKC, PRO G6VHD. 23 Jan (Annual Dinner with Chippenham & DARS). Meetings Fridays 8pm. Football Club Social Club, Nursteed Road, Devizes. Sec G4VUD, tel Chippenham 651471.
Eastleigh (Itchen Valley ARC)—2 Jan (Natter night), 16 ("The modern pabx", G4VII), 30 ("Ramblings", G3KWU). Alternate Fridays 7.30pm. The Scout Hut, Brickfield Lane, Chandlers Ford. Club net, Thursday 8.30pm. S21-23 G6IVR. Sec G1IPQ, tel (0703) 736784.
Fareham (F&DARC)—Every Wednesday 7.30pm. Portchester Community Centre, Portchester, Hants. Sec G3CCB, tel Fareham 288139.
Farnborough (F&DARS)—Second and fourth Wednesday of each month. Railway Enthusiasts Club, Access Road, off Hawley Lane, Farnborough. PRO G4SBU.
Gosport (Rowners & DARS)—Watch for details of the Solent Fortifications Award in 1987. 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 GU1PMY, tel (0481) 26392.
Horndean (H&DARS)—First Thursday of each month, 7.30 for 8pm. Murchiston Hall, London Road, Horndean. Sec G4RLE, tel (0705) 755274.
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)—7 Jan ("SEB Telecoms", G4VNM), 21 ("Treloar Hospital Radio", G0DBS). 8pm. The Railway Hotel, Liphook. Sec G0BTU, tel Petersfield 66489.
New Forest Repeater Group (GB3NF)—For information or to join the group and help support the repeater, contact G6DLJ, tel (0703) 847754.
Plessey (Christchurch ARS)—Second Thursday of each month. Plessey Social Club, Grange Road, Christchurch. Sec G1PFX.
Poole (PARS)—Last Friday of each 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, please contact Mr A L G Price, tel (0329) 281852.
Portsmouth (Marconi EARS)—Last Tuesday of each month, 8pm. Broad Oaks Canteen, Portsmouth Airport. Sec G3FWE.
Salisbury (SRES)—13 Jan (AGM), 7.30pm. Grosvenor House, Churchfield Road, Salisbury. Sec G4LDR, tel Amesbury 22809.
South Hants (SH International Telegraphy Society)—Thursdays 7.30pm. The Community Centre, Malins Road, Portsmouth. Sec G3JZV.
Southampton (SARS)—Alternate Wednesdays 7.30pm. Millbrook Community School, Green Lane, Southampton. Sec G4VKB.
Southampton (SUARS)—Wednesdays 1pm and 7.30pm. 65 University Road, Southampton. Details G0ERI, tel (0703) 559122 ext 2137 (work).
South Dorset Repeater Group (GB3SD & GB3DP)—For information or to join the group and help support the repeaters please contact G0EVW, tel (0305) 771517.
Swindon (S&DARC)—8 & 22 Jan (Natter nights), 15 ("Procurement and resale of surplus electronic equipment", G4YEC), 29 (Talk by G4LTZ). Thursdays 7.30pm. Oakfield School, Marlowe Avenue, Swindon, Sec G4YQZ.
Trowbridge (T&DARC)—7 Jan (AGM), 21 (Natter night). 8pm. Territorial Army Centre, Blythsea Rd, Trowbridge. Please note change of venue. Sec G4SPE, tel Trowbridge 4532.
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)—27 Jan ("Oscar", G1RFB). 7.30pm. Community Centre, Blackfield, Southampton. Sec G0BPA, tel (0703) 893937.
Wessex (W Amateur Wireless Club)—Alternate Tuesdays 8pm. The Cricketers, Wimborne. Sec G6SDQ, tel (0202) 822125.
Weymouth (SDRS)—6 Jan ("Meteosat", G4RQAK). 3 Feb ("The Atom", G4VYT). 7.30pm. The 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.
Winchester (WARC)—16 Jan (AGM). 7.30pm. Durngate House, Winchester. Sec G4ZNO, tel (0703) 772191.

May I take this opportunity of wishing all Clubs and Area Reps in Region 17 a Happy New Year and to ask you to keep me informed of your club activities at least eight weeks ahead of the due date in 1987. *G3KWU.*

REGION 18—RR Ian Gibbs G4GWB, 61, The Gables, Widdrington, Morpeth, NE61 5QZ. Tel 0670 790090.

Aycliffe & Shildon (A&SARC, G4ZKZ)—Meetings Tuesday evenings, Scout HQ, 4 Cross St, Shildon. Sec G4OHZ, tel 0325 314638.
Berwick (Borders ARS, G0BRS)—Meetings first and third Friday evenings. St John's Amulance Brigade Hall, Church St, Berwick. Members and visitors please note new venue. Sec GM1IRN, tel 0289 82491.
Bishop Auckland (BARAC, G4TTF)—Meetings Monday and Thursday evenings, Travellers Rest Pub, Evenwood. Sec G0ACY.
Blyth (BARC, G4VKY)—Meetings Wednesday evening, The Community Centre, Warwick St, Blyth. Sec G1JFW, tel 0670 353069.
Cambois (Wansbeck ARA, G0FNQ)—The Antenna Farm, Colliery Baths, Cambois, Blyth. Details G4NAX, tel 0670 818442.
Consett (Derwentside ARS, G4PFQ)—Meetings Monday evenings, Consett Assoc, F B Club, Belle Vue Park, Consett. Sec G3KMG, tel 0207 504198.
Durham (DARS)—Meetings Friday evenings, Rowing Club, Green Lane, Durham. Sec G4WJV, tel 0783 853552.
Durham (UODR&ES, G4DUR)—C/O Mr Puddephat, Grey College, South Rd, Durham.
Easington (EARS, G4APN/G6APN)—Meetings Tuesday and Thursday evenings, Village Inn, Easington Village. Sec G4RXR, tel 0783 867725.
Darlington (D&DARS, G4ZVH)—Jan 16 (Visit by RR). Meetings Friday evenings 7.30pm. Hurworth Grange, Hurworth, Nr Darlington. Sec G6PRV, tel 0325 460528.
Great Lumley (GLR&ES, G4EUZ)—Meetings Wednesday evenings, Community Centre, Great Lumley. Sec G4MSF, tel 091 4693955.
Hartlepool (HARC)—Meetings Monday evenings, Grange Road, Methodist Church Hall, Tankerville Street entrance. Sec G4SHJ, tel 0429 67419.
Hetton le Hole (Houghton le Spring ARC, G1NMD/G3NMD)—Meetings, Wednesday evenings, Hetton downs Hotel, Hetton. Sec G0ABF, tel 091 5844673.
Morpeth (Northumbria ARC, G4AAX, G6AAX)—Meetings Thursday evenings, Old Telephone Exchange, Cresswell Rd, Ellington, Morpeth. Sec G0EVV, tel 0670 513026.
Newcastle (NER & CC, G4YPT)—Meetings Monday evenings, Village Hall, Hazelrigg, Newcastle. Sec G1GNY, tel 091 2365288.
Newcastle (Tynedale ARC, G4ONQ)—Meetings first Tuesday of the month. 8.30pm. French Arms pub, Throckley, Newcastle. Sec G0DZG, tel 091 2651718.
Newcastle (Tyneside ARS, GEZQM)—Meetings Wednesday evening, Scout Centre, Harbottle St, Byker, Newcastle. Sec G4KOT, tel 091 2341148.
Redcar (East Cleveland ARS, G4CRS)—Meetings Friday evenings, RAFA Club, Newcomen Terrace, Redcar. Sec G1GMF, tel 0642 474769.
South Shields (South Tyneside ARS, G3DDI)—Meetings Monday evenings, Marine & Tech College Club, South Shields. Sec G4XWR, tel 0632 543955.
Stockton (S&DARG, G4XXG)—Meetings Wednesday evenings, Billingham Community Centre. Sec G1NOY, tel 0325 310058.
Sunderland (SARS, G4LPK, G6BXJ)—Meetings Monday and Thursday evenings and Sunday 11.30am. Sec G0ASM, tel 091 5288079.
Teeside Repeater Group, GB3TS—Sec G8MBK.
Tyne & Wear Repeater Group, GB3TW—Sec G8YWK, tel 0385 45425.
Washington (W&DARC, G4YGW)—Meetings Sunday evenings, 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 (BRES)—22 Jan (AGM). Meetings are held at this club on Mondays with RAE class; Tuesdays, morse class, and Thursdays natter nights. The meetings are all at Westbury Rec Centre, Westbury School, Barking, Essex. Sec G4UIF, tel 01-594 0291.
Borehamwood (BEARS)—Meetings are held at the Organ Hall Club, Bairstow Close, Borehamwood, at 7.30pm on the second Monday of the month. Details G0DDJ, tel 01-207 3809 or G4XEW, tel 01-953 5287 (day).
Cheshunt (DDARC)—Meetings are held in the Church Hall, Church Lane, Cheshunt, Herts, at 8pm on every Wednesday evening. All are welcome to attend. Sec G4VMR on Dane End 250.
Chiswick (ABCARC)—20 Jan (AGM), 7.30pm. Chiswick Town Hall, High Road, Chiswick. Sec G3GEH, tel 01-992 3778.
Ealing (EADARS)—27 Jan (AGM). The Community Centre, 71a, Northcroft Road, W13. Sec G4SCR, tel 01-997 1416.
Edgware (EDARC)—8 Jan. (AGM), 22 (Informal). 8pm. Watling Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware. Sec G4RMD, tel Hatfield 64342.
Feltham (TEFARC)—6 Jan (Natter night). 20 (Raynet, G4SYT). 5.30pm. Lower bar of the Sports and Social Club, Mono Lane off Victoria Road, Feltham. Sec Dave Austen, tel 01-890 3600 Ext 2617. Attendance is not restricted to members of Thorne staff.
Grafton (GRA)—10 Jan (Audit books). 24 (AGM) 8pm. Haringey Sea Cadet Corps TS. WIZARD, White Hart Lane, London. N17 7JP, on the second and fourth Fridays of the month. Sec G1ACL, tel 01-833 3401.
Harrow (RSH)—8 Jan (AGM). 22 (Informal) 8pm. Roxeth Room, Harrow Arts Centre, High Road, Harrow Weald. Sec G0DIN, tel 01-861 0419.
Harpenden (HARC)—6 Jan (Informal night). 20 (Social night versus the Dynamics Hatfield ARS). 8pm. The Silver Cup ph, Harpenden. Details G1BJC, tel 05827 2455.
Hillingdon (HARC)—This club meets at the Hillingdon Gold Club at 8pm on Tuesdays. Details G6STI, tel 01-561 2917.
St Albans (Verulam ARC)—13 Jan (Activity evening), 27 ("Broadcasting developments", N Davies). Meetings held at RAFA HQ, New Kent Road, St Albans, Herts. Sec G4OBH, tel St Albans 52003.
Southgate (SARC)—8 Jan ("Phase locked loops and frequency synthesis," G4AEZ). 22 (Informal). 7.45pm. Holy Trinity Church Hall, Green Lanes, Winchmore Hill, N12. Details G4YLL, tel 0992 30051.
SW Herts UHF Group—This group runs GB3MR RB14 and GB3SWM on 10·368GHz at Bushey Heath. They are also building a 1·3GHz beacon/repeater, GB3BH which should be on air by the time you read this. The Group is available to give talks and demos. Contact G4KUJ. Donations for the Building Fund will be gratefully received by G3THQ. The 432MHz repeater, GB3HR, built and maintained by this Group is now into its eleventh year. An info sheet is available on request from G4KUJ.
Uxbridge (Brunel UARC)—Shack will be open every lunchtime, behind the Students Union. Basic tuition and morse classes held. Nets nightly at 8.30pm on 144·710MHz. Sec, G6ZYT, tel Uxbridge 39125.
Welwyn (WHARS)—5 Jan (CW practice). 19 (Construction project). 8pm. 9 WGC Scouts Hut HQ on third Monday of month. Main meetings held at Lemsford Village Hall, Brocket Road, Lemsford first Monday of month. Nets held on 144·375 Mondays at 8pm. Sec G0AII, tel 0707 326138.
Westminster (Civil Service ARS)—Lunchtime meetings first and third Mondays of each month at the CS Recreation Centre, Monck St, Westminster. SW1. Shack with equipment available to licensed members 10am to 1030pm Monday-Friday. Station Manager Bob Treacher. 01-212 8823.

New Year greetings to all club members. To club secs, please remember to hand over your job correctly to the next person taking it on. ie club notes have to be in to me at least six weeks before publication dates. Read about it at the start of this month's notes. Also do not send your club notes via RSGB HQ, it causes delay. *RR19*

REGION 20—C R Hollister, 34 Battersby Way, Henbury, Bristol BS10 7SU Tel 0272 508451.

Area representatives
E A Perkins, G3MA, 40 Carlton Road, Gloucester GL1 5DY.
A C Denning, G4JHB, 19 The Park, Yeovil, Somerset BA20 1DN.
J Thorn, G3PQE, 43 Hill Road, Weston-Super-Mare, Avon.
A W J Capel, G4ROX, 33 Romney Avenue, Lockleaze, Bristol BS7 9ST.

Bath (B&DARC)—Alternate Wednesdays, 8pm. Englishcombe Inn, Englishcombe Lane, Bath. Club station G4MTH regularly operating. Details G6EIY, tel 0225 318128, or G3FIH, tel 0225 837539.

Bath (Downside School ARS)—Details Physics Department, Downside School, Stratton-on-the-Fosse, Bath, Avon.

Bridgwater (Sedgemoor ARC)—Third Wednesday in each month, 7.30pm. Bridgwater Sea Cadets HQ, The Docks, Bridgwater. Details G4EHU, tel Bridgwater 455923.

Bristol (BARC)—Tuesday, 7.30pm. YMCA, Park Rd, Kingswood, Bristol. Details G4YOC, tel Bitton 4116.

Bristol (BRSGBG)—26 Jan (AGM). Last Monday of the month unless date coincides with Bank Holiday, when meeting brought forward by one week. 7.30pm. Small Lecture Theatre, Queens Building, University of Bristol, University Walk, Clifton, Bristol. Details G4SQQ, tel 0272 508451.

Bristol (First Crockern Scouts SWG)—Details P Knowles, tel Pill 8814248.

Bristol (HTVRC)—Details G3TKF, tel Bath 20442.

Bristol (North Bristol ARC)—2 Jan (Christmas party), 16 (VHF activity night), 30 (AGM), 7pm. SHE, 7 Braemar Crescent, Northville, Bristol. Details G4YQQ, tel 0272 690404.

Bristol (South Bristol ARC)—7 Jan (Club project, G8BDZ), 14 (VHF activity evening), 21 (Bring & buy), 28 (Photography evening, W Pipping), 7.30pm. Whitchurch Folk House, East Dundry Road, Whitchurch, Bristol BS14 0LN. Details G4RZY, tel 0272 834282.

Bristol (UoBARS)—Term time net on S8 most evenings. Details G6TGN, c/o Students Union, University of Bristol, Queens Road, Clifton, Bristol BS8 1LN.

Bristol (432MHz Repeater Group, GB3BS)—Details S Bailey G4MCQ, 50 Quantock Close, North Common, Warmley, Bristol BS15 5UT.

Cheltenham (CARA)—Stanton Room, Charlton Kings Library, Cheltenham. 7.30pm. Details G4VXE, tel 0242 26723.

Cheltenham (Government Communications ARC)—Details c/o GCHQ, Benhall, Cheltenham.

Cheltenham (Smiths Industries RS)—Alternate Thursday, 7.45pm. Club House, Newlands, Bishops Cleeve, Cheltenham. Details G8UJG, tel Bishops Cleeve 2175 or 3333 ext 2511.

Cirencester (C&DARC)—Alternate Thursdays, 7.45pm. Phoenix Centre, Beeches Road, Cirencester. Details G0AXD, tel Cirencester 5015.

Gloucester (GARS)—7 Jan (Visit by Regional Rep). Meetings Mondays, 8pm (RAE & morse classes 7pm). St John Ambulance HQ, Heathville Road. Details G6AWT, tel 0452 504515.

Mendip (M Repeater Group)—GB3WR 144MHz repeater, GB3UB & GB3VS 432MHz repeaters and GB3UT 1·3GHz tv repeater. Details and applications for membership from G8GMZ, tel Midsomer Norton 413902.

Portishead (Gordano ARG)—Fourth Wednesday of each month, 7.30pm. Ship Hotel, Down Road, Portishead. Details G3LJD.

Shepton Mallet (Mid Somerset RC)—Alternate Sundays, 7.30pm. The Kings Arms, Shepton Mallet. Details G4WZF, tel Chilton-Polden 722946.

Shirehampton (SARC)—Fridays, 7.30pm. Twyford House, Shirehampton, Bristol. Details G4GTD.

Street (S&DARS)—First Thursday of each month, 7.30pm. Toc-H Hut, Brutach Terrace, Street. Club Net every Wednesday 10pm 145·350MHz for news and views. Details G4SCD, tel 0458 45145.

Stroud (SARS)—Alternate Wednesdays, 8pm. Nelson School, Stratford Road, Stroud. Details G0DZM, tel 045 383 2773.

Stroud (S&DARS)—Tuesdays, 7.30pm. Scout HQ, Parliament Street, Bisley Road, Stroud. Details G3TEV.

Taunton (T&DARS)—Fridays, 7.30pm. Basement, County Hall, Taunton, Somerset. Details G4ZLF.

Thornbury (T&DARC)—First Wednesday of each month, 7.30pm. White Horse Inn, Groves End (A38). Details G8AZT.

Wells (EMI Sports and Social Club RC)—c/o Cedar House, Chamberlain Street, Wells, Somerset BA5 2PJ.

Weston-super-Mare (RAFARS)—HQ station of RAFARS. Details Admin Sec, RAFARS, RAF Locking, Weston-super-Mare, Bristol BS24 7AA.

Weston-super-Mare (WsMARS)—12 Jan (AGM), 26 (Constructors night), 7.30pm. The Bristol Hotel, Locking Road, Weston-super-Mare. Details G1DJW, tel 0934 514429.

Yeovil (Y&DARC)—8 Jan ("The transmission equation", G3MYM), 15 ("Producing aerial gain", G3MYM), 22 ('Soldering techniques", G3GC), 7.30pm. The Recreation Centre, Chilton Grove, Yeovil, Somerset. Details G3GC, tel 0935 75533.

Yeovil Repeater Group, GB3YS—Details G6AGL.

OBITUARIES

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

Mr M L Aspinall, DSM, G3PZP
Len Aspinall died in June 1986. After service in the Merchant Navy, he joined the Royal Navy in 1933, and was awarded the DSM for action against submarines. After leaving the RN he joined BOAC, and was a founder member of the BOAC ARC and was also a member of the RNARS and of the German naval amateur radio society Marine Funke Runde. He gave many years' service to Talking Books for the Blind, and was a regular operator of GB2RN on board *HMS Belfast*.

Mr H Bedford, GW3HPS
Harry Bedford died on 4 October 1986 aged 61. He was licensed in 1952, and was an immaculate constructor of many projects.

Mr F W A Brisley, G4NRJ, ex G8ZVW
Frank Brisley died on 21 September 1986 aged 62. He was a member of the RAFARS and had been secretary of the Greater Peterborough ARC for several years, His interests included the hf bands, 144MHz and dxtv.

Mr G L Brownson, G5CR
Gilbert Brownson died at the age of 79 on 4 August 1986. He was first licensed in 1926 and had held the callsigns 2BOW, G5BR, GW5CR and G5CR. He always used morse and constructed his own equipment.

Mr J Burns, G8FNL
John Burns died on 25 October 1986 aged 76. He passed the RAE in 1965 and obtained his first licence in 1970. He was an active member of the Weston-super-Mare RS, and was an RSGB newsreader for several years.

Mr W Cartwright, FRAS, G4IRI
Bill Cartwright died on 17 October 1986 aged 76. He was an active member of the Bolton ARS and Raynet, and an accomplished morse instructor.

Mr R Crane, G4PHS
Bob Crane died at the age of 32 on 16 August 1986. He was an active member and officer of the Echelford ARS, an enthusiastic constructor and operator on hf and vhf, and an RAE instructor.

Mr J A Coomber, G4GYG
Jack Coomber died on 27 October 1986 aged 68. He was a founder director of Telequipment in 1952, became a director of Tektronix UK Ltd following a merger, and later joined Scopex Instruments Ltd as a director. He made a major contribution in the test equipment field, particularly with oscilloscopes. He became an ardent radio amateur after retiring in 1983.

Mr V E Diment, G4HTC
"Vyv" Diment, who died in September 1986 was licensed in 1978 and was active on 3·5MHz and vhf. He was an early Amtor enthusiast on 144MHz using home-brew computer and terminal equipment.

Mr A H Donhou, G3PMQ
"Donny" Donhou died on 13 October 1986. He was a founder member of the Norfolk ARC, and became well known for a satellite tracking computer program which he devised. More recently he became interested in packet radio and wrote the software for a split-screen display.

Mr D A Dyer, GW8UH
Alan Dyer, an "old-timer" of the Cardiff RSGB Group and a former RSGB area representative died on 3 August 1986. He was a dedicated home constructor, and made all the equipment he used on hf and vhf. He was a regular contributor to the Sunday morning 3·5MHz net for GWs.

Mr D Edwards, G3DO
Douglas Edwards died on 21 June 1986 aged 78. He joined the RSGB in 1930 as BRS427, was licensed in 1938, and became a life member of the Society in 1943. Apart from the official silence of the war years, there were few days during his amateur radio career when he was not heard on the air. He gained many amateur radio awards, including the Whitworth Trophy in 1956. He was a founder member and first treasurer in 1931 of the Midlands ARS.

Mr C Hartshorne
Cyril Hartshorne died on 14 September 1986 at the age of 81. He was a long-standing member of the Burton upon Trent & DRS, his name appearing in the records of the "Burton Wireless Club" in 1919, and was its president at the time of his death. He had a keen interest in df and had not missed an event for many years.

Mr E R Jolley, G3HLC
Eric Jolley died on 26 July 1986. He was interested in radio from an early age, and after service in Royal Signals he obtained his amateur licence. His full log book and boxes of QSL cards testify to his enthusiasm, and he was a keen supporter of club activities in the Staffordshire area.

Mr R Jardine, GM3GPN
Roy Jardine died on 22 August 1986. Until his retirement four years ago he had been inactive for many years, but he then reclaimed his callsign and took up amateur radio again with enthusiasm, being active mainly on 3·5MHz.

Mr T Lambert, G4VBL
Tom Lambert died in September 1986. He was well-known, particularly in the London area, for his work on behalf of the RSGB; his outstanding cw broadcasts, to which he devoted every evening, being a testimony to his enthusiasm.

Mr T V Livesey, G3GSA
Tom Livesey died on 7 August 1986 aged 89. He had been interested in radio since 1920. In the 'thirties he received experimental tv pictures on home built equipment. He was active on 144MHz and on the British Railway ARS and FIRAC nets.

Mr R A R Matthews, G3ZNZ
Bob Matthews died on 30 September 1986. His main interests were the vhf bands and propagation, being well-known on 144 and 432MHz. He held several vhf/uhf awards, including the RSGB Senior awards, the Dutch Senior PAC1000, and the German Gold DLD500, and also the DLD1000 for the hf bands.

Mr H R Mackie, GM3FYB
Harry Mackie died on 27 October 1986. An active and innovative member, his main interests were operating on vhf/uhf, and the design and construction of equipment for those bands.

Mr C Noke, G6DV
Cecil Noke died on 25 July 1986 aged 78. First licensed over 50 years ago, he was a keen constructor and active on 3·5 and 144MHz until very shortly before his death. During the war he maintained the interest of Ashton-under-Lyne & DARS members with morse lessons, and this was noted in the March 1942 issue of the *T & R Bulletin*.

Mr P L O'Connell, G4TSP
Peter O'Connell died on 25 September 1986 aged 68. After retirement from sea-going service, he was first licensed as G8XDB in 1980 and became G4TSP in 1983. He was active initially on 144MHz, and later on rtty and phone on 3·5 and 7MHz.

Mr J J Phillips, G3KYR
Joe Phillips died on 16 September 1986 aged 78. He was licensed in 1956, and was active on hf, often to UK and through the YL DX Net, and on 144MHz via GB3WR.

ERRATUM

Mr A S B Cutbush, G6ZNU
As a result of a clerical error, the name of Mr Cutbush was included in the "Obituaries" list published in our October 1986 issue.

He has written to tell us that he is very much alive, and we apologise for any distress that this unfortunate error may have caused to him, his family and friends.

THE Members' Ads PAGES

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 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.

HEATHKIT RA1 tower, 32' high, never used. Complete and dismantled. Buyer collects, £100. G8AXE, QTHR, tel: 061-442 0696.

EDDYSTONE 750 HF gen/cov RX. Some refurbishing has been done but to a gd std. Plus CCTs and alignment details, £60 ovno. Also CBM64 EPROM programmer. EPROM based software fitted. Programs Standard 27 series EPROMS manual, £30 ono. G6NLX, tel: Dunstable 867808, evenings.

TOKIO HL160 2m linear 10W in-160W out pre-amp used approx 10-12 hours, £180. 10m all mode converted CB + 165W linear, £150. GOFKK, tel: Maidstone 27078, after 6pm.

TATUNG ITEMS, brand new and boxed: TM01 colour monitor, £145; TP100 printer, £140; TP80 printer, £120. All BBC etc compatible. Sage accounts for IBMPC, £50. Supercalc 2+ for Apricot, £40. Both new. Carr extra. Simon, G8POO, QTHR, tel: 0661 842389.

THE FOLLOWING as new: Yaesu FT726R, 2m/70cm and sat modules, YM-48 mic, orig pkg, £900. SMC polarphaser, 2m, SO239, £38. Swan WM-6200 wattmeter/SWR bridge, 0.20.200W, 50-150MHz, £40. MMG144v PL switching preamp, £27. Mirage D1010, 70cm/100W linear, £260. Reace UH-74 50/144/432MHz pwr/SWR bridge 10W, remote coupler, £20. KR500 elevation rotator with indicator, £100. MET 2m pwr splitters, new, £20 ea. MET 70cm ditto, £17. JB PMH2 phasing unit, 70cm, new, £7. TAR 2m phasing unit, new, £7. Antennas, MET 432-17X, new £35, vgc £25. Fylde 2m/8X, new £23, vgc £15. Jaybeam 12XY/70, £22. 12XY/2m, £17, both with phasing harnesses. The following in vgc: Marconi sig/gen TF801D/1/S, 10-485MHz, spare oscillator valve, handbook, £65. Advance sig/gen S2, 100KHz-100MHz, £18. UHER Report stereo professional tape recorder, mic, leather case, as used by BBC/OB, £340. Belco BR-8 LCR bridge .1ohm-11.1 meg/1uH-111H/10pF-1110 uf, £15. Airmec Electronic voltmeter 314A, £25. TT145 transistor checker, £5. Azden PCS2000 2m FM mobile, remote control head and cable, 25W, mic with up/down, six memories, large LED's, £170. Microlog ATR-6800 dedicated RTTY/Morse with computer modules and all manuals, Sanyo HR monitor (cost over $2500), £750. Hy-Gain, hi-range V, easily converted 10m, SSB, £75. B/W 18" TV, £8. SX200N scanner with SSB kit, £165. Commodor Navigator 60 aviation computer, £65 Sentinel HF pre-amp, £6. Buyer inspects and collects except small items. G3AAG, Hampshire, tel: 0730 892143 or 893534

LMW Electronics 13cm tvtr boxed, psu, 500mW output IC202 interface needs antenna relay, £85. Tonna 20696 23 cm Yagis, £85. MMC144/28 cvtr, £13. All carr extra. WANTED: Ambit 91600 IF strip also FT7(B)/FT200B for EME net. Dave, G4FRE, tel: 0394 271622.

2m linear 100W incl psu, £65. 13.8v 35A fully protected psu, £40, 0-30v 20A psu, £25, bases, coils etc for HF linear (2x4Cx250), £15, 70cm PA QQV03-20 QQV06-40 no psu, £10, 5v 60A switchmode psu, £25. Chris, G4CRF, QTHR, tel: 0582 68446.

AMT-1 unit for Amtor etc, £110. PK-80 packet controller, £160. G4YBR, tel: Southend-on-Sea 552729.

MOBILE SHACK: Safari 12'6 caravan. Well equipped with plenty of room for radio equip. Ideal for clubs, field days, contests etc, fitted with cooker, fridge and heater. Sep toilet compartment, £375 ono. GOCAD, NOT QTHR, tel: Oxford 67165, after 7pm.

G3PLX VDU system with memory board, RTTY, £50. Hallicrafters S-27C UHF communications RX, £10. Buyers collect. Bell, tel: 0705 550834, after 6pm.

SWAN 10ZBX HF TCVR 160-10, £500. Swan 100MX mobile HF TCVR ext vfo, £300. Yaesu FP707 psu, £100. Yaesu FTV707 2m, £100. Western WM40 tower winches no ground hinge or head unit, £200 ono. G4LPL, NOT QTHR, tel: 0977 661369.

CR100, wkg with manuals, £23. G3RSE, tel: Cambridge 356385.

AN ATTRACTIVE 2 yr old modern retirement home in rural Wiltshire close to M4. Fully established & complete in all respects. Ground rent and rates £440 per yr. Broadband HF sloper dipole c/w super detached radio shack. First offer of £17,600 accepted. Photos and other details supplied on request. GOFZR, tel: 0225 709066

YAESU FT290R c/w nicads, case, chgr, vgc, £225. George, G3HKF, QTHR, tel: Clitheroe 41737.

FT726 TCVR, 2m only, purchased Sept '86. FRG8800 gen/cov RX and FRT7700 swl atu, both purchased April '86. All items mint condx, purchased brand new, hardly used, receipts available. Prices to be discussed. Can be sold separately. G1WDH, tel: 0272 427668, between 6pm-8pm.

YAESU 757GX TCVR c/w FC-700 atu and YM-35 mic, £600. Tono 5000E RTTY terminal, £550. All good as new. G4WGK, QTHR, tel: Churchstanton 541.

DAIWA SR9 2m FM monitor RX, 12v operation, car radio dimensions, built-in spkr, 144MHz-146MHz on vfo, 11 xtal channels fully xtalled. R0-7, S19-21, ideal new swl, £50. Suitable homebrew psu also available. G4OHB, QTHR, tel: 021-449 3530.

TONO 9000E RTTY, CW ASC2, light pen, and word processor, ex condx, manual, orig pkg, £350. Burns xtal calibrator CC-10 1MHz, 500KHz, 100KHz, 50KHz, 10KHz, 5KHz o/p's, £25 ono. Burns wavemeter TC-101 0.8 500MHz 6 bands, £25 ono. G4KHX, QTHR, tel: 0604 858999.

KENWOOD VFO 520S remote vfo for TS520 series, ex condx, manual, boxed, £40. Kenwood DG5 digital display and freq counter 100Hz-40MHz, ex condx, manual, boxed, £40. Trio AG202A oscillator 20Hz-200KHz 4 ranges, ex condx, manual, boxed, £40 G4KHX, QTHR, tel: 0604 858999.

COLOUR GENIE with Radsoft RTTY package with Morse send receive training prog, £65. ZX81 16K, £15. Datong Morse trainer, £35. 2m GPV5 colinear, well used, £15. GOFMD, QTHR, as G6RJE.

TRIO 120S HF TCVR 10m-80m, boxed, vgc, £350. Complete CW RTTY TCVR setup incl C16 computer complete, JEP terminal unit, program and all leads suit any HF VHF rig, £95 ono. Phil, tel: Gravesend 64224, anytime.

TRIO TR7800 2m FM TCVR 5W-25W 15 memories with autoscan, battery backup, mic, mobile mount, manual, orig pkg, vgc, little used, £150 inc p&p. G2KI, QTHR, tel: Chiselborough 560 (Som).

FT790R, immac, £295. BNOS 12/25A psu, immac, £135. 144MHz linear 4Cx250B, £150. 432MHz linear 4Cx250B £150, psu for above, £175. PF1 TX, RX + nightcall RB15, £35. Richard, G6HKS tel: 0733 354 354 extn 233 or 0945 584640.

FT290 6 months old, £290. Used 20 times approx in this 2m desert and have just (Hooray!) got my A licence. Will consider exch for superb Argosy or similar CW/ssb. Trevor Artingstoll, 14 Barn Street Haverfordwest, Dyfed.

YAESU FC700 atu, mint, unused, £80 ono. Digital readout unit for FT7B, £55 ono. G3HQH, QTHR, tel: 0663 44087.

ICOM IC25E 25W FM mobile, £175. Kawasaki Z400 motor cycle "V" reg, 16,000 miles, taxed, MOT'd, £325. SMC 12v 25A psu, £90. All ono. Exch last for scanner. G8XCL, QTHR, Lydd, Kent, tel: 0679 20954.

FT221 2m multimode TCVR muTek front-end fitted, ex condx, £325. MET 144-19T 19-ele 2m beam as new, £30. Prefer buyers collect. G6JUI, NOT QTHR, tel: 0734 594495.

BULLETINS RadCom 1938 to 1985. QST from 1946 to 1973. SWM from 1947 to 1963. G4JW, QTHR.

MICROWAVE modules 144/28 linear tutr c/w 15dB attenuator to match 10WT HF rig or conv CB rig, 2 yrs old, £80 ono. F9FT 9-ele portable antenna, £10 c/w box. G1HQL, QTHR, tel: 0403 55011.

FT790R, vgc, 18 months old, boxed, manual, £275 ovno. Search 9 marine RX vfo or xtals, £35, ono. WANTED: Pye europa H/B FM TX board. G1DXQ, QTHR, tel: Norwich 745734.

COLLINS TCS12 TX in FB wkg order with HB psu and cct diagrams, £30. Trio 2300 2m FM with 15W PA nicads and chgr, boxed, £110. Yaesu FC700 atu with PP meter, boxed, £80. Mick, G4ODD, QTHR, tel: Mansfield 811681.

SILENT KEY G6WUZ: Yaesu FRG7700 RX plus FRT7700, £300. FDK multi 750X 2m TCVR plus FDK PS750, £240. Hansen SWR3E swr and pwr meter, £20. All mint condx. G2AIV, tel: 0703 842259.

YAESU FT203R/FNB4 FM handheld 3.5W c/w chgr, spare battery pack & YH2 headset. Hardly used, pristine condx, £150. G4ZFZ, QTHR, tel: 0865 510245.

SAVE £££'s! One Trio/Kenwood external VFO-240, unused, brand new & boxed, £50. Also Colour Genie computer with CW/RTTY software, interface unit & data conditioner, as new, £70. Post free. Nev Kirk G3JDK, QTHR, tel: Wickersley 541606.

COLOUR GENIE computer 32K with RTTY software/ hardware, all cables manuals, serial printer interface, technical manual, in maker's carton, surplus to requirements, little used. Reasonable offers? G4OPL, QTHR, tel: 054 36 3131, pm only.

MODEM VTX5000 for Spectrum+, as new, wish to swap for Teletext decoder or WHY? BRS87185, (Lincs), tel: 05218 569, most evenings.

TRIO 9000 multimode, mint condx, CW base unit matching psu, spkr, mobile ant with mag mount mounting brkt, £350. 5-ele X Yagi, £12. G4LCL, QTHR, tel: 0782 503384.

AR40 ROTATOR c/w controller, leads, manual, gc, £60 ono. Peter, G6TWW, QTHR, tel: 0483 579840.

HEATHKIT SB301/SB401, £125. Keyer ETM3C, £28. Also Datong filter FL1, £35. G3IEW, tel: Exmouth 265858 after 6pm.

ICOM IC730 HF TCVR, new bands CW filter, manual, boxed, vgc, £400. Yaesu FT209RM FNB-4 2m TCVR, soft case, manual, boxed, as new, £240. G4OWV, NOT QTHR, tel: 05645 3652.

TRIO 940S, ex condx, 1 yr old, £1500. SP940 spkr, £35. MC60 desk mic, £35. G4BXR, QTHR, tel: 0908 566266, after 6pm.

YAESU FT209AH, 5W hand portable, £180. Toyoruma RF speech processor, £60. Yaesu FC707 aerial tuner/ swr, £85. Realistic VHF/UHF scanner, £60. Several dictaphones/tape decks of historic value, £30 ea. Pye 21VR20 TV tuner/timer, £40. G6ASA, tel: Oxford 863333.

GOING QRT. TS120S, mic, CW filter, boxed, £325. IC740, pu SM5, mic, keyer module, as new, £600. FT221 mic super 2m rig, as new, £350. All above with user and service manuals. Very old Morse key with glass cover and TX/RX switch, marked GP078. Lovely condx. Offers? 4Cx250 linears 2m & 70cm. Offers? Tower, heavy duty rotator beams for 70cm, 2m/6m, almost new TB3 c/w H100 and control cables. Offers for complete ant installation? G3TA, QTHR, (Glos), tel: Miserden 571.

ICOM ICR70, FM board fitted, plus MM/144 cvtr, £375 ono. Alan, BRS87147, tel: 0732 366704.

YAESU FRG-7700 RX, gc, £230. Also Spectrum+ 48K computer, books, £70. Prefer buyer inspects & collects. Eddie, GW4OMF, Presteigne, Powys, tel: 0544 267140, evenings only after 7pm.

DAIWA auto atu CNA1001 c/w leads, manual, etc. Perfect wkg order, boxed, £110. WANTED: Tranzmatch with Ezitune fitted. Eamonn, tel: 0504 265675.

YAESU FT 1 gen/cov TCVR, vgc, £950. TET HB35C 5-ele tri-band beam 12' boom length longest el 33' vgc, £350. G4ZLI, QTHR, tel: 0622 44405, anytime.

TRIO/KENWOOD digital VFO DFC236 suit TS530S etc, £35. Constant current chgr variable 0-750mA o/p with timer, charge up to 16 cells, £20. Alphacom 35 printer for Spectrum, £25. All items vgc. Post extra. G4RVY, QTHR, tel: 091-526 6357.

ICOM 471E 70cm multimode base stn, ex condx, no mods, £575. G4TBR, QTHR, tel: Chesham 786510.

290R 144-148 PTL i/p chgr manual, mint, plus Mirage B230A 30/40W linear, £290. Liner2 144-165 144.405 ssb, vgc, £75. Yaesu 223 mobile full rptr cover plus S20-21 22-23 10W o/p manual, £80. G1LCI QTHR, tel: Bourne End 26493.

'SATPACK' 40T 5.25" disks for BBC-B, "Orbital Prediction" (weather, amateur, Russian); "VoSAT 2 Telemetry Decoder"; "Multi-scheduler"; "Weather Chart Plotter", c/w manuals. Bargain! £30. WANTED: Monoitorscope YO901, SB-614, WHY? Mains txfmr for SB-610 Heath scope. Steve, GM4GTU, QTHR, tel: 0224 743039.

ICOM 290D 25W c/w SM8 desk mic, £425. Icom 245E 12W c/w SEM Sentinel amp, £245. Yaesu FT790R c/w nicads, case, £250. All rigs m/mode. Drae 24A psu, £75. G1DVC, QTHR, tel: 01-843 0191.

MUFAX COURIER fax machine, converted to receive NOAA and meteosat pics, £95. G3PLX RTTY system c/w keyboard and message store, £25. Carr on both items extra. Towns, tel: 0376 510664, after 7pm.

REALISTIC DX 302 RX. Synthesised, digital readout, triple conversion, 10KHz-30MHz, service manual, vgc, £125. Maurice, QTH, Glos, tel: 0242 674711.

COLLECTORS pr German WW2 transmitting valves Telefunken RS237 100W triodes c/w ceramic base sockets. 600 British USA valves. Service manuals handbooks, circuit diagrams, books etc. sae lists Offers? G3APX, QTHR.

MICROWAVE PREAMPS: Avantek 1.0-2.6GHz N-sockets, 15v. 2.0-4.3GHz c/w i/p limiter, o/p isolator, integral mains psu. 2-4.5GHz sma sockets, mains psu. Hewlett Packard SPDT coax relay, 18GHz, 24v. Sensible offers? G6ELH, QTHR, tel: Watford 30254.

YAESU FRG7700 gen/cov RX, little used, as new, boxed, £275. G4UZZ, QTHR, tel: Worksop 721421, after 6pm or weekends.

ICOM 4E 70cm handheld, mint condx, case, 0.5 wave etc, £175 ono. Also R1155, orig condx, no mods, ext psu and o.p., £35. WANTED: Compact/mobile HF TCVR. G3TCO, QTHR, tel: Bristol 681068.

BBC MICRO Model B, vgc, issue 4 board o.s. 1.2 basic 2 c/w pace amcom disk filing system (62 files per disk), dust cover, Morse and propagation software, manuals, £250. G1LPA, QTHR, tel: 051-355 9325.

3-OFF EACH 250 and 350 pF wide spaced variable condensers, £12 ea. 2m linear mod to 70MHz, can be converted back, circuit with unit, £25 ono. GW1IEF QTHR, tel: 055-934 892.

TASCO 11TE-5 pwr reflector telescope, new unused in pkg with flexible controls on a Alt-Azimuth and equatorial mount, c/w eyepieces and Barlow lens. 4.5" reflector, price £250, no offers. GW1IEF, QTHR, tel: 055-934 892.

FT101E HF TCVR, incl mic, good condx, £290 ono plus carr. Dave, G4DPZ, QTHR, tel: 0245 73331 extn 3269.

NASCOM-2 48K, prototype board, case, software, manuals, £150. Valve psu's. 250v and spare, £15. 140v, £10. 2m valve TX strip, QQV03-10, £5. QQV06-40, base, o/p cct, £10. RadComs April '72 to Dec '85, 1 missing, £15, carr extra. Parkinson, tel: 0377 46919, anytime.

FT221R fully xtalled outboard readout just realigned smc, £350. HF quad 6-band coverage 2-ele £100. TR2500 with base mount, mobile mount, spkr/mic, soft case, boxed as new, £250. G0ECP, QTHR, tel: 0642 604771.

EX-BBC equip: 26" Prowes colour transmission monitors PAL/NTSC. 9" B&W. gwo, £40 defective, £10 Leevers-Rich floor standing tape machines E200 stereo transistor, £350, valved £150. Phil Moss, tel: 01-337 7309.

BROTHER EP44 typewriter/printer, 3.726K character on board memory. 15 character LED display, as new, orig ribbon, less than 1 hour use, c/w psu, £140. Also ZX81 c/w 16K RAM pack plus Morse program, ex condx, £25. G1LRW, QTHR, tel: 048 68 5722

POWER SUPPLY (4) 4-off Radford LAB59R AC/DC 0-25v (8A) 0.2v steps. 6.3v @ 3A, 300v @ 150mA. Also included HT/LT smoothing units. Excellent general purpose pwr supply for lab, rig or PA, £50 ea ono. G6BSO, QTHR or tel: 01-856 4433 extn 40 Science Dept.

PRO2003 VHF/UHF scanner RX, base or mobile, receives 2m and 70cm amateur bands, aircraft, marine, broadcast, PMR etc over 20,000 frequencies between 68-512MHz, 60ch programmable memory, as new in orig box with instructions, £120. G4RNE, QTHR, tel: Southport 77508.

TRIO TS120v HF TCVR, boxed with manual c/w FL110 100W linear, £350. Trio 3200 70cm 12ch (full) 8W W+D PA and mobile colinear, £120. WANTED: Trio R1000 or 600. Collect within 30 mile radius. G8GMT tel: Walsall 413958, after 6pm.

ICOM 740 all-band TCVR, must be seen, mint condx, prefer buyer inspects/collects, £550. No offers. Ring for details. Sanderson, tel: 0385 734276.

FAIRMATE SPM57680 55-440MHz scanner, mint condx, with portable discone, £130. Panasonic RF3100 gen/cov RX with VHF FM, mint condx, £140. Write to P Hawker, Hugh Stewart Hall, University of Nottingham, NG7 2QX.

FRG7700M digital RX, 12 memories. 240v AC or 12v DC plus FRA7700 active antenna, FF5 filter, works service, operating manuals, boxed, mint condx, £295 ono. G3AUV, QTHR, tel: Wickham (Hants) 833069

FT901DM AM/FM/SSB RTTY modes, spare o/p valves, c/w warcband kit, all accessories, works service, operating manuals, parts list, boxed, vgc, £550 ono. AR88LF RX LF-30MHz, service manual, spare valves, vgc, £60 ono. G3AUV, QTHR, tel: Wickham (Hants) 833069.

HONEYWELL termi net printer RS232 interface incl stand and approx 2000 sheets paper, £180 ono. Prefer buyer collects. G3EXV, QTHR, tel: 0772 616929.

DATONG FILTER FL2, £45. Datong psu for FL2, £5. Datong speech processor, manual setting model, £40 G2FLB, QTHR, tel: 01-467 1078

JVC GRC1 video camcorder, little used, hence sale. 3 batteries, several tapes and long throw mic. Can use as camera only and playback to TV without recorder, £500 the lot. Delivery possible. G1LGH, NOT QTHR, tel: Winterbourne 773057.

TRIO R2000 RX with vhf conv CW filter, gd condx, £495. Gillott, tel: Sheffield 745795, after 6pm.

TS811E in mint condx and c/w orig pkg at a substantial saving on the new price of £1,000. Yours for £745. Phone: 0905 620041 anytime and speak to Charles if G6JNS is out.

EARLY STC wavemeter complete in wooden box with spare HL2 valve, £30. Ferrograph series 6 mono tape recorder, new condx, £30. HW17A 2m TCVR, £30. G3XKH, tel: Bishops Cleeve 3520.

FDK MULTI 800D 2m FM TCVR 1W-25W variable o/p 144MHz-148MHz in 5KHz steps fitted pre-amp and auto scan facility, £90 ono excl postage. G8PGU, tel: Redruth 218410, anytime.

3 ONLY new Aerovox paper caps 15uf 1500VDC, £4 ea. 3 only Zenith variacs, as new 0-270 in/out 2.5A, £10 ea. Items plus post. WANTED: Help please! Anyone with info Airmec 858 osc. Your price? G3ESB QTHR, tel: 0332 671536.

FT101ZD 6-band fan mic manual, little used, vgc, £425. FL2100B linear amp 10m-80m 1200W PEP manual vgc, little used, £250. G3NZY, QTHR, tel: York 410385.

SONY ICF2001 digital tuning RX AM/CW/SSB 150KHz-29.999MHz, FM 76-108MHz. Direct, preset, scan or manual tuning. Ideal swl RX. Wonderful to key the frequency and up pops wanted station. Immaculate all accessories, orig carton, £125. Brian, tel: 01-728 8432 or 0732 456708.

SPECTRUM keyboard, stonechip vgc, cost £60, bargain £25. Spectrum 5.25" floppy disk interface, £25, as new with manual. Robbie, G6EZU, QTHR, tel: Tamworth 67004.

TR2400 c/w case, belt/clip etc, chgr, s/mic spare nicad, slight display fault, £110. FT708R NC9C chgr, s/mic, 2 FNB2 nicads, £170. MM144P 10/100W PA/preamp, £90. MM144 3.5/25W PA/preamp, £20. SWR25 3.5-150MHz swr/rf meter, £5. G8YNC, QTHR, tel: 01-888 2758.

ATLAS 215 160-15, beautiful condx, handbook, £300 ovno. Standard C8800 2m TCVR, ex condx, £160 ovno. Spectrum with terminal unit for RTTY etc, mint. Offers for complete unit? Other items like atu's etc. G4JGD, QTHR, tel: 0527 43625, please ring anytime.

PACKET AX25 TNC AEA PK80, £150 (£240 new). Easily driven from any computer or dumb terminal with a serial port. 3 simple connections to rig PTT/mic & ext sp. still under warranty, as new. Inspection/demonstration welcome. Dave, G4WIZ, tel: Tadley 5185.

FT290R with nicads, mint, no mods, £215. G4IOK, QTHR, tel: Witney 4867.

FT290R, little used, c/w nicads, chgr, helical, 8XY Yagi. Sell £250 or swap, p/exch HF rig. Anything considered. Andy, G0FLT, QTHR, tel: 0763 48061.

FT101Z absolutely mint, low hours, FM, fan, 9-bands, £450. FT202R fitted S20, 21, 22, R5, 6, vgc, £45. KDK digital 2 10W FM, 2m mobile, gc, £40 Tentec atu, £35. WANTED: FT290R. G4LEX, NOT QTHR, tel: Timsbury (Bath) 71224.

FT102, £500. SP102, £48. FC102, £150. FAS-1-4R, £20. Icom R70, £500. Datong FL2, £60. HQ1 mini beam, £100. SP901, £50. SP55, £10. Welz CH20A, £15 Alinco ELH260D, £50. All ono. G4VOT, QTHR, tel: 0376 515017.

MINI BEAM HQ1 10m/15m/20m, clean gd condx, £100 ono. Keith, G4PEU, (Staffs), tel: 0889 270652 or 270324.

TRIO 9000 TCVR 1/10W, ex condx, not used mobile, £295. MM1445OS linear amp 10W i/p 50W o/p, £55. 2x21-ele Tonna antenna 432MHz 2-way pwr splitter cables connectors, vgc, £60. WANTED: SP230 spkr. G4SXP, QTHR, tel: 0787 79498.

YAESU FT203R handheld, vgc, FNB4, 4.5W o/p, case, £150. WANTED: 70cm board for FT726R. Robert, G4XDD tel: 01-221 4399, anytime.

ICOM 251E+ muTek front-end, £395. MML100S 2m linear with switchable preamp, 10W i/p 100W o/p, £95. Both little used and in ex condx. Reason for sale white stick operator changing to talking rig. G4HXB, QTHR, tel: 061-483 0776.

BROADBAND HF 15W linear amp. Complete kit incl heatsink. Approx 0.5W in for full o/p. KM4000 memory keyer; inboard lambic paddle. FB, £30. SB-610 monitorscope, needs txfmr, £20. WX/amateur satellite prediction 40T/5.25" disks for BBC-B. GM4GTU, QTHR, tel: 0224 743039.

TEN-TEC ARGONAUT 515 TCVR, £225 ono. QRP atu, £25 and 500Hz xtal CW filter, £20. Both suitable for TCVR. G4DUS, QTHR, tel: 0923 720616.

VALVES used but gc: 829, 832(2), £2.50 ea. TT11 6V6G, 6F6G, 6L6G(8), 6X5GT, 6SH7M, 6H6GT, 6H6M, 6J5GT, 6SN7G(4), 6Q7GT, 6K7M(2), 6K8G, 6K6G, 12J5GT, 12SG7M(2), 6A7, 6A8, 5R4GY(2), 77(2), 78(3), 42, 58(4), 2A5(2), EL84, EF80(3), EL91, PCF80, PCL83(2), PY82, £1 ea. SP41(2), SP61(3), EB34, EBC33, EF36(7), EF50(7), HL4, AC/ME, KTW61, 2D21, S130(3), UU5, U8(2), 50p ea. All post extra. G5KM, "Robin Hill", Lane Head Road, Cawthorne, Barnsley S75 4AA. tel: 0226 790986.

MICROWAVE MODULES MML 144/100 linear amplifier and muTek SNLA144S preamp, incl coax connecting lead. An excellent combination for base or mobile use, £115. G8EGL, QTHR, tel: 0226 281855, home, or 0226 282290, office.

ZX81 16K + set of keys and pcbs to construct pw RTTY unit. Also Skywave "Forth" ROM plus all data, £35. Harry, GODQL, NOT QTHR, tel: 0388 834270, weekends.

WESTERN DX-33 3-ele tri-bander, 10/15/20m, gwo. Reason for selling, to make space for a quad. G4WWG, QTHR, tel: Skelmersdale 28740

YAESU FT200 with FP200 psu, £175 ono. Yaesu FT221, £250 ono. SCM Europa-C, vhf tvtr, £40 ono. Vanco swr meter Altai multimeter. Gear of G4UDP, now silent key. G4AUT, QTHR, tel: 0942 670138.

YAESU FT757GX HF TCVR with MH-1 scanning mic, £595 Trio-Kenwood TR-3500 70cm handportable c/w AC chgr £210. MS-1 mobile stand/chgr, £27. SC-4 soft case with belt hook, £12. BT-1 alkaline battery case, £5. PB-25 400ma NI-cd battery pack, £20. SMC-25 spkr/mic, £15. 70cm 12W amplifier kit, new £35. 2 5A regulated psu 7.5A surge, £12 & £15. Simpson 260 analog multimeter, £25. Gutter mount, £2.50. Heathkits model AV-3U valve millivolt meter & T-4 sig tracer 110V, £7.50 ea. 70cm Starphone part converted RBO, £45. Hi-fi graphic equalizer/echo 24 individual adjusters with leds per channel, new £160. Daiwa infrared mobile mic model RM-940, £28. Post at cost. Amis, (Norfolk) tel: 0328 710641, 7.30pm-9.30pm.

FT790R 70cm multimode c/w nicads, chrgr, case & accessories, vgc, £285. Bob, G4OAC, QTHR, te: Rochdale 50174.

FT790R, vgc, c/w nicads & case, £300 incl free FL7010 matching 10W linear. PRO2002 realistic 50-chann scanner, £100. All above in orig boxes/pkg. Bailey, tel: Kenilworth 53393.

BOUND VOLUMES RADCOM '68-'83, £5 per volume. Woden UM3 modulation txfmr. Offers? Wilcox, tel: Cardiff 598062.

TRIO 2300 2m FM portable c/w nicads, chgr, case, £80. Staton, tel: Chandlers Ford 61950.

KENWOOD TS830S with 500Hz filter spare driver & PA valves, vgc, £625. IC-210 2m FM TVR. All vfo. Variable 1-10W. Mains or 13.8v. Repeater shift and toneburst., £130. G4ALV, QTHR, tel: 01-460 3852.

TRIO TS130S CW filter fitted VFO 120 SP120, all as new condx, boxes, manuals, £525 ono. HQ1 mini beam c/w extra element to make same as AQ20E type aerial. G4YRR, QTHR, tel: 0782 395017.

VERSATOWERS 60': one mobile, one post mounted tiltover with 3-ele HF beam. Both heavy duty winch operated galv steel lattice, £495 ea. G3BXI, Essex tel: 0371 84250.

YAESU FT709R FNB3 FBA5 spkr/mic Nc-9C case little used, £280. G1LPJ, tel: 0533 413908.

MICROWAVE MODULES tvtr 2m TX 10mIF perf wkg order. Swap for 70cm tvtr or £90. John, G3LBW, 8 Muirfield, Nunthorpe, Middlesbrough, TS7 0JN, tel: 317547.

EDDYSTONE EA12 amateur band RX, mint. Offers? Heathkit HW8 and pwr pack, £100. Eddystone EC10 gen/cov RX, mains/battery, £85 ono. Bang Olufsen 4000 Tangential record player, £85. G2CYN, QTHR, tel: Bedford 711 538.

YAESU FT101ZD Mk3 FM with mic, fan warc bands with FV101DM digital vfo both as new, £525. Solartron D/beam scope CD1400 fitted CX1441 wideband and CX1442 differential amplifiers vgc, £60. Pre-war LE1TZ Valoy 1 enlarger vgc, collectors item. Newland tel: 02562-0991.

COLLINS KWM2A, linear 30-L1, matching outboard VFO heavy duty psu, switchable dummy load. All works but age is showing, hence £300 on the nail! Also aluminium tubular mast bits and Collins atu. Hart, tel: Bradford 587904 for details.

ANTENNAS 2m 70cm 435MHz 19-ele Tonna, mint condx, £18. Met 8-ele long Yagi for 2m, £21. Met 534MHz 17XY Yagi, £35. 70cm not used due to lack of activity. Phillip Cane, GM4SUF, QTHR, tel: 086-282 246.

DETACHED Secluded bungalow, large garden, BX1 tower TA33 beam Ham.M. rotator. Two bedrooms, lounge, dining, kitchen, laundry, garage, gas heating, 2 miles Paignton, 3 miles Torquay, £57,500. G3WUU, QTHR, Going ZL.

DRAGON 32K computer, ideal for RTTY, CW, Amtor, G4BMK, £40. Also keyboard Datronics, for Spectrum computer, £30. G4SSX, QTHR, tel: Ruislip 630627.

MX7000 scanner 25-550/800MHz-1300MHz, £299. SX-200N, £190. Drae wavemeter, £19.50. SA450N co-ax switch (new), £15. Yaesu YM48 mic, new, suit 480/726, £15. FT980 + FTV107R, 6m & 70cm, matching grey, tranzmatch W/Ezitune, unused 6m Tonna. All £1,450. Might separate. Tono 9000E RTTY/ASC2/CW TX/RX terminal, many features, was £669, accept £375. Icom AG-1 M/H preamp, suit 451/471, £45. BNOS LPM432-10-50, £150. P/exch considered. Walford. tel:0268-774089 2pm-10pm, any day.

YAESU FT2700RH dual-band TCVR c/w ,mobile mount, duplexer, £355 ono. Hammarlund HQ120 RX, offers? Heathkit HW8, mint condx, £130. Heavy duty telomast 30', £40. AR40 rotator, £50. G4HHB, QTHR, tel: 0442 217461.

DRAE slow scan TV TX/RX. Complete unit to decode sstv signals into normal video or transmit camera video, mint condx, £220 ono. G3TCO, QTHR, tel: Bristol 681068.

HEATHKIT all vgc RX HR 1680 TX HX1681 and psu PS23 scope IO18U sine/square wave generator IG82U, £350 the lot, or will split. G3LP, QTHR, tel: Glos 34890.

ICOM IC720 CW filter PS15 ex condx, £600. IC751 CW + AM filters int mains pwr supply, £950. GW4ACO tel: 0492 515240, evenings.

TRIO TS510 c/w psu, remote VFO. New 6146Bs and driver valves. Good workhorse, orig pkg, £200. Buyer collects. G4ZXN, QTHR, tel: Coventry 451051

THREE SECTION lattice tower 60' c/w head unit, no ground post, winches, £150. Realistic STA2000 200W t/amp four spkr capability tape, dubbing monitoring six i/p's, immaculate condx, £250. Will consider swap for amateur TX/RX equip. Mal, G4OAB, QTHR, tel: Runcorn 65804.

AMT1 with CW receive board, vgc, c/w leads, manual boxed, £175. Pair 2m Pye FM bantams c/w chgr, gc £50. Might separate, prefer buyer inspect/collect but carr can be arranged. Jack, Worcs, G2AFD, QTHR tel: 06845 3242.

APPLE2 Europlus system with i/face cards for TV monitor, RS232 printer drive, twin disk drive, 80-column, Z80 CP/M. The system can be seen in the Cambridge area. £200 ono for quick sale. G3UFZ, QTHR, tel: 0803 845304.

VIC20 with 16K ram, cassette recorder, psu, RTTY term unit G4IDE, Morse tutor prog, other amateur progs books, all gc and ready to go. The lot, £85. G4HZF, QTHR, tel: Grimsby 71215.

SCANNER AOR AR2001 25 550MHz AM FM as new, £225. Telequipment S32A serviscope 10MHz, vgc, £45, both with manuals. G3FUN, QTHR, tel: 0795 532608.

KW VICEROY Mk3 HF TX 10m/15m/20m/40m/80m, c/w technical handbook and circuit diagram, vgc, £115. G3ELI, QTHR, Hitchin, Herts. Tel: 0462 712527.

TS520S HF TCVR 160m-10m 100W+ o/p, ex condx c/w hand/mic also Shure 444 box & manual, £365. FT480 2m multimode 10W gc £250. WANTED: HF rig with 2m tvtr. G0DXC, QTHR, tel: Reading 596485, after 8.30pm or weekends.

COLLINS 32v TX, £50. US military exciter/freq meter PM0S 19" ovened unit, 2MHz-8MHz 50Hz readout, £25. Handbooks, advance CVT MT140A 150W, £5. 115v 6A Variac, £10. Buyers collect. G3RFI, QTHR, tel: 0767 260800.

VIBROPLEX standard lambic twin paddle key, hardly used, ex condx, £50 ono. Purchaser collect. G4LHK, QTHR, sae please.

HF TCVRS ssb/CW FTDX401 500W, FT200 200W, both ex condx, £215 ono ea. Must well. Want solid-state. Also super FDK TCVR 2m 25W FM, £135 ono. Jardine, tel: Luton 423495, anytime.

10m FM DNT M40FM TCVR plus 25W linear 29.3MHz-29.7MHz. Fitted xtal filter on RX, £40. Also G4BMK RTTY/CW cartridge for Dragon 32 with terminal unit for HF bands, £20. G4DBE, QTHR, tel: 051-648 6525.

SILENT KEY. 830S new July 1985 unused 1986, £725. FDK 750 multimode, £260. 5/8 whip c/w magmount, £20. Western ultimast c/w rotor head, rotor and TA33 Jnr, £350. All onvo. Various other ancillaries. G4RNQ, QTHR, tel: 061-652 5403, after 6.30pm.

IC745 PS15 SM6 mint condx, 1 yr old, £820. GM4UQG, QTHR, tel: 0698 459301, evenings.

IC04E 70cm TCVR, gc, £180. Ten-tec Argosy2 HF rig, AC psu, keyer, £450. Flightcased sequential pro-one synthesiser, £150. G8IAM, tel: 0222 754220 evenings.

BBC"B" OS1.2 + DFS, £225. Microline printer, £75. Spectrum-plus 48K, interface/microdrive, Alphacom printer and software, RTTY/CW, sstv, locator and much more, £150. Code-master CW/RTTY reader, mod CWR-610E, £85. ZX81, £15. WANTED: Yaesu FL2100Z linear. Swop? G0DDJ, QTHR, tel:01-207 3809.

DURST M30 enlarger c/w Minolta lens, large qty processing equip inc 2 electric print dryers, auto print washer, Janpol enlarger lens built-in variable colour filters, auto-electronic timer and exposure meter, £120. Tony, G0DDJ, QTHR, tel: 01-207 3809 for complete list.

KW2000B HF TCVR c/w mic/handbook, vgc, £200. Buyer collects. G3WRO, QTHR, tel: Harlow 30609.

AR88D daily use/manual, £85. Millbank, (Somerset), tel: 0278 781513.

TRIO TR751E 2m multimode, 5W/25W base stn only. 20 weeks old. Boxed as new, £440. Buyer collects or pays carr. No offers. G1DDH, QTHR, tel: 0748 4458.

FT980 fitted with optional filters and electronic keyer. Condx as new, £995 will secure this superb rig. No offers. G0CJU, QTHR, tel: 0342 312374

YAESU 480R, Yaesu 290R, 4MHz BNOS linear 10W i/p 100W o/p, nicads, chrgr, all mint condx, £700 ono. Fishon, tel: 01-907 7977, evenings.

HQ1 mini quad, vgc, waxoiled from new, £60. Buyer collects. Alan, G4RJU, QTHR, tel: Worcester 429455 after 6pm.

TRIO TS-430S HF TCVR, £675. PS-430S matching psu, £100. Tokyo HC-200 atu, £80. All approx 6 mths old c/w orig pkg/manuals TET MV3-BH vertical, £20. G-whip multimobile system 10m-160m, £35. Buyer collect or pay carr. Peter Martin, G4SDK, tel: 021-429 7141, weekdays.

YAESU FT790R, nicads, chrgr, case, vgc, £285. MM432/30L, £95. MM144/100S, £95, Global AT1000 atu as new, £45. G4VXE. Tel: Cheltenham 36723.

APPLE 2 Europlus 64K with monitor printer CPM softcard, software incl supercalc wordstar DB master and much more, £550 or would exch for HF band TCVR, gc. G3RYV, QTHR, tel: 066 67 467.

TR9130 2m all mode TCVR base/mobile 25W c/w mobile fixing bracket, £350. G4YYV, QTHR, tel: 0704 79825

COMPLETE 2m-70cm stn. Immaculate FT726R with 2m, 70cm, satellite unit, CW filter, £950. Ampere 80W 2m amplifier, £120. MM 100W 70cm amplifier, £190. Chris, G8FEV, NOT QTHR, tel: 0409 24 493.

SHACK CLEARANCE SALE for late RS44733: Send sae for 2 x A4 list. Includes realistic DX300 PRO 200B FRG7 1155 RX HRO RX BC221 antennas atu's etc. Free gift with each list donated by friends. Write to: G4FLX, QTHR.

SPC3000 3kW Rollercoaster transmatch. Built to last a lifetime, vgc, cost £300. Offers around £200 or exch FT709R or multiformat colour, dichroic head, photographic enlarger 6X6cm to 35mm or Commodore daisywheel printer. G0CCU, tel: 0272 717226.

YAESU YD148 base mic, £15. Truvox 7" reel tape recorder + box of new tapes, £35. ST5 RTTY complete in case, needs wiring, £50. 10-ele Jaybeam Yagi 2m, £20. D52 service scope, faulty, £10. Class D wavemeter, £8. G4RKQ, QTHR, tel: Northampton 712865, evenings.

VERSATOWER 25' c/w post and head unit giving 32' Mustang Mk2 beam with balun. CDE HAM2 rotator with control unit and manual, gc. Purchaser collect, £300 for quick sale. G3VPO, QTHR, tel: 0403 60216.

HEATHKIT SB200 1kW HF linear, as new condx, £350 ono. G3NAS, QTHR, tel: 05432 55992.

TVTRS MMT 144/28, £75. MMT432/28S c/w leads, £95. Stornophone 500 not xtalled, £15. WANTED: 2m mobile, handheld. G4WZD, QTHR, (Teesside). tel: 0642 550659.

TRIO 9130 with Adonis 503 mic and mobile mount, mint, unused, £380 ovno. BNOS 25A Txfmr, mint, £120. Yaesu FT209R handheld with nicad pack, case, battery pack etc, £250 ono. G6JFK, tel: 0604 491627.

HMV PORTABLE clockwork gramophone, Watts surveying compass c/w case AR88D prod/detr wkg order. Inductance capacitance bridge test set no 373A, £35 ea plus carr p&p. WANTED: Hansen FH710H, Daiwa CN410M Welz SP220 Trio SM220 scope. Jackson, (Cumbria) tel: 0229 89635.

TVTR TCV707 2m set up to work with 430S, £130. G4MJN, QTHR, tel: Kettering 85637, daytime or 790094, evenings etc.

FT200/250 SPARES: Circuit; information; NEC 12BY7A 12 coils for coil pack, data on 6JS6C, Lot £9. 57' multi-cable 12 strands 20G, screened, PVC covered, 9/16" dia, £4. 500 micro-amp meter, 3" round, £4. G3MBL, QTHR (Suffolk), tel: 0284 60984.

YAESU FT790R 70cm multimode, £300 ono. ICOM IC251E with muTek front-end, £425. Heatherlite 2m amplifier, £440. PW meon tvtr for 6m with 5-ele 6m Tonna, £65. G3ILO, tel: Nailsworth 3411.

CH.HOWES 80m-QRP CW TX/RX and vfo, £40. Howes all-band atu, £20. Howes CW-RF side tone gen, £10. PW TEME 20m/40m QRP TX and VFO, £40. HB lambic keyer, £10. All above assembled, boxed and wkg. G4VOE, QTHR, tel: 061-740 4126.

FDK multi-700 AX 2m FM TCVR, 25W variable, boxed, mint condx, incl Slim-Jim and .25 wave whip, £175. G4GGN, QTHR. (near Bakewell, Derbys) tel: 062-987 475.

HQ1 mini-beam ex condx, good performance, £125 ono WANTED: TET beam in good condx. G0DOE, QTHR, tel: 01-391 0514, evenings.

HF5 and various dipoles with 1986 design 32' mobile home attached sited on delightful retirement park nr York. Full gas ch with or without furnishings, £12,000 ono. G3VJZ, QTHR, tel: 0904 702612.

5-BAND radial kit for HF5V vertical aerial, boxed, immaculate, with all fittings, cost £45, accept £30, buyer collects. Also superb Morse transceive programme for Commodore 16 computer, with instrs. Cost £15, accept £8. GOCKY, QTHR, tel: Leeds 609456.

ICOM IC551 6m base stn. 10W with internal psu or external 12v DC, £450. Reason XYL injured, cash needed. IC120 1200MHz FM mobile, £175. Can use as

cvtr, 10.75MHz IF o/p. G4RNI, NOT QTHR, tel: Stanley (Co Durham) 235569.

RX DX302 gen/cov, £120. Alinco ELH730C 70cm linear slight fault, PA good, £30. Both ovno. Harper, tel: 01-697 8407.

2m FM mobile, standard 8800, fully synthesised, 1W-10W, full scanning from mic or rig, ex condx, £115. Datong Morse tutor, £35. WANTED: Yaesu 780 70cm or similar. Chas, tel: 01-764 6767, evenings or weekend.

2m ssb FM, RJX 230 by National plus 40W MM PA, rotator and 6-ele quad plus fixings. Complete 2m stn, £400 ono. WANTED: 8-track tapes, older the better. Collections bought. G4XBD, tel: 0438 362554.

WESTERN TA33 3-ele tribander 14'x25', £100. KR400RC rotator with 50' 5-core cable, never used, £100. WANTED: TS700S. G4RSY, QTHR, tel: 01-651 0633.

YAESU YO901P monitor scope. FTV901R tvtr with 6m, 2m and 70cm boards. FV901DM scanning vfo. All 3, £650. Mike Green, GM4MPU, NOT QTHR, tel: Eaglesham 2364.

SILENT KEY SALE: Few remaining items of G6ZR: Morse paddle, new, £45; Homebrew atu, £10; Trio Kenwood headset, £15; Codor RX, £20. Contact Mrs C R Ponting, tel: Weston-super-Mare 29138.

YAESU 726R 2m-70cm sat, £875. G1KAE, tel: 01-423 6159.

HF RX Realistic 160 DX, £50. Oscar 10m FM TCVR, £35. Datong Morse tutor, £30, OR £115 the lot. Roberts, tel: Deeside 811687.

YAESU FT270RH 45W 2m FM mobile, fitted with FVS1 voice synth, very little used. Boxed as new, £285. H Thomas, tel: 01-514 5998.

ICL AMT-2 with IBM and BBC software, as new, £150. Microwave modules 144/432 tvtr, £75. Mike, G3TEJ, tel: 0480 54560. 7 The Close, Godmanchester, Cambs PE18 8DU.

TOKYO HL90U 70cm linear, £160. Marconi TF144H 10KHz-72MHz sig/gen, £65. AMT2 terminal unit, £165 Extel printer 50 + 75 bauds, £25. Marconi TF801D 10MHz-480MHz sig/gen, £55. Racal freq counter 30MHz, £30. Sulzer standard, £25. G8WYT, QTHR, tel: 0444 450265.

YAESU FT290, pre-amp, nicads, as new and boxed, £250. Video effects gen, 3-camera i/ps, master sync o/p. Used to fade or wype from one camera to another. Full documentation, £200. GM6JOD, QTHR, tel: Irvine 217383.

COLLINS KWM2A fitted 136B2 NB, PM2 psu, in CC2 case. Also 516F2, 312B5, manuals and 20+ spare valves. Offers for complete stn only to G3ONU, QTHR, tel: 0923 676344.

HW8 QRP TCVR, vgc, no mods, £90, G4GLC, QTHR, tel: 0509 212583

G1HJU Silent Key sale: FT290R with 25W linear, £250. Trio TS2300 with nicads and psu, £100. Trio R600, £200. Unwin, GOFMT, 11 Carlton Rise, Melbourn, Royston, Herts. tel: 0763 61215.

FT 107R HF solid-state TCVR 160m-10m digital memories USB LSB CW FM. Immac condx. Boxed complete, £395 ono. G4AQU. tel: Stourbridge 392147 anytime.

TRIO TM401A 70cm FM, £225. Trio TR7700 2m FM, £130 Icom IC02E and IC04E c/w chgrs & case, £195 ea. ICBP8, £30. Spkr/mic, £10. All boxed and ex condx. G4VID, QTHR, tel: Kettering 516547, after 7pm.

TELESCAN 2 Scanner aerial c/w mpu (see RadCom p813 Nov '86), £27.50. WANTED: Godar PR40 pre-selector transistor model. R J Newey, 1 Barlow Close, Oldbury, Warley, W Mids, B68 8ND or tel: 021-544 4185, after 6pm.

IC240 2m FM mobile, mod to 80-chann, £60. TR2300 with nicads, rubber duck, chgr, base psu, vgc, £75 Large heavy Siemens teleprinter, free to caller. Some TTY accessories, cheap. Old magazines, free. G3VKQ, NOT QTHR, tel: 0279 59311.

TR2400 2m handheld c/w ST-1 base stand, £130. G4JPQ, QTHR, tel: Stowmarket 613870.

YAESU FT480R multimode, immac, £295. Drake R4B, £125. QRO HF linear. Pr QY4-400 with matching 3.5kV psu, £275. Star masterkey cmos memory keyer, unused, £70. Accu-keyer with internal psu, £15. G3VMW, QTHR. tel: 0937 844510, after 6pm.

DRAKE atu swr/pwr meter 300W, c/w matching B1000 balun, £75. Drake 300W D/L, £20. Drake 1000W L/P filter, £20. High quality swr/pwr cross needle meter ,Ham-Soku, 200W-1000W, £50. G2DYM 2000W AMU balun with 160m switch, £15. Marconi valve multi meter, £10. RX o/p, AC, voltmeter, £10. KW coax switch, £5. 2 brass Morse keys, £8. Admiralty handbook of W/T Vol 2, 1938, £5. G3UVE, tel: Bexhill 215983.

YAESU 7700 RX with matching atu and manual, £200. Daiwa search 9 2m RX, £20. Both in clean condx. Prefer buyer to collect. Roger, GOFQU, tel: 0234 711950, evenings.

FT101B with CW filter, £295. MM 1296MHz tripler, £10. 1296MHz loop quads, £10. Teletype with handbooks. Offers? 432MHz gasfet masthead preamp, £45. 432MHz 2C39 amp, psu, £40. 70MHz Jaybeam 4Y, £15. G4ERP, QTHR, tel: 0242 674478.

YAESU FRG965, Japanese home mkt FRG9600, 60MHz-905MHz multimode scanner, £290. Realistic DX302 Wadley loop RX, £100 ono. Heathkit GDO GD-1U £20. 100m 5-core rotator cable, £15. Buyer collect G8PYC, QTHR, (Oxon), tel: 084 421 5857.

SILENT KEY: John G1AWQ. Trio 9130 B09A plinth, £350. Welz RS1100 psu, £45. MC60A mic, £40. SP430 spkr, £25. 10XY .875x.875 colinear with rota, £45. Welz SP220 swr/pwr meter, £40. All items in orig boxes. GODWD, tel: 0734 694040.

TRIO 120A complete mobile brkt, G-Whip aerial vgo 10m-10m, £300 ono. KW 160m atu, £40. G4JFE, QTHR, tel: Newbury 41613.

COLLECTORS ITEM DST100 RX c/w psu. World War 2 triple super/h used by interception services. 7 wavebands with turret coil assys, £40 ono. G2LP, QTHR, tel: 01-399 6931.

VALVES 813s, CV26, heavy duty, brand new, £45 pr. G4VLZ, QTHR, tel: Sheffield 391169.

AR88 vg wkg order, £45. 2 Philips 2020 video recorders in need of repair, £15 ea. WANTED: Balanced armature drive unit, with or without magnet, for early Amplion cone spkr. G3WIF, QTHR, tel: Bristol 293738.

2m 150MHz G.E. USA commercial linear and psu, 19" rack, 30" high, full metering. Uses 2 4-125A, 2 spares incl. O/p 250W+ continuous, 500W+ intermittent. Purchased as wkg, never used. Requires 120v AC supply, £100. G4EZG, (Somerset) tel: 0963 51133.

TRIO TR2500 2m handheld, keypad entry, 10-mems, prog scan, 3W-.5W with mobile mount/psu, nicads, chgr, sprk/mic, as new in orig pkg c/w 10W P/A. Perfect order but case marked. Complete, £225. G1MDN, QTHR, tel: 0609 6520.

FT101E HF TCVR, vgc, 10MHz, spare tubes etc, £300. FR101S HF RX, vgc, FM, 2m, matches above, £175. Pye W15FM 50MHz, mint, orig box, extras, £50. All above carr extra or collect. Hill, tel: 021-777 1659, after 7pm.

YAESU FT225R 2m TCVR multi-mode. Little used, as new, orig pkg, handbook/mic etc. Prefer buyer to inspect and collect, £350. G4LJP, QTHR, tel: 0452 721510.

YAESU 101Z mic, fan, manual, as new condx, limited use, £400 ono. Cash sale, buyer collects. Taylor, 9 Forest Road, West Moors, Wimborne, Dorset. tel: 0202 873175.

TONO 9000E, hardly used, £400. Trio 2500 with chgr £195. Icom R71E with every extra, 10 months old, £700. NOAA rec, cond and frame store in 19" rack, £150. View UK G1VRF. Tel: 058283 2380 or GERMANY 06842 51736

ICOM IC2E c/w BP4 and chgr. All vgc, £140 ono. Buyer collects. G1TEP, QTHR, tel: Farnham 722344, after 6pm.

AX25 PACKET RADIO unit, £89. 1985 ARRL handbook, £3. Yaesu FT708 70cm FM handheld, £160. FT230 25W FM mobile, £150. Trevor Tugwell, 6 Kestrel Drive, Mudeford, Christchurch, Dorset, BH23 4DE. Tel: 0202 486344 extn 2223.

TRIO R1000 RX, mint condx, manual, £240. Eddystone EC10 RX, £40. GOEWD, QTHR, tel: Barnsley 765306, after 6pm.

FAX - Pair of Burroughs DEX 1100 fax terminals, £80 the pair. GOEFZ, QTHR, (West Midlands) tel: 05645 5802.

TRS80 COMPUTER 64K c/w cassette recorder, printer, joysticks, RTTY/CW/ant box Art Gallery DRS games TRS80/Dragon converter tape. As new, £150 ono. G6SVG, QTHR, (Redhill) tel: 0737 61399.

YAESU FRG7 RX 0.5-30MHz, ex condx with manual and circuit diagram, £80. Buyer collects or arranges carr. G4BRF, QTHR, tel: 05036 72349

FT101B, ex condx, fitted double balanced mixer, CW filter, G3LLL clipper, mic, manual, £320. Solartron CD1400 15MHz scope, gc, £70. Cobra 148 GTL DX, £35. TS510 80m-10m TCVR, £180. WANTED: Atlas 215. G4ILA, tel: Lymm 2388.

FT757GX YAESU, 1 year use, 1 owner, £595. Piezo DX344 mic, excellent on FT757GX, £25. 3-ele 10m Yagi beam 8dB gain, £25. Kenwood AT130 antenna tuner, £90. Vert 5/8 wave 10m, £10. All gd condx. Alan, GOEGX, tel: Tiptree 815978.

DATONG PC1 short wave to 2m cvtr, £65 ono. Wayne-Kerr CT53 gen 8.9-300MHz, £30 ono. Advance J1 audio gen, £30 ono or swap for ATV gear b&w camera etc. Buyer must collect. Chris Barker, G1EZJ, QTHR tel: 0782 46570.

HF rig wanted by new A-licensee. FT101ZD, TS530, or would consider FT77, preferably within easy travelling distance of my QTH so as to inspect/collect. Write with details to Ian, GOFNF, QTHR, (G1SJI in old callbook).

SERVO AS-2 or AS-3 to fit Acoms AP-535 FM digital proportional radio control system needed to finish a model boat. Stuck without it. Now out of production, help please! G10SP, QTHR, tel: Sherburn 70546, after 6pm, Sunday to Thursday

VIDEO RECORDER, Philips N1500 or N1700 system, large box cassette type, any condx. G6POR, QTHR, tel: 0462 683189.

XF9B FILTER with or without carrier xtals, speaker ex Pye AM10D Cambridge. G3KGN, QTHR, tel: 0702-77779.

DOCTOR DX cartridge for Commodore 64, must be in gwo with instructions. Andrew, G1SKT, QTHR, tel: 0902-753567, after 6pm.

TS930S HF TCVR. G4ARI, QTHR, tel: 0530 243258.

FRV7700A cvtr, gc. Also any info on the following: Burndept BE469 & BE443; Storno CQL614; Dymar 880 batt/chgr to suit BE443. Alan, GW8KSF, QTHR, tel: Wrexham 759732, evenings or weekends only.

TS120S or TS130S TCVR, must be vgc, no mods. Also Altron AQ6-20 3-ele space saver beam. Dennis, tel: 0407 830182, after 7pm.

HF LINEAR, all bands 160m-10m, 100W i/p, prefer Trio or Yaesu but others considered, must be in gwo and vgc. Carr or collection required, depending on distance. GM4WYR, NOT QTHR, tel: 0383 721281, evenings.

YAESU FV107 vfo, FC102 atu, FV102 vfo, gdo. Cheap Cleartone handheld TCVR for spares. Good dummy load, 70cm swr meter, N-type antenna switch for 70cm, Fasi-4R remote aerial switch to fit FC102 atu. G6ZYG, NOT QTHR, tel: 0933 318493.

HF TCVR for recently licensed operator. Anything considered. CW only or CW/SSB but must be in good condition and less than £250. GOFGS, tel: Bristol 421965.

EXCHANGE: Mizuho TX/RX 2m 1W for Eddystone EC10 Mk2 or uhf770R RX. Will collect 50 miles. G8CKM, QTHR, tel: 0939 250679.

TA33 or similar 3-ele tri-band antenna. Must be gc Will collect or pay carr. G4YFV, QTHR, tel: 0603 403022.

INFO: Technical data/circuits on any of the following: Pye series 400 base TX/RX handhelds PF2 Cintel cap bridge 1863; Solartron scope CD1012; AVO all-wave oscillator. G3JIX, QTHR, Ash 812723.

BULL! The great bulletin hunt continues for issues from 1926-1945. Bound volumes preferred but any considered at a reasonable price. G6JNS, QTHR, tel: 0905 620041, anytime.

DISH AERIAL approx 1.2m dia F/D ratio approx 0.35. Printer for HP41C calculator. Yig oscillator 2-4GHz or 4-8GHz. Wideband balanced mixer DC-4GHz. HP catalogue about 1973. Manual for HP8444B tracking generator. Microwave disc trimmers approx 0.5-3pF. John, tel: 01-428 0974.

EDDYSTONE 840C and/or EB35 RX. Must be in ex condx please. Inglis, tel: Cheltenham 526799.

TURNS COUNTER for use with roller coaster atu, max size 3.5"x4", prefer ex-military if poss. G3UKH, QTHR, tel: 091-2744115.

CW TX/RX PROGRAMS for TRS80 Level2 and Acorn Atom, also any comm programs, NOT RTTY, for above micros GW4UZL, QTHR or tel: 034882 346.

CC TV EQUIPMENT: Pan and tilt mechanism, cameras, monitors, lens, wkg or not, with wiring diagrams

if poss. Can collect. Webb, Sth Yorkshire, tel: 0909 564289.

9-BAND atu 2kW pep, must be vgc. Also 1kW dummy load. GOCML, QTHR, tel: Doncaster 855935.

B2 Wartime clandestine wireless set, any condx acceptable, if possible c/w manual or circuit diagram. Will collect. GOFQX, NOT QTHR, tel: 0908 667250.

EX-RAF BUBBLE SEXTANT. Must be in gwo and vgc, preferably with orig carrying box. G3UPO, QTHR, tel: 0477 33603.

ONE TRIO or Kenwood R2000 RX, about £360. Wood, tel: Clochan 378.

KEEN TO BUY old textbooks on automatic telephony, also an "Old Technology" automatic exchange, 25 lines or smaller. All letters answered. Andrew Emmerson, 71 Falcutt Way, Northampton, NN2 8PH. tel: 0604 844130.

NEEDED to complete AS10 manpack station, transit case, user manual, metal wkg instr card. G4WWX, QTHR.

16-ELE TONNA. Must be in gd condx. John, G4TGK, tel: 0679 62295.

2m BASE STATION TCVR, digital readout, 25W o/p preferred, FT225RD or similar could PX 2m TR9000 & BNOS psu or buy. GOCNV, QTHR, tel: 0482 643231.

RACAL TA940 linear amp. G3OZT, QTHR, tel: 0703 843198.

30'-35' TELESCOPIC tower. G3NSU, QTHR, tel: Leeds 630661.

EDDYSTONE EC958 HF RX c/w manual. Write to Ken, G6OSG, QTHR, (Hants).

ADMIRALTY Handbook of Wireless Telegraphy 1927. Advise price incl postage. Ian Millar, SH3AP, Los Arcos 10, La Nucia (Alicante), Spain.

GEC BRT400 RX in gd wkg condx and gd condx. G8WTY QTHR, tel: Malvern 4968.

TS430S or TS440S, must be vgc. Will collect any reasonable distance. G4RVD, NOT QTHR, tel: Weybridge 59253.

GOOD QUALITY communications RX such as Racal, Redifon, Plessey, etc. Cash available. Westell, tel: Whalley 3305.

TEKTRONIX 555 D/beam scope for spares for own, prefer wkg, if not, OK. Especially need H/voltage R/Hand txfmr and crt circuit parts. Will collect. Must be cheap as no income. Please write with details. G4TSR, (QTHR 1984 callbook).

TS120v. Must be 100% OK and reasonably priced. Dave, G4NZY, tel: 021-427 1788 or 021-230 2485.

EDDYSTONE 898 dial in gd condx or G2DAF RX using above. B C Barker, G3NIJ, QTHR tel: 091 2733000, daytime.

HEATHKIT HWA-17-2 the FM adaptor for my 2m HW-17A, or the assy manual for the adaptor. Carter, tel: 0874 730158.

DATONG FL3 filter unit. G4YIX, QTHR, tel: Glos 617145.

DATONG D70 Morse tutor, Yaesu NC8 chgr, Altron or similar 6m beam, Trio TH 41E, Yaesu FT703R or similar handheld. FOR SALE: FV101 DM, £100. Starphone UHF mobile 5-chann xtalled, £75. G4INX, tel: Chester 678679.

14Mcs BANDSPREAD coil for HRO. Someone must have one they no longer need. G3VPZ, QTHR.

HF linear amp 500W-1kW valve o/p. Anything considered but must be gd wkg order. Urgently need monitorscope, YO901, SB-614 or WHY? Also need mains txfmr for SB-610 scope. Have number Woden modulation txfmrs. Ring details. GM4CTU, QTHR, tel: 0224 743039.

MASTHEAD PREAMPS. muTek GFBA 144e, muTek GLNA 432e good quality ant switch with "N" type conns. Reasonably priced 70cm linear amp 100W. KLM 420-470 50ohm "N" balun or consider complete antenna. Alan, G6ZYG, Rushden, Northants, tel:0933 318493.

HF linear amplifier KW500, KW600, SB200 or WHY? Also wind up tower/mast, must have low minimum height, prefer around 15' lattice type. G4FMO, QTHR, (Staffordshire) tel: 0283 840667.

EDDYSTONE 730/4 manual with service info, costs refunded; 405-line video recordings, WHY?; Sony TV9-90UB portable B&W TV; also Sony VTR AV3420CE service info. All replies answered. G8UDJ, QTHR, tel: 0865 735821.

EDDYSTONE gc valve RX, 898 dial type, etc, cheap. Also Davco DR30 gc RX. Both must be gwo; Davco must be gd condx. Details please. FOR SALE: Trio fist mic MC35S. Offers? Don, G4KXW, QTHR, tel: 0246 416988.

P60 MAST tiltable. I have a post but can buy yours Healey, tel: 0983 523397.

YAESU FC901 or FC902 atu + 70cm module for FTV901R money waiting + SP901 spkr. GW1SSQ, QTHR or tel: Norman on Cwmbran 61771, evenings or Mr N Patterson, Cwmbran 61211, extn 228, daytime.

FOR THORNTON CLEVELEYS ARS CLUB stn, antenna tuning unit to match Yaesu FT101E. Must be vgc. G4BFH, QTHR, Tel: 0253 853554.

ICR70 or R-71E, must be in gwo, fair price paid for one in mint condx. Also JIL SX-400 scanner. Good price given. Bart, RS48056, tel: Burnley 39874, anytime.

DRAKE TR7 or TR7A in first class condx. G3AAE, QTHR, tel: 01-508 3669.

HRO MAINS psu, either rack mounting or table model Chorley, 7 Foxfield, Everton, Lymington, Hants. tel: Lymington 45231.

FT101 ZD Mk3. External VFO and spkr. FT102 + spkr SP102. FT707 + FP707 etc. FT757GX. FT77 + FP700 etc. Mint condx, no mods please. G3NXD, QTHR, tel: 0562 850570.

COUNTER and Nixie type display unit for Racal RA 1218 RX, type MDA 75209 or counter tray and fascia or fascia. Also reqd: Racal or Collins equip, need not be wkg as long as equip complete. G3KDA, QTHR, tel: Weymouth 832974.

URGENTLY for newly formed school radio club: A reliable HF RX. Must resolve ssb on 80m/40m/20m. Offers please to: G3ADZ, QTHR, tel: Rugby 815222.

HF VERTICAL. Diamond CP5 5-band trap vertical. Must be gc. Will collect up to 100 miles from Wigan. Laurie, GOFIB, tel: 0942 213325, evenings.

FRG7, mint condx. Private or dealer, Somerset area Millbank, tel: 0278 781 513.

723A/B or equiv. YD1060 or sell DK1UV 3456 MHz cavity, £50. SSB products 23cm and 13cm boards or units. Sale twin paddle key, £30. G3VVB, QTHR, tel: 0726 842368.

TET HB33M mini 15m/10m/20m antenna. Signal R5375 airband RX. C-whip helical tri-band mobile antenna Good quality antenna switch. Stateside radio magazines. Small mobile atu. Roger, G4SEF, QTHR, tel: 0469 74657.

RCA 7360. Has anyone one lying around and would sell at sensible price? Thompson, G3AMF, Friedhofstrasse 17, 7024 Sielmingen, West Germany.

MANUAL, circuits of National BW TV camera type WV341/NB borrow, copy, photostat, will pay deposit and all expenses. Details of 10-pin socket on base of camera and any other data. Please, please! Iain G3SMF, QTHR, (Essex) tel: 0375 678201.

16-ELE 144MHz Tonna. Must be portable version. Any condx accepted. WHY? G4ASR, QTHR, tel: Longtown Castle 679.

EARLY WIRELESS and xtal sets wanted, particularly interested in World War 1 sets and 1920's items, valves, spkrs, bound volumes of "Wireless World", catalogues, etc. Top cash paid. Jim Taylor, G4ERU, 5 Luther Road, Winton, Bournemouth, tel: 0202 510400.

DRAKE RV75. Cash waiting for a unit in mint condx. Write to: Diamond, 01 BP 7168, Abidjan 01, Ivory Coast, West Africa. Telex to Abidjan 22413 (answerback NCRCO-CI) or tel: international 225 22 69 69. Cost of call reimbursed.

COLLECTOR SEEKS anything Racal: manuals, service sheets, equip, WHY? Particularly any info on TA127 TX, RTA191 RX, MA174 aerial multicoupler. Also MA282 adaptor unit. Pete, G8BBZ, QTHR, tel:0442 69544, evenings/weekends.

813 VALVE BASES. 2 required for homebrew HF linear Seller's price accepted within reason. G4MKK, QTHR tel: 051-480 0240.

OPERATING MANUAL plus circuit diagram needed, Trio communications RX R300. Can you help please? G4PDN QTHR, tel: 01-777 2340.

EDDYSTONE loudspeaker cabinet type, catalogue no 935, good price paid. Frank Ashcroft, G4CJL, QTHR, tel: Stalbridge (Dorset) 63357.

LOAN OF QST Oct 1971 for 2 days in return bag of useful components. Also wanted: Collins 75A4 RX, condx immaterial but must be complete. G3HGE, QTHR tel: 0284 84452

BC610 USA SCR TX reasonable condx. G2DYM, Cobhamden, Beerdown, Uplowman, Tiverton, Devon, EX16 7PH. tel: 03986 215.

7094 VALVES. G3QD, QTHR, tel: 0602 257197

MANUAL or CCT. Diagram for Realistic Patrolman PRO-47 scanning RX. Your price for loan or copy. GW4IED, QTHR, tel: 0633 280958.

SERVICE Manual for Tektronix 453 scope to purchase borrow or hire. G3ADJ, QTHR, tel: 0734 734882, evenings, all expenses repaid.

INFORMATION on Strono 500 (batties needed), cleartone CH900 UHF, Mobira HC17A2S-90 vhf, Rank Mita UHF, handhelds. Also wanted CCT for PRC350 plus 19-volt batties. Any SABA, DCBA and CDBA equip or spares. WHY? Terry, G8MQT, tel: 0727 39825.

FAS 1-4R remote antenna switch for FC102 atu. GU4XCG, QTHR, tel: 0481 46520.

URGENTLY required FT230 and FT730. Price & condx to G1EXK, QTHR, Tel: Norwich 45791, after 6pm.

COLLINS 62S1 vhf tvtr, any condx with manual. G3AJT, QTHR, tel: 0794 512557.

UHF 2-chann mobiles and line controlled base. Must be current spec. G8EPH, QTHR, tel: 0377 87323.

YAESU FL2100Z HF linear, Trio TL922 HF linear, Drake L7 HF linear. Alan, G4YYD, QTHR, tel: 061-764 7623, after 6pm please.

TRIO PS30 psu. Must be in mint condx. Stan, G1VUK, tel: 01-230 3016, daytime or 01-435 0459, evenings

FP700, FC700, FTV700, FV700DM, gc. Reg, G8QS, QTHR tel: York 768545.

MCR1 RX and any other ex-WD equip, esp spy sets. Also looking for any synthesised HF ex-WD TCVRs. FOR SALE OR SWAP: Several WWZ radios. Phone for list. Keith, G4MSF, tel: 091 4693955.

MARCONI Atlanta AC psu, KW2000 TCVR. Cash paid for good rig. GODCR, QTHR, tel: 0376 40317.

MONITOR-SCOPE: Trio-Kenwood SM220. Must be in gd condx. Can collect. G4JQI, QTHR, tel: 025 482 3366.

MODERN synthesised 2m base rig, FM or multimode considered. Also 2m FM handheld. G4KMY, QTHR, tel: Norwich 860963.

HRO, mains pwr supply. R. Pritchard, G4MUX, 171 Somerfield Road, Bloxwich, Walsall, W Mids, WS3 2EN. tel: Bloxwich 406687.

CLUB NEEDS: books and cassette on ham radio. HF5 and AT230 atu wanted. Anyone please know where we purchase VHS video tapes on Ham Radio? Also radio software for the Amstrad 464? Seaward, tel: 0288 4892.

HELP! for swl colour codes for 5-band 1% resistors program the 48K Spectrum, tape or print out. Return postage. And 1 display 5-LT-01 unit, postage cost returned. BRS35140, M E Lee, 26 Bromford Cres, Erdington, Birmingham, B24 9RL.

TRIO TL120 linear amplifier. GM3WIJ, QTHR, tel: 0224 317019.

RACAL RA6217 RX. Adams, tel: 01-876 2070.

ICOM IC202/S. Must be in gc. G1JUZ, NOT QTHR, tel: 0745 822038.

RSGB SIMPLE transmitters circuits book. G3BPE, QTHR, tel: 0373 826939.

FT225RD or IC251e c/w muTek front-end, must be in gd condx, gd price paid for gd example. Also EIMAC 4Cx250B valve new or used. G1HQL, QTHR, tel: 0403 55011.

DRAKE 2B, any condx, to good home. Instruction manual for 1154/5 and any ancillary equip please. Collection no problem. Chris, G4ILR, QTHR, tel: Cromer 761612.

DRAKE MS4 spkr or Trio SP180 spkr. G1LJV, QTHR, tel: 0947 880317.

MIZUHO MX4 4m ssb handheld. GOESB, NOT QTHR, tel: 0543 264586, after 6pm.

KW107 or KW109 atu. Must be ex condx. G4WPR, tel: 0235 20229.

FOR LIFE BOAT STATION: Marine band vhf, df system. Must be in full wkg order. Also ship's radar, wkg, for teaching/training purposes. Limited budget available. Pink, tel: 0329 237463, evenings.

CODAR PR30 RF preselector. G2VF, QTHR, tel: 0703 775064.

SWR POWER BRIDGE. Hanson FS710V or Welz SP380 or equal for 50MHz-150MHz 200W. Must be unmarked. Digital world time clock. Radio amateurs callbook international and North American listings. Howard, tel: 0394 460 474.

VIDEO INSTRUCTION manuals for Ferguson 3V01 portable video and 3V06 colour camera, also 3V02 battery for camera. HF full size tri-band beam, tower, rotator, or might consider Altron A06 at right price. G0EFZ, QTHR, (West Midlands) tel: 05645 5802.

LATTICE MAST extending, heavy duty rotator, tribander antenna, GW4TYB, NOT QTHR, tel: Llanbedrog 740712.

OLD KW VICEROY psu txfmr T2 250-0-250 plus 6.3V 8A G6JY, 81 Grosvenor Avenue, Newcastle-upon-Tyne. tel: 091 2810400

TP10 TR9130 2m multimode TCVR in gc. Simon, G1SNT, QTHP, tel: 0386 853366.

CAPCO ELECTRONICS LTD Tel. 0695 27948

S.P.C. 300D
£225 incl Vat 1kW pep

S.P.C. 3000D
£325 incl Vat 3kW pep

Truly these must be the finest handbuilt British made Aerial tuning units ever produced. They will tune the proverbial piece of wet string, no seriously will tune from quarter of an ohm to several thousands of ohms, will tune continuously from 1.6MHz to 30MHz no gaps. Built in 4 to 1 balun for balanced fed aerials, choice of three switched aerial positions, direct or through switched position. Built in safety cct for switching all aerials to ground when you switch off obviating the need to unplug your aerials when lightning or high static charges are around (often) protecting your very expensive equipment. Obviously will not stop a direct hit, nothing will. S.P.C. format using roller inductor and large variable capacitors. As reviewed by Angus McKenzie G30SS see R.S.G.B. "The buyers guide to Amateur Radio" 73 de TONY G4OGP.

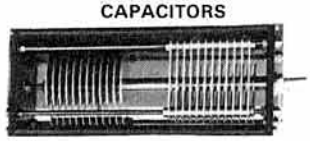
Stay tuned for ever with a CAPCO A.T.U—Once bought—Never replaced!

May we take this opportunity to wish you all a Happy, Healthy & Prosperous New Year—Tony & Helen.

Dealers: South Midlands Communications Ltd (all branches), Amcomm/ARE, Ray Withers Comm, Reg Ward & Co, Arrow Electronics, Radio Shack Ltd

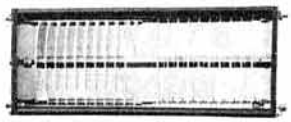
The amazing G4OGP unique clip on open wire feeder system kit, with tee piece. These are the original ones as seen at NEC some years ago. To take 1.4mm multi strand PVC very light and totally weather proof. **£5.30**

CAPACITORS



MAKE-A-CAP Ready built very high quality large airspaced variable capacitors. 2.5mm spacing rated 8kv

Twin gang 250 pfd	**£18.95**
Single gang 250pfd	**£15.50**
Single gang 500pfd	**£21.95**



4.5mm spacing rated 12kv

Twin gang really high power	**£22.95**
Single gang 1200pfd	**£25.95**
Differential capacitors 8kv	**£18.95**
Differential capacitors 12kv	**£22.95**

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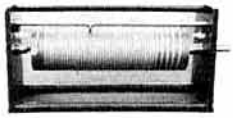

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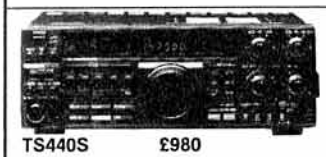

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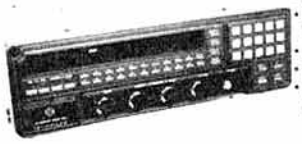

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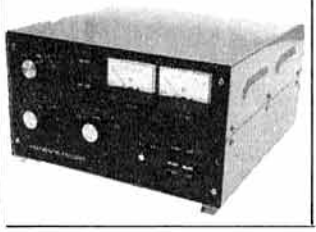

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Radio Frequency Interference (ARRL)	£4.86	£4.13
RTTY the Easy Way (BARTG)	£4.92	£4.18
Satellite Experimenters' Handbook (ARRL)	£11.75	£9.99
Secrets of Ham Radio DXing (Tab)	£9.22	£7.84
Semiconductor Data Book (Newnes)	£9.24	£7.85
Simple Low-cost Wire Antennas (RPI)	£11.08	£9.42
Towards the Radio Amateurs' Examination (Stam)	£5.01	£4.26
Towers International Digital IC Selector	£11.11	£9.44
Towers International MOSpower and other FET Selector	£11.11	£9.44
Towers International Transistor Selector	£16.23	£13.80
Towers Op-Amp Selector (Foulsham)	£11.54	£9.81
Tune in the World with Ham Radio (ARRL)	£5.41	£4.60
TV for Amateurs (BATC)	£2.58	£2.19
Understanding Amateur Radio (ARRL)	£5.46	£4.64
Vertical Antenna Handbook (CQ)	£11.97	£10.17
VHF Handbook for Radio Amateurs (RPI)	£14.40	£12.24
World Atlas (ARCI)	£3.91	£3.32
99 Test Equipment Projects You Can Build	£11.29	£9.60

Interference suppression filters		
Braidbreaker filter	£6.78	£5.76
Ferrite toroid (pack of two)	£3.14	£2.67
High-pass filter for fm broadcast band 2	£6.78	£5.76
High-pass filter for uhf tv	£7.47	£6.35
Kit of 10 different filter types	£57.41	£48.80
Notch filter tuned to 145MHz	£7.70	£6.55
Notch filter tuned to 435MHz	£6.78	£5.76

Language and morse instruction aids		
Radio Amateurs Conversation Guide (OH1BR)	£5.76	£4.90
Dutch supplement to *Conversation Guide*	£1.18	£1.00
French cassette supplement to *Conversation Guide*	£4.62	£3.93
German cassette supplement to *Conversation Guide*	£4.62	£3.93
RSGB morse instruction tape (to 5wpm)	£5.04	£4.28

MAGAZINE SUBSCRIPTIONS		
QST (including ARRL membership):		
One year—surface mail	£27.94	£23.75
Two years—surface mail	£53.37	£45.36
Three years—surface mail	£79.52	£67.59
One year—air (KLM) W Europe only	£47.45	£40.33
Ham Radio Magazine, one year, by air	£34.69	£29.49

***Items marked with an asterisk may not be available immediately; please telephone before ordering to confirm availability.**
Members visiting HQ are advised to telephone first to confirm availability of goods.

ORDER FROM: RSGB Publications (Sales), Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE

(For details of RSGB newsletters and Raynet supplies, contact the Circulation Dept at RSGB HQ)

RAD COM OPERATING GUIDE 1987

(Supplement to *Radio Communication* January 1987)

General rules for RSGB vhf/uhf/shf contests 1987

The rules governing all RSGB vhf/uhf/shf contests held in 1987 will include the following general rules, supplemented by individual rules for each contest. **Please read the rules carefully before the event.**

Cover sheets (Form 427-86), summary sheets (Form 4422), and small quantities of log sheets (Form LSVHF) are available from RSGB HQ on receipt of a large sae. Larger quantities of log sheets may be obtained from RSGB Publications (Sales).

Queries on vhf contests may be made to John Quarmby, G3XDY, 12 Chestnut Close, Rushmere St Andrew, Ipswich, Suffolk IP5 7ED; tel Ipswich 717830 (between 6pm and 9pm).

The individual contest rules contain most of the detailed information on the sections, scoring systems and methods of tabulation. Unless otherwise stated in the individual contest rules, all of the general rules apply in every contest.

Please note that, as last year, all points claimed for a contact will be lost if either station logs callsigns incorrectly, including any suffix. The receiving station will also lose all claimed points for a contact where other information is logged incorrectly. Ten times the claimed score will be lost for unmarked duplicate contacts.

More inspections are likely to be made this year than previously, and will include contests other than VHF NFD. A close watch will be kept on the use of high power amplifiers.

Rules that have changed are marked by an asterisk.

1. Entries
All entries must be sent to the contest adjudicator at the address shown in the individual contest rules. All entries become the property of the RSGB and cannot be returned.

2. Last posting date
All entries must be postmarked not later than 15 days after the end of the contest or last cumulative activity period.

3. Cover sheets*
All entries must be accompanied by a correctly completed current RSGB vhf/uhf contest cover sheet (Form 427-86) for each band used, including full details of antennas and final amplifier devices. In multiband events entrants must also complete a multiband summary sheet (Form 4422).

4. Operators
All operators must be RSGB members.

5. Fixed stations*
To be eligible to enter a fixed-station section, the station must be located at the main address shown on the licence validation document.

6. Single-operator stations
Single-operator stations are those operated by one person who received no assistance with operating or log keeping during the contest.

7. Locations
In multiband events all stations forming one entry must operate from one site, defined as a circle of 1km radius. All equipment for portable stations must be installed on site during the 24 hours before the contest or during the contest itself. Entrants may not change the location of their stations during the contest.

8. Valid contacts
No points will be lost if a non-competing station which has been contacted by an entrant is unable to supply a QTH, locator, or serial number, but the receiving operator must obtain and record enough information to be able to calculate the claimed distance score. Contacts with stations whose callsigns appear on the cover sheet will not count for points.

Only one scoring contact may be made with a given station on each band in use during the contest, ie any callsign regardless of suffix or prefix may only be worked for points once. Any non-scoring contacts must be clearly marked in the log. Unmarked duplicate contacts will be penalized at the rate of 10 times the claimed score for that contact.

In cumulative contests, one contact may be made with a given station (as defined above) during each activity period. Only the three highest scoring activity periods will count towards the final score. However, all available logs should be sent to the adjudicator for the purpose of checking.

9. Radial ring scoring
Contacts made between stations separated by the distances shown in the table will score as indicated.

Km	Points	Km	Points
0-50	1	151-200	7
51-100	3	201-250	9
101-150	5	251-300	11

and *pro rata*.

10. Final tabulation of multiband contests*
The final tabulation showing the overall results will be formed by taking the sum of the normalized score on each band. The normalized score will be calculated by dividing each station's points score by that of the band leader and multiplying by 1,000.

ie Normalized score for each band $= \frac{\text{Score achieved}}{\text{Band leaders score}} \times 1{,}000$

11. Awards*
There will be an award to the highest scoring in each section. An award will also be made to the runner-up in each section in which there are 10 or more entries. In events tabulated under Rule 10, a certificate will be awarded to the highest scoring station on each band that has not qualified for either the overall winner or runner-up award. Certificates of merit may be awarded at the adjudicators discretion.

12. Crossband contacts
Crossband contacts do not count for points.

13. Log keeping*
The logs for contest entries must be made out on current RSGB vhf/uhf log sheets or, if computer listings are to be submitted, these must be cut to A4 size, RSGB log format, line spaced to contain 25 contacts per sheet, and correctly collated (not Z-fold). Each sheet must be headed with the entrants callsign, IARU locator, contest title, and sheet number. Logs must be tabulated as follows:

(i) Date/time (gmt)
(ii) Callsign of station worked
(iii) My report of his/her signal and serial number
(iv) His/her report on my signal and serial number
(v) IARU locator received
(vi) QTH or county received (when required) or comments
(vii) Points claimed

The contest exchange must consist of both callsigns, RS or RST report followed by serial number and IARU locator. Where QTH information must be exchanged it must be given as a point identifiable on an Ordnance Survey route planning map (scale 1:625,000) or as a distance and direction not greater than 25km from such a point. Any complaints received or made about signals must be recorded in the comments column.

14. County multipliers*
In contests using a county multiplier scheme, the contest exchange will include the full county name or the code letters shown in this operating guide. The score obtained under Rule 9 will be multiplied by the total number of counties and countries worked. Where more than one station is worked in a particular Scottish region, additional multipliers can be claimed for each contact, up to a maximum of three multipliers per region. Each new multiplier must be clearly marked in the log and listed with the contact serial number on a separate multiplier check list. Please note that your own country counts as a multiplier, and that a contact with a station in another G prefix area can count for both a county and a country multiplier.

15. Serial numbers
Serial numbers start from 001 on each band and advance by one for each contact. In culmulative contests, serial numbers increment from 001 for each activity period.

16. A station must operate within the terms of his/her normal licence (this excludes high power permits). Special event callsigns may not be used.

17. The same antenna system must be used on transmit and receive.

18. Stations using telephony in the recognized cw sub-bands 70·025-70·150MHz, 144·000-144·150MHz, 432·000-432·150MHz and 1,296·000-1,296·150MHz, or transmitting on beacon frequencies, are liable to disqualification. Entrants must observe the provisions of the IARU/RSGB band plans.

19. Stations which persistently radiate poor-quality signals, or otherwise contravene the code of practice for vhf/uhf contest operation (see below), are liable to disqualification or loss of points. Gross errors in logging will result in disqualification.

20. Contacts made via a repeater, man-made satellite, or moonbounce will not count for points.

21. Proof of contact may be required.

22.* Entrants must permit inspection of their station by members of the VHF Contests Committee, or its representatives, and give site access information if requested to do so. The inspector must be permitted to remain for as long as desired, and to return to the site at any time during the contest. Contestants must demonstrate to the inspector's satisfaction that they are obeying the rules of the contest.

23. The ruling of the Council of the RSGB shall be final in all cases of dispute.

General rules for RSGB Listeners vhf/uhf contests 1987

1. The 1987 general rules for vhf/uhf contests will apply.

2. Listeners contests are open to all non-licensed members of the RSGB. Only the entrant may operate the receiving station.

3. Logs must be show in columns: (a) date/time (gmt), (b) Callsign of station heard, (c) My report on his/her signals, (d) report and serial number sent by station heard, (e) callsign of station being worked, (f) IARU locator given by station heard, (g) QTH given by station heard (if appropriate), (h) points claimed.

On 144MHz the callsign in column (e) may only occur once in every 10 contacts logged. CQ and test calls do not count for points and should not be logged. If both sides of a QSO can be heard, both can be claimed for points.

The Hansen Trophy will be awarded to the entrant with the highest aggregate score in all the swl contests between 7 March and 20 September 1987. The aggregate score will be calculated in accordance with general Rule 10.

Code of practice of vhf/uhf contest operation

1. Obtain permission from the landowner or agent before using the site, and check that this permission includes right of access. Portable stations should observe the Country Code.

2. Take all possible steps to ensure that a site is not going to be used by some other group or club. Check last year's results table to see if any group

UK 144MHz band plan

144.000		
CW only	144.000 to 144.025	*Moonbounce*
	144.050	*CW calling frequency*
	144.100	*MS cw reference frequency*
144.150		
SSB and cw only	144.250	*Used for GB2RS (ssb) and slow morse transmissions*
	144.260 ±	*Used by Raynet*
	144.300	*SSB calling frequency*
	144.400	*MS ssb reference frequency*
144.500		
All modes non-channelized	144.500	*SSTV calling frequency*
	144.600	*RTTY calling frequency*
	144.600 ±	*RTTY working (fsk)*
	144.650	*AX25 packet radio and experimental packet repeaters*
	144.675	*Data and packet radio*
	144.700	*FAX calling frequency*
	144.750	*ATV calling and talkback*
	144.775	*Raynet*
	144.800	*Raynet*
	144.825	*Raynet*
144.845		
Beacons	(144.850	*Raynet)*
144.990		
FM repeater inputs	145.000 R0	
	145.025 R1	
	145.050 R2	
	145.075 R3	
	145.100 R4	
	145.125 R5	
	145.150 R6	
	145.175 R7	
	145.275	*AX25 packet radio and experimental packet relay stations until end of 1987*
145.200		
FM simplex channels	145.200 S8	*Raynet*
	145.225 S9	*Used by Raynet*
	145.250 S10	*Used for slow morse tone modulated transmissions*
	145.275 S11	
	145.300 S12	*RTTY afsk*
	145.325 S13	
	145.350 S14	
	145.375 S15	
	145.400 S16	
	145.425 S17	
	145.450 S18	
	145.475 S19	
	145.500 S20	*FM calling channel*
	145.525 S21	*Used for GB2RS (fm) broadcast*
	145.550 S22	*Used for rally/ exhibition talk-in*
	145.575 S23	
145.600		
FM repeater outputs	145.600 R0	
	145.625 R1	
	145.650 R2	
	145.675 R3	
	145.700 R4	
	145.725 R5	
	145.750 R6	
	145.775 R7	
145.800		
Satellite service		
146.000		

UK 430-440MHz band plan

430.000		
	NB: 431-432MHz not available within 100km of Charing Cross, London.	
432.000		
CW only	432.000 to 432.025	*Moonbounce*
	432.050	*CW centre of activity*
432.150		
SSB and cw only	432.200	*SSB centre of activity*
	432.350	*Microwave talk-back*
432.500		
All modes non-channelized	432.600	*RTTY calling frequency*
	432.600 ±	*RTTY working (fsk)*
	432.675	*Data transmission calling frequency*
	432.700	*FAX calling frequency*
432.800		
Beacons		
433.000		
FM repeater outputs in UK only	433.000 RB0	
	433.025 RB1	
	433.050 RB2	
	433.075 RB3	
	433.100 RB4	
	433.125 RB5	
	433.150 RB6	
	433.175 RB7	
	433.200 RB8	
	433.225 RB9	
	433.250 RB10	
	433.275 RB11	
	433.300 RB12/SU12	*RTTY repeater and rtty afsk working*
	433.325 RB13	
	433.350 RB14	
	433.375 RB15	
433.400		
FM simplex channels	433.400 SU16	
	433.425 SU17	
	433.450 SU18	
	433.475 SU19	
	433.500 SU20	*FM calling channel*
	433.550 SU22	*Used for rally/ exhibition talk-in*
	433.600 SU24	*RTTY-afsk*
	433.700	*Raynet*
	433.725	*Raynet*
	433.750	*Raynet*
	433.775	*Raynet*
434.600		
FM repeater inputs in UK only	434.600 RB0	
	434.625 RB1	
	434.650 RB2	
	434.675 RB3	
	434.700 RB4	
	434.725 RB5	
	434.750 RB6	
	434.775 RB7	
	434.800 RB8	
	434.825 RB9	
	434.850 RB10	
	434.875 RB11	
	434.900 RB12	*RTTY repeater-afsk*
	434.925 RB13	
	434.950 RB14	
	434.975 RB15	
435.000		
	434 – 440	*ATV – frequencies chosen so as to avoid interference to other band users and, in particular, the amateur satellite service*
	435 – 438	*Amateur satellite service*
440.000		

Notes on UK 144MHz and 430MHz band plans

MS operation can take place up to 26kHz higher than the reference frequency (see RSGB *Amateur Radio Operating Manual* p80).

The beacon and satellite service must be kept free of normal communication transmissions to prevent interference with these services. († – 144.850MHz in use by Raynet until further notice, subject to 25W erp max and vertical polarization).

The use of the fm mode within the ssb/cw section and cw and ssb in the fm-only sector is not recommended.

Repeater stations are primarily intended as an aid for mobile working and they are not intended to be used for dx communication. FM stations wishing to work dx should use the all-mode section, taking care to avoid frequencies allocated for specific purposes.

From January 1987, 433.200MHz ceased to be a simplex channel and became a permanently designated repeater channel, RB8.

UK 50MHz band plan

50.000		
CW only	50.020 to 50.08	*Beacons*
50.100		
Narrowband modes	50.110	*Worldwide dx calling*
	50.200	*SSB activity centre*
	50.300 ±	*CW ms*
	50.350 ±	*SSB ms*
50.400		
All modes		
50.500		

UK 70MHz band plan

70.025		
Beacons only		
70.075		
CW only		
70.150		
SSB and cw only	70.200	*SSB calling frequency*
70.260		
All modes	70.260	*National mobile and calling frequency*
	70.300	*RTTY calling frequency*
	70.350 to 70.400	*Raynet*
70.400		
FM simplex only	70.450	*FM calling frequency*
70.500		

IARU Region 1 HF Band Plan

Band (MHz)		Type of emission
3.50—3.60	± 20kHz	cw (2)
3.60		rtty (1)
3.60—3.80		cw and phone (2, 3)
7.00—7.04	± 5kHz	cw
7.04		rtty (1)
7.04—7.10		cw and phone
10.100—10.150	± 5kHz	cw
10.145		rtty (1)
14.00—14.10	± 12·5kHz	cw
14.0875		rtty (1)
14.10—14.35		cw and phone
18.068—18.110	± 5kHz	cw
18.105		rtty (1)
18.110—18.168		cw and phone
21.00—21.15	± 20kHz	cw
21.10		rtty (1)
21.15—21.45		cw and phone
24.890—24.930	± 5kHz	cw
24.925		rtty (1)
24.930—24.990		cw and phone
28.00—28.20	± 50kHz	cw
28.10		rtty (1)
28.20—29.70		cw and phone

Notes

(1) For rtty, recommended section of operation shared with cw.
(2) 3,500-3,510 and 3,775-3,800kHz reserved for intercontinental working.
(3) 3,635-3,650kHz is used by USSR stations for intercontinental working.
(4) For sstv recommended operation frequencies are: 3,735, 7,040, 14,230, 21,340, 28,680kHz, all ± 5kHz.
(5) For beacons, 28·195-28.3MHz is recommended.
(6) For the downlink of amateur satellites, 29.3-29.55MHz is recommended
(7) The transmitter power on the 10MHz band should not exceed 250W mean output power, (NB: UK max carrier power is 20dBW).
(8) No contests should be organized on the 10MHz band.
(9) Credit for awards or diplomas should be accepted for contacts made on the 10MHz band.
(10) SSB may be used on the 10MHz band during emergencies involving the immediate safety of life and property, and only by stations actually involved in the handling of emergency traffic.
(11) Contest preferred segments for major contests: 3.5-3.56, 3.6-3.65, 3.7-3.8, 14-14.06, 14.125-14.3MHz.

UK 144MHz band plan

144.000		
CW only	144.000 to 144.025	*Moonbounce*
	144.050	*CW calling frequency*
	144.100	*MS cw reference frequency*
144.150		
SSB and cw only	144.250	*Used for GB2RS (ssb) and slow morse transmissions*
	144.260 ±	*Used by Raynet*
	144.300	*SSB calling frequency*
	144.400	*MS ssb reference frequency*
144.500		
All modes non-channelized	144.500	*SSTV calling frequency*
	144.600	*RTTY calling frequency*
	144.600 ±	*RTTY working (fsk)*
	144.650	*AX25 packet radio and experimental packet repeaters*
	144.675	*Data and packet radio*
	144.700	*FAX calling frequency*
	144.750	*ATV calling and talkback*
	144.775	*Raynet*
	144.800	*Raynet*
	144.825	*Raynet*
144.845		
Beacons	(144.850	*Raynet)*
144.990		
FM repeater inputs	145.000 R0	
	145.025 R1	
	145.050 R2	
	145.075 R3	
	145.100 R4	
	145.125 R5	
	145.150 R6	
	145.175 R7	
	145.275	*AX25 packet radio and experimental packet relay stations until end of 1987*
145.200		
FM simplex channels	145.200 S8	*Raynet*
	145.225 S9	*Used by Raynet*
	145.250 S10	*Used for slow morse tone modulated transmissions*
	145.275 S11	*RTTY afsk*
	145.300 S12	
	145.325 S13	
	145.350 S14	
	145.375 S15	
	145.400 S16	
	145.425 S17	
	145.450 S18	
	145.475 S19	
	145.500 S20	*FM calling channel*
	145.525 S21	*Used for GB2RS (fm) broadcast*
	145.550 S22	*Used for rally/ exhibition talk-in*
	145.575 S23	
145.600		
FM repeater outputs	145.600 R0	
	145.625 R1	
	145.650 R2	
	145.675 R3	
	145.700 R4	
	145.725 R5	
	145.750 R6	
	145.775 R7	
145.800		
Satellite service		
146.000		

UK 430-440MHz band plan

430.000		
	NB: 431-432MHz not available within 100km of Charing Cross, London.	
432.000		
CW only	432.000 to 432.025	*Moonbounce*
	432.050	*CW centre of activity*
432.150		
SSB and cw only	432.200	*SSB centre of activity*
	432.350	*Microwave talk-back*
432.500		
All modes non-channelized	432.600	*RTTY calling frequency*
	432.600 ±	*RTTY working (fsk)*
	432.675	*Data transmission calling frequency*
	432.700	*FAX calling frequency*
432.800		
Beacons		
433.000		
FM repeater outputs in UK only	433.000 RB0	
	433.025 RB1	
	433.050 RB2	
	433.075 RB3	
	433.100 RB4	
	433.125 RB5	
	433.150 RB6	
	433.175 RB7	
	433.200 RB8	
	433.225 RB9	
	433.250 RB10	
	433.275 RB11	
	433.300 RB12/SU12	*RTTY repeater and rtty afsk working*
	433.325 RB13	
	433.350 RB14	
	433.375 RB15	
433.400		
FM simplex channels	433.400 SU16	
	433.425 SU17	
	433.450 SU18	
	433.475 SU19	
	433.500 SU20	*FM calling channel*
	433.550 SU22	*Used for rally/ exhibition talk-in*
	433.600 SU24	*RTTY-afsk*
	433.700	*Raynet*
	433.725	*Raynet*
	433.750	*Raynet*
	433.775	*Raynet*
434.600		
FM repeater inputs in UK only	434.600 RB0	
	434.625 RB1	
	434.650 RB2	
	434.675 RB3	
	434.700 RB4	
	434.725 RB5	
	434.750 RB6	
	434.775 RB7	
	434.800 RB8	
	434.825 RB9	
	434.850 RB10	
	434.875 RB11	
	434.900 RB12	*RTTY repeater-afsk*
	434.925 RB13	
	434.950 RB14	
	434.975 RB15	
435.000		
	434 – 440	*ATV – frequencies chosen so as to avoid interference to other band users and, in particular, the amateur satellite service*
	435 – 438	*Amateur satellite service*
440.000		

Notes on UK 144MHz and 430MHz band plans

MS operation can take place up to 26kHz higher than the reference frequency (see RSGB *Amateur Radio Operating Manual* p80).

The beacon and satellite service must be kept free of normal communication transmissions to prevent interference with these services. († – 144.850MHz in use by Raynet until further notice, subject to 25W erp max and vertical polarization).

The use of the fm mode within the ssb/cw section and cw and ssb in the fm-only sector is not recommended.

Repeater stations are primarily intended as an aid for mobile working and they are not intended to be used for dx communication. FM stations wishing to work dx should use the all-mode section, taking care to avoid frequencies allocated for specific purposes.

From January 1987, 433.200MHz ceased to be a simplex channel and became a permanently designated repeater channel, RB8.

UK 50MHz band plan

50.000		
CW only	50.020 to 50.08	*Beacons*
50.100		
Narrowband modes	50.110	*Worldwide dx calling*
	50.200	*SSB activity centre*
	50.300 ±	*CW ms*
	50.350 ±	*SSB ms*
50.400		
All modes		
50.500		

UK 70MHz band plan

70.025		
Beacons only		
70.075		
CW only		
70.150		
SSB and cw only	70.200	*SSB calling frequency*
70.260		
All modes	70.260	*National mobile and calling frequency*
	70.300	*RTTY calling frequency*
	70.350 to 70.400	*Raynet*
70.400		
FM simplex only	70.450	*FM calling frequency*
70.500		

IARU Region 1 HF Band Plan

Band (MHz)		Type of emission
3.50—3.60	± 20kHz	cw (2)
3.60		rtty (1)
3.60—3.80		cw and phone (2, 3)
7.00—7.04	± 5kHz	cw
7.04		rtty (1)
7.04—7.10		cw and phone
10.100—10.150	± 5kHz	cw
10.145		rtty (1)
14.00—14.10	± 12·5kHz	cw
14.0875		rtty (1)
14.10—14.35		cw and phone
18.068—18.110	± 5kHz	cw
18.105		rtty (1)
18.110—18.168		cw and phone
21.00—21.15	± 20kHz	cw
21.10		rtty (1)
21.15—21.45		cw and phone
24.890—24.930	± 5kHz	cw
24.925		rtty (1)
24.930—24.990		cw and phone
28.00—28.20	± 50kHz	cw
28.10		rtty (1)
28.20—29.70		cw and phone

Notes

(1) For rtty, recommended section of operation shared with cw.
(2) 3,500-3,510 and 3,775-3,800kHz reserved for intercontinental working.
(3) 3,635-3,650kHz is used by USSR stations for intercontinental working.
(4) For sstv recommended operation frequencies are: 3,735, 7,040, 14,230, 21,340, 28,680kHz, all ± 5kHz.
(5) For beacons, 28·195-28.3MHz is recommended.
(6) For the downlink of amateur satellites, 29.3-29.55MHz is recommended
(7) The transmitter power on the 10MHz band should not exceed 250W mean output power, (NB: UK max carrier power is 20dBW).
(8) No contests should be organized on the 10MHz band.
(9) Credit for awards or diplomas should be accepted for contacts made on the 10MHz band.
(10) SSB may be used on the 10MHz band during emergencies involving the immediate safety of life and property, and only by stations actually involved in the handling of emergency traffic.
(11) Contest preferred segments for major contests: 3.5-3.56, 3.6-3.65, 3.7-3.8, 14-14.06, 14.125-14.3MHz.

used the site last year. If it is going to be used by another group, come to an amicable agreement before the event. Groups are advised to select possible alternative sites.

3. All transmitters generate unwanted signals; it is the level of these signals that matters. In operation from a good site, levels of spurious radiation which may be acceptable from a home station may well be found to be excessive by nearby stations (25 miles away or more).

4. Similarly, all receivers are prone to have spurious responses or to generate spurious signals in the presence of one or more strong signals, even if the incoming signals are of good quality. Such spurious responses may mislead an operator into believing that the incoming signal is at fault, when in fact the fault lies in his own receiver.

5. If at all possible, critically test both receiver and transmitter for these undesirable characteristics, preferably by air test with a near neighbour before the contest. In the case of transmitters, aim to keep all in-amateurband spurious radiations, including noise modulation, to a level of – 90dB relative to the wanted signal. Similarly, every effort should be made to ensure that the receiver has an adequate dynamic range.

6. Above all, be gentlemanly at all times. Be helpful and inform stations apparently radiating unwanted signals at troublesome levels—having first checked your own receiver! Try the effect of turning the antenna or inserting attenuators in the feedline; if the level of the spurious signal changes relative to the wanted signal, non-linear effects are occurring in the receiver. Some recent synthesized equipment has excessive local oscillator phase noise, which will manifest itself as an apparent splatter on strong signals, even if there is no overloading of the receiver front-end. Preamplifiers should always be switched out to avoid overload problems when checking transmissions. If you receive a complaint, perform tests to check for receiver overload, and try reducing drive levels and switching out linear amplifiers to determine a cure. Monitor your own signal "off air" if possible. Remember that many "linears" may not be linear at high power levels under field conditions with poorly regulated power supplies. The effects of overdriving will be more severe if speech processing is used, so pay particular attention to drive level adjustment.

If asked to close down by a Government official or the site owner, do so at once without objectionable behaviour.

General rules for RSGB hf contests 1987

The general rules for RSGB hf contests are given below and are to be read in conjunction with the specific rules for each particular contest, which may contain specific exceptions or additions to these general rules. International contest rules will contain the relevant sections of the general rules for the benefit of overseas entrants.

1. Entrants must operate in accordance with the terms of their licences.

2. Only one contact on each band may be claimed with a specific station, whether fixed, portable, mobile or alternative address. Each contact to be scored as per the rules of the particular contest. Points are deducted for errors in the logs. Duplicate contacts must be logged and clearly marked as duplicates without claim for points. Unmarked duplicates will be penalised at the rate of 10 times the number of points claimed and logs containing more than five such duplicates will normally be disqualified. Proof of contact may be required.

3. Unless otherwise stated, only single-operator entries will be accepted. A single operator station is one manned by an individual operator who receives no assistance whatsoever during the contest period.

4. When multi-operator entries are specifically allowed, such entries will be accepted only if:

(a) The declaration is signed by one operator, who will be regarded as the entrant, and

(b) The operator's callsign is given for each contact, or group of contacts.

5. Operators of stations located within the British Isles, ie within the call areas G, GD, GI, GJ, GM, GU and GW, must be fully paid-up members of the RSGB.

6. A contact consists of an exchange and an acknowledgement of an RS report on telephony or of an RST report on telegraphy, and a three-figure serial number commencing with 001 and increasing by one for each successive contact throughout the contest period, irrespective of the band or mode in use. In an accumulative type of contest, each session will recommence with 001. Serial numbers, when sent, must be recorded from non-competing stations. In order to preserve contest-free segments, contestants are recommended to operate only within the segments designated in the rules of each event.

7. Entries must be clearly written or typed on one side only of RSGB hf contest log sheets (Form HFC1) or international A4 size paper using blue or black ink. *Separate log sheets must be used for each band.* Logs must be kept and entries submitted in gmt. Computer derived logs will be accepted provided that they follow the same format as standard hf log sheets, with 40 entries on an A4 size page split into groups of 10 and having the same column spacings and headings as HFC1.

8. Each entry must include a cover/summary sheet (eg Form HFC2) incorporating a signed declaration.

9. Entries must be addressed to the adjudicator, whose address will appear in the specific rules for each contest, with the name of the contest marked in the top left hand corner. All entries must be postmarked not later than 15 days following the contest. If acknowledgement of receipt is required, British Isles entrants should include a stamped addressed postcard which will be returned to the sender. Overseas entries will not normally be acknowledged.

10. All entries become the property of the RSGB. In the event of any dispute, the ruling of the Council of the RSGB shall be final.

11. For scoring purposes, aeronautical mobile and maritime mobile stations will count only as the minimum score of the particular contest and not for any bonus or multiplier. Entries from GB stations, aeronautical mobile and maritime mobile stations will not be accepted.

12. Awards are made at the discretion of the Council of the RSGB and may consist of trophies, plaques or certificates.

13. Certificates of merit are normally sent to the three leading stations in each section of a contest.

14. Entrants may be disqualified for failure to observe the general rules or the specific rules.

15. The practice of pre-arranging contest contacts with specific stations before the start of the event is considered not to be in the spirit of the contest. Proof of this taking place may result in disqualification.

16. Small quantities of RSGB hf contest log sheets (Form HFC1) and cover/summary sheets (Form HFC2) may be obtained from RSGB HQ on receipt of a large stamped addressed envelope. Larger quantities may be purchased.

General rules for RSGB hf receiving contests 1986

1. To claim points, a station may be logged once only on each band whether fixed, portable, mobile, or alternative address.

2. A receiving station log must show in columns: date/time (gmt), callsign of station heard, report and serial number sent by station heard, callsign of station being worked, bonus points, total points. The band in use must be shown at the top of each log sheet.

3. A cover/summary sheet (eg Form HFC2) must be submitted with the logs. The signed declaration must include the words "I certify that I do not hold a Class A transmitting licence".

4. The following rules from the transmitting general rules also apply to receiving contests: 3, 5, 7, 9, 10, 11, 12, 13, 14 and 16.

Code letters for use in RSGB contests

County/Region	Letters
Alderney	ALD
Antrim	ATM
Armagh	ARM
Avon	AVN
Bedfordshire	BFD
Berkshire	BRK
Borders	BDS
Buckinghamshire	BKS
Cambridgeshire	CBE
Central	CTR
Cheshire	CHS
Cleveland	CVE
Clwyd	CWD
Cornwall	CNL
Cumbria	CBA
Derbyshire	DYS
Devon	DVN
Dorset	DOR
Down	DWN
Dumfries & Galloway	DGL
Durham	DHM
Dyfed	DFD
Essex	ESX
Fermagh	FMH
Fife	FFE
Mid Glamorgan	GNM
South Glamorgan	GNS
West Glamorgan	GNW
Gloucestershire	GLR
Grampian	GRN
Guernsey	GUR
Gwent	GWT
Gwynedd	GDD
Hampshire	HPH
Hereford & Worcester	HWR
Hertfordshire	HFD
Highlands	HLD
Humberside	HBS
Isle of Man	IOM
Isles of Scilly	IOS
Isle of Wight	IOW
Jersey	JER
Kent	KNT
Lancashire	LNH
Leicestershire	LEC
Lincolnshire	LCN
Greater London	LDN
Londonderry	LDR
Lothian	LTH
Greater Manchester	MCH
Merseyside	MSY
Norfolk	NOR
Northamptonshire	NHM
Northumberland	NLD
Nottinghamshire	NOT
Orkney	OKE
Oxfordshire	OFE
Powys	PWS
Shropshire*	SPE
Sark	SRK
Shetland	SLD
Somerset	SOM
Staffordshire	SFD
Strathclyde	SCD
Suffolk	SFK
Surrey	SRY
East Sussex	SXE
West Sussex	SXW
Tayside	TYS
Tyne & Wear	TWR
Tyrone	TYR
Warwickshire	WKS
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West Midlands	WMD
Wiltshire	WLT
North Yorkshire	YSN
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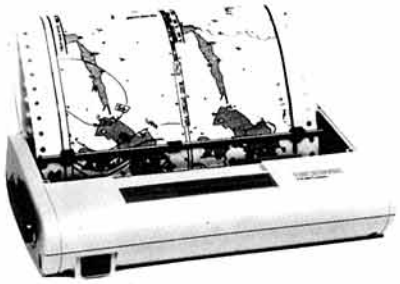

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