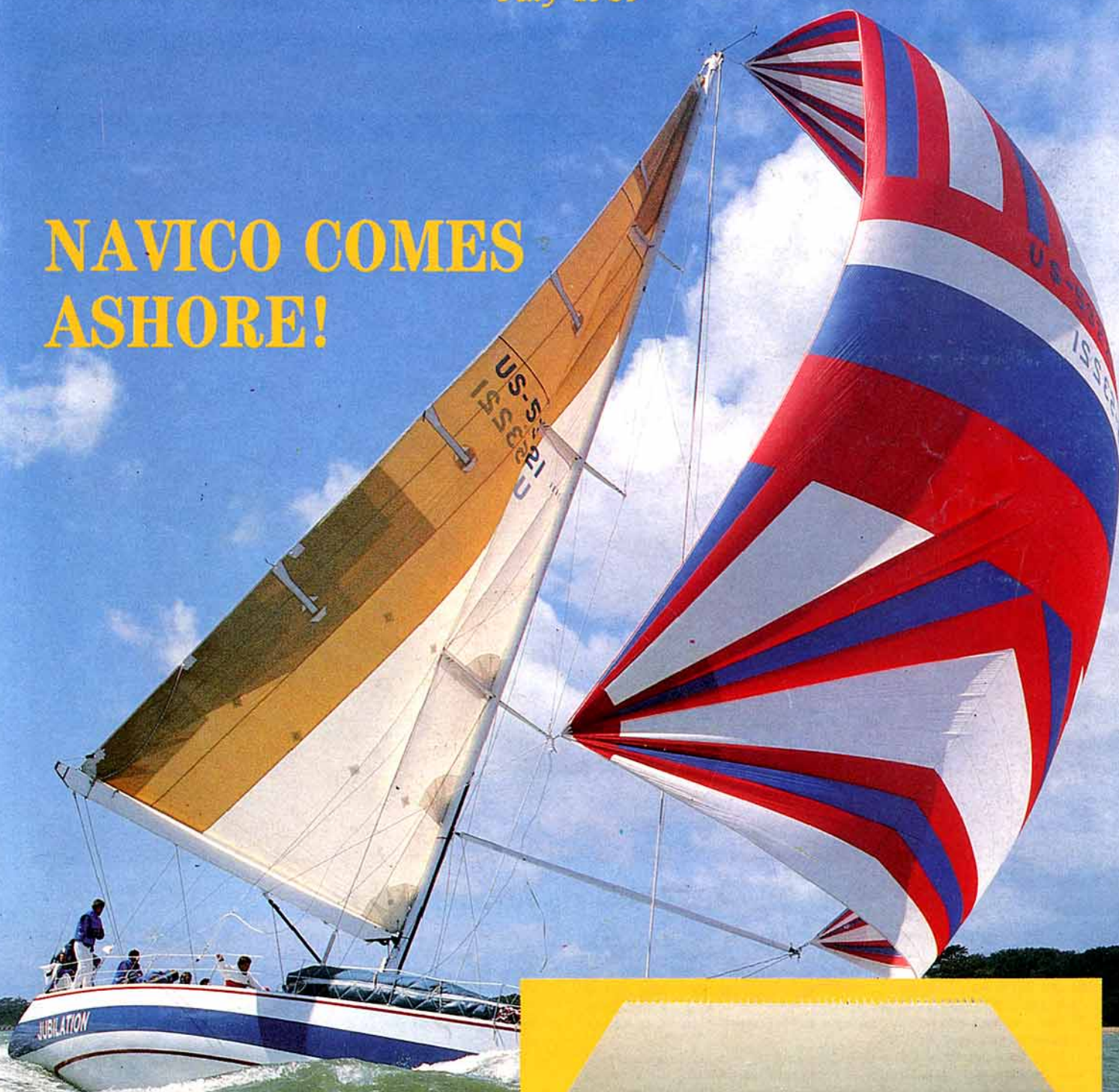


# Radio Communication

July 1989

**NAVICO COMES  
ASHORE!**



**Marine derived, UK made  
— the AMR1000S reviewed**





# KENWOOD



## TS-440S – The rig for all reasons

Successor to the highly acclaimed TS-430S, the TS-440S is designed to be the all purpose HF transceiver for the man on the move. Small enough to carry around, yet with all the performance of its big brother TS-940S, the TS-440S is perfect for today's fast moving methods of communications. Unseen advantages such as 100% duty cycle transmit and fast receive/transmit change over times make the TS-440S the ideal packet radio transceiver, and of course with full BK it's at home in demanding CW contests as well.

Shown here with the matching PS-50 power supply, you can get some idea of how attractive your station could be ... I can't guarantee the availability of Kenwood coffee mugs, but microphones and headphones are no problem.

As bands become more crowded and the sunspot cycle staggers upward, the receiver performance of any transceiver will become more and more important. The TS-440S is reckoned to be one of the best in this respect, and reviewers everywhere have commented on the sheer ability of the TS-440S to dig out weak signals on crowded bands. The performance is equally impressive across the full receiver coverage of 100kHz to 30MHz (actually it tunes down to 30kHz if you want to do some exotic listening).

The TS-440S also demonstrates that Kenwood skill in matching performance to ease of use, and when you sit down at one of our branches and try out the rig on the air, you will certainly see why thousands of operators world wide have decided that the TS-440S is that "Rig for all reasons".

For more details, simply send a large stamped addressed envelope to Matlock head office, and request the 8 page colour brochure on the TS-440S. It is worth reading.

TS-440S £1138

## LOWE ELECTRONICS LTD.

Chesterfield Road, Matlock, Derbyshire DE4 5LE

Telephone 0629 580800 (4 lines)

**Sole Appointed UK Distributor for KENWOOD Amateur Radio**

**Editor**  
Trevor Preece, G3TRP

**Deputy Editor**  
David Bobbett, G4IRQ

**News Editor**  
David Gough, G6EFQ

**Design**  
Linda Penny

**Draughtsman**  
Derek Cole

**Editorial Secretary**  
Marcia Brimson

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

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

Tel (Editorial): 0707 59015  
Tel (GB2RS late changes):  
0707 59260  
E-mail (Telecom Gold):  
76:MSX020  
Prestel Page 8107

Reports for *Spectrum Analysis* should be sent to the Band Editors:

**HF**  
John Allaway, G3FKM, 10 Knightlow Road, Birmingham B17 8QB

**VHF/UHF**  
Norman Fitch, G3FPK, 40 Eskdale Gardens, Purley, Surrey CR2 1EZ (Telecom Gold 76:MSX022)

**SWL**  
Bob Treacher, 93 Elibank Road, Eltham, London SE9 1QJ

**MICROWAVES**  
Mike Dixon, G3PFR, Woodstock, Gazebank, Norley, Warrington, Cheshire WA6 8LL

#### ADVERTISING

Advertisements (not Members' Ads) should be sent to:

**M J Hawkins, G3ZNI**  
RSGB Advertisement Agent,  
The Business Workshop Ltd  
Design House  
Junction Road,  
Dorking, Surrey RH4 3HB  
Tel: 0306 740010  
Fax: 0306 740899

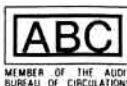
*Radio Communication* is published by the Radio Society of Great Britain as its official journal on the last Friday of the previous month and is sent free and post paid to all members of the Society.

Closing date for contributions, unless otherwise notified, is five weeks prior to publication date

© Radio Society of Great Britain 1989

Filmset by JJ Typographics Ltd,  
Cottis House, Locks Hill, Rochford,  
Essex. SS4 1BX

Printed by Mayhew McCrimmon  
Printers Ltd, Units 1-4 Star Lane  
Industrial Estate, Great Wakering,  
Essex. SS3 0PJ.



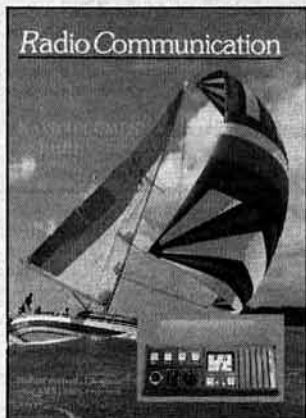
36,070 copies per  
issue average  
circulation in 1987

# Radio Communication

VOLUME 65 No 7

JULY 1989

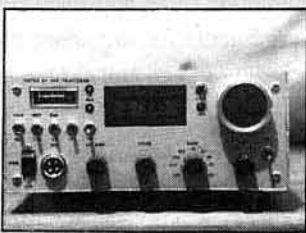
## CONTENTS



**Main Photo:** The yacht 'Jubilation' in full sail, reflects the marine radio heritage of the Navico AMR1000S, reviewed this month (p58).



**Hazel Murray from Capital Radio** interviewing Andrew Keeble during a recent visit (p7).



**The G3TSO transceiver, this month a successful constructor gives handy hints for building this homebrew project (p40).**

### 4 SOCIETY AFFAIRS

The long term benefits of the newly de-restricted 18 and 24MHz bands

### 7 NEWS

18 and 24MHz band details • Greece gets 50MHz • Esperanto and Amateur radio • 2m channel spacing survey • 1988 VHF Contest Awards • Slow Morse

### 15 RADCOM/SERENITY HOLIDAYS COMPETITION — PART 2

The second set of clues and locations which could win you a DX holiday

### 16 PROJECT YEAR

Your last chance to nominate a candidate to be Young Amateur of the Year

### 19 SPECIAL FEATURE — WORKING THE 18 & 24MHZ BANDS

Why not read our getting-going guide on 18 & 24 MHz

### 21 SPECTRUM ANALYSIS

- 21 • HF
- 22 • HF Propagation Predictions
- 23 • VHF/UHF
- 26 • SWL

### 35 TECHNICAL TOPICS

Line Matching Unit • Over Voltage, Over Current Protection • Updated 50MHz Valve Amplifier • Economical PSUs • Fast Switching Power FETs

### 40 HOMEBREW HINTS FOR THE G3TSO TRANSCEIVER

By one who has successfully trodden the G3TSO path to homebrew

### 42 CW FILTER FOR THE RC14

A simple, add-on project for the RSGB beginners receiver

### 46 RSGB MAIL ORDER PUBLICATIONS

### 49 TESTING THE UNTESTED

A useful project for selecting SL600 surplus ICs

### 51 SPORADIC E — PART 3

Theory meets practice in this analysis of the 1987 Es season

### 55 IN PRACTICE

An introductory series for the practically inclined

### 58 NAVICO AMR1000S REVIEW

British 2m mobile manufacturers were conspicuous by their absence up until now — we test the lone UK contender

### 67 COLUMNS

- DATACOMMS Amtor, RTTY and Packet News, 9600Baud tests
- SATELLITES Oscar and UoSat, Pakistan downlink problems
- QRP Argonaut II launch and new beginners receiver
- MICROWAVES New 1.3GHz beacons news, micro-wave activity

### 76 CONTEST NEWS AND RESULTS

Contests Calendar

### 84 MEMBERS' ADS

### 86 HELPLINES

W6HPH corrections

### 87 DIARIES AND DATES

Mobile Rallies, GB Calls and Club Diary

### 89 OBITUARIES

### 90 THE LAST WORD



# RADIO SOCIETY OF GREAT BRITAIN

THE NATIONAL SOCIETY WHICH REPRESENTS UK RADIO AMATEURS

Founded 1913. Incorporated 1926. Limited by guarantee.  
Member society of the International Amateur Radio Union

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

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

Headquarters and registered office:  
**Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE**  
Telex 9312 130923 (RSGB)  
Electronic mail via Dialcom/Telecom Gold: 87: CQQ083  
Telephone: 0707 59015. Fax: 0707 45105

**Secretary and Chief Executive: David Evans, G3OUF**

## COUNCIL OF THE SOCIETY

**PRESIDENT:** J Gannaway, G3YGF  
**EXECUTIVE VICE-PRESIDENT:** F D Hall, GM8BZX  
**IMMEDIATE PAST-PRESIDENT:**  
Sir Richard Davies, KCVO, CBE, CEng, FIEE, G2XM  
**HONORARY TREASURER:** B O'Brien, ACIB, G2AMV

## ORDINARY MEMBERS OF COUNCIL

E J Allaway, MB, ChB, MRCS, LRCP, G3FKM  
N G Brinkworth, G3UFB  
Mrs M H Clayton-Smith, G4JKS  
G R Jessop, CEng, MIEE, G6JP  
A McKenzie, MBE, CEng, FIEE, FAES, G3OSS  
N F O'Brien, FAI, FSCA, ACIS, MIM, G3LP  
F S G Rose, G2DRT  
G L Benbow, Msc, CEng, MIEE, G3HB

## ZONAL MEMBERS OF COUNCIL

**Zone A** G R Smith, BSc, MISTC, MBIM, G4AJJ  
**Zone B** J Allen, G3DOT  
**Zone C** J Greenwell, AMIEE, G3AEZ  
**Zone D** P E Chadwick, G3RZP  
**Zone E** E J Case, GW4HWR  
**Zone F** J T Barnes, G3UUS  
**Zone G** F Hall, GM8BZX

## HONORARY OFFICERS

**Audio Visual Library co-ordinator:** R G Auckland, G2PA  
**Awards managers:** HF: S Emlyn-Jones, GW4BKG;  
VHF: Ian L Cornes, G4OUT  
**Chief morse test examiner:** A N Ianson, G3GDO  
**HF manager:** E J Allaway, G3FKM  
**Microwave manager:** C W Suckling, G3WDG  
**Trophies manager:** Mrs M H Clayton-Smith, G4JKS  
**VHF manager:** K A M Fisher, G3WSN

Correspondence to honorary officers should be addressed directly to them (QTH), not to RSGB HQ

## ANNUAL SUBSCRIPTION RATES

Once-off joining fee: £1.50

**Corporate members: UK and overseas (Radio Communication by accelerated surface post): £20.50**

**UK associate member under 18: £6.95. Family member: £8.20**

**UK students over 18 and under 25: £10.45** (Applications should give applicant's age at last renewal date and include evidence of student status)

**Affiliated club or society/registered group (UK): £20.50** (including Radio Communication): £12.30 (excluding Radio Communication) (Subscriptions include VAT where applicable)

Membership application forms available from RSGB HQ

## RSGB Legacy Trust

This note is intended for those who might now, or at some time in the future, be making a Will and who are considering bequeathing money to the Society.

Article numbered 4 of the Society's Memorandum of Association states, amongst other things, that "the income and property of the Society shall be applied exclusively to the foregoing objects and no dividend shall be paid to its members". Examination of the earlier paragraphs will confirm that, apart from the exceptions in No. 4

(ie interest on money lent, rent of premises or work of a literary nature) no benefit can be passed to members in the form of cash or its equivalent.

Should money be bequeathed specifically to the Society it must therefore be used in the running of the organisation or in the purchase of a Society asset. Because of this, problems have arisen when monies have been bequeathed specifically to "RSGB" but with a proviso that they must be used for a certain category of member (eg incapacitated in some way or other).

To avoid future difficulty, RSGB has now established a Legacy

## NEWS EDITOR

The Radio Society of Great Britain requires a News Editor for its monthly magazine "Radio Communication" and weekly on-air news broadcasts. Familiarity with the technical hobby of Amateur Radio, plus the ability to recognise a good story, follow up leads and write to fit are necessary qualifications. Some experience of working with modern 'electronic' production and office communications equipment would also be highly desirable; the RSGB's publications are moving rapidly towards desk-top publishing.

It is a staff position within a small, enthusiastic new team, operating from offices in Potters Bar. Salary is negotiable, according to experience and age.

## EDITORIAL ASSISTANT

A new position arises in "Radio Communication's" editorial team for an editorial assistant. He or she is required for sub-editing and keying copy, transmitting it to typesetters, proof-reading galleys/pages and liaising with regular contributors. Some publishing experience and/or successful completing of an approved course in publishing are basic requirements for intending applicants. Salary will be set according to age and experience.

*Please apply in writing, enclosing a CV, to the Editor, Radio Communication, Radio Society of Great Britain, Lambda House, Cranborne Road, Potters Bar, Herts. EN6 3JE. Please mark the envelope "Editorial Vacancies. Private and Confidential."*



## Help wanted with QSL Pile-up

In recent months more QSL cards than ever have reached the QSL Bureau from overseas national societies as a result of increasing band activity. As a result, although our two bureau staff are sorting these cards as fast as they can, they are nevertheless overloaded by the sheer volume at present. Thus we need more help.

To combat this QSL overload problem we have set up a special sorting room at HQ and we are

asking for volunteers to come and help with the back-log. If you are able to help, please let us know immediately by post, writing 'QSL/DS' on the front of your envelope and enclosing details of a day-time telephone number where you may be reached.

The RSGB and its members would greatly appreciate any help which is offered in getting our QSL mountain down to manageable proportions.

## 18 and 24MHz - THE LONG TERM BENEFITS

Behind the full release of the 18 and 24MHz bands to the amateur service this month lies a success story which started some 14 years ago.

Over 160 countries are now members of the ITU (International Telecommunications Union), which is based in Geneva, Switzerland. Every 20 years or so there is a major conference to look at frequency allocations for all the numerous users of the radio spectrum and the ITU undertakes the co-ordination of such work as an agency of the United Nations. Apart from the Amateur Service there are 36 other services which include some of the more well-known ones such as the Fixed Service, Mobile Service, Aeronautical Mobile Service, Broadcasting Service, Radio Location Service, and the Broadcasting Satellite Service, to name but six of them. Many of the radio services could do with more spectrum space and as the desires and aspirations of the people in all of the countries of the world change, so do their requirements for frequencies.

There are many major factors which influence the political and commercial pressures on the radio spectrum. For example, when there are problems launching communications satellites, many governments and organisations again turn their eyes to the HF spectrum so as to meet their communication requirements. With such global pressures at work, it is perhaps quite surprising that the amateur service has any bands at all. The fact that we do is because of the high reputation of radio amateurs for international goodwill and public service - especially for their technical achievements and during times of need.

At the last major ITU conference in Geneva in 1979 (The World Administrative Radio Conference), the amateur services gained, in principle, 3 new HF bands and many new microwave bands. This success, for it was a great success, was due to the efforts of links together all of the national societies. The 1979 success in winning new allocations was also due to the IARU Observer Team which spent 3 months in Geneva. It countered every move which was considered to be negative and put forward every positive aspect of amateur radio for its benefit. In fact, the RSGB was one of 8 countries which actually transferred to other frequencies. Ten years later these bands have been fully allocated to the Amateur Service as from 1 July 1989. Ten years might seem a long time to have waited, but such are the complexities of global frequency management.

It might also be worth recording that in the UK, prior to 1979, the seeds had been sown by the RSGB for the release of the 50MHz band to all UK amateurs in 1988. Again, a long wait perhaps, but all credit to the Society for its patience and determination for wanting to use the fascinating 50MHz band.

Now some excellent planning work, started some 14 years ago, has finally reached fruition in the shape of the full release of the 18 and 24MHz bands. The moral of this story is a simple one and it concerns good long-term planning, faith in the future, and patience. As one of the leading national societies in the next major ITU Conference in 1992. It also recognises the dangers in not recruiting new amateurs who will carry forward the fine traditions of amateur radio into the future.

The year 1999 might seem a long way off but what the RSGB does now in its Project YEAR initiative will determine the status of amateur radio ten years from now. It is well worth reflecting on how you could make a positive contribution to the future of amateur radio, by assisting the Society in its work.

David Evans, G3OUF

Trust — the Deed of which gives the Trustees power to use for charitable purposes, in so far as our members are concerned, any money left specifically to the Trust.

Would-be benefactors should therefore, when making a will, consider their intentions. If "RSGB" is specified, the legacy would be used for the running of the organisation etc. If "The Legacy Trust" is specified then the money may be used for the benefit of members as may or may not be detailed in the Will.

## Committee changes

Dan Bernard, G4RLE, has resigned as Chairman of the EMC Committee. His successor is Ian Dearlove, G1WZZ, and EMC queries should now be directed to him. On the subject of EMC, by the way, we've introduced a new service as of 5 June. You can now raise any EMC-related queries on a 24-hour telephone number — 0329 239644. It'll have an answerphone on it some of the time, but all enquiries will be dealt with promptly.

Council has confirmed the appointment of John Bazley, G3HCT, as the new Chairman of the Licensing Advisory Committee. Dr JN Gannaway, G3YGF, will remain involved with the Committee and will probably take over the Chairmanship next year following his term of office as the Society's President.

## Terms of reference for the Scottish VHF NFD trophies

### The Tartan Trophy

Recently there has been some confusion over the terms of reference for the Tartan Trophy. This trophy is awarded to the leading GM station in VHF NFD. However, what constitutes a 'GM

station' has become rather blurred over the years. After a great deal of digging I have unearthed the original terms of reference for this trophy. It states that all members of the operating team must be resident in Scotland and have been so for at least 6 months prior to the event. Clearly over the past few years not all operators have been Scottish residents.

As from this year's VHF NFD the residency clause will operate in respect of the Tartan Trophy. When the green book is updated, the residency clause will be included.

### The Scottish Trophy

The Scottish Trophy has different terms of reference. It is awarded to the leading GM in the restricted section of VHF NFD. In this case GM means 'all comers' activating the GM prefix, no matter where they are resident. I hope this sets the record straight.

G4JKS — *Trophies Manager*

## Scottish trophies

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

Nominations for each of the trophies, along with citations, are required from at least five RSGB members resident in Scotland, who should send them to their respective RLO by 15 August 1989. To be eligible for the awards, the member, or group of members, shall have been resident in Scotland for the period for which the award is made.

In the event of no nominations being received, the trophies shall pass to the zonal manager for safe keeping until nominations are called for in 1990.

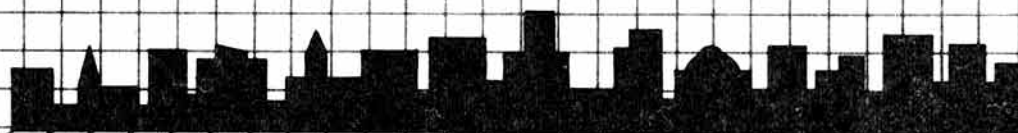


**L.A. Moxon, G6XN**



# **hf antennas**

*for all locations*



HF ANTENNAS FOR ALL LOCATIONS by Les Moxon, G6XN, is renowned worldwide as probably the most in depth look at practical amateur radio hf antennas available. Sometimes controversial, but always helpful and encouraging to the experimenter, the author guides the reader through the theory of hf antennas with the minimum of headaches. The book is not just theory however. Many practical designs are given, a large proportion of which are completely unique to this book. Whether you throw a piece of wire out of an upstairs window, or have four elements on 7MHz you cannot fail to be fascinated by this book.

HF Antennas for All Locations costs £6.15 to RSGB members by post.



# 18 and 24MHz bands released to amateur service on 1 July

Headquarters just before we went to press, the Department of Trade and Industry confirmed that the 18 and 24MHz bands would be fully released to the UK amateur service as of 1 July. A Gazette Notice was apparently in the pipeline but not available by press time — we expect to bring you the text of it next month. SSB and CW power limits will be the standard UK HF ones, to wit 26dBW SSB and 20dBW CW, and antenna restrictions will disappear. All models will be permitted, and our status will be

primary.

So by the time you read this, we'll have two extremely interesting HF bands of our very own. It's great that we'll have a chance to start using them before the Cycle 22 peak — they should be extremely interesting bands to be on, and certainly it's been most frustrating to hear loud DX stations on SSB without being able to work them!

This seems the right time to mention that there is an internationally agreed band plan in Region 1 for both bands, which of

course the Society supports. With the restricted access we had before it was irrelevant; however, we should now abide by its terms. The bandplan looks like this:

*18.068-18.100MHz CW only  
18.100-18.110MHz CW and RTTY  
18.110-18.168MHz CW and phone  
24.890-24.920MHz CW only  
24.920-24.930MHz CW and RTTY  
24.930-24.990MHz CW and phone*

More next month. In the meantime see our special feature on page 19.



On 31st May, RSGB Headquarters was visited by Hazel Murray, a reporter from Capital Radio, one of the London based independent local radio stations. Ms Murray was shown around headquarters by Chief Executive David Evans before being introduced to a variety of aspects of amateur radio.

Brett Rider, book manager and staff member of the RAYNET liaison committee demonstrated RAYNET procedures with the assistance of Chris Rutt, G0AMG. Later, a demonstration of HF operating techniques was provided

by Jim Smith, G3HJF, of the membership services department. Hazel, Capital Radio's 'Flying Eye', also met Andrew Keeble, Young Amateur of the Year 1988 and is seen here interviewing him in the GB3RS radio room.

At the time of writing a precise transmission date for the news feature was yet to be set but it was anticipated that this would take place in the latter part of June. With a potential audience of several million listeners, the visit should prove invaluable in putting both the RSGB and Project YEAR firmly on the map.

## NEWS & REPORTS

### Greece gets 50MHz

In a letter dated 9 May 1989 — received just after the June issue had been 'put to bed' the Radio Amateur Association of Greece announced that the first eight experimental 50MHz licences had been issued to Greek amateurs as from 27 April 1989, on a secondary, non-interference basis.

The total number of 50MHz licences will be limited to approx 25 for the first year. They will be provisional and will be renewable each year. For the time being, these licences will be valid for the Attica Prefecture only, that is, in and around Athens.

The permitted bandwidth is 2MHz (50-52MHz) and all narrow-band modes, including data transmission will be permitted with the exception of FM phone, which is permitted only in the event of emergencies. The permitted power is 25 watts average, measured at the output of the transmitter, and there are no restrictions on the polarisation, height or gain of antennas. Mobile, repeater and link station are not permitted.

The licensees are required to submit regular reports, every two months, to the licensing authority on the results of their experimental activity in the 50MHz band. As of Monday 22 May, the first sixteen Greek stations licensed for 50MHz were: SV1AB, SV1IW, SV1DC, SV0BY, SV1OE, SV1EN, SV1DH, SV1UN, SV1JA, SV1PL, SV0BS, SV1NN, SV1VS, SV1IO, SV1AIN and SV1AN.

### DTI agrees to provide more info for Call Books

In a press release dated 25 May, the Department of Trade and Industry announced that it would be supplying publishers of Call Books — as far as we know that currently only means the RSGB — with the first two letters of the postcode of those amateurs whose full details are not already given. The DTI said that their privacy would be protected since the information released would only indicate a broad area equivalent to a county or major conurbation.



# Esperanto and Amateur Radio

Britain will host the 1989 International Conference of Esperanto at the Brighton Conference Centre between 29 July and 5 August; it's hoped to establish an amateur radio special event station, callsign GB0UKE, at the centre during the conference. The station will be run by the International League of Esperantist Radio Amateurs (ILERA), who hope to make contact with fellow members around the world using Esperanto. Other languages, including English, will also be used where appropriate. ILERA nets operate regularly in the amateur

bands in all countries, despite the fact that English is generally used as the international language of communication.

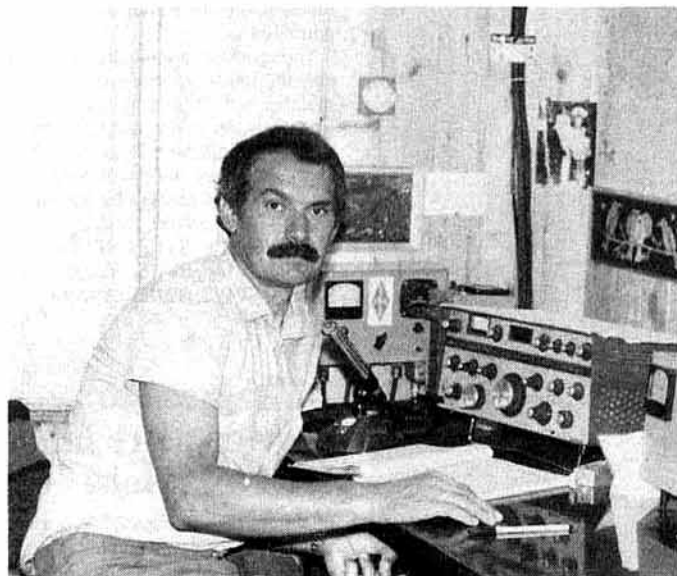
Readers who are interested in helping to set up and/or operate the station should contact: **Barry Foreman, G0EXS, 10 Wilmington Close, Brithon BN1 8JE, tel 0273 502272**

*General information about Esperanto, including details of text books and courses, can be obtained from: The Esperanto Association of Great Britain, 140 Holland Park Avenue, LONDON W11 4UF.*

## Over-size QSL Cards

The RSGB's QSL Bureau Manager Ted Allen, G3DRN, has written to say that he's recently received about 100 QSL cards in respect of contacts made in 1987 with the special station SY1UA, which was run by the Athens University. Unfortunately, these cards measure

14"x9" and cannot be delivered through the usual channels without what Ted called "...brutal folding". If you are one of those waiting for a card from SY1UA, please send a large stiff stamped addressed envelope to Ted, who will return your card forthwith. Might be a good move to brief your postman not to push it through the letter box! So much for following the 5 1/2 x 3 1/2" recommendation!



## Glasnost in Horsham

Stan, RB5JZ, and his wife Svetlana arrived in England on 2 June to stay with Al, G3FXB, and his wife Maud. This is believed to be one of the first private visits arranged via amateur radio since the adoption of the "glasnost" policy by the Soviet authorities.

In keeping with the spirit of international co-operation, the DTI - in collaboration with the RSGB - has granted special permission for RB5JZ to operate G3FXB's station. Keen contesters will know Stan as a founder member of UK5MAF.

## You're nicked, mate

"To while away the boredom of unemployment, a Sanderstead radio communications engineer built himself a radio transmitter and happily chatted away to other operators in Europe. But the short wave band Kenneth Holwill was using was supposed to be restricted to aeronautical use and his activities were therefore illegal, magistrates heard this week". So quoth a press release from the Croydon News Agency, which added that Holwill was fined £200 with costs of £100.

More seriously, in a similar case one Derek Arthur - a car sprayer from Mitchley Hill, Sanderstead, who holds the amateur callsign G0DLN - was also hit for £200-plus-£100. Arthur denied that he had been interfering with aeronautical transmissions; "I use too low a power", he said. Arthur claimed that the 6.67MHz band was anyway never used for aeronautical purposes, saying that "It has been used by radio pirates for years. I have never heard any aeronautical transmissions on this part of the band. I believe the real reason for prosecutions such as this is that the Government wants to sell off this part of the frequency spectrum for commercial purposes and have given orders for the pirates to be cleared off".

Both Holwill and Arthur had their radio equipment confiscated.

## GB2SPT — for a pier without peer

Over the weekend of 5/6 August, Southend Borough Council will be celebrating the centenary of its pier - "The Longest Pleasure Pier in the World". As part of the celebrations, the Southend & DARS has been invited to man a special event station. The Borough Council has been very supportive of amateur radio over the years, and the Southend & DARS ran a similar station for the official re-opening of the Southend Pier Trains by HRH The Princess Royal, as well as during the annual Spring Festival. Actually the history of co-operation goes back to the 1920s, when the club was first formed.

On this occasion the station will be located at the end of the pier. This is about a mile out to sea, but the station is still considered to be land-based! Contact with other towns in Great Britain and Europe

which boast pleasure piers will be particularly welcome during the weekend's activities. The festivities will be along Victorian lines - there'll be barrel and steam organs, brass bands, old-style pier entertainers and a balloon race using several thousand balloons. GB2SPT will be active between 11am and 5pm on Saturday 5 August and between 9am and 5pm on Sunday 6 August on or around the following frequencies according to band conditions on the day:

80m - 3750kHz  
40m - 7075kHz  
20m - 14.200MHz

A special QSL will be sent for all contacts and further details can be obtained from Brian Wood (G4RDS) on 0702 232322.

## Helping the blind

Licensed radio amateurs, not to mention knowledgeable SWLs, are in a unique position to be able to help those who cannot see, and the Royal National Institute for the Blind (RNIB) needs more of our assistance. Many blind folk use the "Talking Book Service" which relies on cassette-type tape players; something over 64,000 blind readers (4200 of which are over 90 and an astonishing 130-odd over 100) receive assistance and guidance from over 3800 volunteer technical helpers. However, the RNIB urgently needs more volunteers, initially to do nothing more demanding than fit a plug and show the blind recipient how their new box works and then to carry out some maintenance if necessary. There's a full technical back-up service available to volunteers, with circuit diagrams and full technical details available plus telephone support if required. The workload doesn't generally exceed more than a couple of evenings per month.

The RNIB currently badly needs help in the following areas: Isle of Wight, Sunderland, Gateshead, Morpeth, Alnwick, Newbiggin-by-the-Sea, Berwick-upon-Tweed, Dudley, West Bromwich, Brecon, Derby City, Dagenham, Barking, Grays, Ramsgate, Dover, Faversham, Isle of Sheppey, Chumleigh, Lynton, Okehampton and the following London postal districts: SW8, SW11, SW12, SW19, SE4, SE5, SE14, SE17, SE20, SE22, NW4, NW5, NW6, NW8, NW9, W2.

So come on, folks - the RNIB have been relying on us for 42 years and we can't let them down now. If you can help, write to:

**D Finlay-Maxwell, c/o J Gladstone & Co Ltd, Wellington Mills, HUDDERSFIELD HD3 3HJ.**

## 144MHz CHANNEL SPACING SURVEY

Please help to shape the 144MHz of the future by spending a couple of minutes answering the following questions. To answer the questions, please tick the most appropriate boxes. Any additional comments can be made overleaf.

On average, how active are you on 144MHz FM?

Daily	Weekly	Rarely/ never
-------	--------	------------------

What is the average density of 144MHz Amateurs in your area?

High	Medium	Low
------	--------	-----

Do you regularly monitor a locally used channel?

Rarely/ never	Sometimes	Often
------------------	-----------	-------

Bearing in mind your personal level of activity, how often do you hear 2 or more conversations/repeaters on the same frequency?

Rarely/ never	Sometimes	Often
------------------	-----------	-------

Would you be prepared to spend money upgrading your equipment if it meant less congestion?

No	Maybe	Yes
----	-------	-----

Should 144MHz FM be re-channelised to a 12.5kHz standard?

No	Don't care	Yes
----	---------------	-----

Thank you for your time and effort. Your survey form should now be posted into the box on the RSGB Membership Services stand (ground floor), or at the VHF Committee stand (first floor).

Steve White, G3ZVW.  
VHF Committee.

## Channel spacing on 144MHz

You might recall that last year we published an article by Angus McKenzie, G3OSS, on channel spacing in the 144MHz band. The Society's VHF Committee is currently pondering the matter of future channel spacing in this band and conducted a questionnaire-

based survey on this topic at this year's VHF Convention. They'd now like to broaden their database, as it were, and would greatly appreciate it if all members active on 144 MHz would take part.

On this page we've re-printed the text of the questionnaire. You could

either photocopy the page and tick the boxes or - if it's easier - fill in the answers on the back of a postcard. Either way, please send your input to:

Steve White, G3ZVW, "Ian Lodge"  
Stonard Road, Palmers Green,  
LONDON N13 4DJ.

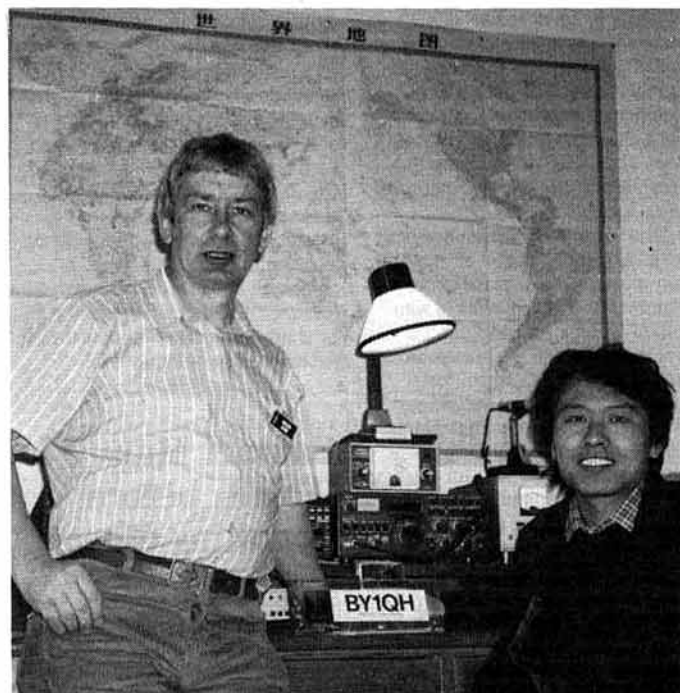
He will be exceedingly pleased to hear from you.

## Flannan Islands on the air

Six members of the Cambridge University Wireless Society will be afloat on the yacht 'Annag' in the Outer Hebrides between 8-15 July. They hope to be active from the Flannan Islands (a new one for the RSGB's Islands on the Air Award) and from St.Kilda. The exact dates (and indeed the possibilities of any operation at all) are dependent on good weather conditions but the group hopes to be on the Flannans between 9-11 July, using the callsign GB0FLA, and on St.Kilda between 12-14 July, using the callsign GB0SK. GM6UW/P may also be used. Some low-power 50 and 144MHz equipment may be taken but contact will probably only be possible with good openings such as sporadic E or aurora. The main activity will centre on the following frequencies, plus or minus QRM:

3760kHz  
7060kHz  
14.260MHz  
21.260MHz  
28.560MHz

QSL cards for any contacts made should be sent to:  
G3ZAY, 41  
Enniskillen Road,  
Cambridge CB4 1SQ



John Smith, G0AEB, is shown here with Bao, BY1QH, the station manager of Tsinghua University in Beijing on a recent visit to China. John was able to operate the club station under Bao's supervision without having to apply to the authorities - only a copy of his home licence was required. Unfortunately John was not able to work Europe as both propagation and the time difference made it impossible.

## Expedition to Foula

A group of intrepid VHF DX types will be active from the island of Foula, in the Shetlands, between 9-14 August. Before you yawn and complain that you've worked the Shetlands 66 times since you became licensed, check these locators - IP80XD (Maidenhead), YU70d (QRA), and HT93 (WAB). That's right - the elusive YU square. GM4CAN/P and GM0FRT/P will be the callsigns used and the frequencies/modes are as follows:

GM0FRT/P - 50.160MHz, ALL  
MODES  
GM0FRT/P - 70.170MHz, ALL  
MODES  
GM4CAN/P - 144.080MHz, CW/  
CWMS  
GM4CAN/P - 144.180MHz, SSB

Skeds can be arranged in advance by writing to:  
Stewart Cooper, GM4AFF,  
Grytviken, South Cookney,  
STONEHAVEN, Scotland AB3 2RX.

or via packet to:  
GM4AFF @ GB7CQV  
or daily throughout the  
expedition on the 'VHF Net' on  
14.340MHz, between 1400-  
1600GMT.

## GB4JUL - The Fourth of July

The Darley Amateur Radio Club at Harrogate, North Yorkshire, is unusual insofar as it has both British and American members and for the past four years the club has run a special event station - GB4JUL - to celebrate American Independence Day. Local UK amateurs are also invited along to help put the station on the air "in a big way". The station is usually run 'contest style' to the USA on 14, 21 and 28MHz, with more leisurely 'rag-chewing' on 3.5 and 7MHz. Last year the club made over 3000 contacts during the weekend event, most of which were with US or UK stations. This year the station will be active for 28 days commencing on 1 July, with most of the activity centred - naturally - on 4 July. Operation will be in all bands using SSB and CW, as well as some satellite activity.

QSL via the Bureau or  
KE2AE,  
PO Box 823,  
APO New York,  
zip code 09210.



## Russian Phrases for Amateur Radio

This is a new 20-page syllabus compiled by W6HJK with a view to helping amateurs communicate better with their Soviet colleagues. You don't need to be an expert linguist, just (according to the blurb) to "...keep trying". The booklet provides (1) English words and phrases for QSOs, accompanied by (2) the Russian translation and (3) the English transliteration, to assist with pronunciation of the Russian. The syllabus follows the natural sequence of a QSO and there are additional sections on the Russian

alphabet, phonetics, CW characters, numerals and given names. Suggestions are also made for addressing mail to the Soviet Union.

The author undertook this project out of a personal interest in improving the quality of his contacts with Soviet amateurs and to enhance relations. The booklet is free of charge, with the first printing and mailing being funded by 'Beyond War' - an educational foundation to build global dialogue and co-operation. Anyone who would like a copy is free to write to: *Russian Phrases for Amateur Radio, Len Traubnam, W6HJK, 1448 Cedarwood Drive, San Mateo, California 94403, USA*. Contributions to help sustain the project would be very welcome.

## Norman Joly's book on A/R in Greece

Norman Joly, G3FNJ - the well-known Graecophile, who can be heard regularly on the 'Souvlaki' (Greek) Net on 14.285MHz - has recently completed a unique book, entitled *Radio Amateurs in Greece*. The book deals with the beginning of amateur radio in Greece and tells the story of those who started it all. It is dedicated to SV1AA, now aged 83, who made his first phone contact in 1921 when in the fourth form at school. Unfortunately it's available only in modern Greek, although it contains a large number of previously unpublished photographs - most of which were taken by the author many years ago. Norman has been working on the book for quite a few years and last year spent six months in Athens



'putting it to bed'. The book is ideal for anyone learning modern Greek who would like to know something about the early days of amateur radio in Greece. It is available direct from G3FNJ (QTHR) at a cost of £10.00



David Gough, the RadCom News Editor, left the Radio Society on Wednesday 31 May to prepare for his emigration to Perth in Western Australia. The Council and staff at RSGB HQ presented David with a Sony 'Discman' in appreciation of his seven and a half years service with the Society.

David joined the Society in September 1982 as a Membership Services Officer and, in May 1987 became Senior News & Information Officer at HQ. In this capacity he became responsible for the compilation of news from many sources for the news pages of RadCom. He also produced the GB2RS News Bulletin from HQ and during this time he was also instrumental in the success of the 75th Anniversary by designing the special logo and Programme for this occasion.

In December 1988 he was appointed News Editor of RadCom, and became solely responsible for all news reports, club diaries, and was instrumental in the production of the DX Holiday competition which is currently running in RadCom.

David's wife, Chris, originally came from Australia, and they have decided to move there and settle down permanently.

All the staff at headquarters, and especially those working closely with David wish him the best of luck for his future life in VK.

Readers may be interested to know that the photo features David Gough wearing an 'ethnic' hat in preparation for his departure!

## Why do some QSL cards bounce?

Council member Peter Chadwick, G3RZP, writes:

"There must be a number of members who happily send off QSL cards to the Bureau for a particular QSO, only to get them back several months later with a rubber stamp mark stating 'Not Member DARC' or whatever national society is involved. This is because a number of national societies don't have the facility for delivering cards to non-members and, in some cases, are prevented from doing so by local laws. The RSGB doesn't have this problem and does receive incoming cards for freeloaders.

"The RSGB's HF Committee has asked why the rejection of cards for non-members takes place in other countries and how this fits in with the IARU Region 1 Resolution at Noordwykerhout. The answer from DARC is that the German Postal Law states that postal exchanges are a monopoly of the Post Office, except for members of private societies; the same goes for Austria. So if the card you particularly wanted for an award - be it HF, VHF, UHF or Microwave - isn't available via the bureau, you'll have to either QSL direct or resign yourself to the problem of working a freeloader who isn't a member of his or her national society.

"While I'm on this tack, think how much more your national society would be able to do if all UK amateurs were members. We all know someone who isn't a member, for one reason or another - often because they had a conflict of

opinion with the national society several years ago, has never renewed their membership since, but has continued to benefit from the society's work. Remember, the higher the membership, the stronger the representation, and the stronger the representation, the more substantial the argument. It's worth thinking about!"

Peter defines a freeloader as someone who freely accepts all the benefits that the national society obtains or provides for the amateur service - new bands and modes, QSL bureau, liaison with licensing authorities, international representation, etc - without paying a subscription.

After all if the resources needed to obtain new bands were paid for by a larger number of people then each would have to pay less!

## Contact Man Women before operating GD

The Isle of Man Amateur Radio Society invites all amateurs planning to visit the island with the intention of setting up an amateur station to contact June Wrigley, GD7DPG before hand. In the past there have been some unfortunate instances of interference caused by visiting stations, and the IOM ARS will be able to advise and assist visitors to avoid such problems in the future.

## Committee changes

Dan Bernard, G4RLE, has resigned as Chairman of the EMC Committee. His successor is Ian Dearlove, G1WZZ, and EMC queries should now be directed at him. On the subject of EMC, by the way, we've introduced a new service as of 5 June. You can now raise any EMC-related queries on a 24-hour telephone number - 0329 239644. It'll have an answerphone on it some of the time, but all enquiries will be dealt with promptly.

Council has confirmed the appointment of John Bazley, G3HCT, as the new Chairman of the Licensing Advisory Committee. Dr J N Gannaway, G3YGF, will remain involved with the Committee and will probably take over the Chairmanship next year following his term of office as the Society's President.

## Verulam's second Project Year meeting

A few months ago we published an item on the Verulam club's first Project YEAR meeting, held last year. On 14 March the club held a second meeting devoted to attracting youngsters into amateur radio. The structure of this meeting was a bit different from the first one: the approach was a little more formal, with lectures on two topics specifically requested by the youngsters who attended the previous meeting. Hugh Davies, G0CNR, gave an animated presentation on packet radio which involved a great deal of audience participation. Andy Ince, G0BZS, explained some of the fascinating aspects of weather satellite reception to a group of around 40 children and 28 adults.

The lectures were followed by live demonstrations which attracted great interest - not only from the youngsters but also the adults! Weirhead, of Watford, very kindly donated constructors' packs containing a useful selection of components, Veroboard, wire, earpiece and loudspeaker; in fact, everything the beginner could wish for to start on the construction projects suggested in the club's *Novice Newsletters*. These were given as prizes in a free raffle on the night. After some free refreshments, the children settled down to watch the ARRL video entitled "The New World of Amateur radio" - which went down well. At the end of the



## Bedford and Bamberg Get Together

For a number of years the towns of Bedford and Bamberg in northern Bavaria have been "twinning". During this time, in addition to the usual Civic exchanges, a constant amateur radio link has been maintained by members of the Bedford and District Amateur Radio Club and German radio amateurs in the Bamberg area. The principal operator has been Alfred Rösch DL3NAX.

It was therefore a most fortuitous

event when Alfred, in his capacity as a schoolmaster, accompanied a party of schoolchildren from Bamberg on an exchange visit over the Easter period this year.

Despite his other commitments, Alfred was able to find time to visit the Bedford club's HQ for a social get-together where he was presented with a plaque to take back to his home club.

On Easter Saturday the Market Square in Bedford was the scene

for Special Event Station GB4BBE (Bedford/Bamberg Exchange) and during the day Alfred operated the station, making contacts with radio amateurs in Bamberg and a variety of other locations.

The photo shows the special event station GB4BBE (standing L to R), Ray, G0EYM; Tony, G0EKD; CLEM, G0EYG; (seated L to R) John, G7ARJ; Glenn, G0GBI and Alfred, DL3NAX.

*Photo Courtesy Bedfordshire Times*



evening, there were vociferous requests for another get-together; perhaps next time the weather will be fine enough to have a day 'in the field' with workshops and a station

on the air. One thing is certain - it's the children who are now motivating the club! A sure sign that the introduction of new blood into any club will bring a fresh outlook

on the hobby to the older members, who may have forgotten just how exciting amateur radio can be. In the photo, Hilary Clayton-Smith is seen addressing one of the gatherings.



# VHF CONTEST TROPHIES FOR 1988



◀ Surrey Trophy — awarded to the Hillbillies as winners of the VHF NFD, Open Section.

▼ Telford Trophy — awarded to the Hillbillies as winners of 50MHz Trophy event.



▲ VHF Contest Committee Cup — awarded to the Hillbillies as winners of the 1.3GHz Trophy event.

The Hillbillies, seen here with the array of awards which they collected in the 1988 VHF Contest. ▼



▲ 1951 Council Cup — awarded to Sheppey Western Contest Group as winners of 432MHz Trophy Contest.



◀ Tartan Trophy — awarded to MacAdders & Sheppey Contest Group for VHF NFD, leading GM station.

▶ Thorogood 144MHz Trophy — awarded to Andrew Cook, G4PIQ as winner of 144MHz Contest, Single Operator Section.



▶ VHF Manager's Trophy — awarded to the Hillbillies as overall winners of 70MHz Trophy event.



▲ Mitchell Milling Trophy, — awarded to the Hillbillies as winners of 144MHz Trophy Contest, Multi-operator section.



▶ G6ZR Trophy — awarded to the Hillbillies as winners of the 2.3GHz Trophy event.



▶ Arthur Watts Trophy — awarded to Warrington Radio Club & Contest Group as winners of VHF NFD, Restricted Section.



## AWARDS

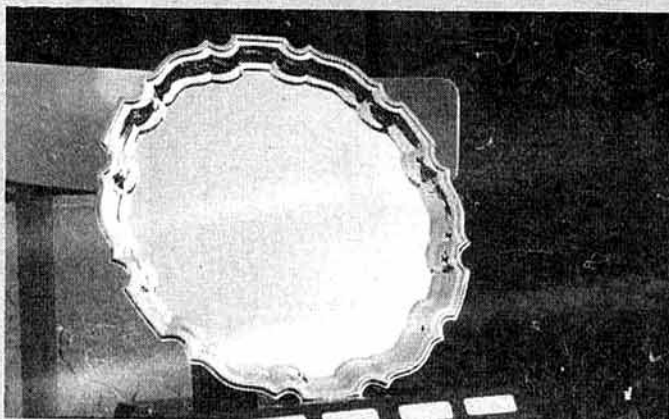
### NATIONAL

#### New HF award

The late Ted Wake, G5RP, was a well-known HF DX-chaser, who for many years was high on the DXCC Honor Roll. He was also very keen to encourage newcomers to HF DX. His friends have now donated an RSGB trophy, to be awarded annually to the 'most promising newcomer' to HF DX.

The award will be made to the RSGB member (resident in the UK) who has made the greatest progress in HF DX during the twelve-month period from July to June. Nominations can come from any two RSGB members who are class A licence holders. Judging will be by the RSGB HF Committee and representatives of the Vale of White Horse ARS, of which G5RP was chairman.

If you know someone who deserves the G5RP award, find another HF operator who agrees with you and write jointly by 31 July



to the HF Committee chairman: Martin Atherton G3ZAY — at 41 Enniskillen Road, Cambridge.

Your nomination should summarize the candidate's HF DX achievements during the past year, and the judges will pay particular attention to progress in DXCC, WAZ and the RSGB's Commonwealth, IOTA and ITU Zones programmes. The first annual G5RP award, for the year

ending this month, will be made at the RSGB HF Convention in September.

### INTERNATIONAL

#### The XIV Commonwealth Games Award

This award is to promote the Commonwealth Games taking place in Auckland in January and

February 1990. Requirements are QSOs with five ZM1s and one each of ZM2, ZM3, and ZM4 plus one with another Commonwealth country in each of IARU Regions 1, 2, and 3. QSLs are not needed. Send a list of log entries, certified by two licensed amateurs, to Awards Manager, Mrs A Johnston, ZL1ALE, 63 Red Hill Road, Papakura, New Zealand.

#### AGCW DL Awards 30 Meter Century Award

It's understood that the Awards Committee of REF has recently stated that no QSLs managed by F6FNU will be accepted for the official REF Award programme with effect from 1 March 1989. This, we believe, follows breaches of the REF rules of conduct and ethics.

#### AGCW DL Awards

Please note that the AGCW Awards manager has changed address and his new QTH is Heinz Muller, DK4LP, Husumer Str. 2B, D-2251 Rantrum, FR Germany.

# WORLD NEWS BRIEF

### NEW ZEALAND

The March issue of *Break-In* — the official journal of the New Zealand Association of Radio Transmitters — carried a very interesting article by Simon Candy, ZL2UIV, entitled "Add an Extra Band to the Yaesu FT-726R". In the article Mr Candy draws attention to the fact that many users of the FT-726R would prefer to have the use of all four currently available modules (upper HF bands, 50, 144 and 430MHz) but there is provision for only three out of four to be plugged-in to the rig. He describes, step-by-step, the procedure for installing the extra board so that all four modules can be controlled from the front panel. It may be possible to obtain a copy of the article by writing to NZART but, if you are seriously thinking about tackling this mod, ZL2UIV will send detailed instructions on receipt of a self-addressed envelope and a few IRCs. (TNX: Break-in)

### INDIA

The All India Ham Convention took place on 11/12 February. It featured

an exhibition of home-brew and commercial equipment including HF and VHF transceivers, accessories, and antenna systems used by amateurs for satellite communication. Several topics were discussed at the convention including raising the profile of amateur radio to a similar level as the Rotary and Lions clubs, the design of simple practical construction projects, the Indian Hams Medical Net, the introduction of amateur radio to youngsters through the various amateur radio clubs, and the setting up of workshops to encourage students in practical circuit design. Mr Suri, the Director of NIAR, gave his report and hoped that similar conventions of this type would act as a melting pot for discussion. He also hoped that by the turn of the century and with the dedicated motivation and sustained efforts of NIAR, hams in India would be able to make a major contribution to industrial and economic development. (TNX: NIAR News Letter)

### SOUTH AFRICA

In response to a proposal from the South African Radio League (SARL), the licensing authority in Windhoek, SWA/Namibia has introduced a new callsign prefix available on application to radio amateurs in South West Africa who are members of UNTAG — the United Nations Transitional

Assistance Group. The foreign amateur's callsign will follow the prefix ZS3UN/... Previously, licence facilities have been limited to permits valid for up to three months, unless the visitor arrived from a country with which a bilateral agreement had been concluded. Now amateurs from the UNTAG group who hold valid CEPT Class I or Class II compatible licences may operate while in the ZS3 call area. Two repeaters for 2m mobile operation are currently operational and a digipeater is planned for installation within the territory some time this year. UNTAG consists of a team from Australia, Great Britain and other nations and supervises the transition of the territory to independence in terms of the UN Resolution 435, and the team is expected to stay for at least 12 months. (TNX: SARL HQ Bulletin)

### USA

On 10 May US President George Bush chose the name 'Endeavour' for the new Space Shuttle orbiter currently under construction. The name 'Endeavour' resulted from a nation-wide orbiter-naming competition which attracted over 6100 entries school children of all grades. The competition was split over two categories: Division 1 (kindergarten to grade 6) and Division 2 (grades 7-12). The two winning teams, who both proposed the name 'Endeavour' were: 5th graders from Senatobia Middle

School, Senatobia, Mass., and a team from Tallulah Falls School, Tallulah Falls, Ga. The new orbiter, previously designated OV-105, is being built by Rockwell International, Downey, California, to replace Challenger. Endeavour is scheduled to be completed in 1991 and her maiden voyage is scheduled for March 1992. (TNX: NASA)

An amateur radio station is scheduled to fly aboard the Space Shuttle in March 1990. Approval for the inclusion of the Space Shuttle Amateur Radio Experiment (SAREX) on the secondary payload list of flight STS 35 has been received from NASA HQ. Ron Parise, WA4SIR — a payload specialist for the ASTRO 1 payload to be carried on that flight — will operate the station in the orbiting shuttle. He plans to communicate with amateurs worldwide using voice and video communications as well as — for the first time — packet radio. The orbit of the shuttle will permit amateurs located between approx latitudes 46° North and 46° South to communicate directly with the spacecraft and the SAREX transmissions will be such that a standard scanner-radio will be able to receive them. Approval for the SAREX operation is contingent on the Johnson Space Centre's final approval of the SAREX hardware and on priorities concerning the secondary payloads for the STS 35 flight. (TNX: Gateway)

# RSGB SLOW MORSE TRANSMISSIONS

## VHF TRANSMISSIONS

	Day	Time	Freq	Mode	Op	Pract*
<b>Ayrshire</b>						
Prestwick	Mon	19.15	145.250	F2A/F3E	GM4RSJ	yes
Prestwick	Tue	19.15	145.250	F2A/F3E	GM4RSJ	yes
Prestwick	Wed	19.15	145.250	F2A/F3E	GM4RSJ	yes
Prestwick	Thu	19.15	145.250	F2A/F3E	GM4RSJ	yes
<b>Bedfordshire</b>						
Chawston	Tue	20.30	144.250	A1A/J3E	G4PDP	yes
<b>Cheshire</b>						
Stockport	Sat	19.30	145.275	F2A/F3E	G4XQI	yes
Stockport	Sun	19.30	145.275	F2A/F3E	G4XQI	yes
<b>Cornwall</b>						
Truro	Wed	19.00	145.250	F2A/F3E	G2ABC	no
<b>Derbyshire</b>						
HorsleyWoodhouse	Mon	19.00	145.250	F2A/F3E	G4FEX	no
HorsleyWoodhouse	Thu	19.00	145.250	F2A/F3E	G4FEX	no
<b>Durham</b>						
BishopAuckland	Wed	18.30	145.250	F2A/F3E	G4TYF	yes
BishopAuckland	Fri	18.30	145.250	F2A/F3E	G4TYF	yes
<b>Essex</b>						
Chelmsford	Mon	20.00	145.250	F2A/F3E	G4INM	yes
Chelmsford	Tue	20.00	145.250	F2A/F3E	G4INM	yes
Chelmsford	Wed	20.00	145.250	F2A/F3E	G4INM	yes
Chelmsford	Thu	20.00	145.250	F2A/F3E	G4INM	yes
Chelmsford	Fri	20.00	145.250	F2A/F3E	G4INM	yes
<b>GreaterLondon</b>						
Putney	Sat	19.30	144.250	A1A/J3E	G4YMK	no
<b>GreaterManchester</b>						
Atherton	Tue	19.30	145.275	F2A/F3E	G4GBK	yes
Atherton	Thu	19.30	145.275	F2A/F3E	G4GBK	yes
Atherton	Fri	19.30	145.275	F2A/F3E	G4IAV	yes
<b>Kent</b>						
Maidstone	Sun	20.30	144.250	A1A/J3E	G3ORP	yes
<b>Lanarkshire</b>						
Glasgow	Wed	21.30	145.250	F2A/F3E	GM4HYF	yes
Glasgow	Thu	22.00	145.250	F2A/F3E	GM4HYF	yes
<b>Lancashire</b>						
HeskethBank	Thu	19.00	145.250	F2A/F3E	G0KMU	yes
Heysham	Sun	12.00	145.575	F2A/F3E	G3PER	no
Hoghton	Wed	19.00	145.250	F2A/F3E	G3PS	yes
Leyland	Fri	19.00	145.250	F2A/F3E	G0GVA	yes
Preston	Mon	19.00	145.250	F2A/F3E	G4WYH	yes
Preston	Tue	19.00	145.250	F2A/F3E	G0EHW	yes
<b>Merseyside</b>						
Huyton	Mon	21.00	145.250	F2A/F3E	G3AVJ	no
Huyton	Wed	21.00	145.250	F2A/F3E	G3AVJ	no
Huyton	Thu	21.00	145.250	F2A/F3E	G3AVJ	no
Huyton	Fri	21.00	145.250	F2A/F3E	G3AVJ	no
<b>Norfolk</b>						
Norwich	Fri	20.30	145.250	F2A/F3E	G4ODC	yes
<b>Northern Ireland</b>						
SouthBelfast	Mon	20.00	145.250	F2A/F3E	GI4VSC	no
SouthBelfast	Wed	20.00	145.250	F2A/F3E	GI4VSC	no
<b>Nottinghamshire</b>						
WestBridgford	Mon	20.00	145.275	F2A/F3E	G4NZU	yes
<b>Oxfordshire</b>						
Banbury	Thu	20.00	145.250	F2A/F3E	G4DLB	yes
Oxford	Wed	19.00	145.250	F2A/F3E	G3BLS	no
Oxford	Sun	11.00	145.250	F2A/F3E	G3BLS	no
<b>Somerset</b>						
Yeovil	Mon	19.00	144.155	A1A/J3E	G3CMH	yes
<b>Staffordshire</b>						
StokeonTrent	Sat	10.00	145.250	F2A/F3E	G3HVI	yes
StokeonTrent	Sun	12.00	145.250	F2A/F3E	G3HVI	yes
<b>Surrey</b>						
Farnham	Sun	19.30	145.250	F2A/F3E	G0CPE	yes
Ripley	Thu	19.30	145.250	F2A/F3E	G0JOP	yes
Sutton	Wed	19.30	145.250	F2A/F3E	G0FCE	yes
ThamesDitton	Fri	19.30	145.250	F2A/F3E	G0FTV	yes
WestEwell	Mon	19.30	145.250	F2A/F3E	G0IZU	yes
<b>Tyne&amp;Wear</b>						
WhitleyBay	Mon	20.00	145.250	F2A/F3E	G3GMS	yes
WhitleyBay	Thu	20.00	145.250	F2A/F3E	G3GMS	yes
<b>WestMidlands</b>						
Coventry	Wed	22.00	145.250	F2A/F3E	G4KZZ	no
Halesowen	Sun	19.30	144.160	A1A/J3E	G3LDW	yes
Wolverhampton	Mon	19.30	144.160	A1A/J3E	G4LLU	yes
Wolverhampton	Tue	19.30	144.160	A1A/J3E	G4TDO	yes
Wolverhampton	Sat	19.30	144.160	A1A/J3E	G4TDO	yes

## HF TRANSMISSIONS

	Day	Time	Freq	Mode	Op	Pract*
<b>Avon</b>						
	Mon	18.30	3.550	A1A	G3GNS	no
	Tue	12.00	3.550	A1A	G3GNS	no
	Wed	18.30	3.550	A1A	G3GNS	no
	Thu	18.30	3.550	A1A	G3GNS	no
	Fri	18.30	3.550	A1A	G3GNS	no
	Sat	12.00	3.550	A1A	G3GNS	no
	Sun	12.00	3.550	A1A	G3GNS	no
<b>Glasgow</b>						
	Wed	21.30	28.350	A1A/J3E	GM4HYF	no
	Thu	22.00	28.350	A1A/J3E	GM4HYF	no
<b>Gloucestershire</b>						
	Sun	10.15	1.875	A1A	G3CGD	no
<b>Lincolnshire</b>						
	Thu	20.00	1.818	A1A	G2ACZ	no
<b>Middlesex</b>						
	Mon	20.30	1.976	A1A	G3ASR	no
	Thu*	19.30	1.976	A1A	G3ASR	no
<b>West Yorkshire</b>						
	Wed	19.00	28.450	A1A/J3E	G4DNB	no
	Fri	20.00	3.585	A1A	G4DNB	no

\*Sending practice — arrangements for 'on air' sending practice for the morse test can/cannot be made at end of broadcast

## COMPUTER PROGRAMMER VACANCY

The Radio Society of Great Britain has a vacancy for a full-time computer programmer, based at its headquarters in Potters Bar.

The successful candidate will need to have had sound experience of RPG III and should have knowledge of the IBM38 or similar systems. An ability to manage the headquarters 20+ terminals will be required and knowledge of PC systems would be considered to be an advantage.

A very satisfactory remunerative package will be available to the right person for this demanding appointment.

Applications, including a CV, should be sent to:

**Mr R Seaman, Accountant,  
Radio Society of Great Britain,  
Lambda House, Cranborne Road,  
Potters Bar, Herts EN6 3JE**



Closing Date  
July 31st 1989

# YOUNG AMATEUR OF THE YEAR 1989

JULY IS THE FINAL MONTH OF THIS YEAR'S COMPETITION AND YOUR  
LAST CHANCE TO PUT FORWARD YOUR YOUNG PERSON FOR THE DTI'S  
AWARD. TO ADD TO THE VALUE OF THE AWARD SEVERAL SPECIAL PRIZES  
HAVE BEEN GENEROUSLY DONATED.

## HOW TO ENTER

1. Young amateurs who lack a personal sponsor may just fill in their own form.
2. Senior amateurs may care to select and sponsor their own candidate.
3. Affiliated Societies and local radio clubs are invited to put up a young member.
4. Other National Societies, Contest Groups and the Uniformed Organisations with amateur radio branches, are invited to submit their entrant.
5. All entries must be received at RSGB HQ by 31st July 1989.

## NAVICO AWARD

Navico Ltd of Margate have come up trumps with their very welcome offer of a Navico AMR1000S 2metre mobile transceiver (value £299) to be presented to this year's winner. In addition, they have kindly arranged for the lucky YM or YL to be given a guided tour of their production facilities in order to provide a useful insight into marine electronics manufacturing here in the UK.

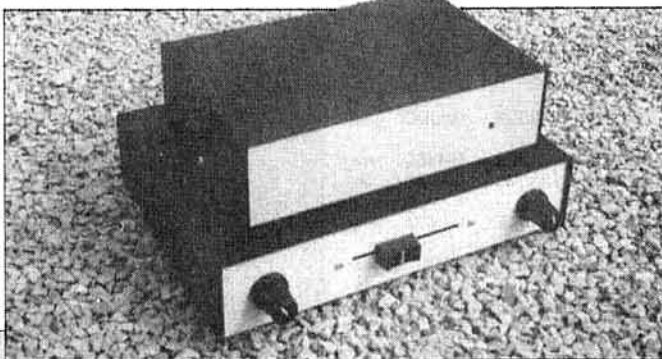


Navico AMR1000S 2 metre transceiver

## MOBILE RADIO USERS ASSOCIATION AWARD

In 1988 the Association was a co-sponsor with the DTI and, once again, Association Chairman Cliff Dadson has arranged for this year's winner to attend a week long residential training course on

amateur radio. This invaluable opportunity to be taught by the professionals is to be presented as a complete package including course fees, hotel accommodation and expenses.



## CIRKIT HOLDINGS PLC PRIZE

Cirkit the mail order suppliers for electronic constructors will present an RC14 Receiver Kit to the YL and the YM who are the runners up.

RSGB RC14 Receiver and the 80 metre converter

## RULES

The Department of Trade and Industry's second annual Award for the 'Young Amateur of the Year' is open to all young amateur radio enthusiasts in Great Britain. The event is for: anyone who is under 18 and;  
— is keen on DIY radio construction; or  
— is interested in using radio and gaining operating skills; or  
— is using radio for community service, such as helping the disabled or in emergency

communication networks; or  
— is good at encouraging interest in amateur radio; or  
— is involved in amateur radio in any way such as in a school scientific project, is eligible for the 1989 Award and its £250 cash prize. The prize, for the most outstanding achievement between 1 April 1988 and 31 July 1989, will be awarded by the DTI and presented at the Radio Society of Great Britain's 1989 HF Convention. The closing date for applications

is 31 July 1989. Entrants do not need to be a radio licence holder to enter and the competition is open to anyone in the UK, the Channel Islands, or the Isle of Man, who is under 18 on 31 July 1989. Through its sponsorship of the Award, the DTI is encouraging young people to become involved in amateur radio which gives invaluable 'hands-on' experience for anyone considering a career in radio or electronics. It complements part of the RSGB's education and training initiative

'Project YEAR' which aims to introduce more people into the hobby, and the Department's Enterprise and Education initiative which encourages young people to gain the skills, aptitudes, and abilities they will need for the world of work. Entry forms for the award (printed right) must be sent to: The Secretary (YAOTY), Radio Society of Great Britain, Lambda House, Cranborne Road, Potters Bar, EN6 3JE, NO LATER THAN 31 July 1989.

# FINAL PRIZE LINE-UP

## TO THE WINNER

- ☆ The title of 'Young Amateur of the Year' and £250 Cash Prize presented by the DTI plus a guided tour of their Radio Monitoring Station at Baldock.
- ☆ RC14 Receiver (ready built) plus a 80 metre converter kit, presented by the Council of the RSGB.
- ☆ Technical Training Course from the Mobile Radio Users Association.
- ☆ Navico AMR1000S 2 metre transceiver and a tour of their marine production unit.

## TO THE YL AND YM RUNNERS-UP

- ☆ RC14 Receiver kits will be presented by Cirkit.

## TO ALL ENTRANTS

- ☆ UK Radio Frequency Allocation Charts will be presented by the DTI and mailed to all participants.

## TO THE SUCCESSFUL SPONSOR

- ☆ To the Club or individual who puts forward this year's winner, a suitable engraved plaque to mark their work in supporting and encouraging us all in the drive to enhance the hobby's potential for future generations.

## JUDGING AND PRESENTATION OF PRIZES

- ☆ Judging of all entries will take place during August and early September in time to allow the winners to be invited to attend the *HF Convention* at Oxford on Sunday 1st October 1989. Naturally parents and sponsors of the winners will be invited to share in the occasion.

## Our Grateful Thanks

The Council is delighted by the response to this Project Year competition and, on behalf of the amateur radio movement, wish to express their sincere thanks and appreciation to Mike Coolican and his colleagues at the DTI, to the MRYA, to the Directors of CIRKIT and NAVICO and to all those who are working so hard to ensure its success.

## ENTRY FORM

FOR THE 1989  
YOUNG AMATEUR OF THE YEAR AWARD  
sponsored by the Department of Trade & Industry

### CANDIDATE'S DETAILS

Name \_\_\_\_\_ Age \_\_\_\_\_  
Address \_\_\_\_\_  
Town \_\_\_\_\_ Postcode \_\_\_\_\_  
Home telephone No \_\_\_\_\_  
Male/Female (indicate) \_\_\_\_\_  
Callsign/BRS (if any) \_\_\_\_\_  
Club memberships \_\_\_\_\_  
Uniformed organisations \_\_\_\_\_

Enter brief details of OUTSTANDING ACHIEVEMENTS here or on attached separate sheet

### PROPOSER'S DETAILS

Name \_\_\_\_\_ Callsign/BRS \_\_\_\_\_  
Address \_\_\_\_\_  
Town \_\_\_\_\_ Postcode \_\_\_\_\_  
Club title (if club proposal) \_\_\_\_\_  
Contact telephone No. \_\_\_\_\_  
Signed \_\_\_\_\_  
Date \_\_\_\_\_

NB: Photocopies of this form appropriately completed or personal letters are equally acceptable as entries.



## AZDEN PCS 6000 2M FM RIG

+ "Free Scanning Receiver"



£329

The Azden PCS6000 crept on the scene with very little announcement. Those in the "know" immediately realised its potential and snapped the first shipment up. By the time you read this we hope to have bulk supplies. So what is all the fuss about?

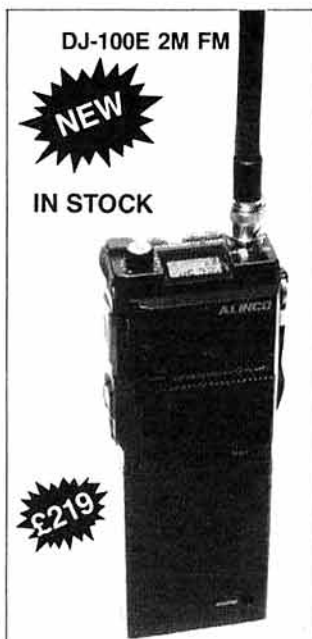
The basic transceiver is the same as the competition; 25 Watts of rf output, 144-146MHz, 20 memories, auto tone-burst, excellent receiver sensitivity etc. On the face of it nothing to get excited about! But that's only the beginning, the next part is really exciting. The receiver coverage has been extended from 108 to 179MHz. Yes it covers the aircraft band with a built-in AM detector for reception up to 136MHz and a properly designed front end with AGC and 5kHz steps for offset-VOLMET transmissions. Above this range, reception is FM. The transmitter side has a programmable CTSS module which is also used to programme the tone-burst of 1750Hz. The shift frequency is also programmable and is made to error-out on transmit beyond the range 144-146MHz. However, this can be used in conjunction with the reverse repeater switch to instantly monitor duplex transmissions throughout the entire receiver range. What is particularly attractive is the ability to programme into each memory, a unique shift and if appropriate, a unique CTSS tone. This makes the rig somewhat unique when looked at in conjunction with the frequency range. Finally the price: most rigs are well in excess of £350 these days, without all the above listed features. So for £329, we think you will agree that this has to be a very special deal indeed.

## ALINCO PRODUCTS

We now have in stock the new DJ500E dual band hand-held for 2m and 70cm. This hand-held comes complete with ni-cad pack, AC charger and helical for £375. Send for details.

- ★ 2M FM 144-146MHz
- ★ RX 140-170MHz!
- ★ 3 Watts output
- ★ Battery Saver
- ★ 10 memories
- ★ LCD Readout
- ★ S-meter
- ★ Tone Burst
- ★ Priority
- ★ 12.5KHz steps
- ★ 12v DC operation!

Another winner from ALINCO. A true handy transceiver with no extras to buy! Unlike its competitors, you get the nicad pack (500MAH) AC charger, and provisions for direct 12v DC charge. Measuring 168 x 61 x 30mm it's a beauty! Optional accessories include speaker-mic, mobile bracket and high power packs. Get the facts today!



- ★ 2m/70cm. Full duplex operation.
- ★ 25 watts FM on both bands.
- ★ Single antenna socket output.
- ★ 21 memories & 2 "call channels".
- ★ Programmable scanning and priority.
- ★ 12.5KHz & 25KHz steps.
- ★ Includes all hardware & microphone.
- ★ Bright LCD readout.
- ★ Reverse repeater operation.
- ★ 12 months warranty parts & labour.

**FREE CATALOGUE & PRICE LIST!** We now have an illustrated catalogue of some interesting products for the radio amateur that we have never had the space to advertise. Also details of new items coming along. Just drop us a first class stamp and we will send you this plus our price list of over 700 items!

## QRP & AERIALS!

We are about to introduce a range of compact single band hf rigs: (80/40/20m) for the QRP enthusiast. Each one provides SSB/CW output of 2 watts. Features include VXO tuning, RIT, optional noise blanker and break-in module, built-in Morse key, internal dry cells or external supply, analogue power/S-meter, good dynamic range, excellent IF rejection and ultra stable. Send SAE for further details, prices and availability.

The GLOBAL, LF-80/40 dipole kit is now in stock and gives you a two band antenna for 80 & 40 metres with a total length of 70ft. £29 + £1.50.

GLOBAL Mini G5RV kit. We can now supply a trap kit that will enable you to turn your half-size G5RV into one that covers 80 metres. Total length becomes 66ft approx. (80-10m). £17.95 + 1.00.

**NEW! SHORT WAVE LISTENERS "CONFIDENTIAL" FREQUENCY LIST.** Now replaces old edition of "UKCFL." Fully up-dated it is probably the most comprehensive guide available. £7.95 post

### DIAMOND AERIALS etc.

X50 2m/70cm 4.5/7.2dB.....	£59.00
X500 2m/70cm 8/12dB.....	£129.00
D130N Discon 26-1300MHz.....	£82.00
CLP5130 1.50-1300MHz beam 12dB.....	£179.00
CLP5130-2 105-1300MHz beam 13dB.....	£89.00
CP22J 2m 6.5dB base antenna.....	£49.95
M265 2m Mobile 5/6th PL259.....	£14.95
EL770H 2m/70cm Mobile PL259.....	£30.00
NR72M 70cm mobile 5.5dB PL259.....	£27.00
GLS Gutter mount/cable for mobiles.....	£14.95
D24N Duplexer 2m/70cms.....	£26.95
CP4 40-10m vert + radials.....	£149.00
CP5 80-10m vert + radials.....	£189.00

### VSWR METRSetc (New Design)

SX100 1.6-60MHz 3KW.....	£65.00
SX200 1.8-200MHz 5/20/200w.....	£65.00
SX400 140-525MHz 5/20/200w.....	£79.00

SX600 1.6-525MHz 5/20/200w.....	£119.00
MS1 Monitor Scope Pep etc.....	£269.00

### MISC

ADONIS AM303G Base mic.....	£49.95
ADONIS AM503G Base mic.....	£65.95
ADONIS FX-1 Mobile Goose Neck.....	£55.00
2m 5/8th BNC telescopic ant.....	£12.95
LF 80/40 70ft dipole kits.....	£29.00
"Limpet" Rubber bag base. It won't move!.....	£19.00
VHF/UHF Airband Guide 2nd Ed.....	£5.95
UK Confidential Frequency List.....	£6.95
Secret of Learning Morse Code.....	£4.95
Complete Guide To VHF/UHF Frequencies.....	£5.95
Pocket Guide to RTTY & FAX Frequencies.....	£2.95
Oceanic Airband Communications.....	£3.50
PLUS HUGE STOCKS OF KENWOOD, YAESU, ICOM, DATONG, JAYBEAM, TONNA: etc. If its in this magazine we have probably got it!	

**WATERS & STANTON**

RETAIL & MAIL ORDER:- 18-20, Main Road, Hockley, Essex SS5 4QS.

Tel: (0702) 206835, 204965

RETAIL ONLY:- 12, North Street, Hornchurch, Essex RM11 1QX.

Tel: (04024) 44765

Visa and Access by telephone. 24hr. Answerphone.

# SPECIAL FEATURE

Since the WARC bands were released to UK amateurs there have been restrictions on power, antennas and mode. Now that those restrictions are lifted we can use them in the same way as other HF bands. This article answers some of the common questions and collects some of the useful information together into one place.

## HF COMMITTEE

If we want to hold on to any of the WARC bands we have to use them responsibly. The WARC bands are popular bands with the amateur who likes to relax at his hobby and enjoys DX contacts at his own pace. Few amateurs have put up substantial systems for 18 and 24MHz and this seems to make the DX easier to work.

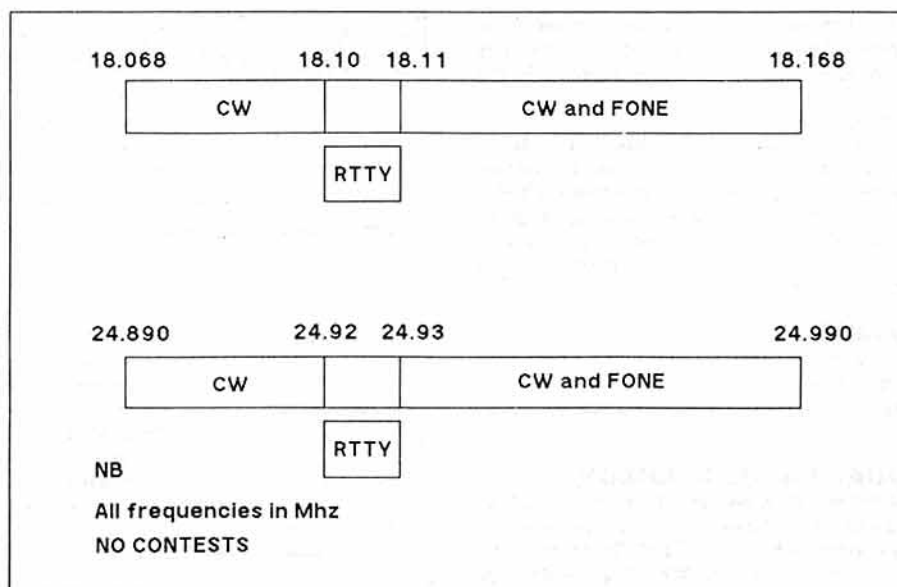
## BANDPLANS

The bandplan for the 18 and 24MHz bands are shown in Fig 1. The key point is that it has been agreed in IARU that there will be NO CONTESTS on these bands. Contacts will count for credit to relevant awards. The position on some of the more common Awards is shown in Fig 2.

## PROPAGATION

Many UK amateurs have been using the 18 and 24MHz bands for the last few years and with the upswing in the Solar activity have been able to gain a better idea of how these bands behave. Of course they behave like the adjacent 14, 21 and 28MHz bands but after a bit of listening it soon becomes clear that there are noticeable differences. Looking at the propagation predictions gives some clues as the general effects. 18 and 24MHz are more similar to 21 and 28MHz than they are to 14MHz. That is they are basically daylight bands whose opening characteristics are linked to sunrise but whose nighttime character depends on the solar activity.

Propagation persists well after sunset in periods of high solar activity but rarely all night. The dominant propagation mode is F2 and with the level of solar activity in the next few years it should be possible to follow the MUF from band to band during the day and nightly variation. Long path effects on 18 and 24MHz are more noticeable than those you would expect from listening on 21 or 28MHz respectively. In this respect 18MHz mirrors 14MHz. But the pattern of absorption is also different giving sometimes surprising signal strengths. During the summer months of course there is sporadic E.



# Working the WARC bands

## Getting going on 18 and 24MHz

by Bob Whelan, G3PJT

## ANTENNAS

Several of the antenna manufacturers are offering add on kits for the 18 and 24MHz bands but frankly you can make your own for a fraction of the price.

The dimensions of antennas for these bands can be derived from the well known formulae. To assist those who have decided to put up an antenna for these bands the necessary dimensions are tabulated here.

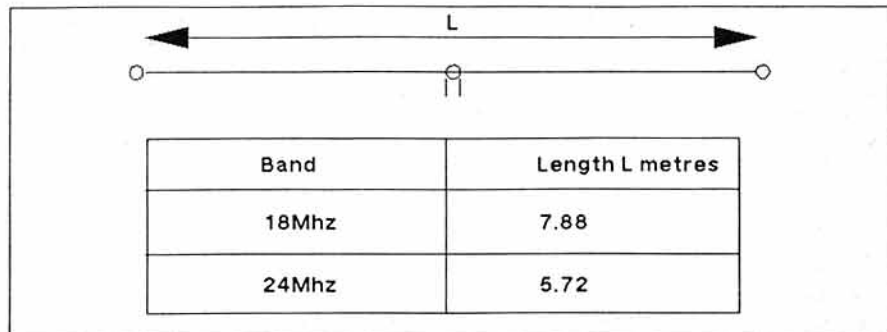
Fig. 1 (Top of page) Recommended band plans for 18 and 24MHz

Fig. 2 (Right) Currently available awards

Fig. 3 (Below) Dipole dimensions for 18 and 24MHz

## AWARDS CURRENTLY AVAILABLE

ARRL DXCC 18 MHz and 24MHz  
 RSGB Commonwealth Century Club  
 DX Listeners Century Award  
 Islands on the Air (IOTA)  
 IARU Region 1 Award  
 Worked ITU Zones  
 WAB Worked All Britain  
 CQ Awards are currently under consideration





## DIPOLAS AND VERTICALS

Dimensions are shown in Figs 3 and 4. For 18 and 24MHz, verticals will normally be mounted on a post with elevated radials.

## LOOPS

One of the most attractive antennas is one of the forms of the loop either as a quad form or the delta loop form (Fig 5) use single elements in the vertically polarised form, it cuts down the high angle propagation [Ref 1]. High solar activity will cause very short skip distances and its worth cutting down the QRM. If you make a 2 element version, the dimensions are shown in Fig 5 also and you won't have to worry about high angle so much. Why not try a fixed 2 element aerial running east and west? You can switch direction with a relay and some tuning stubs. [Ref 2].

## YAGIS

The lengths for 2 and 3 element yagis are shown in Fig 6. These can be made of aluminium or wire and work very well. A 4 element yagi is described in [Ref 3].

## DUAL BAND ANTENNAS

Most loops and wires can be persuaded to work on 18 and 24MHz if they are fed with open wire line and tuned with an ATU [Ref 5]. Most of the switched coil ATUs will have adequate coverage to handle the expected impedances. One simple dual band antenna is the nested quad or loop and suitable dimensions are given in Fig 5.

For those with limited space a 24MHz loop can be loaded to cover 18MHz (Fig 5 and [Ref 6]). A pair of traps are required to isolate the capacity loading when the loop is used on 24MHz. A pair of commercial 24MHz traps can be used or, even better, a pair of traps constructed using the coaxial cable technique described in [Ref 4]. This antenna does need to be set up carefully.

## SUMMARY

The 18 and 24MHz bands are now fully open for business. There is plenty of scope for experimentation as well as plenty of DX to be worked. The HF Committee looks forward to hearing of your experiences and will be glad to publicise them to help others make best use of these frequencies. A WARC bands table runs in the HF Column, let us have your country scores.

If we wish to retain these and our other HF allocations we must use them. □

## REFERENCES

1. VC Lear *Ham Radio* Jan 1985 page 67-71 'Reduced size corner fed delta loop'.
2. *ARRL Antenna Anthology* page 70-72 'A convenient stub tuning systems for quad antennas'.
3. *ARRL Antenna Book* (1988) 15th edition page 11-17 to 11-22 'The PV4 four element monoband yagi'.
4. *ARRL 1986 Handbook* page 33-6 to 33-9 Coaxial Traps.
5. *HF antennas for all locations*, L A Moxon RSGB 1982.
6. J M Hawkes, *RadCom* p60, page 300-303 April 1984.

Two very useful reference books are:-  
*Beam Antenna Handbook*, Orr and Cowan, Radio Publications Inc. *All about Cubical Quad Antennas*, Orr and Cowan, Radio Publications Inc.

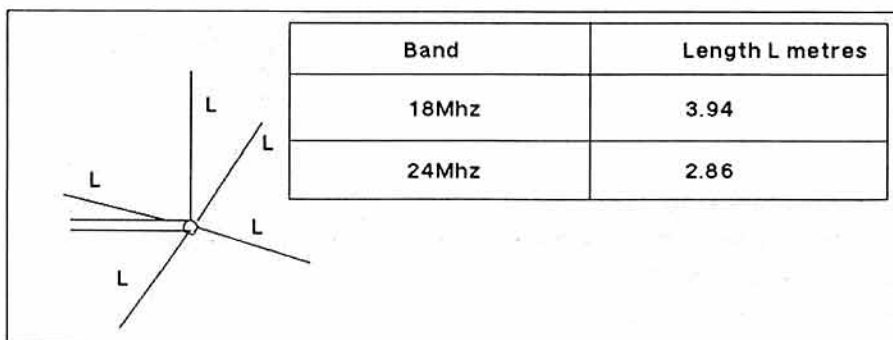


Fig. 4 Dimensions for vertical aerals

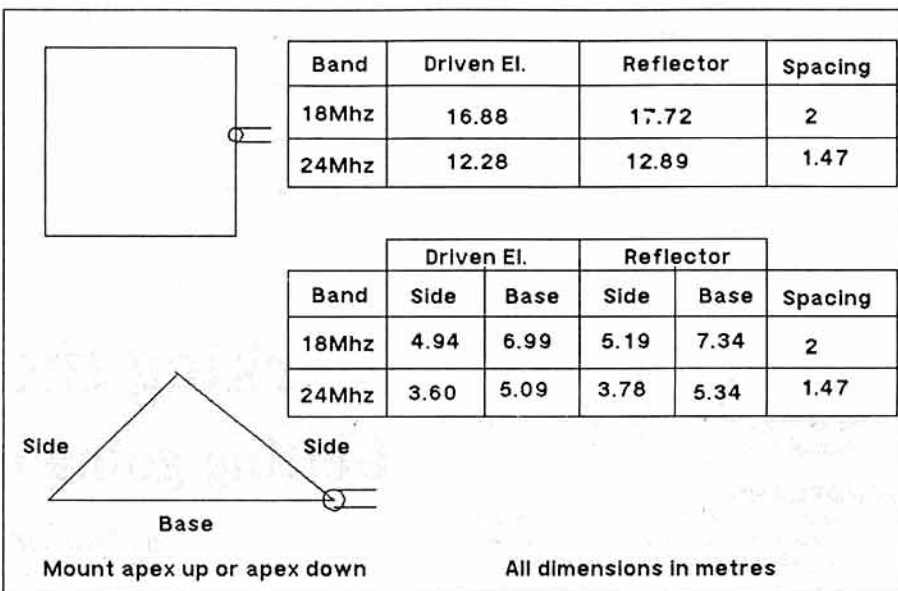


Fig. 5 Dimensions for quad aerals (uppermost) and delta loops

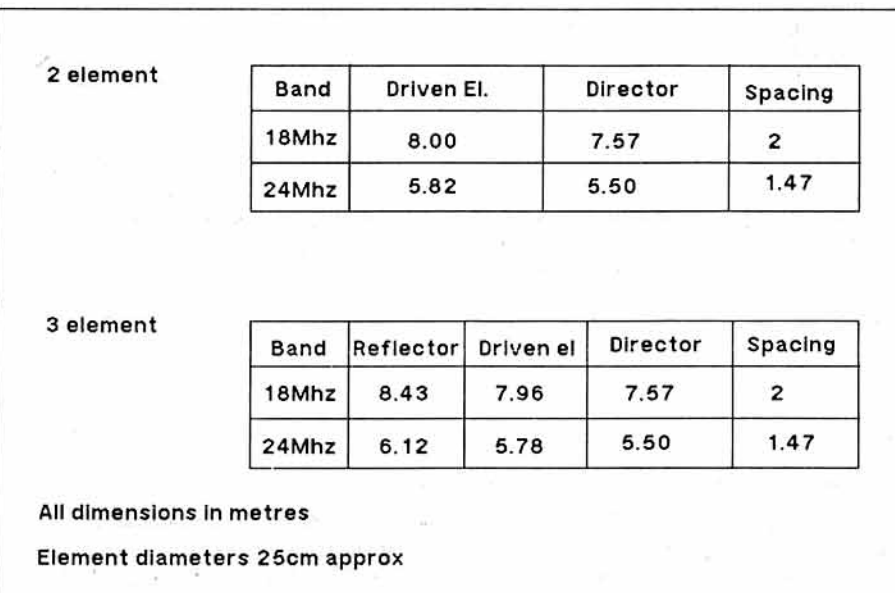
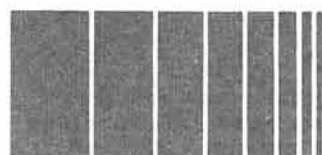


Fig. 6 Two and three element dimensions for Yagi aerals



# SPECTRUM ANALYSIS

## HF

JOHN ALLAWAY G3FKM

Thanks go to those who did write and these are: G2's AKK and HKU, G3's GVV, KSH, and YRM, G4's EHQ, MUW, NXG/M, UZN, and ZYQ, and G0's BXQ/M and IHB. As always - CW stations in italics:

### 14MHz

0200 N6IV/KL7  
0300 HK0TLN  
0800 XF4L  
1000 XF4L  
1400 JX7DFA  
1800 TSYD, *US0SU/1*  
1900 FH/DL7FT, 4L1DC  
2100 HL9EP PY0FF

### 21MHz

0800 JT1KA1, UA1OT, 5W11B  
0900 NL7MF  
1100 P29VMS, T30BC  
1200 5W1GW  
1500 *K7GE/M* (Montana)  
1700 WA3KOG/KH6  
1800 9M2ZZ  
1900 D68JL, FY89AN, XF4L  
2000 VP8QP

### 28MHz

0600 BT1TUS, T5MF  
0700 KG6JJ, N2OO/SV5  
0800 BT5QSC/5RT, 3B9KR, 5H3TW, 9N1MC  
0900 BY5NC, JA, TR8SA, VK6, 5B6BL  
1000 BY1PK, VK9NS, VQ9LF, ZL3AHW, 3X1SG  
1100 FH/DL7FT, FY4FM, KX6DC, TZ6MG, VQ9LW, XX9KR, YK1AA, 9L1RK  
1200 P29PF, SU1EK  
1300 FY5YB, PA0GAM/ST2, TZ0MAR  
1400 VQ9LW, XF4L  
1500 DU3GD, ZS8MI, 9M2AX, 9Q5DX  
1600 C9MKT, TL8EL, VP8BFM, VP8BUB (S.Ga), YB2FRR  
1700 D68JL, FS/JA8RWO, KC4AAA, LU2ZC, S79J, TL8NS  
1800 HL5BDS, T53RC, XF4L, 9M2DW  
1900 J52US, VP2EXX, 7X3DA  
2000 CE0FFD, P43WLP, VP8BFH, ZL4OD (LP), 5T5ET

Thanks go to all the following for items extracted: the *Ex-G Radio Club Bulletin* (WA8GTA), *DX Report* (VK9NS), the *Lynx DX*

*Group Bulletin* (EA2JGO), *DXpress* (PA3CXC0), *CQ Magazine* (W1WY), the *DX Bulletin* (VP2ML), *DXNL* (DL3RK), the *Long Island DX Bulletin* (W2IYX), and *DX News Sheet* (G4DYO).

The closing date for copy for the September issue will be July 27th.

## OVERSEAS NEWS

Gwyn Morgan, GW4KYN, has written to tell me that he has been successful in obtaining a legitimate Somali call - T5GM - and will soon be QRV on 7, 14, 21, and 28MHz with a TS440S, a Butternut mini-beam and an AEA (PK-232)/Toshiba 3100 combination for RTTY, AMTOR, and packet. He says that he is happily installed in a small flat on the fourth floor of a commercial building in Mogadishu which has a flat roof and is located about 500m from the sea. Gwyn works for one of the UNDP executing agencies and may be more easily recognised by one of his many other calls viz. 5Z4GM, 5N6MGN, YB0ATG, etc.

He says that it is exceedingly difficult to acquire and retain a legitimate licence in Somalia and all contacts are asked to refrain from asking any sort of questions outside of purely technical, weather, and normal routine QSO exchanges. Gwyn also says that postal communication is not as reliable as one would wish, therefore, (although he does not know it yet!) Roger, GW4HSH, is likely to be coerced into the organisation of the odd list or QSL for UK stations - as indeed he has done several times before. This will hopefully provide a confirmed contact with this semi-rare location to all who need it. Gwyn hopes that his long suffering friend GW4HSH, who has kept weekly skeds with him for many years, will not mind this last chore before he retires in two years time to live in Bangkok.

Anyone wishing to have Gwyn's direct postal address can do so by writing to me - with an stamped self-addressed envelope please!

## IS IT A NEW ONE?

In the past few months several small islands in the Pacific have been activated by keen DXers in the hope that their particular choice might be granted DXCC status. Hopes have been raised by the amendment to DXCC Rule 2(a) which has taken place recently - resulting in no less than five applications being dealt with by the DX Advisory Committee.

The Marquesas Is are more than 250 miles from their parent country but in this case there is doubt about

QTH CORNER	
GB4JUL	RSGB Bureau or KE2AE, PO Box 823, APO New York, 09210, USA
IM0GBA etc	PO Box 19, I-09013 Carbonia CA, Italy
SO1DX	EA3AOC, Box 291, 08700 Igualada, Barcelona, Spain
T33JS	HIDXA, PO Box 90, Norfolk Is, Australia 2899
T33RNA	KN6J, 18360 Knuth Rd, Los Gatos, Cal, 95030, USA
XX9KA	via KC9V, Betty Collins, PO Box 263, State Line, Ind, 47982, USA
YJ1BKS	(see YJ1TRS)
YJ1TRS	E D Carling, G0CGL, 46 Jubilee Gardens, Ensbury Park, Bournemouth, BH10 4ET
4J1FS	OH5NZ, John Ahlbom, Puustellint 3 E, 53200 Lappeenranta, Finland
9N1MC	Krishna, Ministry of Communications, Kathmandu, Nepal
6Z stations	Robert F Wynhoff, K5HUT, 12915 Memorial Drive, Houston, Texas, 77079, USA

the status of French Polynesia as a 'parent country' as it is actually an overseas province of France. If Marquesas is accepted then the Austral Is would automatically qualify under the same criteria.

Conway Reef is similar to Rotuma. It is 281 miles from the nearest point in Fiji and Rotuma has already been accepted on a similar basis. Ocean Is (or Banaba Is) is more than 250 miles from Western Kiribati and more than 1,000 miles from Central Kiribati - however the problem here is that a decision has to be made regarding which 'Kiribati' is the parent country, in which case Rule 2(b) might have to be invoked requiring it to be more than 500 miles from Central Kiribati. In either case there seems to be a distinct possibility of acceptance.

The last on the list is Frederick Reef, which is in the Coral Sea off VK4. However, in this case Swain Reef is between it and the mainland and may disqualify it. There may be more - so work them and find out later!

## DX NEWS

From LRAA (Liberian national society) comes news that during July the special prefix 6Z will be used by Liberian stations to celebrate the 142nd Independence Anniversary of the Republic of Liberia. The 6Z will replace the normal EL so that EL2BA will become 6Z2BA. Awards will be issued to those who work (or hear) five different 6Zs during the month. All QSLs go to the address in QTH Corner and not to Liberia and should be accompanied by an SAE

### 1989 28MHz COUNTRIES TABLE

G0CKP	151 (CW)	G04XTT	98
G4MUW	147 (SSB)	G0BXC/M	96
G0IHB	145 (SSB)	G4NXG/M	90
G4DWW	144	G0JHC	78
G4XAH	134 (SSB)	G0JSM	72
G4ZYQ	123	G4SUG	72
GM4ELV	122	G4SDK/M	54
G4OBK	100		

and IRC. Applicants for the Award should send a certified list of log extracts (signed by a national society officer or two licensed amateurs) plus US \$5.00 or 10 IRCs to LRAA Awards Manager, PO Box 10-0987, 1000 Monrovia 10, Liberia.

ZD8RP is on the air from Ascension Is often around 1700 on Mondays and Thursdays on 28.32MHz and at 1900 on Sundays on 21.375MHz. 9X5KP, in Rwanda, is on the air at weekends and on Mondays from 1700 on 21.335MHz. 9X5AA meets QSL manager W4FRU at 1900 on Tuesday on 21.35MHz. F6EEM has told *DX News Sheet* that two operators will be on the air from Tchad for four months from late May. D68CY was formerly FH8CY and according to *DX-NL* he will put Comoro on the air on bands between 7 and 28MHz, mostly between 1000 and 1230 and again in the evening. Those looking for a QSO with the Cape Verde Is on 28MHz should try looking for D44BC on 28.495MHz from 1700. ZS8MI seems to have some favourite frequencies which are near 14.18, 14.225, 21.23, and 28.4MHz. The *Long Island DX Bulletin* says that 3V8LO is a new licensee in Tunisia and at the time of writing was taking part in a list operation with UG6GAW near 14.221MHz at 0030. Maybe not ideal for Europe but certainly of interest in as much as there has been no recent legal activity from there.

G3MCN reports that four members of the Chester Radio Society will be operating from the Faroe Is from 1 to 7 July. Calls will be OY/G3MCN, OY/G3TZU, and OY/G6IFB and they hope to be on LF, HF, 144MHz, and also (if all goes according to plan) on 50MHz. The *DX Bulletin* says that K7UDG, K7ZR, WA7WXA, WR7Q, KETV, and K7RA of the Western Washington DX Club have been invited to a ten day trip down the Volga from 5 to 15 July. Most likely they will use the UA4/ prefix and their own callsigns. Lloyd and Iris, W6KG and W6QL,



## SPECTRUM ANALYSIS

are also believed to have started a tour of the 15 Soviet republics.

JX7DFA is very active about 10kHz above band edges from Jan Mayen mostly around 1700. He will be there until October. *DX News Sheet* says that a large group of Italians will sign as IMOs, GBA, HGZ, JZJ, MBP, XBS, YEV, YFO, and YUJ from Sardinia between 7 and 9 July on all bands 3.5 to 28MHz. They will be on Rossa di Teulada is which counts for the Italian Islands Award. Likely frequencies to watch include: 3.66, 7.06, 14.16, 21.16, and 28.46MHz for SSB and 10kHz above the lower band edges for CW.

Mexican amateurs in Tijuana were due to use the prefix 4C2 in the period 11 June - 11 July to mark the 100th anniversary of the town and XE100TU will also be on the air. WA6VNR and wife N6RLE plan to be on the Cayman Is as ZF2AH and ZF2JT for most of this month. They will operate mostly 10kHz above band edges. *DX News Sheet* reports that CY0DXX, from

St. Paul Is, may be activated by VE1AL, VE1XT, and W5KNE during August, and that W6/GOAZT also hopes to be in the same area in late July and during August.

To celebrate the International Scout Jamboree taking place this summer on Prince Edward Is the PE1ARA station will be on the air as CJ1PEI for the whole of July.

### THE ROAD TO SAMOA!

Bing Crosby, VK2BCH, is in the Pacific area again. Some of his expedition is already over but he may still be on the air from American Samoa as VK2BCH/KH8. He was due to leave there on 7 July for Rotuma Is and to stay there until 8 August. He may also visit the Tokelau Is. He does not work split-frequency and will only QSL direct and not via the bureau - but please don't send cards to him until after August. Once again New Zealand amateurs are able to use the ZM prefix - this until the end of December and in connection with the Commonwealth Games and

New Zealand's 150th Anniversary celebrations.

VK0GC on Macquarie Is has been worked by Europeans on about 28.55MHz at 0730 via the short path. He also joins the ANZA Net on 21.205MHz at 0500 at weekends. VK0AE is also on the air from the same island and does some operation by list with VK2DEJ at 1030 on 14.206MHz. ZL7TZ, on Chatham Is, is reported by USA stations to be on 14.22MHz from 0200.

V85AA keeps a sked at 1400 every Sunday on 14.32MHz. If you need a contact with Brunei he does work all comers after this is finished.

### BAND REPORTS

A relatively short report from G8KG this month which goes as follows: "During April and the first weeks of May solar activity was on something of a plateau with the daily solar flux values fluctuating gently between 170 and 210sfu. This is probably best seen as a pit stop in the race to be the highest

cycle. Its immediate effect is to place Cycle 22 a little behind 19 but the comparison is complicated by the fact that at month 31 the present cycle was in a minor trough whereas both 19 and 21 were nearing solar peaks, a situation which may well have been reversed by the time that this is read.

There were some disturbed spells in late April and early May after which the geomagnetic field settled down to a mainly quiet period in which HF band conditions were generally good for the time of the year."

## VHF/UHF

NORMAN FITCH G3FPK

For most of May, the British and west-European weather was dominated by anticyclonic systems. Unfortunately, while much of mainland Britain enjoyed decidedly summery weather, the static nature of these high-pressure systems did not produce any remarkable tropospheric openings. The first

## HF F-LAYER PROPAGATION PREDICTIONS FOR JULY 1989

The time is represented vertically at two-hour intervals 00(00)GMT for each band, ie 00=0000, 02=0200, 04=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.

Time / GMT	28MHz	24MHz	21MHz	18MHz	14MHz	10MHz	7MHz	3.5MHz
/ GMT	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802
** EUROPE								
MOSCOW	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
MALTA	.....21.	.....21.	.....21.	.....21.	.....21.	.....21.	.....21.	.....21.
GIBRALTAR	.....	.....	.....	.....	.....	.....	.....	.....
ICELAND	.....	.....	.....	.....	.....	.....	.....	.....
** ASIA								
OSAKA	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
HONGKONG	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
BANGKOK	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
SINGAPORE	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
NEW DELHI	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
TEHERAN	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
COLOMBO	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
BAHRAIN	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
CYPRUS	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
ADEN	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
** OCEANIA								
SUVA/S	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
SUVA/L	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
WELLINGTON/S	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
WELLINGTON/L	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
SYDNEY/S	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
SYDNEY/L	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
PERTH	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
HONOLULU	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
** AFRICA								
SEYCHELLES	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
MAURITIUS	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
NAIROBI	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
HARARE	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
CAPETOWN	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
LAGOS	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
ASCENSION Is	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
DAKAR	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
LAS PALMAS	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
** S. AMERICA								
STH SHETLAND	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
FALKLAND Is	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
R DE JANEIRO	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
BUENOS AIRES	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
LIMA	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
BOGOTA	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
** N. AMERICA								
BARBADOS	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
JAMAICA	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
BERMUDA	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
NEW YORK	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
MEXICO	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
MONTREAL	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
DENVER	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
LOS ANGELES	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
VANCOUVER	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.
FAIRBANKS	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.	.....11.

The provisional mean sunspot number for May 1989, issued by the Sunspot Index Data Centre, Brussels, was 138.4. The maximum daily sunspot number was 149 on 8 May, and the minimum was 83 on 5 May. The predicted smoothed sunspot numbers for July, August, September and October are respectively: (classical method), 182, 184, 184 and 183; (SIDC adjusted values) 193, 195, 195 and 194.

Sporadic-E QSOs on 50MHz this year occurred on the 5th, while later in the month Band II FM stations in Spain were copied. There were no major auroras either.

## CONTESTS

During a recent meeting of the VHF Committee, we discussed ideas for promoting greater use of the 430MHz band. Cumulative contests are all very well but are at the mercy of conditions. A better idea is an on-going event, and the VHF Contests Committee – under the chairmanship of Bryn Llewellyn, G4DEZ – has adopted this approach.

So a 430MHz Activity Contest is scheduled for the whole of August under the General Rules as published in the January *RadCom*. Any two-hour period in the 24-hour GMT day may be chosen but each period must start on the hour. The exchanges are to include callsign, signal report, locator code and county, but no serial numbers are required. A maximum of five sessions may be entered.

There are two categories; fixed station, single operator and portable station, single operator. The -/P entrants may use different locations for each period but may not move during a session. Use radial ring scoring with county and country multipliers for each session. Entries must be submitted on standard RSGB VHF log sheets, starting a new sheet for each period, with covering forms 427-86 and 4422. A check log is required in accordance with Rule 14(d). Send your entries to G4DEZ (QTHR), postmarked no later than 15 September.

A similar contest has been planned for the 1.3GHz band to run for the whole of September. The adjudicator for that is G4NBS and the latest posting date is 15 October.

## RULE 16 – AGAIN

On behalf of the VHF Contests Committee, G4DEZ has written about modified Rule 16, the basic idea of which is to prevent cheating in VHF/UHF contests. For the final chapter in this saga, please refer to the Contests News feature in this issue.

## AWARDS NEWS RSGB

Awards Manager Ian Cornes, G4OUT, has been busy issuing parchments to members, including the following:  
Supreme awards to Dr Geoff Grayer, G3NAQ, on 13 April and Dr M K Franks, G4MKF, on 20 April.  
50MHz 100 Squares awards to Paul

Turner, G4IJE, on 16 Feb and John Stace, G3CCH, on 23 Feb.  
144MHz 250 Squares awards to David Dibley, G4RGK, on 11 March and Paul Pasquet, G4RRA, on 13 April.

432MHz 120 Squares award to G4RGK on 3 April.

70MHz 40 Squares award to G4MKF on 13 April.

Congratulations to all the above.

## REPEATERS

Some repeaters are subjected to a good deal of abuse and it seems surprising that certain of them are allowed to continue operating. I have received copies of correspondence between the secretary of one repeater group and the Society's Repeater Management Group. The former stated that its committee felt it was responsible for the running and maintenance of the equipment and was "...not able to censor the users." In reply, Geoff Dover, G4AFJ, Chairman of the RMG, pointed out that the licensee is the RSGB, the various groups being franchised to run the repeaters on the Society's behalf. Therefore it followed that the groups are indeed responsible for the traffic through these relays and for the behaviour of all users. He referred to a case where the DTI had requested the shutting down of a repeater because of abuse.

In this case, it seems that some sinners were group members whose bad behaviour appeared to be condoned by the committee, resulting in its losing the support of "...a large number of amateurs in its service area." Geoff outlined the steps the RMG suggested the group should take "...to demonstrate to all that amateurs are capable of keeping their own house in order."

The May issue of the Kent Repeater Group's Newsletter includes brief reports on the status of the eight repeaters which the KRG manages. It reveals problems with several of them, and one has to admire the dedication of members who give up their spare time to find and fix faults and generally maintain a good service.

## BEACONS

Brian Bower, G3COJ, IARU Region I Beacon Co-ordinator, showed me a list of Dutch beacons and I noticed that PI7CIS on 144.935MHz runs 50W and its keeper is PA0CIS. In the last week of May the Cornish beacon GB3CTC was still QRT. Meanwhile its 144.915MHz frequency has been occupied by a keyer signing FE6BPB, but G3COJ has no information about it. It sounds like a "private" keyer since all official French beacons have an

FX prefix. The Waterford beacon, EI2WRB, (IO62IG) is now QRV again on 144.920MHz. It is also transmitting on 432.870MHz using the same format.

On 50MHz, CX4HS told Ted Collins, G4UPS, (DVN) that CX1CCC (GF15) is a new Uruguayan beacon on 50.020MHz; it runs 5W to a ground plane antenna. The Greek beacon, SV1SIX, is now QRV on 50.040MHz; it was reportedly copied on 15 May by ZS3E (JG89).

## DXPEDITIONS

Martin Dale, G6ABU, has sent information about this year's expedition by the Derbyshire Hills Contest Group. It will be to the island of Harris in the Outer Hebrides, possibly WR07f (WAB square NG19), the dates being 6-18 August. The callsign will be GM4ZAP on all bands and it is hoped to dispense with the -/P suffix.

The team includes G4VVZ, G4YYB, G6ABU and G6HKS. QRO operation on 50, 70, 144 and 430MHz is planned with large antenna arrays. Some -/P operation is possible from WS (IO68). Tropo operating QRGs will be decimal 220 on all bands; on 144MHz, the CW MS operation will be on 144.144MHz with SSB on 144.444MHz. As in previous years, they will be QRV on 144.444MHz, 23-24GMT for random SSB MS devotees. All QSLs for last year's Scilly Isles operation have been dispatched. Anyone still lacking a card from earlier expeditions should contact G4VVZ who is QTHR. Further information and skeds from Martin (QTHR) or by telephone on 0602 626018.

Andy Adams, GW0KZG, is the 2nd Engineer on the Royal Research Ship "Challenger" and has written about a 15-month scientific research programme into the processes which affect the quality of the North Sea. Maritime mobile operation will be possible until 22 August in the 144MHz band using a Trio TR-9130 running 25W to an 8-element Jaybeam Yagi.

Between 24 July and 4 August, operation from several 'wet' squares is planned, as follows: 24-26 July JO12; 27th JO12, JO13; 28th JO24; 29th JO34; 30th JO25, JO34, JO35; 31st JO05, JO15, JO25; 1/2 August JO04, JO05 and on the 3rd and 4th JO04, JO05, JO13, JO14. Times are 11-12GMT and 16GMT on, but will always depend on Andy's workload. He will make initial calls on 144.300MHz and a working QRG of 144.31MHz. Some CW operation is possible. Andy stresses that this schedule could be changed due to

weather or operational delays, so anyone wanting a particular square should listen a few days earlier to see if there have been any changes. QSLs can go via the bureau or direct to: Mr A Adams, 2nd Engineer, R.R.S. Challenger, c/o The Natural Environment Research Council, Research Vessel Services, No. 1 Dock, Barry, South Glamorgan, CF6 6UZ.

Clive Penna, GM3POI/P, will be operating from mainland Orkney (OKE) from 27 July to 3 August from IO88OW, primarily on 50MHz, but perhaps with a modest station on 144MHz, too. Previous operation from 59° North proved quite interesting. Finally, reminders about the GB4XT activity from North Rona by the Five Bells Group from 12-19 July, and from Foula (IP80) by GM4AFF and friends from 9-14 August, both detailed in the June issue.

## AURORA FEEDBACK

Charlie Newton, G2FKZ, has written in response to GM0EXN's observations in last month's VHF/UHF concerning enhanced tropo conditions and auroral events. In essence, he doesn't think there's much possibility of any connection and writes:

"There are five points worth making. (1) The aurora, even if we include the very lowest level of the D-region, would be 60-70km high, whereas the highest levels for tropo are only a few thousand FEET, and at most times less than 2000. (2) It is true that noctilucent clouds have been seen to dissolve away when the aurora has been observed, but these are around 40km high. (3) The aurora is caused by particles, whereas tropo is the result of subsidence in the air mass and the lapse rates of water vapour and temperature. (4) I do not remember anyone reporting tropo openings during auroras other than openings that were there anyway, and which would have occurred without the aurora. (5) It is true that openings occur on the HF bands – what I call pre-auroral enhancements – but this is shortly before the aurora; there are very good reasons for this."

"A rather mundane explanation for this apparent tropo enhancement after an aurora could be that it brings on some of the big E-M-E stations. Their considerable ERP could be copied by tropo scatter after the aurorally reflected signals have gone. I would suggest checking the signal levels of distant beacons to test this hypothesis, and it would be useful to record this information in the log for future study."



## SPECTRUM ANALYSIS

Bill Tynan, W3XO, (TX) in his "The World Above 50MHz" column in the June issue of *QST*, covered the massive aurora of 12-14 March. It is obvious that it was an outstanding radio event for North American VHF types too. On 50MHz, stations as far south as New Mexico and Texas were able to participate. Many operators reported that some signals sounded more like Es than auroral. For example, KA1MFA (RI) worked N5KW (OK) at S9 with no tone A, and others in the 4th and 5th call areas, some with tone A, some without. At 2200 on the 12th he copied beacon OX3VHF, which is about 2800km from Warwick.

On 144MHz the event was very widespread too, with many contacts made around the 1700km distance. W2CRS/0 in Colorado (DM78) made 88 QSOs with 24 states and 54 squares. Some auroral-E propagation was observed on this band. Visually, the aurora was reportedly seen just south of Cuba and in Belize - which is about latitude 17.5° north.

In the May 1989 issue of *Scientific American* there is a fascinating article entitled "The Dynamic Aurora" by Syun-ichi Akasofu. The author is "...internationally recognised for his pioneering work in auroral physics..." and is the director of the Geophysical Institute at the University of Fairbanks, Alaska. My thanks to Ted Honeywood, G3GKF, for bringing it to my attention.

## METEOR SCATTER

The British Meteor Society's Radiant Catalogue shows several showers that could prove useful in July; eg, on the 12th, four showers should peak. One of these is the Nu Geminids with an hourly reflection rate (ZHR) of 60. The Right Ascension is 98° and the Declination 21°. I have run this on my PCW8512 and it shows the radiant to be above the London horizon between 04 and 19GMT. Best times are: NE/SW 09, E/W 11, SE/NW 13 and N/S 15GMT. Data for the other showers will be similar.

The next major shower is the Perseids (RA 45° DEC 59°) which is available all day, peaking around 12 August. Reflection efficiencies exceed 50% as follows: NE/SW 08-18, E/W 10-01, SE/NW 18-04 and N/S 08-13 and 22-03GMT.

I would like some feedback on this method of presenting MS data. Regular MS operators probably use a computer to help them choose the best times for skeds, so may not be very interested anyway. The data given are intended for newcomers

to the mode, who may not have access to a suitable computer and software.

## 50MHz

First the news from overseas readers. On 6 May I received three sheets of information from Hong Kong, listing activity along the southern coast of China, up to the end of March. There was neither a covering letter nor any sender's address on the envelope, so I am not sure who to thank. The writer asked that the following QSL details be passed on: VS6CT via KA6V or JA4ENL; VS6DO via WA3HUP and not K4ICA; VS6DX and XX9DX via WA4BCQ; VS6DO via G3IFB; VS6WA via W7TIR; VS6WV via K0TLM; XX9CT via KA6V; XX9JN via KU9C and XX9KA via KC9V. Cards for VS6UP and XX9TDM should be sent to the Call Book QTH and not via W7TIR. Please note that the VS6 QSL Bureau cannot handle cards for non-resident XX9s. (XX9 is Macao).

I was delighted to hear from Mal Geddes, Z23JO (G2SO from decades ago), the only station active on the band from Zimbabwe. He has been using 10W since last Christmas from his QTH 100km NE of Harare at 1200m above sea level. Countries worked include CT1, CT3, EA8, F, G, I, PA, S7, SV, T7, YU, ZS3, ZS6, 5B4, 5N and 9H, some of them crossband, of course. (Just unearthed your ZE3JO QSL for a CW contact we had on 28MHz on 7/9/1958, Mal).

Arnold Mynett is another very well-known VHF enthusiast whose British call was G3HBW, under which he achieved many 'firsts' when the RSGB VHF Awards were introduced in 1961. His South African call is ZS6BMS (KG44) and his QTH is to the SE of Pretoria, about 900ft above the city. Most of the active ZS6s are in the greater Johannesburg area but Arnold finds that, being a little further north, QSOs with stations north of the equator seem easier to make.

His station comprises an Icom IC-740, home-built transverter, and a PA using two MRF316s giving 200W output on SSB and 150W input on CW. The antenna is a home-made 6-element Yagi at 10m AGL. TEP occurs nearly every night in the Sept. to Nov. and Feb. to May periods, but E/W propagation is almost non-existent from his QTH. Up to 4 May, he had contacted 185 British stations in all seven countries, including GD3AHV on 25 Feb which was a 'first'. Two other firsts were with T77C the same day, and Z23JO on 1 April. Arnold may have made the first ZS/SM QSOs on 19 March with SM7BAE and awaits confirmation.

SM7BAE and awaits confirmation.

5 May was a 'red-letter day' bringing an extended opening to NW Europe between 1455 and 1712. 61 stations were worked, mostly Gs, but including EI5FK for country number 33. Between 1613 and 1710 the next day, ZS6BMS worked 13 Gs including G14OPH, thought to be Es-assisted TEP mode.

Highly selective openings seem to be a worldwide feature of 50MHz propagation. On 6 April, stations in the Pretoria area all worked the same, five KH6s who were in one small area of the Hawaiian Islands. At the same time, ZS6LN, who is 200km NNE of Pretoria, worked five KH6s but they were in a different area some 200km away from the former; neither group heard the other group's QSOs. A few days later, in another KH6 opening, the Pretoria group worked the group they could not hear on the 6th. KH6 is almost the Antipodes for ZS6 operators, by the way.

Next the input from UK readers, beginning with Dick Hyde, G0LFF (ex-G1CWP) (SXW) who uses a Yaesu FT-726R with 50MHz module and a 5-element Yagi by Tonna. He

enters the Squares Table with 83 on the band. Unfortunately the news of his proposed operation from Gibraltar in June came far too late for any publicity in this column.

Mike Devereux, G3SED (HPH) was QRV on 28 April from 1225 and worked 14 South African stations: ZS6XJ, 4S, 4AAB, 6LN, 4NS, 4RP, 6BMS, 6LW, 6BPB, 6WB, 6CGS and 3E, plus ZR5AL and ZR6A up to 1800. Either it was a very selective opening again, or nobody else was on the band. On 3 May at 1817, LU7DZ was heard working G3JVL and G4JCC till 1830. Mike is only 11km from JCC but could not work the LU.

Ela Martyr, G6HKM (ESX) reports the band livening up during the afternoon of 5 May, when she contacted ZS6LN (KG46) for a new square. A CQ call was answered by ZS6XJ, then within the hour she made Es QSOs with 9H1GB (JM75), CT1DTQ and EA1MO. Karl Lamford, G6ODT, (NHM) sent a map showing the 37 squares heard during the aurora of 13 March; best DX was OH7AXP (KP32WH) at 2,010km. His RX system comprises a converter, Kenwood R-500 and



**CX4HS** LOC: GF 17

---

CONFIRMING NICE QSO WITH  
 RADIO G3OUF ON 50.110 MH AT 17.16 GMT  
 OPERATOR DAVID ON 21-4-89 SIGS R.S. 5-2

TRANSCIVER: <u>IC 505 - A1015</u> ANTENNA: <u>617-63</u> REMARKS: <u>TNX FOR THE</u> <u>1ST CX - G AB.</u> <u>ALBERTO E. SYMONDS</u> BEST 73 DX PSE - QSL - TNX P. O. BOX 274 - MONTEVIDEO U R U G U A Y	MODE: <u>2XSSB</u> OTHER: ARRL HIDXA EUDXF CUV FDXF NCDXF QCWA IDXF UDXG INDEXA RCC DIG: 3560 10X: 33620 SMIRK 5395
--	--

First 50MHz UK-Uruguay QSO, between G3OUF and CX4HS.

5-element Yagi by Tonna.

Steve Damon, G8PYP (DOR) worked ZS6BMS at 1622 on the same day and also suggests it was an Es-assisted TEP path. He contacted 9H1GB at 1655 and heard CT1DTQ and EA1MO. Next day he worked DL4MDQ (JN58) crossband to 28MHz; on the 8th F1AAI (IN99) on tropo FM; on the 11th OZ9QV (JO65) crossband to 28MHz and on the 14th F1TC (IN98) by tropo and IK5EHR (JN53) crossband to 28MHz. The crossband QSOs were via Es.

Brian Waddell, GM4XQJ (CTR) is the RLO for Central Region and has something to say about the stations allegedly running high power on the band. He feels that these operators are preventing the normal-power stations from working very much at all, and that their cheating is making a mockery of the Society's awards. He uses a Kenwood TS-130V, home-built transverter and amplifier delivering 12W to a 3-element Yagi at 43ft. This combination has brought QSOs with W, VE, LA, PA, F and OH stations and an auroral contact with G3SYG, both running only 2W output. Brian adds that "...

28.885MHz has been the QRP SSB calling/working frequency by international agreement for at least ten years. Many QRP stations are crystal-controlled and are getting very angry when they are told to move off the 50 MHz crossband frequency." I have not heard this complaint before, nor can I find any reference to 28.885MHz being a QRP frequency in the Amateur Radio Operating Manual, which only mentions 28.060MHz. Can anyone shed any light on this?

G4UPS's information dropped on to the doormat at the eleventh hour. Ted reports: ZS3KC (JG77), a new station QRV from Namibia; on 27 April the Greek authorities issued seven permits for 25W operation on 50-52MHz for one year. Initially, only stations within a 50km radius of Athens were covered, but any amateurs applying for permits will get them; Hungary is now available crossband in the guise of HA1AG (JN87TQ); 9L1SB is QRV from Sierra Leone - further details awaited; EL2MR will soon be operating from Liberia. (Late flash - for a bit more on the Greek 50MHz permit situation, see the News pages - Ed)

On the 'skull and crossbones' front, several Italian stations are operating in-band but are unlicensed - tut tut. Ted heard IR5ITU on 20 May sending "Testing de IR5ITU" on 50.072MHz. He called him and the chap said he was sorry but he was just testing! SV5TS was also widely worked on the

same day, but is reckoned to be illegal.

Ted suggests the tropo capability of the band is underrated; he's been having daily QSOs with G3CCH (HBS) by this mode, a QRB of 349km. He heard/worked ZS stations on May 1, 3, 5, 11, 14-16 and 18. Highlighted also were: 5 May EA4CGN at 1538, the first crossband Es QSO of the season; at 1600 a QSO with EA0VY at RST599 each way, described as "... a mystery station, very bad CW"; 11th at 1944 5B4CY heard at RST339; 13th ZB2VHF at S9+; 16th a QSO with 5H1HK (IK93) at 1837; 20th at 1457 a crossband contact with G0KPW/EA8 (IL18RJ); at 1602 IOJX heard at S9+ then he QSYed to 28.885MHz; at 1949 SV5TS.

G4UPS has seen a draft copy of PA3EU's European Activity List which includes over 1400 UK stations who are operating on 50MHz. When the draft has been updated, Ted plans to photocopy it and send it "... to all information outlets."

## 70MHz

Stanley Sparks, G3JLY (LCN) reports activity on the increase. From the beginning of April he worked nine different stations in the Sheffield, Wirral, Leicestershire and Kent areas, using 3W and a 4-element Jaybeam Yagi. G8CVF (MSY) has been heard and worked on many evenings, but CW stations are rarely copied. His QTH is in a very flat area but he often hears the Angus beacon, so perhaps northern stations should beam his way. The Buxton beacon is always strong and very useful for converter alignment. He thinks that 3W is insufficient power and that indoor antennas are seldom effective on 70MHz.

Ray Scaife, G3RSB, (CBA) says there are about half a dozen stations active on FM in the north Lancashire and south Cumbria area, using 70.26 and 70.45MHz. There is some mobile operation, too. G4OUT operates on CW and 'phone and now has an entry in the annual table to keep John Acton, G1DOX, (AVN) company.

Derrick Dance, GM4CXP, (BDS) has re-erected all his antennas after they were "grounded" by the gales in mid-February. He will be QRV on 70MHz as soon as he has discovered why the PA stage in his transverter is misbehaving.

## 144MHz

Probably the first Sporadic-E QSOs this year were made on 5 May. Colin Morris, G0CUZ (WMD) learned from DL4MDQ (JN58) that

he worked CT1BSQ (IM69) at 1548. This suggests a reflecting region over SW France, so stations in the West Country might have had propagation into EA6. G0CUZ is very active on all modes and has worked 301 squares in 48 DXCC countries - a fine achievement, especially since he does not regard himself as one of the "big guns." As I4YNO once put it, more of a "little pistol!" For the last year, Colin has been getting good results with a Heliax-fed 5-element Yagi. His system consists of a Yaesu FT-726R, GaAsFET preamplifier - 0.7dB noise figure - and a 4CX350 PA. In the April Lyrids meteor shower Colin was QRV on the 22nd between 04-07GMT and completed 'easy' CW QSOs with OZ1DJJ (JO65), IK0BZY (JN61) and SM5CBN (JO78). At 00GMT on the 23rd he worked YU1EXY (JN64) and reckons the shower was average. On 5 May, in the very underestimated Eta Aquarids shower, Colin completed with I1DMP (JN35) at 05 and at 09GMT with I5YDI (JN53) at the 11th attempt. On the 6th, he gave IK1JXY (JN44) his first MS QSO at 05GMT and again the shower was average.

Via tropo on 1 May G0CUZ worked EI3VVN/P (IO43) and on the 7th, in the IARU contest, conditions were well up to the south and brought QSOs with EA1BCB (IN63) and EA2ARD (IN93) in the morning. In a short aurora at 2140 that evening he heard GM4UFD and GM3NHQ weakly. G6HKM mentions QSOs with GB4IOS (SRK) on May 1 and Y26QI/P (JO51) at 07GMT on the 5th.

G8PYP found G4CJG/MM in IO60 on 1 May for a rare "wet" square. In the contest on 6/7 May, Steve worked assorted F, ON and PA stations on the 6th and EA2ARD/P on the 7th. Most of John Lincoln's (GM0JOL) (HLD) QSOs are via auroral mode but on 1 May he joined with near neighbour GM0EXN and GM6WOF (OKE) to work GM0AVR/P who was on Housay Island (SLD).

In very limited operating from G3FPK, the only QSOs of note were on 1 May with GB0IOS (SRK) and EI3GE (WKW); 2nd OZ1DOQ/P (JO64) who was working scores of Gs in the monthly Scandinavian Activity Contest, and on the 11th EI4VBM/P (CRK) in IO61; his English call is G3UAX.

## 430MHz

During a QSO on 144MHz with Bob Hamer, G6NVQ (MSY), we discussed the lack-of-activity syndrome on 430MHz. He wonders

if TVI is one factor which keeps people off; any comments? Also he thinks that the use of very narrow beams could give the impression of flat conditions. May be we should consider smaller 'search' antennas with broader beam widths. Bob also mentioned hearing nets in which no calls are given; the participants do not appear to welcome strangers.

G6HKM operated in the contest on 6 May which brought Ela's only new county for the month - GW0DVP/P (CWD). In a 144MHz QSO with EI9GO (IO62), G8PYP learned that Eamonn was QRV on 430MHz, so was able to work him. During the 6/7 May contest, Steve added PE0MAR/P (JO21), F6APE (IN97) and FF6KFP/P (IN99) to his squares tally.

G6ODT has been on the band since last July; up to mid-May Karl had made 318 contacts, which he thinks is not bad for a quiet band. His equipment comprises a Yaesu FT-790, producing one watt, and his antenna has a 15.5dBd gain. In the contest, the best of his DX were ON7WR/A (JO20), DK0VS/P and DJ3IW/P (JN39), ON1BLY (JO10) and PE0MAR/P.

## 1.3GHz

The only contributor mentioning 1.3GHz activity is G6HKM who worked G8OPR (HPH) on 4 May. In the contest Ela collected nine more counties and a couple of countries, GW and PA, for this year's table. Dutch QSOs were with PE0MAR/P, PA0WWM, PA3BLS and PA0PLY.

## BELGIUM ACTIVE ON 10GHz NB

A brief slice of news on 10GHz activity from Mike Dixon, G8PFR: Simon, G3LQR (Woodbridge, Suffolk) recently worked ON7YK two-way on 103GHz narrowband; he was heard by ON6OO and worked crossband to 2.33GHz. As far as I recall, this is the only Belgian activity on this mode and band in recent years. Maybe with the appearance of these two stations, more activity will be encouraged both in ON, and at least in East Anglia!

## DEADLINES

If propagation runs true to form, there should be reports of Es events in early June in next month's VHF/UHF. The deadline for your letters, telexes and E-mail messages for the September issue is 22 July and for the October edition, 26 August.



## SWL

BOB TREACHER BRS32525

Mid-April saw the fine expedition to Revilla Gigedo (XF4L) where the group was particularly active on 28MHz, providing a new country for several listeners. Mid-April also saw the German trip to Conway Reef, which it is hoped will count for DXCC; 14 and 21MHz were the bands where that expedition was reported. As mentioned last month, ZS8MI had been heard, mainly on 14MHz, but one listener heard them around 28.400kHz at about 1900. On the CW front one or two listeners reported FW0BX operating from Wallis Island. Another call appearing in logs recently was VK0GC. For the early birds among us, he had been heard in the ANZA Net on 21.205kHz at 0500. Later, he had been a good signal on both 28 and 14MHz — Jim Smith VK9NS handles the cards.

Moving into May, Vanuatu (YJB) was activated by a group of JA's and had been heard by some keen types on CW using YJ0AYT. The major trip at the time of writing was that of VK9NS and KN6J to Banaba Island. That is what used to be called Ocean Island and found its way into some listener logs in the '70s thanks to VR1L and VR1O. We will have to wait and see whether it gets separate country status.

These, of course, have been the major events of the last month. There has been much good DX on offer and here is a selection of the calls which have been reported: A35AA, BV2FA, BY1QH, CE0MTY, D44BS, D68CY, HC8GR, KC6JC, S01A, TL8TG, TN4NW, VP8BUB, Y11BGD, ZD9BV, 3B8CF, 3B9FR, 3C1MB, 3X1SG, 4S7UU, 6W6JX and 9K2BC; all of these were heard on SSB on the HF bands.

## OTHER NEWS

G4OHX has asked me to make several points with regard to QSLing direct. First, surely it goes without saying that if stations expect a QSL card returned direct, return postage *MUST* be sent. It appears that some amateurs (and listeners) are sending cards direct with just an envelope enclosed.

Second, it seems that some DX stations are attempting to make money out of QSLing. If a DX station receives cards direct from, say, a dozen G's, there is some evidence to suggest that return cards are now being sent back to one of the G's who then has to either distribute the cards himself or put them in the bureau. I have first hand proof of this myself, as



last year, I received cards back from one un-named DX station and had to distribute a number of cards around the DX fraternity. Let's play the game folks!

A letter from Ray, G3ALI (Robert Small's father) pointed to a mistake in the May column. I referred to Robert having his Dad's beam to help him pull in the DX, whereas Ray points out that he only has dipoles for 28-14MHz and an 18AVT for 7 and 3.5MHz. These antennas have got Ray onto the DXCC Honor Roll at 335 confirmed, he is No. 2 G in IOTA (behind G3KMA), and only needs KH6 and KL7 on 3.5MHz for 5BWAZ. He is obviously proud to have achieved these feats on 'simple' antennas.

Ray also mentioned that he has to thank David Whitaker, BRS25429, for VP8BUB (South Georgia) on 7MHz. David phoned the 'Voicebank' one evening about 2345 to report the VP8. A few minutes later Ray phoned in and heard the report and managed to contact him at 2356. This shows the true value of the Voicebank and the dedication of one listener in informing his licenced colleagues of a real goody so late at night.

G3FWE had written about 'International Marconi Day' and the

new Marconi 'Spectrum Award' (above). There have been no SWL claims to date — something which the Marconi Society wishes to change. Basically, the requirements for the Award are fairly complex and an SAE to G3FWE would be by far the safest way of ensuring your claim complied with the rules. A copy of the Award is included here. In passing, the Society also administers claims for the 'Mary Rose' Award, where claims are approaching the 400 mark. Details of this Award, and claims for it, can be sent to G3FWE.

## DX NEWS

As Zone 23 is quite rare, it is worth noting that RB7GG acts as manager for RV0YF. Cards for UA0KK, UJ8XA, UA0ZZ, RL9MM, RH8AA, RH8AX and UG6GM are also handled by this station. His address is PO Box 73, Kherson 325000, USSR.

ZF0Y is being aired in all the big contests this year by ZP5JCY. QSL via Box 416, Asuncion, Paraguay.

Another big expedition to the Sahara Democratic Republic (S0) was likely to have hit the bands at the end of May. OH2BH and OH3UU were to have concentrated on CW this time. Another

Laccadives expedition is likely later this year too, as is another trip to XF4.

New Zealand amateurs can once again use the ZM prefix. This time in connection with the Commonwealth Games to be held early next year and the celebration of the country's 150th year. There is a special event station to hear or work — ZM14CG — which will be active for the Games. As you would expect, there is an Award too. It is available until 10 February next year and is to promote the Games and the 150th celebrations. You need five ZM1's and one in each of ZM2, 3 and 4, plus one Commonwealth country in Regions I, II and III — making 11 in all. Log extracts only to ZL1ALE at 63 Red Hill Road, Papakura, New Zealand.

## VHF NEWS

Little to report this month. Although at the time of writing, the Sporadic-E season appeared to be getting underway. 15 May saw G's working crossband to Italy, and Italian TV was seen and heard at around 1815z GMT. On the 16th, 9H4W was heard on 50MHz, and Italian TV was again audible. Next month will obviously see a much greater influx of information.



# Microwave Modules

## MML 144/100-S

£149 (c)

- ★ 100 Watts output power.
- ★ Suitable for 10 or 25 Watt transceivers.
- ★ Linear all-mode operation.
- ★ Straight through operation when turned off.
- ★ Ultra-low noise receive preamplifier — front panel selectable.
- ★ Equipped with RF vox and manual override.
- ★ Led status lights for power, transmit and preamp on.

## MML 144/30-LS

£105 (B)

- ★ 30 Watts output power.
- ★ Suitable for 1 or 3 Watt transceivers.
- ★ Linear all-mode operation.
- ★ Straight through operation when turned off.
- ★ Ultra-low noise receive preamplifier — front panel selectable.
- ★ Equipped with RF vox and manual override.
- ★ Led status lights for power, transmit and preamp on.

## MMT 50/28-S

£295 (B)

- ★ 20 Watts output power.
- ★ Input frequency range 28-30MHz.
- ★ Output frequency range 50-54MHz.
- ★ Input level range 0.1-750 milliwatts.
- ★ Modes:- SSB, FM, CW, FSK or AM.
- ★ 18.5 dB conversion gain.
- ★ Exceptional large signal receiver performance.
- ★ RF vox operator adjustable from 20 milliseconds to 1.5 seconds.

## MMT 70/144

£149 (B)

- ★ 10 Watts TX output.
- ★ Output frequency range 70-72MHz.
- ★ Input frequency range 144-146MHz.
- ★ Input power range 10-500 milliwatts.
- ★ Low noise receive converter.
- ★ RF vox provides automatic changeover.
- ★ Input modes:- SSB, FM, AM or CW.

## MMT 50/144

£295 (B)

- ★ 20 Watts output power.
- ★ Input frequency range 144-148MHz.
- ★ Output frequency range 50-54MHz.
- ★ Input level range 150 milliwatts-15 watts.
- ★ Modes:- SSB, FM, CW, FSK or AM.
- ★ 10 dB conversion gain.
- ★ Exceptional large signal receiver performance.
- ★ RF vox operator adjustable from 20 milliseconds to 1.5 seconds.

## FREE CATALOGUE

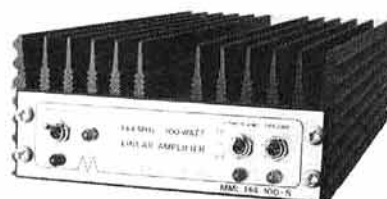
We have many other linears and transverters in our range as well as ATV and weather satellite equipment. Just write or 'phone and we will be pleased to send you a **FREE** catalogue which contains detailed descriptions and the full specifications of our products.



**MICROWAVE MODULES LTD.**

Brookfield Drive, Aintree, Liverpool L97 7AN, England.  
Tel: 051-523 4011. Telex: 628608 MICRO G. Fax: 051-523 8899.

Callers are welcome but it is advisable to telephone in advance to ascertain stock levels.  
Our hours of business are:-  
Monday-Friday, 9-12.30, 1-5.00 p.m.  
(Post & Packing B = £5, C = £6).



**Microwave  
Modules**

RF Amplifier  
and Transverter  
Catalogue



**ALL PRODUCTS  
ARE FULLY  
GUARANTEED  
12 MONTHS**





# KENWOOD

amateur radio equipment

## When only the best will do

### The TM-721E — Double Vision



When I originally wrote about the TM-721E, I said that this rig re-defined the whole concept of the dual band 2M/70CM FM transceiver, but it was Richard Hillier our manager here in Matlock who came to me and said "did you know that the TM-721E is unique?" Then I realised what a revolution it was. (Well, no one can know everything can they?) The unique feature is the ability of the TM-721E to listen simultaneously on both 2 metres and 70cm, the balance between the two bands being a simple audio slider control on the front panel. It's certainly an eye opener (or should that be ear opener?) to be able to monitor both bands at the same time, with two frequency readouts and two signal strength meters. Add to that the full duplex capability, cross band operation, and the Kenwood design excellence as well, and you have the recipe for success.

A feature which I particularly like is the automatic band change function which lets you monitor both bands in quiet solitude with the squelch controls set. When a signal appears on either band, that band is automatically transferred to the "Main" display position, with the other band being transferred at the same time into the "Sub" display. Doesn't sound much when you read about it, but it's amazingly useful when you try it out — and try it out you should, at one of our branches around the country.

Operating the TM-721E is so easy that you tend to forget just how versatile a transceiver it really is. Of course, the engineering behind it all is unquestionably the best in the business — and Kenwood have made it their business to give you the best. Not for them the bent tin chassis held together by self tapping screws; the TM-721E is built on a precision die cast backbone chassis which gives not only real mechanical strength, but also the long term stability of all RF adjustments necessary for long trouble-free service under mobile conditions.

Remember that the TM-721E has 45 watts out on 2 metres, and 35 watts on 70cm, which makes it a particularly powerful package in either mobile or home station use. As always, a detailed descriptive brochure is available on request, and if you send off the postage shown on the coupon below, specifying particular interest in the TM-721E, we will send back a full Kenwood colour catalogue and lots more reading matter for your perusal.

When looking at the TM-721E as I wrote this text, it struck me that whilst it may be fashionable in some quarters to denigrate modern amateur radio equipment, these newer transceivers are actually amazing achievements. Those of you who visit our showroom at Matlock will have seen our display of interesting and historic equipment, one item of which is a VHF transmitter capable of generating a cool 40 watts of AM on the air band. Generating such power in the late 1940s involved a six foot high rack full of VERY heavy units, no less than 13 separate tuning controls, and really dangerous voltages floating around inside. After half an hour or so tuning this beast, you had a single channel up and running — on transmit only. There may be less personal involvement in tuning the rig these days, but it's certainly easier to carry the rig around in your car, and I for one am very happy that the days of "CQ, CQ, Tuning high to low" with the car careering from side to side down the Great North Road are all behind us. (So are the other road users).

"Non progredi est regredi," as the Romans were reputed to have said. (Not to advance is to go backwards).

73

John Wilson  
G3PCY/5N2AAC

**TM-721E £699**

## LOWE ELECTRONICS LTD.

Chesterfield Road, Matlock, Derbyshire DE4 5LE Telephone 0629 580800 (4 lines) Fax 580020 Telex 377482  
Shops in GLASGOW Telephone 041-945 2626, DARLINGTON Telephone 0325 486121, CAMBRIDGE Telephone 0223 311230,

# 25 years in amateur radio

## DAIWA RF POWER METERS



### NS-660P P.E.P. METER

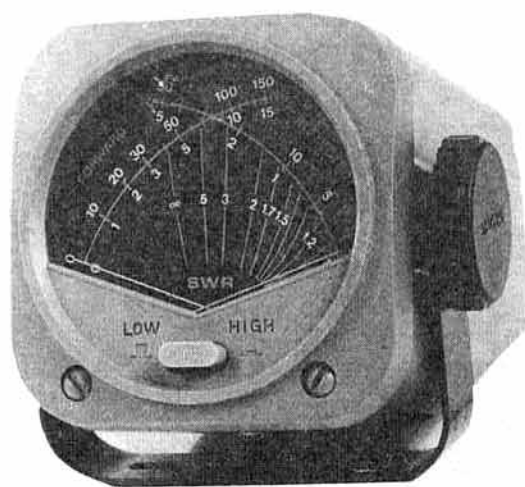
What's so special about "cross needle" R.F. power metering? Well, it's typically Daiwa to go direct to the heart of the matter and develop a system which will give you the true value of forward power, reflected power, and SWR all at a single glance. The elegant simplicity of the idea hides a great deal of thought, which of course is the hallmark of Daiwa products.

You will see from the photographs that the meter displays have two scales, one reading forward power, the other reflected power. Since SWR is calculated using these two values, Daiwa have arranged the meter pointers so that SWR is shown at the crossing point of the two meter needles.

Why don't other makers use the idea? Basically it's a question of power meter accuracy. The usual type of single or twin meter "SWR/power meter" uses a simple strip line to measure the VSWR on the transmission line. You will note that I have said "VSWR", and this is important. These so-called power meters are in fact only measuring the voltage standing wave and in order to display power, you need to monitor both voltage and current in the line. Daiwa meters of course, do just that, and consequently are very accurate indeed. The cheaper so-called power meters depend for their accuracy in being terminated in a resistive load, and exhibit wild inaccuracy when terminated in a reactive load. In other words, when the indicated VSWR on the meter is other than 1:1, their accuracy is quite badly affected.

To summarise: the Daiwa cross needle power meters give you easy, unambiguous readings at a glance, and what's more those readings are accurate even in lines displaying high SWR, and since Daiwa meters measure true power, they are accurate at any point in the feedline from transmitter to aerial.

As with all Daiwa products, their meters show the Daiwa approach to design, combining accuracy, ease of use and interpretation, and that indefinable feel of quality which is the sure sign of a good product. Once owned, never discarded.



### CN-460M

### CN-410M

CN410M 3.5-150MHz 150W £61.72  
CN460M 140-450MHz 150W £65.40  
NS660P 1.8-150MHz 1500W £115.00

**Note** The NS660P measures average power and P.E.P. with a "hold" facility to memorise the actual peak power. Also measures up to 1.5kW forward power.

## Frequency counters by OptoElectronics

OptoElectronics specialise in high quality hand held frequency counters for the professional communications and research market, but we think that the radio amateur will appreciate just how useful the counters can be in the station or in the field. The original 1300HC model was an undoubted winner, but OptoElectronics have now introduced a new range with even more performance than before.



### 2400H 2.4GHz frequency counter

A new addition to the "shirt-pocket" frequency counter range from OptoElectronics, the 2400H features measurement capability from 10MHz to 2.4GHz with eight digit display, internal rechargeable batteries, selectable gate times, and high sensitivity.

Sensitivity is better than 10mV from 27 to 2100 MHz and better than 5 mV from 60 to 1800 MHz. This sensitivity allows the 2400H to be used for "off-air" measurement of even low powered RF sources, using the optional telescopic antenna, and its light weight and small size make the 2400H a real carry round friend.

The 2400H has internal batteries which can be charged from any 9 to 13Vdc dc source. The counter can also be powered directly from a nominal 12V dc supply, so it is really versatile.



### 1300H/A high sensitivity counter

The new 1300H/A counter carries on where the successful 1300H left off. With a measurement range of 1 MHz to 1300 MHz, the 1300H/A is ready for a wide variety of applications, but the outstanding feature is a sensitivity below 1mV from 30 to 400 MHz thanks to the inclusion of a surface mount pre-amplifier. This makes the 1300H/A usable for off-air measurements at up to 500 feet from a typical 150MHz 1W transmitter.

Power supply is by internal chargeable batteries, and these can be recharged from any 9 to 12 Volt dc source; and indeed the counter can be directly powered from the same source. Weighing only 9 ounces complete with batteries, the 1300H/A can literally be carried in your pocket, and extend accurate frequency measurement to any location you want.

Name \_\_\_\_\_  
Address \_\_\_\_\_

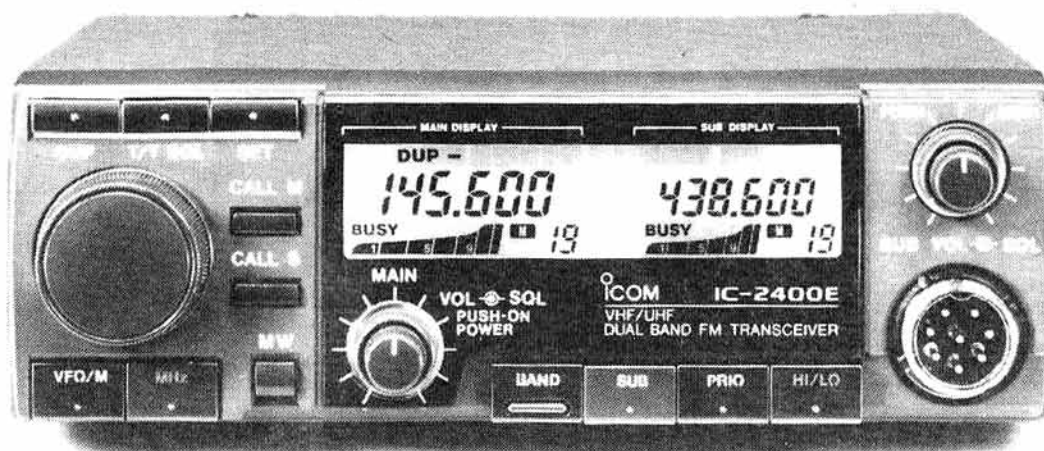
Post Code \_\_\_\_\_  
**FREE INFO.**  
Don't forget £1  
to cover postage.  
R.C.

All branches are closed all day Monday.  
**S. WALES (BARRY)** Telephone 0446 721304, **LONDON** Telephone 01-429 3256 **BOURNEMOUTH** Telephone 0202 577760



# ICOM

## DUAL-BAND FM TRANSCEIVERS



**IC-2400**  
**144/430MHz**  
2mts 45W  
70cms 35W

These new models from ICOM add a new dimension to the mobile scene. Enjoy the freedom of the open road and experience the advantages of simultaneous dual-band operation.

They are capable of receiving on both MAIN and SUB bands at the same time. While operating on one band, you can monitor a second band for activity. It is very easy to switch between the MAIN and SUB bands allowing you to reply immediately to calls received on either bands.

Full duplex operation lets you transmit on one band while receiving on the other for telephone style contacts. Each band can be independently

regulated using separate volume and squelch controls.

Both models incorporate 20 memory channels and a call channel for each band, these memory channels store all the information needed for repeater operation.

For 23cms operation the IC-2500 features a AFC function which automatically tunes the receive frequency to the transmit station frequency. The AFC function eliminates the need to retune if a stations transmit frequency is off centre.

**IC-2500**  
**430/1200MHz**  
70cms 35W  
23cms 10W



**Icom (UK) Ltd.**

Dept RC, Sea Street, Herne Bay, Kent CT6 8LD. Tel: 0227 363859. 24 Hour.

Count on us!

# IC-751A HF ALL-BAND TRANSCEIVER



- **Amateur Bands 160m - 10m.**
- **General Coverage Receiver.**
- **105db Dynamic Range.**
- **100W Output (40w A.M.)**
- **32 Memories.**
- **Electronic Keyer.**
- **CW Semi/Full Break-in.**
- **HM36 Microphone.**

The ICOM IC-751A was created for the ham operator who demands high performance whether entering contests, chasing DX or just simply enjoying the shortwave bands. It is an all mode solid state transceiver with a host of features designed for the crowded HF bands of today.

Additional features include 9MHz notch filter, adjustable AGC, noise blanker, RIT and XIT. A receiver pre-amp and attenuator provides additional control when required. The FL32 9MHz/500Hz CW filter is fitted as standard with CW sidetone on Rx and TX modes. On SSB the new FL80 2.4Khz high shape factor filter is fitted.

The transmitter is rated for full 100% duty cycle with a high performance compressor for better audio clarity. With 32 memory channels and twin VFO's, scanning of frequency and memories is possible from the transceiver or the HM36 microphone supplied.

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

Options available:- PS35 internal AC power supply, PS15 external AC power supply, EX310 voice synthesizer, SM8 desk microphone and SP3 external loudspeaker.

**Helpline:** Telephone us free-of-charge on 0800 521145, Mon-Fri 0900-13.00 and 14.00-17.30. This service is strictly for obtaining information about or ordering Icom equipment. We regret this cannot be used by dealers or for repair enquiries and parts orders, thank you.

**Despatch:** Despatch on same day whenever possible.

**Visa & Mastercard:** Telephone orders taken by our mail order dept. instant credit & interest-free H.P.





**SMC**

# South Midlands Co

S M HOUSE, SCHOOL CLOSE, CHANDLERS FORD INDUSTRIAL ES

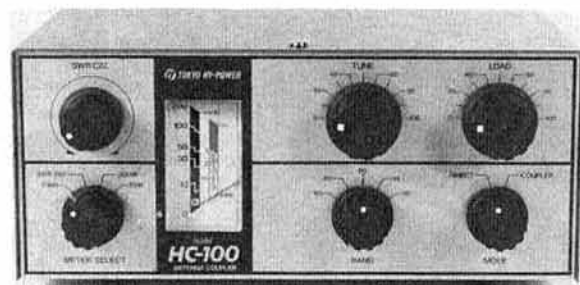
Opening hours 8.45 pm-5.15 pm Monday-Thursday 8.45-5.00 pm Friday, 9.00 am-1.00 S

**FREE FINANCE — buy now, save up to 36.9% — 0% Interest Subject to Status**

## TOKYO HY-POWER PRODUCTS AND ACCESSORIES

### TRANSCEIVERS

HT106 6m CW/SSB 10W PEP.....	£325.00
HT120 20m CW/SSB 10W PEP.....	£299.00
HT180 80m CW/SSB 10W PEP.....	£299.00



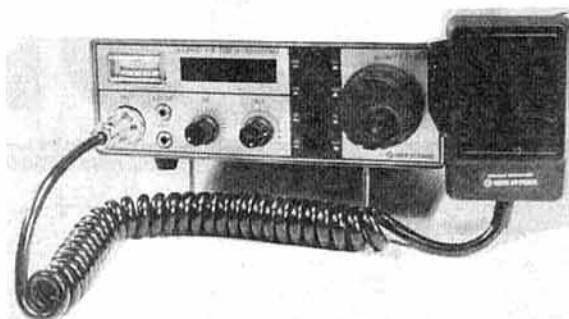
### ANTENNA TUNERS

HC200A 80-10M 200 W PEP.....	£115.00
HC400L 160-10M 350 PEP.....	£199.00
HC2000 160-10M 2KW PEP.....	£359.00



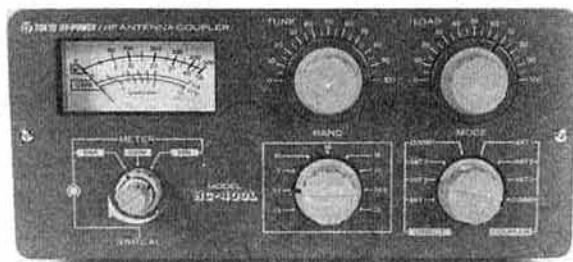
### VHF/UHF AMPLIFIERS

SAGRA600 2M 25W DRIVE PAIR 4CX250b.....	£850.00
HL66V 6M 10W IN 50-600W PEP PREAMP.....	£129.00
HL166V 6M 3/10W IN 80/160W PEP PREAMP.....	£249.00
HL1K/6 6M 10W IN PAIR 4C×250B.....	£945.00
HL37V 2M 3W IN 30W PEP PREAMP.....	£89.00
HL62V 2M 10W IN 60W PEP PREAMP.....	£135.00
HV110V 2M 2/10W IN 100W PEP PREAMP.....	£215.00
HL 180V 2M 3/10/25 W IN 170W PEP PREAMP.....	£295.00
HL30U 70CM 2WW IN 30W PEP PREAMP.....	£135.00
HL60U 70CM 12W IN 50W PEP PREAMP.....	£179.00
HL130U 70CM 3/10/25W IN 120W PEP PREAMP.....	£389.00



### TRANSCEIVER ACCESSORIES

HP100S MAINS PSU for HT Series.....	£99.00
HP100 ANTENNA TUNER 80-10M 200W.....	£109.00
HCF100 CW FILTER HT Series.....	£39.00
HNB100 NOISE BLANKER UNIT HT Series.....	£19.95
HBK100 Mobile Bracket HT Series.....	£9.99



### HF LINEARS AMPLIFIERS

HL2K 160-10M PAIR 3-500Z.....	£1425.00
HL1K 160-10M PAIR 4CX250b.....	£945.00
HL100B/10 10M 10W-100W PEP.....	£179.00
HL100B/20 20M 10W-100W PEP.....	£179.00
HL100B/80 80M 10W-100W PEP.....	£179.00



**BIRMINGHAM**  
SMC (Birmingham)  
504 Alum Rock Road  
Alum Rock, BIRMINGHAM  
021-327 1497/6313  
Tue-Fri 9.00-5.00  
Sat 9.00-4.00

**LEEDS**  
SMC (Northern)  
Nowell Lane Ind Est  
Leeds LS9 6JE  
(0532) 350606  
9-5.30 Mon-Sat  
Closed Sat afternoon

**CHESTERFIELD**  
SMC (Midlands)  
102 High Street  
New Whittingdon  
Chesterfield  
(0246) 453340  
9.30-5.30 Tue-Sat

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

**JERSEY**  
SMC (Jersey)  
1 Belmont Gardens  
St Helier, Jersey  
(0534) 77067  
9-5.30 Mon-Sat  
Closed Wednesday

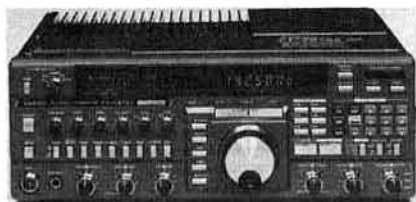
**N. IRELAND**  
SMC (N. Ireland)  
10 Ward Avenue  
Bangor, Co Down  
(0247) 271875

**AXMINSTER**  
Reg Ward & Co Ltd  
1 Western Parade  
West Street  
Axminster, Devon EX13 5NY  
(0297) 34918  
9.00-5.30 Tue-Sat

**SOUTH WALES AGENT: JOHN DOYLE, TRANSWORLD COMMS, NEATH (0639) 632374 DAY (0639) 642942 EVE**

OFFICIALLY APPOINTED SOLE U.K. DISTRIBUTOR

## A SELECTION OF YAESU PRODUCTS & ACCESSORIES



FT767GX

### OPTIONS FT767GX

SP767 Speaker.....	£69.95
144/767.....	£169.00
50/767 6M module.....	£169.00
430/767 70CM module.....	£215.00
F17000 500W linear.....	£1600.00

### OPTIONS FT757GX

FC700 ATU manual.....	£149.00
FP757HD 20A PSU H/D.....	£258.75
FC57AT Automatic ATU.....	£2349.00
MMB20 mobile mount.....	£25.00

FT757GX



FT747GX

### OPTIONS FT747GX

FC700 ATU manual.....	£149.00
FP700 Mains PSU.....	£219.00
D3000568 FM unit.....	£39.90
D3000569 TCXO unit.....	£46.00
MMB38 Mobile mount.....	£22.00

### OPTIONS FT290R2/690R2/790R2

FBA8 Batt case.....	£27.00
FL2025 2M 25W PA.....	£115.00
FL6020 6M 10W PA.....	£109.00
FL7025 70CM 25W PA.....	£139.00
CSC19 Carrying Case.....	£8.50
NC26C Charger.....	£11.50
MMB31 mobile mount.....	£17.50

FT290R2



FT4700RH

### OPTIONS FT4700

YSK4700 Remote Kit.....	£24.95
FTS8 CTCSS unit.....	£60.83
AD2 Duplexer 2M/70CM.....	£26.45
MH14B8 Speaker mic.....	£25.00
MH15C8 DTMF mic.....	£37.50

### OPTIONS FT736R

FEX1.2/736 23CM module.....	£425.00
FMP1 Message processor.....	£159.00
D3000535 Keyer unit.....	£15.95
XF455MC CW filter.....	£60.00
FIF232CVAN CAT/TNC interface.....	£125.00

FT736R



### GENERAL ACCESSORIES

MH1B8 Hand mic.....	£21.00
MD1B8 Desk mic.....	£79.00
YH55 Headphone.....	£19.99
YH77 Headphone lightweight.....	£19.99
MF1A2B Boom mic.....	£25.00

SP55 Mobile speaker.....	£18.95
SP3 Mobile speaker magnetic base.....	£14.55
SP4 Mobile spkr c/w noise filter.....	£20.13
YH1 Mobile headset.....	£28.75
SB10 PTT switch unit 8 pin.....	£22.00

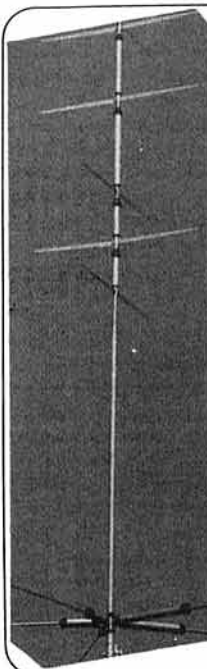
**FREE FINANCE ON SELECTED ITEMS**  
On many regular priced items SMC offers  
Free Finance (on invoice balances over £120)  
20% down and the balance over 6 months or  
50% down and the balance over a year.  
*You pay no more than the cash price!*  
Details of eligible items available on request.  
Subject to status.

Free interlink delivery on major equipment.  
Small items, plugs, sockets, etc by post £1.75.  
Antennas, cables, wires and larger items. Lynx  
up to £5. Interlink delivery available, upon  
request for items other than radios from £7.30  
depending on weight. Same day despatch  
whenever possible.

#### YAESU DISTRIBUTOR WARRANTY

Importer warranty on Yaesu Musen products.  
Able staffed and equipped Service Department.  
Daily contact with the Yaesu Musen factory.  
Tens of thousands of spares and test equipment.  
Twenty five years of professional experience.  
Prices and availability subject to change without  
prior notice.





## COMET & HOKUSHIN ANTENNAS

New from Comet the GTI range of antennas for those of you who don't want your hot hatchback to look like a porcupine. Comet have created the new CHL21J and CHL23J mini dual band antennas, for best performance we recommend you use the matching mounts TBR, RS17 for hatchbacks and coming soon the RS16 mini gutter mount and CK-3LX mini cable assembly.

CHAS	WX1	CA2X4WX	CF416MN
HF Vertical 80-10M 5 Band C/W Radials 200 W Pep £210.00	VHF/UHF Base 144/432 MHz 4.5/7.2dB Gain 200W Max £49.95	VHF/UHF Base 144/433MHz 6.5/9dB Gain 200W Max £79.00	Duplexer 1.3-150MHz/ 400-540MHz PL VHF/HF 'N' UHF 200W/100W UHF £25.50

### MOBILE ANTENNAS

2QW	2M 1/4 WAVE	£4.95
2NE	2M 5/8 WAVE FOLD OVER	£13.25
2VF	2M 1/2 WAVE FOLD OVER	£16.13
78F	2M 7/8 WAVE BALL MOUNT	£15.00
78F	2M 7/8 WAVE FOLD OVER	£21.50
88F	2M 8/8 WAVE	£24.10
258	70CM 2 x 5/8 WAVE	£29.37
358	70CM 3 x 5/8 WAVE	£33.73
268E	70CM 2 SECTION COLINEAR	£32.80

### BASE ANTENNAS

ABC123	2M 3 c 5/8 COLINEAR	£63.97
GP23	2M 3 x 5/8 COLINEAR	£45.00
GP144W	2M 2 x 5/8 COLINEAR	£42.00
GP144DX	2M 2 x 5/8 COLINEAR S/S	£53.13
SO144	2M SWISS QUAD VERT/PL	£53.13
GP432X	70CM 3 x 5/8 WAVE COLINEAR	£88.20
WX1	2M/70CM COLINEAR	£49.95
CA2X4WX	2M/70CM COLINEAR	£79.00
CA2X4MAX	2M/70CM COLINEAR HIGH GAIN	£99.95
CF416MN	DUPLEXER 1.3-150/400-540MHz	£25.50

### ANTENNA MOUNTS

GCCA	GUTTERMOUNT AND CABLE	£14.25
HTMCA	S/S TRUNK MOUNT AND CABLE	£12.25
SOMM	MAG MOUNT AND CABLE	£12.75
SOCA	4 MTR CABLE	£8.90
TBR	S/S HATCH BACK MOUNT NEW	£11.25
RS17	MINI HATCH BACK MOUNT NEW	£12.50

### DUAL BAND MOBILE

70N2M	2M 1/2 WAVE 70CM 2 x 5/8	£24.95
70N2DX	2M 6/8 WAVE 70CM 3 x 5/8	£37.75
CHL21J	MINI DUAL BAND MOBILE	£14.95
CHL23J	SMALL DUAL BAND MOBILE	£16.90
CA2X4KG	2M 5/8 70CM 4 x 5/8	£39.95

CARRIAGE BASE ANTENNA £4.50, MOBILE ANTENNAS £3.00, CABLES AND MOUNTS £2.50

## SONY RECEIVERS



SMC are pleased to be able to offer the SONY range of Multiband Receivers. They feature all the latest technology allowing unequalled coverage of both broadcast and shortwave bands, yet remaining both compact and easy to use. All the models illustrated cover VHF Broadcast, SW broadcast and some SW or Air bands (only on certain models).

**ICF7600DS**  
Compact, synthesised portable receiver covering FM Broadcast, AM Broadcast (LW & MW) and SW bands with SSB. Large LCD display. Keypad entry and memory scanning.

**ICF7600DS**  
Compact, handheld scanning receiver covering 150 KHz to 108 MHz and 115 to 223 MHz. SSB, FM (W & N), AM modes. 40 memories and PRO80 8 way timing system.

**ICF7600DS...£159**  
**ICF200ID...£299**

**ICF200ID**  
Compact, lightweight synthesised receiver including FM Broadcast, AM Broadcast (LW & MW) Airband and SW Bands with SSB. Keypad entry, memory scanning and numerous other functions.

**AIR-7**  
Compact, handheld scanning receiver AM/FM reception covering VHF broadcast airband and AM Broadcast (MW). 30 channel memory and Keypad entry.

**ICFPR080...£299**  
**ICF200ID...£299**

A full range of accessories is also available  
Carriage free on all above Receivers (not accessories)

## ROTATORS



Superb engineering standards combined with pin sharp setting accuracy means new technology from Yaesu create Kenpro Hygain.

### ROTATORS

AR200XL	OFFSET TYPE 3 WIRE	£38.50
G-250	BELL TYPE TWIST/SWITCH CONTROLLER	£78.00
G-400	BELL TYPE METER CONTROLLER	£139.00
G-400RC	BELL TYPE ROUND CONTROLLER	£169.00
G-600RC	BELL TYPE ROUND CONTROLLER	£219.00
CD45	BELL TYPE METER CONTROLLER	£218.90
HAM1V	BELL TYPE METER CONTROLLER	£327.00
T2X	BELL TYPE METER CONTROLLER	£449.00
G-800SDXBELL	TYPE 450 DEG VAR. SPD.	£325.00
G-1000SDXBELL	TYPE 450 DEG VAR. SPEED.	£368.00
G-2000RCBELL	TYPE ROUND CONTROLLER	£445.00
KR500	ELEVATION METER CONTROLLER	£149.95
KR5400	AZIMUTH/ELEV DUAL CONTROL	£279.00
RC5-1	BELL TYPE ROUND CONTROLLER	£219.00
RC5A-3	BELL TYPE VAR. SPEED AND PRESET	£425.00
RC5B-3	BELL TYPE VAR. SPEED AND PRESET	£675.00

### ROTATOR HARDWARE

AR200AB	ALIGNMENT BEARING AR200XL	£17.50
KS505	ROTARY BEARING 1 1/2" MAST	£19.95
GS-065	ROTARY BEARING 2" MAST	£29.95
GC-038	LOWER MAST CLAMP G-400, 600 etc.	£16.95
9523	CHANNEL MASTER BEARING	£19.95
CK46	ROTARY BEARING 1.5 - 2.5 MAST	£34.95
MC1	LOWER MAST CLAMP RC5 SERIES	£25.00

### ROTATOR CONTROL CABLE

RC5W	5 WAY G-400RC, 800, 1000SDX PER MTR	£0.48
RC6W	6 WAY G-250, 400, 600 RC KR500 PER MTR	£0.66
RC8W	8 WAY HAM1V, T2X 2000RC RC SERIES PER MTR	£0.72

CARRIAGE:  
ROTATORS FREE, ROTATOR HARDWARE £2.85, ROTATOR CABLE £2.20 UP TO OVER 20 MTRS. OVER 20 MTRS £3.00

## STRUMECH VERSATOWER



### MINITOWER 10M10 Series

10M10P3030FT	POST MOUNTING	£482.50
10M10B3030FT	BASE PLATE MOUNTING	£511.00
10M10F3030FT	FIXED BASE MOUNTING	£475.00

### STANDARD 13M20 SERIES

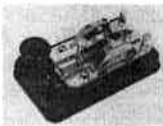
13M20P2525FT	POST MOUNTING	£392.50
13M20P4040FT	POST MOUNTING	£536.50
13M20P6060FT	POST MOUNTING	£652.00
13M20F2525FT	FIXED BASE MOUNTING	£300.00
13M20F4040FT	FIXED BASE MOUNTING	£448.00
13M20F6060FT	FIXED BASE MOUNTING	£571.00
13M20B2525FT	BASE PLATE MOUNTING	£477.50
13M20B4040FT	BASE PLATE MOUNTING	£523.50
13M20B6060FT	BASE PLATE MOUNTING	£741.00
13M20M2525FT	MOBILE TOWER	£2176.00
13M20M4040FT	MOBILE TOWER	£2393.00
13M20M6060FT	MOBILE TOWER	£2553.00

### HEAVY DUTY 16M20 SERIES

16M20P4040FT	POST MOUNTING	£803.50
16M20P6060FT	POST MOUNTING	£911.50
16M20P8080FT	POST MOUNTING	£1426.50
16M20F4040FT	FIXED BASE MOUNTING	£644.50
16M20F6060FT	FIXED BASE MOUNTING	£763.50
16M20F8080FT	FIXED BASE MOUNTING	£1219.00
16M20B4040FT	BASE PLATE MOUNTING	£851.00
16M20B6060FT	BASE PLATE MOUNTING	£953.00
16M20B8080FT	BASE PLATE MOUNTING	£1531.00
16M20M4040FT	MOBILE TOWER	£2790.50
16M20M6060FT	MOBILE TOWER	£2965.50
16M20M8080FT	MOBILE TOWER	£3681.00

ALL TOWERS EXCEPT MOBILES ARE AVAILABLE FROM STOCK.  
10M10 AND 13M20 SERIES SUPPLIED WITH STANDARD WINCHES.  
16M20 SERIES SUPPLIED WITH AUTO BREAK WINCHES. ALL ARE SUPPLIED WITH HEAD UNIT DRILLED TO TAKE G-065 BEARING.  
HOLDING DOWN BOLTS FOR BP AND FB TOWERS ARE AVAILABLE AT £28.75 PER SET EXTRA.  
ALTERNATIVE WINCHES AND HEAD UNITS ARE AVAILABLE AT EXTRA COST.  
DELIVERY IS BY QUOTATION DEPENDENT UPON DISTANCE.

## MORSE KEYS



### MORSE KEYS

			P.P.
HK702	STRAIGHT KEY	£42.95	1.75
HK703	STRAIGHT KEY	£38.45	1.75
HK704	STRAIGHT KEY	£26.35	1.75
HK705	STRAIGHT KEY	£22.49	1.75
HK706	STRAIGHT KEY	£21.80	1.75
HK707	STRAIGHT KEY	£20.15	1.75
HK708	STRAIGHT KEY	£21.50	1.75
HK710	STRAIGHT KEY	£39.95	1.75
HK711	STRAIGHT KEY KNEE MOUNTING	£41.75	1.75
BK100	MECHANICAL BUG	£34.95	2.00
MK701	SINGLE LEVER PADDLE	£38.35	1.75
MK702	SINGLE LEVER PADDLE	£36.25	1.75
MK703	SQUEEZE KEY	£34.50	1.75
MK704	SQUEEZE KEY	£20.00	1.75
MK705	SQUEEZE KEY	£32.78	1.75
MK706	SQUEEZE KEY	£30.48	1.75
HK802	DELUXE BRASS KEY	£112.54	2.50
HK803	DELUXE BRASS KEY	£107.75	2.50
HK804	DELUXE BRASS KEY	£99.69	2.50

### MORSE EQUIPMENT

KP100	SQUEEZE KEYS	£109.75	2.50
DEWSKEYSD	STAR MASTER KEYS	£54.69	2.50
DEWSKEY M	STAR MASTERKEY MEMORY	£94.99	2.75
D70	MORSE TUTOR	£56.35	FOC

### DATA TERMINAL

PK232/FAX/NAVTEX	MULTIMODE DATA TERMINAL	£279.95	FOC
------------------	-------------------------	---------	-----

SMC LTD, SM HOUSE, SCHOOL CLOSE, CHANDLERS FORD

INDUSTRIAL ESTATE, EASTLEIGH, HANTS SO5 3BY.

Tel (0703) 255111. Telex 477351 SMCOMM G. Fax: (0703) 263507



# TECHNICAL TOPICS

PAT HAWKER G3VA

## FREEMATCH LINE MATCHING UNIT

Frits Geerligns, PA0FRI, whose PL509 linear design appeared in the June 77, also contributes details of his 'Freematch' line matching unit (LMU) for reducing the SWR seen by a transmitter on the coaxial cable feeder to resonant antennas (see Fig 1). It is a modified version of the well-known Z-match and is designed as the result of experiments in flattening the SWR on the five HF bands between 3.5 and 28MHz (plus the WARC bands) without the necessity for switching coils and with a minimum of knobs. It is essentially a 'kiss'

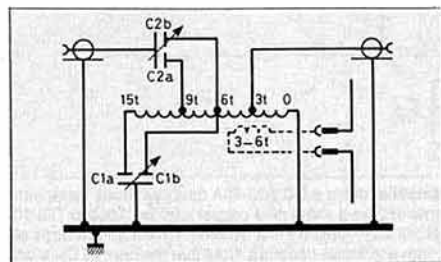


Fig 1. The PA0FRI 3.5/28MHz line matching unit for minimising the SWR presented to the transmitter output. Such a unit is suitable for use with resonant antennas nominally matched to the transmitter and should not be expected to cope with a very wide range of reactive impedances.

approach, cheaper and faster than an automatic ATU provided that the calibrated settings on each band for minimum SWR are known so that the capacitors can be quickly reset.

PA0FRI writes: "The 'Freematch' (PA0FRI-match) has been devised as an unbalanced tuner for improving the SWR at the transmitter end of coaxial feeders to resonant antennas (eg verticals, dipoles, trapped dipoles, G5RVs, Yagis, loopquads, European FD4 etc). In practice it has proved more flexible than expected and in some cases permits matching to non-resonant antennas. With an extra 3-6 turn bifilar winding over the earthy end of the coil (as indicated) a 'balanced' output for 75ohm twin wire or 300ohm ribbon feeder is feasible. However, it should be noted that this design cannot satisfy all possible matching conditions (eg random length wires), though it is possible that this can sometimes be overcome by increasing or decreasing the length of the coaxial feeder and/or reversing the input/output terminals of the Freematch. To meet all possible matching conditions a more complex arrangement would be necessary."

Component information: Coil 15 turns of 2.5mm

diameter enamelled copper wire on 5cm (2-in) inner diameter. For powers lower than 200 watts, a T200-2 toroid can be used with 15 turns on 3/4 of the body covered with plumbers PTFE tape. Taps 3, 6 and 9 turns from earthy end. Variable capacitors can be receiver-type twin-gang (10-490pF per section) for powers up to about 100 watts or for higher powers if power is reduced during tuning. For QRP operation a T200 toroid and two air-dielectric variable capacitors discarded from transistor radios can be used. If random sized coils are used the taps should be ratio n, 2n, 3n for a coil having 5n turns.

## SMALL ENOUGH?

I must admit that for fixed-station HF operation, I have never been attracted by the decreasing size and weight of modern amateur radio equipment, although I can understand its appeal for mobile or portable operation or where the station has to be squeezed into a small space. Surface-mounted components, VLSI devices with their many leads etc just do not suit my increasingly clumsy fingers and call for watch repairer's skills. Such miniature components seem to me to be one of the factors that have moved the hobby so far away from home construction. I feel lucky in that my junk boxes still include a number of components and valves from the vintage years of home construction when there was no nonsense about squeezing a quart

## OVER-VOLTAGE, OVER-CURRENT PROTECTION

For those determined to power 13.5V equipment from the mains supply without an intermediate car battery, the protection of equipment against over-voltage and over-current transients remains an evergreen topic. Ken Attack, G4WAS offers the following advice:

"The circuit of Fig 2 provides a number of safety features which operate entirely independently of the voltage regulating circuit, which for this reason is not shown in detail.

"The use of a 'soft start' circuit allows the rating of the mains supply fuse, F1, to be equal to the value of the (240V) full load current. Without this feature the high magnetic in-rush current which can occur will necessitate a much higher fuse rating or a more expensive anti-surge fuse. It should be noted that the PSU must be 'off-load' at the time of switch-on, otherwise excessive voltage drop across the 100ohm resistor will prevent the operation of relay RL2. This is not a bad thing, since the output voltage should always be checked before use.

"There are two stages of over-voltage protection. Stage 1 is provided by thyristor THY2 the gate voltage of which is set by RV2 to trip at 14.3V thus shorting out the coil of RL2, which drops out, opening the mains-transformer primary circuit. At this time, the neon lamp N1 will light and N2 go out.

"In the event of a major fault in the regulating circuit causing an 'instantaneous' rise in output volts, the 'crowbar' circuit (THY1) is triggered via the more sensitive thyristor THY1, which is set to fire at 14.8V. As the 'crowbar' effectively reduces the output voltage to zero, RL2 will drop off and again disconnect the mains supply. Meanwhile, one or both fuses will have blown. If N1 is lit, fuse F1 is good, indicating that F2 must have blown.

"Apart from the normal over-current protection offered by the two fuses, additional and more

sensitive overload protection is provided by means of the relay RL1, the operation of which triggers the gate of THY3. This in turn short-circuits the coil of RL2 and thus disconnects the mains.

"Relay RL1 was made up from an old open-type relay having an adjustable tension-spring-controlled armature. The original coil was removed, the winding stripped and replaced with six turns of 18swg enamelled copper wire and the spring tension carefully adjusted so that the relay pulled in at 27.5A (the normal full load being 25A).

"Finally and perhaps most importantly is the use of the large value electrolytic capacitor C2 (39,000µF) across the output of the PSU. This effectively increases the rise time of the output voltage in the event of an 'instantaneous' breakdown of the regulating circuit and allows the 'crowbar' time to operate well before the voltage rises to a dangerous level.

"It is a very worthwhile exercise to check the performance of any over-voltage-protected PSU by observing the output voltage on a good quality (20MHz) oscilloscope as the regulating circuit is deliberately bypassed. In the arrangement shown here, before C2 was fitted, the output voltage was seen to rise from 13.5V to around 25V, albeit as a very short duration 'spike'. With C2 at 39,000µF, this 'spike' was reduced to about 16V."

The above notes from G4WAS illustrate well the need for quite complex, fast-acting protection arrangements for any high-current PSU feeding voltage-sensitive solid-state equipment which could be severely damaged by even a short-duration transient. Series voltage regulating power transistors (not shown in Fig 2) can and do break down in short-circuited form resulting in a hefty increase in the voltage output from the PSU unless fast-acting protection is provided.

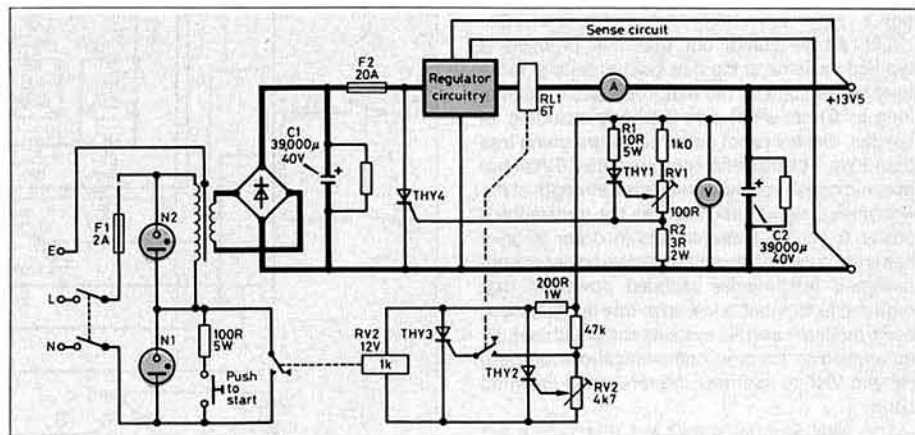


Fig 2. Circuit diagram of G4WAS's over-voltage and over-current protected PSU. THY1, 2, 3 are any small thyristors (SCRs) with Igt about 0.2mA and Vgt about 1.2V. THY4 is a heavy current device with Igt up to 100mA and Vgt up to 3V. The values of R1 and R2 should be chosen so that the voltage across R2 when THY1 fires is about 10% higher than the trigger voltage (Vgt) of THY4.



into a pint pot. There was a time when the larger and heavier the station equipment, the more adorned with meters and weighed down with door-stop mains transformers and smoothing chokes, the more it was prized.

I still use for an ATU, a hefty (3-in inner diameter) ten-turn coil made from self-supporting copper tubing bought from Webb's Radio (of cherished memory) about 1937 for 4d per turn. This was for my first 10-watt (6L6-T20) transmitter though it would not have been out-of-place in a 5 or 10kW amplifier! Because of its large size and air-spaced turns, taps can be made simply with a large crocodile clip avoiding the use of high-voltage RF switches and multiple taps. I still find uses for the plug-in coils once made by Eddystone, Raymart (and the long-forgotten 'Formo' range). Components were made to last though there were some notable exceptions. Old capacitors tend to leak. Even today electrolytic capacitors that have not been in use for some time, require 're-forming' in the manner described in *TT*, June 1987. Quite old electrolytics will usually respond to this treatment but be warned that some don't and will overheat and are liable to explode if put back into service. Anybody who has ever had to clean up the mess that can be caused by an exploding electrolytic capacitor will afterwards always make certain that a capacitor has successfully reformed before using it in a high-voltage power supply!

Nowadays, with dimensions in microns, times in nanoseconds and chips with hundreds of thousands of active devices, it seems we have reached the ultimate practical stage of microminiaturisation. Drop a modern component and you'll be lucky if you can find it again. But now two factors are combining to place limitations on the size of even portable and pocket equipment: controls still have to be related to fingers, and its operation is governed by the size and weight of the batteries.

It has been pointed out in the *New Scientist* (May 6, 1989) that "Portable electronic equipment is now about as small as it will ever be. The designers of portable video cameras and video recorders, personal computers and pocket (radio-transceiver) telephones all face the same problem. If the equipment is made too small it becomes impractical to use, and the rechargeable battery needed to provide its power will weigh almost as much as the equipment itself... developments in the miniaturisation of electronic circuitry have now outstripped developments in battery technology."

The article points out that this problem is typified by some of the new pocket cellular radio telephones such as the Motorola 9800X (162mm long by 61mm wide) with the body including its keypad, display panel and antenna weighing less than 200g. The transmitter can radiate 0.6 Watt but the chip continuously monitors the strength of the (incoming) signals and reduces the transmitter's power to match these signals in order to save battery current. Incidentally adaptive power control designed to minimise radiated power to that required to maintain a low error rate is a feature of some modern naval HF systems and could usefully be applied to amateur communications on both HF and VHF to minimise interference in crowded bands.

The *New Scientist* points out that "There are virtually no further savings in power that can be made. So manufacturers face a trade-off between length of time the unit can operate and the size of the battery."

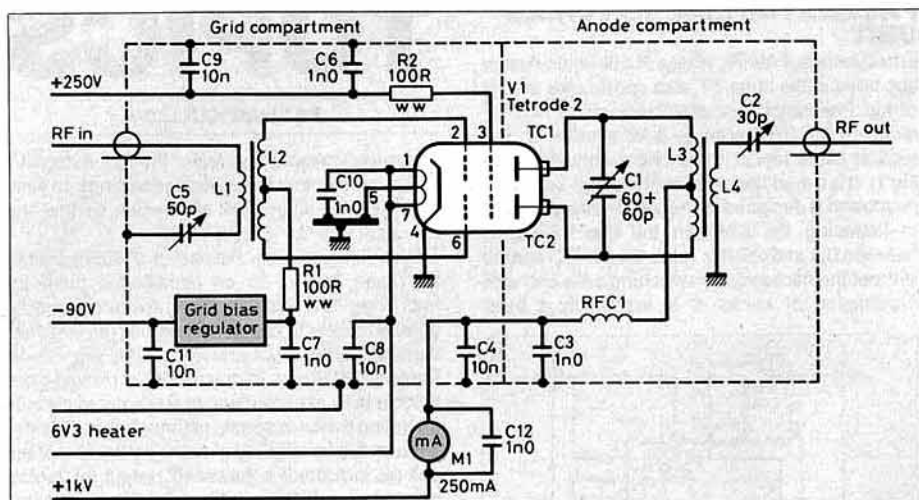


Fig 3. Circuit diagram of G4IDE's updated 50MHz 80W power amplifier using a QV06-40A double-tetrode valve with modern solidstate regulation and control circuits. L2 is 8 + 8 turns of 24swg enamelled copper wire on Amidon T50-10 toroid core, tuned by stretching/compressing the winding. L1 is a 3-turn coupling link winding. L3 is 4.5 + 4.5 turns of 16swg copper wire, 1-in diameter, air-spaced. L4 is a 2-turn link with adjustable coupling. Note that the rotor of C1 is not grounded.

## UP-DATED 50MHz VALVE AMPLIFIER

A new twist to the perennial valve vs solid state debate has appeared over the horizon with the disclosure of current research work on 'vacuum microelectronics' as described, for example, by Dr Rosemary Lee (GEC Hirst Research Centre) in 'Return of the vacuum valve' (*Electronics & Wireless World*, May 1989, pp443-447). She also described on a BBC Radio 4 science programme the rationale behind the intensive work now in progress at various research centres throughout the world aimed at developing a range of micron-sized vacuum electronic devices based on field emission of electrons rather than the thermionic technology of hot cathodes.

Dr Lee writes: "Semiconductor devices are poorly equipped to survive certain environments

and there is a need for devices which can work at high temperatures, withstand high voltage pulses and have the potential to provide high-frequency operation. Vacuum valves offer such properties. Ironically, it is the semiconductor fabrication technology which has been developed over the past few years which now offers the opportunity of producing vacuum valves as small as transistors." There is a military spur to such work to overcome the fear of massive disruption of telecommunications and computers etc by the electromagnetic pulse that would result from exploding a nuclear bomb in the upper atmosphere (NEMP).

At present GEC seems to have reached the stage of producing tiny vacuum microelectronic diodes (shades of Ambrose Fleming) but it is already being claimed that such work is leading the way to the creation of whole families of new

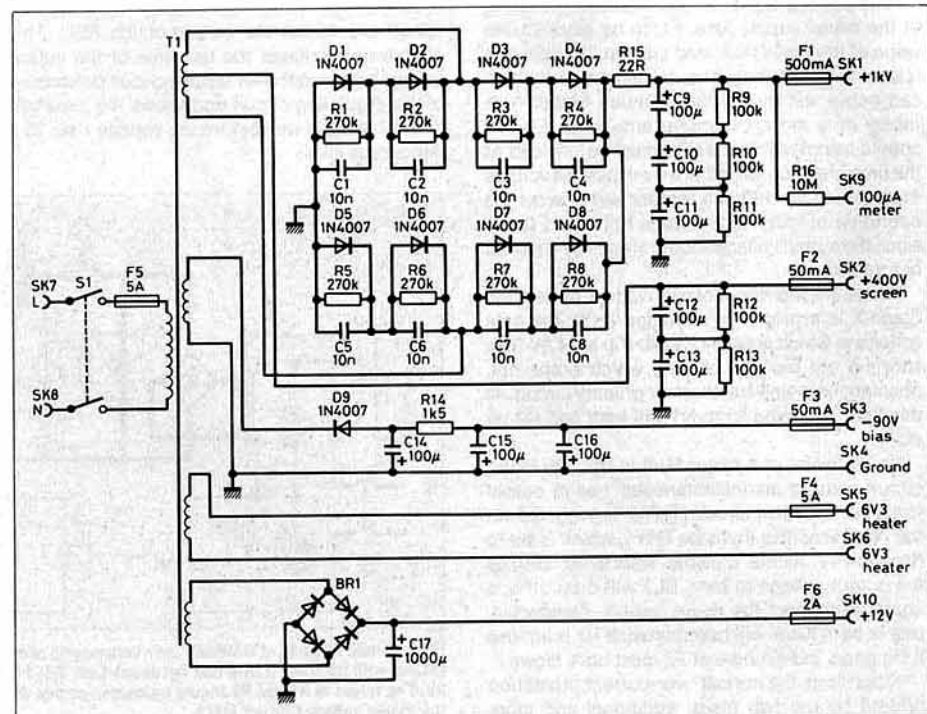


Fig 4. Basic PSU for the 50MHz amplifier.

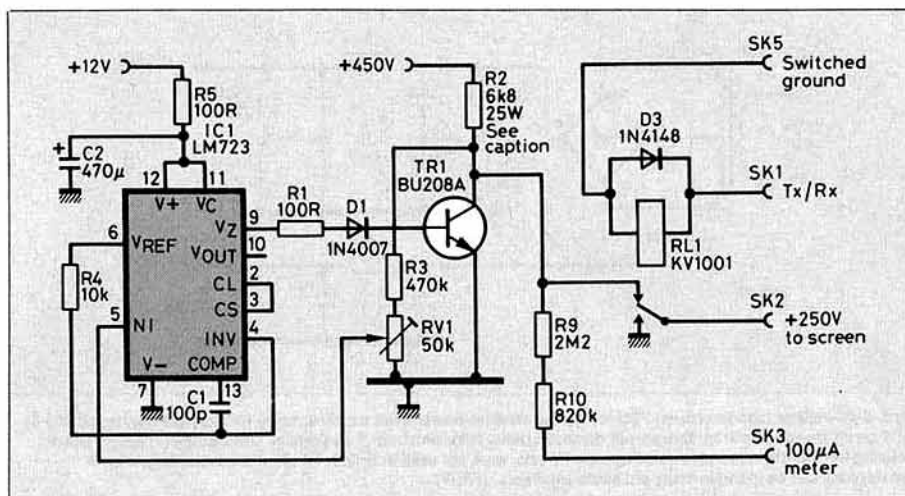


Fig 5. Screen-voltage regulator. Set RV1 to give 250V for the screen at the collector of TR1. R2 should be chosen to give 25-30mA through the BU208A when the screen is not being supplied.

microelectronic devices based on the valve approach that so many branches of the electronics industry have already virtually forgotten.

I suspect that it will be some years, if ever, before vacuum microelectronics comes to play a significant role in amateur radio. But meanwhile there are very good reasons for continuing to use conventional valve technology if only for RF power amplification (or indeed for many other applications if the fancy and junk boxes move you in that direction). Even so there is no reason to ignore the value of current solid state devices in implementing equipment based on valves, with particular reference to the regulation, protection and implementation of power supplies.

Roger Barker, G4IDE, believes that the availability of the 50MHz band has given a renewed impetus for amateurs to start building at least some of their own equipment again, despite the headaches induced by the problem of acquiring the necessary bits and pieces — particularly difficult in the case of high-voltage components suitable for use in valve amplifiers, etc. The QOV06-40A double-tetrode valve, once a popular choice for 144MHz, remains an excellent performer at either 50, 70 or 144MHz.

G4IDE writes: "I have recently built a new QOV06-40A power amplifier for 50MHz; Figs 3-7. When I started the project my theme was 'ancient and modern' — the ancient bit being the 6-40A! I wanted the rest of the design, essentially the power supplies, to reflect current practice. Probably the most interesting feature is the screen supply. My then-existing amplifier used a standard OA2/OB2 voltage regulator arrangement. This performs quite adequately but to have duplicated it for the new amplifier would have meant two more valves and extra metal bashing! I did not fancy the idea of a string of zener diodes and

finally developed the shunt stabilisation design shown in Fig 5.

"If nothing else, this must be one of the most unusual applications yet devised for an LM723 regulator! Since the output voltage from the LM723 needs to rise as the feed-back voltage rises (to drive the BU208A harder and so lower the circuit output voltage), the reference voltage pin on the LM723 is connected to the inverting input and the feed-back voltage to the non-inverting input — the reverse of the usual configuration. It should also be noted that the feed-back voltage represents only a small percentage of the circuit output voltage. This, together with the fact that the drive needed to the base of the BU208A is only about 1V, means that the loop gain around the LM723 is very high. Despite this, the performance of the circuit is excellent. It appears to be extremely stable and I have tested it with a scope on the output while driving the PA to 80W PEP with two-tone input. The ripple on the screen

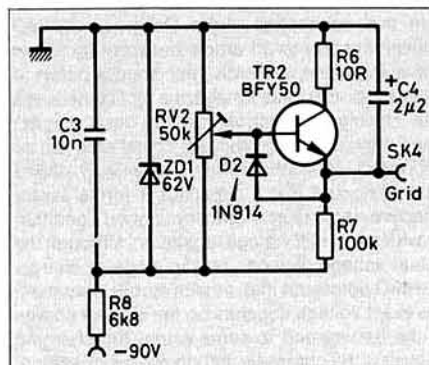


Fig 6. Grid bias regulator. Set grid bias to around -30V by adjusting RV2.

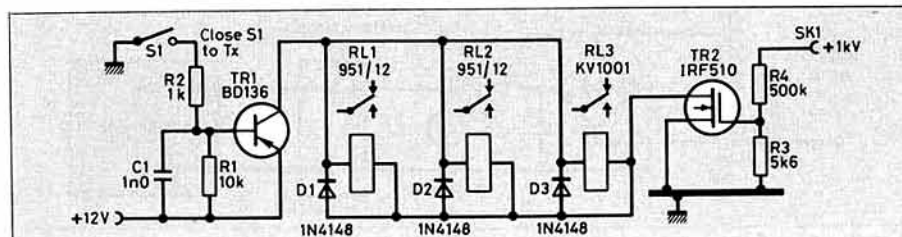


Fig 7. Transmit/receive control unit for the QOV06-40A 50MHz power amplifier.

supply is no more than 0.1V. The same test with the conventional OA2/OB2 arrangement showed a ripple of several volts. No doubt a string of zener diodes would be even worse.

"A number of other points concerning the power supply should be noted:

- 1) The series-zener output on the LM723 is used to allow the true output of the device ( $V_{OUT}$ ) to fall into its normal operating range. Driving the BU208A from  $V_{OUT}$  gave very poor regulation.
- 2) R2 needs to be of adequate wattage and should be chosen to give 25 to 30mA through the BU208A when the screen is not being supplied.
- 3) The BU208A needs a heat sink since, with the PA idling, it will be dissipating around 7W.
- 4) Any attempt to decouple the inputs to the LM723 is guaranteed to turn it into a very potent saw-tooth oscillator!

"Another feature of the design that may be of interest is the relay-switching arrangement: Fig 7. The IRF510 MOSFET is kept turned on by the presence of the 1,000V HT. If the HT should fail then it is impossible to energise the relays. This seems a very simple way to implement HT-failure protection compared with some of the circuits I have seen. Note that the 500k resistor must be a high-voltage item.

"Some other points that may be of interest include:

- 1) The toroid for the grid-tuned circuit is an idea passed to me by G3ENY. It is a bit fiddly to tune up, but once done seems to offer excellent long-term stability and saves the cost of a grid tuning capacitor.
- 2) The emitter-follower in the grid-bias circuit was more or less copied from my original PA which was built by G4BPB (at the time when he was G8BHH of 144MHz contest fame). I do not know whether it has any advantage compared with the orthodox arrangement of taking the grid-bias direct from a lower value potentiometer across the bias supply, but it seemed to work well, so I copied it.
- 3) For the 50pF variable capacitor on the input coupling loop I used nothing more than a compression trimmer accessed through a hole in the chassis. Most designs specify an airspaced capacitor in this application but the Jackson C804 is not exactly cheap; since the PA can be driven to 80W output with only a couple of hundred milliwatts of drive, the compression trimmer is more than adequate."

## HF COST OF ENTRY

For many years, a major objective in amateur radio was to puzzle out ingenious ways of avoiding the need to invest large sums of money in what is basically a spare-time hobby that hopefully should appeal to all sections of society including the impecunious. In earlier times, few newcomers, particularly the younger ones, expected to start straight away with high-power, multiband equipment even during the years when good value-for-money, factory-built units were available. Later these may have been purchased after a spell with relatively crude equipment used as an excellent form of hands-on training and for finding out which of the many aspects of amateur radio were likely to prove of lasting appeal. There is still no better way of understanding the elements of radio communication than by actually tackling the problem of making something you have built work or coaxing an old secondhand piece of equipment back to its original specification, or modifying it for improved performance, though this is not



always practicable with modern forms of construction.

Few of us seek to acquire the mathematical skills and expertise of a professional design engineer but struggle along lifting circuits and design ideas from the periodicals, using parts of published designs to create our own individual equipment. In real money terms, current equipment prices are probably not unreasonable, but that surely does not mean that the entry to HF operation should involve a £1,000-plus transceiver, possibly as much again for a high-power linear, and a costly rotary beam antenna array. It sometimes seems to be a lost cause to continue to argue the case for starting off on HF with a simple home-built two or three-band, 15/25-watt CW transmitter, possibly even crystal-controlled, simple ATU and an end-fed all-wave antenna supported from roofs/trees etc. Such rigs can still bring plenty of enjoyable contacts on the HF bands, if not consistently the most exotic DX, and form an effective means of becoming a proficient CW operator (a skill that will last a lifetime even if subsequently you opt for speech or data). One has only to listen on 21 and 28MHz to the many excellent signals from Russian operators using home-built 10-watt transmitters and delta-loop or ground-plane antennas to realise that there is a happy medium for the newcomer between the skills of extreme QRP and the factory-built 100-watt transceiver.

Recently I enjoyed putting together a classic beginner's transmitter (6AG7/CO-807/PA) using purely junk-box components. Even if one had to buy new components such a rig — or its solid state equivalent — would put one on the air for a lot less than a £1,000 economy rig!

## ECONOMICAL POWER SUPPLIES

An aspect of station building in which significant savings can still be made without undue constructional skills is in the area of power supplies, both medium and high-voltage PSUs for valve equipment and high-current supplies for solid state. For a simple CW rig, either entirely valve or with a valve power amplifier (PA), there is no need for elaborate regulation or even protection (a simple fuse will suffice). A single mains transformer with a 250-0-250V or 350-0-350V, preferably rated for about 100mA current, salvaged from an old radio receiver or preferably (because of the higher current rating) from an old Hi-Fi audio amplifier, plus a few silicon diodes or bridge rectifier of adequate peak-inverse-rating can provide a useful two-voltage supply. Fig 8 shows such a unit as described by Charles Aud, F8CV in *Radio-REF* October 1988.

The availability of low-cost silicon diodes in lieu of the now obsolete double-diode valve rectifiers makes possible a variety of configurations that would have been impractical in the days when one needed separate, well-insulated heater/filament supplies for bridges or voltage-doubling circuits. Fig 9 shows the basic characteristics of a number of standard arrangements.

For low-voltage, high-current equipment, it has been stressed many times in *TT* that a car battery and simple trickle charger provides one of the safest and most economical ways of running 12V equipment from the mains supply, provided always that care is taken to ensure that there is no possibility of the output from the unregulated trickle charger by-passing the battery (which needs to be maintained in good condition).

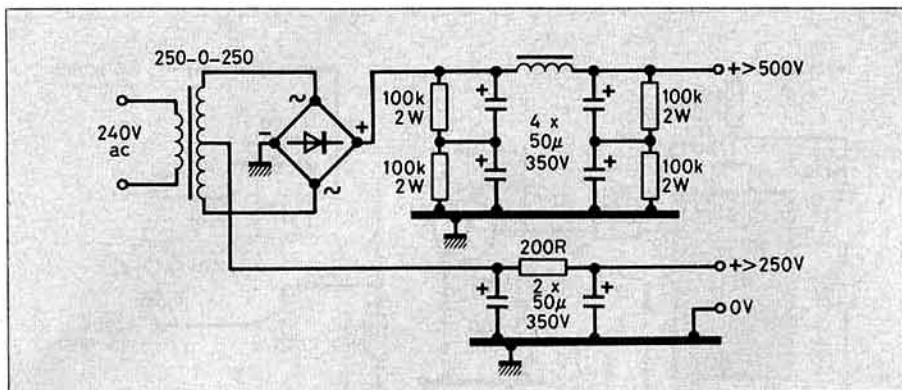


Fig 8. Dual-voltage (anode/screen) PSU for typical medium-power valve amplifier using for example a salvaged 250-0-250V mains transformer from thrown-out domestic radio, television or hi-fi equipment. Unfortunately heavy-current isolating transformers, found in some foreign TV sets, were not used in British TV valve receivers, but suitable transformers can be found in many old audio amplifiers. (F8CV)

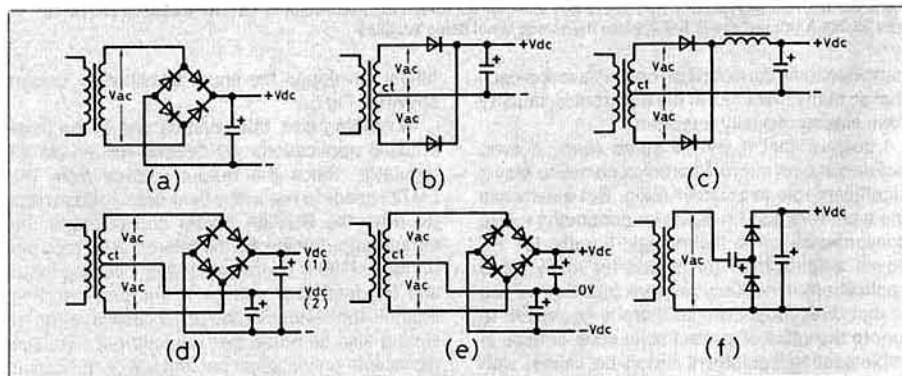


Fig 9. Basic diode rectifying circuits. (a) Full-wave (bi-phase) bridge with capacitive input ripple filter (ie reservoir capacitor) in which Vdc approximately equals 1.4Vac. PIV of each diode section 1.4Vac. (b) Full-wave with capacitive input filter. Vdc approximately 1.4Vac. PIV of each diode 2.8Vac. (c) Full-wave with choke-input filter. Vdc approximately Vac. PIV 1.4Vac. (d) Dual-voltage bridge with centre-tapped transformer and capacitive input filter. Vdc (1) about 2.8Vac, Vdc (2) approximately 1.4Vac. (e) Bridge with balanced output voltage. Vdc about ±1.4Vac. (f) Voltage doubler (unsuitable for heavy current supplies) (unsuitable for heavy current supplies). Relatively poor voltage regulation. Note that the inclusion of a large-value reservoir capacitor raises the maximum DC output voltage significantly above that obtained with an inductive or resistive load. An inductive filter (smoothing choke) reduces the voltage variation between no-load and full-load conditions.

In this connection, John Osborne, G3HMO draws attention to an article he wrote for *Short Wave Magazine* in March 1987 shortly before it emerged primarily as a magazine for listeners. His title 'The biggest electrolytic in the world' emphasised that a battery can be considered as an enormous capacitor in that it similarly stores electricity; and like a capacitor it forms a very effective ripple filter. A battery in good condition provides very stiff voltage regulation, although the actual voltage depends on the state of charge. G3HMO points out that, as with mobile operation, the exact voltage depends on the state of charge of the battery and to some extent the charging current if the charger is left on during operation,

varying from about 12.5V to about 13.8V, but changing by not more than about 0.2V for a typical full load.

G3HMO recommends that a voltmeter should be kept in circuit to enable the operator to keep an eye on things. Note that it is a false economy to use old clamps and it is advisable to use two sets of clamps for charger/battery and battery/transceiver in order to ensure that corrosion or disconnection of a single pair of battery clamps does not leave the equipment connected directly to the charger: Fig 10.

In his 1987 article, G3HMO reported using this system for over two years to power an FT77, FT290 and a 28MHz FM 'talk box' (converted CB

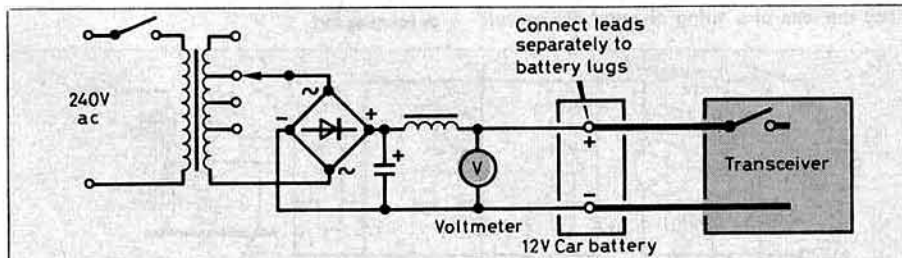


Fig 10. Use of a car battery and simple charger to provide a safe and effective 13V power supply for domestic operation of solidstate transceivers at relatively low cost compared with factory PSUs.

equipment), adding: "I have twice topped up with distilled water in that time. Very little was needed. I have resisted the temptation to overcharge as this would cause loss of water through gassing. This could also be undesirable in that corrosive fumes would be released into the shack. Watching the voltmeter is the key; never charge (typically about 2-4A) unless the volts are down. Bearing in mind the (tough) life a car battery normally leads, in this application it is running very light.

Perhaps one should add the warning given in *TT* (April 1989, page 35) that transceivers nominally rated as 12V, are designed for operation between 13.5-13.8V and that dropping the voltage supplied to such equipment to about 12V will generally reduce the RF output power by 10-20% (not really significant) but may also severely degrade the linearity and hence increase intermodulation distortion on SSB. In his covering letter, G3HMO comments that the car battery approach is a form of 'kiss' that has served him well and avoided the necessity of paying around £150 for the factory-built PSU intended for his equipment: "With the advent of 24V equipment, two batteries in series along these lines should prove equally effective."

## HERE AND THERE

The use of low-cost aluminium kitchen foil to form indoor antennas has been mentioned several times in *TT*, dating back to the 1970 broadband aluminium foil dipole of DJ7VYA and to W8AP's 1971 'quickie quad for two'. A 144MHz window-pane single-element square loop using household aluminium foil mounted on cardboard and then taped to the inside of a high-rise window. Both of these antennas were subsequently included in *ART* and it is worth remembering that window glass imposes virtually no attenuation at HF or VHF so that the quickie quad can provide a very effective antenna at least in the direction outwards from the building. Aluminium foil turns up again as the basis of N5NBU's 'Nice but Ugly \$1.29 Antenna' (*Ham Radio*, May 1989, pp39-40) this time as a 66ft length of foil to provide an end-fed HF antenna with the foil unrolled in a roof space. Aluminium foil, of course, is not suitable for use outdoors because of the wind loading but can work well in roof spaces or along the sides of walls. Incidentally I would expect 66ft of strip to resonate as a half-wave antenna at a frequency below 7MHz because of the large width/length ratio that produces the broadbanding effect. The DJ7VYA broadband dipole had foil elements of 2 x 6.2m for 7MHz using 45cm wide foil.

## USING FAST-SWITCHING POWER FETs AS RF AMPLIFIERS

*TT* (July 1988) presented circuit details of two broadband HF amplifiers using modern RF power MOSFETs: a 300W amplifier based on the Motorola 'Gemini' push-pull package (MRF151G); and a more modest 40W PEP unit by VK3AFQ using a single MRF138. The March 1989 *TT* included a broadband push-pull FET power amplifier capable of providing 5W output (from a 13V supply) using two IRF510 switching-type power FETs which cost considerably less than the devices specifically intended for use in HF or VHF amplifiers.

Power FETs are increasingly seen as offering useful advantages over bipolar devices, including higher voltage operation (28V or 50V), absence of thermal runaway (with a FET the main decreases with increasing temperature) and greater immunity

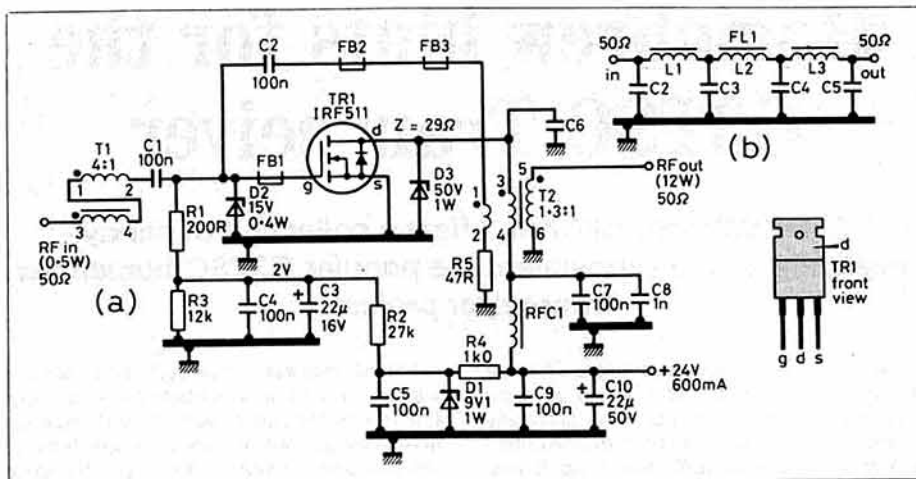


Fig 6 (a) Circuit diagram of W1FB's 12W power-FET class C amplifier with negative feedback. (b) The 7-element pi-type filter (FL1) which proved satisfactory for both 12W and 25W amplifiers after earlier problems with an alternative filter resulting in destruction of a number of power-FETs. For details see Table 1.

from destruction when unloaded or working into a significantly high SWR.

Unfortunately, RF power FETs tend to be more expensive than bipolar transistors providing equivalent output power. They are also very liable to instant self-destruction if they go into parasitic oscillation that can easily result in an excessively high voltage appearing on the gate, puncturing the thin layer of silicon-oxide insulation. This can of course also occur with such devices out of circuit due to electrostatic charges.

"Power-FET switches as RF amplifiers" by Doug DeMaw, W1FB (*QST*, April 1989, pp30-33) provides a useful review of the pros and cons of FET devices and presents details of two amplifiers using low-cost IRF511 devices. These devices are intended for use as high-speed switches but are capable of providing Class C or linear amplification throughout the HF spectrum. A single IRF511 in Class C for CW operation can provide 12W RF output from 0.5W drive with a 28V supply. Although push-pull rather than parallel operation of power-FETs is to be recommended, W1FB also presents the design of a 25W linear amplifier (1W drive) using two IRF511 devices in parallel. The single-device amplifier is shown in Fig 11(a).

All polarized capacitors are electrolytic or tantalum. Others are disc ceramic, 100V or more. R1, R4 1/2-watt, others 1/4-watt. C6 is used to bypass VHF harmonic currents at TR1 drain, its capacitive reactance should be at least four times the drain impedance to avoid power loss. For 20-ohm drain

impedance Xc is 116ohms (ie 200pF is largest value for 7MHz). RFC 10T, No 26 enam on Amidon FT-37-43 toroid. T1 has 12 bifilar turns, No 28 enam on Amidon BN-43-302 balun core. T3 1:3:1 impedance ratio, use 1t No 24 hook-up wire for winding 1-2, 4t No 26 enam for 5-6, wound on Amidon BN-43-3312 balun core observing winding polarity indicated on diagram by the dots. FB1-3 mini ferrite beads (Amidon FB-43-101). Power FETs are enhancement-mode devices and require positive gate voltage to turn them on. Typical +2V for CW. Set by R2 for 25-50mA Idq for linear operation. Negative feedback is set by R5. Use no more than necessary to avoid excessive reduction of power gain (feedback may not be required but as shown improves stability). FB1 helps suppress VHF parasitics and should not be omitted. For detailed information on this and the 25W version refer to W1FB's *QST* article.

His experiments were prompted by discovering the low prices at which these useful devices can sometimes be purchased in the USA for around \$1 each (a possible source is listed as: All Electronics Corporation, PO Box 567, Van Nuys, California CA91408, USA). However he does admit to destroying six of these devices by attempting to use a 7-element T-network harmonic filter (resulting in parasitic oscillation) before changing to the conventional 7-element pi-filter arrangement of Fig 11(b) and Table 1. The T-network filter caused both his 12W and 25W amplifiers to self-oscillate so there is obviously need to take care.

TABLE 1 — COMPONENT VALUES FOR THE FL1 BAND-PASS HARMONIC FILTER USED BY W1FB BUT SUITABLE ALSO FOR MOST LOW-POWER 50 OHM TYPE SOLID STATE AMPLIFIERS

Band (MHz)	C2, C5 (pF)	C3, C4 (pF)	L1, L3	L2	Wire	Cores
3.5	560	1200	2.46μH, 21t	2.89μH, 23t	No 26	enam T-50-2
7	470	820	1.4μH, 17t	1.56μH, 18t	No 24	enam T-50-2
10.1	220	470	0.96μH, 15t	1.13μH, 17t	No 24	enam T-50-6
14	110	300	0.6μH, 11t	0.65μH, 14t	No 24	enam T-50-6
18	100	250	0.52μH, 11t	0.65μH, 13t	No 22	enam T-50-6
21	110	240	0.48μH, 11t	0.56μH, 12t	No 22	enam T-50-6
24	120	270	0.54μH, 12t	0.63μH, 13t	No 22	enam T-50-6
28	56	150	0.3 μH, 8t	0.38μH, 10t	No 22	enam T-50-6

Note: Various cut-off frequencies and ripple factors used to achieve preferred value capacitors. Coil turns may be spread or compressed with an insulated tool to peak output. Capacitors are silver mica or polystyrene, 100V or greater.



# Homebrew hints for the G3TSO Transceiver

**Miles Salmon, G2CKM, offers a collection of handy practical hints to supplement the popular G3TSO homebrew transceiver project.**

Unlike a number of home constructors, I had not tackled a large project such as an all band transceiver before. I am not very technically minded — transistors having been invented after I was and I have never really caught up! It was, therefore, entirely from scratch that I was enthused by the "Home Brewers net" on 3,733kHz and that started off my interest in Mike Grierson's (G3TSO) transceiver as a development on the original G4CLF exciter board, using Plessey SL600/1600 ICs. As I had sight of the draft of the article published in October and November 1988 *Radcom*, I was able to start construction in January 1988. In July 1988 the 'clone' was put on the air with very satisfactory reports. As a result, I was encouraged by several people to put my notes on the practical side of the construction down on paper.

## FIRST STEPS

After detailed study of the component list and noting the requirements for each of the 10 PCBs, I wrote to several of the many mail order suppliers for the bits. A list is given at the end of this article.

Having received all the components, the resistors and capacitors were sorted out into groups of values and put in labelled, partitioned boxes — this saved hours of searching later on. It is also important to check the actual values of resistors with an ohmmeter as it is not uncommon for some to be wrongly colour coded. This can cause a great deal of anguish when a wrong value has been soldered into the PCBs, I was foxed for twenty-four hours due to a 15k resistor being put in which actually measured 1k5 when finally located in circuit.

The next step was to draw each of the transistor pinouts as seen from underneath ie the legs toward you. Then under each transistor drawing, draw them again with the pinouts as seen from the top (component) side of the PCB. This saves much mental gymnastics during construction and avoids putting transistors in the wrong way round, something which I managed to do many times as have many other people, I gather!

If you have a component layout sheet, never rely on the layout for correct position but check the connections against the circuit diagram. When inserting diodes, always leave a short amount of lead above the PCB so that you can check voltages at both ends from the component side of the PCB. It is also important to put diodes in the same way up ie with the bar mark on the PCB end when mounting them vertically. Most malfunctions are due to diodes being the wrong way round in the diode switching circuits.

In the exciter board the density of components is very high and it is an advantage to use 10 volt working electrolytics to save space which is at a premium. If you purchase any SL600 ICs from J Birkett at 27p each, they are supplied in plastic envelopes with a label and it is worth scratching the chip number on the top as they do not have any markings.

When using Toko coils, it makes life much easier if you make up a template for the pinholes from 1/4 inch Perspex so that the drilling of the PCB can be done accurately. As several Toko coils are almost touching, any error in drilling will make it difficult to fit them into the board. It is usually advised that DIL ICs should not be used with

sockets. This is essentially so in the case of the SL1612 IF stage chips in the exciter board, although most of the others including the TO5 packaged SL600 series can be fitted into DIL low profile sockets. This makes life much easier should one have to replace an IC which is below specification or (a rare case) a 'dud'. I spent many hours finding the cause of distortion which was due to a 'dud' VOGAD and desoldering is much more difficult than soldering — especially when one could have used a socket.

The other advantage of sockets is that you can take voltage measurements from the top of the board in situ as compared with finding one's way upside down from the underside when the board has to be removed to test. A solder-sucker is essential for removing other components.

Ensure that you have a supply of at least 6 way computer ribbon cable for the diode switching lines. Use the lightest gauge of wire for flexibility as the current is low, it can also be used for inter-connecting wires by stripping off single wires and using the different colours. Be consistent in using the same colour for each frequency band ie red for 160 metres, orange for 80 metres etc. Obtain a supply of numbered plastic sleeves in duplicate and put each number on the ends of every wire and record them in a book for use when circuit checking. There are more than sixty wires to be connected and it makes life much easier a month later when checking connections. There are not enough colours to use only colour coding for wiring!

Every PCB is inter-connected with either 6 way cable shells carrying the diode switching lines which are plugged into PCB plug pins (obtainable from Cirkit Ltd) or Molex plugs and sockets for wires and RG 174 miniature coaxial cable. This enables every PCB to be removed from the chassis in seconds without any unsoldering.

I do not possess an oscilloscope and all testing during construction was done using an FET voltmeter with an RF probe which was made up from the circuit shown in 'Amateur Radio Techniques' (Fourth Edition) page 244. I also built a capacitance bridge taken from the same book, page 247.

By using the low power transverter output from a Trio TS430. I found I had a calibrated signal generator for tuning the band-pass and low-pass



filters. I used the transverter receive input of the TS430 for checking the transmit output of each oscillator, being sure to use a very small capacitor in series with the output from the oscillator under test.

## CONSTRUCTION

First of all, a stable VFO is a prime requirement so I made up a different VFO unit from that described by Mike Grierson and used the circuit shown in *Technical Topics* (June 1986) which was developed by G4UAZ. This was installed in a diecast box and was found to be remarkably stable, 60Hz drift from switch-on is normal. Do note however that resistors R4 and R5 in this circuit should be 270ohms and not 270k. I experienced some frequency shift on modulation peaks and solved the problem by putting a 1000µF capacitor across the 6V8 Zener. The voltage change was 0.2 volts without it.

I later changed the VFO to the design found in all ARRL handbooks, which is the same circuit as shown in the G3TSO design except that I have added the buffer amplifier, 2N2222, to make the loading flatter. The VFO is on double-sided board and uses a trimmer to switch sidebands whilst staying on the same transmit frequency as found in Trio transceivers.

As there are ten separate PCBs in this transceiver, a start was made on the 9MHz-exciter board. There are several articles on the making of PCBs and reference should be made to March 1988 *Radcom* which gives details of several methods of manufacture. I used DEK rub-on symbols and made sure that the copper was polished to brightness before applying the rub-on symbols. If you have a component layout, take a photocopy of it and use the copy to prick through onto the copper sheet at every component hole and locate the DEK rub-on symbols over each prick mark.

A light rub over the board with methylated spirit or cotton wool removes finger marks which can prevent etching of the copper if not removed. I heated the etchant to 90°F in the oven and used a plastic (microwave proof) box in a large biscuit tin for safety.

Hole drilling is made much easier by purchasing an Expo Reliant 12V drill and 0.7mm drill bits such as those which are available from C R Supplies of Sheffield. Where double-sided glass-fibre board is used for the PCBs, it is necessary to countersink the non-earth holes. I marked all the earth holes with a marker pen and used a 3/16" drill bit to countersink all unmarked holes. It is a bit hard on the fingers but they do recover! A magnifying glass is a must to check for any bridging and for accuracy of the track layout. This is worth doing more than twice.

Each PCB can be checked for satisfactory operation before going on to the next one as the exciter will receive some signals, complete with commercial station breakthrough, and Radio 2 can be heard by putting a screwdriver on to pin 5 & 6 of the first IF SL1612.

## OSCILLATOR CHECKS

The carrier and mixer oscillators can all be checked on a general coverage receiver. When the transceiver is operating, the general coverage receiver can also be used to check for any spurious signals that may be out of band. Initially the SSB carrier oscillators can be set up to 9001.50 and 8998.5kHz by tuning the trimmers while listening on the general coverage receiver. Final adjustment will be made for best audio quality 'on the air'.

## SUPPLIERS

Bonex, 12 Elder Way, Langley Business Park, Slough, Berks, SL3 6EP.  
Circuit Distribution Ltd, Park Lane, Broxbourne, Herts, EN10 7NQ.  
C R Supply Coy, 127 Chesterfield Road, Sheffield, S8 0RN.  
J Birkett, 25 The Strait, Lincoln, LN2 1JF.  
Electromail, Box 33, Corby, Northants, NN17 9EL.  
Harrogate Electronics, 24 Regent Parade, Harrogate, HG1 5AZ.  
IQD (crystals) North Street, Crewkerne, Somerset, TA18 7AR.  
ElectroValue, 28 St Judds Road, Englefield Green, Egham, Surrey.  
SMC/TMP Electronics, Unit 27, Pinfold Lane, Buckely, Clwyd, CH7 3PL.

When the band-pass and low-pass filters are made, they can be tested out of the chassis by making up a 6-way extension lead and plugging one end into the diode switching circuit and the other into the board under test. By applying a low power signal to the input and the RF probe on the FET voltmeter to the output, the bandpass filter can be peaked at both ends of each band and a direct readout of the frequency obtained from the TS430. The loss of signal can be measured by putting the probe on the input and then the output. The cut-off frequency of the low-pass filter can be checked in the same way.

When each board is working satisfactorily, it is worth taking voltage readings and recording them so that they can be referred to later when all the boards are fitted and a check is made following any adjustments.

A 25:1 slow motion drive was obtained at a rally and a cord driven pulley was extracted from a commercial bedside radio and glued to the VFO capacitor spindle. This gave a 100:1 drive and 5kHz per revolution of the tuning knob. If you can find a 6:1 drive with a sector of bandspread at 25:1, it can be converted to a 25:1 drive by filing off the lug.

I used ten sub-miniature dpdt switches on the front to operate the following circuits. Top row — forward and reference SWR, SSB/CW, IC and AGC, processor on/off, normal/inverted sideband; bottom row — RF amplifier on receive, VOX, two-tone generator, notch filter and RIT. All the bottom row have LEDs below each switch which are mounted on a sub-panel made of PCB so that when the front panel is removed, the switches are held in position and no unsoldering is required. All other controls can be left attached to the wiring when taking off the front panel.

## CABINET CONSTRUCTION

The overall dimensions of the transceiver are 4 x 8 x 10" deep. The top and bottom are made up from two U-shaped 16 gauge aluminium sheets. There are also two dummy side pieces attached to the chassis that bolt on to the front and back panels which enable the transceiver to be built and operated with top and bottom covers removed.

4 BA Hank bushes were used as nuts fitted inside the inner sheet which avoids having to hold a nut in place when putting in the bolts — they come at very inaccessible places! The bolts also have cup washers under the heads which make a neat fit, and cover any eccentricity in the hole. A variant on spray painting the cabinet is to glue on

suitable coloured vinyl 'leatherette' which gives a good clean, durable finish. If the top and bottom covers overhang the panel, this can be neatly finished by fitting plastic edging strip such as that obtainable from Maplin.

The digital read-out unit, FC177, is available from Circuit Ltd and is driven by a 74LS13 and a 74LS90. Reference should be made to the article by G3OGQ in *Radcom*, April 1983.

## MODIFICATIONS AND ADDITIONS

I have built in an audio filter as described in *Technical Topics*, May 1988, by GOFAH. This filter has a cut-off at around 3kHz and cuts out a great deal of the IF hiss, it was also found that a 100µF capacitor across the 13V line to this board removed the slight instability which was present. This filter is in place of the CW filter that G3TSO used and if you use CW, is an excellent design.

On the exciter board, the excellent AGC generator, SL621, suffers from slight distortion when a loud signal suddenly operates the AGC. This was completely cured by changing C125, on pin 3 from a 100µF to a 10µF.

The Circuit PA unit has been slightly modified in the bias circuit. The 10k resistor to the base of TR8 has been replaced by a 6k8 resistor to obtain a more stable amplifier bias voltage. The 13V feeds to each stage have been progressively switched so that the pre-driver can be turned on independently for transverting. Liberal decoupling and more ferrite beads seems to prevent parasitic oscillation. The VOX circuit is based on the SL3046 or CA3046 monolithic five transistor block described in an article on Plessey chips in *Radcom*, October/November 1977. A notch filter has been used as described in *Radcom*, April 1974, p234.

The two tone generator by G3UVY referred to earlier, is described in *Practical Wireless*, May 1984.

## TESTING AND OPERATION

The first QSO I had with this excellent design was by connecting the antenna to the output of the SL610 amplifier and running about 1mW. The other station was 11 miles distant and good quality reports were received using the manual ALC control. I used an electret mike fed straight into the SL6270 VOGAD and there was sufficient gain to drive the Circuit PA module up to 20 watts.

I have removed the resistor (R125) on the output of the SL6270 on pins 7 and 8, so as to give full gain from the VOGAD and enable the operator to speak up to 6 feet(!) away from the microphone and thus avoid the breath noise so often heard on the air. Further details on this chip can be found in an article by G1SJJU in *Radcom*, March 1988. The audio quality, I am told on the air, is very little different from my TS430, and that is reported as good.

## FINALE

I would like to thank the many amateurs who have given so much valuable advice and help, both on the air and by mail. To those who have read Mike Grierson's article and are contemplating 'having a go', I can only say that it is one of the most satisfying projects I have ever tackled and it is not as difficult as I thought when I started. As regards cost, the home built transceiver can be built for something like 20 per cent of the price of the commercial equivalent and the satisfaction obtained from rolling your own is immeasurable. □



The RC14 beginners receiver, which was described in the June 1987 issue of *RadCom* (pages 397-399), contains an active audio filter designed primarily for the clear reception of SSB. As users of the RC14 will testify, this filter also copes reasonably well with CW (morse). Nevertheless, when the CW segment of the band becomes crowded, or when there is a very strong interfering signal close to the wanted transmission, it can prove difficult to concentrate on the QSO (contact) of interest.

Ideally, we could solve the problem by building a receiver that only responded to one CW signal at a time. Unfortunately, it is virtually impossible to achieve such a goal, but there is a very practical compromise based on the application of an additional filter. Use of the active CW filter described in this article cannot guarantee that only the wanted transmission is heard, but it will nevertheless improve CW reception quite considerably.

The filter, which is designed to fit inside the RC14 case, is available in kit form, from Cirkit, Park Lane, Broxbourne, Herts EN10 7NQ. Tel: 0992 444111. The price (including VAT and carriage within the UK) is £9.50.

## HOW IT WORKS

The CW filter consists of a single IC (integrated circuit) and a handful of other components, all of which are mounted on a small printed circuit board. The RC14 audio output is routed via the filter so that the additional filtering can be applied to signals prior to them being fed to the headphone output socket. A by-pass switch is also provided, thus enabling the user to disable the CW filter when listening to SSB. The filter module occupies some spare space to the right of the RC14 PCB and does not, therefore, require its own case. A few minor wiring changes and modifications to the RC14 are called for and these will be fully described later on.

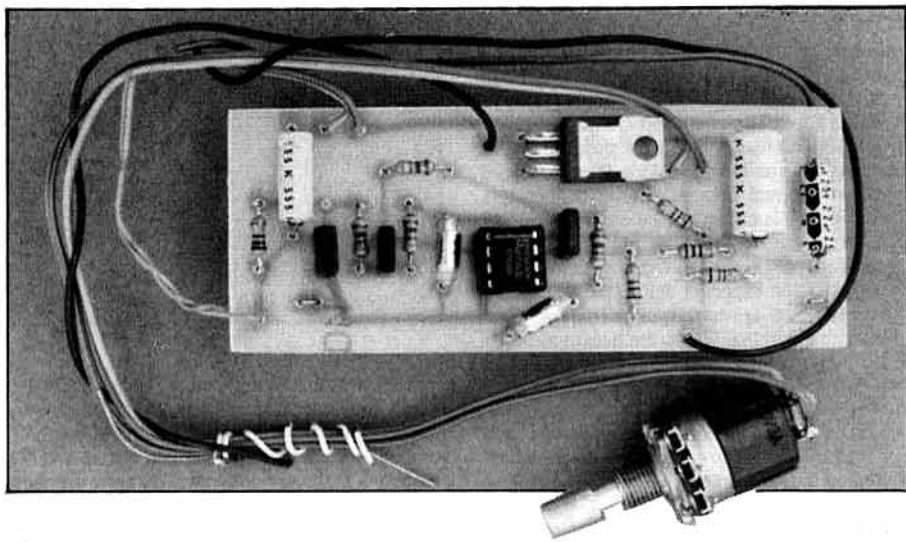
But how can we improve CW reception by using a different filter? Take a look at Fig 1 which shows the frequency response of both the SSB and CW filters. These filters are of the low-pass type which means that they will pass all frequencies below their respective cut-off points. The cut-off frequency of the SSB filter is approximately 2.6kHz (2600Hz) whereas the cut-off of the CW filter is considerably lower at around 750Hz. Incidentally, don't be fooled by the logarithmic frequency scale which makes the ratio between the two cut-off frequencies look a lot smaller than it actually is.

It is necessary to employ a higher cut-off when receiving SSB because speech contains a wide range of frequencies and most of this range must be preserved or the voice will become unintelligible. Looking more deeply, we find that speech is never just a single, pure tone, but rather a somewhat distorted vibration, the 'fundamental', accompanied by many overtones 'harmonics'. As the harmonics of speech extend to at least 3kHz we cannot afford to use a cut-off below about 2.5kHz in a communications system.

CW is a different matter altogether. Whenever the key is depressed at the sending station the transmitter generates a carrier wave. The carrier consists of a single, continuous oscillation at signal frequency. Messages are sent by interrupting this carrier to form the familiar dots and dashes of morse code.

When the RC14 VFO (Variable Frequency Oscillator) is tuned to a frequency very close to

# CW Filter for the RC14



**The popular RC14 receiver has an excellent on-board filter for SSB reception. Here Steve Price, GW4BWE, describes an easy to build add-on unit to cater for the CW buff.**

that of a CW transmission, the receiver mixer simply subtracts these two frequencies and produces an audible output whenever the carrier is present. For instance, if the CW station is operating on 14,010.6kHz and the RC14 VFO is tuned to 14,010.6kHz, we hear a 600Hz tone (0.6kHz = 600Hz).

Fig 1 shows us that at 600Hz the CW filter will provide a voltage gain of 2 (6 decibels) which makes the tone louder than it would be if heard through the SSB filter alone. Now let us assume that another station begins sending CW on 14,009.7kHz, which is only 300Hz away from the first station and produces a 900Hz tone. Looking again at the graph we can see that the SSB filter will give the same gain as before and so if the signals are equal in strength there will be no difference in the volume of sound that they each generate. However, introducing the CW filter enables us to attenuate the 14,009.7kHz signal by 20dB (a factor of 10) — this is a useful degree of

selectivity and will make it easier to concentrate on the wanted signal.

As the graph clearly shows, the CW filters' attenuation continues to increase with frequency and at approximately 1200Hz (1.2kHz) it reaches 40dB (a factor of 100). Although not shown by Fig 1, the attenuation continues beyond 40dB, and at a frequency of 2600Hz (2.6kHz), which corresponds to the SSB filter cut-off point, the CW filter will comfortably provide an attenuation of 80dB — and that is equivalent to a voltage ratio of ten thousand to one! What this means in practice is that if an unwanted transmission appears on a frequency more than about 1kHz away from the station of interest, we can utilize the CW filter selectivity to almost completely eliminate the distracting signal.

## CIRCUIT DIAGRAM

Fig 2 shows the circuit diagram. IC1 is a dual operational amplifier of the same type as is

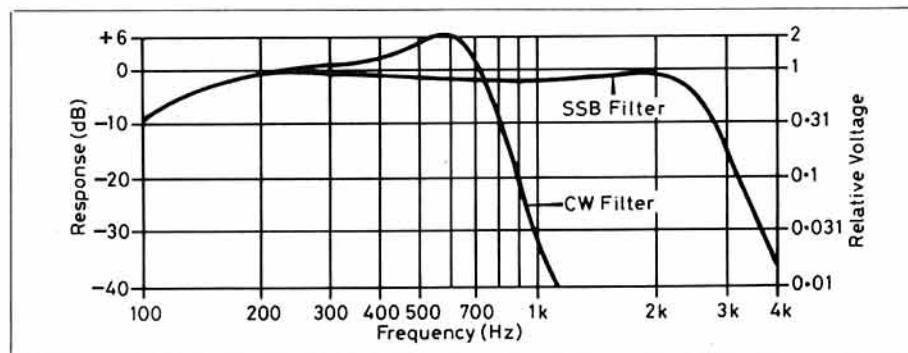


Fig 1 The active CW filter has a much lower cut-off frequency than the RC14 SSB filter. This means that interference can be attenuated far more effectively.

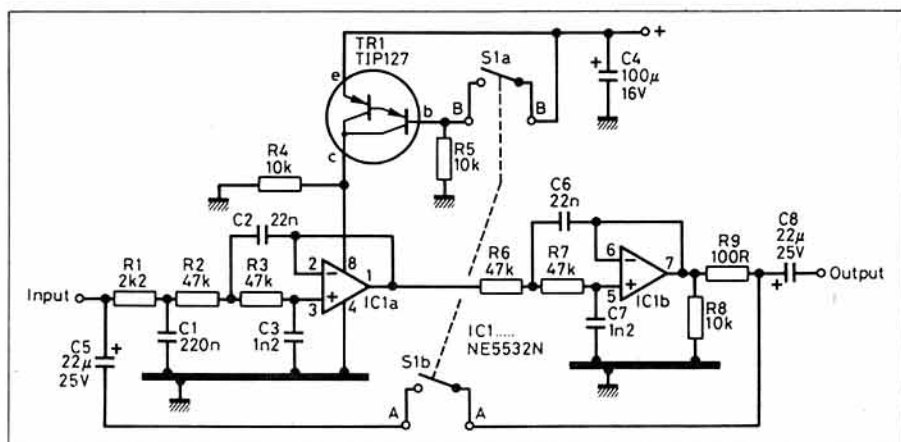


Fig 2 Circuit diagram.

employed in the RC14. The network of resistors and capacitors connected to each of the two amplifiers contained within IC1 (labelled a and b respectively) provide the low-pass filter function. This arrangement is very similar to the RC14 SSB filter but because the components have larger values, the cut-off frequency is correspondingly lower.

The facility to by-pass the filter (ie. so that it is still possible to listen to SSB) is provided by S1. If S1 was a separate component it would be necessary to drill an additional hole in the receiver front panel. This inconvenience has been avoided by combining the by-pass and fine tune controls using a special potentiometer which has a built-in double pole switch. The switch contacts are closed by pulling the potentiometers' spindle out. This method of actuating the switch is advantageous in that S1 may be operated without altering the potentiometer setting. As it is not possible to retro-fit a 'pull-on' switch to the original RC14 fine-tune potentiometer (RV3) it will be necessary to fit an entirely new component. This item is therefore provided as part of the CW filter kit and it

is also available separately from Cirkuit Ltd. (stock number 48-10319).

The filter is brought into operation by opening S1. This does two things: Firstly, S1a disconnects the base of TR1 from the positive supply rail, thus allowing current to flow through R5 and into the base connection of TR1. TR1, a PNP Darlington power transistor, now turns on. When TR1 is in the ON state only a very low resistance exists between its emitter and collector connections. This means that power will be applied to IC1 via pin 8. Secondly, S1b breaks the by-pass line so that signals can only reach the output by travelling through the CW filter circuitry. Conversely, closing S1 (ie. by pulling the potentiometer spindle out) will remove power from IC1 and also by-pass the now inactive filter via coupling capacitor C5.

### CONSTRUCTING THE FILTER

With the exception of S1, all the components shown in Fig 2 are mounted on a small printed circuit board. For those constructors who do not wish to obtain the kit, the PCB foil pattern is reproduced at Fig 6. Very few tools will be

required for this project. A 15-25 watt shouldering iron having a bit diameter of no more than 1.5mm, a pair of wire cutters, a small pair of long nosed pliers and a screwdriver should suffice. Fig 3 features the circuit board layout and Fig 4 will help with the identification and preparation of components prior to mounting. A socket is provided for IC1 and this should be soldered in place first — do not insert IC1 at this stage.

The resistors and capacitors except the three polyester types (C1, 2 and 6) are mounted horizontally — this will necessitate bending their leads. The polyester types, which may be coloured red, will simply drop into place. The polystyrene capacitors (C3 and C7) have translucent mouldings. Only the electrolytic capacitors (C4, 5 and 8) require mounting a certain way round — Fig 4 helps in identifying their leads. Now mount TR1, remembering to bend all three leads as shown in Fig 4 first. It is the marked (front) face of TR1 which rests against the circuit board — see Fig 5 for clarification.

Pairs of flying leads approximately 250mm in length are now soldered between pads AA and BB and the appropriate contacts of S1 (Fig 3). It will be a good idea to shorten the control spindle in preparation for final fixing before you solder the flying leads onto S1. Also solder red and black cables to the +VE and ground pads and a single lead to the output pad.

Before fitting the filter into the RC14 it will be necessary to make a few minor modifications to the receiver itself:-

- 1) The value of R4 must be increased from 10ohm to 22ohms. R4 is located close to C9 — the large 470µF electrolytic capacitor mounted next to the mixer IC. It is not necessary to remove the RC14 circuit board for this operation; simply cut both leads of R4 (colour code Brown Black Black Gold) as near to its body as possible and then dispose of it. The new resistor can now be soldered to what remains of the original resistors leads, (you will need to cut

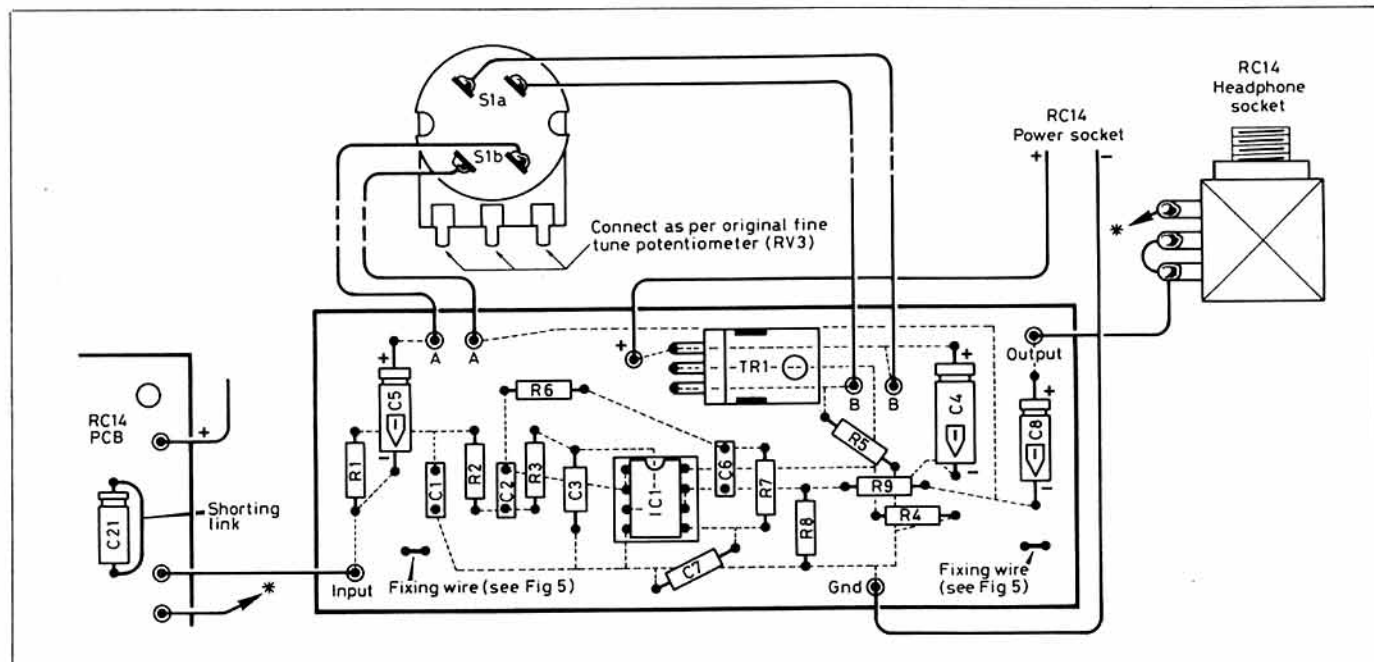


Fig 3 The locations of components on the printed circuit board. Also shown are the off-board connections.



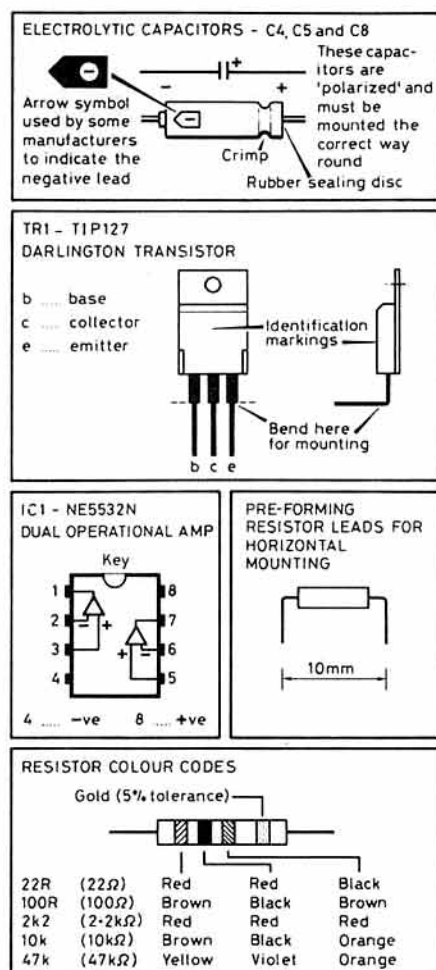
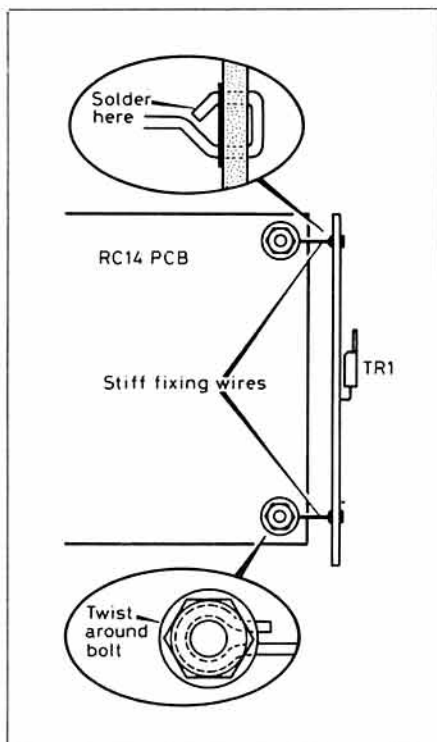


Fig 4 Component identification and pre-forming of leads.

Fig 5 The CW filter circuit board is positioned vertically and to the right of the RC14 PCB.



and bend the 22ohm resistors leads appropriately beforehand).

This modification will improve the receiver audio stability at high AF gain settings and thereby ensure that the additional 6dB of gain provided by the CW filter can be coped with. A suitable 22ohm resistor (designated Rm in the components list) will be supplied as part of the filter kit.

- 2) C21, the RC14 output coupling capacitor, must be shorted out. Simply solder a length of tinned copper wire (eg. an off-cut from one of the filter components) across C21. Fig 3 shows this modification clearly.

The CW filter circuit board is mounted vertically, to the right of the RC14 PCB — ie. between the AF gain potentiometer (RV1) and the headphone socket. Fig 5 shows how this is achieved. Two short lengths of fairly stiff, tinned wire are soldered to the isolated double-hole pads on the filter PCB. These fixing wires are then clamped around the mounting bolts at the edge of the RC14 PCB — the use of washers above the wires will help here. Extra nuts are not required, simply use the existing ones.

Prior to mounting the filter board, complete the wiring as shown in Fig 3. Unsolder the RC14 audio output lead from the headphone socket and resolder it to the filter input pad. The filter output lead should now be soldered to the headphone socket. The other connections are shown well enough by Fig 3 alone — but remember to wire the new fine tune potentiometer exactly as the original (RV3). You will be left with a spare 10k linear potentiometer — this may come in handy for another project!

## TESTING AND USE

Before inserting IC1 into its socket, make the following checks:

- 1) Power-up the RC14 and check that everything operates normally. It is important that the spindle of the new fine tune control is pulled OUT at this stage.
- 2) Push the fine tune control IN and check that the headphones go dead. It should now be possible to measure a voltage just slightly lower than that of the power supply at the junction of TR1 collector and R4. If there is no reading, begin by checking that the filter power leads have been correctly wired to the RC14 power socket.
- 3) Having satisfied yourself that everything is OK, disconnect the power supply and allow about 30 seconds for the larger capacitors to discharge. Now insert IC1 and re-connect the power

## COMPONENT LIST

### RESISTORS

R1	2k2
R2,3,6,7	47k
R4,5,8	10k
R9	100
Rm	22

All fixed resistors are 0.25W, 5% tolerance carbon film types.

### CAPACITORS

C1	220n	Polyester
C2,6	22n	Polyester
C3,7	1n2	Polystyrene
C4	100μ	electrolytic 16V - axial
C5,8	22μ	electrolytic 25V - axial

### SEMICONDUCTORS

TR1	TIP127	PNP Darlington
IC1	NE5532N	Dual-operational amplifier

### MISCELLANEOUS

S1	10k	Linear rotary potentiometer with pull-push DPST switch [Circuit Stock No 48-10319]
----	-----	--

Printed circuit board  
8 pin DIL IC socket  
PVC covered, stranded cable (for flying leads)  
100mm length of stiff, tinned wire for fixing the PCB  
Two small washers  
Short length of multicore solder

**Note**  
The 22nF capacitors (C2,6) may be marked '0.022' and the 220nF value (C1), '0.22'.

supply. Inserted the correct way round — look for the notch in its encapsulation and compare this with Fig.3. With the fine tune control pulled OUT, locate a reasonably strong and stable CW transmission. Tune the signal to give a fairly low pitched tone (if you are a musician, attempt to obtain a note near E above standard A-440) and then push the fine tune IN to activate the CW filter. You should still be able to hear the morse, but if it sounds quieter try carefully adjusting the fine tune so as to bring the signal properly within the CW filter passband.

Getting the most out of the CW filter will take a little practice, but after a few hours of tuning around you will probably start to wonder how you ever managed without it!

## ARE YOU LISTENING ON 3.5 MHz?

The April 1989 edition of *RadCom* contains a description of the 3.5MHz converter designed specifically for the RC14. 3.5MHz is a very good band to listen on if you are trying to learn morse, particularly at the weekends. The 3.5MHz converter kit is also available from Cirkit. □

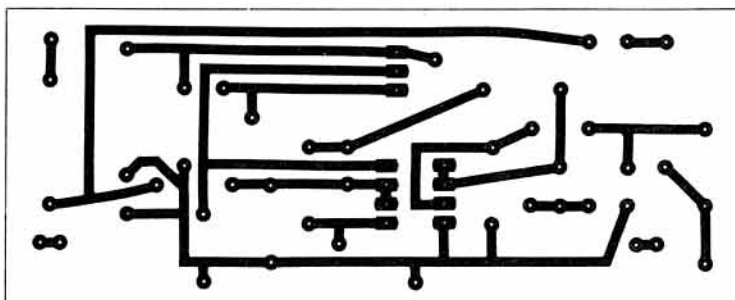


Fig 6 The PCB foil pattern.

*Another new publication from RSGB*

**NEW !**

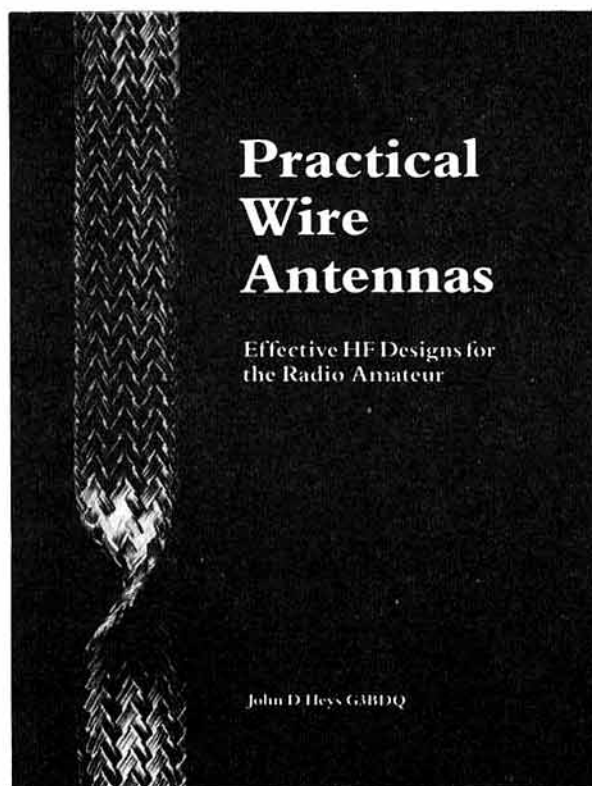
# Practical Wire Antennas

by John D. Heys G3BDQ

Wire antennas offer one of the most cost-effective ways to put out a good signal on the HF bands, and this practical guide to their construction has something to interest every amateur on a budget.

Many different types are covered, ranging from simple dipoles to ingenious multi-wire systems - even underground antennas! Full details of feeding and matching are included, making each antenna easy to set up and use successfully.

Theory has been kept to a minimum - instead, the author has shared his years of experience in this field, offering 'down-to-earth' advice that will be appreciated by beginners and enthusiasts alike.



**No-one who builds and uses wire antennas can afford to be without this handy guide.**

**Available NOW !**

**ORDER NOW ! £6.88 to RSGB members by post**



# PRICE LIST

## NON-MEMBERS MEMBERS

### RSGB BOOKS

Amateur Radio Awards Book (3rd Ed)	£9.35	£7.95
Amateur Radio Operating Manual (3rd Ed)	Out of Stock	
Callbook - RSGB 1989	£9.35	£7.95
G-ORP Club Circuit Book	£6.54	£5.56
HF Antennas for All Locations	£7.24	£6.15
Ins and Outs of Repeaters	Out of Stock	
Morse Code for Radio Amateurs	£3.21	£2.73
Practical wire Antennas	£8.09	£6.88
Radio Amateurs Examination Manual (12th Ed)	£5.82	£4.95
Radio Communication Handbook Vols. 1+2 (PB)	£13.82	£11.75
Radio Data Reference Book (5th Ed)	£9.59	£8.15
Teleprinter Handbook (2nd Ed) - Reduced to Clear	£2.29	£1.95
VHF/UHF Manual (4th Ed)	£10.88	£9.25
World at their Fingertips	£8.62	£7.33

### RSGB LOGBOOKS

Amateur Radio Logbook	£2.65	£2.25
Mobile Logbook	£1.37	£1.16
Receiving Station Logbook	£4.46	£3.79

### RSGB MAPS CHARTS & LISTS

Great Circle DX Map (card for desk)	£0.59	£0.50
Great Circle DX Map (wall)	£3.21	£2.73
HF Awards List and Countries List	£0.54	£0.46
IARU Region 1 Beacon List	£0.44	£0.37
Locator Map of Europe (wall)	£2.17	£1.84
Locator Map of Europe (card for desk)	£0.79	£0.67
Locator Map of Western Europe (wall)	£3.40	£2.89
Meteor Scatter Data Sheets	£3.91	£3.32
Software Register	£1.18	£1.00
UK Beacon List	£0.44	£0.37
UK Repeater List	£0.56	£0.48
World Prefix Map in full colour (wall)	£3.38	£2.87

### RSGB MEMBERS SUNDRIES (MEMBERS ONLY)

RSGB badge car sticker	£0.81	
RSGB belt (leather)	£10.88	
RSGB tie (coffee, maroon, green, blue - please state)	£4.50	
RSGB teeshirts (medium, large, ex. large - please state)	£5.15	
RSGB 'Green Book' (details structure, organisation and objectives of the Society)	£1.20	
Standard callsign lapel badge (5 weeks delivery)	£2.95	
De-luxe callsign lapel badge (5 weeks delivery)	£3.34	
Standard lapel badge (RSGB emblem, pin fitting)	£1.36	
Mini lapel badge (RSGB emblem, pin fitting)	£0.91	
Members' headed notepaper (50 sheets) quarto	£2.81	
Members' headed notepaper (50 sheets) octavo	£1.50	
T & R Bulletin July 1926 souvenir copy	£0.45	
75th Anniversary Calendar	£1.50	

### MISCELLANEOUS

Car sticker 'Amateur Radio' (2 colours)	£0.81	£0.69
Car sticker 'I Love Amateur Radio'	£1.14	£0.97
Car sticker 'I'm on the air with amateur radio' (4 colours)	£0.93	£0.79
Car sticker 'I'm monitoring 5, are you?' (2 colours)	£0.81	£0.69
Radio Communication back issues	£1.47	£1.25
Radio Communication bound volumes	£22.69	£19.29
Radio Communication easibinder	£5.82	£4.95
RSGB HF contest log sheets (100)	£3.87	£3.29
RSGB VHF contest log sheets (100)	£3.87	£3.29

### OTHER PUBLICATIONS

All About Cubical Quad Antennas (RPI)	£7.00	£5.95
All About Vertical Antennas (RPI)	£7.65	£6.50
Amateur Radio Computer Networking Conference Papers (ARRL) Vols. 1-4	£18.10	£15.39
Vol. 5	£7.94	£6.75
Vol. 6	Out of Stock	
Vol. 7	£11.29	£9.60
Amateur Radio Satellites - The First 25 years (AMSAT-UK)	£4.65	£3.95
Antenna Compendium Volume 1 (ARRL)	£10.76	£9.15
Antenna Notebook, W1FB (ARRL)	£7.82	£6.65
ARRL Antenna Book	£13.71	£11.65
ARRL Handbook 1989 (hardback)	£16.41	£13.95
ARRL Operating Manual	£13.65	£11.60
AX25 Amateur packet radio link-layer protocol (ARRL)	£6.76	£5.75
Beam Antenna Handbook (RPI)	£8.53	£7.25
Better Short-wave Reception (RPI)	£5.87	£4.99
Callbook - International Listings 1989	Out of Stock	
Callbook - N American Listings 1989	Out of Stock	
Care & Feeding of Power Grid Tubes (Varian)	£7.88	£6.70
Complete Dixer (Idiom)	£8.47	£7.20
Complete SW Listener's Handbook (Tab)	Out of Stock	
DX Edge (HF propagation aid)	£21.07	£17.91

## NON-MEMBERS MEMBERS

DX Power: Effective Techniques	£9.29	£7.90
FCC Rule Book, ARRL	£7.00	£5.95
First Steps in Radio (ARRL)	£4.41	£3.75
Fuji - FO12 Technical Handbook (AMSAT UK)	£5.65	£4.80
Guide to Oscar Operating (AMSAT UK)	£2.94	£2.50
Hints and Kinks for the Radio Amateur (ARRL)	£4.12	£3.50
History of ORP (Milliwatt Books)	£9.88	£8.40
Interference Handbook (RPI)	£8.35	£7.10
International VHF FM Guide (G3UHK/G8AUU)	£3.29	£2.80
Introduction to Weather Satellite Reception	£2.53	£2.15
Joy of ORP (Milliwatt Books)	£11.35	£9.65
Linear Op-Amp Handbook (Carr)	£18.62	£15.83
Low Band DXing (ARRL)	£9.35	£7.95
Morse Code the Essential Language (ARRL)	£4.06	£3.45
Novice Antenna Notebook (ARRL)	Out of Stock	
Operating an Amateur Radio Station (ARRL)	£2.65	£2.25
OSCAR 13 Handbook (AMSAT-UK)	£6.06	£5.15
Packet Radio Handbook (Tab)	Out of Stock	
Passport to World Band Radio 1989 (RDI)	£11.71	£9.95
QRP Notebook (ARRL)	£4.12	£3.50
Radio Amateur Antenna Handbook (RPI)	£8.00	£6.80
Radio Amateur DX Guide (ARCI)	£4.12	£3.50
Radio Amateur Map of North America (ARCI)	£3.59	£3.05
Radio Frequency Interference (ARRL)	£4.12	£3.50
RTTY Awards (BARTG)	£3.47	£2.95
RTTY The Easy Way (BARTG)	£3.47	£2.95
Satellite Anthology (ARRL)	£4.41	£3.75
Satellite Experimenters' Handbook (ARRL)	£7.94	£6.75
Simple Lo v Cost Wire Antennas (RPI)	£8.53	£7.25
Slow Scan Companion (BATC)	£3.47	£2.95
Solid State Design for the Radio Amateur (ARRL)	£10.53	£8.95
Towards the Radio Amateurs Exam (Stam)	£6.76	£5.75
Transmission Line Transformers (ARRL)	£8.18	£6.95
Tune in the World with Ham Radio (ARRL)	£4.12	£3.50
TV for Amateurs (BATC)	£2.02	£1.72
USA Licence Manual - Advanced Class, ARRL	£4.12	£3.50
USA Licence Manual - Extra Class, ARRL	£4.12	£3.50
USA Licence Manual - Technician Class, ARRL	£4.12	£3.50
World Atlas (ARCI)	£4.67	£3.95
Yagi Antenna Design (ARRL)	£11.71	£9.95
Your Gateway to Packet Radio (ARRL)	£7.70	£6.55
2MT Whistle - The Birth of British Broadcasting	£16.24	£13.80
25 Fun to Build Projects for Learning Electronics Theory	£7.82	£6.65

### INTERFERENCE SUPPRESSION FILTERS

Braid Breaker Filter	£7.39	£6.28
Ferrite Toroid (pack of 2)	£3.14	£2.67
High Pass Filter for FM Broadcast Band 2	£7.70	£6.55
High Pass Filter for UHF TV	Out of Stock	
Notch Filter Tuned to 14MHz	£7.70	£6.55
Notch Filter Tuned to 21MHz	£7.70	£6.55
Notch Filter Tuned to 28MHz	£7.70	£6.55
Notch Filter Tuned to 50MHz	£8.27	£7.03
Notch Filter Tuned to 70MHz	£8.27	£7.03
Notch Filter Tuned to 145MHz	£8.27	£7.03
Notch Filter Tuned to 435MHz	Out of Stock	
RSGB Filter Kit	£51.00	£43.35
Six Section Filter for UHF TV	£20.29	£17.25

### LANGUAGE AND MORSE INSTRUCTION AIDS

CW into Foreign Languages (VE3EIM, VE3MGY)	Out of Stock	
Radio Amateurs Conversation Guide (OH1BR)	£5.65	£4.80
Dutch Supplement to Conversation Guide	£1.41	£1.20
French Cassette Supplement to Conversation Guide	£5.77	£4.90
German Cassette Supplement to Conversation Guide	£5.77	£4.90
Russian Cassette Supplement to Conversation Guide	£5.77	£4.90
Spanish Cassette Supplement to Conversation Guide	£5.77	£4.90
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	£88.24	£75.00
Ham Radio Magazine, one year, by air	£22.00	£22.00

### NEWSLETTER SUBSCRIPTIONS

Connect International (monthly)	£9.35	£7.95
DX News Sheet (weekly)	£21.77	£18.50
Microwave Newsletter (10 issues per year)	£7.94	£6.75
Raynet News (6 issues per year)	£5.82	£4.95
VHF/UHF Newsletter (monthly)	£9.35	£7.95

Newsletter subscription rates are those for subscribers in the UK and countries in the EEC. For rates to other destinations please contact the Circulation Department at RSGB, from where free sample copies of newsletters can also be obtained.

Members visiting HQ are advised to telephone first to confirm availability of goods - 0707 59015.

# RSGB — MAIL-ORDER PRICE LIST

## RAYNET SUPPLIES

	NON-MEMBERS	MEMBERS
Raynet Badge - Embroidered	£1.04	£0.88
Raynet Badge - Lapel	£0.89	£0.76
Raynet Badge Clip	£0.50p	£0.43p
Raynet Car Sticker - Circular	£0.65	£0.55
Raynet Identification Sticker	£0.51	£0.43
Raynet Manual, 1986 Edition	£3.41	£2.90
Raynet Poster	£0.98	£0.83
Raynet Tie	£5.83	£4.96

## MICROWAVE COMPONENTS

Capacitors	NON-MEMBERS	MEMBERS
1000pF Coffin Capacitor (pack of 10)	£1.08	£0.92
Trimmer for G4DDK 1152MHz boards	£0.99	£0.84
Exciters	NON-MEMBERS	MEMBERS
GDHM32 Doppler Module	£74.06	£62.95

## Hardware, PCBs & Laminates

	NON-MEMBERS	MEMBERS
1152MHz Amplifier Board	£4.11	£3.49
1152MHz Local Osc. Source PCB (RC 2-3/87)	£3.87	£3.29
CBT-40 Mounted Termination, 40W, 50ohm	£22.29	£18.95
CuClad 233 pcb, 0.005", 2(x)1 inch block	£0.99	£0.84
CuClad 233 pcb, 0.031", 2(x)1 inch block	£1.46	£1.24
Regulator PCB (RC 10/81)	£2.50	£2.13
UHF Source PCB (RC 10/81)	£7.06	£6.00
WG20 Copper Waveguide (per foot)	£7.14	£6.07

## Semiconductors

	NON-MEMBERS	MEMBERS
DC1501E Mixer	£14.39	£12.23
MD4901 SRD	£10.88	£9.25
MGF1302 GaAs FET	£8.18	£6.95
uPB581C 2.6GHz Divide by 2 Prescaler	£8.02	£6.82
uPB582C 2.6GHz Divide by 4 Prescaler	£8.02	£6.82

## ORDERING INFORMATION

**NON-MEMBERS.** Use left hand price columns. Note that members' sundries are only available to members of RSGB.

**MEMBERS.** Use right hand price columns. It is essential that you quote your call sign or RS number so that you can be recognised as a member.

**PRICES.** These include postage, packing, and VAT (where applicable) and are subject to change without notice.

**AVAILABILITY.** Goods are available less postage and packing from RSGB Headquarters between 9.15am and 5.15pm Monday to Friday. However you are advised to confirm availability of goods by telephone before visiting Headquarters. We attempt to keep ample stocks of all our sales items, however as this list has to be prepared several weeks in advance we cannot guarantee that any item on this price list is immediately available.

**PAYMENT.** Payment may be made by post enclosing a cheque or postal order. These should be crossed and made payable to 'Radio Society of Great Britain'. If sending cash please use registered post. You may use your credit card for payment by post or by telephone. We accept Visa, Access (Mastercharge), American Express, and Diners Club cards. Our telephone number for orders is (0707) 59015 (24hrs). Please note that if ordering by credit card goods can ONLY be sent to the credit card holders address. This is a ruling of all credit card companies for security purposes. Our Giro account number is 533 5256.

**DELIVERY.** Goods will be despatched to UK destinations by 2nd class letter post or parcel post, or surface mail to overseas destinations. Please contact RSGB Headquarters for 1st class letter post or airmail rates. We normally despatch goods a few days after receipt of an order, but as delays can sometimes occur please allow 28 days before enquiring about non-delivery of goods.

## ORDER FROM:

### RSGB SALES (CWO)

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



## DO YOU WORK HF BAND DX?

Would you like to work more?

Would you like:

- Up-to-date DX news
- Awards news
- Propagation information
- QSL details
- DXpedition news
- Band reports
- ... And much more?



**YOU NEED THE RSGB DX NEWS SHEET**



# AMATEUR RADIO AWARDS BOOK

THIS NEW EDITION of Amateur Radio Awards gives details of major radio amateur awards throughout the world.

Each award is listed in an easy to understand format giving full information on how to achieve the award. An innovation for this edition is the provision of checklists so that the amateur can keep a record of progress.

This book is essential reading for the avid award hunter and the DX chaser alike.

**AMATEUR RADIO  
AWARDS BOOK  
IS AVAILABLE  
AT**

**£7.95**

to RSGB members  
by post



# TESTING THE UNTESTED — A PLESSEY IC SELECTOR

Numerous designs have used the now famous Plessey Communications series of ICs. These excellent devices, which have now been in use for over 15 years, are not cheap, but are readily available from Birketts of Lincoln in an 'untested' and unmarked condition at very reasonable prices. These devices have most probably failed to meet the very rigid specification required for their military applications, but many are perfectly usable for amateur applications and complete transceivers have been successfully built using only surplus ICs.

## TEST RIG

Construction of any sophisticated piece of equipment such as a transceiver can be severely frustrated by the use of 'duff' components, so it would be useful to have a simple means of testing these 'untested' ICs so that they can be soldered into circuit knowing that they are going to work. Whilst the use of IC sockets in equipment will allow devices to be tested by substitution, the sockets themselves can lead to problems of instability when used with high gain RF amplifiers. A simple test rig offers the most cost effective alternative if use is to be made of the surplus ICs. In fact the cost of the test rig is less than the price of one new IC!

**Plessey SL600 series ICs are easily available as unmarked surplus but the problem is how to sort the good from the bad. Mike Grierson, G3TSO, supplies the answer in the shape of a simple test circuit which also helps identify the mystery chips.**

The test rig to be described requires only the use of a 12V DC supply and an oscilloscope capable of displaying signals up to 10MHz, a 5MHz scope should do. It enables the completely duff ICs to be thrown away and the remainder can be graded and used for applications dependent upon their observed characteristics. Fig 1 shows the circuit of the complete test rig, which can be used to test SL610, 611, 612, 640, 641 and SL621 devices. These all have round 8 pin CM8 type bases and can be plugged into high quality 8 pin sockets such as those available from Radiospares. Eight pin DIL sockets could be used if the IC legs

are played out and it would have the added advantage that the SL1600 series devices could be tested and compared in the same way.

## CIRCUIT DESCRIPTION

TR2 is an FET oscillator which operates at a typical IF frequency of 9 to 10.7MHz and provides a signal which can be amplified by the SL610, 611, 612, devices which can be inserted into SKT2. The RF signal is fed into pins 5,6 and the output can be observed by connecting an oscilloscope to pin 3. Manual gain of the IC can be controlled by adjusting RV2. The device can be checked for overall gain, linearity and AGC control by varying the DC voltage on pin 7.

The RF signals is also fed to SKT1 where SL640/641 balanced modulators can be checked. By closing S2 (shorting link) the modulator is unbalanced and the RF carrier can be observed at pin 5 (pin 6 Low impedance, SL 640 only). By opening S2 the carrier suppression can be checked.

TR1 is an AF oscillator which operates at approximately 2kHz and can be used to modulate the RF carrier in the SL640/641. Audio level can be controlled by RV1 and if S2 is closed, an AM envelope can be observed at pin 5; when S2 is open a DSB envelope can be observed. The device can therefore be checked for operation, carrier

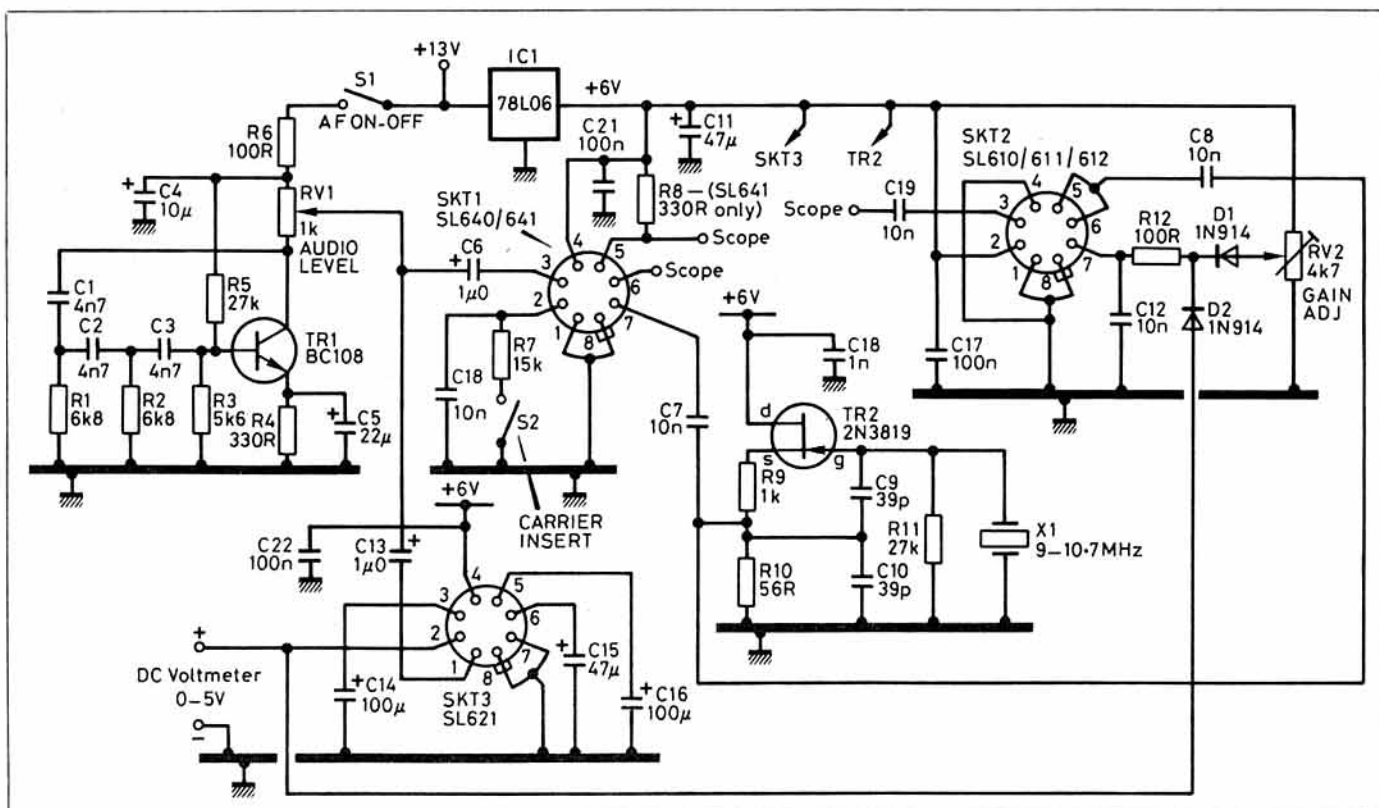
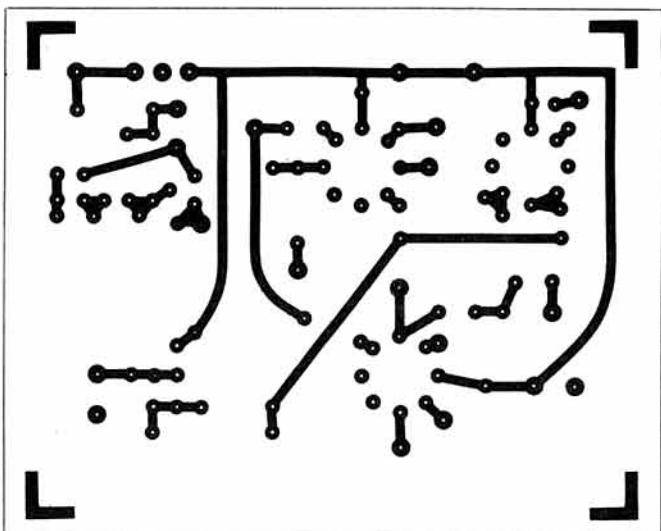


Fig.1 Circuit diagram of the test unit

## IC SELECTOR

Fig.2 Full-size underside view of the PCB, copper areas are shown in black



suppression and linearity. R8 is only required for the SL641 device.

Testing the SL621 AGC IC can be done by inserting the IC into SKT3 and by adjusting the audio level inserted from RV1 it should be possible to vary the DC output from pin 2 up to about 4.5V maximum, with no audio input the voltage should fall to zero. A small amount of audio should cause the voltage to step rapidly to 2V and then increase linearly to a maximum.

If required the SL621 can be tested in conjunction with an IC in SKT2, when a variation in the AF output from RV1 should control the RF output from the IC in SKT2. RV2 should be set to minimum (ie maximum manual gain) for this test. In order to test the AGC time constant a switch S1 can be inserted in the DC supply to the AF oscillator, if it is switched on and off abruptly, the

AGC can be observed to rise and decay.

Armed with a handful of the untested ICs it is now possible to quickly determine those ICs which will operate successfully in a project and save the effort of later fault finding. As a general rule at least one out of every 6 ICs tested have been completely dud, a couple had obvious defects and the remaining 3 were very usable. Even those ICs which are non-linear or lack gain may find use in certain non-critical applications.

## CONSTRUCTION

The complete test rig is assembled on a double-sided PCB measuring 6.5 x 7.5 cms. All earth returns are made to the groundplane side which must be lightly countersunk around the holes which are not earthed. Layout is not critical and Radiospare IC sockets are used. Fig 2 shows a

## COMPONENTS LIST

### CAPACITORS

C1, 2, 3	4n7
C4	10µ Tant
C5	22µ Tant
C6, 13	1µ Tant
C7, 8, 12, 19, 20	10n
C9, 10	39p
C11, 15	47µ Elec
C14, 16	100µ Elec
C17, 21, 22	100n
C18	1n

### RESISTORS

R1, 2	6k8
R3	5k6
R4, 8	330R
R5, 11	27k
R6, 12	100R
R7	15k
R9	1k
R10	56R
RV1	1k pre-set
RV2	4k7 pre-set

### SEMICONDUCTORS

TR1	BC108
TR2	2N3819
DI, 2	1N914
IC1	78L06

### MISCELLANEOUS

X1	9-10.7MHz
SKT1,2,3	Radiospares
	8 Pin
	round
	sockets

suggested PCB layout with the component overlay shown in Fig 3. Flying leads are used for all connections with Veropins inserted into the PCB.

## CONCLUSION

The tests described are not foolproof but they do at least guarantee that the devices will operate — and in most cases you could not tell the difference between a brand new and a surplus device. The cost of 6 surplus ICs is less than half the price of a single new one in most cases, so what better justification could one want? □

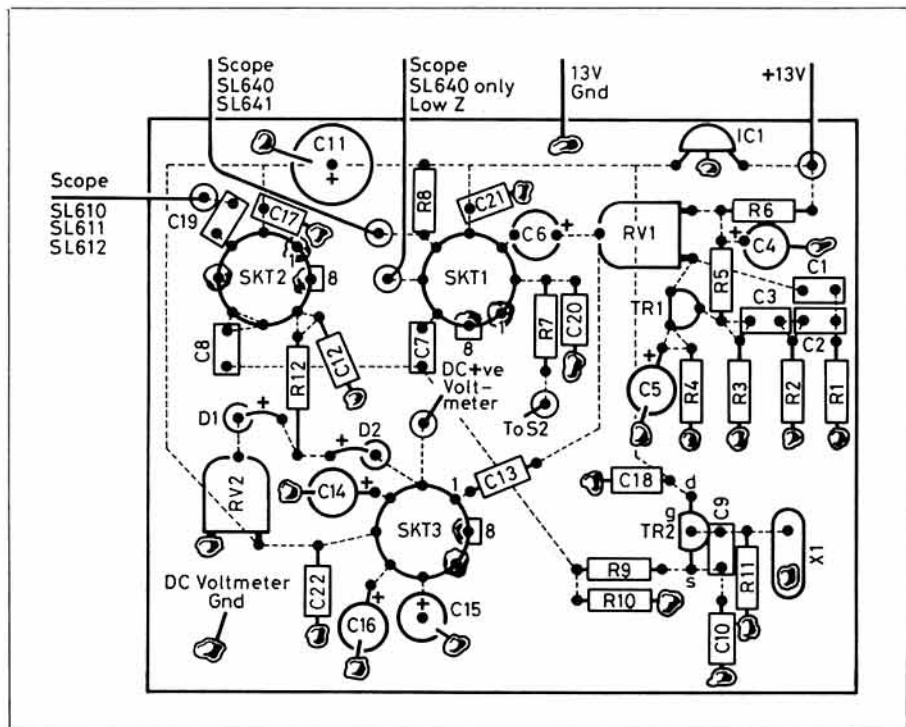
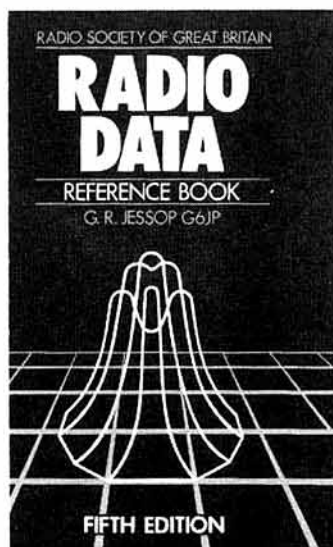


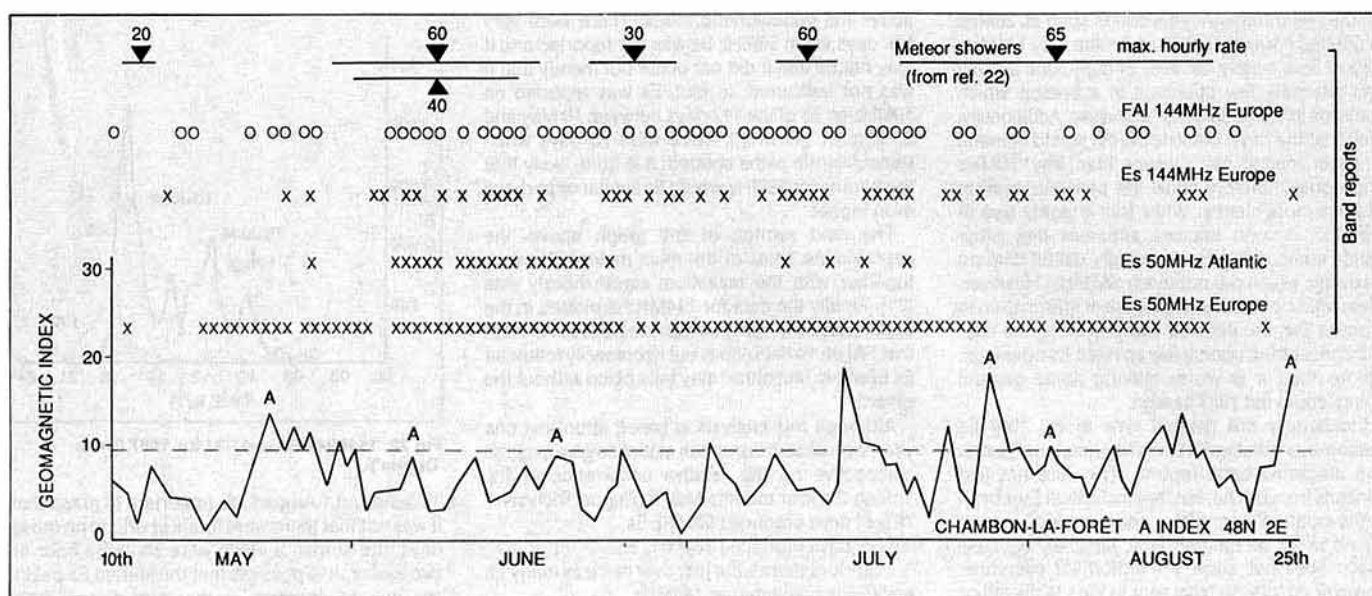
Fig.3 Topside of PCB, showing component placement



## RADIO DATA REFERENCE BOOK

Both the specialist 'home-brew' experimenter and general operator will find this publication of value, covering all aspects relating to the hobby. Radio Data Reference Book can be obtained from RSGB HQ.





# AN INTRODUCTION TO SPORADIC E (part 3)

Jim Bacon, BSc, G3YLA.

TABLE 3 - 144MHZ Es EVENTS 1987 FROM BRITAIN

Date	3Time	Path from UK	K index	Trigger
28 May	1645-1730	Malta, Italy, USSR, Poland, Yugoslavia	1,2,2,2	T,J
4 June	2011-2012	Italy	1,2,1,1	M,J
6 June	2000-2030	Yugoslavia, Hungary, Bulgaria, Italy	2,3,3,3	A,J
7 June	1115-1300	Italy, Greece, Yugoslavia	0,2,3,2	T,J
	1720-1830	Yugoslavia, Bulgaria, Hungary, Ukraine, Rumania		
11 June	1600	Malta	1,2,2,2	T,J
	1720-1845	Italy, Greece, Yugoslavia		
13 June	-	Spain	1,1,1,1	T,J
15 June	-	Italy, Malta, Yugoslavia	0,1,0,3	T,J
	1115	N.Ireland to Italy		
16 June	0850	Malta & Italy	1,1,1,2	T,J
	1050	Yugoslavia		
	1141	Spain		
18 June	1342-1456	Yugoslavia, Italy, Austria, Rumania, Germany, Hungary, Czechoslovakia, Poland	2,2,1,2	T,J
30 June	1600-1700	Italy	0,0,0,0	T,J
	1615	Spain & Portugal		
10 July	1650-1700	Poland, Ukraine, USSR	1,2,3,2	T,J
11 July	0930-1014	Italy, Sicily, Sardinia, France	2,0,1,2	T,J
	1648	Morocco		
13 July	1602-1706	Morocco & Spain	1,0,1,0	T,J
18 July	1418	Spain	2,2,3,3	J
19 July	-	Lithuania	1,1,2,2	T,J
20 July	1115-1130	Wales to Spain	2,1,1,3	T,J
	1400	Spain		
	1600-1730	Germany, Italy, Yugoslavia, Spain, Switzerland, Rumania, Poland, Hungary, Austria, Ukraine & Czechoslovakia		
21 July	1720-1758	Sardinia, Italy, Germany, Yugoslavia, Austria, Hungary	1,1,1,2	T,J
26 July	1600-1620	Spain, Canaries & Sicily	1,1,0,1	T,J
	1715-1741	Malta, Sicily & Italy		
	1835	Hungary		
28 July	1600	Poland	2,3,3,4	M,J
5 Aug	1616-1628	Spain & Portugal	2,2,2,2	T,J
	1659	Hungary		

K index is shown for 3-hour intervals 06-09, 09-12, 12-15, 15-18  
Trigger codes are T=thunderstorm, J=Jet stream, M=meteor scatter, A=auroral Es.

## THE VALUE OF AMATEURS' LOGS

In the previous two issues of Radio Communication I've explained how some of the current theories about the formation of Es suggest a link between the lower atmosphere and the ionosphere [20]. Weather seems to play a part in this but evidence is very hard to come by, so a great deal may be learnt by studying Es events reported by radio amateurs. The capability of observing events over a large geographical area is probably unique to radio amateurs. This enables us to make some useful statements about Es events, especially in relation to the extent and movement of the reflecting clouds. In some cases this may be more useful than a simple fixed site observation. It is, therefore, important that amateurs continue to 'fuel' the debate by examining this unique data set to see if it can provide any new clues or generate ideas for others to probe more fully; as a matter of fact, this is one of the remaining areas where the original spirit of experimentation in amateur radio can still be a rewarding exercise. It is not expensive and neither is it very arduous, and most stations can make some useful observations with equipment already in the shack.

There are three dates for the Es trial in July. The first and second will probably have passed by the time you read this, but the final date - the 12th - may still be available; see the May edition of *RadCom* for details [20]. Incidentally, it is equally useful to log the 28MHz beacons since they can often indicate the most favourable direction for Es. A regular sweep of the beacon section of this band about every 10mins, starting on the hour and subsequently at ten-minute intervals, would be ideal.

## GENERAL OBSERVATIONS OF THE 1987 SEASON

This was the first year in which I started to gather data for this survey. It proved to be a very fortunate choice, since near to a sunspot minimum there was not much high-MUF activity to cloak the data

Fig 19. (above). 1987 Sporadic E season 10 May to 25 August. Note: 50MHz Es does not show events on 7, 14, 19 & 20 April.

on the lower frequency Es bands such as 28MHz or 50MHz. It was decided to examine only 144MHz data at first, mainly because of high band activity and relatively few openings in a season which made the information easier to analyse. Additionally, I felt that the rarer 144MHz events would demand stronger forcing mechanisms than, say, 50MHz and would therefore show the possible weather triggers more clearly. While this is partly true in practice, it soon became apparent that other bands could also provide equally useful data on Es events which did not reach 144MHz. However, there really is such a vast amount of information to process that the detailed analysis of events later will concentrate upon a few specific Es openings. Before then it is worth making some general points about the 1987 season.

Incidentally this general view of the 1987 Es season was obtained from many amateur reports and magazine band reports. They are not just contacts from Britain, but they include all European paths notified during the same period. I don't intend to list all the callsigns, basically because space does not allow a mention for everyone; however, to all who have sent in logs to myself or the various magazines, please take this series of articles as a thank-you.

The characteristics of the 1987 season are best seen in a graph, see Fig 19. The geomagnetic A index for Chambon-la-Forêt in France, at 48N 2E, is plotted on the lower graph and shows that - except for a few isolated periods of disturbance - the index was at or below 10 for most of the period. Some of the events with a high index (peaks marked 'A') may have produced a radio aurora. The days when openings occurred on 50MHz, together with trans-Atlantic events, are shown just

above the geomagnetic index. There were very few days when 50MHz Es was not reported and it may not be that it did not occur but merely that it was not measured. In fact, Es was reported on 50MHz on 96 of the 117 days between 10 May and 25 August. All in all, there were 20 days when trans-Atlantic paths opened. It is quite likely that the figures for 28MHz would be similar or perhaps even higher.

The next section of the graph shows the approximate times of the main meteor showers, together with the maximum zenith hourly rate [21]. Finally the data for 144MHz is plotted in the upper portion of the graph and includes FAI. Note that FAI on 144MHz does not necessarily follow an Es event; in fact either may take place without the other.

Although this analysis is based upon just one year, these basic European statistics give a useful perspective on the relative occurrence of Es. Taking the four months May to August inclusive; 78% of days produced 50MHz Es 35% of days produced 144MHz Es

Therefore there were just over twice as many Es on 50MHz compared to 144MHz.

With a view to checking the times when Es occurred, I plotted the 144MHz data for 1987 published in 'Dubus' [22] - an excellent source of information for Es-watchers. The graph, see Fig 20, shows the number of Es events plotted against time of day. The two peaks in the late morning (1130UT) and early evening (1700UT) - as expected from previous work - show up well. There are also additional peaks some 2.5 hours earlier than usual, at 0900UT and 1400UT. The data shows that these phase-shifted peaks were mainly the result of Es on just two or three occasions; 16 and

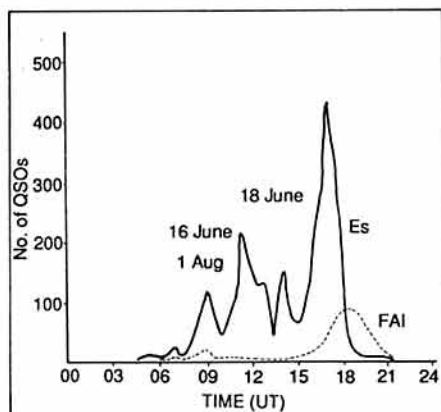


Fig 20. 144MHz Es and FAI for 1987 (from 'Dubus')

18 June and 1 August. It's important to grasp that it was not that there were four Es periods on those days; the normal periods were shifted a hour or two earlier. It is possible that the shifted Es peaks are due to changes in the semi-diurnal tidal forcing which was mentioned last month as being subject to fluctuations from day to day.

One thing to bear in mind is that the apparent magnitude of the peaks can easily be influenced by just one or two very active stations in an opening. It is probably better to plot the number of days when there are openings in the given periods, rather than QSOs. This should take out any variation due to band occupancy. Notice how the time of the FAI maximum (1800UT) is roughly one hour later than the Es peak. The early morning 'blips' at 0700UT and 0830UT are also seen to have a similar shift. The whole question of times of openings is the subject of continuing analysis, and I hope to show other plots of this data in a future article; we may not be plotting what we think we are plotting.

The details of 144MHz Es events worked from Britain in 1987 are shown in Table 3. I have also tabulated the K indices for Chambon-le-Forêt for four three-hour intervals during each day. The table of A and K indices shown in last month's Radcom will be useful to convert to an equivalent A index. It is clear that most openings occur with a

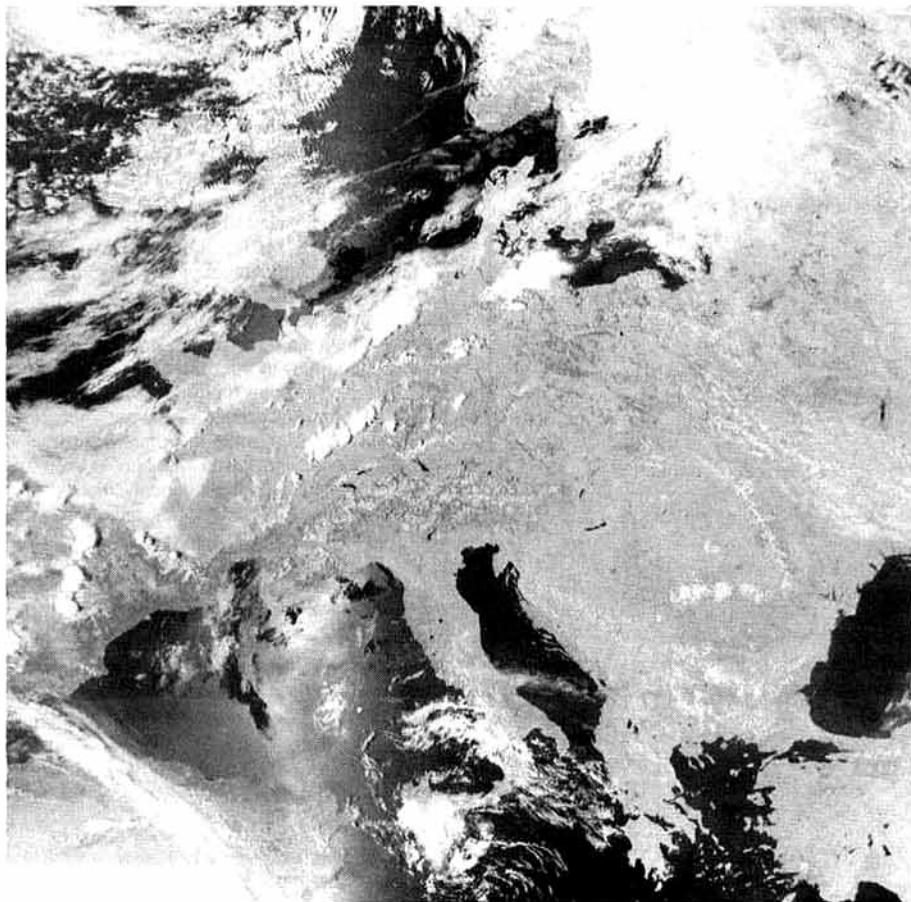
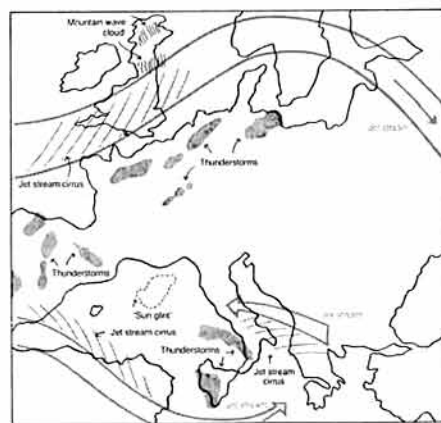


Fig 21. (left) NOAA9 1355 UT 30 June 1987.

Fig 22. Schematic of satellite picture shown in Figure 21.



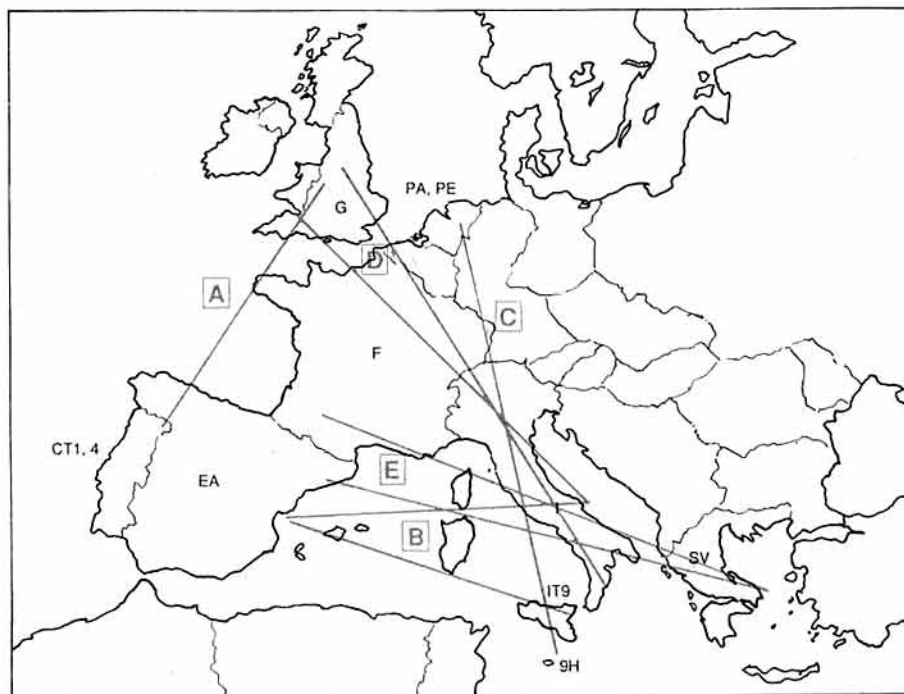


Fig 23. Es paths 30 June 1987.

low K index, mostly 3 or less. Four zeros – as occurred on 30 June – seem very rare, even in a sunspot minimum. A 'trigger code' which suggests a possible cause (or causes) for the event shows that there are often two options present for any one event, but note also that nearly all include 'J' for jet stream.

### SELECTED Es EVENTS

In meteorology, it is often possible to learn a great deal from a more detailed examination of a specific weather feature rather than to rely upon a general analysis of all weather events using less comprehensive data. If we are to explore the different mechanisms at work in Es events with a

view to coming up with some general theories about Es, I think it is reasonable to expect that they should work (at least in part) for each particular Es event studied. With this in mind, the rest of part 3 will now consider a few selected openings which illustrate the points raised in the previous two parts of this series.

### 4th & 6th JUNE 1987

These are both examples of later than usual Es (see Table 3 again). It is possible that auroral particle input is implicated, but the meteorological evidence suggests jet streams, and in one case thunderstorms were also present. They are both possible indicators of the late evening period for Es shown in Fig 18 last month. Although this period was labelled as auroral Es, it may be that it can be triggered in the normal way by weather events, as with the earlier periods in the day. It is also possible that these two days represent occasions when the tidal cycle was running late and the normal Es periods were simply displaced to the right on Fig 18. These evening Es will be worth looking for in future seasons.

### 30 JUNE 1987

This was chosen for closer analysis since it was evident that there were several different paths open on just the one day – making an ideal testing ground for current ideas about Es. Each path should, of course, be explicable in terms of the theories mentioned earlier in this series. Incidentally, the satellite pictures used in this article are reproduced by courtesy of The University of Dundee satellite station. The NOAA 9 picture for 30 June 1987 at 1355UT is shown in Fig 21 together with a schematic version in Fig 22, which indicates the major features of interest.

Firstly, note the presence of thunderstorms near – or along – the Es paths which were reported. The satellite picture also shows a 'streaming' of the clouds over Britain from south-west to north-east; this is typical of jet stream cirrus cloud. The regions of maximum upper wind (jet streams) for 1200UT are shown in Fig 22 and seem to correspond to this cirrus. Note also that there are two minor jet streams over southern Italy and north Africa surrounding another group of thunderstorms over Sicily. The Es paths which

Fig 24. (left) NOAA9 1456 UT 13 July 1987.

Fig 25. Schematic of satellite picture shown in Figure 24.

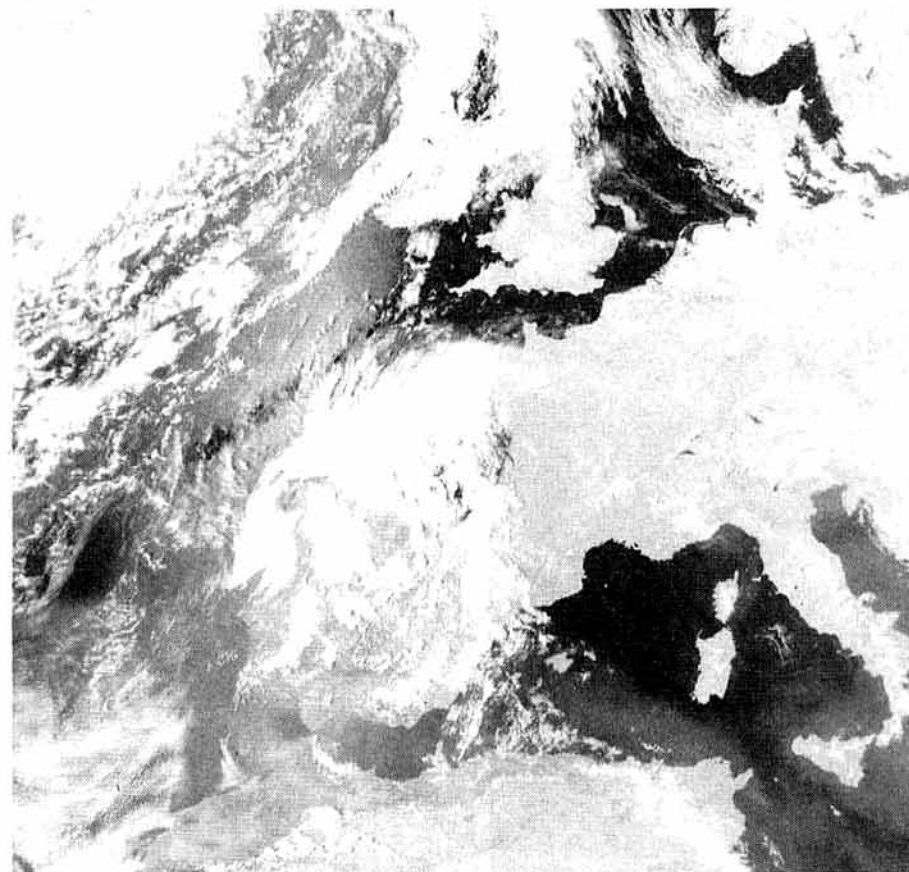
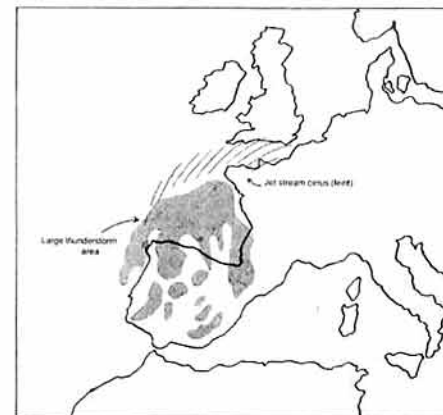




TABLE 4

## Es PATHS FOR 30 JUNE 1987

Path	QSOs	Time (UT)	Distance (km)
A	1	1500-1630	1282
B	9	1523-1548	1160-1484
C	13	1546-1602	1713-1954
D	4	1550-1600	1851-1912
	3	1634-1655	1509-1740
F	22	1700-1812	via FAI scatter mode (not shown in Fig.23)

were reported on this day are shown in Fig 23 and are detailed above in Table 4. It is interesting that there is a decrease in path distance worked between the two sections of group D. The contacts between south-eastern England and Italy were some 15% longer than those from western England some 35 to 55 minutes later. This would be consistent with a lowering of the Es as a sequential layer due to the semi-diurnal tidal effect which was discussed last month. FAI scatter mode was also reported on this day. Note that the paths D and C appear to cross over northern Italy, although this may not mean that the Es patch is located there. Several options exist; for example, the thunderstorms at each end of C and/or part way along D may be the trigger. Equally, it is possible that the jet streams at either end may be responsible. Paths A,B and E contain both thunderstorms and jet streams. Overall, this event is rather hard to pin down to one single cause since both thunderstorm activity and jet streams are present in roughly the correct position for triggering Es. It is important to note that the thunderstorm

and jet stream locations are themselves moving during the period.

## 13 JULY 1987

This day saw paths in one specific direction, to Spain and Morocco. The corresponding NOAA 9 satellite picture for 13 July 1987 at 1456UT is shown in Fig 24 and indicates clearly the large cluster of thunderstorms over Spain and the Biscay area. It is not quite so easy to see the faint cirrus cloud streaming from the northern flank of this storm area towards the east: this may be a sign of a jet stream but in this case the evidence is not conclusive. The schematic picture is shown as Fig 25.

## 18 JULY 1987

This represents the first tentative example of a jet stream trigger without thunderstorms. It is unfortunately not conclusive since some of the cloud on the satellite pictures is hard to identify with certainty.

## 20 JULY 1987

This was possibly the most widespread event of 1987, with many stations worked across a large part of Europe. The satellite picture in Fig 26 - again from NOAA 9 - was taken at 1341UT on 20 July 1987. The corresponding schematic, Fig 27, shows that the bulk of the near continent was affected by very unstable air (which produces showers easily) and there were a few tens of separate storm cells easily visible on the satellite picture; you may be surprised to see how widespread thunderstorms can be! It would be difficult to try to tie in each specific storm cell with a given radio path, but it is probably fair to say that a storm existed along most of the routes which were

worked that afternoon. However, it is also clear that a substantial jet stream was present over central Europe at the same time, which shows up as a very clear streaming of cirrus cloud. It is interesting that the line of the jet stream cirrus is roughly a radial ring centred on Britain and only a little short of the ideal distance for Es to give maximum range of contacts via this mode.

## NEXT MONTH

This represents a sample of the events studied during the 1987 season; it would of course be nice to detail many more. The value of meteorological data has been shown in these three examples and provides evidence of a connection between weather and Es. I could have chosen any of the days shown in Table 3 and produced similar circumstantial evidence. Naturally other events may not be quite so clear-cut, although there have been none which stand out as definite failures. It is interesting to see at this stage how the verdict remains open, with both thunderstorms and jet streams implicated in the formation of Es.

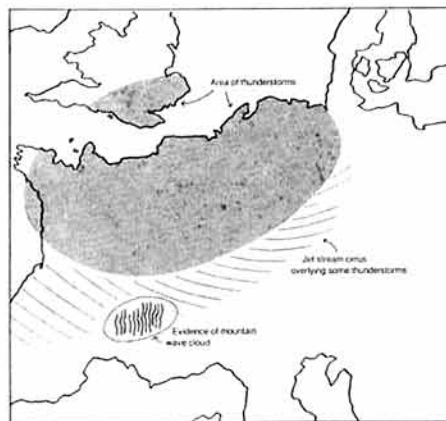
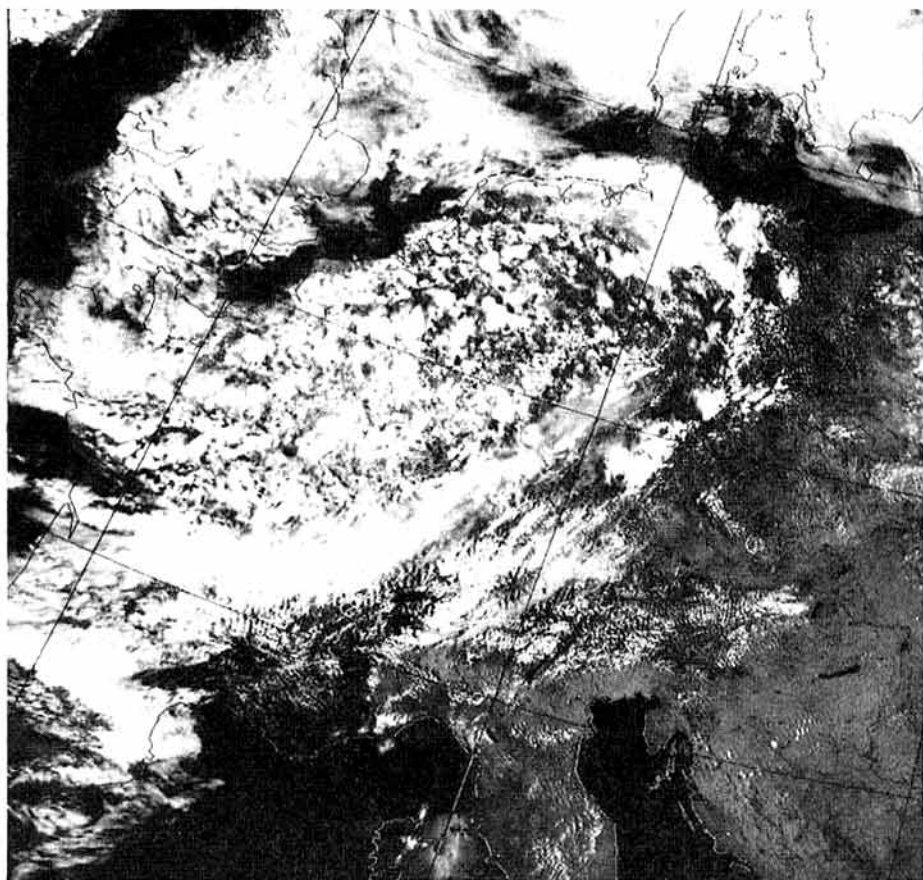
Later reports for 1988 and new data for this year are already clarifying some of the ambiguities left by the 1987 survey. The data for 10 July 1988, which was one of last years' Es trial days, will be held over until next month. It represented a major change of direction for this project - and, as the satellite pictures will show next month, there is no doubt about which of the meteorological triggers was or was not present. It will also be possible to show the movement of the event, and how that related to the movement of the trigger features in the troposphere. This year the Es season is going to plan, with all of the openings so far (to end of May) fitting the theories but with some important indications that the degree of opening does depend upon the strength of the forcing mechanism. More on all this next time, together with a meteorological operating guide for use next season.

## REFERENCES

- [20] Bacon, J.D., "An Introduction to Sporadic E" *RadCom*, May 1989, 37-41 and June 1989, 37-39.
- [21] Eckersley, R.J., 1979 *Amateur Radio Operating Manual*, RSGB, p79
- [22] Kollner, G. "Es Summary 1987," *Dubus*, 1/88, 23-45, *FAI information* 1987, 2/88, 151-161

Fig 26. (left) NOAA9 1341 UT 20 July 1987.

Fig 27. Schematic of satellite picture shown in Figure 26.



## IN PRACTICE

# POWER SUPPLIES

In this, the first of a new series aimed at practical construction tips, we look at the importance of using adequately rated capacitors and dispel some three terminal regulator myths.

By and large, commercially-built amateur radio equipment tends to be pretty well designed. No doubt because amateurs are a discerning lot, manufacturers don't tend to go in for too much in the way of 'specmanship' (unless you're talking about the output of linear amplifiers...) and neither do they tend to re-invent technology that became obsolete about thirty years ago and plug it as the new state-of-the-art. Contrast this with the weird and wonderful world of hi-fi, for instance, in which at least one amplifier manufacturer is currently claiming that the only real way to achieve audio nirvana is to use directly-heated triodes! No doubt the next discovery will be that thermionic rectifiers sound better than solid-state ones.

It was a bad experience with a hi-fi amplifier which prompted this piece, as a matter of fact. Made by a British company with a world-renowned reputation for quality, the 63V working reservoir capacitors in this machine were within an ace of being overrun with 240V mains input (heaven help them when the mains went high) and were subjected to pretty high temperatures into the bargain. The manufacturers didn't condescend to explain why it was designed that way but - reading between the lines - somebody boomed. Having discovered subsequently that one or two of the standard electronics textbooks don't explain simple power supply design problems too well, we thought we'd look at a couple of them. It's very easy to build a reliable PSU, but it's also easy to forget to make sure that your components are

properly rated - at best you might blow some fuses and at worst you could have a very smelly mess on the floor of the shack.

### 12V PSU

Let's suppose you want to build a simple 12V regulated PSU for the shack. We'll assume that the regulator will be one of the standard three-terminal devices and also that we've obtained a suitable transformer and rectifier. What should we ask ourselves about the reservoir capacitor apart from how many microfarads it should have? Two things - (a) what should its working voltage be? and (b) can it cope with the ripple current?

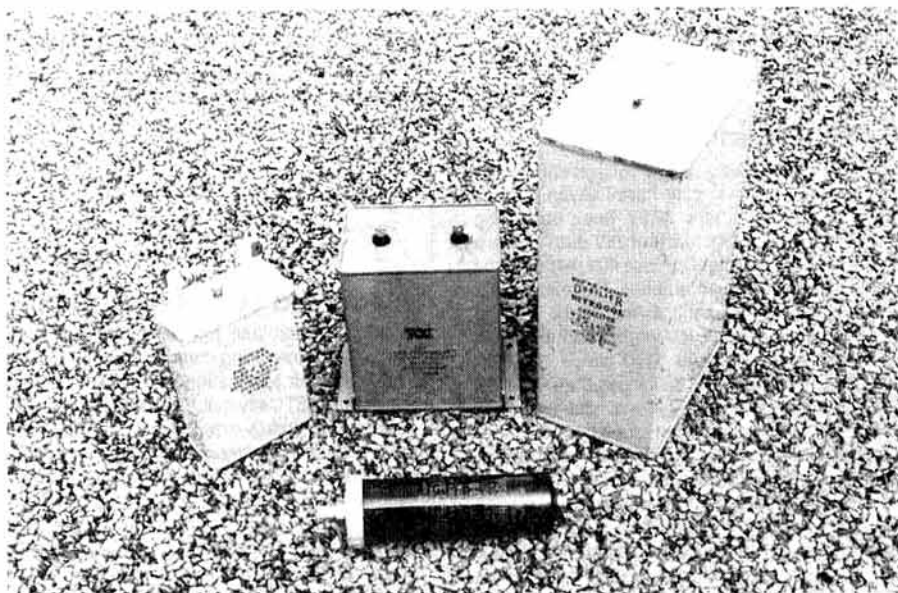
Electrolytic capacitors are available nowadays in what are known as 'preferred values' of working voltage. These are 6.3, 10, 16, 25, 40, 63, 100, 160, 250 and 400, although you'll occasionally come across older or non-standard components with other values of working voltage. 'Working voltage' means the absolute maximum voltage which should ever be applied to the capacitor in normal continuous service, and this is where life starts to get interesting. In a conventional power supply using a transformer, rectifier and reservoir capacitor, the peak voltage applied to the capacitor will be 1.414 times the transformer's secondary voltage less any drop in the rectifier. The reason is that the voltage rating of a transformer secondary is always quoted as an RMS value, so you have to multiply by root 2 to get the peak value. It's the same as the UK mains. If someone asks you what

the mains voltage in Britain is, you reply "240" - which is true. However, that's an RMS value - the peak-to-peak voltage is nearer 340. So suppose that your 12V power supply uses a transformer with a 12V secondary. Multiplying by 1.414 gives pretty well 17V; allowing about 2V drop in the rectifier makes it 15V. In other words, there's a peak voltage of 15 on the capacitor in our "12V" supply.

### WORKING VOLTAGE

So what working voltage should our reservoir capacitor have? Looking at the list above, you might think that a 16V component would be ideal - but would it? For starters, remember that UK mains voltages are plus or minus 6% - in other words, a nominal 240 mains supply can legitimately be almost 255V, and it can be a lot higher than that if you're unlucky. Remember also that the voltage of a transformer secondary is usually specified at full load current, and it's certain to be higher when none is being drawn - i.e. when the PSU is switched on but isn't supplying power to external equipment. The amount by which it is higher depends on a parameter known as the 'regulation' of the transformer, which unfortunately isn't often specified even for new components. For small conventional transformers it can be as high as 25%, becoming better for larger ones. Taking a worst case, this could mean that your notional '12V' secondary could be producing nearer 16V RMS off-load, implying a repetitive peak voltage of 22.6 on the reservoir capacitor. Out of interest, you might like to think about the corresponding situation in respect of the '1600V' secondary of the transformer you're about to use for a valve linear amplifier. What order of peak voltage could that apply to the reservoir capacitors? Incidentally, I've also known generators at contest sites produce 270V...

The other important point is that no professional engineer interested in producing reliable equipment runs electrolytic capacitors right on their ratings. For various good reasons bound up with the way they work (basically, they're not very good components in a number of respects) electrolytics are a great deal more reliable if they're under-run. As a



Fortunately most contemporary circuits no longer require the massive components of yesteryear!

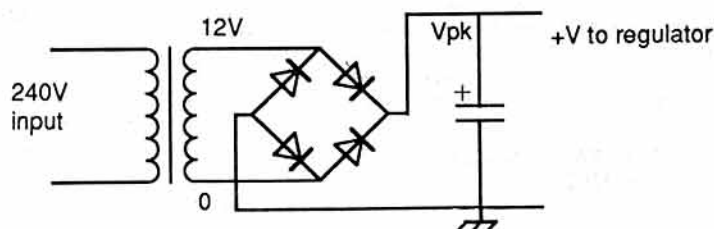


Fig 1. In this circuit,  $V_{pk} = 12 \times \sqrt{2}$  less the forward voltage drop in the rectifier - see text. In a typical circuit it might reach 15V off load, or even more if little load current is drawn.



rule-of-thumb, most professionals use them at perhaps two-thirds of their rated working voltage; it isn't considered good practice to run them at much more.

## UNDER RUNNING

All in all, then, what working voltage should the components in our supply have? Given that we could conceivably have 22.6V peak appearing across them, we might feel that 25V didn't leave a lot in hand – so we might choose 40V, which is the next available rating. In practice, this means that you might have to spend a few pence more if you're buying new and you might need to leave a bit more space in your PSU since the 40V component might be a bit larger than the 25V equivalent. In exchange, you're guaranteed a much longer life. Don't be afraid to under-run electrolytics by as much as you like, except that at very low voltages the capacitance you get might be somewhat less than the value marked on the can. Older components didn't tend to 'form' properly at very low voltages so you hardly got any capacitance at all, but more modern ones don't display this phenomenon.

Having sorted that out, what else should we consider about the reservoir capacitor? Remember that, as a consequence of what it's there for, it's passing some current through itself. The amount of this 'ripple current' varies with the load drawn from the supply and there are various ways of calculating it, but as a rule-of-thumb you can reckon that it's going to be about 1.3 times the load current. In other words, if your PSU is supplying something which draws 2A from it, the ripple current in the reservoir capacitor is going to be about 2.6A.

Ripple current causes internal heating of the capacitor and it's the other major factor in determining its life. Obviously you need to use a component which is capable of handling the ripple current which it will have to pass in your supply, and here again you want to allow a factor of safety. If your PSU will supply up to 5A, for instance, your maximum ripple current will be 6.5A and you'd be wise to have reservoir capacitors with a ripple rating of maybe 8A in there. Don't forget that it's perfectly OK to put capacitors in parallel, by the way; assuming that they're the same value, this will double the capacitance and also double the ripple current rating. If you buy new components, the data sheet or catalogue will tell you what the ripple current rating of the capacitor is. However, if you're buying from a rally and the ripple rating isn't shown on the capacitor (it often is), you'll have to go on size. Given a choice, use a component which is physically large.

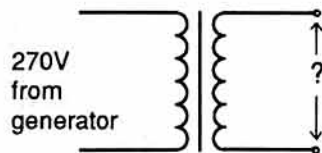


Fig 2. Remember that a '12V' secondary assumes 240V mains input. What happens when the mains goes high – or the generator at the contest site? In this example the secondary voltage is now  
 $12 \times \frac{270}{240} = 13.5$   
 You must think about "worst-case" in PSU design.

## RIPPLE CURRENT VS TEMPERATURE

Derating factor for ripple current against temperature at 100Hz for typical electrolytic:

Temp	Multiplier
30°	2.2
50°	1.9
70°	1.5
85°	1.0

Remember the ripple current  $\approx 1.3 \times$  load current

## OPERATING TEMPERATURE

The other golden rule for using electrolysis is to keep their operating temperature as low as possible. In their application notes, the capacitor manufacturers STC say that: "Reducing the element temperature greatly extends the life expectancy of the capacitor. A component which is endurance tested for 1000 hours with an element temperature of 85 can have a life expectancy of 100,000 hours at an element temperature of 40 degrees. Reduced ripple current, adequate ventilation and careful component placement all contribute to maximising life."

In other words, don't mount your reservoir capacitors up against the mains transformer or adjacent to the heatsink for the regulator device.

One other final hint – DON'T EVER CONNECT THEM UP THE WRONG WAY ROUND. Electrolytic capacitors are polarised and if you get it wrong they'll get very hot very quickly and kaboom! Before you run up a new PSU, or if you're replacing a reservoir capacitor in an existing one, do check that you've got the thing connected up so that the positive terminal (usually marked +) goes to the positive voltage. In smaller electrolytics with axial wires, the negative end is usually marked by a black ring.

In case you're wondering why we're making a bit of a meal of how to look after your electrolytics, by the way, the answer is that when they fail they often go with a bang – literally. And believe me, it isn't funny. I've known situations where an exploding electrolytic has broken adjacent PCBs into several pieces and demolished a variety of adjacent components. And the smell and mess (the smell, especially) is really horrible. It takes days for it to disappear, and I've known people arrive in professional workshops a week or so after an electrolytic exploded, sniff the air and ask what happened. And it doesn't take much to upset these components. By mistake I recently ran a new high-quality 250V working electrolytic at about 260V, although miles below its ripple-current rating. After about three hours' use there was a loud bang and it went dead short-circuit, fortunately without actually exploding.

Let's just recap on the golden rules for using electrolytics. Watch your working voltage (remember that a 12V secondary will apply a lot more than 12V to the capacitor and pro-rata) and think about ripple current ratings before you use a particular component from the junk-box. Also keep them cool and double-check the connections to them before switching on. If you do those things, your piece of kit should have a long and happy life.

## USING THREE-TERMINAL REGULATORS

We had a please-help letter the other day which brought a smile to our faces. This was only because we'd fallen into the same little trap some years ago and spent the best part of a week trying to work out what was happening (never again).

The writer had built a piece of equipment which required split-rail (ie +12V and -12V) supplies and he was using the very popular LM340/320 (or 78xx/79xx) 1.5A TO220 regulators. Although the positive rail was working perfectly well, the negative rail wasn't – the supply fuses kept blowing and he couldn't work out why. He'd changed every component in sight including the regulator but was getting nowhere.

We figured this one out in about two seconds flat. Because you tend to use positive regulators such as the LM340 all the time, you soon remember that the connections to them (holding the device with the body of it facing you and the leads downwards) are input-common-output – the common is the centre lead of the three and is connected to the mounting tab, and in 99 cases out of 100 it goes to deck. When you come to use the corresponding negative regulator – the LM320, which you probably come across less often – you tend to assume that it's the same as an LM340 and forget that it has a different pinout. Holding it the same way round as the '340, the connections are common-input-output. In other words, the centre pin is the input and, like the positive regulator, it's connected to the mounting tab. So if you mount an LM320 to chassis, or an earthed heatsink, you must use a mica washer and insulating bush. Otherwise, like our friend, you'll short the regulator input to earth. Result is that the fuse goes pop (or the rectifier, if you forgot to include a fuse...)

Don't forget that the negative regulators in this family need a capacitor across the input (2.2μF tantalum or 25μF ordinary electrolytic) if they're located more than 3" from the reservoir capacitor and that they also require a 1μF tantalum or 25μF electrolytic across the output for stability. The positive regulators only need an input capacitor if they're a long way from the reservoir (ie, on a different card – use a 22n ceramic) and the application notes say that they don't need an output capacitor for stability although a 0.1μF ceramic helps transient response.

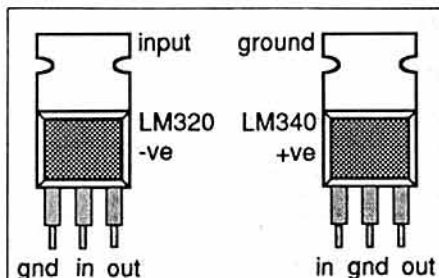


Fig 3. Care must be taken to observe the pin-outs when using three-terminal regulators in dual-polarity supplies.

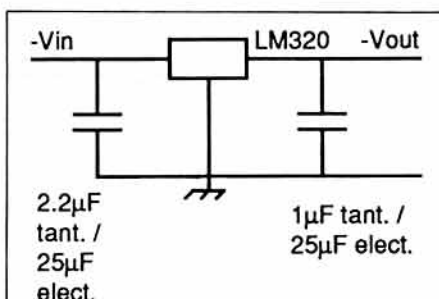


Fig 4. Stabilising capacitor requirements for -ve regulators.



# DX COMPETITION — HOW TO ENTER

This month we are printing the next set of photographs and clues (see bottom of this page) relating to well-known landmarks around the world. All you have to do is identify the precise location of the landmark, write down the ITU prefix associated with the respective country and also its capital city (or main town/village in the case of islands). When you have successfully identified all locations and provided the required information, you must then estimate the total number of International Nautical Miles flown point to point by the shortest direct route (ie, ignoring the normal airline routes and availability of a local airport) if you were to visit each of the locations in the order in which they appear. The start and finish point is at RSGB Headquarters in Potters Bar. This latter part of the competition will be the tie-breaker.

For example — the photograph shows the Sydney Opera House so, if this were the first clue (which it isn't), your answer would be;



Sydney Opera House, Sydney NSW, VK(1) and Canberra. The shortest distance between RSGB HQ and Sydney is 9,166 International Nautical Miles — OK?

By the way, don't forget that you will have to add the distances between each of the locations as they appear, starting and finishing at RSGB HQ, in order to arrive at the total.

The entry form and final clues will be in the August issue of Radio Communication and a small entry voucher will be printed with each of the other sets of clues. These vouchers **MUST** be attached to the entry form (photocopies of the vouchers or entry form will **NOT** be accepted). The competition is open to RSGB members only and, in the event of a tie, the entrant with the nearest estimated total International Nautical Miles travelled will be the winner. In the event that no entrant successfully identifies all of the locations or gives all of the required information correctly, the judges will exercise their discretion.

**So - it only remains to wish you the best of luck and "GOOD DX".**

## RULES:

Entries **MUST** be received at RSGB Headquarters by 5pm on Friday 29 September and the judges' decision will be final.

The winner will be notified by post and the first prize of the holiday must be taken during the Winter 1989/90 season on a mutually convenient week for the winner and Serenity Holidays Ltd, excluding Christmas, the New Year and Easter holidays. If the

winner would like an additional week at the same accommodation or at another hotel in The Gambia, this can be arranged at extra cost. (It's certainly worth considering this since the air fare forms part of the prize and the cost of an extra week is, therefore, quite reasonable.)

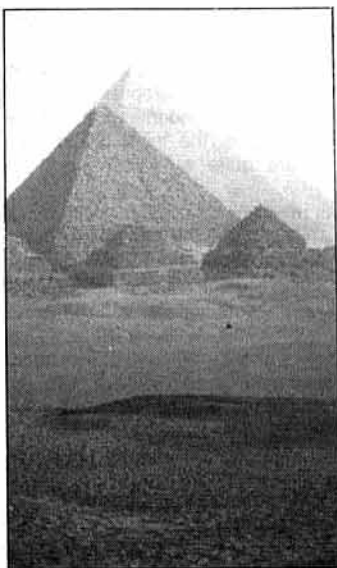
No cash alternative prize will be available.

The winner of the competition may be required to provide a write-up of his/her experiences in the Gambia for possible future publication in *Radio*

*Communication* and should be prepared to allow their name and photograph to be used in conjunction with any publicity resulting from winning the competition, either by the RSGB or Serenity Holidays Ltd.

Immediate family members of Mr & Mrs G E Sumption, or employees of Serenity Holidays and immediate members of their families, or employees of the RSGB, or the Council of the RSGB, and immediate members of their families, will **NOT** be eligible to enter the competition.

## CLUE 4



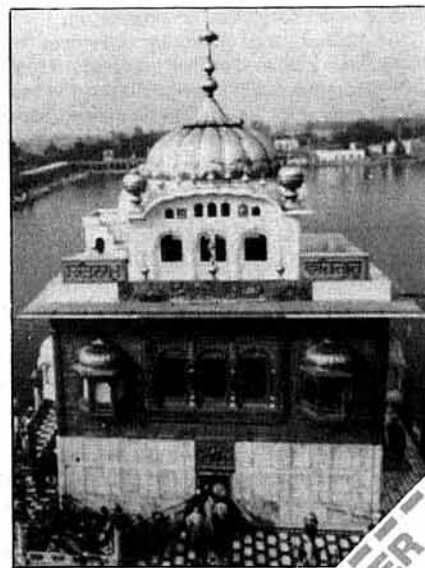
**THE ORIGIN OF A FAMOUS 'SOAP' OR NOT.**

## CLUE 5



**THIS ISLAND WAS EVACUATED IN OCTOBER 1961.**

## CLUE 6



**'SEEK' OUT THIS FAMOUS TEMPLE.**



## Navico AMR1000S - Review

**Peter Hart, G3SJX, investigates this all-British newcomer to see if it promises to give the imports a run for your money.**

With the amateur transceiver market being more or less dominated by Japanese suppliers, it makes a welcome change to see the recent emergence of a British manufacturer of 2m FM rigs. The 'newcomer' Navico, is an established name in the marine leisure field, manufacturing VHF radios, echo sounders, auto-pilots and other related products.

The required electrical characteristics of a 2m FM mobile are very similar to a marine VHF radio (156-163MHz). Hence a marine radio is a good base on which to develop an amateur rig.

The Navico range currently comprises two 144MHz models based on their successful RT6500 VHF FM marine radio. The AMR1000 is the basic 25W mobile with the AMR1000S having added features including memories and comprehensive scanning facilities - the AMR1000S is the subject of this review.

### PRINCIPAL FEATURES

Both the AMR1000 and AMR1000S have a common set of core features. The radio covers the frequency range 144 to 146MHz with 12.5 or 25kHz channel spacing, which covers European requirements but is unsuitable for use in the US. The unit incorporates two VFOs and the frequency is stepped by up-down keys located on both the front panel and the microphone. These increment at a faster rate if held in for longer than about 2s. The transmitter power level is selectable between 25W (high) or 5W (low) and a back-lit liquid crystal display is incorporated which indicates frequency, 'S' reading, selected VFO and TX power. The AMR1000S also indicates memory number and other functions associated with the extra scanning, programming and priority channel monitoring facilities.

Six levels of display illumination are selectable, with the 'S-meter' readout being displayed digitally from S0 to S9 with S9+20dB and S9+40dB. One

particularly useful feature is the ability to select between frequency display mode (eg display showing 145.525MHz) or channel display mode according to the IARU band plan (eg display showing S21). The band plan for repeaters is also implemented (eg display showing R7) with optional selection of French and other European variants. In channel display mode, only the channelised FM portion of the band is operative, enabling rapid channel selection by missing out the satellite sub-band and 144 to 145MHz.

When operating in the channel display mode with a repeater channel selected, a 600kHz repeater offset is automatically implemented and an 'intelligent' toneburst enabled. Simple toggling between normal repeater duplex and simplex operation on either repeater input or output frequencies is also provided. The 'intelligent' toneburst is enabled when operating on repeater channels. On the first press of the PTT on the selected channel, a 1750Hz 400ms toneburst is transmitted, but on subsequent presses, the toneburst will only be transmitted if the squelch has closed (ie receiving no signal) for a period of over 10s. In addition, a toneburst is transmitted whenever one of the up-down keys are pressed whilst on transmit.

The AMR1000S has many additional features. Ten memories are incorporated which are skipped if empty, priority channel monitoring once per second and a comprehensive selection of different scanning modes. Scanning can be selected so as to stop or pause on either a busy or a vacant channel. There are three basic modes of scanning; scanning of memory channels, scanning of channels between two limits and scanning all channels. Scanning all channels can also be limited to the IARU designated simplex and repeater channels. Priority channel monitoring will also function simultaneously with scanning selected. Up to 48 channels can be skipped in the scan-all mode and

if the scan stops on a repeater channel then the intelligent toneburst and repeater offset are automatically enabled. Some scanning functions may also be selected from the microphone.

Many of the basic operating parameters of the AMR1000S may be changed at switch-on. These parameters include scan rate, scan hold time, toneburst length, intelligent toneburst time-out, squelch enabled or disabled on external audio output, preset illumination level, start-up frequency, 12.5/25kHz step size and European repeater options. Only the latter two parameters (step size and repeater options) are selectable with the AMR1000 and these are not retained on power-off. Simple interfacing to packet TNCs is provided via the microphone connector.

A 36 page instruction manual is provided which describes in full how to install and use the equipment. A brief technical description is also given together with a block diagram. Each transceiver comes complete with fist microphone and DC power lead.

Available accessories for the AMR1000S include extension loudspeakers, mounting kits, telephone style handset, mains PSU and 24V/12V converter.

### DESCRIPTION

Navico have obviously given much thought to the styling of this radio and the logistics of mounting in a vehicle (or boat). The shape is unlike any other radio, as can be seen from the photo, with a thin main body and sloping front panel. This design allows for mounting in many different positions as the front panel can be reversed very easily to ensure that the controls and display will always face the user. The overall size is, however, somewhat larger than the latest rigs out of Japan.

As may be expected with a pedigree derived from marine radio, the AMR1000S is solidly built. The main case is a two-piece die-cast aluminium moulding which contains a single PCB holding the majority of the circuitry. The micro-controller is contained on a smaller, second PCB which is located behind the plastic front panel. A front facing speaker is incorporated, the ideal location, although inevitably rather small at 5cm diameter. The power, antenna and external speaker connectors fit into a recessed area underneath and hence do not protrude out of the back of the unit, although they are quite awkward to tighten securely.

The receiver uses a double superhet with IFs of 21.4MHz and 455kHz. A single-loop frequency synthesizer generates the receiver local oscillator and transmit signal source. The synthesizer VCO is modulated on transmit and the transmit chain employs discrete low-level amplifier stages which feed a 25W power module. All control functions, synthesizer programming, display driving etc, are handled by a single chip microcontroller. Memory contents and the user set-up options are all stored in non-volatile memory; no back-up battery is used.

### MEASUREMENTS

All measurements were made using a 12.5V supply using the full length of the power cable supplied with the equipment. No change in receiver or transmitter performance was observed over the supply voltage range 11 to 15V. The measured performance is summarised in the accompanying table and additional comments are as follows.



## RECEIVER MEASUREMENTS

**Sensitivity:** The sensitivity figure is good and in line with the specification figure quoted in the instruction manual. The squelch sensitivity limit was around 0.1µV which is sufficient to allow any readable signal to operate the squelch.

**S-Meter Calibration:** The S-Meter is grossly over sensitive, indicating S9+40dB for only 1µV input and only 22dB range between S1 and S9+40dB. However, this is a common failing of virtually all FM rigs. If FM rigs used the IF amplifier integrated circuits which were developed for cellular radio mobile telephones, a linear S-meter with 80dB range could easily be provided.

**Adjacent Channel Rejection:** Both the 25kHz and 12.5kHz adjacent channel rejection figures are excellent. This rig is obviously equipped with narrow IF filters to achieve effective 12.5kHz channelised operation, unlike many of the rigs currently on the market.

**Spurious Response Rejection:** Rejection of image and all other unwanted responses is excellent.

**Strong Signal Performance:** The third order intercept is average, generally bettered by many of the latest rigs on the market.

**Receiver Audio:** This is slightly lower than specified (4W into 4ohm) but note that the internal speaker, which is 8ohm, is only rated at 0.5W output. The distortion does not improve at lower levels and full output could only be achieved when the deviation on received signals was greater than 4kHz. The rig is, perhaps, a little low on audio gain.

## TRANSMITTER MEASUREMENTS

**Power Output:** The transmit power is a little lower than specified.

**Spurious Outputs:** The harmonic output is very low and no other spuri were observed down to a level of at least -80dBc.

**Transmit-receive Switching Time:** I am informed by experienced packet users that time delays are not generally a problem in the majority of situations. This may be contrary to my comments made in previous reviews (IC228H, *RadCom*, December 1988). In this case the Navico figures are acceptable.

**Frequency Accuracy:** As supplied, and at room temperature, the transmitter was about 500Hz low in frequency. This also applied to the receive frequency and is perfectly acceptable.

## ON THE AIR

The AMR1000S was used on the air over a period of about two months, during which time the rig generally performed well. The receiver was sensitive, no strong signal problems were encountered from local stations and good rejection of adjacent channels on 12.5kHz was obtained, confirming the measurements. The small internal speaker produced quite a lot of sound before overloading, but the audio quality seemed somewhat on the 'toppy' side with very little bass. This has to be expected with such a small speaker. Rather better quality was achieved with a larger external speaker. In my rather noisy car, the internal speaker lacked sufficient output for motorway driving and an external speaker proved preferable. This obviously will depend upon both the car and the mounting position. The S meter had very limited range so that virtually unreadable signals indicated S5 and nearly all fully quieting signals S9+40.

On transmit, audio quality reports varied considerably. Speaking close to the microphone, good reports were received and the audio had plenty of punch but speaking only an inch or two away from the microphone resulted in reports of

NAVICO AMR1000S MEASURED PERFORMANCE	
RECEIVER MEASUREMENTS	
Supply current (no illumination, min audio)	130mA
Sensitivity for 12dB SINAD, 3kHz pk dev.	0.14µV (-124dBm)
S meter sensitivity — S1	0.08µV (-129dBm)
S5	0.14µV (-124dBm)
S9	0.25µV (-119dBm)
S9+20	0.45µV (-114dBm)
S9+40	1.0µV (-107dBm)
Adjacent channel rejection	80dB approx
1) 25kHz with 3kHz dev.	70dB
2) 12.5kHz with 3kHz dev.	73dB
3) 12.5kHz with 1.5kHz dev.	5dB
Co-channel rejection	96dB
Image rejection	>90dB
Rejection of any other channel	-32dBm
Blocking/recip. mixing — 100kHz offset	-30dBm
200kHz offset	-15dBm
3rd order intercept	3.2W
Max audio before clipping — into 4ohm	1.6W
— into 8ohm	2.2%
Audio distortion up to clipping level	
TRANSMITTER MEASUREMENTS	
Power output — high power	23W
low power	4.6W
Current consumption — high power	4.8A
low power	2.2A
Harmonic output (2nd, 3rd)	-72dBc, -74dBc
Spurious outputs	<-80dBc
Max deviation	5.5kHz
Switching time (ref to PTT) RX to TX	80-120mS
TX to RX	up to 80mS

NOTE: All signal input voltages given as pd across antenna terminal.

thin sounding audio with no body. This is probably a characteristic of the microphone transducer but has the advantage of providing excellent extraneous noise reduction.

Ergonomically, the equipment is easy to use. The controls are well placed and not too small and the display is easy to read with a reasonable viewing angle. The ability to toggle between frequency and channel display is a very convenient feature and the many little software enhancements add considerably to the pleasure of using the rig. However, avoid selecting the channel display mode when outside the IARU band plan, otherwise the VFO will be set to R0. The scanning features are most comprehensive and simple to implement. It is particularly easy to use with repeaters, everything is automatic, there are no additional controls to operate when moving from simplex to repeater channels.

Although there are many features which are easy to use, there are other features which are much less convenient. On power-on, the frequency, step size and repeater options are set to the start-up condition. For the AMR1000, the radio is set to the calling channel, 145.500MHz with 25kHz step size, but for the AMR1000S, the start-up condition is programmable. For some users, this is much less convenient than powering up to the conditions existing prior to the previous power-down as adopted by most other transceivers. Other users may prefer a defined start-up condition.

Programming the memory channels and priority channel is cumbersome and it is not possible to store a VFO frequency directly in memory. First the radio must be switched off, then the up-down buttons are pushed with two fingers of one hand

whilst simultaneously turning on the radio with the other hand so as to enter programming mode. Then after more button pushing, the memory channels can be accessed before stepping to the required frequency from the now selected start-up frequency. After storing the frequency in memory, the programming mode is exited by switching off the radio again. Surely a more convenient system could have been adopted. Note also that recalling a memory overwrites the selected VFO.

## CONCLUSIONS

The AMR1000S is a useful rig for 2m FM, the receiver has a good performance and unlike many rigs on the market, gives excellent results on 12.5kHz channel spacing. On transmit, good results were obtained but it was essential to speak close to the microphone.

The radio has some nice features to aid operator convenience, particularly for use with repeaters. Although some operations such as memory programming are awkward, all the important and most used features are easy to use. Overall a good performer.

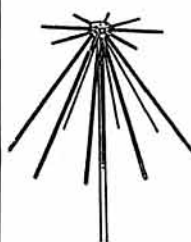
The price of the AMR1000S with fist microphone in May 1989 was £299 inc VAT. The basic AMR1000 without memories, but with microphone and power lead, is £247. These prices represent good value for money.

## ACKNOWLEDGEMENTS

I would like to thank Navico Ltd of Margate for the loan of the equipment and those stations worked who provided valuable comments on the transmission quality. □



## REVCONC



The UK's favourite discone composed of traditional British quality engineering.  
The REVCONC works well without exaggerated advertising claims. It is designed to cover 50 to 500MHz, and thousands of satisfied users will testify to its efficiency. Unlike some manufacturers we do not claim a wider frequency coverage, and we do not quote inflated figures for gain. A gain figure is meaningless unless the reference point is stated.  
Optional vertical whip feature: It is possible to fit a vertical whip section to a discone. We do not want to give you the "hard sell" where this vertical element is concerned but there is some evidence that it may improve the performance of the antenna around the resonant frequency of the whip. That's why we make it an optional feature.  
Another option is the N-type connector instead of the popular SO239. N-types give a better UHF performance, but they cost a bit more. The choice is yours.  
Because the REVCONC is British-made by a Company which has been in business for 30 years, you buy with confidence knowing that there is back-up should anything go wrong.

## RADAC

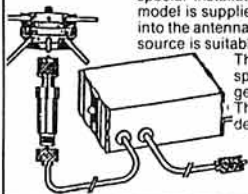


This Wide-band antenna offers an interesting alternative to the discone. It is simply an array of dipoles, but the clever bit involves arranging the dipoles to maximise bandwidth and minimise interaction. The RADAC can be set up for a range of frequencies from 27MHz to 500 MHz, and because very good impedance matches can be obtained the user can specify any six frequency bands in this range for optimised performance, either for receiving, or more usefully, for transmitting. For example, all the Amateur Bands from 10M to 70CM can be covered in one antenna. If you are in the PMR business, the RADAC can be customised for your needs. Aircraft listening enthusiasts can specify VHF & UHF Airband coverage.  
What a versatile antenna! Design and engineering excellence from REVCO!

## WIDE-BAND PRE-AMPLIFIERS

The problem with omni-directional wide-band antennas is their lack of gain. The REVCO PA3 range of wide-band pre-amplifiers complement the antennas and compensate for their shortcomings.

The basic specification of the products is similar: coverage 20MHz-1GHz, at 1GHz: minimum gain 13dB, noise factor 5.5dB. Choose from a mast-head version (PA3) or a standard die-cast box style (PA3I). Best results are normally obtained from the masthead model which gives a boost to weak signals which would otherwise have been lost in the feeder cable. Also feeder cable noise is not amplified which is the case if the amplifier is mounted at the base of the feeder. On the other hand, the die-cast box version requires no special installation and is readily taken out of circuit. The masthead model is supplied with a special power unit which feeds the DC supply into the antenna feeder. No psu is provided for the PA3I, as any 9-15v DC source is suitable (current requirement about 25mA).



The PA3I finds application in instrument work, e.g. input to spectrum analysers, boosting the output from signal generators to give a low-power Tx.

The standard version of the PA3I has BNC sockets and is designated "PA3I/N"; available to special order N-type sockets ("PA3I/S") or SO239 ("PA3I/S").

A special feature of the PA3 series is a high-pass filter to attenuate frequencies below 20MHz; high-power HF & MF broadcast stations can be very troublesome!

## ON-GLASS ANTENNAS



This type of antenna mount has been around for a long time, but they are very difficult to produce successfully at VHF. The Cellular Radio Industry has popularised the glass-mount, but there are fewer problems at 900MHz, because the coupling assemblies are small. REVCO's extensive experience in making the UK's best Cellular On-glass has led to the production of superior quality VHF and UHF models. Here are a few facts which you should know:  
**Coupling efficiency:** apart from the question of effective power transfer to the outside world, you don't want too much RF floating around inside the car, do you? Not healthy for vehicle electronic systems, and possibly not good for humans either. REVCO glass mounts feature very efficient power transfer.  
**Sticking power:** no good if they fall off half way home. A properly installed REVCO stays on.

Should you change your car, a refit kit is available. **Simplicity:** some of the competition has a multitude of loose components; the REVCO has 2 pre-assembled parts: inside and outside. What could be simpler?

**Weather-resistant:** REVCO antennas are made from corrosion resistant materials so you can leave them out in the rain with confidence. It is not necessary to plaster the product with silicone rubber to keep the water out.

The REVCO glass mounts do cost a bit more, which reflects these superior features.

REVCO also make a full range of mobile antennas for frequencies from 27MHz to 950MHz, and new products are constantly under development. Contact your local Dealer or in case of difficulty write, phone or fax. Trade enquiries welcome.

Revco Electronics Ltd, Old Station Yard, South Brent, S Devon TQ10 9AL Tel: 0364 73394 Fax: 0364 72007

## TELESCOPIC STEEL BOX TOWERS

Model No	Height ft	Number Sections	Sec od	Top	Bot	Price Inc VAT
A22N	22' 13.5'	2	50mm	60mm		£125.00
A22H	22' 13.5'	2	60mm	80mm		£145.00
A32H	32' 13.5'	3	50mm	80mm		£195.00
B32H	32' 13.5'	3	60mm	100mm		£240.00
C32HS	32' 13.5'	3	80mm	120mm		£295.00
C42H	42' 13.5'	4	60mm	129mm		£350.00
B42H	42' 13.5'	4	50mm	100mm		£320.00
C52N	52' 13.5'	5	50mm	120mm		£395.00
A33XL	33' 19'	2	50mm	60mm		£175.00
A33N	33' 19'	2	60mm	80mm		£255.00
B33HS	33' 19'	2	80mm	100mm		£285.00
B48N	48' 19'	3	60mm	100mm		£355.00
C48HS	48' 19'	3	80mm	120mm		£485.00

Complete tower and tilt post package with single winch operation

A33NC	33' 19'	2	60mm	80mm		£285.00
B33HSC	33' 19'	2	80mm	100mm		£325.00
B48NC	33' 19'	3	60mm	100mm		£395.00

## ELECTRIC MOTOR DRIVEN WINCHES

EW40	For small towers	£286.00
EW60	For towers up to 60ft	£325.00

## REPEATER CONTROL BOARD

Work your Base or Mobile Transceivers (all modes) via your 70 cms Handheld and QSY £120.00

Send 3 First Class Stamps for full list.

## Hedleys Electrical and Engineering Services

7 Midhill Close, Langley Park, Co. Durham DH7 9TY

## NEW LOW LOSS CABLE PRODUCT

### WESTFLEX 103

50 OHMS

#### FEATURES

1. LOWER LOSS THAN URM67/RG213 and H100
2. MORE FLEXIBLE THAN H100
3. VERY EASY TO FIT CONNECTORS... BOTH PL259 & N.TYPES
4. NORMAL 10.3mm DIAMETER.
5. AIR SPACED 5 CELL CONSTRUCTION.
6. CENTRE CONDUCTOR HELD FIRMLY IN CENTRE OF CABLE.
7. LIGHTWEIGHT.
8. AFFORDABLE PRICE.

In response to many requests we have now introduced another super low loss Coaxial Cable. This is now being marketed under our own WESTFLEX Brand Name. Type 103 in order to keep the loss as low as possible we have kept the braid and tape screening and the solid centre conductor, apart from this the construction is very much different from H100. For a start it is the same size as URM67/RG213U, 10.3mm dia., hence the 103 in the name. Also the Jacket material is PVC rather than Polyethylene. This makes the cable much more flexible and very easy to secure all types of connectors. The fitting of any N Plug is as easy as doing it to URM67.

The Cable is of a 5 cell air spaced construction. This ensures that the centre conductor is firmly fixed in the dielectric and will not creep or pull along the length of the coax.

Another bonus of the construction is that the attenuation is less than H100 at all frequencies.

#### TECHNICAL SPECIFICATION

As a comparison with other types. All expressed in DB per 100 Metres

	H100	Westflex 103
RG213/URM67 (Mil spec)		
100 MHz	7 db	3.2 db
144 MHz	8.5 db	4.4 db
200 MHz	10 db	5.5 db
300 MHz	13 db	7.3 db
432 MHz	15.8 db	9.1 db
1000 MHz	27 db	13.3 db

#### PRICE... 95p per Metre

Postage 6p per m (Minimum postage per order £2)

#### SPECIAL OFFER 100 Metre DRUM... £80

Plus £5 Postage

W. H. WESTLAKE, CLAWTON, HOLSWORTHY, DEVON  
0409-253758

## FAULTY ANTENNA?

### LOSING DX? Check with an ANTENNA NOISE BRIDGE

Measure RESONANCE 1-160MHz and RADIATION RESISTANCE 2-1000 ohms, without transmitting, even outside the bands, find where it is 50 ohms, fun-to-build kit, all parts, pcb, pre-wound transformer, case, postage etc only £27.90, with list of other kits from

#### CAMBRIDGE KITS

45(RU) Old School Lane, Milton, Cambridge



# IS YOUR AMATEUR RADIO EQUIPMENT PROPERLY INSURED?



Amateur Radio Insurance Services can offer you a comprehensive insurance for your amateur radio equipment at a cost you can afford. We operate 2 Schemes both specially designed for RSGB members as follows:-

**SCHEME 1** — Provides full cover for home use and mobile/portable operation.

Free Worldwide extension for a maximum period of 30 days.

**SCHEME 2** — Provides full cover for Base Stations.

Special Extension for equipment whilst at or in transit to or from any Rally, Field Day, Club Meeting, Building or Caravan when on holiday.

## APPLYING TO BOTH SCHEMES

- \* Cover on a "new for old" replacement basis.
- \* Insures all radio and ancillary equipment including masts, antennae, rotators plus home computers and peripherals.
- \* Plus up to 10% inflation increase per item on claims payments.
- \* Equipment up to £2,000 automatically insured immediately after purchase so long as we are advised within 7 days.

## ADDITIONAL FEATURES

- \* Optional Liability Extension — covers you against your legal liabilities to Third Parties arising from the ownership and use of your equipment. Limit of Indemnity £1,000,000. Additional premium £3.00.
- \* Theft from unattended vehicles automatically covered up to £1,000, excluding the first 25% of any claim. The limit can be increased from £1,000 to £2,500 at an additional premium of £15.00.

### PREMIUM TABLES

SCHEME I (Mobile, portable and home)			SCHEME II (Base station only)		
SUM INSURED (i.e. replacement cost of all your equipment)		YEARLY PREMIUM	SUM INSURED (i.e. replacement cost of all your equipment)		YEARLY PREMIUM
From	To		From	To	
£0	£1,000	£22	£0	£2,000	£15
£1,001	£2,750	£35	£2,001	£3,000	£20
£2,751	£3,500	£40	£3,001	£4,000	£25
£3,501	£5,000	£50	£4,001	£5,000	£30
£5,001	£6,500	£60	£5,001	£6,000	£35
For each additional £1,000 band of sum insured over £6,500 add £5 to the premium of £60			For each additional £1,000 band of sum insured over £6,000 add £5 to the premium of £35.		

Complete the application below and return with your cheque made payable to ARIS to:

**AMATEUR RADIO  
INSURANCE SERVICES,  
FREEPOST,  
4A RUSSELL HILL ROAD,  
PURLEY CR2 9PZ.**

Or telephone Sarah on 01-660-0820 if you have any queries.

### AMATEUR RADIO INSURANCE SCHEME APPLICATION CORNHILL INSURANCE PLC

TITLE \_\_\_\_\_ INITIALS \_\_\_\_\_ SURNAME \_\_\_\_\_  
(BLOCK LETTERS)

ADDRESS \_\_\_\_\_

POST CODE \_\_\_\_\_

CALL SIGN OR RS NUMBER \_\_\_\_\_

1. The equipment listed is to be insured under (only tick box of scheme required):

**SCHEME I (HOME, MOBILE, PORTABLE)** ☐ **OR** **SCHEME II (BASE STATION)** ☐

2. Do you require the optional liability extension?  
(Liability limit £1,000,000. Additional premium £3.00) YES/NO

3. For Scheme I only. Do you want to increase the 'theft from vehicle' limit from £1,000 to £2,500? (Additional premium £15.00) YES/NO

4. Do the sums represent the full replacement value of the equipment to be insured under this scheme? YES/NO

5. Have you or any members of your family normally residing with you:  
(a) suffered any losses in respect of your equipment for any of the risks proposed with the last three years? YES/NO

If yes give details \_\_\_\_\_

(b) In insuring your equipment had a proposal declined, a renewal refused, cover terminated, special terms or conditions imposed by any insurer? YES/NO

If yes give details \_\_\_\_\_

(c) been convicted of arson or any offence involving dishonesty of any kind, e.g. fraud, robbery, theft or handling stolen goods?

YES/NO

If yes give details \_\_\_\_\_

6. State any other material facts below. Material facts are those facts which are likely to influence us in the acceptance or assessment of this proposal and it is essential that you disclose them. If you are in doubt about whether a fact is material then for your own protection you should disclose it since failure to do so could invalidate your policy.

#### Declaration

1. I am a member of the Radio Society of Great Britain or an affiliated Club or Society.

2. All property to be insured is in a good state of repair and will be so maintained.

I declare that to the best of my knowledge and belief the above statements and particulars whether written by me or by others on my behalf are true and complete. I agree that the proposal whether signed by me or caused to be signed for me shall be the basis for the contract between Cornhill Insurance PLC and myself and I agree to accept the Company's standard form of policy for this class of insurance. A copy of the policy wording is available on request.

Date \_\_\_\_\_ Signature \_\_\_\_\_

#### PREMIUM DETAILS

Yearly premium (see Scheme I or Scheme II premium table) £

#### Plus if applicable

£3.00 for optional liability insurance £

£15.00 to increase 'theft from vehicle' limit to £2,500 (Scheme I only) £

Total of cheque attached payable A.R.I.S. £

**PLEASE ATTACH TO YOUR APPLICATION A LIST OF ITEMS  
SHOWING THE MANUFACTURERS NAME, MODEL, SERIAL NO  
IF POSSIBLE AND CURRENT REPLACEMENT VALUE  
(SUM INSURED)**

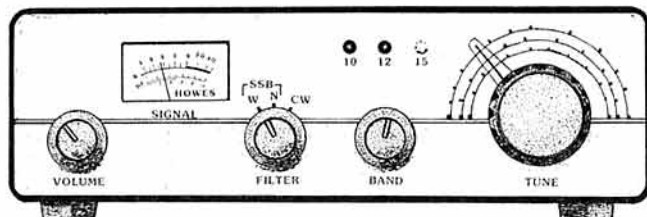
# C. M. HOWES COMMUNICATIONS



**Mail order to:**  
**Eydon Daventry**  
**Northants NN11 6PT**  
**Tel: 0327 60178**

## NEW RECEIVER

— Catch the DX on 10, 12 & 15 metres!



Concept receiver featuring DXR10, DCS2 and CSL4 kits

Now that the sun's activity is high, propagation on the highest frequency shortwave bands is becoming excellent, with many DX stations, and much intercontinental working.

A brand new **HOWES** receiver, the **DXR10** has been developed to give the home constructor the opportunity to get in on the action. This is a three band receiver covering all of 10, 12 and 15 Metres. The prototype I have been using certainly pulls in the stations in a most impressive manner! Like our very popular **DeRx** single band receivers, the **DXR10** is designed to be easy to build and within the scope of the beginner, whilst offering an amazingly good level of performance for a simple set.

Technical features include a double balanced mixer, bandpass input filtering (which requires no tuning or set up adjustment), active AF filter, and plenty of audio output to drive a loudspeaker or headphones. Suitable for holiday, portable and home station use.

The price is still to be fixed at time of writing this advance information, but it should be **under £30 for the kit**. Ring or write for the exact figure, they should be in stock by the time this advert appears in print.

### Some other HOWES KITS:-

**ASL5 Dual Bandwidth Filter** — worthwhile extra filtering and selectively for virtually any receiver. Simply connects in line with external speaker or headphones.  
**Kit: £14.90** **Assembled PCB: £22.50**

**CSL4 Dual Bandwidth Filter** — the same excellent filtering as the ASL5, but designed for internal fitment with our receiver kits. Really sharp selectivity for CW or SSB.  
**Kit: £9.90** **Assembled PCB: £15.90**

**CT30 Antenna Matching Unit** — an ATU for use on all HF bands and 6M for receiving or transmitting at up to 30W RF. High quality performance at a sensible price.  
**Kit: £27.90** **Assembled PCB: £33.90**

**DCS2 Relative Signal Strength Indicator** — "S meter" in common parlance! Special **HOWES** custom made meter (see picture), with a two chip driver circuit for use with all our receiver kits. Adds a touch of "class"!  
**Kit: £7.90** **Assembled PCB + meter: £11.90**

There are over thirty different kits in our range. We have **receivers from £14.30**, and **QRP transmitters from £13.80**. **HOWES KITS** interlink, so that you can start with, say, a simple receiver and if you wish, expand it into a full transceiver at a later date. Most kits are suitable for the inexperienced constructor, as well as the "old hand"!

If you would like more information on any item, or a copy of our catalogue showing our whole range of kits, simply drop us a line enclosing an SAE. Technical advice and sales are normally available by phone during office hours.

All **HOWES KITS** come with full, clear instructions, good quality PCB (drilled, tinned and screen printed with the parts locations), and all board mounted components. Delivery is normally within 7 days.

**PLEASE ADD £1.00 P&P** to your total order value.

**73 from Dave G4KQH, Technical Manager**

## GUIDE TO FACSIMILE STATIONS

9th edition — June 1989

**320 pages. ISBN 3-924509-69-7 £14.00 or DM40.-**

Reliable and easy-to-use FAX equipment is now available for less than 200 GBP. It prints weather charts, press photos, satellite pictures etc. with excellent resolution via a standard Epson-compatible dot matrix printer on ordinary paper. The interest of mariners, yachtsmen, pilots, radio amateurs, monitors and meteorologists around the world in the reception of FAX transmissions has subsequently exploded during the past three years. Apart from the hardware mentioned, the potential user needs detailed and up-to-date schedules of those FAX stations. That vital information is published since the early seventies in our international reference books like the **FAX GUIDE**.

The numerical frequency list covers 380 frequencies — from VLF to UHF — of FAX stations which were monitored in 1988 and 1989. Frequency, call sign, name of the station, ITU country/geographical symbol, technical parameters of the emission, and details, are listed. All frequencies were measured exact to the nearest 100 Hz. The alphabetical call sign list covers 228 call signs, with name of the station, ITU symbol, and corresponding frequency (-ies).

Schedules of 93 FAX stations of 338 frequencies are listed alphabetically, including the latest schedules of Bracknell Meteo, the new METEOSAT-4 operational since 19 June 1989, and Royal Navy London. Additional chapters cover:

- Comprehensive list of equipment on the market for both FAX and meteorological satellite reception, with photos and manufacturer's addresses.
- Detailed explanation of the technique used for the transmission of FAX pictures.
- Regulations on technical characteristics of FAX equipment, including all CCITT and WMO standard test charts.
- Comprehensive list of both geostationary and polar-orbiting meteorological satellites, with full technical data. Detailed explanation of APT PREDICT and FANAS polar-orbiting satellite position data codes.
- Radio amateur FAX activities.
- 225 abbreviations.
- 61 station addresses in 36 countries.
- 240 sample charts and their interpretation (thereof 24 from British stations).

Further publications available are **Guide to Utility Stations, Air and Meteo Code manual, Radioteletype Code Manual**, etc. Write for detailed catalogue of publications on commercial telecommunication on shortwave. All manuals are in the handy 17 x 24cm format, and of course written in English.

Prices include **airmail** to anywhere in the world. Payment can be by cheque, cash or International Money Order. Postal Giro Account: Stuttgart 2093 75-709. Dealer inquiries welcome — discount rates and pro forma invoices on request. Please order from

**Klingenfuss Publications, Hageloch, D-7400 Tuebingen**  
**Fed. Rep. Germany. Tel. 01049 7071 62830**

## PACKET RADIO FROM THE SPECIALISTS!

*Siskin Electronics have a policy of supplying the best range of packet radio equipment available for the radio enthusiast. We have examined the products of many manufacturers and are pleased to be able to offer what must be the widest range of equipment available from just one UK supplier. All prices include VAT and are valid at time of publication.*

**PACCOMM**  
 TINY 2 with PMS.....£119.00  
 TNC-320 dual port NEW.....£179.00  
 MICROPOWER-2.....£139.00  
 Real Time clock option.....£27.95  
 Printer port option with cable.....£34.95  
 9600 baud modem.....£95.00

**AEA**  
 PK88 Budget TNC.....£129.95  
 PK232 best selling multimode.....£279.95

**KANTRONICS**  
 KPC2 HF/VHF with Wefax.....£159.00  
 KPC4 HF/VHF dual port.....£225.00  
 KAM all mode with Wefax.....£265.00  
 "Smartsocket" battery backup.....£17.95  
 "Smartwatch" real time clock.....£27.95

**UPDATES**  
 PACCOMM PMS (fits TNC-200/220, MFJ 1270/74, G0BSX and AEA PK80).....£12.50  
 KAM/KPC4 2.85 UK.....£15.00  
 KPC2/KPC4 2.85 UK.....£10.00  
 AEA PK88 (30th Dec 1988 UK).....£10.00  
 AEA PK232 (30th Dec 1988 UK).....£15.00

**PACKET ACCESSORIES**  
 32K (62256) static ram.....£15.00  
 27256 32K eeprom.....£5.00  
 27512 64K eeprom.....£8.00  
 BBC MICRO RS423 lead.....£7.95  
 PC RS232 lead.....£9.95  
 ATARI ST RS232 lead.....£9.95  
 Custom made RS232 leads from.....£9.95  
 4 way RS232 switchbox.....£24.95  
 SPECTRUM 48K TNC interface.....£14.95  
 AMSTRAD 464/664/6128 or PCW 8256/8512/9512 RS232 I/F.....£59.95  
 HF 125 AM/SSB/CW receiver.....£375.00  
 G3RUH 9600 baud modem.....£95.00

**BOOKS/PUBLICATIONS**  
 BARTG Beginners Guide.....£0.95  
 ARRL AX-25 PROTOCOL.....£8.50  
 UK Confidential freq. guide.....£6.95  
 Master Packet Radio (208 pages).....£9.95  
 Digital Comms. with ham radio.....£8.95

**SOFTWARE (Packet & FAX only)**  
 We supply suitable software for most computers **FREE** of charge with all TNC purchases. Phone for commercial s/w list.

**NOTE: All our units have CW Ident to comply with UK regulations. Plus a wide range of scanners, audio and computer connectors, and industrial packet radio products. Large SAE for catalogue and price list.**

### Siskin Electronics Ltd

Southampton Road,  
 Hythe, Southampton.

SO4 5HU.

FAX: 0703-847754

**Tel: 0703-849962**





# ARE

## COMMUNICATIONS

### THE SHOP WITH THE SMILE

Our policy of direct imports of Yaesu and Kenwood ensure cheaper prices to the radio amateur.



"BERNIE - WHAT DO YOU THINK OF PICKETT'S LOCK FOR THE LONDON AMATEUR RADIO SHOW



"A SUPERB VENUE, FREE PARKING FOR 3,000 CARS, ONLY £1 ENTRANCE AND IDEAL FACILITIES FOR THE FAMILY.

## TS680S

The fabulous TS680S, General Coverage, Multimode, now that SIX Metres is open, there is no better time to buy. Discounted price £929.00 including FREE microphone MC43S.

Also available the TS140S without 6m, £799.00.



PHONE 01-997 4476

## TS440S

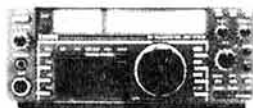
Similar to the TS140/680S, but with additional "base station enhancements", the ever popular TS440S continues to be a best seller. At our discounted prices of only £1199 with ATU and £1039 without, can you really resist the temptation?



PHONE 01-997 4476

## IC735/725

For the ICOM enthusiast, the IC735 is probably the most popular HF transceiver available under £1K. Still available at a very competitive price. Phone for details.



ICOM have now introduced the new IC725 as an economy version. Available from stock at only £749.00

PHONE 01-997 4476

## WHO'S FIRING BLANKS?

It would appear that since Trio is now officially referred to in the UK by its original name of Kenwood, our friends in the Dales have been a little kinder in their criticism of our activities.

But, even though activity on the Northern front has virtually ceased, there have been some heavy bursts of gunfire emanating from south of the Midlands.

The warning published in a major advertisement in the May issue of Radio Communication warns the UK Amateurs of the perils in purchasing equipment through sources other than that of the official UK distributor of Yaesu equipment. It suggests that this equipment is put on to the Japanese market for testing to see whether any faults develop. There are approximately 250,000 Japanese amateurs who probably have, by reputation, more knowledge of their equipment than the rest of the world market. Are they likely to be fooled into being used in this way by being sold sub-standard equipment?

There are some distributors who appear to have little or no respect for the intelligence of their customers... B&B.

## SO HERE SURELY MUST BE THE ULTIMATE IN HAND-HELDS.

## The YAESU FT 728 or FT 470

Both available.  
Both are UK spec



### FEATURES:

- Full duplex operation
- Monitor both 2/70 at the same time
- Dual display
- Full 5 watts output capability
- Programmable power save
- Auto shut-off
- FT23R/73R accessory compatible.

List price slashed!!!  
£ phone!

See them all at the June Rallies  
HMS Mercury & Longleat

Opening Hours Monday-Friday 9.30 to 5.30  
NOW OPEN SATURDAY MORNINGS 10.00-1pm



ARE Communications Limited, 6 Royal Parade,  
Hangar Lane, Ealing, London W5A 1ET, England  
Fax: 01-991 2565 Telex 94016185 AREC G

Tel: 01-997 4476

# USED AMATEUR EQUIPMENT?

## I Buy, Sell & Exchange

**WANTED** - Your TOP QUALITY USED EQUIPMENT! We pay best prices for all types of used amateur radio equipment.

Is YOUR gear for sale? Is it in top condition? Why not give us a call? If our offer isn't up to your expectation, why not join the growing ranks of amateurs selling their gear through our 'RIGSEARCH' service? By the time you read this, our new showroom should be open, where we can display your rig until sold, or alternatively you hang on to it until we find a suitable buyer. This service costs you nothing, your gear is offered to every prospective purchaser that calls, and we achieve the price YOU require. All with least hassle for you. Why not give us a try!

**DON'T FORGET - IF YOU'RE SELLING, IT'S G4TNY and RIGSEARCH!**

**BUYING** - If you're looking for quality used amateur equipment, it has to be G4TNY. We have a large stock of used equipment ourselves, but, if we don't have what you're looking for, our new amateur radio brokerage RIGSEARCH possibly will.

Phone or write with your Requirements, here or on RIGSEARCH!

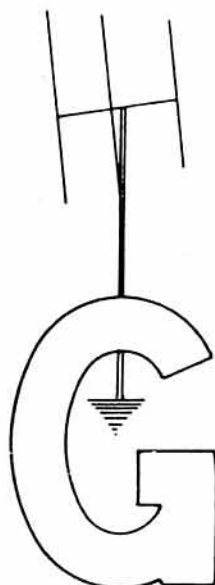
We can always help you buy, or sell your used equipment!

Why not visit our new showroom? Only 5 mins from Dartford Tunnel & M25. Much equipment now on display. Do please call before setting out on a long journey though, as I'm still a one man band! (For that personal touch!).

Phone Dave, G4TNY on (0708) 862841 or (0836) 201530.

From 9.30 am to 7 pm, Tues to Sat.

**SAE PLEASE FOR LISTS. CALLERS BY APPOINTMENT, PLEASE.**

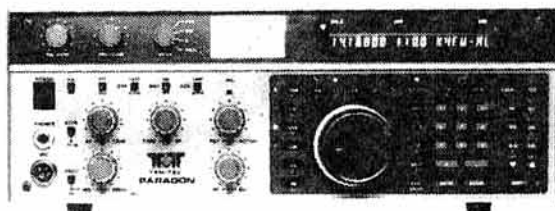


**MAIL ORDER?  
OVERNIGHT DELIVERY  
NOW AVAILABLE!**

**G4TNY AMATEUR RADIO**  
**UNIT 14, THURROCK COMMERCIAL CENTRE, JULIET WAY,**  
**SOUTH OCKENDON, ESSEX RM15 4YG.**

**PART  
EXCHANGE  
POSSIBLE**

## THE TEN-TEC PARAGON Synthesized Transceiver



This general coverage all mode receiver tunes from 100KHz to 29.9999 MHz. Modes USB, LSB, CW, FSK, AM, (FM optional). Sensitivity SB/CW/RTTY 0.15uV. Dynamic range: 100dB on SSB. Blocking and 3rd order intercept, very impressive figures. Transmitter 200 watts D.C. Input. CW Sidetone, Speech compression.

Write or phone for details of the PARAGON or ARGOSY II 100w Transceiver, CORSAIR II 200w Transceiver, CENTURY 22 CW only Transceiver and other TEN-TEC products.

We also stock KW Tapes & Dipoles; Antenna switches; Baluns; Fritzal Baluns; Butternut & Cushcraft Beams and Verticals. MFJ (U.S.A.) ATU's; Packet Radio Terminal and RTTY/ASCII/CW computer interface etc.

**KW COMMUNICATIONS LTD,**  
**Vanguard Works, Jenkins Dale, Chatham, Kent ME4 5RT**  
**Tel: (0634) 815173. Telex: 965834**

## TX-3 RTTY/CW/ASCII TRANSCEIVE

The high performance, low cost system

Split-screen, type-ahead operation. Unbeatable features. Needs TIF1 interface or T.U. **BBC, CBM64** tape £20, disc £22. **SPECTRUM** tape £35, +3 disc £37 inc adapter board (needs TIF1 or TU also).

## RX-8 for the BBC computer

Receives screen and printer **FAX** charts and photos, HF and VHF **PACKET**, Colour **SSTV**, **RTTY**, **AMTOR**, **CW**, **ASCII**, **UoSAT** 1 & 2.

Receive them all with every possible feature, superb performance and ease of use. Full printer and disc support. The best receive system ever **£259.00**. **FREE** Klingens Utility Guide for first 50 purchasers, **DISCOUNT** for RX-4 users.

More details in May issue or send for full information.

## RX-4 RTTY/CW/SSTV/AMTOR RECEIVE

Performance, features and ease of use make this still a best-seller. Text and picture store, disc and printer support. Needs TIF1 interface. **BBC, CBM64** tape £25, disc £27. **VIC20** tape £25. **SPECTRUM** tape £40, +3 disc £42 inc adapter board (needs TIF1 also) or software-only version £25.

**TIF1 INTERFACE** Optimum HF and VHF performance with our software. 4-pole filtering and computer noise isolation for excellent reception. MIC, PTT and KEY TX outputs. Kit £20, ready-made, boxed with all connections £40. Available only with TX-3 or RX-4 software.

Also **MORSE TUTOR** £6, **LOGBOOK** £8, **RAE MATHS** £9 for **BBC, CBM64, VIC 20, SPECTRUM. BBC LOCATOR** with UK, Europe, World maps £10. All available on disc £2 extra.

## technical software

Fron, Upper Llandwrog, Caernarfon LL54 7RF.

**Tel: 0286 881886**



LONDON'S MULTI-BRAND PRODUCT DISTRIBUTOR

# AMCOMM

ONE  
STOP  
BUYING!

FOR PRODUCT CHOICE, MAIL ORDER AND SERVICE

## NOW STOCKING TEN-TEC



Paragon 100W HF Multimode	P.O.A.
Corsair II 100W HF TCVR with PTO	P.O.A.
Argosy Portable HF 50W TCVR	P.O.A.
Century 50W CW HF TCVR	P.O.A.
Titan 1500W HF Linear	P.O.A.
Hercules 1KW Super Linear	P.O.A.

All Accessories Available — Call for Prices!

## MICROPHONES

Adonis AM303G	£49.55
Adonis AM503G	£65.95
Hell HM5 Table Mic	£49.95
Hell BM10 Boom/Headset Mic	£49.95
Icom SM8 All Icom	£79.00
Icom SM10 Table Mic with Equaliser	£113.00
Yaesu MD1B8 Table Mic	£75.00
Yaesu MH1B8 Hand Mic	£21.00

Add £2.00 P&P

## BNOS AMPS & LINEARS

L50 6mtrs 3 in 25 out	£74.75
LP50 6mtrs 3 in 50 out	£138.00
LP50 6mtrs 10 in 50 out	£138.00
LPM 6mtrs 10 in 100 out	£235.00
L144 2mtrs 3 in 25 out	£74.75
LP144 2mtrs 3 in 50 out	£138.00
LP144 2mtrs 10 in 50 out	£138.00
LPM144 2mtrs 3 in 100 out	£235.00
LPM144 2mtrs 10 in 100 out	£205.00
LPM144 2mtrs 10 in 180 out	£355.00
LPM144 2mtrs 25 in 180 out	£305.00

UHF also available

TL50/28/25 watt	£316.25
TL50/144/25 watt	£299.00
TL70/28/25	£316.25
12/25 amp PSU	£249.00
12/12 amp PSU	£145.00
12/6 amp PSU	£89.00
12/40 amp PSU	£499.00
12/5E amp PSU	£74.75
12/10E amp PSU	£129.00
12/20E amp PSU	£175.00
12/30E amp PSU	£219.00

All Units Carriage £3.00

## DATONG PRODUCTS

AD 270 Indoor Antenna 200Khz-30+Mhz	£49.00
AD 370 Outdoor Antenna	
200Khz-30+Mhz	£69.00
D 70 Auto Morse Tutor	£55.00
ANF Auto Notch Filter	£65.00
FL3 Multi Mode Audio Filter with Auto Notch	£125.00

Add £2.00 P&P

## ICOM

IC 781	ICOM
IC 761	ICOM
IC 735	ICOM
IC 751A	ICOM
IC 2KL	ICOM
IC 2KLPS	ICOM
IC AT500	ICOM
IC AT150	ICOM
IC AT100	ICOM
IC R7000	ICOM
IC R71E	ICOM
IC MICRO 2	ICOM
IC 2E	ICOM
IC 2GE	ICOM
IC 290D	ICOM
IC 28E	ICOM
IC 28H	ICOM
IC 275E	ICOM
IC 275H	ICOM
IC MICRO 4	ICOM
IC 04E	ICOM
IC 490E	ICOM
IC 475E	ICOM
IC 475H	ICOM
IC 3210E	ICOM

CALL AMCOMM NOW  
ON 01-992 5765  
FOR LATEST AND  
BEST PRICES!

CALL AMCOMM NOW  
ON 01-992 5765  
FOR LATEST AND  
BEST PRICES!

CALL AMCOMM NOW  
ON 01-992 5765  
FOR LATEST AND  
BEST PRICES!

All accessories available  
All units add £7.50 carriage

## MFJ

989B 3Kw Fully Metered ATU all inputs	£359.00
962B 1.5Kw Fully Metered ATU all inputs	£239.00
949C 300w Fully Metered ATU all inputs	£149.00
941D 300w Fully Metered ATU all inputs	£99.00
945E 300w ATU coaxial + Wire Inputs	£69.00
901B 200 Random Wire Tuner	£59.00
1Kw Dummy Load Dry	£28.35
1Kw Versaload	£50.66
204B Noise Bridge	£84.12
202B Noise Bridge	£63.10
752C SSB Tunable Audio Filter	£95.60

All Units Carriage £3.00

## AMP PRODUCTS

NEW FROM USA: The Pile up Penetrator LK 500ZC linear amplifier. Some of the features: Full QSK, HF tank coil and Centralab bandswitch are silver plated, Hypersil plate transformer and separate filament transformer. Computer grade capacitors. Amateur continuous duty in all modes. ALO: Auto Lock Out ceases amp operation if mis-tuned or over current appears on the pair of two 3-500z valves. Full coverage WARC Bands. 2 speed fan. RF output: SSB 1.5KW PEP continuous. CW 1.2KW average continuous. SSTV & RTTY 1KW average, 1.5KW PEP. Call now or write for full spec literature.

## PMR & MARINE EQUIPMENT

RENT OR BUY FROM OUR  
LARGE STOCK OF THE  
ICOM RANGE — CALL  
01-992 5765 FOR  
PRICE OR LITERATURE



## VHF/UHF SCANNING RECEIVERS

Uniden H/Held 50XL 66-88, 136-174, 406-512 Mhz	£99.00
Uniden H/Held 70XL 66-88, 118-174, 406-512 Mhz	£179.00
Uniden H/Held 100XL 66-88, 118-174, 400-512 Mhz	£189.00
Uniden Base Rcvr 175XL 66-88, 118-174, 400-512 Mhz	£179.00
BJ200 H/Held 26-30, 60-88, 115-178, 210-260, 410-520 Mhz	£229.00
AR2002 Base 25-500 Mhz and 800-1300 Mhz	£475.00

## ROTORS

AR 200XL VHF L/Weight	£49.95
Yaesu G400 Medium to Heavy	£139.00
Yaesu G400RC Med/Heavy circular compass	£169.00
Yaesu G800SDX Med/HD 450° turn, variable speed	£325.00
Yaesu G1000 SDX HD 450° turn, variable speed	£368.00
Yaesu KR5400 Elev/Rot HD Dual Control	£279.00
Yaesu G600RC Heavy Duty	£219.00

Carriage Included

## YAESU MUSEN

FT 767GX	YAESU
FT 757GX MKII	YAESU
FT 747	YAESU
FC 757 ATU	YAESU
FP 757HD	YAESU
FT 767 2M module	YAESU
FT 767 6M module	YAESU
FT 767 70cm	YAESU
FL 7000 Lin Amp	YAESU
FT 23R	YAESU
FT 73R	YAESU
FT 790R	YAESU
FT 690R	YAESU
FT 290R	YAESU
FT 212RH	YAESU
FT 712RH	YAESU
FRG 8800	YAESU
FRG 9600	YAESU
FT 736 2M 70cm 1.2Ghz	YAESU

All Accessories Available  
All Units Add Carriage £6.50

BUTTERNUT CUSHCRAFT  
TONNA JAYBEAM  
G WHIP HYGAIN MET

# AMCOMM



DELIVERY NORMALLY FROM STOCK BY RETURN

WHERE A GOOD DEAL MORE COSTS A GOOD DEAL LESS!

373 Uxbridge Road, London W3 9RH, Tel: 01-992 5765 Telex: 24263 FAX: 01-992 5767 CLOSED MONDAYS

\* Huge Range of Secondhand Equipment in Stock \* All Previous Advertisements Void E&OE





**D A T I N G**  
E L E C T R O N I C S L I M I T E D

**Clayton Wood Close  
West Park  
Leeds LS16 6QE  
Tel: 0532 744822  
Fax: 0532 742872**

## For products you can rely upon to give amazing results

For information on **Active Antennas, RF Amplifiers, Converters, Audio Filters, the Morse Tutor and Speech Processors** send or telephone for a free catalogue and selective data sheets as required.

All our products are designed and made in Britain.

Orders can be despatched within 48 hours subject to availability.



VISA AND ACCESS WELCOME



## R. N. Electronics

Professionally designed equipment for Amateurs

### TRANSVERTERS

- 144/50 MHz 25w p.e.p. £189 + £4 p&p. Use with an FT290 or similar 2m transceiver, for the opportunity to work U.S.A., Africa, Japan, Australia, etc. In fact almost anywhere in the world.
- 28/50 MHz 25w p.e.p. £199 + £4 p&p
- 145/70 MHz 25w p.e.p. £239 + £4 p&p
- 145/70 MHz 10w p.e.p. £199 + £4 p&p
- 28/70 MHz 10w p.e.p. £199 + £4 p&p
- 7dB Switched Attenuator £22 + £2 p&p

### POWER AMPLIFIERS

- RN690 P.A. £75 + £4 p&p
- Add to your dedicated rig to give 25w p.e.p.

### RECEIVE CONVERTERS

10M receive, 2M I.F. With thru switching on transmit use with 6m transverter and work 10m/6m Crossband £45 + £2 p&p

### RECEIVE ONLY CONVERTERS

2m IF for 4m, 6m, or 10m, receive £39 each + £2 p&p each  
10m IF for 2m, 4m or 6m receive £39 each + £2 p&p each

### PRE AMPLIFIERS

- Low noise (<1 dB) GaAs FET Pre-amplifiers for 6m, 4m and 2 metres. RF or DC through switching (Max 100w pep).
- Indoor boxed unit £36 + £2 p&p
- Masthead (line powered) with indoor DC feed unit £69 + £4 p&p

### MET. ANTENNAS

50MHz 3 el. £42.95, 5 el £64.40, 70MHz 3 el. £37.30 p&p £4.50

### NAVICO 2m FM MOBILES

AMR 1000 25/5w 12.5/25KHz 2 Metre FM Mobile £247.25 + £4 p&p  
AMR 1000S 10 memory + full scanning £299.00 + £4 p&p  
Top mount bracket for above £6.85 + £1.00 p&p

All prices include VAT

37 Long Ridings Ave, Hutton, Brentwood.

Essex CM13 1EE. Tel: 0277 214406



## SPECTRUM COMMUNICATIONS

MANUFACTURERS OF RADIO EQUIPMENT AND KITS

**NEW SINGLE BOARD TRANSVERTERS** for 2, 4, or 6 metres with 2 or 10 metre IF. 500mW output, 1mW or 50mW or 5W drive options, phone for price and details.

**CB TO 10 FM CONVERSION BOARDS**, for rigs with LC7137 and TC9119 to give 29.31 to 29.70MHz. Built and aligned board SC29 £18.50. Or send your rig and we'll fit it £31.50 inc P&P, £35 inc P&P for base rigs. For rigs with MM55108 use SC29F board £15, or £28 fitted.

**MULTIMODE CB CONVERSION KITS** Phone for details and prices.

**FM CONVERSIONS FOR YAESU & KENWOOD**, for rigs with AM £64 boards or £108 fitted, rigs without AM £74 boards or £118 fitted. Add £16 for Valve only rigs. State rig type when ordering.

**RECEIVE PREAMPS**, 2, 4, 6 or 10 metres. RF switched and DC sensing. 100W power handling, gain panel adjustable 0-20dB, NF 1dB on 2m, 4m, & 6m, 3.5dB on 10m. 13.5V negative ground operation. Excellent performance at a reasonable price. Types RP2S, RP4S, RP6S, & RP10S. PCB kit £14.75, PCB built £22.25. Boxed kit £25, Built & tested £35.50.

**TRANSVERTERS**, single board 1/2W out for 2m or 4m or 6m. 10m drive 25mw-500mw. Types TRC2-10, TRC4-10, or TRC6-10. PCB kit £39, PCB built £54, Boxed kit £54. Built & tested £83.25.

**TRANSVERTER**, receive converter and 2.5W transmit converter in single boxed unit. 10m drive 10-100mW unbuffered, types TRX4-10H & TRX6-10H. Boxed kit £60, Built & tested £99.50. Buffered types for use with 10m rigs giving -6dBm drive, TRX4-10B & TRX6-10B, Boxed kit £68, Built & tested £115. With interface unit for use with 2m drive 1/2W-5W types TRX4-21 & TRX6-21. Boxed kit £68, Built & tested £115.

**FREQUENCY MOD-DEMODO BOARD** converts AM only synthesized rigs with 455 KHz IF to FM. Type FM455, PCB kit £8.25, PCB built £14.

**NOISE SQUELCH**, mutes rig when noise is too high. Allows reception of weak signals between noise bursts. PCB kit £9.50, PCB built £14.

**TRANSMIT AMPLIFIERS**, linear single stage, gain 10dB, 30W output, ideal for FT290, FT690, etc. RF switched and DC sensing. Types TA2S1, TA4S1, & TA6S1, PCB kit £33, PCB built £40.25, Boxed kit £39, Box built £49.50.

**TRANSMIT AMPLIFIERS**, linear two stage 1/2W in 20/30W out, unswitched suitable for MEON. Types TA2U2, TA4U2 & TA6U2, PCB kit £41.25, PCB built £52.50, Boxed kit £45, Boxed built £59.25. Switched version for use with Spectrum transverter, types TA2S2, TA4S2, & TA6S2, PCB kit £47, PCB built £60, Boxed kit £58.25, Boxed built £72.50.

**VAT & P&P INC PRICES**  
Delivery within 14 days if available.  
24 hr answering.

**SHOP TIMES:**  
9 am-1 pm & 2 pm-5 pm TUES-FRI  
9 am-1 pm & 2 pm-4 pm SAT  
CLOSED SUNDAY & MONDAY



UNIT B6, MARABOUT INDUSTRIAL ESTATE,  
DORCHESTER, DORSET. TEL: 0305 62250



## NEIL LASHER, G6HIU

40 Farm Road, Edgware, Middx  
HA8 9LT

## AMTOR

News of the first AMTOR mailbox in the world to receive a licence for 7/10/14MHz was announced in May and the best part of this news is that the station concerned is British.

GB7PLX, operated by Peter Martinez G3PLX, is situated in Gosport Hants and although the mailbox is active only on HF AMTOR it does have a link into the Packet Network. The station should make good links into the HF Network for the forwarding of personal mail, although it should be noted that AMTOR is not suitable for forwarding data, programme listings or any messages that must arrive at the destination station 100% error free. This is due to the fact that the coding methods used by AMTOR tend to change various ASCII symbols and also shift everything to upper case.

## RTTY

News received from BARTG (British Amateur Radio Teledata Group) is that they have issued two new books and some software. The software is called 'RTTY for the IBM PC and Clones' it has been written by Mike Martin G4VRQ and has been described by a keen contest operator on BARTG's committee as excellent. The two books are part of the *Beginners Guide* series, one to cover AMTOR and the other RTTY. These should prove to be a welcome complement to the *Beginners Guide to Packet* which is already in print.

BARTG has announced details of its 1989 rally which will be held at Sandown Park race-course on Sunday 27 August. Their aim is to organise an event catering mainly for the amateur radio data enthusiast. Further details about BARTG and the above can be obtained from Mrs Pat Beedie GW6MOJ at 'Fynnonlas' Salem, Llandeilo, Dyfed SA19 7NP.

## Packet

A letter received at HQ from the DTI has clarified the position regarding the issue of mailbox Notices of Variation to club licensees, this was previously considered to be impossible. The letter states that they "see little problem in this as long as the NoV is properly issued to the club licence holder at the Main Station Address of the club as shown on that licence". The letter goes on to say "Obviously it would not be possible to issue a NoV to a club licence holder for premises which are not registered in the club

licence. But addresses can easily be amended at RALU". This represents a major step forward and should satisfy most club applications.

## Mailbox Software

I have promised to give a report on WORLI since the May issue, regrettably however, a report has still not been forthcoming from my sources. The reason for this the ever changing software - as we go to press version 10.05 has already been released, while I still await a report on 10.02!

Steve Coleman's software 'G4YFB' has taken another step forward with the release of version 2.11. I am informed that this version handles full remote SysOp commands with password access and many more commands are now available. Future versions of Steve's software will be available from John Wells, G1AWD, QTHR.

John has taken over the distribution role from John Theodorson, G4MTP, who announced the closure of his mailbox GB7NTS due to work demands. John Theodorson must be thanked for his efforts and many hours of telephone time given to SysOps around the country, who have had difficulties setting up their mailboxes.

Please note that the June column had an error in the heading for the software report - the call sign should have read AA4RE.

## 1.3GHz Kit

Details were received at HQ from Cirkuit Ltd, in reply to questions asked about the availability of their 1.3GHz receiver kit. Cirkuit have stated they have no intention of deleting this from their range; they have sourced an alternative component for the obsolete semi-conductor and the kit is available once more. They have had a lot of interest from packet users, but at this time have no plans for a matching transmitter.

## 9600 Baud

Has anyone used the James Miller, G3RUH, 9600Bd modem with any success over a path of more than a few kilometres? We know of one or two links working over very short, noise-free, paths but none over any great distance on any frequency.

How well does it work when the signal to noise ratio falls below anything other than perfect? Is anyone else doing work on medium or high speed links in the UK? If anyone has any information on any of the above, please let me know and I will throw it into the *Datacomms* melting pot - suitably acknowledged of course!

## Licences

I am happy to be able to report that two HF AMTOR mailboxes GB7PLX and GB7LDI (mentioned earlier) located in Norwich are now operational on 14 and 21MHz.

I have also received information that a large batch of UHF applications has passed through the MoD (Ministry of Defence - the Primary User) and are now in the final stages of processing. By the time you read this they may already be on the air.

## Beginners

This month continues the glossary of terms.

### Part 2: D-L

**Data communications software** - a computer program that causes a computer to function as a DTE for the purpose of transferring data via a communication medium.

**Data rate** - the speed at which the data is transferred, usually expressed in Baud or bits per second. Known also as baud rate.

**Data terminal equipment (DTE)** - an interface device between operator and computer, to allow the operator to exchange information with the computer.

**Default** - the state of the TNC's parameters after a reset or on initial power up.

**Destination** - the intended recipient of a packet frame.

**Digipeater** - also known as a digital repeater, a device that receives, temporarily stores and then retransmits (repeats) packet radio transmissions which are specifically addressed for routing through the digipeater.

**Download** - to receive data from a mailbox or another packet radio station.

**Dumb terminal** - a simple DTE that provides only basic input and output facilities.

**Eastnet** - in the USA it is a network of stations linking the Northeastern stations. In this country it is a network of stations which it is hoped will one day link Lincolnshire, Ipswich, Cambridge etc at 9600Bd on 1.3GHz.

**Echo** - a TNC function which will print each character typed into the DTE keyboard onto the screen.

**Enter** - the key on a computer keyboard which causes the computer to accept the information which has been previously typed.

**Field** - a sub-division of an AX.25 frame.

**Flag field** - the field in an AX.25 frame which indicates the beginning and end of a frame.

**Flow control** - the method of

stopping and restarting transfer of characters between terminal and TNC.

**Frame reject frame (FRMR)** - an AX.25 unnumbered frame which indicates that the source station cannot process the frame and the error is such that to send it again will not correct the problem. The eventual result is normally a disconnection.

**Frame** - a group of fields consisting of an opening flag, address, control, information, frame checking sequence and ending flag fields.

**Frame check sequence field** - the field used in AX.25 for error checking.

**Gateway** - a device or mailbox that allows two stations on different frequencies to communicate with each other.

**H bit** - a bit in the SSID of each digipeater address that causes packets to be repeated in the same sequence.

### High level Data Link

**Control (HDLC)** - an ISO standard defined for the link layer of OSI-RM (see *Datacomms* June 1989).

**I Frame** - abbreviation for information frame.

**Information field** - the field in the AX.25 frame that contains the user data.

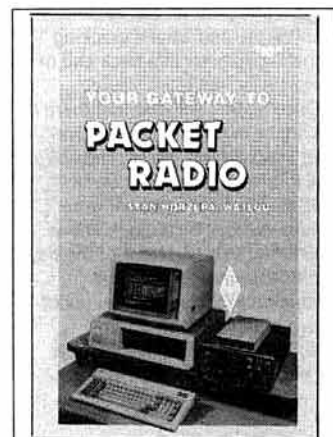
**Information frame** - or I Frame, the frame that contains the user data.

**Layer** - one level of the seven level hierarchy of the OSI-RM

**Log on** - the method of telling a mailbox you wish to use it.

**Log off** - the method of telling the mailbox you have finished.

(Part 3 M - R) next month)



'Your Gateway to Packet Radio' is an extensive treatment of this increasingly popular aspect of amateur operating. Written by Stan Horzepa, WA1LOU, the book incorporates a brief history of Packet evolution, explains the 'technish' which so often befuddles the newcomer and looks forward to future Packet developments. Available from RSGB HQ for £7.70 for non-members of the society, £6.55 for members. All prices include p&g.



## RON BROADBENT G3AAJ

94 Herongate Road, Wanstead Park,  
London E12 5EQ. 01-989-6741

Apologies are in order for not including the "Oscar 13 or Oscar 10 Satellite Times at a glance" Chart which we printed in the May issue. The reason is quite simply a question of space. To be readable to the majority of users it would need to be at least in A5 format, which would occupy one complete page of *RadCom* for the two satellites. For the limited number of members involved this really is not practicable, especially as it's possible to obtain a copy by post for the courtesy of a few postage stamps. Pop a request into the post, to the address above, for 'Month at a Glance' relevant to the satellite you want to track.

You can generate your own charts if you have an IBM and a printer. The programme is now included in the AMSAT-UK SATSCAN-TWO suite of software. It will even give you a printout of the angles and tracking points for the Moon or Sun.

Here are the schedule and MA times for AO-10 and 13 over the next few months.

## Oscar 10

Owing to excellent Sun angles we expect Oscar 10 to be usable at all times when in range, by the time you read this (hopefully) in early July. This applies to Mode B operation, of course, and keep off if you hear the Beacon on 145.810MHz doing a bit of FM'ing. We really are trying to nurse this old girl along for a few more months yet, and what a cracking signal it has been this back end of May.

Once again I will add that there is not space in these pages to give long lists of dates, times, and MA's. The information is given on all AMSAT-UK Nets and I am very willing to assist by a quick phone call during the day. Most of the day my IBM is running the latest prediction programme. You could also purchase the bi-monthly calendar from the above address; it's free to AMSAT-UK members.

## Oscar 13

14 June to mid August will be scheduled as follows:

Mode B	MA 003 to MA 160
Mode JL	MA 160 to MA 200
Mode B	MA 200 to MA 240
Off	MA 240 to MA 003

The Mode S Beacon will be active from MA 210 to MA 222 every orbit for anyone experimenting on this higher frequency of 2400.661MHz.

I received a very fine QSL card a few days ago from Leonid, UA3CR. It shows the Trek of the Skiers across the North Pole last year. With it arrived the USSR Special Postal Stamp which the Russian Postal Authorities printed in honour of the Skiers, both Canadian and Russian. Would it not be splendid if our HM Postmaster discovered amateur radio after all these years and did the same. It would make a change from wild birds! We have only designed, built and launched two very successful Amateur satellites to date, and when we put up the next two in November someone should wake up the Post Office; it could be a money spinner for Post Office Counters Ltd.

## MIR

As most of you will already be aware, **MIR** is still up there, in a slightly higher orbit, and the crew are still down in Russia somewhere. Tales of contamination of water supplies, overheating and freezing of the spacecraft, and general disability of the crew prompted the command Station to bring the lads back to earth. I understand that there are plans afoot to return a crew, with an Amateur TX/RX, sometime in late August this year. In the meantime, should you have worked U2MIR you will be able to send your QSL cards to Boris Stepanov, UW3AX, PO Box 679, Moscow, 107207, USSR and reasonably expect to get a QSL in return.

I understand that it is an offence not to send a QSL if one is received for a correctly made out card from a licensed amateur. That used to be the theme all over the world a long time ago, but it was of course called a courtesy in those days.

Now that we are getting a few cloudless skies over the south of England you should be able to spot **MIR** in the twilight zone. We always issue information on the Monday AMSAT-UK Nets, 3780MHz at 7.00pm. Give us a call, G0AUK. All are welcome. Incidentally, we would very much welcome some of you north of Preston as well!

## UOSAT D and E

Both are very much alive and well, and as I write this both are undergoing full testing of the modules which will make up the whole satellite(s) for a November launch using the Ariane rocket. This launch will also carry the AMSAT-NA series of Microsats. Just think of it folks - six amateur satellites being launched at one time! Shades of RS 2, 3, 4, 5, 6, 7 and 8 a few years ago. It will be remembered that UOSAT D will

carry the AMSAT-UK Forward-Store-and-Packet system which members of AMSAT-UK have paid for. Readers will also remember my plea from some of the Packeteers out there to cough up a few shillings to help pay for this communication system which will be available to all radio amateurs worldwide. So far I have received only two such donations from readers of *RadCom*. No comment, except to say that the £20 will not go very far towards assisting the command stations maintain a regular schedule once the PCE is up and flying, will it?

## Pakistan Downlink

As I write this in May, we have been informed of a request by an Organisation in Pakistan to the International Frequency Regulations Board at Geneva for permission to fly a satellite operational in the 70cm and 2m bands. Unfortunately it appears that they have no idea about band planning and have requested a downlink to 145.040MHz. This has stirred a few of us into getting some messages into Pakistan asking for clarification. More as it ripens, or read all about it in *Oscar News*, June issue.

## RS12 and 13

News also just arrived from Bandi, HA5WG, in Budapest, that **RS12** and **13** will be in orbit in June. It's going to be a bit crowded up at the top ends of two and ten in a few months' time.

## Dataspace

Just a short word, and a plug. Dataspace '89 is very much on at the University of Surrey from 27-31 July. See past issues of this magazine. If you wish to attend you will have to be quick. Bookings for day-only attendances can be made up to 15 July. If in doubt shout at me on the above telephone number. Doors are open to anyone interested, but you must pre-book.

## AMSAT AGM

One last word. If you feel strongly about anything to do with AMSAT, or amateur satellites in general, you have your chance to stand up and say so at the AMSAT International Assembly Meeting, Thursday 27 July 1989. Venue Lecture Halls of the University of Surrey, Guildford. Apply for a Booking Form from me or R5GB. Come along and give us the wisdom of your arguments, be prepared to listen to some of ours, but in any case come along to meet some very interesting people and have some fun.

## GEORGE DOBBS G3RJV

St. Aiden's Vicarage, 498 Manchester Road, Rochdale OL11 3HE.

## The Argonauts Sail Again

In the QRP Column in *RadCom* of December 1989, I mentioned the attempt by the American QRP ARCI to encourage Ten Tec to re-introduce the Argonaut transceiver. The Argonaut has been the flagship of commercial low power transceivers. It ran through three models: 505, 509 and 515 until Ten Tec ceased production some years ago and replaced it with the Argosy. This left a gap in the market for an exclusive QRP CW and SSB transceiver.

Ten Tec were the first company to see the need for low power transceivers in the amateur market. In 1968, Al Kahn, K4FW, and Jack Burchfield, K4JU, founded Ten Tec. Their first amateur product was the PM series of low powered transceivers. These were direct conversion, 2 or 5 watt output, two or three band, simple transceivers. The individual printed circuit boards were also available for those who wished to use them as the basis for their own constructed transceivers.

The idea behind the PM series was to offer a cheap and simple product to the 'entry level ham'. But once the warranty cards began to arrive back at Ten Tec, they noticed a majority of two letter calls. Seasoned operators were buying these simple rigs and sitting them alongside their high powered DX machines. Some of the American radio amateurs who had done it all on the bands were looking for a new challenge: a market that Ten Tec had not expected.

The early PM series transceivers can still be found, from time to time, at radio rallies and are usually cheaply available. They lack a good receiver. Probably because in the early days Ten Tec imagined that most QRP stations would be working loud QRO stations rather than chasing anything on the band. The growing popularity of two way QRP working and QRP DXing led to the development of the Argonaut 500 series transceivers. Since the early 1970's the Argonaut range of transceivers have been regarded as the best in purpose built QRP equipment. They are still highly sought after: try to buy a second-hand one! In March of this year, TenTec announced that they are to produce another model of the Argonaut transceiver.

## The New Argonaut II

As Sidney Kitrell, W0LYU, Ten Tec's Marketing Manager, told me



in a recent letter, "Jack, our President, decided that he had one more QRP design in him so he belied up to his work bench and laid out the Argonaut II."

The new generation Argonaut is certainly different from the previous models. Called the ARGONAUT 535, it is a synthesized PLL design which includes a general coverage receiver. The RF power output is 5 watts: SSB, CW and optional FM with AM receive only capability. It is designed for energy efficiency with an LCD display panel.

A novel feature is the IF filtering which is a continuously variable bandwidth crystal network. Ten Tec claim that this design is unique and they are applying for a patent. All of the Ten Tec staff are active radio amateurs and most of them are keen CW operators, and they say that the new Argonaut is first and foremost a good CW rig.

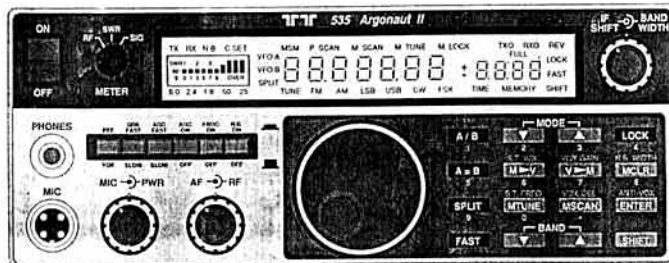
The Argonaut 535 will be manufactured alongside a new model of the Argosy, which is the Argonaut with an addition a 100 watt amplifier. Production units are expected later this year and the expected American price is \$900 for the Argonaut and \$1,100 for the Argosy.

I certainly look forward to meeting the new Argonaut 535. I have, over the years, owned the old models 505, 509 and now use model 515. I admit to being hesitant about the new design route and price. I enjoyed using the Argonauts with VFO and crystal mixing, tight band-tunable front ends and circuits that I could understand, get at and service. I wait to listen to the received low signal CW note from yet another synthesized transceiver. But I can only say, "Well Done" to Ten Tec for having another go at the QRP market.

## A New Beginners Receiver

For many years the G QRP CLUB have been producing simple constructional projects suitable for the beginner to build and get a taste of using home made equipment on the amateur bands. Usually these have been little transmitter boards which cost only a few pounds and take an evening's work to put a few watts of RF power onto an amateur band. The most successful of these has been the ONER transmitter, a simple circuit built up on a one inch square printed circuit board. Hundreds of kits for the ONER have been sold by the G QRP CLUB and many ONER signals have been heard on the HF bands.

A common request from QRP Club members has been for a simple receiver design of modest cost, capable of reasonable results



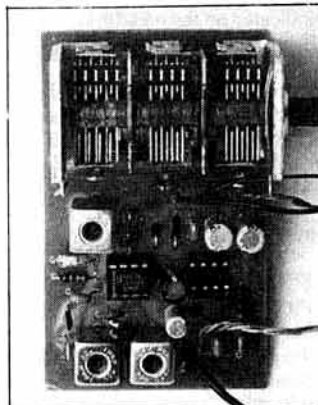
Front panel mock up for new Ten-Tec 535 transceiver

on the HF bands. Several attempts have been made in the past to produce such a receiver but there was always some factor or other that made each design 'not quite right'.

Two years ago, at the Dayton Hamvention, I met John Westpahl, W8YNA, an avid amateur constructor, who introduced me to the NE602 integrated circuit and gave me some samples to bring home and try. The NE602 has been mentioned by Pat Hawker, G3VA, in Technical Topics, several times in recent issues of *RadCom*. It is a double balanced mixer, an HF oscillator and a voltage regulator all built into an 8 pin DIL package. Amongst the circuit information supplied by W8YNA was a design called the 'Neophyte' published in *QST* of February 1986. This was a simple direct conversion receiver design using the NE602. Inspired by this basic design, I tried several versions of such a receiver using UK components and commercially available inductors.

Prototypes of a simple receiver, using just ICs, were built and later with Ian Keyser, G3ROO, a range of single band receivers for any band from 160 to 20 metres were produced. This receiver was published in the Spring issue of *SPRAT*, the journal of the G QRP Club and called 'The Sudden'. The rather odd name comes from the area where I live. I am the Vicar of Sudden, in Rochdale.

The whole receiver is built on a 2



The 'Sudden' beginners receiver

inch square printed circuit board and uses two ICs, the NE602 and the LM386, as the only active devices. Easily available commercial inductors are used for the VFO and input tuning. The whole receiver can be built in an evening by anyone without previous experience. Although it is not at the forefront of communication receiver design, it is capable of receiving a surprising range of signals on the amateur bands.

Printed circuit boards are available from the G QRP Club but not being set up to produce full kits, the kit version is being supplied by Kanga in Folkestone. The full electronic kit, it excludes case and hardware, is available for £13.95 to QRP Club members and £17.95 to non-members: another good reason for joining! Enquiries to Kanga Products, 3 Limes Road, Folkestone, Kent, CT19 4AU. TEL: 0303 276171.

## QRP Mini-convention

Several QRP operators have spoken of the need for a central and northern gathering. This year a new, trial, event is to be held in the north of England to complement the existing Yeovil QRP Convention.

The convention will be held on Saturday, 28th October at St. Aidan's Hall, Manchester Road, Rochdale. It will include a full programme of lectures, component and kit traders, an exhibition of homebuilt equipment, a bring and buy, or swop, stall and other items of interest to the QRP operator or equipment builder. Lunch and tea will be available.

As this is a new venture, with little understanding of what the response might be, people are being asked to book in advance. This will help to ensure more successful catering and space organisation. If you wish to attend, please send £1.00 (cheques to G QRP CLUB) with your name, address, call sign (if any), QRP Club Number (if any) to QRP Convention, St. Aidan's Vicarage, 498 Manchester Road, Rochdale, Lancs, OL11 3HE.

**BOB TREACHER BRS 32525**  
93 Elibank Road, Eltham, London  
SE9 1QJ

This month I will be taking advantage of the slight lull on the news front in order to briefly mention a piece of test gear which is indispensable for SWL and transmitting stations alike.

## SWL Contest

But first though, a brief reminder to all readers that the Society's SWL Contest takes place over the weekend of 8/9 July. We hope for plenty of entries from the UK this year as entries from overseas have always tended to outnumber those from our shores. Thanks here are due to the fine publicity work which Malcolm Harrington, BRS20249, does for the Society.

It does not matter how seriously you take the Contest, send in an entry and you might even win one of the Society's famed contest certificates. It is worth reiterating that Class B licencees can also enter, and indeed, several took part last year.

We all hope that conditions are good, and that there is plenty of activity and good DX on the bands. After the contest, write your log up carefully in ink and in accordance with the rules, and remember to delete any duplicates (leaving them in will cost you points). Send your completed entry to me by the date quoted in the rules and I will endeavour to get the results into print as soon as I can.

## UBA Competition Results

The final results of the UBA's 6th SWL Competition are to hand. Once again, a good number of logs were received from around the world, with entries from 17 countries. There were five entries from the British Isles. In the phone category Tina Parry was the leading G entrant in 8th place and in the same position in the CW section was Don Piccirillo BRS52868, both will receive certificates for their efforts. There were no British entries in either the RTTY, SSTV or All Mode, Multi Operator categories, so we are looking to improve on that next time around.

The UBA hope for an increase in the number of entries for 1989 and full details of the year-long competition can be obtained from: Marc Domen ONL6945, Postbus 38, B-2200 Borgerhout 1, Belgium.

## 144MHz Squares Award

As news from elsewhere is a bit scarce, I thought this would be an ideal opportunity to let readers see

what is possible as an SWL on 144MHz. I have been fortunate to be awarded the first SWL 200/30 Award, so I trust that this will spur others on to make the seemingly impossible, possible!

The map (Fig 1) shows what has been heard and confirmed on the band in the last ten years. The number of serious 144MHz SWLs appears to be quite small, and this is a little hard to understand, especially when there can be so much DX on offer during the course of a year. It is certainly not possible to claim this class of Award without resorting to meteor scatter, and being in the right place at the right time when Sporadic-E and Auroral openings occur. However most of the near squares were heard by good old tropospheric propagation, with the more further afield stations being heard as a result of either monitoring Meteor showers — Geminids in mid-December, Quadrantids in early January and the ever popular Perseids in mid-August. Listening at the peaks of these showers can be extremely productive, and indeed has resulted in hearing OY9JD in The Faeroes, EA6FB in the Balearics, and several squares in Bulgaria and Hungary. Sporadic-E has accounted for all of the squares in the IM and JM large squares.

In general, you will get a better return from QSL cards which report on 144MHz QSOs, especially from reports on stations heard in Sporadic-E openings. For example the one OH card to hand — from OH1AWW — reported on what seemed to be a very brief opening to the British Isles. From the OH's reply it appears that he had been working DX from around Europe for the best part of two hours prior to my hearing him, but he only worked one G. He found the report extremely useful.

It would therefore be encouraging to know that there are other British SWL's active on 144MHz. Alternatively, it would be good to think that SWL's would become enthusiastic about the band and start providing reports to the amateurs heard. Remember, reports to Europeans on 144MHz are many, many times more useful than reports to the same stations heard on 14MHz!

## Pen Pal

The Society have had a letter from SP9NLF, a short wave listener from Poland who wants to correspond with a British listener. We have few other details, but he can be reached at: Jaroslaw Grytner, ul: Kochanowskiego 5/4, 41-506 Chorzow, Poland.

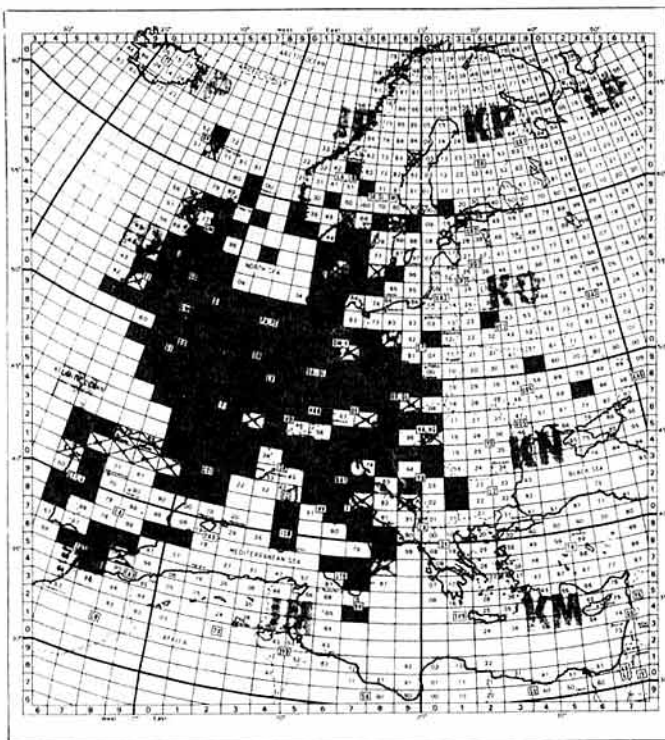


Fig 1. Although obtaining the SWL 200/30 Award may seem to be nearly impossible, the map above shows the number of squares collected over a ten year period. Those squares which are cross-hatched constitute 'heard' squares, solid squares have been 'confirmed'.

## An Antenna Noise Bridge

A licensed friend of mine has suggested that I include some details of an antenna bridge in the column, which listeners might find particularly useful when cutting antennas to resonance or feeders to specific electrical lengths. It can also be used to measure antenna resistance.

The unit consists of a signal source, a bridge circuit, and a detector. A diode noise generator and an amplifier are built into the device along with the bridge and your receiver will serve as the detector. Two balanced legs of the bridge form the secondary of a bifilar transformer which is wound on a toroid core with a broadband noise signal being applied across the primary. A third leg of the bridge is a calibrated variable resistor, which is the only control on the unit. Its dial should be calibrated from 0 to 100ohms.

The antenna or feeder to be measured is connected as the fourth leg of the bridge. When the bridge is balanced, there is minimum signal applied to the receiver and this occurs when the antenna resistance is of the same value as the setting of the bridge resistor. If reactive components are present, the bridge does not balance — any such reactance is balanced out by tuning the receiver.

In doing this, the resonant frequency of the antenna system is determined.

Having explained that, it might be worth explaining the operating procedure. Basically, the bridge control is set to the approximate antenna resonance. The receiver is tuned over the band to which the antenna is to be resonated so as to find the minimum noise frequency (minimum audio output from the speaker and minimum S-meter reading). From there, adjust the bridge resistance for the best minimum (null) and adjust the receiver tuning and bridge controls for the best minimum. The resonant frequency of the antenna is taken from the receiver dial while the antenna radiation resistance is indicated on the noise bridge dial.

In short, a simple but effective means of ensuring optimum antenna performance. Further details of suitable noise bridge circuits can be found in *Radio Communication Handbook* 5th Ed, 18.24 or *VHF/UHF Manual* 4th Ed, 11.19. Both these publications are available from RSGB Headquarters.

## Finale

Please do make sure that your news and views are with me no later than 4 July — note the particularly early deadline. I am particularly interested to receive shack photos and pen-pal pictures,

## MIKE DIXON G3PFR

'Woodslock', Grazebank, Norley, Warrington, Cheshire WA6 8LL

## News from the deep South West

Cyril, G3VVB (St. Austell) successfully completed building the 1.3GHz beacon for GB3CTC and while waiting for DTI clearance for a minor site change ran the beacon from home, effectively on a prolonged 'soak test' as an attended 'personal callsign' beacon.

Since then he has constructed another attended personal beacon comprising a G4DDK-001 oscillator source, running into a G4DDK-002 amplifier. The output from this is further amplified to 3W by a DF8QK/DC0DA (VHF Communications, 1/79) amplifier which uses a pair of BLQ68 transistors. This output is fed to two phased 23 element Tonna yagis pointing approximately E and SE. The keyer is the G4FRE EPROM design published some time ago. His comment, "thanks to 'DDK and 'FRE for these excellent designs."

Cyril's location is 200ft above sea level and the beacon antennas are only about 15 feet above ground. Nevertheless, there is an excellent takeoff and sea-path up (and across) the Channel. He would welcome reports on beacon reception — either on 1.3GHz, or QTHR, or tel. 0726 842368.

Another personal beacon on 1.3GHz was mentioned — that of Louis, F6CGJ (IN78UK) which runs 800mW on 1296.385MHz. Anyone interested can contact Cyril for more details.

G3VVB's next projects are completion of an LMW Electronics 2.3GHz transverter to a 2C39 PA and a home-made 48 element loopquad antenna — hopefully in time to catch some Channel Island activity on both 1.3 and 2.3GHz. This should emanate from G4TAW who is reported to be in GJ for at least 18 months, and "threatened activity" on 1.3 and 10GHz from GU8IRF. Cyril already has working wideband and untested narrowband equipment for 10GHz.

Activity in Cornwall is reported as being (still) very low, although Cyril and Dave, G6LEU, activate 1.3GHz every evening at about 1900 to 1930z. They deliberately sit on 1296.200 (the calling channel), "making ourselves antisocial" in order to try to create some activity by simply being heard on the frequency. Don't forget to turn your beams west or southwest!

## Is there life out there?

There seem to be a number of Marie Celeste-type mysteries



surrounding a black hole known as microwaves!

*Practical Wireless* some years ago sold well over (if my memory serves me right) 400 18in parabolic dishes to support their "PW Exe" 10GHz wideband transceiver design. I'm sure that there were never 400 more stations active as a result.

In similar vein, the Microwave Committee Components Service has now supplied over 100 of each of the G4DDK boards and nearly as many MGF series GaAsFETs, again without any apparent increase in activity on either 1.3GHz or any other band for which the two boards can be used to provide drive. We neither seem to get increased band activity and reports, nor do we get much technical feedback on what people are actually *doing*. So just what does happen to all these components?

Perhaps one explanation is given in the long and rather sad letter from Chris, G6CHW (Watford) who takes a very jaundiced view of what the recent "advances" in the UK licence has done to microwave band activity. Long active on both 1.3 and 2.3GHz, he asks first the

same question as Ela, G6HKM - "Where are all the stations? - activity levels are very, very low."

Chris runs 100W on 1.3GHz to a 48 element loopquad between 156 and 164 feet above ground level (on the top of a 16 floor tower block, itself 216 feet ASL, at IO91TQ (ZL29g). His 2.3GHz station is 500mW to a 66 element 'JVL' loopquad at the same height. His April log (conditions poor to very flat) listed 50 contacts with 18 stations, all in the UK, resulting from no less than five hours spent calling CQ and 26.5 hours actually in contact! No less than 20 of the contacts were with one station, G3GWE and it is interesting to note that ten of the stations were B licensees and the remainder A's.

He complains of a zero reaction to the idea of an activity night on either or both bands and feels that "since the Society negotiated 6m, 4m and Packet, this has killed off all activity on 23, 13, 9 and 6cm and reduced activity on 2m and 70cm". He also noted with some dismay that microwave contests "have been reduced by one to make way for yet another 6m contest and note that the Microwave Committee are

trying to encourage activity on the bands above 24GHz," the inference being that a spread of activity either way in frequency has seriously detracted from activity on the 'middle bands'.

His final shot was "there *are* stations QRV on 23, 13, 9 and 6cm, but do we hear about activity, circuit designs, test equipment and measuring equipment? NO! - when is there going to be some encouragement to increase activity and more suggested circuits....from the Microwave Committee?" Powerful stuff!

All I can say in reply is that I can only report what I get to know from you, the users (I can't remember the last time I had time to actually operate on any of the bands for which I have equipment and get my news first hand!).

While the Committee is trying to support microwave design by offering the Rouse Memorial Trophy, operating awards, 'writeup and editorial' services, supply of components, materials, semiconductors, PCBs and some popular practical designs (the well known G4DDK designs, again), this kind of activity is only one facet of

the Committee's work.

I have said it before, and will say it again, that the Committee cannot and should not originate all the designs; this would be inhibiting to design by others, which is part of the essential life-blood of experimental amateur microwave activity.

Many of our collective aims and objectives would be better served by the assessment and development of other people's interpretation of their own self-generated ideas, or perhaps the germ of ideas generated in committee, and thrown outwards to members for development. This would generate positive feedback which really could stimulate practical design and activity. I can't help but feel that there is a strong element of St. Apathy around at the moment; do people really want it all handed to them on a plate? Maybe we have got it all wrong, after all, and amateur radio *has* degenerated into a black-box operators' club! I can understand that sort of need from real, raw beginners, but not from the more experienced 'hands'. A cynical view maybe, but I haven't abandoned hope yet!

# RSGB NATIONAL MOBILE RALLY

SUNDAY 26 AUGUST 1989 OPEN 10AM

WOBURN ABBEY  
BEDFORDSHIRE  
(COACH PARK SITE)

• LARGE TRADE EXHIBITION  
• RSGB BOOKSTALL AND ENQUIRIES STAND  
• MEMBERS' MART • RAYNET STAND  
• BARTG STAND  
(all under cover)

Members' Mart this year will be charged at £3 per hour per table, which will enable members to sell direct. Tables will be offered on a first-come first-served basis.

The RSGB makes no charge for entrance to the rally but all visitors must pay for entrance to Woburn Park, in which the rally takes place, at £2.25 per vehicle, including passengers.

Limited overnight caravan stay at £3.75 per night. Booking forms available from Norman Miller, G3MNV.

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

## HOW TO GET TO THE WOBURN RALLY

Via the M1 — leave the M1 from north or south at junction 13, not 12 as signposted. After leaving the motorway follow signposts through Husbourn Crawley to Woburn Abbey.

Avoid routes signposted to "The Wild Animal Kingdom" or "Game Reserve". The rally takes place in Woburn Park and correct routes are signposted to "Woburn Park" or "The Abbey". Also watch for RSGB signs. Usual talk-in facilities will be in operation by Dunstable Downs RC on 144 and 432MHz.

All enquiries regarding this event should be made to Norman Miller G3MNV, 180 Warley Hill, Brentwood, Essex, CM14 5HF.



# NEVADA

HIGH QUALITY BRITISH MADE PRODUCTS

NEW TM 1000 2kw All Band ATU



Our unique wide band roller coaster enables effortless matching of G5RV, LW, Vertical and Coax fed antennas with this unit

Standard model ..... £168  
For balanced feed ..... £199  
Fitted with 2kw Balun  
TM1000 Kit complete ..... £138  
(Add £5 carriage for all versions)

BUILD YOUR OWN HIGH POWER ATU  
WITH OUR RANGE OF ATU COMPONENTS



Roller Coaster 2kw 30uH ..... £28  
Var Cap 250pF 1kw ..... £19.95  
Var Cap 250 + 250pF 1kw ..... £28  
Turns Counter (For R/Coaster) ..... £14.95  
Empty ATU Case ..... £26  
2kw Balun Assembly ..... £28

WE ARE THE UK SCANNER SPECIALISTS

NEW MODELS - JUST ARRIVED!

STANDARD AX700 - (50 - 904 MHz)  
With Panoramic Display ..... £575  
AOR 3000 (100 KHz - 2.2 GHz)  
New Base Receiver ..... £765

HANDHELD SCANNERS  
Black Jaguar MkIII ..... £199  
Bearcat 200XLT (W/900 MHz) ..... £229  
Bearcat 100XLT ..... £199  
AOR 900 (W/900 MHz) ..... £235

BASE/MOBILE SCANNERS  
Bearcat 950 XLT (W/900 MHz) ..... £249  
Bearcat 800 XLT (W/900 MHz) ..... £229  
Bearcat 175 XLT ..... £169.99  
AOR 2002 ..... £487  
Cobra SR925 Base RX ..... £149



REMOTE  
ANTENNA SWITCH

(For masthead mounting)  
Freq DC - 1.2 GHz  
Power 300W P.E.P.  
Insertion Loss 0.19 dB at 900 MHz  
Connectors Green Par 'N' Type

£49.95

ALLOWS SELECTION OF 2 ANTENNAS FROM 1 COAX FEEDER

DISCONE ANTENNAS - New British Made Antennas

Nevada WB1300 (25-1300 MHz)  
Wideband Top of the range  
stainless steel ..... £59.95

Nevada Discone  
(50-700 MHz)  
High Quality  
8 Element  
£24.00

Nevada PA15  
Base Antenna 100-960 MHz.  
A new Colinear Ant with over  
9dB gain at 900 MHz ..... £49.95  
(+£4.60 P&P)



USE YOUR CREDIT CARD FOR IMMEDIATE DESPATCH  
**HOTLINE (0705) 662145**

NEVADA COMMUNICATIONS  
189 London Road, North End,  
Portsmouth PO2 9AE. Fax: (0705) 690626

NOW YOU CAN  
SEND FAX  
USING YOUR

**SPECTRUM**

Join the growing group of FAX users. Send and receive FAX, using your Spectrum.

All the benefits of our very popular Receive Only programme, and the ability to transmit as well!!

Interface includes Auto PTT, Tone Generator and Drum Speed Generator!

Send prepared displays (SCREENS) or just type in your message and send it.

Compatible with existing FAX machines.

**PROGRAMME ONLY £15**

Supplied on Tape. Add £3 for +3 disc.

**INTERFACE £48**

A "Trade in" allowance of £18 is offered against your receive only system.

Send large SAE for full details & product list.

**J.B.P. ELECTRONICS LTD.**

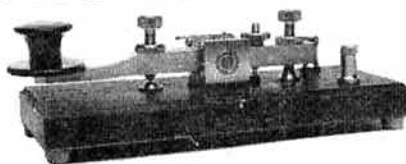
Unit 45, Meadowmill Est, Dixon Street, Kidderminster DY10 1HH.



Tel: (0562) 753893



## Quality MORSE KEY KITS



The Kent hand key is used world wide by professional and amateur operators alike. The silver contacts are mounted in precision fine pitch threaded screws fitted with positive locking nuts which are instrument knurled for ease of precise adjustment. Our shielded ball race bearing pivots are renowned for their superiority over all keys using plain and bush type bearings.

The key is available in kit form or ready assembled. The kit takes less than an hour to complete, resulting in a key of unrivalled professional standard.

KEYS OF UNBEATABLE QUALITY AT UNBEATABLE PRICES!

	In kit form	Ready Assembled	
Straight hand key	£31.00	£38.00	+ £2.50 p&p
Twin paddle key	£39.50	£47.90	+ £2.50 p&p
Single paddle key	£31.00	£38.00	+ £2.50 p&p

S.A.E. For details



**KENT**

**R. A. KENT (ENGINEERS)**

243 Carr Lane, Tarleton, Preston, Lancs. PR4 6YB  
Telephone: Hesketh Bank (0772) 814998

**J. BIRKETT**

25 The Street  
LINCOLN LN2 1JF  
Tel. (0522) 20767

RECALL FREQUENCY COUNTER type 9511 120 MHz @ £86 (p+p £2). RECALL FREQUENCY COUNTER type 9901 @ £120 (p+p £2). FLUKE FREQUENCY COUNTER 1900 A @ £95 (p+p £2). PHILLIPS FREQUENCY COUNTER PM 6607 @ £98 (p+p £2). SYSTRON AND DONNER FREQUENCY COUNTER @ £95 (p+p £2). ADVANCE FREQUENCY COUNTER TC11 15 MHz @ £48 (p+p £2). DYMAR LYNX MOBILE TRANSCIVER 80 to 110 MHz 16 channel FM 25 watt @ £12.50 (p+p £2). PYE WESTMINSTER W15FM 80 to 110 MHz 10 channel FM Mobile Transceiver @ £12.50 (p+p £2). STORNO BOOT MOUNTING 80 to 110 MHz TRANSCIVER No controls 10 channel FM @ £8 (p+p £3). PYE BOOT MOUNTING W15FM TRANSCIVER No controls @ £8 (p+p £2). VHF-UHF COAX RELAY R.S. 346-211 24 volt coil @ £10. SMALL KEYBOARD push to make Switches @ £5 for £1.50. MIKE INSERTS 250 Ohm @ 60p 800 Ohm @ 60p. CRYSTAL @ 60p. CRYSTAL @ 60p. CARBON INSERTS @ 10 for £1.50. CRYSTAL FILTERS 1.4 MHz BW 2.4 KHz Upper and Lower Side Band @ £11.95 pair. ITT CRYSTAL FILTERS 014 DG 10.7 MHz BW 3.75 KHz @ £3.95. 024 BF 21.4 MHz BW 7.5 KHz @ £2.95. 024 BF 10.7 MHz BW 6 KHz @ £5. X BAND GUNN DIODES @ £1.65. X band diodes like IN23 @ 45p. SIM 2 @ 45p. 1501 BE @ £1.65. micro-min surface mounting diodes @ £1. Tag Ended Diodes @ £1.65. SEMI-RIGID 50 OHM COAX CABLE Solid Copper Outer PTFE inner 1mm dia approx 7m approx for £5. PYE EUROPA 6 CHANNEL 80 to 110 MHz 25W TRANSCIVER @ £18.50 (p+p £2). SEMCO RF CAPACITORS 35 Ohm. 22pF. 220pF. 300pF. 400pF all at 30p each. COMMUNICATION RECEIVERS type R210 unconverted @ £50 carr £6. Converted to mains @ £79.80 (carr £8).

ACCESS AND BARCLAY CARDS ACCEPTED.

P.P. 60p UNDER £5.00 OVER FREE. UNLESS STATED OTHERWISE.

C.M. HOWES AND WOOD AND DOUGLAS KITS AVAILABLE BY POST FOR CALLERS.

Unit V, Rudford Industrial Estate, Ford, Arundel, West Sussex, BN18 0BD

## TW-2 Microcomputer Weather Station



The **DIGITAR** model TW-2 gives constant digital readout of:-

- Wind Speed and Direction
- Temperature
- Time
- Scanning of all parameters

This exceptionally well priced unit is battery driven and can be programmed to record maximum wind gust and minimum/maximum temperature. NiCad battery pack and charger available. Other models in range give barometer, altitude readings and data logging on IBM-PC. Catalogue available.



TW-2: £114.94

DSK-22 Desk Stand: £9.14

Post and packing, any combination: £5.00

## ICS MET-1 Meteosat Receiver



Built in AM demodulator and loudspeaker. Operates well with Amiga-Fax and other grey scale Fax software. A new cloud cover picture every 30 minutes! Excellent performance. Software available for Amiga, Atari, Archimedes and IBM PS-2 computers. Antennas available. Call for details.

MET-1 Receiver: £399.95 plus £4.00 p+p

MET-1a (matching pre-amp): £119.95 plus £2.50 p+p

## PK-232 Seven Mode Data Terminal Unit



- Amtor, Packet, RTTY, CW, ASCII, Facsimile, Navtex
- Superb filter/ demodulator performance
- The UK market leader!
- Excellent driver software for most computers. Send for free descriptive leaflet.

PK-232: £279.95 plus £4.00 p+p

## PK-88 VHF/HF Packet Radio TNC



- Built in HIF modem and personal mailbox
- Excellent host mode driver software available
- Full front panel status display
- 32K RAM
- Excellent documentation
- NET-ROM compatible
- Currently the best value packet TNC on the market

PK-88: £129.95 plus £2.50 p+p

## FAX-1 Radio Facsimile Demodulator



- Demodulates facsimile, RTTY and Navtex
- Superb image definition
- No computer required
- Connects between any short wave SSB receiver and an Epson compatible printer
- Fully automatic operation
- All leads supplied

FAX-1: £279.95 plus £4.00 p+p

Including Printer: £399.95 plus £9.50 Securicor delivery  
12v Marine System: £574.74 plus £9.50 Securicor delivery

All prices include VAT at 15%

Full 12 months parts and labour warranty

Applications assistance always

Visitors by appointment

We reserve the right to change prices without notice

COMPUTER PRINTERS £99.95 PLUS VAT. CALL.

Telephone: 0903 731101 - Facsimile: 0903 731105



# STEPHENS-JAMES LTD.

47 Warrington Road, Leigh, Lancs WN7 3EA. Telephone (0942) 676790  
Turn at the Greyhound Motel on the A580 (East Lancs. Road).



LANCASHIRE & THE NORTH WEST'S LEADING RETAILER IN AMATEUR RADIO.

## ANTENNA RANGE

<b>Cushcraft</b>	
A3 3 Element Tribander Beam.....	£262.00
A3 4 Element Tribander Beam.....	£353.35
10-3CD 3 Element 10m Monobander.....	£115.04
15-3CD 3 Element 15m Monobander.....	£139.70
20-3CD 3 Element 20m Monobander.....	£238.21
AP8 8 Band Vertical 25ft High.....	£164.35
AP5 5 Band Vertical 25ft High.....	£123.36
18 Element 2m Boomer Antenna.....	£106.59
15 Element 2m Boomer Antenna.....	£85.26
Ringo Ranger 2m antenna.....	£42.95

<b>Butternut</b>	
HF6VX 6 Band Vertical Antenna.....	£159.00
HF2V 80/40 meter Vertical.....	£142.00

## All Butternut accessories available

Hy-Gain Antenna Range available

KLM range of antennas available

<b>Jaybeam</b>	
TB3MK3 3 Element Tribander.....	£348.85
TB2MK3 2 Element Tribander.....	£234.60
TR1MK3 Rotary Triband dipole.....	£117.30
VR3MK3 Triband Vertical.....	£81.65
DB4 4 & 5 Element Beam.....	£129.37
4Y6m 6m 4 Element Beam.....	£20.53
5 Element 2m Yagi.....	£20.53
8 Element 2m Yagi.....	£26.28

## Antenna Tuning Units

Kenwood AT230.....	£208.00
MFJ 962B 1.5 kW Versatuner.....	£241.00
MFJ 949C 300W Versatuner.....	£157.00
MFJ 300 Watt Basic ATU.....	£105.00
MFJ 1601 Random Wire Tuner.....	£42.00
Global AT1000 SWL Antenna Tuner.....	£69.00

## Weiz

D130N 25-1300 MHz Discone Antenna.....	£79.00
DCP5 5 band trappes vertical with radial kit.....	£195.00
DCP4 4 band vertical.....	£145.00

## ALPHA range of linears now available

Full size G5RV Antenna.....	£16.50
Half size G5RV Antenna.....	£14.50

Carriage/Postage at cost

## Kenwood Range

TS940S HF Transceiver.....	£1995.00
AT940 Automatic Antenna tuner.....	£244.88
SP940 Speaker with filters.....	£87.55
TS440S HF Transceiver.....	£1138.81
AT440 Automatic Antenna tuner.....	£144.82
PS50 20 amp power supply.....	£222.49
TS140S HF Transceiver.....	£862.00
PS430 power supply.....	£173.78
AT250 Automatic Antenna tuning unit.....	£366.00
AT230 Antenna tuning Unit.....	£208.67
TL922HF Linear amplifier.....	£1495.00
MC50 Base station microphone.....	£46.00
MC60A De Luxe desk microphone.....	£88.22
TR751E 2m Multimode Mobile Transceiver.....	£599.00
TM2550E 45 watt 2m Transceiver.....	£465.00
TM221E 45 watt FM Transceiver.....	£317.00
TM21E 70cm 35 watt Transceiver.....	£372.00
TS680S HF + 6m Transceiver.....	£995.00
TM721E FM Dual Bander.....	£699.00
TH25 2m FM Handheld Transceiver.....	£258.00
TH205E 2m FM Handheld Transceiver.....	£215.00
TH215E 2m Handheld FM Transceiver.....	£252.00
TH405E 70 cm Handheld FM Transceiver.....	£288.00
R5000 General coverage receiver.....	£875.00
VC20VHF Converter 108-174MHz.....	£167.21
R2000 General coverage receiver.....	£595.00
VC10VHF Converter 118-174MHz.....	£161.95
HSS De Luxe headphones.....	£37.54
LF30A Low Pass Filter.....	£34.00
TM231E 50 Watt FM 2M mobile.....	£289.00
TM431E 35 Watt FM 70cm mobile.....	£318.00
TM701E Dual Bander 25 Watt.....	£469.00
RZ1 Wide Band Scanner.....	£465.00

## "TEN TEC"

We are pleased to announce we are the northern stockist for the full Ten Tec range

"PARAGON" Transceiver + General Coverage

£1839.00

"CORSAIR" amateur band transceiver.....

£1200.00

"ARGOSY" mobile transceiver.....

£589.00

"CENTURY" CW only transceiver.....

£399.00

Full range of accessories, Psu's - Filters -

Microphones.

## Receivers

AR2002 Scanning receiver covering 25-550MHz and 800-1300MHz.....	£487.00
R535 Aircraft Bands receiver covering 108-143 and 220-380MHz.....	£249.00
R537 Handheld Aircraft Band Receiver.....	£69.50

Antennas and accessories for above stocked.

## New model HF225 General Coverage Receiver.....

£395.00	
AR900 UK Scanner.....	£235.00
WIN108 Handheld Scanning Airband Receiver.....	£175.00
ACR 800E Hand Held Scanning FM-AM Receiver. 75-105MHz, 118-136MHz, 140-174MHz, 407-495MHz, 830-950MHz.....	£199.00

## Datong Range

AD370 Outdoor Active Antenna.....	£69.00
AD270 Indoor Active Antenna.....	£51.75
AR900 UK Hand Held Receiver.....	£235.00
D70 Morse Tutor.....	£56.35

## MFJ Accessories Range

MFJ1701 6 way Antenna switch.....	£30.72
MFJ910 Mobile Matching Unit.....	£20.42
MFJ300 watt dummy load.....	£28.35
MFJRF Noise Bridge.....	£63.10

MFJ 815 2KW Cross needle SWR/Power meter.....

£57.32

## Daiwa

CS201 2 way Ant Switch.....	£14.00
CS4 4 way Ant Switch BNC Sockets.....	£30.39
NS660P 1.8-150MHz + PEP Meter.....	£115.00

## Rotators

GS400.....	£139.00
GS400C.....	£169.00
GS600C.....	£219.00
Daiwa MFJ 750E.....	£254.00
CDE AR40.....	£168.72

## Power Supplies

PS120M 3-15V variable 12AMP max.....	£79.50
PS30MX 30AMP PSJ.....	£129.50

Stockist for Heil microphones, Mirage amplifiers, Global Publications by RSGB and ARRL.

Post/carriage charged at cost.

Our secondhand list is updated daily. Please send SAE for this or any information.

Shop Hours 9.30 to 5.00 pm Mon, Fri. 4.30 pm Sat

# HEATHERLITE



PRODUCTS



## HF HUNTER LINEAR AMPLIFIER

The Best of British



- Designed for prolonged operating periods: Heavy Duty Internal Power Supply
- 1000 watts PEP SSB O/P; 700 watts CW O/P; 400 watts RTTY O/P
- Tuned Cathode I/P CCT 50 n Tuned Pi Tank O/P Circuit 30-80 n: 3-500Z Triode
- Drive required 0-100 Watts: 50 Watts to full output is variable from front panel control
- 3.5 - 30MHZ. Amateur Bands. Manufactured in Britain using 70% British parts



Price £875 inc VAT  
CARRIAGE £15 EXTRA



Manufacturer of Power Amplifiers & Microphones  
75 St. Catherines Drive, Leconfield,  
North Humberside HU17 7NY. TEL: 0964 550921



**HATELY ANTENNA TECHNOLOGY GM3HAT**  
1 Kenfield Place, Aberdeen AB1 7UW, Scotland.

TELEPHONE: Evenings 6.30-9.30 (0224) 316004

## CROSSED FIELD ANTENNA

This month listeners will begin to hear the CROSSED FIELD ANTENNA in use on the air. UK Amateurs will be heard on 40 metres and 80 metres using the CFA from roof top or interior locations in lofts or attics. The first purchasers will, many of them, be enjoying release from the restrictions of the strict British environmental planning regulations, thanks to our newly invented technique of POINTING VECTOR SYNTHESIS.

By thoughtful application of MAXWELL'S EQUATIONS we have generated intense radio waves by means of compact, low voltage, field stimulators. One gets half the power from the transmitter and makes the Electric Field. The other gets half the power to make the Magnetic Field. At the antenna these are crossed and carefully timed to synthesise the ELECTRO-MAGNETIC WAVE which flows out to infinity with the velocity of light. See "Maxwell's Equations and the Crossed Field Antenna" by Kabbary, Hately & Stewart, in March 1989 Electronics & Wireless World.

The CFA is supplied as a kit, which can be assembled in about half an hour, and is only 35cms high (1ft 3ins) and 40cms in diameter (1ft 6ins) standing on a small ground plane less than 1 metre square (3ft sq). It generates vertical polarisation with a low angle uniform horizontal radiation pattern, and is wideband at any setting of the power phasing unit. It will transmit (and receive) any frequency from 1.8 to 30MHz and work up to 400W peak power.

KIT FORM at £300 inc UK VAT and Postage. Delivery about 4 weeks presently. Europe same Price inc Air Parcel USA £325

Sterling Draft Please. We take ACCESS and of course the new RSGB MASTER CARD.

Look out for us at the SCOTTISH CONVENTION at GLENROTHES Sept 16th.

Proprietor: Maurice C Hately, MSc FIEE Chartered Electrical Engineer (GM3HAT).

# QUARTZ CRYSTALS

SAME DAY SERVICE

Any frequency from 2MHz to 55MHz. Orders received before 10.00am are completed and posted THE SAME DAY! Just let us know; frequencies? holder sizes? circuit conditions? (i.e. series resonance or load capacitance) or alternatively we can work from your samples. Just £11.50 inc. post and VAT. Cash with order or use our credit card facilities.

0703 848961



McKnight Crystals

Amateur Radio Division (Dept X)

Hardley Industrial Estate, Hythe, Southampton SO4 6ZY

Tel: 0703 848961 Telex: 9312131928 Answerback MK G Fax: 0703 846532





# HRS Electronics — Now Importing...



# THE BEST-FROM THE U.S.

## TEN-TEC The new Paragon — 100w all band, all-mode H.F. transceiver.

Here's the very latest hi-tech North American state-of-the-art transceiver to reach the U.K.'s HAM Shops. The new Paragon — or should we say Paragon of virtue! Ten-Tec's unique combination of 'in-house' processes ensures their ability to produce equipment of highest quality, reliability and value for money.



- Improved receiver performance • Freq stability 1 PPM per °C (worst case) at 28 MHz • Microprocessor PLL synthesized • Aluminium/construction throughout!
- General coverage receiver • R.F. output adjustable (10-100w) • SSB, FSK optional FM • Noise blanker/speech processor • Dual VFO's, RX offset and TX offset • QSK changeover • 30 m/s • Five IF filters • Pass-band tuning • Greatly reduced phase noise • Glass epoxy circuit boards removeable with no de-soldering • 62 programmable memories • 7 digit alpha-numeric display — for entering net-name, call sign or I.D.

### ARGOSY II — COMPACT HF 50w SSB TRANSCEIVER (NOW MADE IN THE U.K.):

- PTO freq control (see Corsair) • No tune solid state final • Rugged and reliable for portable/mobile use • 80m through 10m in 500KHz segments
- 12-14v dc supply • 50w or 5w output • Variable notch > 50 db rejection
- LSB/USB/CW • Weighs just 8lbs!! • Size: 4" x 9 1/2" x 12"

**Ten-Tec** ...America's Best Kept Secret!

### CORSAIR II — 100w HF TRANSCEIVER:

- All 9 Bands — 1.8-30 MHz SSB/CW • Permeability Tuned oscillator for improved RX performance (unique to Corsair) • Low noise floor even with strong adjacent signals • 50+ db notch • Passband tuning with 16 pole XTAL ladder filtering • QSK changeover < 30 m/s • Integral speech processor • Iambic keyer adjusts 8-50 wpm for the HAM radio purist.

### •TITAN 1500w HF LINEAR •CENTURY 22 — 20W CW HF TRANSCEIVER

- SEE (AND HEAR) THE LATEST RECEIVER IMPROVEMENTS AND ADVANCED TX DESIGN — YOU'LL BE IMPRESSED!!

**MFJ**



U.S. Engineering that put men on the Moon!

#### Antenna Tuners

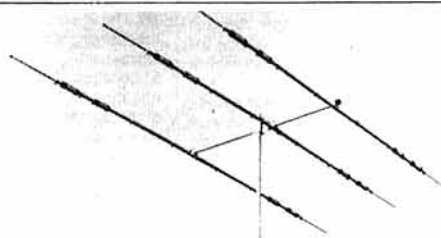
MFJ989B 3KW Roller Inductor built-in dummy load, Cross needle SWR/PWR meter, 6 way antenna switch and built-in balun	368.16
MFJ962B 1.5KW Versatuner MK III, Cross Needle SWR/PWR Meter, Built-in balun	241.95
MFJ949C 300W Deluxe Versatuner built-in dummy load, cross needle SWR/PWR meter, 6-way switch and balun	157.75

MFJ941D 300W Built-in SWR/PWR Meter, 6 way switch and balun	105.13
MFJ901B 200W Versatuner	63.07
MFJ16010 Random Wire Tuner	42.02
MFJ1701 6-way Antenna Switch 2KW SSB	30.72
MFJ910 Mobile Antenna Matcher	20.42

#### Accessories

MFJ250 1KW Dummy Load (Less Oil)	50.66
MFJ260 300W Dummy Load	28.35
MFJ1040 All Band Receiver Preselector	99.40

**clushcraft**



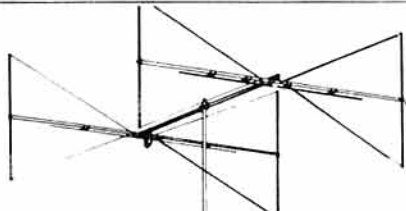
#### Multiband Beams

A3 3 Element 20-15-10M	279.00
A3SK Stainless Steel Hardware Kit for A3	35.51
A4 4 Element 20-15-10M	353.35
A4SK Stainless Steel Hardware Kit for A4	42.64
A743 Add-on Kit for A3 giving 40M or 30M	90.39
A744 Add-on Kit for A4 giving 40M or 30M	90.39

#### Monoband Beams

10-3CD 3el 10M	115.04
10-4CD 4el 10M	131.48
15-3CD 3el 15M	139.70
15-4CD 4el 15M	147.92
20-3CD 3el 20M	238.31
20-4CD 4el 20M	328.71
40-2CD 2el 40M	349.95
<b>Verticals</b>	
AP8 8 Band 25ft high	164.35
AV3 3 band 14, 21, 28 MHz	56.02
AV4 4 band 7, 14, 21, 28 MHz	104.58

**BUTTERNUT ELECTRONICS**



#### Verticals

HF6V 6 Band 26ft high	159.00
HF2V 80/40M 32ft high	142.00
A18-24 HF6V 17/12M add on kit	30.99
STR11 HF6V Stub Tuned Radial Kit	33.49
MPS HF6V Mounting Post Sleeve	5.99
20MRK HF2V 20M add on Kit	33.49
30MRK HF2V 30M add on Kit	33.49
TLK HF2V Top-Loading Kit	13.84
RMK-11 HF2/6V Roof Mounting Kit (includes radials and tripod tower)	51.49

#### T2

Tripod Tower 2ft Roof Mounting	14.79
TBR-160SHF2/6V 160M add-on Kit	53.99
SC3000 30-512 MHz Scanner Ant	63.99
2MCV 2M Colinear 9.8ft 3db gain	53.99
2MCV-5 2M Colinear 15.75ft 5db gain	63.99

#### Compact HF Beam

HF5B 10-12-15-20M Butterfly (wingspan 12'6" Boom 6')	235.00
--	--------

**TELEX hy-gain**



#### Monoband Beams

105BAS 5 Element 10M	187.00
155BAS 5 Element 15M	288.00
205BAS 5 Element 20M	524.17
204BAS 4 Element 20M	357.00
BN86 Balun	30.05
18AVT 5 Band Vertical	146.00

TH7DX 7 Element 20-15-10M	669.00
TH5 Mk2 5 Element 20-15-10M	575.00
EXP 14 4 Element 20-15-10M	449.00
QK710 Add on kit for EXP 14 giving 40M or 30M	115.00
TH2 Mk3 2 Element 20-15-10M	249.00
DISC 7-2 2 Element 40M	486.62
DISC 7-3 Yagi Director Element 40M	305.70

## •HY-TOWER, HY-TECH, HY-GAIN!

WITH THE BETTER WEATHER 'WORK THE WORLD' ON H.F. — ESPECIALLY 10 M

## HRS Electronics Plc

Ring 021-789 7171 for your nearest dealer.  
Ask for Fred Rendell!

HRS Electronics Plc., Garretts Green Lane, Garretts Green, Birmingham B33 0UE. Tel: 021-789 7171

ALL PRODUCTS AVAILABLE FROM AUTHORISED STOCKISTS

# CONTEST NEWS

## RULES

### 144MHz LOW POWER SWL CONTEST RULES

1500-2300 GMT 5 AUGUST 1989

The general rules published in *RadCom* January 1989, will apply. There will be three sections, section F for single operator fixed stations, section O for all other transmitting stations, and section L for listeners.

County/country multipliers will be used (general rule 14).

Output power must not exceed 25W PEP at the transmitter.

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

A certificate will also be awarded to the highest placed single operator station licenses for less than one year. Please state the date of issue of your licence if you wish to compete for this award.

All entries and check logs to: VHF Contests Committee, c/o BCS Llewellyn, G4DEZ, 110 South Avenue, Southend-on-Sea, Essex, SS2 4HU.

### ROPOCO 2 1989 RULES

1. The general rules for RSGB HF Contests will apply.

2. **Date and time:** 8.00-10.00 GMT, 6th August 1989.

3. **Sections:** Single operator entries only. All entrants must be paid-up members of the RSGB, resident in the British Isles, and holding a class 'A' licence.

4. **Band and mode:** CW in the 3.5MHz band only. Entrants are requested to confine their operation to 3.520-3.570MHz.

5. **Exchange:** Send RST, plus — for the first contact, your own postal code; for the second and subsequent contacts, the postal code received in the previous contact. Contacts with European stations will not count.

6. **Scoring:** Ten points per contact.

7. **Documentation:** Entrants are requested to use RSGB HF contest log sheets (HFC 1) and the cover sheet (HFC 2) which must include a signed declaration stating that the rules and spirit of the contest were observed. Column five should be headed 'postcode received' and used for this purpose.

8. **Name and address for logs:** Logs should be sent to Mrs H Claytons-Smith G4JKS, 115 Marshalswick Ln, St Albans, Herts AL1 4UU.

9. **Date for entries:** Logs to be postmarked not later than 21 August 1989.

10. **Awards:** Certificates of merit will be awarded to the first, second and third placed entrants. The G3XTJ Memorial Trophy will be awarded to the entrant with the highest checked score and most accurate log. This trophy will only be awarded once in 10 yrs to the same station. Previous winners — GW3YDX, G3SXW, G4DJX, G4BUO.

### 432 AND 1296MHz ACTIVITY CONTESTS

1. **Dates:** 432 MHz Contest the whole of the month of August 1989, 1296 MHz Activity Contest the whole of the month of September

1989.

Rules for both contests. General rules apply, licence regulations apply as to power output.

2. **Time:** Any 2 hour period in the 24 hour day using GMT times. Each period must start on the hour.

3. **Contest exchange:** Callsign, signal report, QTH Locator, County, NO serial numbers.

4. **Contest scoring:** Radial ring, times (countries plus countries). For each session.

5. **Log sheets:** Standard RSGB VHF log sheets, new sheet for beginning of each new session.

6. **Check log:** Check log for each session please. See rule 14.

7. **Entry forms:** 427-86 for each entry, 4422 summary sheet showing each session.

8. **Requirements:** Only 5 sessions to be entered for adjudication, (less is acceptable, more will be disqualified).

9. **Sections:** Fixed station single operator. Portable station single operator. Operator may move for each session but not during each session.

10. **Adjudicator:** 432MHz G4DEZ, B Llewellyn, 110 South Avenue, Southend, Essex SS2 4HU. 1296MHz G4NBS, AJ Collett, 10 Quince Road, The Limes, Hardwick, Cambs CB3 7XJ.

Entries to be postmarked on or before 15th of the month following the event.

The idea of the activity contest is to increase activity on the two bands, also to allow those, whose work commitments make it difficult, to enter contests. The contestant can choose which days and times to operate and may work on the band every day for more than two hours a day, it is up to the operator to choose which 2 hour segment will give the most points. Each session must start on the hour, so if the first QSO is at 15:10 then that period would have to start at 15:00 for scoring purposes.

### IARU REGION 1 VHF/UHF/SHF CONTEST RULES

1. **Eligible entrants.** All licensed amateurs in IARU Region 1 can participate in the contests. Multi-band entries from UK groups competing in the IARU Region 1 VHF/SHF Contest, working from a single location and using one callsign on each band, will be accepted for the "all other stations" section of the contest. The contest entry should show which single call-sign should be used in the overall tabulation of the results. Contestants must operate within the letter and spirit of the contest and at no greater power than permitted in the ordinary licences of their country. Stations operating under special high power licences do so *hors concours* and cannot be placed in the contest proper.

2. **Contest sections.** The contest will comprise two sections for each band:

2. All other stations.

3. **Dates of contests**

**VHF contest:** The contest will take place during the weekend of 2 and 3 September 1989 on the 144MHz band.

**UHF/SHF contest:** The contest will take place during the weekend of 7 and 8 October 1989 on all bands from 432MHz to 47GHz.

4. **Duration of contest.** The contest will commence at 1400gmt on the Saturday, and end at 1400gmt on the Sunday.

5. **Contacts.** Each station can be worked

only once on each band, whether it is fixed, portable or mobile. If a station is worked again during the same contest, only one contact will count for points, but any duplicate contact should be logged without claim for points and clearly marked as duplicate. Contacts made via active repeaters, translators, eme or meteor scatter do not count for points. Any telephony contacts made with stations generating in the CW (A1A) sub-bands shall not count for points.

6. **Type of emission.** Contacts may be made on A1A, R3E, J3E or F3E. F2A may be used above 1GHz. Only one transmitter may be used on each band at any time.

7. **Contest exchanges.** Code number exchanges during each contact shall consist of the RS or RST report, followed by a serial number commencing at 001 for the first contact on each band, and increasing by one for each successive contact on this band. This must immediately be followed by the locator of the sending station (eg 59 003 JO22PB).

8. **Scoring.** Points will be scored on the basis of 1 point per kilometre. The final claimed score must be shown on the first sheet.

9. **Entries.** Entries should be sent to the RSGB VHF Contests Committee, c/o the adjudicator for the RSGB contest on the same date. Separate cover sheets (Form 427-86) should be completed for the RSGB and IARU events, but common log sheets may be used with both radial ring and points per kilometre scoring shown.

10. **Awards.** The winner of each section will receive a certificate. The entrants compete for the following challenge trophies:

**VHF contest:** (a) The IARU Region 1 VHF Trophy for the winner of the single-operator 144MHz section. (b) The PZK Trophy for the winner of the all other stations 144MHz section.

**UHF/SHF contest.** (a) The Vittoria Alata Cup 1, for the winner of the single-operator 144MHz section. (b) The Vittoria Alata Cup 2, for the winner of all the other stations 432MHz section.

**Overall winner:** An overall winner of the IARU Region 1 VHF/SHF Contest will be declared. For this competition the scores of entrants will be normalised for each band and the resulting scores combined. The 3-4GHz band will not be included in calculating this overall score.

The entrant with the highest score will be awarded the IARU Region 1 Medal.

### IARU REGION 1 VHF/UHF/SHF SWL CONTEST RULES

The IARU Region 1 VHF/UHF/SHF Contest rules should be used, with the following differences.

1. **Eligible entrants.** All listeners in Region 1 may take part. Licensed amateurs are not eligible to enter.

2. **Contest sections.** (a) There will be one section in the September 144MHz contest. (b) There will be one section for each band from 432MHz to 47GHz in the October contest.

3. **Reporting.** Any station may be logged only once on each band, whether it is fixed, portable or mobile. CQ or test calls will not count for points and should not be logged. Stations heard via active repeaters, translators, eme or meteor scatter do not count for points. The callsign of the station contacted

by the station heard may only appear five times, or if there are more than 100 QSOs logged, only once in every 20 logged contacts.

4. **Scoring.** Points will be scored on the basis of one point per kilometre between the listener and the station heard.

### RSGB SSB FIELD DAY 1989 RULES

1. **Eligible entrants.** Members or groups of members of the RSGB located in the British Isles.

2. The general rules for RSGB HF contests, published in "Contest News", *RadCom* January 1989 will apply.

3. **Period.** 1500gmt, 2nd September to 1500gmt, 3rd September.

4. **Sections.**

(1) **Open.** Multi-operator, maximum licensed power. Equivalent: one transmitter and one receiver, or one transceiver plus an additional receiver if desired. Antenna: no restriction.

(b) **Restricted.** Multi-operator, 200W pep input maximum. Equipment: only one transmitter and one receiver, or one transceiver. Antenna: only one antenna may be used which must be a single element such as a dipole, long wire, W3DZZ, or trapped vertical, having not more than two elevated support points. No part of the antenna may be higher than 15m above ground level.

**Notes** (these apply to both sections). (i) Stand-by equipment is allowed, but it may not be connected at the same time as the main equipment.

(ii) The use of support points for antennas for permanent buildings or structure is not permitted.

5. **Location.** Each portable station must operate from the same site for the duration of the contest and may not be located in a permanent building or use public mains supply.

6. **Power.** Power for all equipment may be derived only from a portable generator on the site, accumulators, or batteries.

7. **Installation.** No equipment or antennas may be installed or erected on the site prior to 24 hours before the start of the contest. This does not apply to the storage of equipment.

8. **Contacts.** Phone only in the 3-5, 7, 14, 21 and 28MHz bands.

9. **Contest call and exchange.** Call "CQ Field Day". Exchange RS plus serial number starting with 001.

10. **Scoring.**

(a) QSO with a fixed station in IARU Region 1.....2 points

(b) QSO with any station outside IARU Region 1.....3 points

(c) QSO with a portable or mobile station in IARU Region 1.....5 points

See Appendix for list of IARU Region 1 countries.

**OSY rule.** An entrant who QSYs from one band to the other and makes a scoring contact may not return to the original band until at least 10 minutes have elapsed since the previous scoring contact on the original band; E9, G9ZZZ works W1AA at 1555 on 21MHz, then QSYs to 28MHz and works NP4A at 1558; G9ZZZ may not make another scoring contact on 21MHz until 1605.

11. **Multiplier.** Each DXCC country worked on each band gives one multiplier.



**12. Final score.** The total points scored on all bands is to be multiplied by the total number of different countries worked on each band to give the final score (ie total QSO points x multiplier = final score).

**13. Logs.** Separate logs are required for each band, together with a check list showing the countries worked on each band. Log sheets are to be headed: date/gmt; station worked; RS and serial number received; operator; new country/multiplier; points. RSGB HF Contest Log Sheets should be used.

**14. Declaration.** Logs must be accompanied by an RSGB HF Contest Cover/Summary Sheet with the declaration signed by the person responsible for the contest entry.

**15. Address for logs.** RSGB HF Contest Committee.

**16. Deadline for logs.** Postmarked not later than the Monday 22 days after the end of the contest.

**17. Awards.** The leading station in the open section will receive the Northumbria Trophy. The leading station in the restricted sections, and the entrants placed second and third in each section will receive certificates of merit. Certificates will also be awarded to the stations submitting the leading check log from each continent.

**18.** Any log found to contain more than five unmarked duplicate contacts for which points have been claimed will be automatically disqualified. Points to the rate of 10 times the contact value will be deducted for each unmarked duplicate contact up to five.

**19. Date Protection Act.** Entrants should note that the contest adjudicator may enter information from their logs into a micro-computer for the sole purpose of checking for duplicate contacts and preparing contest tabulations. If any entrant objects to this, they must clearly state their objection on the cover sheet so that the adjudicator can hand process their information.

#### Appendix

IARU Region 1 countries include those in Europe and Africa, the USSR, Mongolia and ITU Zone 39. For a precise definition refer to the RSGB *Amateur Radio Operating Manual*.

## 21MHz CW CONTEST 1989 RULES

### TRANSMITTING SECTION

**1. General:** The basic format of the event remains unchanged from previous years. Provision of a checklist (dupe sheet) is a request this year, rather than a requirement, but it is hoped that entrants will comply, and thus ease the burden on the adjudicator. Entrants are particularly asked to use standard (A4) size log sheets, with 40 QSOs per page. UK scores count 20x towards the HF Contests Championship.

**2. Eligible entrants:** Overseas (including EI) — all licensed amateurs, British Isles — Class A licence holders, who must be members of RSGB. Single-operator entries only will be accepted.

**3. When:** 0700 to 1900GMT. Sunday 15 October 1989.

#### 4. Sections:

- (a) British Isles
  - (b) Overseas (including EI)
  - (c) British Isles QRP
  - (d) Overseas (including EI)
- QRP stations may use 10W RF OUTPUT or less.

**5. Frequency/Mode:** 21MHz CW only. Entrants are requested not to operate in the band 21.075-21.125MHz.

**6. Contact Exchange:** RST and serial number, commencing with 001. No points will be lost if a serial number cannot be obtained from a non-competing station,

but any contest exchange sent by that station should be logged.

#### 7. Scoring:

(a) British Isles stations. Each completed contact with an overseas station will count three points. The final score is the total of points scored multiplied by the number of countries worked. The ARRL Countries List will apply, with the exception that VO1, VO2, and VE, VK, ZL, JA and USA numerical call areas. Irrespective of prefix, will all count as separate multipliers. Contacts with stations in the British Isles (excluding EI) will not count for points or multipliers.

(b) Overseas stations. Work only British Isles (excluding EI) stations. Each completed contact will score three points. The final score is the number of points scored multiplied by the number of different prefixes worked. British Isles prefixes are: G0, G2, G3, G4, G5, G6, G8, GD0, GD2, GD3, GD4, GD5, GD6, GD8, G10, G12, G13, G14, G15, G16, G18, GJ0, GJ2, QJ3, QJ4, GJ5, GJ6, GM0, GM2, GM3, GM4, GM5, GM6, GU0, GU2, GU3, GU4, GU5, GU6, GU8, GW0, GW2, GW3, GW4, GW6, GW8. Contacts with stations using the special GB prefix will not count for points or multipliers.

**8. Logs:** Entries should be typed or written in ink on one side only of standard (A4) size paper or pre-printed log sheets, and should contain 40 QSOs per page. Columns to be headed: Time gmt; callsign of station worked; RST and serial number sent; RST and serial number received; multiplier (if new); points claimed.

Duplicate contacts must be clearly marked and not claimed will result in the deduction of 33 points. Entries containing more than five such duplicates will be liable to disqualification.

Each entry must be accompanied by a cover sheet (HFC2 or equivalent) indicating the section entered and power used, as well as the usual details of equipment and serials. Also don't forget the operator's name and address and LIST of the multipliers worked.

Entrants making more than 80 QSOs are requested to include a check-list of the callsigns appearing in the log, sorted into alphabetical order and with either the serial number sent or the time of contact beside the callsign.

**9. Declaration:** Each entry must be accompanied by the following declaration, signed and dated: "I declare that this station was operated strictly in accordance with the rules and spirit of the contest, and I agree that the decision of the Council of the RSGB will be final in all cases of dispute."

**10. Address for logs:** RSGB HF Contests Committee, c/o 6 V Knowles G3UFY, 77 Bannham Manor Road, Thornton Heath, Surrey, CR4 7AF, England.

**11. Closing Date for logs:** British Isles entrants, 25th November 1989; Overseas entrants, 30th December 1989.

**12. Awards:** The leading British Isles station will be awarded the T E Wilson GBVQ Trophy, and will also receive RSGB publications to the value of £10. Certificates of merit will be awarded to the second and third-placed British Isles stations, and to the leading three overseas entrants. Additional certificates may be awarded (at the discretion of the HF Contests Committee) to the leading stations from each overseas country.

### RECEIVING SECTION

Rules as for the transmitting section except where specified below.

#### 2. Eligible entrants:

- (a) British Isles — RSGB members only
  - (b) Overseas — all SWLs
- Holders of transmitting licences for frequencies only above 30MHz may enter the receiving section.

**7. Scoring:** British Isles SWLs should log only overseas stations in contact with British Isles stations participating in the contest. Overseas SWLs should log only British Isles stations in contact with overseas stations participating in the contest. Scoring and multiplier as for the transmitting section.

**11. Logs:** Columns to be headed: time gmt; callsign of station heard, report and serial number sent by that station; callsign of station being worked; multiplier; points claimed.

**NOTE:** In the column headed 'station being worked' the same callsign may only appear once in every three contacts except when the logged station counts as a new multiplier.

Each entry should be accompanied by the following declaration, signed and dated: "I declare that the station was operated strictly in accordance with the rules and spirit of the contest and I agree that the decision of the Council of the RSGB shall be final in all cases of dispute. I do not hold a transmitting licence for frequencies below 30MHz."

**12. Awards:** Certificates of merit will be awarded at the discretion of the HF Contests Committee to be the leading three entrants from the British Isles, and to the leading entrant from each overseas country.

### RULE 16

Since its inception there has been a lot of controversy and concern about the new variation on Rule 16. The reason for including it was, quite simply, to prevent anyone cheating during contests. The main problem appears to focus on the RSGB's VHF Contest Committee applying limitations on various types of equipment that can be used by Amateurs, in this instance decided by final output device dissipation limits.

Where normal contests are concerned (not low-power) should the licence conditions currently laid down by the DTI apply were are not concerned with the type of output device is used, provided the signal produced is clean and does not exceed DTI licence limits.

With regard to low-power contests and the restricted section of VHF Field Day, any final amplifying device/s capable of delivering more than twice the stipulated power limit for that contest is disqualified.

In the case of Open contests any amplifying device(s) capable of more than 1kw output must be registered beforehand (notification to arrive at least 7 days before the contest) with the adjudicator of that contest. Details of how power output is to be reduced must be given. Use of Variacs in this instance is not allowed (variacs can easily be moved once the inspector has gone). Modifications must be of a semi-permanent nature, not just a switch, variable control or variation of drive level.

In the low power or restricted section of VHF Field Day any amplifying device(s) which do not comply with the rules as stated above, and are capable of more than twice the contest power limit must also be registered and modified as above.

Any Station using equipment capable of more than the limits previously mentioned and which does not register will be disqualified automatically. Also, any Station inspected and found to be running excessive power, or running registered equipment which has been reset to run higher power than that registered, will be disqualified immediately and will not be allowed to enter any contest governed by the VHF Contest Committee for a period of 1 (one) year in the first instance, and permanently for any subsequent instance. Station means

all operators of that station.

All we are asking is for all groups to abide by their licence conditions (high power licences are not allowed in any contest), and to abide by the contest power limits.

## RESULTS

### 1988 432 MHz CUMULATIVE CONTEST RESULTS

This year there was an increase in the number of new callsigns seen, however, some of the regulars were noticeable by their absence. The committee is always open to suggestions to increase the level of activity and the number of entries. Would county multipliers improve things?

The logs received were of a reasonable standard, with the majority of points being lost due to minor logging errors. Conditions were described as poor, with only session 3 classified as above average.

Congratulations to the Wirral & District ARC (GW4MGR/P) and John Pilgals (G8HHI) for coming top in their respective sections. They will receive certificates, along with the runner-up G61AT.

GM8MJV

### OXFORD DF QUALIFYING ROUND — REPORT

The first Qualifying Round for the RSGB Direction Finding Final and Trophy was held on Sunday 23 April 1989 and organised by the Oxford and District Amateur Radio Society. Following an unfortunate and severe hic-cup, due to lack of details appearing in *RadCom*, 21 teams did eventually assemble at the Lechlade start.

Good signals were received from both transmitters, complaints that one station's signals were too strong was ignored! A quick check by the organiser amongst the competitors before the 'off' showed that the bearings were very well taken and plotted, obviously a 'good' start location.

Station 'A', G3UJO/P Peter, was quite clearly going to be amongst the myriad of lakes below South Cerney ten miles to the west and probably in his wet suit up to his neck in water, or so it was generally thought. In fact Peter was hidden in a small bush beside a stream next to a disused and 'nearly empty' canal beside another stream close to the River Churn, all a bit complex and further from the obvious waters than expected.

With the usual dearth of cover at this time of year Alan Simmonds did not find Peter too difficult to locate at 14.09 followed soon after by a deluge of wet footed competitors all fighting to get their form timed and signed such that the control log did not get completed. The last to find Peter was at 16.28 and 50 secs — just inside the time limit!

Station 'B', G4MDF/P was manned by Brian G3NMC and Paul who were hidden in one of the very 'Open' woods just to the West of Bruern Abbey on the North East part of the map and some 14 miles from the start. The proper access to the wood was very wet and muddy and difficult to avoid. Only two competitors chose to locate this station first, this was clearly a mistake as one competitor took over an hour to find the transmitter and then had a considerable distance to travel back to the other transmitter; in fact many others joined him in the search for 'B' after finding the 'A' transmitter!



# CONTEST NEWS

## OXFORD DF — RESULTS

Pos	Name	Club	Time of arrival	Stat. 'A'	Stat. 'B'
1	G. Whenham	Coventry	14.21.16	15.22.21	
2	B. Poole	Mid-Thames	14.31.15	15.23.15	
3	T. Gage	Mid-Thames	14.17.56	15.23.30	
4	G. Foster	Stratford	14.12.32	15.23.40	
5	I. Butson	Colchester	14.20.25	15.23.50	
6	P. Lisle	Mid-Thames	14.19.36	15.23.52	
7	W. Pechey	Mid-Thames	14.21.25	15.24.00	
8	R. Brooks	Chelmsford	14.22.28	15.25.20	
9	P. Larbalestier	Devizes	14.15.00	15.25.37	
10	B. Bristow	Mid-Thames	14.15.54	15.26.00	
11	A. Williams	Colchester	14.18.57	15.26.22	
12	A. Simmonds	Mid-Thames	14.09.00	15.26.50	
13	C. Plummer	Mid-Thames	14.18.05	15.28.05	
14	G. Nicholls	Banbury	14.20.22	15.50.00	
15	G. Metcalfe	Mid-Thames	14.17.59	15.52.00	
16	M. Mallinson	RSGB	14.23.20	16.03.53	
17	A. Collet	Dartford Heath	15.22.07	16.16.34	
18	D. Newman	Northampton	16.28.50	15.25.00	
19	K. Chan	South Manchester	—	15.23.00	
20	P. Cunningham	RSGB	—	15.26.40	
21	M. Standen	Mid-Thames	—	16.15.00	

B Poole and T Gage qualify for the National Final in September 1989.

The aerial at the 'B' station was of 32swg wire and not easy to see being fiendishly wound about up in the branches of the trees and amongst the bushes causing some horrible effects and floundering about to occur. The last to find station 'B' at 16.16 was the reigning National Champion!

The overall winner was George Whenham who found his second transmitter, station 'B', at 15.22 and 21 secs and was presented at tea with the prize of a fire extinguisher to

reduce the heat produced by his fast speed. Unfortunately for George he is organising the National Final in September thus the next two competitors qualify for the Final, they are Bernard Poole and Trevor Gage — there were no shouts of 'Fiddle'!

After a good competition, which was not marred by weather conditions, tea was once again taken at the 'Rock of Gibraltar'.

G3JLE

## MARCH 144/432 MHz CONTEST REPORT

This year the weather was a little kinder, except in IO87 where it was a touch windy! Sheppy Western complained of snow preventing them getting over 2000 feet, not stamina these lads!

Conditions were reasonable with some good DX on both 144 and 432. Many stations worked HB9 on 432, most found conditions better on Sunday. Activity about the same as last year. There were about 475 stations active on 432 and 2500 on 144, so there are plenty of stations to work even for the big groups (who think they work everybody).

Logging has improved, but it appears that some stations push their luck a bit and invent some of the information. Some errors which appear from one contest to another are becoming apparent in some

leading stations databases, perhaps you should listen to the radio and not rely on your computer all the time! Remember garbage-in garbage-out.

Comments on log sheets are appreciated, a few are shown for your enjoyment:

G6UJJ — I heard DF6KV at 11:05 but he couldn't hear me. Sounds familiar.

Alford CG — Mast tied to caravan and Land Rover. Caravan almost blew away. Couldn't hold a cup of coffee without spilling at height of gale. Try a flask and a straw.

Malvern ARC — Rumour has it that at least one Italian station was on the band. No, it was just normal contest splatter!

Certificates and congratulations to the leading 2 stations in each section.

Adjudicator G4JLG, notes and comments G4DEZ.

## MARCH 144/432 MHz 1989 CONTEST RESULTS

144 MHz SWL Section						
Pos	Station	Pts	QSO's	Loc	Ant	Km
1	RS28198	435	71	00HX	1x10P	435

432 MHz SWL Section						
Pos	Station	Pts	QSO's	Loc	Ant	Km
1	RS28198	61	9	00HX	1x46MB	310

Listener Section — Overall Results				
Pos	RS No.	144 MHz	432 MHz	
1	28198	1000	1000	

Check logs: G4NBS, G1MZD, G1DWIP, G8ZRE, G2FWX, G4CI.

144 MHz Single Operator Section						
Pos	Callsign	Pts	QSO's	Loc	Ant	Km
1	G4PIQ	4863	505	01MU	2x250B	739
2	G0CLP/P	2430	313	84KD	50w	721
3	G0HAX/P	1624	254	01EI	50w	666
4	G4DFI	535	71	01BL	1x350	498
5	G4ZTR	402	50	01LV	25w	607
6	G1WIS	399	48	91WG	100w	510
7	G6FQZ	314	49	91JR	25w	595
8	G3JJZ	305	48	01AJ	25w	431
9	G6UJJ	174	19	94FV	100w	475
10	G4BZP/P	105	22	84KF	2.5w	433

## 432 MHz Single Operator Section

Pos	Callsign	Pts	QSO's	Loc	Amp	Ant	Best DX	Km
1	G4ZTR	302	33	01LV	25w	1x19Y	F6ILR/P	548
2	G0DLP/P	252	41	84KD	10w	1x48M	G4YPC/P	426
3	G4PIO	243	25	01MU	15w	1x21Y	DK0JJ	427
4	G3JJZ	157	21	01AJ	25w	1x19Y	HB9MIN/P	699
5	G6FQZ	104	20	91JR	100w	1x19Y	PE1MAR/P	367
6	G4DFI	103	18	01BL	90w	1x19Y	G4GCM/P	375
7=	G0HAX/P	82	22	01EI	40w	1x19Y	G6HYR/P	325
7=	G1WIS	82	10	91WB	10w	1x18P	HB9MIN/F	699
9	G6UJJ	11	3	94FV	10w	1x19Y	G1HIT	197
10	G4BZP/P	7	3	84KF	1w	1x9Y	G1SWH	77

## Single Operator Section — Overall Results

Pos	Callsign	144	432	Total
1	G4PIQ	1000	804	1804
2	G0DLP/P	500	834	1334
3	G4ZTR	83	1000	1083
4	G3JJZ	63	520	583
5	G0HAX/P	210	271	481
6	G4DFI	110	341	451
7	G6FQZ	65	344	409
8	G1WIS	82	271	353
9	G6UJJ	36	36	72
10	G4BZP/P	22	23	45

## 144 MHz Multi-Operator Section

Pos	Callsign	Pts	QSO's	Loc	Amp	Ant	Best DX	Km
1	G4APA/P	8664	711	94RJ	2x350	8x9Y	FC1MJC	866
2	G8LNC/P	7450	750	90MX	2x250B	4x19Y	DB2RR	904
3	G4RKP/P	6140	592	0101	2x250B	2x17Y	DL5MAM	838
4	GW8TFI/P	4955	568	82JG	2x250B	2x9Y	HB9CNY/P	994
5	G4HGU/P	4831	473	81CC	2x250B	4x11Y	F6CVO	1061
6	G0KYW/P	4411	550	81UC	150w	20EL	HB9CXX/P	923
7	G4SIV	4361	420	92TR	'800A7	5x16Y	DK5WN/P	918
8	G3GQC/P	4257	577	93EC	100w	4x14P	F6BUL	975
9	G4ERG/P	3170	373	94PH	2x250B	1x16Y	DF9OT	666
10	G4UHI/P	3136	382	84VB	2x250B	2x9Y	F6ILR/P	858
11	G4RFR/P	2198	300	80WP	2x250B	2x17Y	DF8CO	776
12	G4NOK	1891	273	93FR	1x250B	4x14Y	DF3KV/P	641
13	GM0FRT	1743	118	87WB	6NZ	1x19Y	ON4ASL	790
14	G4MHC/P	1716	225	82LB	2x250B	2x17Y	DK0JJ	708
15	G4VER/P	1607	328	91SR	180w	4x14Y	F6IPX	922
16	G0KLA/P	1580	287	90HW	100w	1x15Y	FC1ADT	709
17	G4DSP	1537	226	92WS	2x250B	1x10Y	F6EKG/P	689
18	G1KAR/P	1035	134	00DR	1x250B	1x17Y	HB9CNY/P	698
19	GJ6CSY/P	553	50	89WF	25w	1x13Y	G4APA/P	585
20	GM6VUL/P	514	35	87RC	200w	1x14Y	PE0MAR/P	712

## 432 MHz Multi-Operator Section

Pos	Callsign	Pts	QSO's	Loc	Amp	Ant	Best DX	Km
1	G4JKN/P	2686	225	81CC	2x250B	4x28Y	HB9DDO	1005
2	GW0FRE/P	2658	236	82JG	1x250B	4x19Y	HB9ASB	969
3	G4BVY/P	2515	228	82LB	2x250B	4x21Y	HB9DDO	1005
4	G4GCM/P	2164	174	94RJ	2x250B	4x21Y	DL0ZNP	838
5	G0FRR/P	1990	201	80WP	2x250B	4x24QL	HB9MIN/P	781
6	G8ZHP	1896	191	92TR	'800A7	6x21Y	F6ICC/P	827
7	G4YPC/P	1482	153	0101	1x250B	4x19Y	HB9MO/P	682
8	G8NEH/P	1156	176	90MX	2x250B	4x17Y	HB9MIN/P	728
9	G1GOC/P	933	142	93EC	50w	2x18P	HB9MIN/P	908
10	G6HYR/P	547	92	93FR	1x250B	4x21Y	GM4ZUK	373
11	G3ZXX/P	430	61	81UC	25w	1x14Y	HB9AGE	803
12	G6VWG/P	313	49	84VB	60w	1x17Y	PE0MAR/P	483
13	G1ZOV/P	276	54	90HW	10w	1x46MB	HB9AGE	741
14	G4TAW/P	262	26	89WF	80w	1x10Y	G4GCM/P	585
15	G3WQK/P	194	18	00DR	10w	1x23Y	HB9MIN/P	640
16	G8VER/P	192	54	91SR	50w	1x48MB	PE0MAR/P	315
17	G8FEK/P	177	25	94PH	35w	1x19Y	G0FRR/P	418
18=	G1DSP	72	30	92WS	50w	1x88MB	PE0MAR/P	302
18=	GM4ZUK	72	6	87WB	15w	2x21Y	G4JKN/P	670
20	GM6WTT/P	8	4	87RC	10w	1x88MB	GM6GCY	71

## Multi-Operator Section — Overall Results

Pos	Group	144	432	Total
1	The Hillbillies	1000	806	1806
2	Sheppey Western CG	559	989	1548
3	Exmoor RC	545	1000	1545
4	Victory CG	840	430	1270
5	Coastguard CH	693	552	1245
6	Five Bells Group	492	709	1201
7	Malvern Hills CG	194	936	1130
8	Flight Refuelling ARS	248	741	989
9	Mansfield ARS CG	480	347	827
10	Three Counties CG	498	163	661
11	Wyre VHF Group	354	117	571
12	B.C.D.	358	66	424
13	N. Wakefield RC	213	204	417
14	Southampton Un.KMI CG	178	103	281
15	Verulam ARC	181	71	252
16	Aberdeen VHF Group	197	27	224
17	Spalding & Dist. ARS	174	27	201
18	Southdown ARS	117	72	189
19	Les Platons CG	62	98	160
20	Alford CG	58	3	61

## 50 MHz FIXED STATION CONTEST REPORT

This contest again reflects the interest currently shown in this band, with a higher level of activity and resultant increase in the number of contacts made and scores claimed, despite poorer conditions this year.

This must have been the first weekend not to provide any DX was how one contestant summed up conditions, there was a short opening to 9H25CG (60KPW) and the ZS beacon was heard (G4GDY). Several stations in 1091 found that they could not break out of the local activity, loud local signals masking the more distant, weaker signals. Those further away from centres of activity found it hard going. Most contestants commented on how much they enjoyed themselves, due to the friendliness of the other participants.

It would seem that contests on Six metres might need a different approach to the tactics used on other VHF bands, it obviously pays to tune around in order to find the DX because it will not come to you. Those operators remote from centres of activity will need to remember not to operate near the calling frequencies since their signals will be swamped by the large number of strong signals in the built-up areas.

A few comments were received as to the length of the contest, the view dependent upon the location of the station. There were a few comments also regarding the 25 point limit per QSO, both for and against.

The paperwork generally was better than last years, but not everybody marked their multipliers. Read rule 14 carefully, mark multipliers on the log and the check sheet and also include second choice multiplier in case the first QSO was invalid for any reason.

Congratulations to G3XBY for repeating his success in winning the Single Operator section again, also to G4BLX the Multi-operator section winner and to G0ERS and G6APZ the respective runners up.

G4NBS

## LOW POWER CONTEST RESULTS

This year the date of the contest clashed with the VHF Convention, but in spite of this, I am delighted to say that, following recent trends, the number of entries has increased. It is also good to see the overseas entries once again in the listings.

Section 'A' entries are so low now, that I will be suggesting to the HFCC that there is a section re-think. Should there only be one section? Perhaps two sections, 3 watts and 1 watt? If you have any ideas and you are a keen QRPer drop me a line, QTHR.

G5LP, G4UOL and G4CZB could not comply with rule 8 but nevertheless took time to send in their logs as 'checklogs'; this is always helpful. The standard of log keeping was good, G3JKS and G4ARI having perfect logs. Equipment used by leading stations ranged from TS120V through Sugiyama F850 to completely home made. Dipoles and G5RVs were mainly used.

As can be seen from the number of QSOs on 3.5MHz the band was in poor shape but luckily 7.0MHz more than made up for it. Comments from entrants:- DJ6FO "Please keep the contest going". G6NA had an enjoyable time in the contest with only his BC108CO/BC108PA and DC RX with dipole "just like old times". Irwin LA3CG heard no signals on 3.5MHz and suffered from ORM on 7.0MHz so went cross country skiing instead! On the subject of ORM, Chas,

## 50 MHz FIXED STATION CONTEST

Multi-Operator Section						
Pos	Callsign	Pts	QSO's	Mult	Cty	Km
1	G4BLX	57387	209	47	SXE	PA0ERA 535
2	G6APZ	49049	198	49	DYS	G1SDX/P 372
3	G4RFR	30184	110	44	DOR	G1GEY 463
4	G0KPW	29298	114	38	SFK	9H25CG >2100
5	G8APB	25198	149	43	SFD	E19Q 349
6	G4KFP	20239	146	37	YSW	G6MXL 320
7	G4SSD	11430	60	30	DVN	G4LOJ 412
8	G6FQZ	8490	91	30	OFE	G1SDX/P 293
9	G3NTS	6325	105	25	LDN	G1GEY 389
10	G1CSR	442	147	—	LDN	G1SDX/P 351
11	G6LCS	124	51	—	CHS	G4BLX 318

Single-Operator Section						
Posn	Callsign	Pts	QSO's	Mult	Cty	Kms
1	G3XBY	57640	209	55	WKS	PA0ERA 572
2	G0ERS	54567	193	47	HPH	G1GEY 455
3	G4AHN	48118	203	49	SRY	G1OWP 410
4	G6HKM	19764	120	36	ESX	G1SDX/P 400
5	G1GEY	16124	67	29	TWR	G4RFR 463
6	GW6ZUQ	15200	116	32	GWT	G4LOJ 296
7	G4GDY	13960	86	40	WKS	G1SDX/P 324
8	G8HHI	12177	112	33	HPH	G1GEY 407
9	G0CCH	10664	101	31	WKS	G1GEY 305
10	G8FUO	10230	83	31	BRK	G1GEY 389
11	G8BFL	9966	96	33	SFD	G1YTS 370
12	G4UDE	9475	60	25	SPE	G0FIG 292
13	G1OGY	8829	72	27	ESX	G4SSD 322
14	G1KDF	8352	55	32	LNH	G4BLX 358
15	G1PBU	7168	91	28	SRY	G4KFP 277
16	G4XCS	6500	63	25	HWR	G0KPW 267
17	G0HVQ	5460	54	26	GLR	G1GEY 351
18	G1YNR	5320	67	20	HBS	G0ERS 302
19	G3AEZ	4715	70	23	SRY	PA0HIP 355
20	GW3XJQ	3654	25	18	DFD	G4BLX 321
21	G8JXV	3420	68	20	SRY	G1SDX/P 336
22	G4LDR	3322	42	22	WLT	G4KFP 287
23	G4TMI	3102	51	22	HPH	G6APZ 264
24	G3UAX	2700	47	20	BRK	G4KFP 259
25	G8PYP	2679	37	19	DOR	G4LOJ 304
26	G0LAM	1998	62	18	SRY	G4KUX 364
27	G4HUP	1254	31	6	SFK	PA0ERA 383
28	G1EHF	1056	40	16	BRK	G4UDE 228
29	G0LCS	923	37	13	HFD	G6APZ 194
30	G1SMD	477	27	9	DOR	G3XBY 172
31	G3TKF	135	52	—	AVN	E19Q 316
32	G1IMS	119	49	—	HFD	G4UDE 242
33	GM4XQJ	112	8	8	CTR	GM4JEJ 96

Check logs gratefully received from G3ILO and G4GBH.

## LOW POWER CONTEST RESULTS SECTION A

Posn	Call	Pwr	Actual points	3.5MHz		7MHz	
				QSOs	Pts claimed	QSOs	Pts claimed
1	DJ2XP*	9	773	—	—	65	805
2	G0FNO*	10	558	38	560	—	—

## SECTION B

Posn	Call	Pwr	Actual points	3.5MHz		7MHz	
				QSOs	Pts claimed	QSOs	Pts claimed
1	G3JKS†	3	1300	30	440	62	860
2	G4CFS*	3	1201	34	500	47	705
3	G4ARI*	3	1150	35	485	49	665
4	G3WYI	3	1144	26	390	52	760
5	G3VIP/P	3	1043	23	345	50	700
6	G3VTT	3	1008	14	210	60	800
7	G4ECI	3	993	19	285	52	725
8	G0IVZ	3	895	4	60	57	835
9	G4SXE	3	856	21	305	39	555
10	G3CQR	3	819	17	255	40	570
10	G4GLC	3	819	14	210	42	630
12	G4OGB	3	810	16	240	41	585
13	G2HLLU	3	755	20	300	31	455
14	G0IDE	3	733	12	180	37	555
15	G3BPM	3	716	13	195	38	565
16	G8QM	2	673	15	225	30	450
17	G4KLO	2	618	18	270	25	365
18	G3AWR	3	523	1	15	34	510
19	G4ZME	3	521	12	180	24	360
20	DJ6FO	3	420	8	120	21	315
21	GM4OSS	3	400	9	135	19	265
22	G3LHJ	1/3	371	3	45	22	330
23	GW3SB	2	348	10	150	14	200
24	G6NA	50mW	236	—	—	16	240
25	LA3CG	3	90	—	—	6	90

\*Certificates †1930 committee cup

GW3SB, said "The highlight of the event was hearing someone calling (on a keyer which he couldn't use) CQ QRM test!" He went on "I agreed with him but was not sure this was what he intended." Colin G3VTT

commented on the number of ORPers who suffered from poor direct conversion receivers. On the whole it was felt that the contest was an enjoyable and relaxed event.

G4JKS

## CONTESTS CALENDAR

### RSGB HF CONTESTS

8,9 Jul	SWL (May89)
16 Jul	Low Power Field Day (May89)
16 Jul	DF Qualifying Event 5 (Salisbury)
30 Jul	DF Qualifying Event 6 (Grimsby)
Aug	432MHz Activity Contest (Jul89)
6 Aug	Ropoco 2 (Jul89)
20 Aug	DF Qualifying Event 7 (Dartford Heath)
Sep	1296MHz Activity Contest (Jul89)
23 Sep	SSB Field Day (Jul89)
10 Sep	DF Qualifying Event 8 (Chelmsford/Colchester)
24 Sep	DF National Final (Coventry)
8 Oct	21/28MHz Phone (Jul89)
9 Oct	28MHz Cumulative
15 Oct	21MHz CW
17 Oct	28MHz Cumulative
25 Oct	28MHz Cumulative
28 Oct	Mollart Memorial Triple DF Night (Mid-Thames)
2 Nov	28MHz Cumulative
10 Nov	28MHz Cumulative
11 Nov	Club Calls Contest 'CCC' [nd] all modes & SWL (Sep89)
18,19 Nov	Second 1-8 MHz CW (Sep89)

### RSGB VHF CONTESTS

1,2 Jul	VHF NFD (Apr89)
8 Jul	24GHz Cumulative (Mar89)
16 Jul	10GHz Cumulative (Mar89)
5 Aug	144MHz Low Power (May89) & SWL (Jun89)
6 Aug	432MHz Low Power & SWL (Apr89)
13 Aug	10GHz Cumulative (Mar89)
23 Sep	144MHz Trophy/IARU VHF & SWL
9 Sep	24GHz Cumulative (Mar89)
10 Sep	10GHz Cumulative
17 Sep	70MHz Trophy & SWL
7,8 Oct	432MHz-24GHz/IARU UHF/SHF
13 Oct	432MHz Cumulative
21 Oct	1-3/2-3GHz Cumulative
29 Oct	432MHz Cumulative
4,5 Nov	144MHz CW
6 Nov	1-3/2-3GHz Cumulative
14 Nov	432MHz Cumulative
22 Nov	1-3/2-3GHz Cumulative
30 Nov	432MHz Cumulative
3 Dec	144MHz Fixed & AFS & SWL
8 Dec	1-3/2-3GHz Cumulative
9 Dec	50MHz CW
10 Dec	70MHz CW

### OTHER CONTESTS

1,2 Jul	Venezuelan Independence Day Contest (Jun89)
15,16 Jul	Seantet 89 Contest (CW) (Jun89)
29,30 Jul	Venezuelan Independence Day Contest (Jun89)
19,20 Aug	Seantet 89 Contest (Phone) (Jun89)
26,27 Aug	All Asian Contest (Jun89)

**First Tuesday each month** 144MHz Scandinavian VHF/UHF/SHF Activity Contest (Jan89 VHF/UHF)  
**First Thursday each month** 432MHz Scandinavian VHF/UHF/SHF Activity Contest (Jan89 VHF/UHF)  
**First Monday each month** Microwave Scandinavian VHF/UHF/SHF Activity Contest (Jan89 VHF/UHF)

Dates of publication of rules in RadCom are shown in parentheses

# ARROW ELECTRONICS LTD

HEAD OFFICE 5 The Street, Hatfield Peverel

(Nr Chelmsford) Essex

Tel: 0245 381626

0245 381673

0836 739577

FAX:

Hours: 9-5 Mon-Sat. Closed Thursday

## GLASGOW SHOWROOMS

Unit 17, Six Harmony Row,

Govan, Glasgow G51 3BA

Tel: 041 445 3060

8.30-5.30 Mon-Fri. Late nite Thurs 7pm

## THE BEST DEAL IN AMATEUR RADIO

ALL MAJOR BRANDS AT DISCOUNT PRICES\*

AVAILABLE NATIONWIDE - CALL ANY NUMBER FOR FAST EFFICIENT SERVICE.

## NORTH WALES

John Lewis,

Tel: Anglesey

0248 714657

(Latest 8.30pm)

## WIGAN

Jim Cook,

Tel: 0942

713405 (day)

## LEICESTER

Dave Foster,

Tel: 0533 608189

(Latest 8.30pm)

## BEST SCANNER RANGE IN UK!

Yes the most comprehensive range of Scanners and Specialist airband receivers both handheld, mobile and Homebased with books, aerials, accessories.

Send SAE for our "AIRSHOP" list...

Send SAE for our 'COMPUTARIG' listings of used equipment available nationwide. We will sell your unwanted rig 10% commission.

ACCESS - VISA - CREDIT SALES (HP) - PROMPT MAIL ORDER



# PACKET RADIO FROM THE EXPERTS

AMDAT is now in its fourth year of supplying and supporting Packet Radio equipment. Before you buy packet equipment from someone else ask if they can provide the radio and computer leads with the software necessary for your computer. When they look at you blankly put the TNC back and give AMDAT a ring. Come to the specialists for your TNC and accessories.

## PACKET TNCs

TINY 2 + with mailbox

£119

KPC2 HF/VHF + WEFAX

£159

KPC4 DUAL PORT

£225

## MULTI MODES

MFJ 1278 9 modes

£229

TX/RX of FAX + SSTV inc mailbox

£265

KAM with mailbox

inc KA-NODE

## ACCESSORIES

We stock leads to connect the TNCs to most radios and computers. Software available for many computers.

## PC TNCs

DRSI Type 1 VHF+HF

£129

HF MODEM for above

£79

G3RUH MODEM for above

£95

DRSI Type 2 Dual VHF

£159

DRSI cards are shipped with all software needed inc split screen user software, G8BPQ The Node software and AA4RE BBS.

## BBC EPROM

AMFAX eeprom

£19.95

Terminal + FAX on screen

Prices inc VAT, p+p extra

# AMDAT

Crofters, Harry Stoke Road

Stoke Gifford,

Bristol BS12 6QH

(0272) 699352/559398

CREDIT AVAILABLE



0272  
557732  
BRISTOL

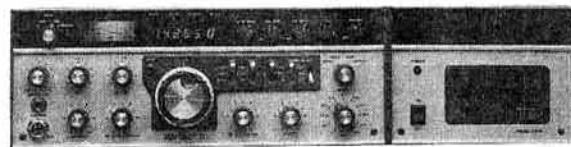
GIDFK  
G2BAR

Radio Communications

Amateur P.M.R. Marine

# UPPINGTON

HAM RADIO SUPPLIES + TEN-TEC + YAESU



TEN-TEC CORSAIR II

£1200.00 inc. carr.

TEN-TEC POWER SUPPLY

& SPEAKER

£215.00 inc. carr.

## CONTINENTAL SERVICE FOR EEC COUNTRIES

### Cushcraft

AS-3SS 3 Element Beam

£299.00

AS-4 Element Tribander Beam

£353.35

19-3CD 3 Element 10m Monobander

£115.00

15-3CD 3 Element 15m Monobander

£139.70

20-3CD 3 Element 20m Monobander

£238.21

### Butternut

HF6VX 6 Band Vertical Antenna

£159.00

HF2V 80/40 meter Vertical

£142.00

A 182HF6V 1712m Add on kit

£30.39

20MRK HF2V 20m Kit

£33.39

MFJ 962B 1.5 kW Versatuner

£241.00

MFJ 949C 300W Versatuner

£157.00

MFJ 300 Watt Basic ATU

£105.00

MFJ 1601 Random Wire Tuner

£42.00

MFJ300 watt dummy load

£28.35

MFJRF Noise Bridge

£63.10

MFJ 815 2KW Cross needle SWR/Power meter

£7.32

### THE G5RV

DIPLOLE

1/2 SIZE

40-10 MTRS

£14.50

+ £2.50 P&P

FULL SIZE

80-10 MTRS

£16.50

+ £2.50 P&P

ZL SPECIAL

2M

ANTENNAS

12el.....£38.00

7el.....£14.50

5el.....£10.50

p&p £3.50

p&p £3.00

p&p £3.00

CARRIAGE

### 2 Element Beams

70 cms £4.95 P&P 3.00

2 mtrs £5.25 P&P 3.00

4 mtrs £12.95 P&P 3.00

6 mtrs £14.95 P&P 3.50

10 mtrs £39.95 P&P 4.00

### Antenna Rotators

G-400HC £169.00

AR50 £149.00

CD45 £219.00

G-600RC £219.00

G-2000 £445.00

G-400 £149.95

G-500 £149.95

## GAMMA MATCHED

3 ELEMENT HF YAGIS

10 MTR £95.00

15 MTR £125.00

20 MTR £155.00

TEL: (0272) 557732 12-14 PENNYWELL RD, BRISTOL BS5 0TJ

# For the First Time! PC/SAT Weather-Satellite Receiving on PC/AT



## HARDWARE

- Antenna for 1.7 GHz
- Low-noise Preamplifier for 1.7 GHz
- Converter/Receiver for RF translation and demodulation of the satellite's signal
- PC/SAT Interface slots into a free AT/XT expansion-slot
- PC/AT or compatible

## User-friendly SOFTWARE

- Automatic reception
- Reception schedule
- 3 picture presentation formats
- Zoom/Histogram
- Up to 50 selectable colour-tables
- Time-lapse/Movie



UKW-Technik  
T. Bittan GmbH  
P.O. Box 80, Jahnstraße 14  
D-8523 Baierdorf  
Fed. Rep. of Germany  
Tel. (49) 91 33-47 15  
Tlx. (49) 91 33-47 18  
Tx. 6 29 887 ukwdo d

Ask for a Demo-program with satellite pictures (DM 20.-) together with further information. Cash or check with order.



# GAREX THE SCANNER SPECIALISTS

## POPULAR SCANNERS

AOR900UK inc UHF Airband	£235
BJ200 MkIII wide coverage	£199
Cobra 925 Economy Base	£149
Uniden 200XL inc 900MHz	£249
Uniden 50XL FM handy	£99

## REVCO RS-3000

### THE COMPACT SCANNER

- Size only 6" x 2" x 8"
- Covers: 26-32MHz, 60-90MHz, 118-180MHz, 380-512MHz
- AM & FM all bands
- Liquid crystal display
- 50 memories
- Scan, search, priority



£225

## JIL SX-200N

### THE SUPERIOR SCANNER

- The choice of the professionals
- Proven reliability
- Covers: 26-88MHz, 108-180MHz, 380-514MHz
- AM & NFM on all bands
- Positive action keyboard
- 16 memories
- 12V dc & 240V ac



£325

## AOR 2002

- Covers: 25-550MHz, 800MHz-1.3GHz
- AM & NFM & WFM on all bands
- Computer interface socket
- 20 memories
- Compact size
- 12V dc operation
- Up/down step control knob



£487

## AOR 800E

### THE SMALLER HANDY-SCANNER

- Covers: 75-106MHz, 118-175MHz, 406-496MHz, 830-950MHz
- AM & NFM programmable on all bands
- Full scan & search functions are available
- 20 memories
- Measures only 2.5" x 5.5" x 2"
- Nicads, charger & BNC whip antenna included in the price



£199

## NEW IMPROVED REVCO

The British made REVCO already renowned throughout the world has now been improved with a new exclusive feature: The addition of a vertical element to a discone has been shown to improve the performance on a selected band.

Now the REVCO offers YOU the choice of band

All new REVCOs supplied by us now incorporate a mounting stud for an optional vertical whip for the band of YOUR choice. Whips may be chosen for any frequency from 27 to 950MHz from the standard REVCO range:

Basic REVCO, excellent value at	£35.95
REVCO with N-type socket	£37.95
Add-on whips from	£3.90 to £10.75

Remember this British product carries no overseas freight or import duty!

## BROADBAND PREAMPLIFIERS

REVCO PA3 inline masthead model, with special mains psu 20MHz-1GHz min 13dB gain £49.95  
PA3i instrument of back-of-the-set version for 12V DC operation. BNC connectors (SO239 or N-type options) £35.50



## GAREX ELECTRONICS

MAIN DISTRIBUTOR OF REVCO PRODUCTS. PRICES INCLUDE UK P&P and 15% VAT. Ask for details of our interest free credit.  
Extensive range of PYE radiotelephone spares — S.A.E. for list.

HARROW HOUSE, AKEMAN STREET, TRING, HERTS HP23 6AA.  
Phone 0296 668684 or 044 282 8580. Callers by appointment only.

Ask for our secondhand scanner bargain list.



**Bredhurst**  
electronics



**BREDHURST ELECTRONICS LTD,**  
High St, Handcross, W. Sx. RH17 6BW  
(0444) 400786

SITUATED AT SOUTHERN END OF M23—EASY ACCESS TO M25 AND SOUTH LONDON

### RECEIVERS

HF225	£395.00
ICR71	£855.00
R2000	£595.00
VC10 VHF Converter	£161.00
FRG8800	£649.00
FRV8800 VHF Converter	£100.00
RS000	£875.00

### HF TRANSCEIVERS

TS940s	£1995.00
TS440s	£1138.00
TS140s	£862.00
TS680s	£985.00
FT980	£1795.00
FT767GX	£1599.00
FT757GX2	£969.00
FT747GX	£659.00
IC761	£2459.00
IC751A	£1500.00
IC735	£979.00
IC725	£759.00

### 2M TRANSCEIVERS

TH25E	£238.00
TH205E	£199.00
TH215E	£228.00
TS711E	£898.00
TM221ES	£599.00
TM231E	£317.00
TM231E	£289.00
FT23R + FNB10	£243.00
FT411 + FNB10	£259.00
FT290R II	£429.00
FT211RH	£309.00
FT212RH	£349.00
IC2GE	£265.00
IC Micro 2	£249.00
IC02E	£279.00
IC290D	£559.00
IC228H	£385.00
IC275E inc PSU	£1069.00

### 70cms TRANSCEIVERS

TS 811E	£998.00
TR 851E	£699.00
TM 421ES	£352.00
TH 405E	£245.00
TH 415E	£268.00
FT 73R + FNB10	£263.00
FT 790RH	£499.00
FT 711RH	£349.00
FT 712RH	£375.00
IC 4GE	£299.00
IC MICRO4	£299.00
IC 04E	£318.00
IC 448E	£429.00

### DUAL BAND TRANSCEIVERS

TM 721E	£699.00
TS 790E	£1495.00
FT 727R	£425.00
FT 736R	£1359.00
FT 4700RR	£875.00
FT470	£425.00
IC 32E	£399.00
IC 3210E	£499.00

### SCANNING RECEIVERS

IC R7000	£989.00
FRG 9600M	£509.00
RZ1	£465.00
AR 2002	£487.00
R 535 Airband	£249.00

### ANTENNA TUNER UNITS

FRT 1700	£59.00
FC 75/AT	£349.00
AT 230	£208.00
AT 250	£366.00
IC AT100	£379.00
MFJ 941D	£105.00
MFJ 949C	£158.00

### DATONG

AD370 Active Antenna	£69.00	3.00
FL3 Multimode	£129.00	2.00
D70 Morse Tutor	£56.35	2.00
ASP Speech processor	£82.80	2.00

### CO-AXIAL SWITCHES

SA450 2 way SO239	£19.49	1.50
SA450N 2 way N	£26.99	1.50
Drae 3 way SO239	£18.69	1.50
Drae 3 way N	£24.15	1.50
C54 4 way BNC	£30.39	1.50
MFJ-1701 6 way SO239	£30.72	1.50

### ROTATORS

G 250 S	£78.00	2.50
G 400 S	£139.00	3.00
G 400 RC	£169.00	3.00
G 600 RC	£219.00	3.00

### HAND HELD RECEIVERS

R5375 Airband	£69.00	2.00
Sony Air 7	£249.00	2.00
Win108 Airband	£175.00	2.00
AOR AR900	£235.00	2.00

Visit our stand at the  
**Sussex Amateur Radio &  
Computer Fair at  
Brighton Racecourse on  
Sunday 16th July 1989**

GOODS NORMALLY DESPATCHED  
WITHIN 24  
HRS - PRICES CORRECT AT TIME OF  
GOING  
TO PRESS - E&OE

MAIL ORDER & RETAIL

### ANTENNA RANGE

J Beam 'Minimax' — Tribander	£361.00
J Beam TB3 MK3 — Tribander	£348.00
Butternut HF6VX	£159.00
Butternut HF2V	£142.00
Cushcraft A3 Tribander	£263.00
Cushcraft 2M 21SWB	£86.25
Tonna 2050S 5 ele 50mhz	£50.72
Tonna 20809 9 ele 144mhz	£24.15
G Whip tribander	£41.00

### MORSE KEYS

Kent Morse key kits	£29.50	2.50
Kent Twin-paddle kits	£38.50	2.50
Hi Mound MK704	£20.00	2.00
Hi Mound HK706	£22.00	2.00
Vitroplex original std	£70.54	2.50
Vitroplex lambo std	£66.33	2.50
Benchner BY2 Chrome base	£76.97	2.50

### FILTERS

AKD HPF1	£6.75	1.00
AKD Braid Breaker	£6.75	1.00
AKD Notch Filter	£7.75	1.00
BNOS Low pass filter 6m	£29.95	1.50
LF30A Low pass filter	£32.25	2.00

### ANTENNA BITS

Hi-O Balun 1:1 5kW PEP	£13.95	1.50
Bricom Balun 4:1 1kW	£13.80	1.50
Bricom 7 1MHz Epoxy Traps (pair)	£10.95	1.50
Self Amalgamating Tape 10M x 25MM	£4.25	0.75
T piece polyprop Dipole centre	£1.60	0.25
Small ceramic egg insulators	£0.65	0.20
Large ceramic egg insulators	£0.85	0.20

### CABLES ETC.

URM 67 low loss coax 50 ohm per metre	£0.95	0.25
UR 76 50 ohm coax dia 5mm per metre	£0.35	0.10
UR 70 70 ohm coax dia 2.3mm per metre	£0.35	0.10
UR 95 50 ohm coax dia 2.3mm per metre	£0.40	0.10
4mm Polyester Guy Rope (400kg) per metre	£0.25	0.10
50mtrs 16 swg hard drawn copper wire	£6.95	2.00
75 ohm Twin Feeder Light Duty per metre	£0.20	0.10
300 ohm Slotted Ribbon Cable per metre	£0.32	0.10

**BREDHURST ELECTRONICS LTD, HIGH ST, HANDCROSS, W. SUSSEX RH17 6BW (0444) 400786**

Open Mon-Fri 9am-5pm except Wed 9am-12.30pm. Sat 10am-4pm

## CLASSIFIED ADVERTISEMENTS

Classified advertisements 40p per word (VAT included), minimum £6.40  
**Box Number £2.00 extra** to wordage or minimum.

Semi display 1/8 page 2 1/4" x 3 1/2" (57 x 91mm) **£96.00**  
 3/32 page 1 1/4" x 3 1/2" (42 x 91mm) **£74.00** + 15% VAT  
 1/16 page 1" x 3 1/2" (26 x 91mm) **£52.00**

Please write clearly. No responsibility accepted for errors.  
 Latest date for acceptance — 7 weeks before 1st of issue month.  
**All classified and semi-display advertisements MUST be prepaid.**  
 Copy and remittance to: **M. J. HAWKINS G3ZNI, RSGB Advertisement Agent,**  
 Design House, Junction Road, Dorking,  
 Surrey RH4 3HB.

Cheques should be made payable to RSGB.  
 Members' Ads must be sent to "Members' Ads," RSGB Hq.

## FOR SALE

**QSL CARDS** printed to your own specification on white or coloured gloss card. Send SAE for sample pack to: The Caswell Press, 11 Barons Way, Woodhatch, Reigate, Surrey. (073 72) 44916.

**AMIDON TOROIDAL CORES**, ferrite rings for TVI filters, ferrite beads. Send SAE for data and prices. SMC (TMP Electronics), Unit 27, Pinfold Works, Pinfold Lane, Buckley, Clwyd.

**PERSONALISED QSL CARDS**, 1000 £19.00; 5000 £60.00. 5000 gloss in two colours. £88.00. Send SAE for samples (DIY QSL's/SWL's + state which!! — 100 mixed designs/colours. £2.50. C.W.O. Q/Cards, 89 Derwent Street, Blackhill, Consett DH8 8LT.

**QSL CARDS**. Try me for quality and price. SAE for samples. A. W. Bailey (G3YNI). Brean Down Press, 78 Alfred Street, Weston-Super-Mare, Avon BS23 1PP.

**G4T JB QSL CARDS** printed to your specification, choose from 15 matt, 14 gloss colours of card. DIY matt £2.75 (100) gloss £3.95 (100). Logbooks £2.50. Bureau envelopes, Morse oscillators, mobile antennas, Agents for Navico, 50MHz linear amps, Photo cards, power supplies, cavity wavemeters, 24v to 12v converters. For samples and full product list SAE to 24 Portishead Road, Worle, Weston-Super-Mare BS22 0UX. Tel: 0934-512757.

**GWM RADIO LIMITED**, 40-42 PORTLAND ROAD, WORTHING, WEST SUSSEX BN11 1QN. Tel: 0903-34897. Pye Westminster W15FM low bank O.K. for 4m units only £25.00. Pye PF2UB units with speaker/Mic no Batts. O.K. for 70 cms £25.00. Pye PF28 low band FM units with speaker/mic No batts O.K. for 4m £25.00. Pye Olympic M201 VHF high band A.M. units only £25.00. ITT AM 7 Mid-band units (107MHz TX 139 MHz RX) Ideal for modification to Air/Glider band. Units only £15.00. Power-one international series type HB15-1.5A output 15 V.D.C. at 1.5A as new boxed with spec sheet open frame PSU only £15.00. Gould Econflex type EX5-20/N open frame — switch mode output 5V at 20A as new boxed with spec sheet only £30.00. All prices include VAT and post and packing.

**"RAYNET" YELLOW REFLECTIVE TABARDS** with "RAYNET" like Police, Ambulance. Medium £9.00, Large £9.50, XLarge £10.00. "RAYNET CONTROLLER" 50p extra. Nonreversible Battery Connectors (10 pairs/pack) £4.00. Mike Watson G8CPH, Ipswich, (0473) 831448.

**PUT TOP BAND** into your FT707 or FT77 for just £29.95. One of the many kits from KANGA PRODUCTS. Send LSASE for free catalogue. 3 Limes Road, Folkestone. 0303 276171.

**QSL CARDS** clear plastic hanging display wallets. Hold 20 large size cards. Pack of 3 £2.90. Viola Plastics, 36 Croft Road, Hastings, Sussex.

**MOSLEY ANTENNAE** — All the famous British Manufactured Antennae, direct from us including spares/replacements. Mustang, Eian, TA-33Jnr etc. Full Details shown in our Handbook, price £1.25 refunded upon purchase of Antennae. Mosley Electronics, 196 Norwich Road, New Costessey, Norwich NR5 0EX (Administrative address only).

**TRAPS FOR D.I.Y. TRIBANDER BEAMS & ANTI-TVI. TRAP DIPOLES.** Aerial D.I.Y. Bits, Baluns, Data. 28pSAE. Aerial Guide £1.00 G2DYM, Uplowman, Devon, EX16 7PH (03986) 215.

**PROCOMM (UK)** — Used amateur radio equipment bought for CASH, part exchange welcome. SAE for stock listing. 102 Larkhill Road, Abingdon, Oxfordshire. 0235-32653 (Callers by appointment).

**POLYPROPYLENE GUYROPE** — Don't waste money on small quantities — Buy a big coil! 220 metres 4mm £12.50, 6mm £17.50. Plus £2.50 postage. Cheques — 'Rope-Link', Cadance, Battle Road, Heathfield, Sussex TN21 9DR.

**G2VF DIY PROJECTS** Loop Antennas Pre Amps etc. Photo Copy HRO Manual. SAE details: Rylands, 39 Parkside Avenue, Southampton SO1 9AF.

**CALLSIGN SWEATSHIRTS** and T-shirts. Send for details. Club enquiries welcome. M.J. Hilton, 3 Highfields, Heston, Wirral L60 7TF.

**REDIFON R50M** ships radio communications receiver (1947), working, pristine condition, c/w manual, circuits, etc. Stand, some spare valves. £350 ono. Phone (07357) 4139.

**SAMSON ETM-SQ** Twin Paddle Key (new product). £35. Also E1-Keyers, ETM-1C £34, ETM-5C £85, ETM-8C (eight memories) £139. SAE details. G5BM QTHR. (0531) 820960.

**CALLERS ONLY** (phone and check hols). 1989 ARRL Handbooks £11.99, Antenna Book £9.99, JBeam HF beams less 12 1/2" till end July. Also usual lines, Ten-Tec, valves for Yaesu, CW filters, FT101ZD, 102, etc. WARC and Rx improvement kits for FT101B/E. Good range new Yaesu Pxx/Com. sales. Black Star counters, 600MHz £145 p.p., 2.4GHz £335 post paid. Drae 24 Amp psu's £150. Compare price/quality. G3LLL, Holdings Amateur Electronics, 45 Johnston Street, Blackburn BB2 1EF. (0254) 59595.

**NAVICO AMR1000** £227.30, AMR1000S £277 and all other Navico goods, ask for list. MET antennas, Uniden scanners, Co-ax cables, plugs and connector. G4GKU Minibeam £79.98 + £3 p.p. Marine radio telephones and antennas. Send or phone for free list. Seaward Electronics, Lynstone Trading Estate, Bude, Cornwall. Tel. 0288 55998 or after 6pm 0288 4892.

**THE PC289 QRP PHONE/CW** 160m transmitter is now in production. Not a kit. £24, see to JC Electronics, 2 Mostyn Avenue, Prestatyn, North Wales LL19 9NF.

**WEATHER STATIONS** — Wind direction, wind speed with maximum gust speed, barometer, outside temperature with max & min., C&F. In very attractive wooden cabinet. Sensors mount on existing mast, 25 metres of cable supplied. For leaflet telephone (0843) 221622. R&D ELECTRONICS, 318A Northdown Road, Margate, Kent CT9 3PW.

## RSGB AMATEUR RADIO INSURANCE SCHEME

**"ALL RISKS" INSURANCE** for portable/mobile/base station amateur radio and ancillary equipment. A service for RSGB members only. Also public liability and equipment insurance for affiliated clubs and societies. Details and leaflets from Sarah Baylis or Jenny Lovell, Amateur Radio Insurance Services Ltd, 4a Russell Hill Road, Purley, Surrey CR2 2LA. Tel: 01-660 0820 or Fax: 01-660 9222.

## COMPUTER SOFTWARE HARDWARE

**SCOTLAND PACK-AGE!** for AEA, Kantronics, PAC-Comm, WX Stations and computers, Atari-ST, WE FAX software for KAM-£15 PACK-AGE, Braeside, Urquhart, Crossford, Fife KY12 8QJ (0383) 721169.

**AMSTRAD/IBM PC COMPATIBLE SOFTWARE**. Large SAE to Charles Crane G4YFN, 2 Pimento Drive, Earley RG6 2GZ.

**"A" LICENCE ASPIRANTS**. Complete Morse tutorial program Amstrad PCW 9512/8512 lessons, Video and Audio, full curriculum not a string of Morse. Disc £9.95 inclusive or see details. Lucid Publications, PO Box 82, Ramsgate, Kent CT12 6YZ.

## HOLIDAY ACCOMMODATION

**FLYING FROM GATWICK?** Stay at Mill Lodge Guest House. 4 minutes from airport. Transport available. Telephone (0293) 771170.

**HOLIDAY IN CORNWALL?** Stay at Clifton Farm, B & B, E.M. Six Berth Caravan. Camping. All set in a very secluded location near Truro. (G4LJY) 0872 863849.

**NEWQUAY, CORNWALL**. Hotel Corniche, Mount Wise, Centrally situated. Bar, Parking, Five minutes beaches. Colour television and teamakers all bedrooms, some en-suite. Free Child offer. Phone G4TGG 0637 876618.

**MAPLETHORPE, LINCOLNSHIRE**. Bungalow sleeps 4-5. Five minutes walk to sea, sandy beach, amenities. Ideal children. Station, Antennas available. Superb HF site. Breakfast and/or Evening Meal available if required. (0521) 77842.

**TORQUAY QUALITY APARTMENTS**. Families/couples. Sea views. Babysitting. Parking. Fully equipped including microwave. G4NOA. (0803) 607333.

**ELEVATED SITE**, use of shack, B&B. Caravan, Bunk House, Camping. Open all year. "Tynrhos", Mynytho, Pwllheli LL53 7PS. (0758) 740712.

## MISCELLANEOUS

**COURSE FOR CITY & GUILDS**. Radio Amateurs Examination. Pass this important examination and obtain your licence, with an RRC Home Study Course. For details of this and other courses (GCSE, Career and professional examinations, etc) write or phone — THE RAPID RESULTS COLLEGE, Dept JT15, Tuition House, London SW19 4DS. Tel: 01-947 7272 (9am-5pm) or use our 24hr Recordacall service 01-946 1102 quoting JT15.

**HEATHKIT UK** spares and service centre. Cedar Electronics, Unit 12, Station Drive, Bredon, Tewkesbury, Gloucestershire. Telephone (0684) 73127.

**FINANCIAL ADVICE**. Pensions, investments, mortgages, life assurance. Free consultation, Home Counties and North London. G3JKS, St Albans. Tel (0727) 59318.

Due To Continued Expansion We Require  
**\*\*\*SERVICE & INSTALLATION ENGINEERS\*\*\***

**PHONE**

Call Now  
**01-573 4541**

## TECHNICIANS MADLEY SATELLITE EARTH STATION HEREFORDSHIRE

British Telecom are seeking suitably qualified technicians for work in a variety of different skill areas at their major satellite earth station in Herefordshire.

### Technicians are required for the following areas:

- Maintenance of Analogue/Digital/RF equipment to component level.
- Installation and testing of associated satellite communication systems.
- Maintenance and operation of microprocessor controlled switching equipment.
- Installation and maintenance of power and environmental control services.

You should be able to demonstrate a practical ability in one of these areas and have a formal BTEC qualification or equivalent.

Applications are invited from suitably qualified people up to the age of 55 years.

Salaries for technician grade start at £9,231 rising to £10,068. Excellent benefits include generous holiday entitlement, pension scheme, non-contributory sick pay.

Please telephone or write for an application form to

**David Butler, Training Manager,  
Madley Satellite Earth Station,  
Madley, Hereford HR2 9NH. (0981 250 001).**

## ANTENNES TONNA (F9FT) THE VHF/UHF ANTENNA SPECIALIST

50MHz	£50.71(a)	144/435MHz	£61.07(a)	POWER SPLITTERS	
5 element		9519 element Oscar		2 way 144MHz	£48.36(b)
144MHz		1250MHz		4 way 144MHz	£57.53(b)
4 element	£29.39(a)	23 element	£32.29(b)	2 way 435MHz	£45.69(c)
4 element crossed	£37.26(a)	4x23 ele - stacking frame -		4 way 435MHz	£55.76(c)
9 element fixed	£33.12(a)	power splitter	£175.00(a)	2 way 1250MHz	£38.35(c)
9 element portable	£35.19(a)	1296MHz		4 way 1250MHz	£43.36(c)
9 element crossed	£62.10(a)	23 element	£32.29(b)	2 way 1296MHz	£38.35(c)
13 element	£49.06(a)	4x23 ele - stacking frame -		4 way 1296MHz	£43.36(c)
17 element	£66.24(a)	power splitter	£175.00(a)	2 way 2300MHz	£38.35(c)
435MHz		55 element	£49.27(a)	4 way 2300MHz	£43.36(c)
9 element	£30.43(a)	4x55 ele - stacking frame -		ANDREW HELIAX	
19 element	£36.84(a)	power splitter	£250.00(a)	LDF-50A	£4.70/m
19 element crossed	£42.44(a)	2300MHz		'N' Connectors	£16.80(c)
21 element 432MHz	£47.61(a)	25 element	£43.47(b)	TELESCOPIC MASTS - STACKING	
21 element ATV	£47.61(a)			FRAMES - COAXIAL CABLE -	
				ROTATORS ETC	

All prices include VAT. Please add carriage (a) £5.00 (b) £2.20 (c) £1.20. U.K. MAINLAND ONLY. ACCESS or VISA cardholders telephone your order for immediate dispatch. Callers welcome, but by telephone appointment only, please. Send 50p for our catalogue which contains the full specifications.

**RANDAM ELECTRONICS (R) SOLE U.K. DISTRIBUTOR**  
FREEPOST, ABINGDON, OXON, OX14 1BR. Tel: (0235) 23080 (24Hrs)



## VALVES VALVES VALVES

The following valves in matched pairs 6JS6/C, 6KD6, 6JB6/A, 6LQ6, 6HF5, 6146A, 6146B. YES the 6JS6/C is Japanese and works in the FT101. Most amateur radio valves including difficult to obtain types EX STOCK. Quotations without obligation. If we don't stock your type we may be able to import for you, PLEASE ENQUIRE, REMEMBER over 200 types EX STOCK. See for list. 'Phone for assistance re types suitable for your equipment. USA and Jap manufacture of popular types available.

**DON'T DELAY 'PHONE TODAY 045 75 6114, GAAZM**  
Wilson, Peel Cottage, Lees Road, Mossley, Tameside, Manchester

## PLEASE REMEMBER

The Advertisers appreciate knowing where you saw their advertisement.

Tell them you saw it in

**RADIO COMMUNICATION**

## A WORLD OF OPPORTUNITY FOR RADIO OFFICERS

We offer a secure and rewarding shore-based career in the forefront of modern telecommunications technology. Thirty weeks special training (plus 6 weeks for non-typists) will prepare you to undertake a wide range of specialist duties as a RADIO OFFICER covering the complete communication spectrum from DC to light.

To qualify you need to hold or hope to attain:  
an MRGC or  
BTEC HNC in a Telecommunications subject with the ability to read morse at 20 wpm.  
City and Guilds 7777 at advanced level,  
incorporating morse transcription skills, would be advantageous.

Anyone without the above qualifications who has 2 years radio operating experience will also be considered.  
Age - preferably under 45 years.

### We offer you:

Comprehensive Training; Good Career Prospects;  
Opportunities for transfers within UK and Overseas;  
Generous Leave Allowances and a Non-contributory Pension Scheme; Job Security;  
Attractive Salaries - and much more.  
Salary (Reviewed Annually) - As a Radio Officer after training: £11,568 rising to £17,057 pa in 5 annual increments, (includes shift and weekend working allowance)  
CIVIL SERVICE IS AN EQUAL OPPORTUNITY EMPLOYER.

For more information and application form write or telephone:



THE RECRUITMENT OFFICE, GCHQ, ROOM A/1108  
PRIORS ROAD, CHELTENHAM, GLOS GL52 5AJ  
OR TELEPHONE (0242) 232912/3

## INDEX TO ADVERTISERS — JULY

Amateur Radio Insurance Services Ltd	61
Amcomm of London	65
AMDAT	80
ARE Communications Ltd	63
Arrow Electronics Ltd	80
J Birkett	72
Bredhurst Electronics	81
British Telecom	83
C-Fone	82
Cambridge Kits	60
Datong Electronics Ltd	66
G4TNY Electronics	64
Garex Electronics Ltd	81
GCHQ	83
Hately Antenna Technology	74
Heatherlite Products	74
Hedley's Electrical & Engineering Serv	60
CM Howes Communications	62
HRS Electronics plc	75
ICOM (UK) Ltd	30, 31 & IBC
ICS Electronics Ltd	73
J & P Electronics Ltd	72
R. A. Kent Engineers	72
Klingenfuss Publications	62
KW Ten-Tec	64
Lowe Electronics Ltd	28, 29 & IFC
McKnight Crystal Co Ltd	74
Microwave Modules Ltd	27
Nevada	72
R N Electronics	66
Randam Electronics	83
Revco	60
Siskin Electronics	62
South Midlands Communications Ltd	32, 33, 34 & OBC
Spectrum Communications	66
Stephens James Ltd	74
Technical Software	64
UKW-technik	80
Uppington Tele-Radio	80
Waters & Stanton Electronics	18
W B Westlake	60
Colin Wilson	83



# Members' Ads

The Conditions of Acceptance are published below the Member's Ad form circulated with every issue of *Radio Communication*. Please note that FOR SALE and WANTED ads must *not* be mixed in the same advertisement. The current rate is £2.30 for 40 words or less: advertisements containing more than 40 words will cost an additional £2.30 for every additional 40 or less words. Each advertisement must be accompanied by the correct remittance, either as a cheque or postal order made payable to Radio Society of Great Britain.

## FOR SALE

- TRIO TR9130 2m all-mode with ant. PSU: £375. Yaesu FT707 HF/SSB: £355. G8URC QTHR. 0622 718051.
- TRIO 130S HF tcvr 80-10m. Fitted SSB/CW filters. 200W PEP. Little used. VGC: £420. Eddie, G4KHH QTHR. (Newton-le Willows, Merseyside) 0952 5927.
- CUSHCRAFT A3 HF tri-band beam. Good cond. £95. Variac transformer. V.large twin 20A independent secondaries encased for floor standing. Good cond. £40. Tim. (Yorkshire) 0377 89257.
- KANTRONIC KAM packet radio. Not used. Synco T88 computer, green screen. VGC: £250. Yaesu 690RII 10W linear batt case: £350. Hardly used. Richard, G1NOE QTHR. 0255 431953.
- FT707, FP707, FC707. Good cond. £500ovno or exch for FT101ZD. 0407 830604 w/e.
- 451E 70cm multimode base, fitted with prototype Mutek. As new cond with orig box. £550 or exch FL2100B/Z or similar, with cash adjustment if necessary. G0DZJ. (Leics) 0455 282168.
- HANDHELD. Kenwood TH215E, latest model, boxed as new, c/w nicads, chrg. case: £195. Linear amp. Yaesu FL2010, to match FT290, good cond. £40. Steve, G0AXS QTHR. 0705 487207 day 0705 827371 eve.
- SCOPE. Telequipment DM53A twin beam storage tube. Inc 4 Y amps giving DC to 15MHz. Manuals. VGC: £65. G3UGL QTHR. 0234 750050.
- DRAKE TR4C HF tcvr 300W with PSU/spkr combined. £325. Peter buyer to collect as rather heavy to send. (Northland) 0670 855953.
- COMPLETE Icom HF station with accs switch controlled from tcvr, comprising the following: 740: £600. 720A: £600. ICLKL: £1200. AT500: £300. All with PSU. TB2: £150. Altron 35ft telescopic tiltover wall mounted mast: £300. All the above in mint cond. Would like to sell station complete for £2850, but will consider separately if necessary. Buyer inspects and collects. G0CJU QTHR. 0342 312374 w/e.
- MD1 desk mic. £45. KR5000 elevation rotator. £50. Mast head preamp 70cm: £60. Mast head preamp 2m: £50. 2x 15Se Cue Dee 2m: £25ea. 2x 19e1e tonna 70cm: £15ea. 2m 70cm power splitters: £15ea or any offers. G0KEY QTHR. 0932 242536.
- TRIO TS780 VHF/UHF all-mode tcvr: £480. Minimeter RX covers 160-10m amateur bands. Also Homebrew type TX for above AM/CW only: £20 pair. Will split. Class D wavemeter: £2. Various SW mags vols 1950/60. Offers. G8PSR QTHR. 09325 61588.
- FT290 chrg. nicads, soft case, m/mount, r/ duck/ s/mic: £2250no. Microwave Modules 144/25 linear: £40. AKD 144 wavemeter: £20. 144 TX/filter: £20. 144/8T MET ant: £20. All perfect WO. Going HF. G0KPF QTHR. 01-309 1295.
- BROTHER M1009 dot matrix printer: £750no. Philips D6280 cassette recorder, new: £20. Sharp EL6010 expense memo/calculator: £10. Des. G4NEK QTHR. 0234 852865.
- ICOM IC202S 2m SSB tcvr. Xtailled to 144.4 plus beacon band. Good cond. £100. G1DWI QTHR. (Sheffield) 0742 556774.
- KW202 RX, KW204 TX, matching spkr, manuals. VGC: £325. Philips FM stereo test gen: £50. Terry G4INT. 04027 51511.
- 10FM TX/RX Fidelity 2001 converted by Spectrum Comm. 25W amp, swr meter, 1/2 wave vertical, centre loaded 1/4 wave whip for car. Work the world for: £40. G4XSM QTHR. (Suffolk) 0284 768084.
- STSM/C RTTY/AMTOR unit, control board, clock, setup for G3WHO s/ware with BBC computer. £45. PW Severn H/B QRP CW tcvr

- 7MHz: £40. Toroidal transformers 240V/24plus28V secondaries probably 1A: £2. 24V relays H/D contacts 3PCO: £1. Klystron, Sperry SRU4438, no info. Offers? TV lens Dallmeyer 1in F1.9 screw thread about 25mm dia. Offers? 5x 6JS6C valves used in rotation FT101E. Little use: £5ea. QOV0640A used, OK: £7. 2x 12BY7A: £2ea. Mike, G4GGC QTHR. 0787 71842.
- McMICHAEL Super Four portable 1930: £25. Signal Corps No19 PSU, working: £15. Eveready type K: £5. Vidor Attache CN381B: £4. Roberts P4D: £8. Exide glass accumulators, 45AH2V, unused: £12ea. All plus post. Ring for details. G1FXD QTHR. 0637 880404.
- FT757GXII. New July 1988. Immac: £725. Matching h/duty PSU/spkr FP757HD: £185. Base mic MD1B8: £65. All perfect with boxes and manuals. Bargain price for all: £945. G0EOL QTHR. (Cheshire) 0606 554857 anytime.
- ZETAGI B550P 500W PEP 3-30MHz solid state linear with preamp. £150 inc post. GMT/CXM not QTHR. 031-226 2515 day 031-226 2892 eve-w/e.
- RACAL RA17L gen.cov.com tcvr 0-30MHz. GWO: £1500no. John. 01-397 7931.
- 57FT ground post mounted Alston lattice tower, H557. As new. Never erected. Luffing and telescopic winch, full inst: £7500no. Buyer collects. Tom. 0454 313740 eve.
- TS440S, AT440, MC85, never used: £1000. BNOS 12/20E PSU: £50. Standard C58 mobile bracket 7/8 whip with new nicads, chrg: £195. Icom 251E with Mutek F/E: £450. HC10 world clock: £50. BBC-B DFS 2 80-track drives. Microvitec colour monitor fitted torch Z80. Some programs. Sage Accounts, Perfect Writer etc: £485. AMT2 with ROM for BBC: £150. Jaybeam Q8/2m with CD45 rotator, control unit, cables. Top section of mast: £45. Bremi 2A PSU: £10. Welz coax switch 20A: £10. Dummy load SMC 150np: £10. All items as new and boxed. G4WPC not QTHR. (Wilts) 0794 22507.
- TS830S with MC35S mic. Fix-xtal, spare valves, deluxe tuning knob, user and service manuals. Boxed: £750. VFO230, boxed: £150. SP230 with filters: £40. Datong Universal Clipper: £30. Palomar engineers noise bridge: £35. Prefer collect or carr.extra. G3ACB QTHR. 0323 897145.
- MARCONI H2540 RX 1.5-30 latest synth, options freq standard, subcarrier, carrier AFC, FSK demod, 2.4,1.2,0.5,0.3 Hz. 1Hz readout. Absolutely as new: £1300. No offers. 0743 884858.
- FT902DM CW filter. FSK/AM/FM/SSB tcvr. WARC bands DC cvtr: £5350no. Also FT230R 2m FM tcvr: £1600no. Both exc.cond. John, G0GUL QTHR. 0203 450476.
- HAMMARLUND HQ170A RX, amateur bands to 54MHz. Badly rusted front panel, h/book: £50. Buyer collects. C.Collins, 60 Alexandra Rd, Skegness, Lincs, PE25 3RE.
- TOWER and beams for sale. Westower 2S/ FBP 2-section 45ft windup and tiltover. Full inst. DX32 2ele tri-band and 6ele quad for 2m: £600 the lot or will split. QTHR. 061-973 1360.
- SHARP M280K computer, with large selection of programs, c/w manual and orig packing. Offers? MML144/28MHz tvt. Offers? Last 10yrs issues of RadCom. Free to good home. GMBYUM QTHR. (Kirkcaldy) 0592 262873.
- PROPERTY of the late CE Sulton, G3AO. TS530SP, TS430S, AT200, VFO120, TS700S, VFO700, PS30. PSUs, ants. approx 1000 valves plus much more. Paul G0FAQ. 0203 228285 day only. Nigel G4KZZ. 0203 441660 after 6pm.
- YAESU FTONE, YH77, MD1B8 and MH1B8. Radio has all options fitted. Genuine reason for sale. OM says I can upgrade my shack! Hence going price of: £900. S.Richardson GWOAWT. 05585 586 eve.
- SOMMERKAMP TS800 2m tcvr 5W/50W 140-150MHz with Yaesu PSU FP12 for fixed station use. Tcvr size 156x58x274mm: £300. Albert QTHR. 061-366 0927.
- TR9000 multimode VHF, BO9A system base home use only, as new, boxed: £280. Microwave Modules MM144/100S linear, as new, boxed:

- £85. Icom IC4E 70cm portable, all accs, boxed: £145. ST5 RTTY terminal unit working: £35. Farnell 13.8V DC 7.5A PSU: £30. Eagle International PRO A35 PA amp, mains/13.8V DC input. 0-160MH/100V line output: £50. 2x RS mains isolating transformers, 200W secondary: £15ea. 2x mains transformers, 0-12V 100VA 0-24V 200VA secondaries. Chris G4TMG. (Sussex) 0903 721225/727052.
- KENWOOD TR9500 70cm multimode TX/RX, all supplied accs. VGC: £299. Mic.Mod. MML432/50 linear, perfect: £89. Tandy PRO2004 scanner, 400ch modifications, scans at 32ch per second! Perfect cond: £179. Blaupunkt Montreal car radio/cassette, FM/LW/MW. Brand new unwanted gift in orig packing: £99. Philips Model 753 car radio/cassette, FM/LW/MW, many features, VGC: £49. Amstrad DMP3160 dot-matrix printer, excellent high speed printer, used very little, price to inc free PD Shareware: £99. Kenwood 5-way hi-fi spkrs, type 5090, elegant wood finish, removable grills, 12in bass drivers, superb sound, exc.cond, well worth seeing and hearing: £89pair. Despatched at cost or would deliver within 100 miles of Fleet, Hants for cost of petrol. G1JPP QTHR. 0252 617962.
- COSSOR 1035 Mk3, Telequipment D33R: £30. Eddystone 770U Mk2: £40. Solartron scope, no tube: £15. Tubes 3KP1 5A1P: £5ea. VCR97 shield base: £5. Rascal control SA520A: £15. Avo all-wave oscillator: £15. G0IPT QTHR. 01-883 3474.
- TEMPERATURE probe for multimeter, brand new, cost £42. RS part no 158-430: £25. 0727 67387.
- TRIO TS711E 2m basestation multimode: £6350no. Kenwood TS811E 70cm basestation multimode: £6850no. Icom IC505 6m rig: £475. All VGC. G4TBR QTHR. (Bucks) 0494 786510.
- KENT twin-paddle key. Best for smooth effortless Morse. Solid brass, heavy steel base. Current price £47.90, yours as new for: £37.50 plus £2.50 post. Gilbert, GMDLZ QTHR. 0475 673271.
- RTTY/CW/ASCII TX computer program for CBM64 c/w technical software plug-in terminal unit, and full inst. Hardly used. The lot for: £15. G6BOP QTHR. (Hants) 0962 55405 eve.
- SELLING professionally built TV RX. 70cm amateur, UHF, and bands 1 and 3 for DX reception. Video and audio out: £30. 12V 4AH nicad: £20. Chrg: £10. Neon helium laser and PSU 1.5mW: £80. Hugh. 0684 573977.
- EMOTO rotator model 1103 MSAX. 5in circular dial. Rotation torque 1000Kg cm. Braking torque 10000Kg cm. Accepts largest beam. Prefer buyer inspects/collects: £210. G4CHP QTHR. 0508 470365.
- 6M equip as new. One Howes HC266 2-6m tvt, 10W out. One factory built spectrum 6m preamp 0-20dB variable. One variable filter: £110 the lot. G6DKE. (Sudbury,Suffolk) 0787 73238.
- BIDS are invited for the following types of equip and thermionic devices. Some are collectors items. Wavemeter type W66 AM REF No.10T/7640. In exc.cond. RCA xtal calibrated wavemeter type TE149 c/w h/book. 2 Eimac valves 7580W/4CX250R, unused. CRT 5CP1 ex-equip c/w mask, screen and base. Creed 7B7/ERP teleprinters and spares. Brenell reel-to-reel tape deck purchased 1959 and never used. German reel-to-reel tape recorder, Zwonitz RFT SMAR46. heavy! Standard SR200. Japanese, portable miniature reel-to-reel tape rec, forerunner to cassette tape rec, perfect cond. Dragon 32 PC approx 1hrs use only, manual, standard s/ware, boxed. Dragon single disk drive unit, never used, manual, boxed. 7 Dragon books, 47 Dragon user mags. Cassette tape rec available. Bob. 0372 57837 9-10pm only.
- ICOM 720A with PSU: £500. 211E: £350. 240: £150. 2E with all bits: £120. All boxed, in VGC. Also BBC-B DFS sidewise ROM/RAM: £200. Philips green monitor: £50. Demon modem: £25. Sony Air 7: £150. 0372 56144.

- YAESU FT726R 2m/70cm satellite modules with manual and MD1 desk mic: £650. G1XCD QTHR. (Notts) 0909 477565.
- MOTORIZED satellite TV system suitable for all DBS broadcasts. Also Premiere decoder: £300. Spectrums computers plus 2: £100 plus 3D/D: £130. TNC and Ham s/ware for both. Exch for good ATU. Minbeam 6m FT709 16-bit computer. G1LHO QTHR. (Harlow) 0279 451129.
- KENWOOD TS520SE 100W tcvr. Mint cond. Spare 6146B, tubes 12BY7A, mic, box: £400. Ant tuner AT230, as new: £130. Welz CT300 300W dummy load: £60. PA3 car adaptor chrg: £8. Buyer arranges collection. G0BXI QTHR. 0703 263232.
- YAESU handheld mic MH1B8, boxed: £17. Paul, G8UED not QTHR. (Newark) 0636 703692.
- ANGLESEY. Superb 6.75 acres, hilltop 3 dble bedrooms, professionally rebuilt extended in character cottage. Slate roof, full oil CH, part double glazing. Two large reception rooms, large fitted kitchen. Rayburn converted oil. Thermal brick insulation throughout except lounge which has Jutul wood burner. Mains electricity, septic tank. Mains water or 50ft bore with pumps to house supply. 70x30ft building suitable for commercial use. Quiet farming area. Easy access. Two masts, one ground post: £135,000no. GWOARP. 0407 730636.
- FT101ZD WARC. CW filter, FM: £485. FV101DM digital VFO: £145. FTV901R tvt with 2m, 6m and 70cm modules: £385. All superb cond, little used. Phil Burgin G4ROZ. (Littlehampton) 0903 771661.
- TRIO TS780 2m 70cm tcvr, mint cond, phones key, UR67 H100 coax, 2m 70cm vert dipoles, D70 mouse tutor. Various RSGB books: £700. Can split. Offers. P6B WUT. 0565 3888 x32574 day 0244 381336 eve.
- HANDHELD tcvr, IC2E, thumbwheel 140-149.995MHz. 5 and 3W, 10V nicad, chrg, leads for packet, leads for car, 12V/4W. Full diags, inst: £170. G3ZVF QTHR. 0592 260477.
- TRIO TR2300, nicads, chrg, whip, rubber duck, soft case. VGC: £95. Trio 7010, 2m SSB/CW rig, manual, m/mount, good cond: £100. Trio TS700G multimode base, h/book, service manual, VGC: £250. Dave. (Fareham,Hants) 0329 230737.
- KENWOOD TR9000 multimode c/w mic, mobile bracket, 5/8 mobile coilinear: £280. G4XP QTHR. (Basingstoke) 0256 56356.
- MYFORD lathe users. Circular saw table with clamping bridge and arbor, 5in HSS metal and 6in wood saws. All unused and unmarked. Today's cost around £170. Offered at: £95. Prefer buyer inspect and collect. G8UQ not QTHR. (Kendal) 05395 61117.
- TS830S plus Kenwood DFC230 split VFO, plus MC50 desk mic, all immac: £725. Buyer collects. Peter, G4YYO QTHR. 05385 702208.
- RX4 RTTY/AMTOR/SSV/CW RX program for Spectrum plus 3 disk only. Fantastic program. I've sold my computer and so this program is surplus to my requirements. Will accept: £12. 0266 45527.
- YAESU FT790R multimode 70cm portable, absolute mint cond, inc. nicads, chrg, only: £300no. Also BBC Micro and dual 40-track disk drive, Teletext adaptor with many disks, manuals, Eproms: £400. Phil G6DAU. 0727 72528 eve.
- DATONG Morse tutor: £35. Vibroplex standard keyer: £35. Both VGC or exch for Kent straight key or similar. G0JLD QTHR. (Minehead) 0643 5196.
- FT101E with manual, no mods. mint, little used: £300. Yaesu FC902 ATU, boxed with manual: £80. G0FDE QTHR. 045383 3905 eve.
- NAGGING blond girlfriend! With expensive taste in engagement rings, forces sale of much loved FT102 HF tcvr, FM/AM board fitted, h/book, mint, new valves, DC pwr lead: £550. G0FEA QTHR. 0787 78383.
- RACAL RA197 pre-selector. G8HLJ. 051-346 1270.
- RADIO control, Futaba Gold FP7FG aerobatic,

mint, less than ten flights from new. No time for building since new job. Cost new £260. Sell: £180 or swap FM mobile similar value. G4YNG QTHR. 0536 524577.

● VERSATOWER Strumech 60ft mobile tower c/w base post and trailer. All in GWO: £450. G1PUV not QTHR. 05436 75301.

● TWO Commodore, BIP, serial interface packs, model S2 part Y8304 for Citizen 1200 printers. One loose, one boxed with manual. What offers? Peter G4VFA, PO Box 259, Stoke-on-Trent, ST4 5ES.

● SILENT key sale. Tono 9000E comms terminal with 1200G VDU: £450. G3NFV QTHR. 0372 372587.

● YAESU separates FRDX400 rcvr, FLDX400 transmitter with matching spkr. Only rcvr being used. Both in GC: £230 or will take 2m handheld in pl/exch. (Northants) 0536 524833.

● AMTZ in terminal by AEA. RTTY/AMTOR/CW/ASCII with interface, firmware, and connectors for CBM64/128. As new: £120. Procom packet modem, cased with connectors 300/1200 baud HF/VHF with Digicom 64 disk based s/w for CBM64/128: £60. G3LCZ QTHR. 0642 582738.

● YAESU FL2100Z. Exc. cond, little used: £500. Dention Clipperton linear amp, 160-10m, 2kW. Uses 4 572B valves. A real powerhouse: £500. TS430S, as new. FM board fitted. Rarely used: £675. GM4NFC not QTHR. (Ayr) 0292 531225 eve.

● FT767GX with 2m module, 144/767, 2mths old: £1450. FT102 all filters, FC102. Complete: £750. 4x 17ele tonnas: 144MHz: £35ea. All carr. extra. Mike. (Sussex) 048649 883 day 0403 732851 eve.

● SANYO MBC 17 plus AT compatible computer. 896k memory. 40Mb hard disk. 1.2Mb and 360k floppies. Taxan Super Vision III colour monitor. Nearest offer to: £975. G0FUX not QTHR. 01-581 1477 x257 day.

● 25FT decent triangular mast, 3 sections, Yaesu bearing, KR400RC MD rotator: £150 OTO. (Evesham) 0386 832233.

● TRIO TR7600 2m FM mobile with RM76 micro-processor controller 10W/1W, 6mem, scanning, repeater shift. With mobile mount, mic, orig. packing, manual: £170. G4MH mini-beam, 10-15-20m, VGC, not been used outdoors, with spare tuning spokes and full inst: £60. KW E-ze Match VGC: £50. KW dummy load: £25. WCLPWF with 50239 sockets: £10. Pair of KT66s, Marconiophone, mint, boxed: £18. One NEC 6JS6C, serviceable, boxed: £5. Buyers to collect or convey. G3UYQ QTHR. (Stockport area) 061-491 0688.

● TRIO 9130 2m multimode 5/25W, boxed, manual, bracket, mic etc. Limited use. VGC: £340. Was withdrawn from last sale, but now selling to upgrade HF rig. G6W0KDM QTHR. 0758 740171.

● KW2000 HF tcvr complete and GWO with mic, manual, circuits, spare valves, LPF etc: £150 the lot. Buyer collects. G3SLI QTHR. (Reading) 0734 474992.

● PYE low-band AM scheme complete, ideal for 70MHz, Red Cross, St. Johns etc. Comprising Reporter x1, Olympic x2 MF5 x2, dash mount W15AM x3, Cambridge x1, W30AM x1 and T30AM, R7AM basestation with desk controller: £250.00. 066474 744.

● PROFESSIONAL SSB cvtr 3.5x19in panel model 1SB3: £250. Similar size scope/pan adaptor: £250. Drake ATU MN2000: £250. Shure 444 mic: £25. Buyers collect. G3GBB. 0379 83657.

● PSU, linear. Fully metered and protected. 40A peaks. Stud diode rectifier. 8-pass transistors. 6mV noise ripple: £100. Praktika LTL3 SLR camera, case with 1.8 standard-135 telephoto lens and flash. As new and perfect. Working cond: £75. G4KDC QTHR. 0375 378783.

● YAESU FT290R Mutek F/E. Modified to listen on input, auto tone burst on minus FM, CW, nicads, chrg, case, good cond: £275 ono. Mic.Mod. MML144/100LS linear with preamp. Immac, boxed: £130 ono. G0JEG. (Merseyside) 051-639 9520.

● SCUNTHORPE, S. Humber-side. 3 bed semi, detached garage with shack, tower with planning permission, gardens front and rear, gas CH, dble glazing, all facilities close by: £55,950. G3HRP QTHR.

● FL101 HF band SSB/CW transmitter, fitted WARC bands. Good cond. Prefer buyer inspect and collect: £160. G3BKF QTHR. (Leicester) 0509 412395.

● ICOM IC240 FM tcvr plus super-scan, covers full 2m band, 25kHz steps: £120 inc PP. Matsui 4099 RX FM, stereo and 150kHz-29.990MHz cont AM/CW/SSB: £80 inc PP. G8VHG QTHR. (Hull) 0482 855436.

● ICOM IC251E orig and little used: £330. Icom kit DX100U, heavy, with SSB unit: £70. QY365A unused: £15. CR sig.gen 56-250MHz: £20. 6146: £5. QVOV320: £8. QVOV310: £5. QVOV26: £5. D43 scope: £35. G3SQA not QTHR. 0602 785664.

● TWO exponential horn-type spkrs inc drivers: £20 pair. Two PA column spkrs: £30 pair. Suit village hall, school? Heavy items, buyer collects. G4LOT. 0785 662884.

● MARCONI DA60 DA30 offered for Tungsram 015/400 T25D PP5/400. Bernard Litherland, G4IMT QTHR. 0225 891254.

● FT401 recently overhauled: £230. KW107 Supermatch: £75. Buyer to collect or pay carr. G0ANF QTHR. (Penzance) 0736 63084.

● FT101ZD FM Mk3, mint cond: £495. Also AT230 ATU: £150. Both for £600. No offers please. G0BOM QTHR. (Gainsbro, Lincs) 0427 617488.

● SEM Transmatch 1.8-30MHz: £65. Ezitune ant tuning bridge: £20. G0AXZ QTHR. (Bardon Mill) 04984 467.

● FT101ZD Mk2 with 2 spare output and driver valves. KW ant 3-way switch. KW E-ze Match. WY3 UK swr bridge. KW 52 ohm dummy load. Sale lot: £420. Buyer collect. H.Gregory, 31 Kempford Cl, Oakenshaw, Redditch, B98 7YZ.

● UNIDEN 2830 multimode: £240. SEM Transmatch 1.8-30 with Ezitune: £80. Philips green screen monitor 80: £60. FT757 mobile mount: £20. G4OBS QTHR. (Wills) 0722272 752.

● CODAR AT5 transmitter c/w PSU: £500.00. Emco Unimate SL model-makers lathe, 20in length: £190.00. G3XIZ QTHR. (Beds) 0767 314693.

● FT707 HF tcvr 100W with FC707 matching ATU with YM35 mic. Also Adonis comp mic, mobile mount bkt, boxed, mint cond: £360. KW107 ATU: £50. Hi-mound Morse key: £10. Datong Morse tutor: £30. FT290 and 30W linear mic, case, nicads, chrg: £220. FT101Z HF tcvr 100W, boxed, needs new driver valves: £210. Hansen swr bridge: £10. SMC swr bridge: £10. Belcom 2m scanner: £10. Trio R600 HF rcvr 550kHz-30MHz: £120. FT227R 2m mobile rig: £120. 30A PSU 12V: £60. HB9CV 6m 2ele yagi: £10. Jaybeam 48ele parabeam: £10. Both never used. Carr. extra on all items. 0202 534933 after 6pm.

● AR40 rotator: £70. KC038 rotary bearing for 2in mast: £20. Unused. Post paid: 0902 344831.

● AR88LF and CR91 gen.cov rcvrs. CR91 without covers. Spare valves, inst.books, circuits. Both in VGC. £120 for the 2 or will split. Need the room. G4TYS QTHR. (Notts) 077784 8080.

● KENWOOD TS530SP all-band HF tcvr. Fitted 500Hz CW filter. 1yr old. Mint cond. Price incs MC355 list mic and spare PA valves. Prefer buyer inspects/collects or post extra: £550. G3SYL QTHR. 0222 565681.

● 30FT Western alu-mast lightweight tower. 3 10ft sections, free standing. Good cond: £100. Please no time wasters. FT708 handheld with mobile chrg, PA3 m/mount. Spkr, mic YM24A. Good cond. All items: £100. Johnny, 0427 5266.

● COLLINS KWM2A round emblem with PM2 PSU and CP1 xtal packet: £450 cash. No offers. Yaesu FRG8800 fitted with internal FRV8800 VHF cvtr and FR7700 ant tuner. As new with orig boxes: £490 cash. G3GYX QTHR. (Notts) 0602 396387.

● SHACK clearout. FT23R with chrg. AOR2001 VHF scanner KPC2 TNC Sinclair QL computer. 2 modems, 1 small Prestel 1200/75 one large and heavy. Various PSUs around 12V 1A. High current diodes etc. Call for details. Iain G3M1PSU. 0506 883091.

● TS430S: £600. IC735: £675. MFJ1278 multimode TNC: £140. SB220 2kW amp, low hours: £650. Commodore 1901 RGB monitor: £150. All VGC. Time wasters will be shot. (Oswestry) 0691 831111 eve-w/e.

● TRIO TS530SP and TS830S HF tcvrs: £595 and £750. Both boxed. Exc. cond. Free carr or can deliver. Len G3XXO 091-478 2965 day.

● TRIO R2000 rcvr with VHF module. VGC: £525. G6RFV QTHR. (Derby) 0332 675105 eve-w/e.

● PARAGON by Ten-Tec plus Ten-Tec PSU 250Hz, 500Hz and 1.8kHz filters fitted, with 700C mic, boxed, inst manual. Worth £2200. Sale: £1525. Yaesu FL2100Z linear amp. WARC bands with orig-box: £500. Trio 7930 2m FM tcvr, 25W or 2W with 21mem channels multi-function: £195. G3VOF QTHR. 04023 73366.

● ERA microreader CW/RTTY decoder with Morse tutor. Practice both send and receive. Operating inst. Exc cond: £75. (Northants) 0536 760643.

● KAMTRONICS all-mode plus Amfax. 5mths old. Leads. VHF/UHF, manual. BBC computer.

Amfax Eprom. Tape deck, manuals, 45 games: £400. G6W0LAL. (Rhyll) 0745 334668.

● MICROWAVE Modules 50/28MHz tvtr less than 24hrs use, inc 50MHz 3ele beam and approx 15m coax cable. All in pristine cond: £250.00. Dave G4GWG. (Wigan) 0942 211397.

● YAESU FT290R Mutek F/E, spkr, mic. Nicads, chrg and carry case: £200. G1UBG QTHR. 0242 301291 eve-w/e.

● GRAND shack clearancem sale! Electrical/electronic/radio and photographic equip and bits for sale. Too much to mention here so SAE for lists. Adrian G8LAH, 7 Cottingham Cl, Kingsclere, nr Newbury, RG15 8NR.

● HF rcvrs, 3 available. CR100 no case: £15. CR100 modified for AM/SSB/FM, int spkr: £30. Hammalund HQ120X: £50. All working with full manuals. G8BLB. 0494 784811.

● BIRD 30dB pwr attenuators model 8322 200W cont. Model 8325 500W cont: £200ea. Rascal 9024 freq. meter, 600MHz: £60. Anadex 1GHz counter: £80. Marconi FT2303 portable modulation meter: £150. Farnell SSG520 synthesised sig.gen: £500. G4AJE QTHR. (Camps) 0354 741168.

● 6M gear, Howes 2-6 tvtr. 5-10W drive, met 3ele ant, 2mths old, surplus to requirements: £200. John. G7DOX. 061-338 8731.

● KW1000 linear, recent new mains transformer, upgraded rating, supplied with spare 572B fitted with 2 small axial fans easily removable. No mods done to accommodate same. Full output. Good cond: £375.00. G4HSF QTHR. (Liverpool) 051-722 0291 after 6pm.

● YAESU FT290R Mutek, chrg, c/case, 1/4 whip: £230. Yaesu desk mic YD844A: £15. MML144/100LS spkr 1.3W in, 100W out: £100. Commodore 1541 disk drive: £100.00. G1JZY QTHR. 061-795 0384.

● FT727 2m 70cm h/held NC15 base, ch/PSU, soft case, m/bracket, box: £325. Would swap for FTV107 tvtr with 2m and 70cm modules. G4ZWP QTHR. 0920 871639.

● TS700G 2m home base: £340. MM144/50S linear: £70. M.Belcher, G1SSL QTHR. 0235 819038 after 6pm.

● SOMMERKAMP FT250 (FT200) HF tcvr, late model, black, pwr unit, fan, mic, manual: £225. Charly, G0LTF QTHR. (Leics) 0530 224002 eve.

● BREAKING: Rohde and Schwarz sig.gen type SMFA BN41300, most parts available inc manual. G4FIT. (Reigate) 0737 241491 w/e.

● TS930S, exc. cond, auto ATU: £1200. Tono 9000E: £300. Mosley TA31JR rotary dipole: £15. FT107. (Yeovil) 0935 22973.

● FT101ZD Mk3, WARC, FM: £400. Carr. extra. FT101B, 9-bands inc WARC, modified by G3LLL, exc working order: £270. Carr. extra. Microwave Modules 70cm linear MML432/100: £235. Carr. extra. Roy. 0543 481202.

● Hy-gain TH3 3ele beam prop pitch rotator with spare motor PSU. Cables control unit: £100. Purchaser dismantles. Also 40ft steel lattice tower. G4JW QTHR. 0742 303686.

● COLLINS KWM380 HF tcvr. Exc unmarked cond. 2 CW filters, processor, noise blanker, service manual: £2000.00. G4JFH QTHR. (Castleford) 0977 556488.

● TRIO TS430S tcvr c/w FM board, CW filter, SP430 spkr, VGC: £625. Trio AT230 ATU: £135. Wood and Douglas ATV tcvr 10W o/p: £42. PSU industrial, steel case 13.8V 19A o/p: £40. Chris, G0INQ QTHR. (Pulborough) 07982 3689.

● 14ELE Met 2m yagi. Never used. List price £57.75. Will accept: £40. G1ARU QTHR. 0279 506933.

● MM 70cm TV TX: £110. B/W ex-security camera: £50. 21ele TV ant: £35. LW rotator: £25. 10m mob lin 10in 60out, 767: £30. 2x 70cm TV UP con, not working: £15. MM144/50S: £65. QTHR. 0400 30103.

● FRG7: £125. 2-10 cvtr: £25. Tono 9000E terminal Philips monitor: £225. Dragon 32 and green monitor: £225. All ono. G1TAN QTHR. (Herne Bay) 0227 361141 after 8pm.

● SCANNING rcvr with 12 xtalled channels and VFO tuneable from 140-152MHz. Fitted with 7 most popular marine band xtals. Exc. cond: £95 ono. FDK Palm II 2m handheld tcvr. Exc. cond: £75 ono. TU1000 RTTY terminal unit. Offers. (Canterbury) 0227 458970 after 8pm.

● COMPLETE station for sale. Yaesu FT757GX, FP757HD PSU, mic, boxed, manuals: £700. Linear amps Ameritron AL80A 1000W PEP SSB out: £650. Daiwa CNW518 ATU: £150. Buy complete station and FRB757, FL1000 low-pass filter free. G0DSI not QTHR. 091-482 0593 eve.

● YAESU FT101Z HF tcvr with fan in pristine cond. Used transverting only: £425. FTV901R tvtr 2m 70cm modules: £250. Both: £600.

Spectrum TR2-10 tvtr with repeater shift: £50. TR6-10 6m: £50. Both tested and aligned. Jim, G1SET QTHR. 0604 713394.

● R109A rcvr c/w orig. working insts. Beme Inop RDF set with orig. spkr and headset! Eagle SH550 rcvr with h/book. Will separate. Offers, P.Norton G6EGT. (Taunton) 0823 277592.

● TR751E Trio with mic, m/bracket, VS1 synth, boxed, as new: £425. 3xQY3125 linear, tuneable 23-60MHz, in-built blowers, only 1cu.ft vol. ex-military: £100. Spare QY3125: £10ea. 600V 19in rck PSU about 0.5A: £30. Chris, G8JFJ not QTHR. (Horndean) 0705 596836 eve.

● MODEL railway Roco Fleischmann Klein rolling stock, Peco points, motors, track. Fleischmann manual, turntable, Klein overhead. Cost approx £400. Sell: £185 or exch standard C120 or similar 2m phone. All as new, boxed. Allan RS92246. (Newcastle)—091-286 1868.

● COMMODORE 64, Datasette, mouse and cheese: £90. 2 disk drives: £80ea. Colour monitor: £90. Plus s/ware for packet, RTTY/AMTOR/SSV etc. Plus games. All VGC: £300 the lot. G4CEY QTHR. 0832 4355.

● AERIAL HQ1 Mk2 requires 2 spokes: £125. Rotator: £30. Also 8ele 2m quad, never used: £30. Phillip, G0JXR QTHR. 0992 468522 Sat or Sun afternoons.

● KENWOOD TS680S mint cond, MC43S mic and 500Hz CW filter: £775. G4YSN QTHR. 02572 793872.

● HQ1, rotator, mast: £110. HF5 vert: £35. 2m Jaybeam 5ele: £10. Slim Jim: £3. 2x Creed 444, 2x tables, ST5TU: £60. Rotel tuner/amp: £20. Goodmans ditto: £20. Goldring turntable: £18. Garrard SP25: £10. PF1s, chrg: £20. G4EYZ QTHR. 0453 47555.

● HEATHKIT HW101 SSB tcvr c/w spkr/PSU, CW filter, desk mic and manuals. Good cond: £180. G4DBI QTHR. 0684 566728.

## WANTED

● 60FT mast, HF linear FL2100B/Z or similar, 70cm tvtr 144lf preferred, FAS1 4R ant selector, FV102DM heavy duty, rotator G0CRT QTHR. (Leics) 0455 282168.

● COMMODORE plus 4 compatible disk drive and printer. Also Plus Four programmers reference guide or other literature, not users manuals. G3NPF QTHR. 0403 66290.

● PLANS for 10m mono-band wave amp. Tim. (Yorks) 0377 89257.

● VERSATOWER M100 mobile lattice tower assembly inc base plated post rotator to match trailer already in my possession. Versatower preferred but would consider other makes for suitability if available. D.Henry, GUOHRY, La Mare Hallia, Salline Rd, St. Peters, Guernsey, CI.

● HEATHKIT SB101 cir. diag, as supplied on separate large sheet with orig. h/book. Good photocopy will be OK. Will pay expenses etc. Stewart Rolfe, GWOETF QTHR. 0248 353833.

● YAESU FV102DM ext VFO for FT102. Top price paid for one in mint cond with cables and h/book. G0IWD QTHR. 0543 252556.

● SUITCASE radio B2 and A Mk3 wanted. Also any clandestine type radios, manuals in any cond. for spares or restoration. (For small collection). G4OFO. 01-949 2317.

● 2542 or Drake R4245. 0745 884858.

● TRIO 751E multimode, purchased late Feb 89. Mint, boxed with mic. Hardly used. Owner decided against mobile use. Ideal for basestation which owner already has. New price £599. Sell for: £475.00 for quick sale. G4SIB QTHR. 030677 362.

● PYE low-band single channel AM type W15 dash mount. Inc mic. Chris, G3VBI QTHR. 0405 3182.

● CIRCUITS, h/book, any info for: Eddystone rcvr model B34, WW2 RN. Paros SSB tcvr model 22TR and Emperor HF linear model LA100. Please advise cost of copying for refund in advance. Will QSL all offers. Also looking for frequency readout dial film for ex-army R210 rcvr. C.W. Nootenboom, Escrow Club Oakdale, Radio Amateur Section, PO Box 2132, Bellville, S.Africa 7530.

● SHACK clearout? QSL cards prior to 1970 wanted for reference collection. Can collect or refund postage. G4UZN QTHR. 0532 693892.

● LARKSPUR equip. C11 TX, ATU No7, PSR No30, rotary PSU, ALS, A Box, E Box, B48, B47, connecting cables, C13, manuals, WHY? Will pay cash or exch. G0JNT not QTHR. (Grimsby) 0472 752794.



## MEMBERS ADS

● ARGOSY 525 or similar HF LW tcvr. Homebrew loop. Manual for Marconi Marine Pacific RX. Cash waiting. Tony, Flat 6, GOKUL. (Bognor) 0243 865468 after 7pm.

● WANTED for special project. RAF air publications AP1086, stores ref nos. Issue One 1938-52 Part 10 all sections. Exc price offered. Other APs on radio, radar and nav. equip also required, together with rotary or static cvtr, preferably AC input giving output of 80V, 2000Hz up to 5A. Other input voltages may do. Martin Gee, 17 Foxley Close, Mountford Est, Ferncliff Rd, Hackney, London, E8 2JN. 01-254 9083 or 01-790 2846.

● OLD timer just relicensed requires KW2000 ATU, low-pass filter, BC221, 10GHz gear. Harry Woodhouse G3MFW. (St.Austell) 0726 73608.

● DRAKE R7 or R7A late serial number. Also Waters rejection notch unit. 0743 884858.

● UNEMPLOYED SWL requires one pwr meter, power pack, frequency meter and some old Midland 3001/2001 radios all for HF electronics training. Can only pay a small amount for each item and will pay post. Ken. 0208 880603.

● OPERATING inst booklet for Taylor 45A valve tester. Original or photocopy. Buy or loan. Your reasonable price. Brown, G4PJN QTHR. 0895 421234.

● 85/100KHZ IF txmers, Denco Electronics or from stripped BC453. Old ARRL, RSGB h/ books. Also wanted PLL suitable to VFO Pye basestation on 2m or circuits, construction for VFO at 134MHz. G8HLJ. 051-346 1270.

● OLD or new Hy-gain TH3 Mk3. Mike. (Sussex) 048649 883 day 0403 732851 eve.

● PENSIONER wants to get back on air, particularly top bands. Can go to £350 inc mic. FT1012D or similar. G3EFK QTHR. Dorset.

● HELPI Does anyone have a h/book, circuit or any data for a GEC Courier, type RC550TR 3ch h/hold tcvr. Will copy and return. All expenses refunded. Gary, G0CUQ QTHR. 01-514 8346 after 6pm.

● HF element 100W or less, cheaper the better, for Bird 43. G3SLI QTHR. (Reading) 0734 474992.

● RADIO and TV leaflets from any period for display in the Wireless Museum. Quad spkr, wire recorder, magazines, books, catalogues. Wartime/pre-war "Radio Times". BBC and Hi-Fi Yearbooks. Mics, keys, car radios. Cartridge recorder. G3KPO QTHR. (Ryde) 0983 67665.

● RADIO compass, magslips, selsyns etc for beam indicator. (Oswestry) 0691 831111 eve-w/e.

● S/H Weyrad IFs T41/1E, T41/2E, T41/3T, 470kc/s or Denco IFT18. Also blue/yellow/red Denco RF coils. Transistor or valve ranges 2 and 3, or non-worker or incomplete radio using the above. Dave. G4WCD. 0482 509898 eve.

● FT1012D, ideally Mk3 for radio club use. Only have £400 to spend. Dave G4GWG (Wigan) 0942 211397.

● DETAILED drawings and/or components to enable the reconstruction of a Baird television for demo purposes. Also Weco valve type 215A. Pete, G4JNU QTHR. (Reading) 0734 477573.

● 1132A h/book or any info published on this RX to assist restoration project. G8KZS QTHR. 0509 507821.

● MORSEMAN tutor, PCB or part complete, working or not. G4FSN QTHR. (Bolton) 0204 691536 eve.

● MARCONI test gear. TF1246, TF1247, TF2170, TM5728A, TM4520. Prefer GWO. Manuals wanted for TF1245, TF2002B. G4FIT. (Reigate) 0737 241491 w/e.

● R1475 RX in good cond. G3VXI QTHR. 0521 6382.

● ALTRON telescopic 15ft sections tiltover mast c/w ground post, auto brake winches. G4PZD QTHR. (Morecambe) 0524 414030.

● CIRCUIT diagram plus any other tech.info Drake FS4 synthesiser. Return of all documents and payment of expenses sure would consider offer to repair at reasonable cost. G8RW QTHR. 01-462 1592.

● FC707 HF ATU, FP707 PSU wanted. Exch for FT209R H/H 30W linear. MH12 spkr/mic. PA3 chrgr. 5/8 mag mount VGC boxed with manuals. Similar quality required or WHY? Yaesu. John, G1RKE QTHR. (Northampton) 0604 415874.

● FC901 ATU and SP901 spkr. GOKBS. 051-722 2898.

● NICK is looking for Eddystone HF valve rcvrs, scrap, damaged, unrepairable and spares, single items or lots. Leave message with items and phone number. 01-852 4065.

● RACAL RA17L in good working cond. Will collect in E.Mids, E Anglia or London areas. Also wanted LF adaptor for above. 0353 720583.

## EVENTSDIARYEVENTSDIARYEVENTSDIARYEVE

## CLUB NEWS

**DEADLINE** - Items for inclusion in the SEPTEMBER issue must be sent to HQ marked "Club News - DIARY" to be received by Tuesday 18 July latest.

If news is received by the published deadline, it will appear in the listing. It is your responsibility to ensure that items are sent DIRECT to HQ in good time. News items should be sent in writing, preferably typed or written legibly, and be signed by the club secretary or the person responsible for publicity.

### AVON

- Bath & DARC - Jul 5, video night; 19, visit and talk by RLO.
- South Bristol ARC - Jul 12, VHF NFD; 5, talk "Pictorial History of WD & HO Wills" by Fred Rice; 12, 20m activity evening; 19, 2m activity evening; 19, Committee meeting; 26, CW activity evening; Aug 2, lecture "Skin Diving" by G30UK.
- Thornbury & DARC - Jul 5, Amateur TV; 19, HF activity.
- Weston Super Mare RS - Jul 3, 7.30 for 8pm, talk by Shaun O'Sullivan, G8VPG, RSGB Avon Liaison Officer; 17, constructors' night, Woodspring Hotel, Worle; Aug 7, Annual DF Hunt.

### BEDFORDSHIRE

- Bedford & DARS - Jul 4, "Amusing Anecdotes" by John G3FWA. 18, "QRP Masters the Power and Antennas that did it!" by G4MEW; Aug 1, 15, Social nights at Allens Club.
- Dunstable Downs RC - Aug 20, "DF/Treasure Hunt". Tony Kelsey-Stead, G0COQ, tel 0582 508259 (24hrs).
- Shefford & DARS - Jul 1, 2, VHF NFD at Topleys Hill; 10, Visit to Royal Observers

Corps HQ, 8pm, Biddenham, Bedford; 27, Club Barbeque.  
► Aylesbury Vale RS - Jul 5, Aug 2, 8pm, Hardwick Village Hall, 3 miles from Aylesbury.

### BERKSHIRE

- Maidenhead & DARC - Jul 6, Foxhunt on 2m; 18, Talk on Amateur Television.
- New Secretary Neil Savin, G8XYN, 7 Bannard Road, Maidenhead, Berks SL6 4NG, tel Maidenhead 25952.
- Reading ARC - Jul 13, talk "Interference - its cause and treatment" by Ian Jackson, G30HX; Jul 22, talk "100kW from the Seychelles" by Dick Wittington.
- Caversham Conservative Club, Mill Road, Caversham, Reading, Berks.

### CHESHIRE

- Chester & DRS - Jul 11, "Computer Aided Design for Radio Amateurs" G3GKS; 18, Bar-B-Q; 25, "Your Questions Answered". Chester RUFC Complex, Hare Lane, Vicars Cross, Chester CH3 7DB.

### CLEVELAND

- Stockton & DARG - Wednesdays, 7.30pm, Billingham Community Centre.

### CLWYD

- Delyn RC - Aug 1, talk by Dr Mike Dixon on "Microwave Radio" 8pm, Daniel Owen Centre; 15, Cheese and Wine evening (bring spouses), venue to be announced.

### CORNWALL

- Mounts Bay ARG - New Chairman, Dennis Stokes, G0BBA.

### DERBYSHIRE

- Alfreton & DARC - Jul 3, Visit Derbys Fire Station Control; 9, Special event 5tn, Crusader Bowman Archery Club; 10, "Sonar" by G8TSQ; 17, Fox Hunt; 24, Natter night; 31, Night on air; Aug 7, Fox Hunt; 14, "Steam Locos" by G4NXB.
- Buxton RAs - Secretary: Derek, G4IHO.

new telephone number 0298 5506.  
► Derby & DARS - Jul 5, Junk Sale, 7.30pm, 119 Green Lane, Derby.

### DEVON

- Exeter ARS - Jul 10, Annual Construction Competition; Aug 14, Free and Easy evening. 7.30pm, Community Centre, St Davids Hill, Exeter.
- Torbay ARS - Jul 1/2, VHF National Field Day contest at Little Halden, nr Teignmouth; 7; 14; 21, "Medium Rare - Radio in the Channel Islands"; 28; 29, Special event station GB2APF at Apple Pie Fair in Marldon, Torbay; Aug 4, Club night; 11, Club night; 18, new Secretary W F Hipwell, G3HTX.

### DORSET

- Flight Refuelling ARS - Jul 2, NFD (no normal meeting); 9, "RIS and the radio amateur" by the Radio Investigatory Service; 16, Raven System update by S. Hudson, G4CEL of FR Ltd; 23, Open meeting: The forthcoming Hamfest. 30, Hamfest: apportioning the work.
- South Dorset RS - Jul 1, VHF NFD. 4, "ATV" talk and demo by G4NTS. 22, Club annual Bar-B-Q. New venue Weymouth Football Club Stadium, Radipole Lane, Weymouth. New Secretary Geoff, G4FJO.

### CO.DURHAM

- Houghton-le-Spring ARC - Now meets Thursdays, 8pm, Fencehouses Comrades Club, Eastfield House, behind Station Avenue North, Fencehouses, Houghton-le-Spring. Details Foster, G0ABF, tel 091-584 4673.

### ESSEX

- Braintree & DARS - Jul 3; 17, "Live Broadcasting" by Henry, G1GMM; Aug 7, 7.30pm, Braintree Community Association Centre, Victoria Street, Braintree.
- Chelmsford ARS - Jul 4, "VHF Contest Operation" by G4FRE.

## HELPLINESHELPLINESHELPLINESHELPLINESH

In case you're a new reader of RadCom, or you've hitherto slung this bit in the WPB, "Helplines" is where we try and put you in touch with others who can help solve your problem, find your long-lost mate or whatever. We've scored some notable successes in our time, so if you think we can help just drop us a line and let the Power of the Press come to your assistance (can't you give him a pill or something? - Ed).

### GV0ISO QSL

Anyway - first, R T Walker, G4PRI, is another reader seeking QSL cards from GV0ISO, GV4LIB and GV4OPE. Does anyone know whether any were actually sent by the operators of those stations? Mr Walker adds that neither GB4RM nor GB4HMS seem to have produced cards either - tut tut, not what we expect from the Senior Service, chaps.

### TOM BEAUMONT - WHERE ARE YOU

F J Chandler, G3HHM (ex-DL2PD) is looking for an amateur he knew in the late 1940s. He writes, "We were both in No 1 Wireless Regiment, Royal Signals, located in the province of Schleswig-Holstein in North Germany. His name is Thomas H Beaumont and he held the British Forces callsign DL2GU (or was it DL2GC?). Mine was DL2PD and he helped me to obtain it. I have an idea that Tom had a UK callsign too, in the early G3-3 series." Anyone with any news of Thomas H Beaumont is asked to write to G3HHM at Selbourne House, Newfield Road, Hagley, Stourbridge, West Midlands DY9 0JR.

### MICRODOT EPROM PUZZLE

Mr L S Gumbrell, G2BAH, has a query about a Microdot communications terminal. He asks,

"Now that it is a requirement to identify oneself in CW at certain times during an RTTY transmission, how does one set about inserting one's callsign into the 2532 EPROM so that if the 'DE' key is touched when you're transmitting RTTY, it sends out the callsign in Morse?" Mr Gumbrell adds that the manufacturers are now defunct and that the EPROM currently has the previous owner's callsign in it. He has a new blank EPROM and the handbook. Data wizards are asked to help out - please write to 53 Park Street, Kendal, Cumbria LA9 5OP.

### REDIFON 'SAFARI' TRANSCEIVER

Mr J Haliburton, GM4AQO, purchased a Redifon 'Safari' transceiver at last year's NEC and is wondering whether anyone has (or can tell him where to find) a front cover/speaker grille for this device. He's also after coil sets A, C and E. Those who can help, drop him a line at 32 Glenbervie Road, Kirkcaldy, Fife KY2 6LQ.

### GETTING THE HEAD TOGETHER

Jason Ingram, G7BSK, has recently obtained an old Avo multimeter type CT38. He's managed to get most of it working but isn't sure how the RF Head Unit works. Anyone who has a manual, circuit diagram or any other information which will help is asked to contact him on 0427 811051 after 4.30pm.

### RECOVERED EQUIPMENT

Finally this month, some good news for somebody - but we don't know who. The

Avon & Somerset Constabulary have "recovered" (good word, that) the following stolen equipment:

1 Heathkit SB401 transceiver

1 Heathkit SB303 receiver

1 Eagle RP14S relay

1 Heathkit SB650 frequency display

If you've lost anything like this recently or have any information about any of it, Detective Constable Barber on Wells 73481 would love to hear from you.

### CORRECTIONS TO THE W6HPH INDUCTANCE METER

Once again the bugs have hit - this time with some details within the June RadCom article "W6HPH Inductance Meter Revisited". It transpires that all of the diodes in the original circuit (Fig 1) were 1N914, and not 1N4148 as marked. The pair of 1N198's in the meter circuit were correct. In the modified circuit's oscillator amplifier, the preset pot R5 should be 100kΩ, and not 10kΩ as shown. In the text, the measurement of output levels of five of the six frequencies used in the design was apparently checked at 2.9 volts, and not 2.0 volts. And finally, at the top of the right hand column on page 49, the reference to 1.0μm should have read 1.0μH. Apologies to anyone misled.









## 14 JULY

- ▶ GB0CDB - COASTAL DEFENCE B, FORT BROCKHURST, GOSPORT, HANTS: SU 597 020
- ▶ GB2NSC - NEWLANDS SPRING COUNTY PRIMARY SCH, CHELMSFORD ESSEX
- ▶ GB4AAW - ASTON ACTIVITY WEEK, ASTON COMPREHENSIVE SCHOOL, SHEFFIELD
- ▶ GB4BG - BBC SCOTLAND, BROADCASTING HS., ABERDEEN
- ▶ GB4RAF - RAF BENSON AIRFIELD, OXON
- ▶ GB5ST - SEMAPHORE TOWER, CHATLEY HEATH, COBHAM, SURREY
- ▶ GB6AAW - ASTON ACTIVITY WEEK, ASTON COMPREHENSIVE SCHOOL, SWALLOW NEST, SHEFFIELD, S. YORKS

## 15 JULY

- ▶ GB0WSF - WARESIDE SCHOOL FETE, WARESIDE, WARE, HERTS
- ▶ GB2BHF - BULLWOOD HALL FETE, HMYOI PRISON, HOCKLEY, ESSEX
- ▶ GB2RGP - RISLEY GARDEN PARTY, RISLEY HALL, DERBYSHIRE
- ▶ GB4BHG - BALLOCH HIGHLAND GAMES, CHRISTIE PARK, BALLOCH, GRAMPIAN
- ▶ GB4KC - KELVIN CARNIVAL, KELVIN COMMUNITY CENTRE, SHEFFIELD, S. YORKS
- ▶ GB4PCP - PEMBRY COUNTRY PARK, CEFN SIDAN, PEMBRY, DYFED
- ▶ GB4USA - USAF, BENTWATERS AIR BASE, SUFFOLK
- ▶ GB4VVR - VINTAGE VEHICLE RALLY, ROYAL VICTORIA COUNTRY PARK, NETLEY
- ▶ GB6SF - SEMLEY FETE, SEMLEY SCHOOL, NR SHAFTESBURY, DORSET
- ▶ GB6WR - WEAVING REVELS, WEAVING VILLAGE HALL, MAIDSTONE, KENT
- ▶ GB8BBC - BBC CLUB SPORTS GROUND, MOTSPUR PARK, NEW MALDEN, SURREY

## 16 JULY

- ▶ GB2CDU - COASTAL DEFENCE, BEMBRIDGE FORT, BEMBRIDGE DOWN, I-O-W: SZ 627 860
- ▶ GB5CR - CANCER RESEARCH, TREDEGAR HOUSE & COUNTRY PARK, NEWPORT, GWENT

## 17 JULY

- ▶ GB4GC - GREENFORD CARNIVAL, MIDDLESEX

## 20 JULY

- ▶ GB2NIS - NORTHERN IRELAND
- SCOUTS, GOSFORD FOREST PARK, MARKETHILL, CO. ARMAGH NORTHERN IRELAND
- ▶ GB8ACF - ARMY CADET FORCE, MOD TRAINING AREA, PENHALE, CORNWALL

## 21 JULY

- ▶ GB2RCC - RADIO CARAVAN CAMPING, NARROW BOAT PUB, WEEDON: SP 675 591
- ▶ GB4SDL - SCOUTS DISCOVERY, LONGLEAT - CANCELLED GB8FC - RFC, SCIENCE MUSEUM, WROUGHTON AIRFIELD, SWINDON

## 22 JULY

- ▶ GB0NTF - NINE THREE FOUR, THORNDON COUNTRY PARK, BRENTWOOD, ESSEX: TO 637897
- ▶ GB2ALG - ANSTRUTHER LIFEBOAT GALA, LIFEBOAT SHED, ANSTRUTHER HARBOUR, FIFE
- ▶ GB2AMR - ANGLIAN MOBILE RALLY, HIGHWOODS LEISURE CENTRE, COLCHESTER, ESSEX
- ▶ GB2GPD - GILWELL PARK DISCOVERY, CAMP SITE, GILWELL PARK, CHINGFORD, LONDON
- ▶ GB4CF - CARRICKFERGUS FESTIVAL, CARRICKFERGUS CASTLE

- ▶ GB8ALG - ANSTRUTHER LIFEBOAT GALA, LIFEBOAT SHED, ANSTRUTHER HARBOUR, FIFE

## 23 JULY

- ▶ GB4CDS - COASTAL DEFENCE, NETLEY CASTLE: SU 451 099

## 24 JULY

- ▶ GB2CPC - CASTELL PENRHYN CASTLE, BANGOR, GWYNEDD

## 25 JULY

- ▶ GB0SPD - SCONE PALACE DISCOVERY, SCONE PALACE GROUNDS, PERTH, TAYSIDE
- ▶ GB2ESS - EAST SUSSEX SCOUTS, BROADSTONE WARREN SCOUT CAMP & ACTIVITY CENTRE, FOREST ROW, E. SUSSEX
- ▶ GB2STH - ST. HELENS, BILLINGE, NR WIGAN

## 26 JULY

- ▶ GB0FAA - FLEET AIR ARM, RNAS CULROSE, HELSTON, CORNWALL
- ▶ GB2JDC - JAMBOREE DISCOVERY CYMRU, JAMBOREE CAMP SITE, PORT TALBOT, W. GLAMORGAN
- ▶ GB2SAT - UNIVERSITY OF SURREY CAMPUS, GUILDFORD, SURREY
- ▶ GB2VII - GO BACK TO TAKE SEVEN, ROYAL BATH & WEST SHOWGROUND, NR SHEPTON MALLETT, SOMERSET

## 27 JULY

- ▶ GB0UKE - UNIVERSALA KONGRESO ESPERANTO, THE BRIGHTON CENTRE, KING'S PARADE, BRIGHTON, EAST SUSSEX
- ▶ GB1CDX - COASTAL DEFENCE X, GOLDEN HILL FORT, FRESHWATER, I-O-W: SZ 339 879
- ▶ GB6CDY - COASTAL DEFENCE Y, YARMOUTH CASTLE, YARMOUTH, I-O-W: SZ 354 898

## 28 JULY

- ▶ GB0GDG - GILLINGHAM DISTRICT GUIDES, WHISTLEY LAKES, MILTON, GILLINGHAM, DORSET
- ▶ GB2KHS - KILMARNOCK HORSE SHOW, KILMARNOCK, Ayrshire
- ▶ GB2NTS - NATIONAL TRUST FOR SCOTLAND, CULZEAN CASTLE, MAYBOLE, Ayrshire
- ▶ GB2NTU - NATIONAL TRUST ULSTER, 'THE ARGORY' MOY, DUNGANNON, CO. TYRONE, N. IRELAND
- ▶ GB2NTW - NATIONAL TRUST FOR WALES, MANOR HOUSE, HOME FARM STACK POLE, NR PEMBROKE, DYFED

## 29 JULY

- ▶ GB2LSM - LONG SHOP MUSEUM, MAIN STREET, LEISTON, SUFFOLK
- ▶ GB5CVS - COBHAM VILLAGE SHOW, LEG O' MUTTON FIELD, COBHAM: TO 102 599

## 30 JULY

- ▶ GB0CDD - COASTAL DEFENCE D, FORT VICTORIA, NR YARMOUTH, I-O-W: SZ 338 899
- ▶ GB2GAV - GEC AVIONICS, GAV/BP CLUB, WERBURGH, ROCHESTER, KENT
- ▶ GB2MLB - MARGATE LIFEBOAT HOUSE, MARGATE, KENT
- ▶ GB6CDV - COASTAL DEFENCE, VENTNOR RADAR STATION, ST BONIFACE DOWN, I-O-W: SZ 569 785
- ▶ GB6GAV - GEC AVIONICS, GAV/BP CLUB, WERBURGH, ROCHESTER, KENT

- ▶ GB8CBS - CAR BOOT SALE, WALCOTE, NR LUTTERWORTH, LEICS

## 31 JULY

- ▶ GB0CDS - COASTAL DEFENCE, FORT SOUTHWICK, PORTSMOUTH HILL, PORTSMOUTH, HANTS: SU 628 069

## Mr MAC McBrayne

Known to us all as "MAC", G3KGU, died on 10 November 1988.

Mac obtained his licence in the pioneering days of 1955 and for 25 years held the honorary position of RSGB slow morse co-ordinator. In addition to this many amateurs own him a debt of gratitude for the selfless assistance he gave with his own weekly slow morse transmissions on top band.

Mac joined the Loughton & DARS shortly after it was formed and was an active member for the many years. For at least twenty of those years, he participated in the Club Net every Sunday morning. Although he resigned from the Club about five years ago, he still retained an interest in all its activities. This interest was emphasised by a financial contribution, his attendance at almost all the social functions, and support in visiting the Club on special event and field days.

Mac held, what some may call, old fashioned and very strong views about class B licensees and operation on 144 MHz, but would always give advice and practical help where needed. For those people who really knew him he will be sadly missed.

I am sure that everyone will join with me in expressing our deepest sympathy to his wife Gladys and son Ian, in their great loss. (G3OPA)

## JM Kirk, MBE, G6ZO

Jim Kirk was licenced as G6ZO in December, 1935, at the age of 17. Soon afterwards, he acquired a bug key which he used constantly. I do not ever remember having heard Jim make a mistake when sending, and other amateurs have made the same observation.

DX was one of Jim's lasting interests. In a QST of nearly forty years ago G6O appears in the DXCC Honor Roll "top ten" only a few countries behind the world leaders. He served throughout the war in the Royal Corps of Signals in which he rose to the rank of Major, and was appointed MBE. Jim, was by profession, an electronics engineer, and worked in a number of countries, including long spells in Chile and Belgium whence the familiar "ZD" call signs were regularly heard.

There was a large congregation at the memorial service on March 14 at St James United Reformed Church, Edgware, where Jim had been on the committee of management for over 20 years and an elder for almost as long. He greatly admired and supported the work of the Gideons, and was for a number of years the secretary and treasurer of the local branch.

We offer our sincere sympathy to Denise, and also to Bernard, Marianne and Martin and their families, and thank them for allowing us to share Jim's friendship over the years. (G6JJ)

Mr CW James, G31KV, 25.12.88

Mr SC Johnson, G3DMG, 8.88

Mr RG Judge, G3ZDJ

Mr NW Kemsley, G3WJK, 25.11.88

Mr KH Knight, RS90199, 8.88

Mr KF Lebeau, RS91614, 11.88

Mr AP Bailiff Lee, G8AVS, 20.12.88

Mr JS Macauley, G3DLQ

Mr LA Malandrone, G1BMO, 13.12.88

Mr J Maling, G5JL, 3.12.88

Mr C Marwood, RS88855, 1.11.88

Mr PN Marriage, G4JFE, 29.1.89

Mr TMA Milne, G14LGS, 31.10.88

Mr WH Morehouse, G4DK, 10.88

Mr LJJ Morgan, G2HNO, 18.11.88

LCpl Morris, RS87919, 11.88

Mr FC Mousley, RS85837

Mr DJL Over, G4TBB, 16.1.89

Mr J Parker, G1CGE

Mr A Perella, G3PBS, 19.11.88

HRH Royal Prince George, G0BDQ, 30.11.88

Mr HO Quade, G4SYP

Mr IP Richter, G0AVA, 26.5.88

Mr JS Rix, G8ZXP, 25.11.88

Mr CR Samm, G1VCW, 12.1.89

Mr GF Samson, G1SQD, 29.12.88

Mr JP Seddon, G4PH

Mr Sibson, G0AJV, 30.1.89

Mr R Smith, GW1JSU

Mr DM Spencer, G0HEC, 10.88

Mr JR Tulloch, GM6SFJ, 21.10.88

Mr GR Teague, G4DOU, 31.1.89

Mr S Thomas, GW3AX

Mr W Thompson, GW3PWE, 21.10.88

Mr J Thompson, GW0HGG, 7.1.89

Mr C Turner, G8NL

Mr HJ Withers, G6XA, 18.11.88

Mr GR Wolfgang, WP2ADC, 27.12.88

Mr K Wood, G1LCA, 1.9.88

Mr C Woods, G4DAI

Mr KG Aston, RS91633

Mr AS Andrews, G4XOA, 28.4.89

Mr WB Bee, G4TDX, 26.2.89

Mr EH Blacking, G1FFY, 14.3.89

Mr I Boyd, G1TGG, 26.4.89

Mr RPP Chapman, RS47628, February 1989

Mr CF Claydon, GM4GNB, 28.4.89

Mr KLB Dalby, RS16949, 14.2.89

Mr G Durrant, G4NGG, 10.4.89

Mr Rev D Dow, G4LHK, 6.5.89

Mr AR Goode, G8OHI, 4.2.89

Capt WE Ingram, G8VQW, 30.4.89

Mr T Kennedy, G6UC, 22.4.89, aged 80 yrs

Mr AH Marshall, G4PBM, 22.9.88

Mr GA Perrins, G3FBP, 5.5.89, aged 71

Mr W Pickard, G8KP, 6.5.89

Mr JC Rijkeboer, PA0XSA, 6.3.89

Mr JC Schofield, G4RBY

Mr TS Skelton, G3MWW, 22.4.89

Mr BA Wilbraham, G2ATU, 7.5.89



# the last ...

## CONTEST QRM

I have for some years, tried to understand the interest and/or mentality of amateur radio contesters.

Oh! I know, or rather I've read and listened, to their excuses for their interest in contests. Personally, apart from obtaining award certificates etc, I fail to see any aspect of self training in their noisy and often ludicrous activity. I have spent some time listening to these contesters and the one most obvious fact that I've observed, is that they are either congenial idiots or the worst liars I've ever heard.

How, I ask, in God's name can anyone give a 5/9 report then ask three times for the other station to report his call sign etc. Then there's the inequality between stations, for example a USA caller using a massive antenna farm, such as we've seen in the past in various mags, with 1-2kW of power or an Italian with a multi-element monoband beam with similar power or some poor QRP'er with 4W. If contesters wish to be taken seriously then it would be a good idea to equalise the stations. Perhaps limiting the stations to 100W using a half-wave dipole on the respective bands.

QRP contest seems to work exceptionally well, so why not limits to other HF contests? Otherwise, as things stand at present, the angry protests at the insufferable behaviour and inconvenience caused over contest weekends, will continue to rage, as it has done for many many years.

JD Bolton, G4XPP

## CB CONVERSION POSER

Concerning equipment for 27 and 28MHz, and following your report in the May edition of *RadCom*, would someone please clear up, unequivocally the last remaining ambiguity. If it is illegal either to possess or to modify CB equipment which does not conform to MPT 1320 or MPT 1333 specs, why in heaven does your article, and the information from the DTI keep repeating such phrases as "individual applications must be made to convert illegal CB equipment"? In short, if possession and conversion is illegal, what possible use does applying for authority serve?

It may interest readers to know that the

DTI is not the only Government Department whose responsibilities cover 27 and 28MHz equipment. HM Customs and Excise are responsible for controlling the importation of most things, including radio equipment. The importation of 27MHz rigs which do not conform to MPT 1320 or MPT 1333 is certainly illegal; therefore, as no such equipment is made in the UK, if you own such a rig it must at some point have been smuggled into the country. Whilst the Customs and Excise are unlikely to have the manpower to go knocking on the door of every radio ham in the country, it is worth remembering that if the possession of smuggled goods, knowingly or unknowingly, is not in itself an absolute offence, certainly the equipment is technically liable to seizure as forfeit to the Crown.

P Thompson, G3MEN

(You can be forgiven for finding the legislation confusing. It has changed very frequently (fortunately mostly for the better) in recent months. To clear up the ambiguity you mention, suffice it to say that it is illegal to possess or modify unlicensed CB equipment UNLESS an Authority is obtained from the DTI. Such an Authority required the equipment to be modified within a reasonable timescale. Although it is quite simple to get permission for a bona-fide conversion for amateur radio use, there may be difficulties if the rig is modified in such a way as to make it simple to restore to CB use)

## G3TSO TRANSCEIVER

I was pleased to read the letter from G3ROX in the May *RadCom* defending my article the Modular Transceiver and similar technical articles which have recently caused some controversy in your letters column.

Even since I produced the article I have received considerable support from the homebrew fraternity, small though it may be, but in the final analysis it is the number of amateurs that derive value from the article that matters.

I am now pleased to report, 6 months after the article was published that the number of amateurs actively engaged in the construction of the Modular Transceiver exceeds 80 and may well be approaching 100 as there are, no doubt,

others that I have not heard from directly. At least 5 Modular Transceivers are actually on the air proving that the design is repeatable with no great difficulty. G2CKM's article in this issue may well provoke more interest in the construction of homebrew equipment.

For those still interested in having a go but lacking the confidence to make their own PCBs, I still have a small quantity of commercially made boards available.

I would like to thank the many homebrewers for their continued support and I am pleased that the effort I put into producing the original article has been of use to so many people.

M Grierson, G3TSO

## 18 & 24MHz

I write concerning a most peculiar observation. Having recently retired I have found time to check the beacons, Italian and Brazilian on the 24.9MHz WARC band. Neither runs great power I believe. The latter sends the information that it runs 5W to a vertical quarter wave in fact! The signal is present on most days for many hours, often up to 55 on my receivers S-meter, yet the band is devoid of amateur signals, other than the beacons, for hour upon hour. The ever efficient purveyors of commercial equipment must have sold tens of thousands of sets covering the WARC bands. I enquire... why doesn't someone USE them — or rather the 24MHz band in particular? Perhaps they do and their signals do not reach into darkest Herefordshire! Maybe beacons use a special electromagnetic wave that gets here and these WARC rigs do not. After all if thermonuclear fusion "works" in water (of water mass!) ANYTHING is possible!

Come on fellow amateurs use or lose.

24MHz must have fewer non-radio amateur signals than any other band so why only 10W/dipole limit... still, please.

DJ Bradford, G3LCK

(A timely letter indeed! Let's hope that the de-restriction of the 18 and 24MHz bands promote an upsurge of activity.)

## PLANNED BAN OR BAND PLAN?

All readers of *RadCom* are regularly reminded of the voluntary band plan — which most people are happy to respect as being the best way of getting the most out of a limited resource. A small number of channels are allocated (if that's an acceptable word) to Raynet.

In the great metropolis of say London, Birmingham, and Manchester, I can understand that there might be pressure on simplex channels to such an extent that quiet 'Raynet channels' need to be used for other purposes. However, in rural (true!) Lancashire, this is not the case. This doesn't prevent some groups from holding their 'club' nets on 'Raynet channels' just to teach Raynet that there is no such thing as a 'Raynet channel' — whether there is a spare half megahertz free each side, or not!

Can I quote from the Government's Home Office publication 'Civil Protection', issue 10, Spring 1989, page 4, in which the Assistant Chief Constable of Dumfries & Galloway is quoted as praising the work of voluntary organisations and Raynet in particular. Referring to the Lockerbie air crash he said "The operation could not have been carried out in this way without Raynet because no other organisation could have provided the necessary communications."

Surely, with comments like these, no amateurs can doubt the benefits to the whole amateur service — even in purely public relations terms, from the help to the community as a whole provided freely by Raynet.

Could I appeal to all radio amateurs to respect the band plan, especially as not all rigs are synthesized and it is sometimes not easy to move channels at the drop of a carrier.

PC Mullineaux, G3XEN

## QSL BUREAU

Two of three recent comments in *RadCom* have given me the impression that the QSL bureau system is overstretched and that the Society would prefer it to be used rather more sparingly. If this is so then the system must be a victim of its own success.

Surely then the way forward is not to discourage the customer but for the Society to invest more resources in the facility. I think it might be interesting to know how many members place a high priority on a well resourced and efficient QSL bureau system and whilst organising prize draws and promoting credit cards will no doubt generate income I have a suspicion that Members' subscriptions form the bulk of the Society's finance.

I offer these comments constructively as one who uses the Bureau system frequently. I appreciate the service and obtain a great deal of pleasure from it. I don't want to be discouraged from taking full advantage of it.

JC Hall, G3KVA

## REBYRNE and the Bore....



Art: GALEN 28 Story: GAULS and QUINTUS IRRATIUS PLACID

## HAM-FISTED HOMEBREW

I do not like amateurs being discouraged from home construction because of their fear of acquiring practical skills. In my experience less dexterity is required for home equipment manufacture than for the more complex operating skills such as CW and RTTY. You can solve many constructional problems by forward planning and ingenuity. Rough drawings of ideas and calculations are also useful as paper is cheaper than components and sheet metal.

TE Hall, G8HFW

# ... word





# ICOM

## Count on us!

# IC-765 HF ALL BAND TRANSCEIVER



We enjoy listening. It's part of what we do well. So when ICOM heard you talking, our engineers designed a transceiver specially for you – the serious DX enthusiast with worldwide contacts in mind. The result is the new super advanced IC-765, an HF all band transceiver built to expand your HF world.

The IC-765 is equipped with ICOM's exclusive DDS (Direct Digital Synthesizer) System, a fully automatic antenna tuner, an electronic keyer with iambic operation and a full break-in function.

### Fully Automatic High Speed Antenna Tuner

A built in CPU automatically memorises the pre-set position of each band without pre-set controls. Tuner speed is ultra fast since tuning starts from a preset position. If the tuner cannot tune from the previous preset position, the re-try function changes the preset position and memorises the best position.

### 10Hz Digit Display

The large fluorescent display shows 7 digits for the operating frequency, the 10Hz digit is displayed.

### Band Stacking Register

Each band memorises the last used frequency, mode and IF filter condition (narrow or wide).

### Complete System for CW Operators

The IC-765 has many advanced functions for CW operators such as CW pitch control, a built-in electric keyer, a keying speed control and high speed full break-in capability.

### New PLL Circuit

The advanced ICOM DDS System ensured high speed PLL lock-up times, clear signal emissions, and high C/N characteristics. A high speed PLL provides very fast CW full break-in performances.

### Convenient Miscellaneous Functions

- 105dB dynamic range
- 10dB preamp and 10, 20 30 dB attenuator
- 99 memory channels
- Split memory on channels 90-99
- Built-in FL32A and FL52A CW narrow filters
- Programmed scan and memory scan
- IF, shift and Notch filter
- Fast/Slow/OFF Selectable AGC
- RF type speech compressor
- Noise blanker
- DATA switch for advanced data communications

## Icom (UK) Ltd.

Dept RC, Sea Street, Herne Bay, Kent CT6 8LD. Tel: 0227 363859. 24 Hour.

**Helpline:** Telephone us free-of-charge on 0800 521145, Mon-Fri 09.00-13.00 and 14.00-17.30. This service is strictly for obtaining information about or ordering Icom equipment. We regret this cannot be used by dealers or for repair enquiries and parts orders, thank you.

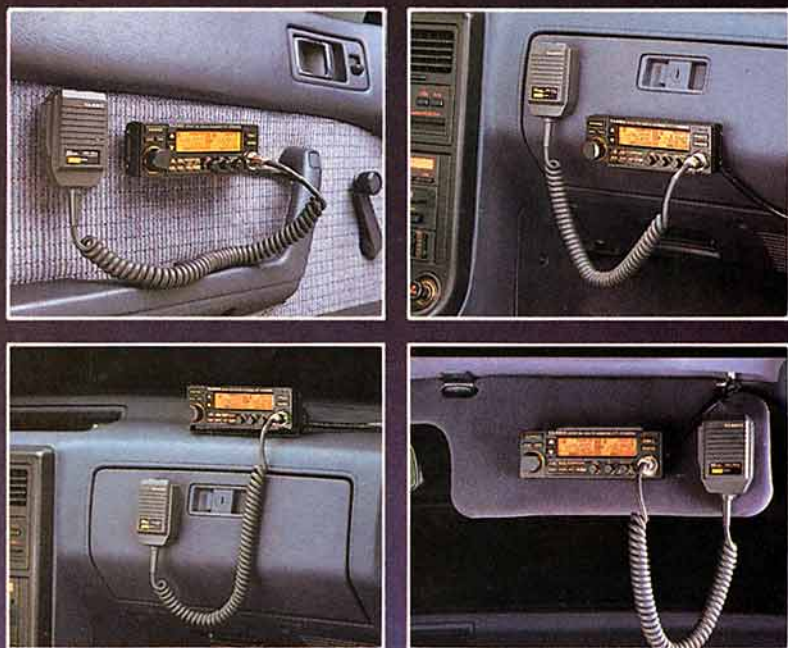
**Datapost:** Despatch on same day whenever possible.

**Visa & Mastercards:** Telephone orders taken by our mail order dept, instant credit & interest-free H.P.





# YAESU'S DUAL BANDER GOES PLACES OTHER MOBILES DON'T.



FT-4700RH control head  
(1<sup>15</sup>/<sub>16</sub>" x 5<sup>7</sup>/<sub>8</sub>" x 1")

**Introducing Yaesu's FT-4700RH dual-band mobile.** Choose Yaesu's FT-4700RH, and you open the door to a lot of tight spaces.

While other dual banders just won't fit in today's small cars, the FT-4700RH utilizes a versatile "remote head" design. So you can mount the "brains" on your dash, visor, or door, and hide the "muscle" under your seat. Optional YSK4700 required for remote operation.

## **High-performance package.**

Packing a solid 50-watt punch on 2 meters (40 watts on 70cm), the FT-4700RH includes Dual-Band Watch for simultaneous monitoring of both bands, with independent squelch settings on the main and secondary bands. When you transmit, opposite band monitoring goes on in a full-duplex mode.

You can adjust the relative volume of the two receive channels with the balance control, too. And with Yaesu's bright LCD display, transceiver status is clearly visible in sunlight or shade.

## **Convenience on the road.**

Human engineering, long a Yaesu speciality, is an important aspect of the FT-4700RH design. The ten-button front panel keypad includes a "do-re-mi" audible command verification, and all important controls are backlit for night operation.

Frequency range 144-146MHz on 2m and 430-440MHz on 70cm. Nine memory channels on each band. High/low power selection (low power five watts). One-touch reverse repeater shift button. Optional CTCSS module. And 16-key DTMF microphone.

**Optional accessories.** FTS-8 CTCSS unit. MH-15D8 DTMF microphone with 10-telephone number memory. SP-3 or SP-4 External Speakers. And YH-1 Headset/Boom Mic or MF-1A3B Flex-arm Boom Mic, both with SB-10 PTT Switch Unit. YSK4700 Remote Kit.

**Discover Yaesu's FT-4700RH today.** And see what "high performance" really means. For dual-band mobile operation Yaesu's FT-4700RH really fits! Call us today for details of your nearest authorised Yaesu dealer.

South Midlands Communications Ltd,  
S M House, School Close, Chandlers Ford  
Industrial Estate, Eastleigh, Hampshire, SO5  
3BY. Telephone (0703) 255111, Fax (0703)  
263507, Telex 477351 SMCOMM.

# YAESU