Volume 71 No 7 July 1995

RadCom

Radio Communication

The Journal of the Radio Society of Great Britain

THE VOICE OF AMATEUR RADIO FOR 82 YEARS

IMPORTANT LICENSING NEWS

- Page 8

Two Exciting New Books From the RSGB

THE THREE POINTS OF THE KENWOOD TRIANGLE REPRESENT ADVANCED TECHNOLOGY, QUALITY AND STYLE

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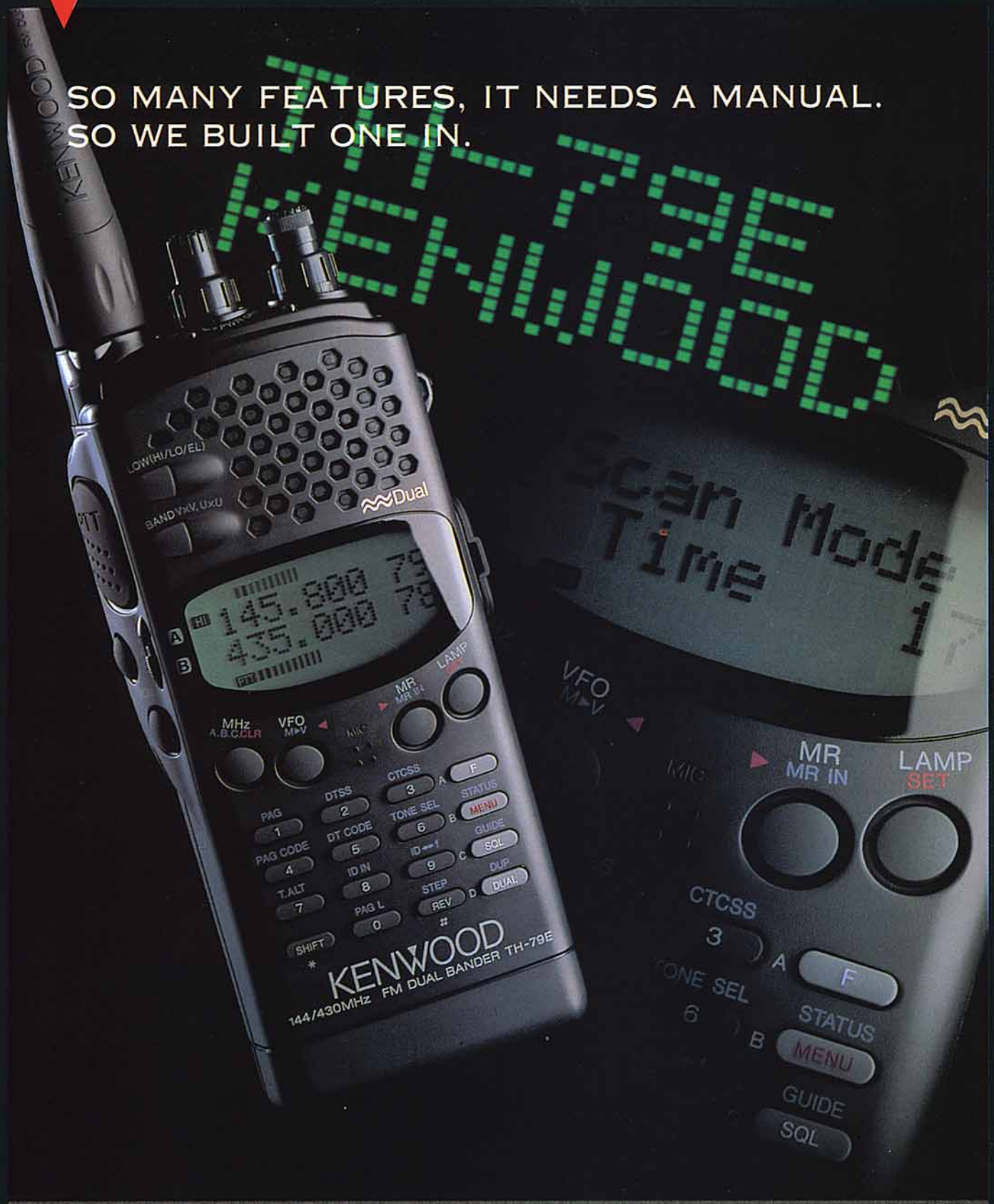

Kenwood's TH-79E marks a new high in user-friendly handheld tranceivers. This slim-line FM dual-bander features a dot matrix LCD menu, which helps you to access the many class-leading features of this stylish unit.

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The latest books published by the RSGB: *Practical Transmitters for Novices* and *Test Equipment for the Radio Amateur*. See This Month's Book choice, P56.

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Kenwood TH-78 Twinbander....one owner	**£349**
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Kenwood TS-830S Classic HF Trans. V.G.C.	**£595**
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Steepletone MBR7 Basic Beginners Receiver	**£45**
Trio 9R59D - Basic Beginners RX	**£150**
Yaesu FRA7700 Active Desktop antenna.	**£45**
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Yaesu FRG8800 Later Mod+Int. VHF Conv	**£495**

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Fairmate HP1000 W.Band Cov1300MHz	**£195**
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Realistic PRO-50..Clean Example.	**£95**
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Trident TR980 - Wide Band,Boxed	**£145**
Trident TR-2400 Handheld with SSB.	**£299**
Yupiteru MVT-3100 H/held...Good Cond	**£185**
Yupiteru MVT-7100 H/held model c/w SSB	**£265**
Yupiteru MVT-8000 - Base, Nice example	**£245**
Yupiteru VT-125 Civilian Airband	**£125**

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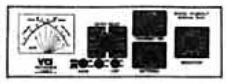

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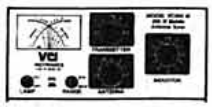

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UK associate member under 18: £16.00. Family member: £14.00
Corporate (Concessionary): £27.00 over 65 or full time student under 25. (Applications should provide proof of age at last renewal date and/or include evidence of student status.)
Affiliated club or society/registered group (UK): £16.00 (including *Radio Commmunication*). (Subscriptions include VAT where applicable.)

Special arrangements exist for blind and disabled persons. Details are available from RSGB HQ.

Membership application forms are available from RSGB HQ

RSGB Main Switchboard:
01707-659015

The RadCom Leader

The RSGB - DSI - and YOU

AT ANY MEETING OF radio amateurs there are always a few that are not members of the RSGB and if questions get round to that subject the most frequently raised points are: *Why should I join?* and *What does the Society do for ME?*

The majority of amateurs reading this will know the answers, for they are members, but there are a few in the affiliated societies who are not. There are other non-members to whom members lend their *RadCom* and it is to those amateurs, and other non-members of the RSGB, that the Licensing Advisory Committee wishes to stress the following points.

THE DSI CONSULTATIVE DOCUMENT

Note the word: 'Consultative'. If we, the RSGB, representing the majority of licensed members did not respond there would be no 'consultation'; the legislation would proceed and the Amateur Service in the UK would have to accept the outcome.

Fortunately for you non-members, the RSGB has had a considerable input from members expressing their concern over the proposals and in many cases putting forward excellent arguments in support of the spectrum that we are currently allocated. Note our use of the phrase: 'currently allocated'

In spite of popular belief, the Spectrum available to the Amateur Service in the UK is 'allocated' - it is not given to us as a 'right'.

SO WHAT CAN YOU DO?

Please read the proposals. Form your own opinion and let us know your views.

Ideally join the national society. For although a lot of the work is also done by volunteers at no cost to the Society for time and expertise, there is a cost in arranging meeting rooms and travelling expenses. The number of members expressing their views adds weight to our input.

There is an extremely short timetable for any further views to be submitted by the RSGB to the RA. We need your views - PLEASE ACT NOW.

THANKS

Finally we wish to thank all of the members who have made representations to us - far too many to acknowledge individually at the moment.

The RSGB Licensing Advisory Committee

DSI Review of the VHF

FIRST, WE WOULD LIKE TO THANK all those members that have taken the trouble to respond to the request for their views following the outline of the DSI Phase 2 proposals in May/June *RadComs*. Without your input, we cannot claim in our submission to the RA that the opinions expressed really represent those of a large proportion of the licensed Amateurs within the UK.

So, how far have we got?

THE MEMBERSHIP response received so far ranges from anger and alarm, to a determination that the Society *must* take whatever steps are necessary to defend the allocations that currently exist. This, the Society's Licensing Advisory Committee will do.

But, we still need more input - we are writing to all Affiliated Societies requesting them to have the DSI Phase 2 proposals as an agenda item at their next meeting, and to write and inform the Society of their members' views. We apologise to those clubs who have already had the foresight to take this action.

The proposed loss of part of the 430 - 440MHz band has produced a very strong response from the membership, who believe this must be fought vigorously. The strongest views come from the ATV and packet users. Those using TV on this band see no viable alternative allocation, and the packet users feel that it would create serious problems for linking which is currently concentrated in the top and bottom parts of the band. Both of these would find moving to the microwave bands unacceptable because of the reduced ranges that would be obtained, and the cost of equipment. The reduction in spectrum would also put considerable pressure on the other activities in the band, including the satellite segment. The individual users and user groups and their special interest groups, BATC, BARTG, and AMSAT have expressed strong opposition to the loss. While the

IARU Input and RSGB Comments on the DSI

THE FOLLOWING IS a summary of the input that the IARU made to the DSI in early 1994, and the views that the RSGB is submitting to the RA in response to the DSI document (reproduced in full on page 30/31 in June *RadCom*). The IARU input to the DSI is given in italics for each band.

29.7 - 30MHz

a) *Retention of 28 - 29.7MHz Primary Exclusive (Status quo in UK).*

b) *Evolutionary return of 29.7 - 30MHz to Primary Exclusive (Not allocated in UK).*

We are disappointed that this additional allocation was not possible at present, particularly in view of the predicted growth in the number of amateurs in the next decade.

40.68 / 60MHz

The proposal for beacons at 40MHz and, in the future 60MHz, is welcomed as giving additional opportunities for propagation study. However we have some concerns about their value. There is potential for confusing the beacon signals with those from ISM devices. Higher ERPs than 10dBW will be needed to make them worthwhile.

50MHz

a) *Retention of existing Amateur Primary Exclusive allocations (50 - 51MHz Primary in UK, on non-interference-basis (NIB) to overseas services).*

b) *Primary allocation of at least 2MHz in all Region 1, of which 500kHz will eventually be Exclusive(UK 51 - 52MHz Secondary on NIB).*

We appreciate the proposals which have taken on board the IARU requests relating to 50MHz.

70MHz

a) *New allocation of at least 100 - 200kHz around 70MHz (70.0 - 70.5MHz Secondary in UK, on NIB to overseas services).*

We welcome the 100kHz CEPT wide allocation which has taken on board the request from IARU, but we are disturbed that there is a possibility that the existing 500kHz allocation may be reduced. It is essential to retain the current allocation of 70 - 70.5MHz within the UK, particularly as we have enjoyed this allocation on a Secondary basis for very many years, during which a considerable amount of development work on data linking has taken place. It is also used for FM simplex operation. We trust that the full 70.0 - 70.5MHz allocation will remain in the UK.

144MHz

a) *Retention of 144 - 146MHz Primary Exclusive, worldwide harmonised allocation (Status quo in UK).*

b) *Access to 146 - 148MHz sought in Region 1 (Not allocated in UK).*

The report acknowledges the rate of growth of the amateur population and our usage of this band. We are therefore disappointed to see that no additional allocation is proposed, especially considering that the Emergency Services users in the 146 - 148MHz band will be moving up to 380 - 400MHz.

220MHz

a) *An allocation is sought beyond the DSI timescale (Not allocated in UK).*

b) *The possibility of some local allocations is sought on an NIB.*

An allocation here of about 1MHz would help alleviate the pressure on 430MHz, if that part of the spectrum is not to be expanded. We are disappointed that currently, no allocation is intended here, to match that in Region 2.

430MHz

a) *430 - 440MHz is sought on a world-wide Primary Exclusive basis. Initially a protected 5MHz segment (Secondary in UK, some restrictions).*

b) *Deletion of footnotes adding the Fixed and Mobile Services in 430 - 440MHz.*

c) *Continuation of current sharing arrangements in 420 - 430MHz (Not allocated in UK).*

d) *Maintain existing footnote allocations 420 - 430, 440 - 450 (Not allocated in UK).*

e) *Concern at the interference from, and the lack of specifications for, Low Power Devices at 433.92MHz.*

The IARU input endorsed the considerable importance that RSGB attaches to the 430MHz band, and while an upgrade of status for 6MHz of it is very welcome, the loss of 4MHz of the band is not an acceptable price to pay for this Primary status, particularly as half the remaining allocation is allocated to the Amateur Satellite Service. In many countries, including the UK, the size and status of this allocation have been considerably reduced from the Primary status it has been given in the ITU Radio Regulations, so the return to this is welcomed. Will the proposed Primary allocation be Exclusive?

This is the lowest band on which reasonable ranges can be achieved on conventional TV operation from home stations. The suggestion to move up to microwave frequencies, eg 1.3GHz, is unacceptable, as the ranges would be reduced unacceptably, and equipment cost and complexity increased, as repeaters would then be essential.

The packet data network makes heavy use of the edges and the middle of this band to provide linking between stations. Several frequencies are used at each station, and adequate frequency separation is needed to minimise the co-siting problems. Requests for speech repeaters on the 7.6MHz spacing have already been received to accommodate the need for greater coverage of the UK.

The talkthrough repeaters used by Raynet for emergency communications use 7.6MHz spacing on this band. The wide spacing is needed to allow co-siting with other links/operation, particularly in the larger emergencies.

There are many constraints on our operation in the 432MHz band. The DSI proposals are removing parts where a considerable amount of time and effort have been invested over the years, in many cases in conjunction with the Primary User, to establish clear areas where we can operate.

The DSI recommendations may be accepted in many countries, but not in all. The UK and other administrations have often opted out and had other local priorities in the past. The loss

UHF Bands - An Update

extension of 50 and 70MHz to other European countries, and additional beacon allocations were welcomed, it was felt that the other improvements in no way compensated for the loss at 430MHz.

This loss is particularly worrying, when the increasing restrictions on the microwave bands are also taken into account. The amateur bands are under more pressure now than they ever have been.

Threat to 10GHz from the 'Information Revolution'

A consequence of the DSI Phase 1, which reported a couple of years ago, has now surfaced, in that the RA have asked for our reaction to the possibility of losing 10150 to 10250 or 10300MHz. A DTI press release on 30 March announced consultation on "Local Loop radio services" - this means links to office premises and rural villages for digital telecoms services (ISDN), and is referred to in the DSI as "Point to Multipoint". This is a similar application to the Ionica system that appeared in the 3.4GHz band a few years ago, and is part of the promotion of competition in the provision of telecoms services, and the 'Information Superhighway'. We have already expressed our strong objections to this change. There are already a number of constraints on finding frequencies for unattended operation in this band, whether for personal beacons or for TV repeaters.

IARU Recommends Opposition

There are very severe, and growing, pressures on our allocations at present - it is in all our interests to defend them as vigorously as possible at every opportunity. The Society will be opposing these losses vigorously in its input to the RA, and a summary of its views on the DSI are outlined below. IARU Region 1 is recommending that all national societies oppose this loss.

Please send your views on both of these topics to: The Chairman, LAC, c/o RSGB HQ.

may be immediate, the other compensation may be a long time off.

It may be that our tenure of the band is safer when sharing with MoD, than with commercial users - The Amateur Service seems to share more successfully with MoD than commercial users.

We welcome Recommendation 29d from Section 10.10.1, regarding the phasing out of the 433.92MHz allocation. The comments on interference from 433.92MHz are noted, but we would like to see some shorter term improvements in equipment standards, particularly for receivers, to avoid further EMC problems developing. Radiated noise from such devices is a significant problem.

920MHz

a) *Seek some access in Regions 1 and 3 to 902 - 905MHz on a Secondary basis.*

The possibility of an allocation at 919.5MHz is welcomed, but we have concerns about sharing with other domestic ISM and low power users. DSI has already suggested that Low Power Devices move from 433.92MHz to 915MHz to avoid problems with amateurs. Can the 900MHz Amateur allocation be placed well away from these devices, or much tighter emission and filtering specifications be applied to these devices? Two allocations spaced by some 10MHz or more, for example within the Region 2 allocation, would facilitate use of this band for duplex data links and repeaters.

Regulatory Matters

We welcome the ability to use 50MHz under the TR61-01 agreement, and for amateurs to listen to beacons on bands that they are not licensed to use on transmit.

The Value of Amateur Radio

OUR SUBMISSION HIGHLIGHTS the value of the Amateur Service to the UK, which includes:

a) Self training in a wide variety of aspects of radio communications, eg:

Operating techniques

Conventional weak signal experimentation

Propagation research

Running a national network of speech repeaters on a low budget

Running an adaptive international data packet network

Television operation

Satellite operation

Many of these involve the new technology of the information revolution, eg computers and TV/video and appeal particularly to the young newcomers. Many of these activities need much wider bandwidths than conventional weak signal operation. The training ranges from the most basic, to state of the art research, and spectrum allocations need to cater for this diversity.

b) The value to industry in providing training in the practical aspects of designing, setting up and operating radio equipment.

c) Provision of Emergency Communications support to the User services.

The *Report of the Radio Spectrum Review Committee Phase 3, 28MHz - 470MHz*, January 1994 p49, section 8.18, notes the value of amateur radio to the community, and recommends that, for the foreseeable future, no changes be made to the amateur allocations. The DSI conflicts with this; we trust that the UK will endorse the recommendation of the Radio Spectrum Review Committee. The USA Congress has formally recognised the value of amateur radio, and legislation has been passed to ensure that losses are compensated by replacements. We trust that the UK will adopt a similar position.

CONCLUSIONS

From the UK viewpoint, the DSI proposes a substantial loss of 4MHz from the 430 - 440MHz band but offers improved status to the remaining 6MHz; improved status from Secondary to shared Primary at 51 - 52MHz, a Secondary 500kHz allocation at 919.5MHz, some small new Secondary allocations for beacons, and minor administrative improvements.

The Europe-wide allocations may be attractive to countries which do not have 50 or 70MHz at present. However, many countries, including the UK, already have these allocations, and the reduction in the 432MHz allocation is too great a price to pay. We disagree strongly with the suggestion that the 4MHz loss is balanced by a gain of 2.95MHz. In the UK, there is a net loss of nearly 4MHz, as we already have most of the proposed allocations.

430MHz

The RSGB, IARU Region 1 Executive Committee, and the overwhelming majority of RSGB members and licensed Amateurs who have written in, view the loss of 4MHz at 430MHz as totally unacceptable. There do not appear to be any suitable alternative locations for the TV and datalink activities that

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Licence Changes

Effective 23 June

TWO *GAZETTE* NOTICES were published by the Radiocommunications Agency (RA) on 23 June, making some minor changes to the Full and Novice Licenses. The first allows the RA to publish the callsigns of amateurs who have requested that their particulars be withheld - this will ensure that callbooks continue to be a comprehensive list of callsigns that have been issued. The second allows the RA to publish the names and callsigns of amateurs who have had their licence revoked. Both of these changes should help to counter piracy and abuse. The third updates the list of countries and abbreviations used in the Licence Validation Document for operation abroad under the CEPT agreement TR61-01. This now includes several non-CEPT countries who have adopted this agreement. The other change is administrative, relating to the format of the Validation Document. The CEPT change does not apply to the Novice Licence.

THE FULL TEXT OF THE GAZETTE NOTICES IS ON PAGE 10

will be affected. The reorganisation would cause considerable problems and hardship to the existing users.

We welcome the upgrade in status, but consider that the benefits of possible Primary Status are not adequate compensation for the loss of 4MHz at 430MHz. We are concerned that the status may not, in practice, improve to Primary in the UK. If the loss goes ahead, we would be seeking considerable expansion of our other allocations in this frequency range.

Domestic Applications

We are concerned at the increasing number of domestic radio applications, eg ISM, low power devices, Digital Short Range Radio, Wireless Local Loop, which are appearing in or adjacent to amateur allocations. This is resulting in co-siting problems because the domestic equipment is not being designed to the stringent standards needed for co-siting situations. There should be a reasonable frequency separation between such types of activity, if they must be co-sited.

Pressure on Amateur Allocations

The Amateur Service makes a unique and valuable contribution to the UK's interests. The overall effect of the two DSI reviews seems to be a drastic cut in the UHF/Microwave spectrum available to amateurs at a time when they are just beginning to be able to make more intensive use of them. The spectrum it has been allocated by ITU has changed little over the years, but, in practice, individual administrations have been eroding it considerably, often, to meet the demands of the commercial interests that have benefited from the training provided by the Amateur Service.

The amateur allocations are a very small fraction of the total spectrum, and amateurs must continue to have sufficient access at each part of the spectrum to continue their role of self training. It would be a very short sighted action to remove this spectrum from future amateurs. This would discourage experimentation, and kill the goose that is laying the golden egg.

DEPARTMENT OF TRADE AND INDUSTRY - WIRELESS TELEGRAPHY ACT 1949

NOTICE OF VARIATION OF AMATEUR RADIO LICENCE (A) OR (B)

The Secretary of State hereby gives notice pursuant to sub-section 1(4) of the Wireless Telegraphy Act 1949 to holders of the Amateur Radio Licence (A) or (B) ("the Licence") that from 23 June 1995, each Licence shall be varied as follows:

1. In this Notice "the Booklet" means the Terms, Provisions and Limitations Booklet BR68, the terms of which form part of the Licence.
2. As and from the date hereof the Licence shall be read and construed as if:-

(1) in sub-clause 1(11) (a) of the Booklet the words "paragraph (d) of" were deleted;

(2) in sub-clause 2(2) (b) of the Booklet the words "band not" were deleted and replaced by "bands below 30MHz";

(3) in sub-clause 7(1) of the Booklet the words "paragraph (b) of" were deleted;

(4) in sub-clause 7(2) of the Booklet the words "paragraph (b) of" were deleted;

(5) in sub-clause 7(7) of the Booklet the words "paragraph (b) of" were deleted;

(6) the following new sub-clause were inserted at the end of clause 7 of the Booklet:-

"7(8) The Secretary of State reserves the right to release details of the call sign of the licensee specified in the Validation Document to third parties so that the call sign may be published in call books compiled by third parties, either in written form or in the form of "read only" computer disks.";

(7) in sub-clause 9(4) of the Booklet the words "The Secretary of State reserves the right to publish the name and call sign of the Licensee if the Licence is revoked." were added after "revocation of the Licence.";

(8) in Note (a) to the Booklet the telephone number for the Radio Licensing Centre were deleted and replaced by "(0117) 925 8333"; and

(9) in Note (y) to the Booklet the words "and non-CEPT member countries" were inserted between "CEPT member countries" and "which have implemented", the words "and non-CEPT member countries (as marked with an asterisk) were inserted between "CEPT member countries" and "are identified by" and the list of CEPT member countries and the abbreviations by which they are identified (where known) were deleted and replaced by the following:

"Albania ..... AL
Austria ..... A
Belgium ..... B
Bosnia and Herzegovina.BH
Bulgaria ..... BG
Croatia ..... HR
Cyprus ..... CY
Czech Republic ..... CZ
Denmark ..... DK
Estonia ..... EST
Finland ..... FI
France ..... F
Germany ..... D
Greece ..... GR
Hungary ..... H
Iceland ..... IS
Ireland ..... IRL
Israel * IL
Italy I
Latvia LV
Liechtenstein ..... FL
Lithuania ..... LT
Luxembourg L
Malta ..... M
Moldova ..... MLD
Monaco ..... MC
Netherlands ..... NL
New Zealand * ..... ZL
Norway ..... N
Peru * ..... PER
Poland ..... PL
Portugal ..... P
Romania ..... RO
Russian Federation
San Marino ..... RSM
Slovak Republic ..... SK
Slovenia ..... SLO
Spain ..... E
Sweden ..... S
Switzerland ..... CH
The Former Yugoslav Republic of Macedonia
Turkey ..... TR
Ukraine
United Kingdom of Great Britain & Northern Ireland..GB
Vatican City ..... SCV"

On behalf of the Secretary of State for Trade and Industry 30th May 1995.

NOTICE OF VARIATION OF AMATEUR RADIO (NOVICE) LICENCE (A) OR (B)

The Secretary of State hereby gives notice pursuant to sub-section 1(4) of the Wireless Telegraphy Act 1949 to holders of the Amateur Radio (Novice) Licence (A) or (B) ("the Licence") that, from 23 June 1995, each Licence shall be varied as follows:

1. In this Notice "the Booklet" means the Terms, Provisions and Limitations Booklet BR68a/N, the terms of which form part of the Licence.
2. As and from the date hereof the Licence shall be read and construed as if:-

(1) in sub-clause 1(8) (a) of the Booklet the words "paragraph (d) of" were deleted;

(2) in sub-clause 7(1) of the Booklet the words "paragraph (b) of" were deleted;

(3) the following new sub-clause were inserted at the end of clause 7 of the Booklet:-

"7(6) The Secretary of State reserves the right to release details of the call sign of the Licensee specified in the Validation Document to third parties so that the callsign may be published in call books compiled by third parties, either in written form or in the form of "read only" computer disks.";

(4) in sub-clause 9(4) of the Booklet the words "The Secretary of State reserves the right to publish the name and call sign of the Licensee if the Licence is revoked." were added after "revocation of the Licence."; and

(5) in Note (a) to the Booklet the telephone number for the Radio Licensing Centre were deleted and replaced by "(0117) 925 8333".

On behalf of the Secretary of State for Trade and Industry 30th May 1995.

- MONEY WILL BE raised for the Radio Amateurs Invalid and Blind Club during the Wolverley Festival 14 - 16 July. GB5WF is to be operated by members of the Wolverley & DARS who are keen to talk to anyone with links to the Worcestershire village or the surrounding area. Contacts are sponsored, so give them a call.
- ANYONE PLANNING to take a Morse test at the Computercations 95 rally at Brixham, Devon on 8 October should note that they must register by 3 August at the latest. Contact John May, G0CDB, QTHR or P O Box 4, Brixham, Devon, tel: 01803 522995, for further information.
- THE CITY AND Guilds of London Institute has moved. The new address is 1 Giltspur St, London EC1A 9DD, tel: 0171 294 2468, fax: 0171 294 2400.
- ONE OF A TEAM of seven bus drivers, David Nuttall, G4ZST, will embark on a 'Bus-A-Thon' around Britain on 22 July. During the 10 day trip, organised to raise money for the Foundation for Children with Leukaemia, David plans to activate as many WAB squares as possible. Operation will be on 7.065 and 3.765MHz. The team intends to take a 3,500 mile route around the coastal roads of mainland Britain in a bid to raise £100,000.

125 Years of the Red Cross

THE BRITISH Red Cross is celebrating its 125th birthday this year and to mark the occasion several special event stations will be operating throughout the country during July under the callsign GB125BRC.

There will be a certificate for anyone working any three British Red Cross stations in 1995.

Worked All Britain Group Helps to Save Lives

£12,500 Raised to Fund a Lifeboat

THE WORKED ALL Britain (WAB) Silver Jubilee appeal has exceeded its target of £10,000. A cheque for £12,500 was presented to the RNLI by Adrian Keeble, WAB's appeal co-ordinator, at the Group's AGM at Drayton Manor Park, Staffordshire, on Sunday 14 May 1995.

The money will provide a D-class lifeboat, a semi-rigid inflatable craft used for inshore rescue. It is to be named *C John Morris DFM G3ABG*, in memory of the founder of WAB, by G3ABG's widow Veda. The ceremony will take place at RNLI's Poole HQ on 28 July. A plaque, stating that a lifeboat was provided by the WAB, will also be unveiled.

The appeal took place over a period of three years. Funds were raised by a levy on the sale of WAB books, a jubilee award, donations and covenants and the proceeds of 1994's grand draw. Members organised activity from lifeboat stations, sponsored mobile runs, walks and other radio-related activities. Others have made donations from the sale of radio equipment and computer programs.

The WAB committee is most grateful to all radio amateurs, SWLs and other supporters who have contributed to this magnificent effort.

WAB Awards Group presents £12,500 to the RNLI. From left to right: Adrian Keeble, G4HPU, WAB Silver Jubilee Award Co-ordinator; Mrs Veda Morris, widow of G3ABG and Anthony Oliver, RNLI deputy head of fund-raising and marketing.

WAB was founded in 1969 to promote amateur radio interest in Britain, and to sponsor the very successful series of awards based upon the geography of Great Britain and Northern Ireland. It is therefore entirely appropriate that the beneficiary of the Silver Jubilee appeal should be the RNLI which assists those in difficulty around the coast of the British Isles.

Life membership of the group, which has thousands of members in nearly 100 countries, is by the purchase of a WAB book: there is no annual subscription. More details on WAB can be obtained from the Membership Secretary, Brian Morris, G4KSQ, 22 Burdell Avenue, Sandhills Estate, Headington, Oxford OX3 8ED.

Young Amateur '95 Deadline

THE LAST DATE for nominations for the Young Amateur of the Year is 31 July. Full details of this prestigious award can be found on p31 of May *RadCom*.

Ben Clarkson, 2E1DHA (right), explains ARDF to *Active 8* presenter Matthew Jones during the filming of an item for BBC TV at Stokenchurch, Bucks.

Youth TV Focuses on ARDF

A LARGE, mostly young, television audience received an insight into amateur radio direction finding (ARDF) courtesy of top children's programme *Active 8*. The show has viewing figures in excess of three million.

Youngsters from the Reading and District Amateur Radio Club and Mid Thames Radio Direction Finding Club were filmed taking part in a DF hunt at Stokenchurch, Buckinghamshire. The four minute item - scheduled to appear on BBC1 on 20 June - should also include an interview with 13 year old DF enthusiast Ben Clarkson, 2E1DHA.

The programme's decision to spotlight ARDF was thanks to the efforts Brian Bristow, G4KBB. He said: "My main objective is to promote and publicise ARDF and that's why I contacted the BBC. The people from the BBC had never even heard of ARDF so we were able to influence the content of the script."

Over a period of two months Brian was involved in consultations with the BBC over

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COUNCIL BRIEF

Notes of a meeting held on 13 May 1995.

Administrative Matters

Consequent to the death of the member for Zone G, it was resolved that Zonal matters should be addressed to I D Suart, GM4AUP, until a Zonal Council Member could be elected.

Amateur Radio Matters

Representation on C&G: Since important policy matters were involved in this, it was resolved that a small working group chaired by J Bazley, G3HCT, should examine the issues involved and report to Council.

Special event callsigns: Disquiet was expressed that special event callsigns had been allocated to stations which subsequently operated from locations outside the UK. This was clearly in breach of the conditions of issue. It was also stressed that such special stations should be accessible to the public at all times. It was resolved that applicants should be reminded of their responsibilities in these areas.

'Hobby Radio': Council recommended that the use of the term 'Hobby Radio' with respect to amateur radio be discouraged. The society policy on the use of this term would be communicated to the RA.

IARU paper - *The Morse code and Amateur Radio*: Council approved the resolution in this paper which sought to confirm that the Society was strongly opposed to the abolition of the Code requirement at this time. Council also recommended that the paper be given the widest possible distribution.

On a windy day outside Lambda House, a group of RSGB Presidents were pictured just prior to the annual Past Presidents' Lunch: (l to r - presidential year in brackets) Tim Hughes, G3GVV (1972); John Bazley, G3HCT (1979); George Jessop, G6JP (1974); Don Baptiste (1983); Willy McClintock, G3VPK (1986); Fred Ward, G2CVV (1971); Julian Gannaway, G3YGF (1989); Clive Trotman, GW4YKL (1995); Ian Suart, GM4AUP (1994); Joan Heathershaw, G4CHH (1985 & 87); Barney Patterson, GI3KYP (1967); Terry Barnes, GI3USS (1992) and John Allaway, G3FKM (1982).

Financial matters

Executive Committee: Council approved the continuance of the committee for a further twelve months and that it could be supplemented by two members from outside the governing body.

The 1995/96 budget proposals were approved but Council expressed concern at the increasing level of committee expenditure.

Senior Novice Instructors

DAVE WHALLEY, G4EIX, has had to give up his position as Senior Novice Instructor for Shropshire, on being appointed Council member for Zone B (the Midlands). His successor is Bill Cowell, G0OPL, of 21 Elm Way, Trench, Telford TF2 6RS. Any Salopian amateur interested in passing on their knowledge to a new generation by becoming a Novice instructor, should contact him on 01952 404251.

Corrections

In the list of Senior Novice Licence Instructors (June, p96) we gave the incorrect telephone number for Mr G J Bennett, G4LJO. His correct number is: 01934 843507.

Also, the callsign of Mr D R Parker, SNI for Northants, should have read G6FJF.

● SCOUTS AT NORWAY'S Sogn & Fjordane Camp will use the call LA4I on HF between 30 June and 9 July.

G5UM Call Re-issued to Leics Club

WITH THE KIND permission of Mrs Grace Hum, the callsign G5UM will once again be heard on the bands. It has been re-issued to the Leicester Radio Society Contest Group and will be used for the first time during RSGB VHF Field Day. Jack Hum, G5 'Uncle Mike', died in January this year [see obituary in the March *RadCom - Ed*] and was President of the Leicester Radio Society for many years.

Barry is Alive and Well Again

NOT LONG AGO, the once thriving Barry Amateur Radio Club was threatened with extinction. Now, thanks to the efforts of a management team led by Glyn Jones, GW0ANA, the club's fortunes have been revived. A new venue was found in beautiful surroundings at Sully on the Bristol channel, less than a mile from the spot where Marconi made history in 1897 by exchanging messages across open water.

On 18 May, RSGB President Clive Trotman, GW4YKL, had the honour of opening the new shack which had been converted from a store-room by club members under the guidance of Shack Manager Jorge Bonter, GW0AGA. The club now looks set to thrive once again.

Glyn Jones, GW0ANA (centre), hands a pair of scissors to RSGB President Clive Trotman, GW4YKL, for the ribbon-cutting which marked the official opening of the new Barry ARC shack. Sharing the honour was Cllr Colin Dunkley, Mayor of the Vale of Glamorgan (right).

MORE RADCOM NEWS ON PAGE 93

11 ideas for a slot on *Active 8*, a show which focuses on a wide range of hobbies.

"With the programme's help, we hope to enlighten children to find out more about the sport. The response to the item could be stupendous but any subsequent progress will depend to great extent on amateur radio clubs. They must encourage children to take part."

He continued: "We need to get children interested in the sport from an early age. We can start them off on 2m DF and then, later on, get them involved in 160m.

"The expense of ARDF is negligible as most radio clubs do some sort of foxhunting. It is by far the easiest way to get children involved. This was the case with me as I first became involved in amateur radio through ARDF."

Brian also believes that an influx of new blood could lead to Great Britain fielding stronger teams at the ARDF World Championships. [Turn to page 46 for how to get your club running VHF foxhunts - *Ed*].

● The amateur radio club at Bigyn County Primary School in Llanelli, Dyfed, was featured in a live television item on S4C's *Heno*, the Welsh language current affairs programme, on Tuesday, 16 May.

Writers Wanted

URGENTLY REQUIRED by *RadCom*, and the RSGB's beginners' magazine *D-i-Y Radio*, are writers capable of one or more of the following:

- Producing and writing-up small projects to order.
- Writing a series of operating articles to order.
- Writing about subjects peripheral to amateur radio, eg radio control, CB, broadcast listening, DX TV etc.
- Writing about computers and software.

An ability to write-to-style and write-to-fit is important as is a commitment to deadlines. Payment is made for published articles. If you are interested, call the Editor on 01707 659015.

DXCC Check at HF Convention

THOSE ATTENDING the RSGB International HF Convention in September will be able to take advantage of the ARRL's DXCC QSL card checking facility - the first time that this has been available in the UK. If you do not want to trust your precious QSL cards to the mail, this is an ideal opportunity to get them checked. Applications *must* be accompanied by a DXCC form obtainable from RSGB HQ.

THIS MONTH'S LEADING FEATURE

RATS: Receiver Alignment Test-Set

The first of two parts by Roger Blackwell, G4PMK*

ONE OF THE MOST popular and enduring items of test equipment over the past few years has been the G4COM alignment aid [1], which promised to make the adjustment of receiving equipment for optimum noise figure a relatively easy task. Despite its success, a number of fundamental problems remain with its use. It requires an audio sample from the receiving system under test, which immediately places constraints on the system performance because of the narrow IF bandwidth of most receivers. The AGC of the receiver has to be turned off, and the AF level carefully set. All these problems mean that alignment can still be a tedious and frustrating process - particularly to extract the last 0.1dB of performance when the meter needle is swinging ±1dB!

This article describes a fundamentally different approach. While RATS doesn't have the performance of a full-blown Precision Automatic Noise Figure Meter (PANFI) it doesn't cost an arm and a leg either. With this system, it is possible to see a 0.1dB noise figure change quite clearly. RATS is a complete measurement system - incorporating one or two (or more!) dedicated wide-band receivers at popular IF frequencies. Thus transverters and preamplifiers can be easily optimized. The instrument offers a number of switched ranges, calibrated in decibels. In addition to a 'noise figure' or Y-factor mode like the G4COM device, it has a signal strength (SS) mode, which can be used with a noise source or external CW signal for initial stages of alignment and gain measurement. A calibrated meter offset control is provided so you can resolve small changes of as little as 0.1dB around any chosen signal level. Example applications are shown in **Fig 1**.

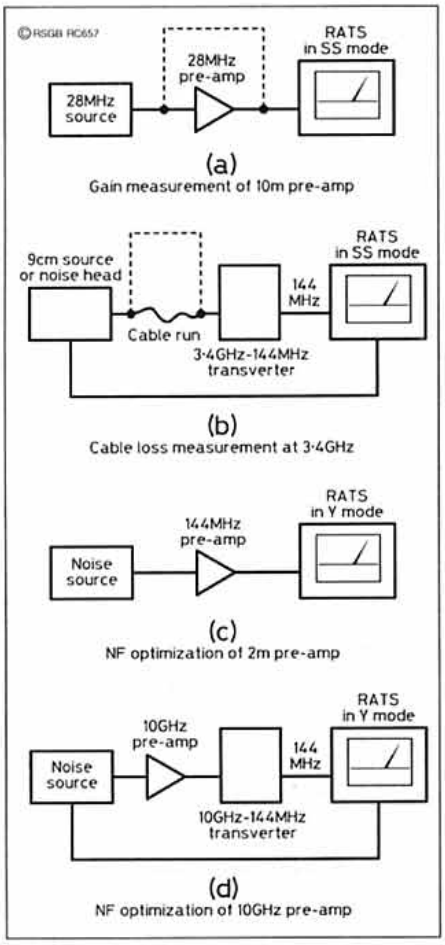

Fig 1: RATS example applications.

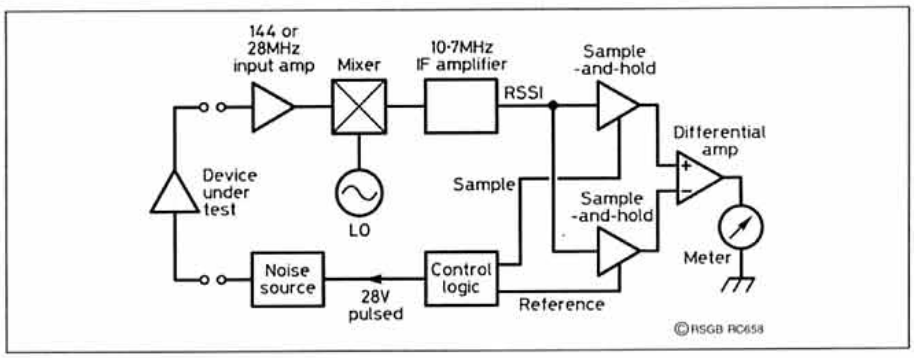

Fig 2: Overall block diagram.

Since interference or instability can wreak havoc with this kind of measurement, an AM/FM audio monitor is provided to keep an ear on what's being received - a refinement you won't find even on a PANFI. RATS provides the commercial standard supply for noise sources (+28 V DC) and I'll also be describing a compatible home-made alternative.

Two receiver units are described, for 28 and 144MHz which are the two most popular frequencies for use with VHF/UHF/microwave preamplifiers and transverters. The prototype unit used both of these. Of course, if you have different favourite IF, it would be a simple matter to alter the receiver design.

OPERATING PRINCIPLE

TO DRIVE THE METER in Signal Strength (SS) mode, RATS uses the Received Signal Strength Indicator (RSSI) output of the NE604A IF chip. This output is logarithmic; in other words it shows the received signal power level in decibels on a linear meter scale. The meter measures either CW signal level or noise level, the only difference being that the needle bounces around a little on noise. By using a wide IF bandwidth of around 250kHz, RATS averages-out much of the statistical fluctuation in noise power levels, so the meter bounce is much less than you see with the typical 2 - 3kHz bandwidth of an audio-based instrument such as the G4COM. To summarise, in Signal Strength mode:

Meter Reading ∝ log (signal power)

or Meter Reading ∝ (signal power in dB)

(the ∝ symbol means 'is proportional to')

OPTIMISING NOISE FIGURE

ALTHOUGH SOME of the applications of RATS in SS mode involve preamplifiers or receiver front-ends, there's a limit to the adjustments you can make using signal strength alone. The input circuit alignment for lowest noise figure cannot be done by tuning for maximum signal from a noise generator. The optimum signal-to-noise ratio is obtained by de-tuning the circuit a little from the settings that give maximum signal, and SS mode won't help you there.

Optimizing a front-end 'by hand' is very tedious. First you measure the noise level with the noise generator on, followed by the noise level with the noise generator switched off; you then have to compute the ratio between the two - the signal-to-noise ratio or 'Y-factor'. You're aiming for the best S/N ratio ie the highest Y-factor, which also means the lowest noise figure. So each time you make an adjustment you have to do two measurements and a computation - time after time.

In 'Y-factor' mode RATS does all of this automatically - everything except turning the

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trimming tool for you. Here is the sequence of events:

1. Switch on noise generator
2. Wait for reading to settle
3. Average and store the RSSI voltage
4. Switch off noise generator
5. Wait for reading to settle
6. Average and store RSSI voltage
7. Display the difference between the two stored RSSI voltages
8. GOTO 1

Later in the article I'll explain the whole procedure in simple practical terms, but now let's look at what this automated procedure is achieving. If N_{on} is the noise power with the noise generator on, and N_{off} is the corresponding value with the noise generator off:

$$\text{Meter Reading} \propto RSSI_{on} - RSSI_{off}$$
$$\propto \log(N_{on}) - \log(N_{off})$$
$$\propto \log(N_{on}/N_{off})$$
$$\propto \text{Y-factor in dB}$$

In other words, in Y-factor mode RATS displays signal-to-noise ratio directly in decibels, using the same scales as for SS mode. To align a preamplifier, you begin in SS mode, adjust everything for maximum gain, then switch to Y mode on the expanded 3dB scale and readjust the input tuned circuit for maximum reading. That's it - done!

Although you can optimize the noise figure very accurately this way, you can't actually measure it without some further information. The Appendix (in Part Two) explains the details.

Fig 2 shows a block diagram of RATS with one RF unit. The input signal is filtered, amplified and converted to 10.7MHz. This signal is fed to a IF amplifier IC, developed for cellular radiotelephone applications, whose RSSI output gives a DC output proportional to the logarithm of the input signal strength.

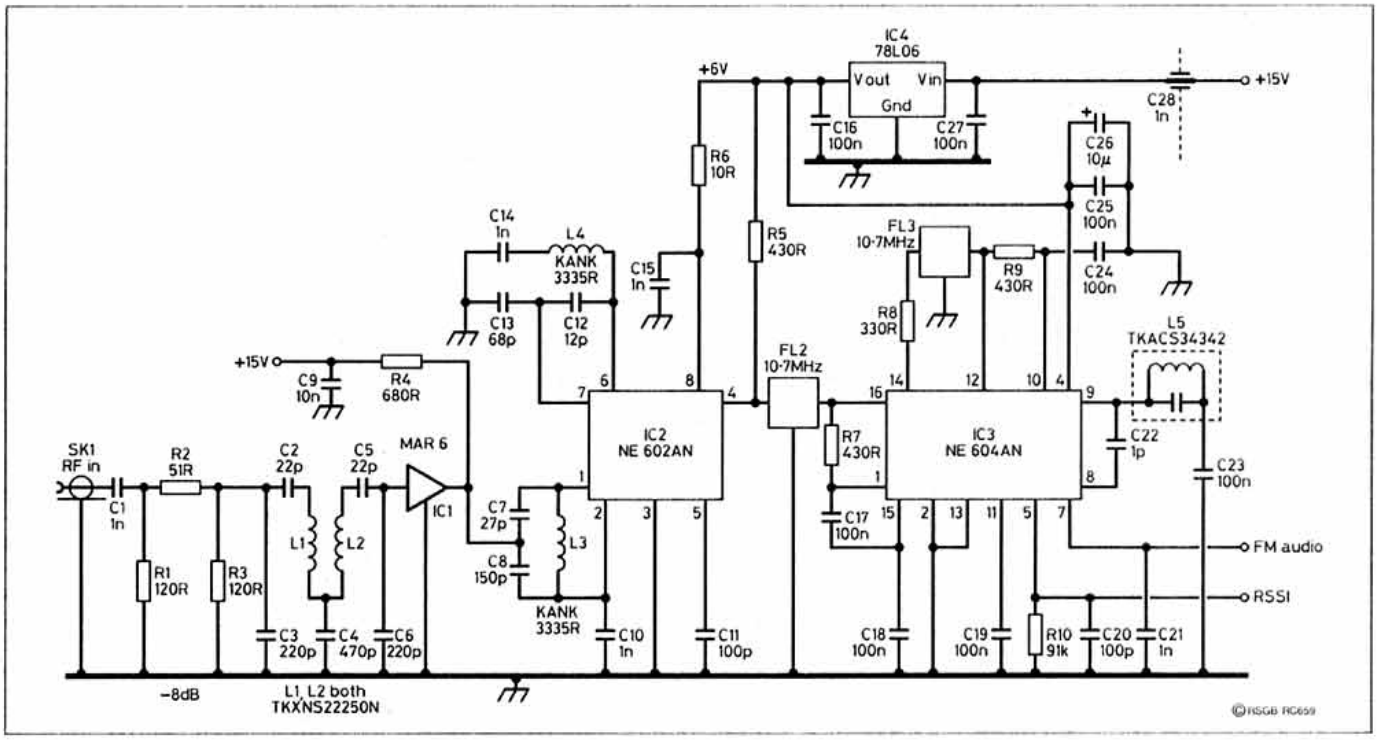


Fig 3: 28MHz Receiver circuit.

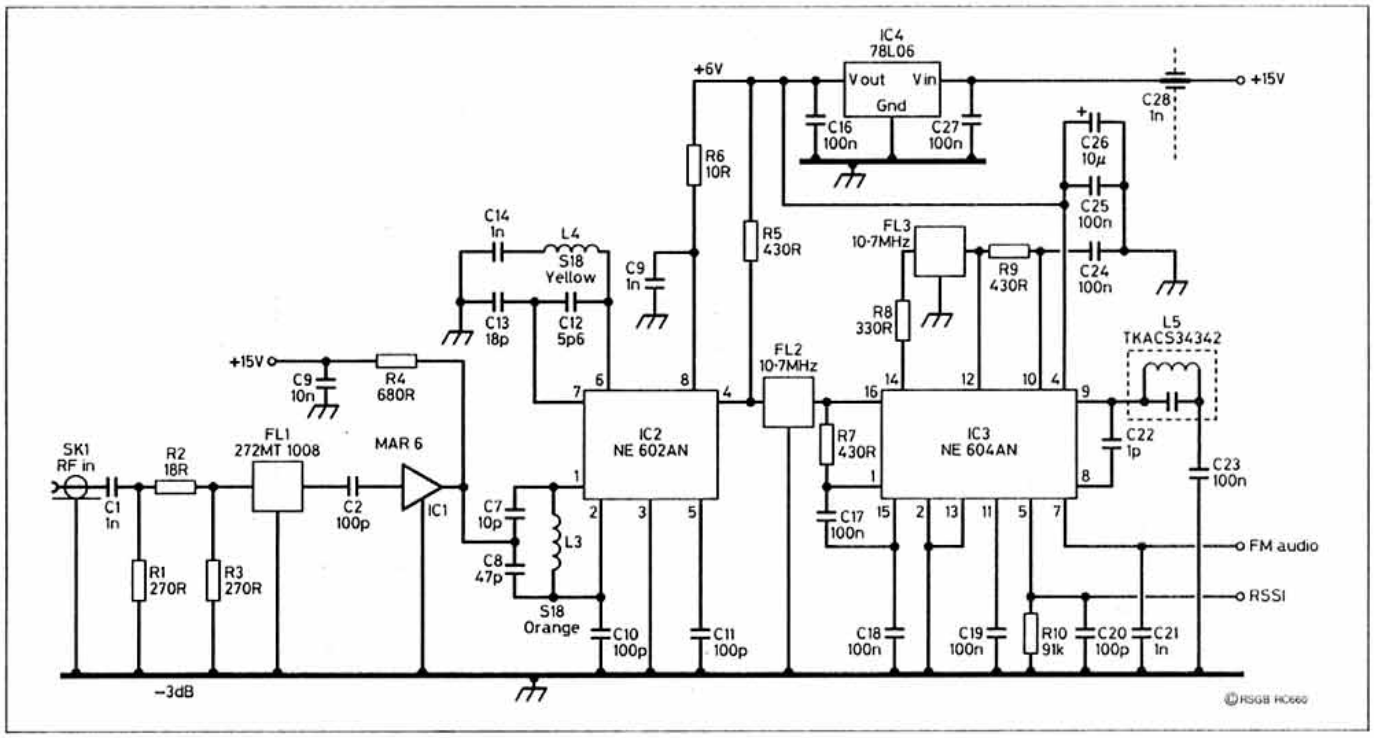


Fig 4: 144MHz Receiver circuit.

The analog unit generates the signals for controlling the noise source and the sample-and-hold (S/H) amplifiers. The noise source is switched *before* the sample is taken to allow the receiver time to settle. The outputs from the two S/H - one of signal strength with the noise source on, the other with it off - are applied to a differential amplifier. In SS mode the reference (Noise off) input is grounded, so the output from the differential amplifier is proportional to signal strength in dB. In Y mode, the output is proportional to the difference between the two signals ie the Y-factor in dB.

CIRCUIT DESCRIPTION

RF UNIT

In order to simplify this description, only the 28MHz RF unit will be described, since both the RF units are the same, apart from the input filter and LO arrangements. Where differences occur with the 144MHz unit, these are noted in brackets in the description below. The circuit diagrams for the 28 and 144MHz units are shown in **Figs 3** and **4** respectively.

Incoming signals at 28MHz (144MHz) are passed to the input filter via a normalising attenuator. This provides an attenuation of -3dB in the 144MHz unit, and -8dB in the 28MHz unit, the aim being to give both the units about the same sensitivity. The filter consists of two coupled tuned circuits (a TOKO 3-chamber helical filter). IC1, a MAR6 modamp provides about +20dB of post-filter gain. The signal then passes via a tuned circuit L3 to IC2, an NE602A mixer/VCO. The signal is mixed with an LO of about 39MHz (155MHz) to give the IF of 10.7MHz. LO frequency is determined by L4 and associated components. The output is passed to IC3, a NE604A via the first of two 280kHz

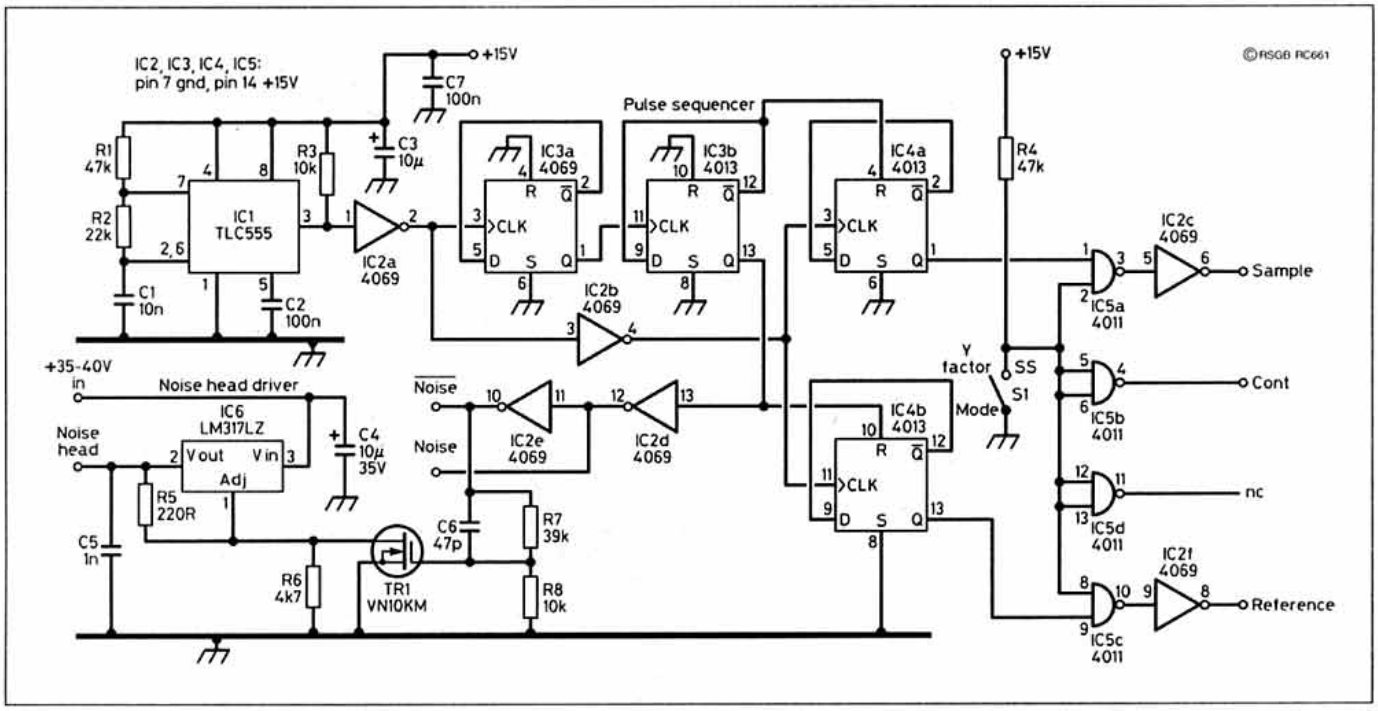


Fig 5: Control board logic section.

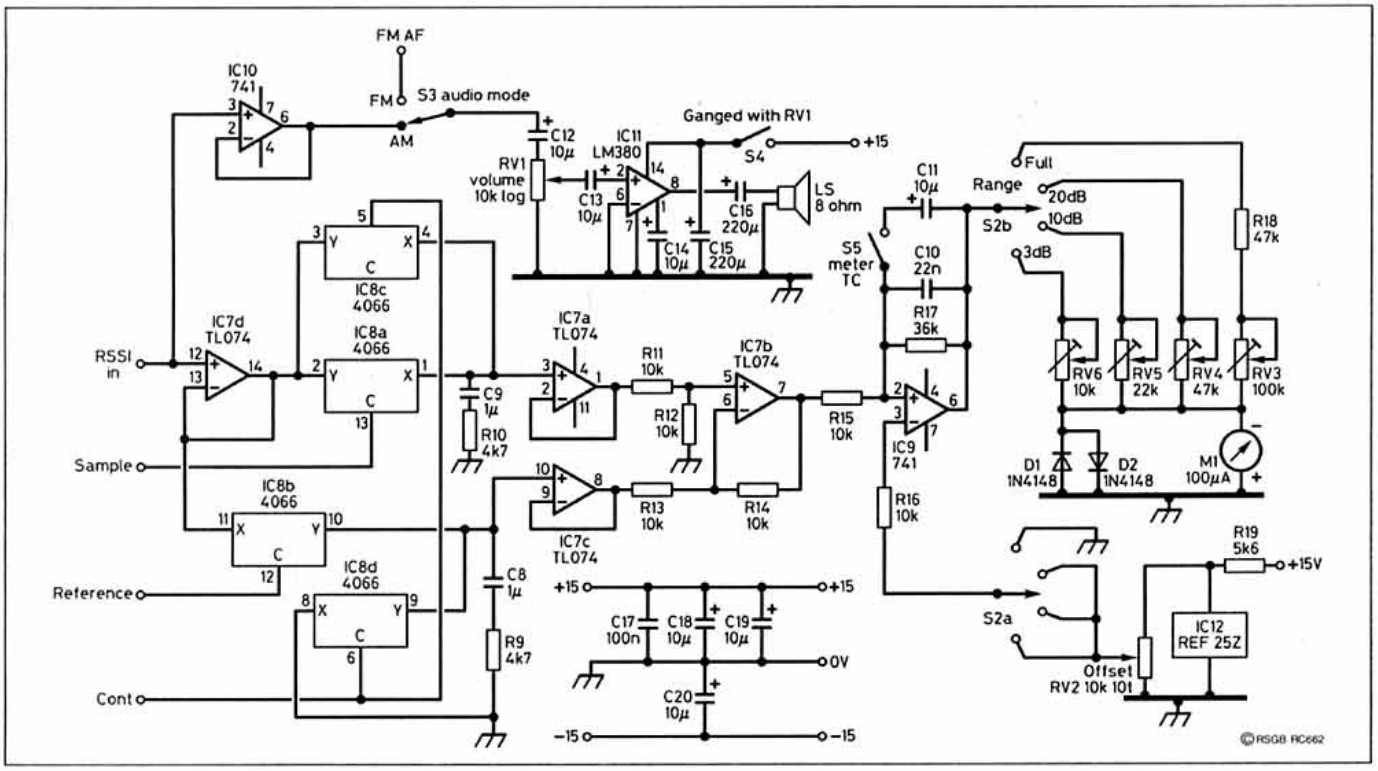


Fig 6: Control board analog section.

COMPONENT LISTS

Component numbers start at 1 for each RF unit, gain block and noise head, and again at 1 for the rest of the instrument.
All resistors are 0.25W types; preferably 1% metal oxide, although 5% carbon resistors are acceptable.

PRINTED CIRCUIT BOARDS

It is intended to make PCBs available via the Microwave Components Service. For details, please write enclosing an SASE to: Mrs P Suckling G4KGC, 314a Newton Road, Rushden, Northants NN10 0SY.

RF UNITS

Complete list for 28MHz module; changes for 144MHz module in brackets. All capacitors are ceramic unless otherwise noted. Numbers in square brackets after inductors and filters are Cirkit stock numbers.

Resistors

R1,3	120R	(270R)
R2	51R	(18R)
R4	680R	
R5, 7, 9	430R	
R6	10R	
R8	330R	
R10	91k	

Capacitors

C1,14,15, 21,	1n0	
C2,5	22p	(C2 100p, C5 n/a)
C3,6	220p	(n/a)
C4	470p	(n/a)
C7	27p	(10p)
C8	150p	(47p)
C9	10n	
C10, 11, 20	100p	
C12	12p	(5p6)
C13	68p	(18p)
C16, 17, 18, 19		
23, 24, 25, 27	100n	
C22	1p0	
C26	10µF 16V tantalum bead	
C28	1n feedthrough	

Inductors

FL1	n/a	(Toko 272MT1008 [17-10083])
FL2, 3	10.7MHz 280kHz stereo FM IF ceramic filter CFS10.M1 or similar [16-10712]	
L1, 2	TKXNS22250N [35-22500] (n/a)	
L3	KANK3335R [35-33350] (S18 Orange, ferrite core [35-10303])	
L4	KANK3335R [35-33350] (S18 Yellow, ferrite core [35-10403])	
L5	TKACS34342 [35-43420]	

Semiconductors

IC1	MAR6 or MSA0685
IC2	NE602AN
IC3	NE604AN
IC4	78L06

Additional Items

Tinplate box	Type 45/7768 (Type 45A/7769)
Appropriate RF connector	

The tinplate boxes are available from Piper Communications, 4 Severn Road, Chilton, Didcot, Oxon OX11 0PW. Please enclose an SASE with enquiries.

GAIN BLOCK

Resistors

R1	680R

Capacitors

C1, 2	1n0 1206 SMD ceramic
C3	1n0 feedthrough to suit box

Semiconductors

IC1	MAR6 or MSA0685

Additional Items

SK1, 2	BNC socket, square type
5-Pin DIN plug	

Either a small tinplate box or a commercial module case such as RS 456-201.

NOISE HEAD

Resistors

R1	33k
R2	12k
R3	1k0 1206 size SMD
R4, 8	100R 1206 size SMD
R5, 7	68R 1206 size SMD
R6	51R 1206 size SMD

Capacitors

C1	100p ceramic plate
C2	1n0 1206 size SMD

Semiconductors

D1	BZY55 C15 zener
TR1	BC558
TR2	BFW92

Additional Items

P1	BNC/N chassis mount plug
SK1	BNC chassis mount socket

Either a small tinplate box or a commercial module case such as RS 456-201.

CONTROL AND PROCESSING BOARD

Resistors

R1, 4	47k
R2	22k
R3, 8,11,12,13,	
14,15,16	10k
R5	220R
R6, 9, 10	4k7
R7	39k
R17	36k

Capacitors

C1	10n polyester
C2, 7, 17	100n ceramic multilayer
C3, 11, 18, 19, 20	10µ 25V tantalum bead
C4	10µ 63V radial electrolytic
C5	1n0 ceramic
C6	47p ceramic plate
C8, 9	1µ0 polyester/polycarbonate 63V
C10	22n ceramic/polyester
C12, 13, 14	10µ 25V radial electrolytic
C15, 16	220µ 25V radial electrolytic

Semiconductors

TR1	VN10KM
IC1	7555 or TLC555
IC2	4069UB
IC3, 4	4013B
IC5	4011B
IC6	LM317LZ
IC7	TL074
IC8	4066B
IC9, 10	741
IC11	LM380

Additional Items

P1, 2, 6	5-way PCB connector pair
P3, 4, 5, 7	2-way PCB connector pair
P8	3-way PCB connector pair
P9	4-way PCB connector pair

METER BOARD COMPONENTS

Resistors

R18	47k
R19	5k6
RV3	100k cermet preset
RV4	47k cermet preset
RV5	22k cermet preset
RV6	10k cermet preset

Semiconductors

IC12	REF25Z
D1, 2	1N4148

Additional Items

P10	6-way PCB connector pair
P11	4-way PCB connector pair

POWER SUPPLY

Resistors

R20	10k
R21	1k2
R22, 23	4k7

Capacitors

C21	100µF 63V radial electrolytic
C22	470µF 63V radial electrolytic
C23, 24	2200µF 35V radial electrolytic
C25, 26	1µ0 35V tantalum bead

Semiconductors

IC13	7815, with small heatsink
IC14	7915, with small heatsink
BR1	W01
D3, 4	1N4004
D5	BZY55 C5V6 zener
D6	Panel mount LED

Additional Items

F1	20mm 0.25A (T) mains fuse and holder
P12	5-way PCB connector pair
P13	2-way PCB connector pair
P14, 15	3-way PCB connector pair
T1	15-0-15V 20VA
SK5	IEC filtered mains receptacle
S7	DPST mains switch

OFF-BOARD COMPONENTS

LS	8-16Ω small loudspeaker
M1	100µA fsd (a 50uA meter can be used with appropriate changes to R17 and RV3-6)
RV1	(AF gain) 10k log with switch
RV2	(offset) 10k 10-turn with turn counting dial
S1	(SS/Y) SPST toggle
S2	(Range) 2 pole, 4 way rotary
S3	(Audio Mode) SPDT toggle
S4	(Audio on) ganged with RV1
S5	(Meter TC) SPST toggle
S6	(RF select) 4 pole, 2 way rotary (3 poles used - optional)
SK1 (2 for 2nd RF unit)	coax entry panel socket BNC etc
SK3	5-pin DIN socket
SK4	coax socket to suit noise head BNC etc

ceramic filters. A second filter is used between the two IF gain blocks incorporated in IC3. The RSSI output, which is a voltage proportional to the log of the RF input signal, is taken to the control and processing board.

L5 and associated components are used to get FM audio for monitoring purposes.

CONTROL AND PROCESSING UNIT

This can be split into two sub-units, the logic control circuitry (**Fig 5**) and the analog processing section (**Fig 6**). The logic circuitry consists of a CMOS 555 astable clock and associated flip-flops and gates. It produces a set of control signals that drive the noise source and sampling gates. **Fig 7** shows the important waveforms. Notice how the SAMPLE and REFERENCE signals are related to the NOISE ON and NOISE OFF signals. There is a 150µS delay after the noise source is activated before the sample-and-hold gate opens and a 500µS delay after the gate closes before the noise source is switched off. This allows the receiver to stabilise and prevents switching transients upsetting the measurement. In SS (signal strength) mode, the SAMPLE and REFERENCE signals are disabled and the CONT output becomes active. Finally the noise head is driven from a LM317L regulator via a VMOS switch TR1, producing a switched +28V output. The two logic signals NOISE ON and NOISE OFF are buffered and taken to a front panel socket.

The analog processing section is quite simple. The incoming RSSI input is buffered by IC7d, then taken to the appropriate S/H (IC7a or c) by means of sections of the transmission gate (IC8 a and b) controlled by the REF and SAMPLE signals from the control logic. In SS mode, the CONT signal permanently connects the buffered RSSI output to the sample S/H and grounds the reference S/H input. The S/H outputs are proportional to the mean, not peak, input signal due to the long time constant created by the resistors R9 and R10 in series with the hold capacitors C9 and C10. These are fed to the differential amplifier IC7b, whose output in Y mode is thus proportional to Y-factor in dB. Finally this is fed to the meter amplifier IC9. S2 provides a number of switched ranges, which can be used in conjunction with the 10-turn offset control RV2 to provide an expanded scale. IC12 provides a stabilised 2.5V for RV2. The time constant of the meter amplifier can be altered with S1. Finally either an FM audio signal from the receiver board, or a buffered RSSI output (that's crude AM detection!) is fed to audio amplifier IC11 if required, to provide an audible system check.

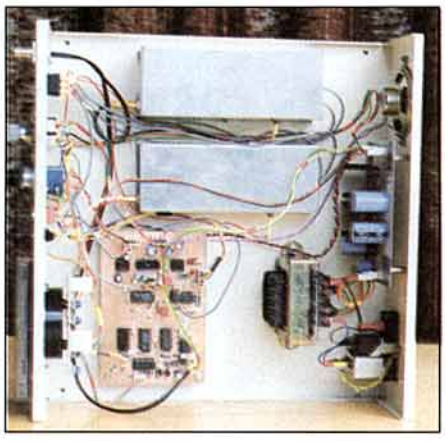
POWER SUPPLY

The power supply (**Fig 8**) is a conventional ±15V supply with a separate voltage doubler providing enough voltage for the noise source drive circuit. D5, a 5V6 zener, reduces the maximum voltage from the doubler to about 38V to keep within the maximum voltage rating of the LM317LZ noise sourceregulator.

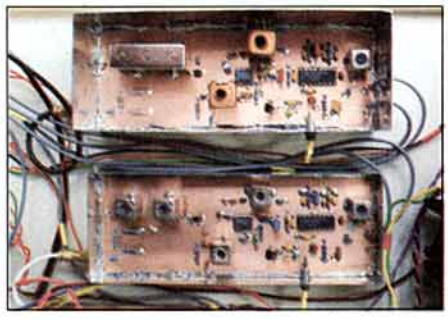
REFERENCES

[1] 'An Alignment Aid for VHF Receivers' JR Compton, G4COM, *Radio Communication*, January 1976, p36. ♦

. . . to be continued



Internal layout.



View of 28 and 144MHz RX modules, lids removed.

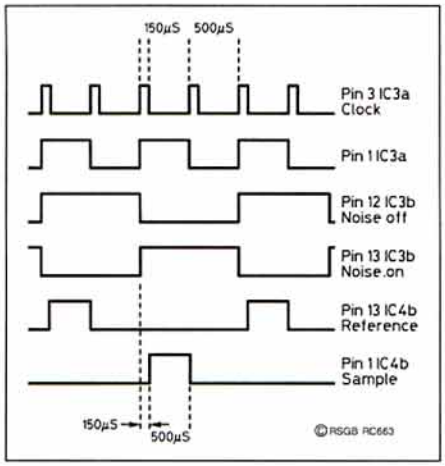


Fig 7: Control board waveforms

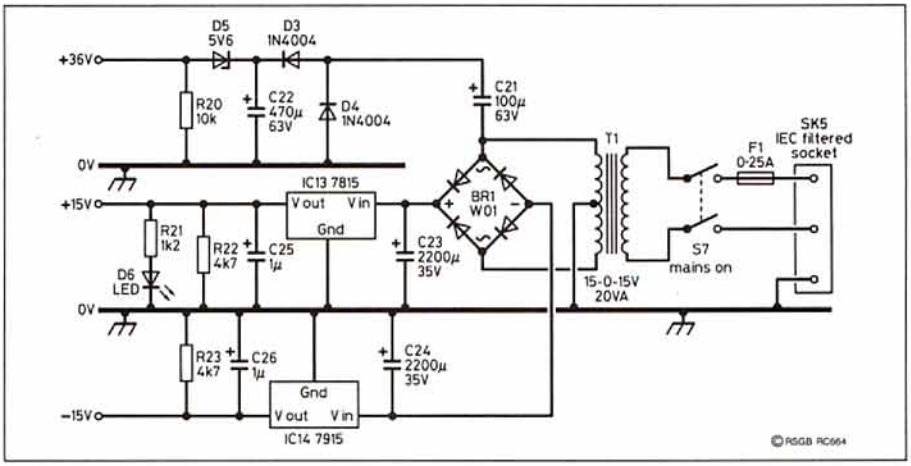


Fig 8: Power supply circuit

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HF NEWS

JOHN ALLAWAY, G3FKM
10 Knightlow Road, Birmingham B17 8QB

A GROUP OF Finnish businessmen left for the Democratic People's Republic of Korea on 12 May, according to a report in *RSGB DX News Sheet*. It is thought that Martti Laine, OH2BH, may have been with this group. The report stated that on 14 May JA1BK called VE3HO to say that 'P5/OH2AM' was operating on 14.295MHz using 100W to a vertical antenna. The station QSYed to 7.002MHz. Operation was in 'demonstration mode' and was sporadic. The callsign OH2AM belongs to the OH DX Ring whose address is that of OH2BH. DPR Korea will be added to the DXCC list once a *legitimate* operation has taken place.

BHUTAN GUIDE

JIM SMITH, VK9NS, is writing a book which will set out important aspects of amateur radio in Bhutan. Jim would like to hear from anyone who has knowledge of activity in the country *before* Gus Browning's expedition in the '60s. He has information on the activities of Pradhan - A51PN - but news of any other activity during the '60s, '70s, or '80s is urgently needed including details of QSO dates, bands, and modes, and whether any QSLs came from a manager or direct. The information is to be lodged with the Ministry of Communications of the Royal Government of Bhutan as an amendment to the existing historical record and all those submitting material will receive acknowledgments. It is understood that Jim will be attending the RSGB HF Convention.

CONTESTS

IARU HF CHAMPIONSHIP

1200 8 July - 1200 9 July

Object is to contact as many other stations as possible - including IARU member-society HQ stations using 1.8 to 28MHz (no WARC bands). No rest period. Single-operator phone only, CW only, and mixed modes, and multi-operator single-transmitter mixed modes only. Society HQ stations send signal report and official IARU member society abbreviation (eg '59RSGB'). Stations may be worked once per band per mode. QSOs with stations in own ITU zone count one point, with other countries in different zones in the same continent three, and with all others five. Multipliers are the total number of ITU zones and HQ stations worked on each band (NB HQ stations cannot be counted as zones as well). Entries must be postmarked no later than 30 days after the contest and mailed to: IARU HQ, Box 310905, Newington, CT 06131-0905, USA. I can provide copies of the rules and strongly advise anyone making a serious entry to ask for one (entries on disks are allowed). SASE please.

YO-DX CONTEST

2000 5 August to 1600 6 August

3.5 to 28MHz (no WARC bands). CW and/or SSB. Single operator single or multiband, multi-operator multi-band. Stay on a band for at least 10 minutes. Exchange RS/T plus ITU zone number, YOs give their county code. (These are: YO2 - AR, CS, HD, TM. YO3 - BU. YO4 - BR, CT, GL, TL, VN. YO5 - AB, BH, BN, CJ, MM, SJ, SM. YO6 - BV, CV, HR, MS, SB. YO7 - AG, DJ, GJ, MH, OT, VL. YO8 - BC, BT, IS, NT, SV, VS.) QSOs with YO count eight points, with another country in another continent four, and with own continent two. QSOs with own country score no points but count for multipliers. Multiplier is the sum of all ITU zones and YO counties on each band. Mail logs before 7 September to: Romanian Federation of Radio Amateurs, PO Box 22-50, R-71100 Bucharest, Romania.

QTH CORNER

A47RS	Box 981, Muscat 113, Sultanate of Oman.
AA4VK/CY	WA4DAN/CY, KW2P/CY, W5IJU/CY Murray Adams, WA4DAN, 403 East 14th St, Greenville, NC 27858, USA.
VK4EZA	W H Metcalfe G6VS/VK4EZA, 8 Eleanor Av, Underwood, Qld 4119, Australia.
VR2EZ	via G4DEZ, or PO Box 12727, Hong Kong.
ZA/DJ7BA	DJ7BA Hans-Adolf Jacobi, Watzmanstr 18, D-86453 Dasing, Germany.
ZA1AJ	via ex-OK2PSZ, Vit Kuncar, Havrice 293, CS-68001 Uhersky Brod, Czech Republic.
ZA1MH	via Z32KV, Box 10, 96330 Struga, Former Yugoslav Republic of Macedonia.
GM4MFW/ZL8	via KA1JC, Phyllis Davis, 5282 Boyle Terr, Port Charlotte, FL 33981, USA.
9X/ON4WW	via ON5NT, Ghis Penny, Lindestraat 46, B-9880 Aalter, OV, Belgium.

I can supply copies of the rules (SASE please).

SEANET CONTEST

0001 15 July - 2400 16 July (CW)

0001 19 August - 2400 20 August (SSB)

1.8 to 28MHz - no WARC bands. Single operator single and multiband, and multi-band multi-operator. Exchange RS/T and serial number from 001 (start from 001 on each band). Contact SEANET area stations. These are: A4, A5, A6, A7, A9, AP, BV, BY, DU, EP, HL, HS, JA, JD1, JY, KH2, P29, S21, S79, VK, VQ9, VS6, VU, V85, XU, XV/3W, XW, XX9, YB, ZK, ZL, 3B6/3B7/3B8/3B9, 4S7, 4X, 8Q7, 9K2, 9M2, 9M6, 9M8, 9N1, and 9V1. One point per QSO and three multiplier points for each different country worked. I have not yet received the 1995 rules but understand that RAST is organising this year's contest. Entries must be received no later than 31 October 1995 and sent (presumably) to SEANET Contest Manager 1995, c/o RAST, GPO Box 2008, Bangkok 10501.

Results of the **1994 CQ WW WPX Contest (CW)** have been published. **G3LNS** came second in the 3.5MHz World listing, **G4ZOB** appeared eighth in the low power category - also on 3.5MHz - and in the QRP/p class **G4UOL** scored 68,288 points on 14MHz. Actual scores are (in the QRP/P class) **GM0GNT** - 4,888 (all band), **G4UOL** 68,288 (14MHz), G4ZME - 5,146 and G3DOP 3,944 (both 14MHz), and **GB4WAT** 50,566 (7MHz). In the **single operator** all band class UK scores were: **G3OZF** 1,355,683, **G4IFB** 805,450, **GW3JI** 398,061, G3TXF 112,850, and G4OBK 8,640. On 14MHz **G3KDB** scored 1,411,438, and **GM0ECO** 507,873. On 7MHz **GM0/W5ASP** had 1,224,132. On 3.5MHz **G3LNS** had 910,848 points. In the low power category - all bands - **G3SWH** scored 603,776, **G3ESF** 461,748, **GM4SID** 362,703, G4ZFE 332,595, G3OOU 227,702, and G5MY 151,940. **G4ZOB** had 108,086 on 3.5MHz. In the Multi-

Ardent DXers make merry at Dayton 1995. From left, Ken Miller, K6IR, Dieter Stumpp, DL1SDN, Fred Hopengarten, K1VR and Peter Island operator Peter Casier, ON6TT.

operator single transmitter class **GB6PX** scored 1,873,125 to come 36th in the World list.

NEW DX SHEET

THE *59(9) DX Report* is a new DX magazine which was launched at Dayton by Bob Nadolny, WB2YQH. It is aimed at all classes of DXers and the sample copy sent to me was very impressive. For further details write to Bob at PO Box 73, Spring Brook, NY 14140, USA. European air-mail subscription rates are US$53.00 for 50 issues or US$30.00 for 25.

AWARDS

THE PODEBA (VICTORY) AWARD

This is sponsored by the Krenkel Central Radio Club of the Russian Federation to celebrate the 50th anniversary of the end of WW2 in Europe. It is available to licensed amateurs and listeners who have contacted/confirmed reports from Russian stations during 1995. Requirements are QSOs with at least 10 'veterans WW2' or 50 QSOs including five veterans. No band/mode limitations. Send applications certified by two other amateurs to the Krenkel Central Radio Club of RF, PO Box 88, Moscow, Russia. There is no charge for this award.

THE RADIO-100-RADIO AWARD

Issued by the Radioclub of Kislovdsk to celebrate the 100th anniversary of radio, the 130th anniversary of the ITU, and the 70th anniversary of IARU. Requirement is to contact (or have received confirmed reports from) with 100 Russian amateurs during 1995 - on any bands/modes. Send certified list with one IRC to Radioclub Award Manager, E Briginevich, PO Box 74, Kislovdsk, 357700 Stavropol Region, Russia. Applications will be acknowledged and you will then be asked to send five more IRCs.

THE LUGO AWARD

Issued by the Lugo DX Group for contacts or confirmed reports with group members after 1 January 1993. European applicants need to make five. The group includes many EA1s and I can supply a list (SASE please). QSLs or a certified list must be submitted and there is no charge for the award. Apply to: Manager, Diploma DX Lugo, PO Box 313, E-27080 Lugo, Spain.

THE KENYA AWARD

Issued by the Radio Society of Kenya to those who acquire 10 points by working RSK members since 31 December 1977. Each QSO counts two points but contacts with the club station, 5Z4RS, count five. All modes/bands. Send a certified list of contacts, signed by an official of a radio club together with ten IRCs to 5Z4BP, the Awards Manager, Radio Society of Kenya, PO Box 73029, Nairobi. Please do *not* enclose money and if possible apply by registered mail and mark 'Kenyan Award' at the top left corner of the envelope. Please also include a self-addressed adhesive label.

TOP LIST AWARD

Issued to those who have worked 1000 DXCC 'band countries' using all the available bands between 1.8 and 28MHz (including the WARC bands).

Endorsements are awarded for each additional 100 countries and the level of 2100 countries will be confirmed with a plaque. Send the total number of countries claimed on each band with a declaration that all cards have been received and the award manager may ask to see any card or cards. The cost is US$5.00 or 10 IRCs.

For those who apply before 30 September there will be no fee. Endorsement stickers cost US$2.00 or two IRCs. Apply to: TOP Award Manager, c/o ARI, Via Scarlatti 31, 20124 Milan, Italy.

SUPER DUPER

PAUL O'KANE, EI5DI, has asked me to publicise that, with reference to the **IOTA Contest**, the 1995 version of Super-Duper for IOTA (SDI) is now available, as freeware, from the following additional sources: (1) CompuServe: The file is SDI702.ZIP in

28 MHZ COUNTRIES TABLE

G0AEV	113
G4OBK	104
G0DNV	90
G0MCT	55
G0NQC	36
G3XBM	32
GJ4GG	27
G2FQR	17
GM4CHX	16
G3ING	14

1995 WARC BANDS TABLE

	10MHz	18MHz	24MHz	Total
G4YVV	63	85	47	195 (CW)
G3ING	56	52	6	114
GJ4GG	37	44	18	99
G0DEZ	57	28	3	88
G4OBK	17	39	17	73
G4CMZ	21	18	5	44
G4FVK	12	26	5	43

BAND REPORTS

This month's crop of reports came from G2HKU, G3GVV, G4CMZ, GJ4GG, GW4KGR, G4OBK, G0MWS and the UK DX Packet Cluster via G4PDQ - to whom many thanks. Loggings were made during the period mid-April to mid-May, and as usual callsigns in italics were of stations transmitting on CW.

7MHz

0000	*SU2MT, TI4CF, 8R1AK.*
0500	*DL4VCG/HC8, K7QQ, V31RD, VK9NS, YS1ZV, ZL3NB.*
0600	*FK8HC, N7DD* (AZ), *TL8DK, W7ZQ* (WY), *XE3ARV, 3D2RW.*
1800	*FR5HG/E, VU2TES.*
1900	*HL1KSE,* HS0/K2XX, *3V8DD, 5H3EH, 5R8FA, 9X/ON4WW.*

14MHz

0500	FH5CB, FO0DEH, *YI9CW,* G4MFW/ZL8.
0700	A71A, AH8A, KH3AF, KH6FKG, KL7XD, RX1OX/FJL, S92YL, 8Q7BE.
0800	FO5IW, WB6FZH/KH6, KH0CG, KS6DV, S0RASD, 5W1AU.
0900	ET3SID, HV3SJ, PY0ZFB, ZK1CC.
1200	A61AF, C21NJ, C21/ZL1AMO, VU2JPS/VU7, XX9GD, 3V8BB.
1400	*BV7FF,* ET3AA, *FY5FE,* V85BG, YB8DOT, *YI9CW, 4S7WP,* 9K2ZC.
1500	A71AR, BV4AS, E21CJN, VR2RJ, XU95HA, *9M2ZA,* 9N1RHM.
1600	AP2MK, J52AK, V51BO, *W7HQC, VQ9TP,* 9M2SX, 9M8DJ.
1700	A41JR, BV8BC, HS1NGR/8, JAs, SU2MT, ZD7WRG.
1900	FS/AI5P, HS0/G4UAV, XT2CH, ZC4RAF, *9X/ON4WW.*
2000	EP2HZ, FY5FJ, S0RASD, TZ6VV, 9X/VE9OM.
2100	FS5PL, HC8/DL4VCG.
2200	N7HRH, PS8DX, S92SS, XT2CH.

18MHz

0800	KH6CD, NH2G, *VK9NS, 5W0XC, 8Q7BE.*
0900	*HL1KTX,* JT1BG, R1JFL, *ZD9BV, 9J2BO.*
1000	*C21/ZL1AMO,* XX9GD.
1300	A71BI, *TR6DF,* V31RD, 4U/KC0PA.
1400	*A71AN, ET3YU,* HZ1AB, *J28GR,* N6EA, *TR8CA,* 5N3/SP5XAR.
1500	A43GI, *VQ9TP,* XT2CH, *ZS9WRT,* 7Q7JL.
1600	FS5PL, *VP5/JA7KBG, 3B8CF.*
1700	D2RL, FY5GF, *VP8CGS,* ZD7WRG, 9X5TFA.
1800	ET3KV, *TU2MA,* US0HZ, *9M2FC,* 9X5TFA.
2100	HH2/KB0SFR, HC4L, HK0TCN, S92SS, S92YL, V31RO.
2200	*KL7HF,* PJ2MI, 8R1Z.

21MHz

0800	*VQ9LW,* 3V8BB, *9U/F5FHI.*
0900	*FR5HG/E,* D68NW.
1100	*HS1AAM,* OX1NO, *S21/PA3BTQ, 5R8DL,* 5V7GL, 5X5A, *9Q5MRC.*
1200	*J20SF,* S92DW, VR2RJ, *VU2BK,* 9G1BJ.
1300	ET3KV, FH5CB, P29VR, *XV7SW,* 3B8DA, 7Q7LA, 8Q7BC.
1500	AP2ZB, D44BC, D68LC, FR5DX, S92YL, TR8IG, TU2JL, 5X1WJ.
1600	A43GI, V51BO, 5V7MP, 5Z4PL.
1800	A92FZ, VP8CIL, XT2CH, ZD7JP, 5H3MH, 9G1BS.

Software Library 6 of the Hamnet forum - keyword IOTA. (2) World Wide Web: **http://www.iol.ie/~okanep/**.(3) Anonymous ftp from Ireland On-Line: ftp.iol.ie. The file is sdi.zip in directory/users/okanep. (4) Anonymous ftp from the Sim Tel Software Repository ftp://oak.oakland.edu./SimTel/msdos/hamradio/sdi700.zip.

DXCC CRITERIA

THE ARRL AWARDS Committee has voted 5 to 2 to accept the recommendation of the DX Advisory Committee on a minimum size rule to Point 2 of the Countries Criteria in the DXCC Rules, adding the following: (c) An island is defined as a naturally formed area of land surrounded by water, the surface of which is above water at high tide. Rocks which cannot sustain human habitation shall not be considered for DXCC country status. (d) An island must meet or exceed size standards. To be eligible for consideration, the island must be visible, and named on a chart with a scale of not less than 1:1,000,000. Charts used must be from recognised national mapping agencies. The island must consist of a single unbroken piece of land not less than 10,000 square feet in area, which is above water at high tide. The area requirements shall be demonstrated by the chart. The new criteria came into effect on 20 April 1995 and will not be applied retrospectively so the application for DXCC status for Scarborough Reef - which was made before that date - would not be affected.

DX NEWS

THE NUMBER OF unprocessed DXCC applications at the end of April was 378 (representing 34,634 QSLs). The department received 536 applications (46,168 QSLs) for endorsements and new awards during the month. Applications being sent out at the end of April had been received about a week earlier.

On 10 May the DXCC Desk announced that documentation concerning the following operations had been received and approved: 3DA/SP2JYX; 4U/KC0PA (W Sahara - only the 4U callsign accepted); 4U/VE3UWC (Syria); 4U9Q (Zaire); 4U9U (Burundi); 6Y5/DL2ECB; 7O1AA (only cards in log copy between 27 March and 16 April 1994); 8Q7DM; 9L1PG; 9Q2L; 9Q5TT; 9U/F5FHI; C21/W9GW; CN2GB; FJ/OZ7SM; J75A; VP5/K0PP; VP5PP; ZB2/N7RK; ZF2VW; ZS6YG and V5/ZS6YG.

Alex, PA3DZN, (ex-9X5EE) will be on the air from **Zaire** as 9Q5L until May 1996, according to *DXPRESS*. He is said to be trying to find a location from which he would be able to erect good antennas for 1.8 and 3.5MHz. Paul, 9L1PG, should remain in **Sierra Leone** until next month. D2YX is Valy, YO3YX, who will remain in **Angola** for a few more months. He runs low power into wire antennas and tends to prefer the lower ends of the CW bands. Mark, 9X/ON4WW, was due to finish his tour of duty in **Rwanda** at the end of June. Jim, TJ1JB (ex-5X1B) is in **Cameroon** and has been found on 14.027MHz between 1930 and 2330.

It is understood that the prefixes KP3, NP3, and WP3 are to be used for **Puerto Rico** (but not in Desecheo). In **Alaska** the FCC will be issuing callsigns in the AL, KL, NL, and WL series followed by *any* number between 0 and 9. However, KL9KAA - KL9KHZ will be reserved for US personnel in **South Korea.** In **Hawaii** the AH7, KH7, NH7, and WH7 prefixes are to be used. Suffixes beginning with a 'K' will indicate that the station is located on **Kure Is.** AA4VK, WA4DAN, KW2P, and W5IJU will be visiting **St Paul Island** between 27 July and 2 August and they are planning to operate on all bands from 1.8 to 50MHz on CW, SSB, and RTTY. They will be using their own callsigns /CY.

F2JD was to be in **China** for two months beginning at the start of May. He was trying to obtain operating permission. *DXPRESS* reports that there is to be the first Beijing DX Convention held from 13 to 16 October at the China Resources Hotel located 10km from Beijing. BT1DX will be on the air for use by visiting amateurs. There will be DX meetings, lectures, forums, and a DX dinner. About 100 foreign operators are expected, and it is rumoured that BZ1HAM has said that there will be a delegation from DPR Korea attending. Further information may be obtained from Bill Kennamer, K5FUV, at the ARRL DX Desk.

DX News Sheet said that VU2JPS/VU7 on the **Andaman Is** has been heard in the USA on 14.196MHz at 0200. According to VR2KF that the best procedure to use if you wish to make contact is to listen for VU2AU on 14.195MHz who makes a list and passes it on to VU2JPS using AM! The Andaman station then calls the listed stations using CW! Marni is also believed to appear on 14.002MHz from time to time.

He works for All India Radio and will be on the islands for several years. Bryn, G4DEZ/VR2EZ, writes to say that he is running an IC745 to a Barker and Williamson Groundplane attached to the window frame of his apartment - which is over 450 feet above the South China Sea. He was planning to take a linear back with him when he returned to **Hong Kong** on 1 May.

Vlado, Z32KV, was very active from 3 to 5 April in **Albania** as ZA1MH. He used an FT757GX and TS50S with Windom and a half-square antennas for 14MHz. He also operated from ZA1AJ's QTH which is located in the Czech Embassy in Tirana. KC1QF and SV1BKN hope to visit **Mt Athos** and operate as SV0GV/3 from near the peak of Mt Athos from 6 to 9 July on CW and SSB on 3.5 to 28MHz and if possible also on AMTOR and RTTY. They intend to try split-frequency on a regional basis. Their transmitting frequencies will be 3.510, 3.780, 7.015, 7.070, 14.010, 14.225, 21.010, 21.355, 28.010, and 28.555MHz. They will also give out news of the expedition on 7.075 and 14.265MHz at 0800, 1200, 1600, and 2000.

It seems that the ZL9GD operation, which took place early in 1995, was largely conducted from on board ship. This seems to have been partly due to a misunderstanding and not because of any intention to flout DXCC rules. QSLs will therefore most probably *not* count for DXCC purposes. VK4EZA (ex-G6VS) is looking for G contacts on 14.065MHz and also on Packet @ VK4KUG-1.

There is a new QSL route for Romeo Stepanenko's operations. QSLs for YA0RR, 1S1RR, 1S0KV, 9D0RR, XY0RR, 3W3RR, US8R, UR0RR, US0RR, and EO7RR should now be sent (direct only) to Vladimir Stepanenko, US1RR, PO Box 28, Chernigrov Postamt, 250000 Ukraine. During major contests in 1995 UX2HO will be using the callsign EN2H.

THANK YOU

TO ALL THOSE who supported the column this month and specially to the authors of the following for news items extracted: *RSGB DX News Sheet* (G4DYO), *DXPRESS* (PA3FQA), the *Lynx Dx Bulletin* (EA2KL), the *Long Island DX Bulletin* (VP2ML), and the *59(9) DX Report* (WB2YQH).

Please send everything for the **September** issue to reach me no later than **13 July.** ♦

VHF/UHF NEWS

NORMAN FITCH, G3FPK
40 Eskdale Gardens, Purley,
Surrey CR8 1EZ

THE FIRST 144MHz Sporadic-E opening of the summer season occurred in May and it was the main activity mode on 50MHz. There are details of some DXpeditions and the new Spanish 6m permit holders are identified.

CORRECTIONS

IAN PAWSON, G0FCT, secretary of the RSGB VHF Contests Committee, has pointed out an error in the VHF Convention report on page 23 in the April *RadCom* concerning the forum in lecture stream A.

He wrote: "Over 100 people attended this forum which was conducted in a very civilised way. A great deal of positive feedback was obtained and the Committee was congratulated on its efforts."

The "poorly attended" forum was the stream B one by the VHF Committee. I am pleased to put the record straight.

In the Moonbounce section on page 24 of the June *RadCom*, the E-mail address for W9IP's Moon-Net reflector should be LISTSERV@VM.StLawu.EDU. Thanks to Bob Fuller, G8CEZ, and others for noticing this. The first 'V' disappeared during file transfer from the editorial office to the printer.

REPEATER NEWS

DARREN SALTER, G1ERM (CBE), writing on behalf of the Cambridge Repeater Group, advises of a proposal tabled at its AGM to change the antenna polarization of 23cm repeater GB3PS, which transmits on 1,297.075MHz (RMT3), to vertical. It was overwhelmingly passed.

To quote: "The reason for this change is primarily to encourage the growing number of mobile and portable users on 23cm by removing the need for unwieldy horizontal antennas."

When not relaying, GB3PS operates in beacon mode, but its usefulness as a beacon would be reduced after the change. The CRG seeks the views of those who use GB3PS as a beacon. If you are against the proposed change contact G1ERM, who is QTHR, and let him know why.

The Argyll VHF repeater GB3LG (R3) became operational from its new site at Creag Buireinich, six miles north of Lochgilphead, on 22 April. The hilltop site is 1,100ft ASL on a farm owned by Colin Ferguson, GM4HNK. GB3LG is one of six repeaters managed by the Central Scotland FM Group. Its keeper is Stuart McMillan, GM4WMM, to whom reports should be sent. He is QTHR.

CONTEST NEWS

DL9SEA SENT details of a contest in September, designated the Marconi Memorial Month. Organised by the AGCW-DL CW Activity Group, you can enter by making 100 or more CW contacts in the month on all bands, HF to VHF/UHF. Send log copies showing date, UTC time, band, callsigns and RST by 31 October. The adjudicator is: Otto Wiesner, DJ5QK, Feudenheimer Str 12, D-69123 Heidelberg, Germany.

The main July event is VHF National Field Day over the weekend of the 1st and 2nd. The rules are on page 81 in the May *RadCom*. There are several other RSGB events in July and they are listed in the *Contest Classified* section.

DX ACTIVITY

PA3FPS WRITES that his contest group "will be active (QRV) as LX/PA3FPS/P from JO30BB on 70, 23, 13, 6 and 3cm during the July contest. The working frequency on 70cm will be 432.240MHz, plus or minus QRM". I assume this will be NFD weekend.

Stefan Heck, LA0BY, will be QRV from KQ10CL during the Perseids meteor shower. Activity will be mainly on 2m running 200W and two 17-ele Yagis from 2000UTC on 11 August through 1000UTC on the 13th. 144.155MHz will be the random and sked frequency and LA0BY/P will transmit in the first 2.5min period at 1,000LPM, abbreviating the call to LATBYP. He will also take 6m gear - 20W and 4-ele Yagi. Skeds may be arranged through E-mail (stefan@eiscat.no) or on the 20m VHF net. The 1400 - 1800UTC period on the 12th will be reserved for random operation.

Martyn Vincent, G3UKV (SPE), writes that members of the Telford and District ARS plan to operate in the 27 - 31 July period from County Down, the likely locator being IO64XC. Listen for portable stations GI0UYE, GI3UKV,

GI3ZME, GI4ZJY, GI8UGL and GI8VZT. They will be QRV on 6m, 4m, 2m, microwaves and HF, with emphasis on 4m.

Clive O'Hennessey, GW4VVX (GWT), responded to comments in the May *VHF/UHF News* about operating portable from mountain tops in snowstorms. He has made several 600-mile trips to the Highland region (IO78UB) in the winter months but suggests that "going portable anywhere in the UK at any time requires careful note of and planning for the weather. Even in July you can end up hang-gliding with a tent; I've done it!"

Clive and a friend use a converted minibus with modified heating arrangements and take at least double the food and water required. Sites are carefully chosen and surveyed and the van is parked with the idea of 'getting off' should the weather turn bad unexpectedly. They are in radio contact with most of the UK and a fully charged hand-held can access at least one repeater.

During the early-March trip, he worked 36 squares on 2m in the contest on the 3/4 weekend. Some auroral QSOs were made on SSB but severe Doppler shift made the going difficult. He describes CW auroral operation as "much more gentlemanly".

PROPAGATION

IN THE APRIL *Report* published by the Six and Ten Reporting Club, retiring editor Ray Cracknell, G2AHU (HWR), revealed that the solar activity fell well below the predictions. The British K-indices continued to show more disturbed geomagnetic conditions in the south. Days when the K-index was five or more were seven at Hartland (DVN), four at Eskdalemuir (DGL) and only two at Lerwick (SLD).

The 50MHz propagation mode puzzle originally commented on by Ted Collins, G4UPS (DVN), continues to be discussed. Eric Parvin, G2ADR (YSN), reports reception of the CT0WW beacon in the 14 - 21 and 25 - 30 April period, sometimes all day long. He wrote: "This is the first time in many years that I have experienced reception of CT0WW as above. Obviously some type of scatter but not with the characteristics of meteor scatter."

Ray concludes: "I now think the time is ripe to collect an early morning six-metre group from Portugal, Italy, Spain, ex-Yugoslavia, the Scandinavian countries and other good stations within Sporadic-E/meteor scatter range." He suggests such a group arrange a sked every morning and that Ted might consider organising it.

The Report is now edited by Prof Martin Harrison, G3USF, whose E-mail address is poa01@keele.ac.uk. Dr S J Reed, G0AEV, (QTHR) is handling the subscriptions and the fee is £7.00 for the 12 issues from June this year until next May. Please make out your cheque to 'S J Reed'.

THE INTERNET

ACCESS TO THE Internet opens up a vast world of information to anyone with a PC, a telephone and a modem. Radio amateurs, weaned on packet radio, BBSs and the DX Cluster, are increasingly using the Internet to acquire and exchange information on anything remotely connected with the hobby.

One of the most comprehensive services is Geoff Brown's, GJ4ICD, excellent 'Home Page' - see page 72 in the April *RadCom*. Geoff advises that three-hour solar information and aurora reports are available at: http://www.atm.ch.cam.ac.uk/MiscMet.html. His E-mail address is equinox@hades.business.co.uk. His telephone/fax number is 01534 877067 during office hours.

Another popular service is Peter Bowyer's, G4MJS, 'VHF Reflector'. He offers the vhf-dx-discuss and vhf-dx-warning lists and the addresses have recently changed. Mail for the vhf-dx-discuss list should be addressed to: vhf-dx-discuss@blacksheep.org while administrative requests go to: Majordomo@blacksheep.org.

SOFTWARE

VENUS ELECTRONICS, a member of the Association of Shareware Professionals (ASP), sent me the 44-page April issue of the *Shareware Catalogue*. There are 14 pages listing about 350 amateur radio titles and VE claims to be "the largest distributor in Europe of amateur radio, communications and engineering shareware and public domain programs for the IBM PC and compatible computers".

The address is: 26 Pevensey Way, Frimley Green, Camberley, Surrey GU16 5YJ and the telephone and fax number is 01252 837860.

MOONBOUNCE

IAN WHITE, G3SEK (IO91), comments on the problems in choosing sked weekends and contest dates. He writes: "Several factors need to be balanced against one another. These include declination (more northerly declinations give more time for QSOs), apogee/perigee (up to 2dB difference in signal strengths), sky noise temperature and proximity of the sun.

In choosing a good 144MHz weekend, sky noise temperature (including sun noise) is probably the most important factor, but this is far less important on the higher bands where sky noise and its variations are smaller, and narrower beamwidths help to exclude sun noise."

Regarding the ARRL Contest dates, Ian says: "ARRL has chosen weekends with low sky noise, mid-way between apogee and perigee, with quite low northerly declination - and have hit two Region 1 VHF/UHF contests. It isn't so much a bad choice as sheer bad luck. What's more, given the ARRL's liking for low sky temperature, it's likely to happen again in 1996."

In his June *432 and Above EME News* Al Katz, K2UYH, states that the May sked weekend produced very diverse reports. A few stations found conditions exceptionally good, while others reported average conditions. The turnout was good in view of May being a post-contest month.

The only activity report is from Graham Daubney, F/G8MBI (JN04), who worked JL1ZCG (PM95UM) on 13 May for the second time. He reports that the EI5HN team put on a good show from southern Ireland making quite a lot of QSOs on 70cm and even a few with a single Yagi on 2m.

50MHZ

NEWS

Neil Carr, G0JHC, the editor of the UKSMG's *Six News*, sent a list of the 1995 Spanish 6m permit holders. There are 53 new EAs, all of whom use the EH prefix on the band. They are: EA1s BE, CG, GJ, NV, QF, SP, SY, TF, AFP, AZC, DAV, EZR and FYW; EA2s BK, ADJ and AZW; EA3s CN, EM, KG, PL, RU, AND, AXV, BID, BTZ, CAD, CUE, DUY, DVJ, FLN, FLX and FMC; EA4s AV and EHI; EA5s BY, CD, EI, FD, YB, BIF, DIT and EIL; EA7s KF, KW, PZ, RW, TL, DBH, GTF and UHH; EA8BPX, EA9IE and EA9RY. There are 60 other EAs from last year whose permits have been renewed.

Paul Baker, GW6VZW (GWT), lists the following local-to-him Welsh stations as active: 1JRM, 1PJP, 1SXT, 4EAI, 4UWR, 4VVX, 7SMV and 7SWN (all in GWT), 3MFY (GNM), 6JNE and 7TGI (GNS), 7LHI (GNW) and 7UKJ.

The following items are from G4UPS. I0CUT will be QRV from the North American College in the Vatican in the Es season; listen for HV4NAC (JN61FV). IK0FVC is the QSL manager. I2ADN will be QRV from several

ANNUAL VHF/UHF TABLE
JANUARY TO DECEMBER 1995

	50MHz		70MHz		144MHz		430MHz		1.3GHz		Total
Callsign	Cty	Ctr	Cty	Ctr	Cty	Ctr	Cty	Ctr	Cty	Ctr	Points
G1SWH	6	5	26	5	72	12	40	7	22	5	200
G6HKM	16	25	-	-	54	12	34	9	15	7	172
G3FIJ	11	6	24	4	51	10	25	6	10	2	149
G8ESB	-	-	5	2	57	10	22	4	17	3	120
G4VPM	-	-	-	-	62	12	24	6	11	3	118
G1HWY	-	-	-	-	50	11	27	7	13	4	112
GW6VZW	28	30	-	-	-	-	-	-	-	-	58
G0FIG	-	-	-	-	39	12	-	-	-	-	51
GW0PZT	-	-	-	-	34	7	-	-	-	-	41
G3FPK	-	-	-	-	36	4	-	-	-	-	40
G3NKS	-	-	31	5	1	1	1	1	-	-	40
G4OUT	-	-	6	1	23	2	-	-	-	-	32
G1UGH	2	2	-	-	16	11	-	-	-	-	31
GM6OFO	-	-	-	-	24	3	2	1	-	-	30
G1AWF	-	-	-	-	23	4	-	-	-	-	27

British counties are those listed on page 79 in the January 1995 *RadCom*; 77 in all. Up to three different stations allowed in each of the 12 GM regions. Do not include EI counties. Countries are the current DXCC ones plus IT9. Deadline for the September issue is 20 July.

Here's proof that the 8x19-element array used by the East Cork group, EI7M, was not photographed during an unusual sunset. The strange hues apparent when the photo appeared on page 17 of June's *RadCom* were actually the result of a problem at the printers.

squares, including JM78 and 88, as in past summers. QSL to the home QTH.

The San Marino club station T70A has had its CW/SSB permit renewed till the end of the year. T7 amateurs may use their own calls with the /A suffix from the station. Cedric Rourke, CT3FT (GI3IVJ), is QRV from Madeira in IM13. He is QTHR. EH8BPX, one of the new Canary Islands permit holders, is on Tenerife (IL18SK).

Ross Wilkinson, G6GVI (LNH), advises that a group in northwest England is trying to build up the rather patchy FM activity in the Manchester and Cheshire area. An activity day on 51.51MHz has been planned for 15 July by David Hughes, G0ODX.

ACTIVITY

Terry Chaplin, G1UGH (SFK), worked IK4ADE (JN54) on 30 April. In May he lists IK0FTA (JN61) on the 11th and I6JEI (JN62) on the 22nd. Ela Martyr, G6HKM (ESX), has been catching up on awards. From the Japanese society JARL Ela has received the VU1000 award number 13 for 1000 SSB QSOs with different stations. On 20 May she completed contacts with ES, F, IS0 and 9H stations; the 21st brought 14 QSOs including CT3FT and SV1EN; on the 23rd she worked OK, OM, YU, 9H and heard Z32BU.

GW6VZW lists Es openings to I0, 4 and 5 on 26 April; to DL, I, OE, S5 and 9A, 1415-1615, on the 30th. May openings were noted on 11 and 14 with 3.5 hours of it on the 15th to CT, EH3, 6 and 7, F and IS0. Jamie Ashford, GW7SMV, worked Italians on 25 April including IC8HBR (JN60) on Ischia, a rare square. A nice one on 11 May was 9H50VE (JM75), plus Italians in the 5, 7 and 8 areas. He contacted I1, 0 and EH3s (JN12) on the 15th and in the big opening on the 20th DL, EH6, IS0, IT9, OE5, OK2, SP6/9 and 9H.

A warm welcome to Geoff Crowley, GM7SJC (GRN), who was first licensed as TF3XXT. He erected a Cushcraft 3-ele Yagi on 19 May, switched on at 1315, and within five minutes had worked Fs in IN88, 94, 95 and 97. The 20th brought QSOs with ES5s in KO38, OH3MF (KP20), SM0FMT (JO89), OH0/SK3SN (JP90), IK2 and IK4. Areas worked next day were CT, EH1/3, ES, F, I0-5, OE9, S5 and 9A with more of the same on the 22nd. Geoff uses an unmodified FT-290R and Spectrum transverter running 25W.

G4UPS sent in a massive list of Es DX worked and heard in May from Devon. On the 9th Ted copied beacon CU3URA, 1515-1650, peaking S7 but no activity from the Azores. On the 20th EH3CUU/B on 50.056MHz was sending 'KKK' repeatedly while EH3CUU was making QSOs. The best days were 11, 15, 19-22. Some of the rarer stations worked/heard included ZB2IF at 1131 on the 19th; CN8NS at 1110 on the 20th working GW and at 1120 he contacted CT3FT; 21st CT3/DL5MAE was heard at 1815 at S9. Geoff Brown, GJ4ICD, copied beacon 5B4CY (KM64) at S5 on 30 April - double-hop Es at 3,350km.

70MHZ

DEREK THOM, G3NKS (GLR), is very pleased with the response to the launch of his *Four Metres News* project. Many 4m operators have already subscribed and submitted news and articles. For further details see page 23 in the May *RadCom*.

144MHZ

THE FIRST BRIEF Es opening of the year occurred on the morning of 20 May to the central Mediterranean. Southern G stations were heard working to parts of Italy and IT9 for 5-6 minutes.

Alec Trusler, G0FIG (SXW), finds it difficult to arrange MS skeds since most of the 'older stations' are only interested in EME now. Recent completions were with S51AT (JN75) on 22 April - a 55s burst received - EA6FB (JM09) and OK1KF (JO69) on 13 May and LY2BIL (KO24) next day. The only tropo QSO of note was with EI5HN/P (IO61) on 6 May.

Mike Jupp, G1HWY (SXW), found activity very good in the contest on 20/21 May, commenting: "I could have worked every English county if needed." His best DX was GM0ULK/P (IO86). In complete contrast, Mike Clark, GM6OFO (TYS), described conditions as very poor. Gerry Schoof, G1SWX (MCH), worked EI5HN/P (IO41) on 11 May. On the 15th he contacted Andy Adams, GW0KZG/MM, on the *RRS Charles Darwin* in IO65KT and on the 17th in IO56MK, a completely 'wet' square.

On 6 May, G1UGH worked DLs in JO44 and 54 and OZ1HLB/P (JO55). Andy Stafford, G4VPM (SOM), worked EI5HN/P when they were in IO53 on 15 May. He operated in the 20/21 May contest and worked several GMs, remarking on the tremendous signal from GM4ZAP/P (DGL). G6HKM took part in the six-hour section of the contest completing 162 QSOs with 52 multipliers. Ela's best DX was to JO51CH. On 24 May, Rik Royall, G8ESB (YSN), worked GM4IPK (SLD). The Lerwick beacon GB3LER was also a strong signal.

Nick Shaxted, GM4OGI (CTR), is busy upgrading his station with a muTek transverter, 1kW PA and five wavelength DJ9BV Yagi. The idea is to investigate extreme range tropo forwardscatter. He seeks sked partners.

Contact him via E-mail. His CompuServe address is 100043,1032 or via the Internet to 100043.1032@compuserve.com. He notes consistent MS reception of beacon DB0FAI (JN58) on 144.855MHz in the 0430-0830UTC period at present. S9+ bursts of 15s are punctuated by many weaker returns, resulting in an almost continuous stream of noise. He wonders whether operators in SE England hear this beacon via tropo?

Joe Ludlow, GW3ZTH, was out portable on 30 April from IO81FP completing nine QSOs, best DX being F/G8MBI. In the 4-7 May period he made 50 contacts in 20 squares, best DX being F1ERG/P (JN27) on the 7th. Referring to G8MBI's report in the May column, GM7SJC confirms he was QRV portable at 0920 on 13 March from IO86FO, 1,000ft ASL near Dunkeld, Perthshire. He was running 24W to a handheld 6-ele Yagi but did not hear Graham.

For F/G8MBI the May highlights were DL5MAE's trip to Madeira and the DL8EBW/P operation from Portugal. On the 3rd Graham worked CT/DL8EBW (IN50XX) on random MS; CT/DF7KF via tropo on CW on the 4th and on the 5th, CT/DF7KF, CT1/DH0LS/P and CT1/DC9KZ/P (all IN51XA) on tropo. The contest on 6/7 May was a bit quiet in JN04 but Spanish activity was high with EA1-4 QSOs plus EA6IB. Other DX included TK5DL/P (JN42), I1MXI/P (JN44) and HB9AOF (JN36).

MS QSOs were completed with EI5HN on the 8th (IO61), 12th (IO41) and 15th (IO53). On the 11th, he received a 75s burst from CT3/DL5MAE (IM12) during their prior sked with EA2LU. Graham also completed his sked at 2,001km. The Sunday morning skeds on 144.285MHz SSB continue, stations worked including G0FIG, G3NVO, G4AEP, G4RGK, G4RRA, G7RAU and GW3ZTH/P. The 20/21 May contest brought very good MS reflections from GM4ZAP/P (IO74) and G0EMG/P (IO94).

430MHZ

G0FIG ADDED one new square on 70cm in May thanks to EI5HN (IO61). G8AIM (IO92) was new on 23cm. G1HWY worked EI5HN/P (IO61) on 70cm on 6 May for his first EI in 10 years. On 23cm in the 6/7 May contest he only worked five stations in 24 hours. G4VPM's sole contact on 70cm was EI5HN (IO61) on 4 May.

G6HKM found it slow going on 70cm on 6 May. Ela made 16 contacts on 23cm including two PEs, an ON and DL0OU/P (JO43). In the Trophy contest on 6 May, G8ESB worked GM0USI/P, GM4LBV and GM8VBX on 23cm. In four hours operating Rik made 11 QSOs on 23cm and nine on 70cm. GW3ZTH blew up his GaAsFET preamp yet again, so only worked G8OHM/P (IO82) on 7 May.

DEADLINES

THE **SEPTEMBER** deadline is **20 July** and the **October** date is **17 August**. The answering/fax machine is on 0181 7639457. The BT Gold mailbox is 87:CQQ083. My CompuServe ID is 70630,603 and the Internet address is 70630.603@compuserve.com. Please include your name, call and postal address if using E-mail. ♦

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IN A RECENT Scarborough Reef (AS-116) press release Chip Margelli, K7JA, of BY1PK and ZA1A fame, stated: "The IOTA Programme, of which Yaesu is the principal sponsor, is the most exciting award program in amateur radio today. DXpeditions to proposed new IOTA entities are subjected through an exacting screening process, to ensure that the requirements for IOTA listing are fully met. Yaesu is proud to sponsor the activities of the IOTA Programme, known for its integrity and responsiveness to the interests of the amateur radio DX community." Chip is a recent convert to IOTA and joins the many DXers who are now pursuing IOTA awards.

PROGRAM FOCUS

THE NEW IOTA Members' computer system (IOTAMEM) is proving very popular with more than 100 disks sold so far. I have received several queries about the system:

- *Does IOTAMEM work only with Turbolog?*
  No. It is a stand-alone system.
- *Can data be imported from log book files?*
  Yes. I can provide a file specification for the interface. New releases of both Shacklog and Turbolog will provide interfaces to IOTAMEM. Other software companies have requested the interface specification.
- *How can a member be certain that he has the latest version of IOTAMEM?*
  The program is being enhanced continually and new versions are sent to checkpoints every two months. When a member receives a disk from a checkpoint it always contains the latest version. This version is then automatically installed on the member's machine together with the latest data, help files and island listings.

G stations can obtain disks from Phil Marsh, G4WFZ, who is QTHR. The price for the initial disk is £5, US$8 or 13 IRCs post paid.

HONOUR ROLL & ANNUAL LISTING

IOTA IS ONE OF the few award programmes that has an Honour Roll and Annual Listing. These create a great deal of interest when they are published each year. Many IOTA enthusiasts are more interested in taking part in these listings than in collecting the certificates. To participate all they need is the basic IOTA-100 certificate. The 1995 listings are shown opposite.

LIST 'CAPPING'

THE 'CAP' OF 1,175 on the island list, introduced in the 1991 *IOTA Directory* revision, is an important feature of the Programme. It is important that there is a 'cap' or limit to the number of island groups so that new and existing participants do not feel that the number of groups is ever-increasing and out of reach. It should be remembered that, although capped, the list includes all or at least 99.9% of the islands of the World's oceans appearing on a scale map of 1:1,000,000.

AN EVEN CHANCE

SOME IOTA enthusiasts have been pursuing islands since the start of the Programme in 1964. Others, indeed the vast majority, are recent enthusiasts. It is important that all island chasers have the opportunity to get to the top of the IOTA Honour Roll, dependent only on their own level of activity and operating prowess and on the islands being activated. Deletions such as the Penguin Islands may have caused a problem here but the IOTA Committee recently decided that credits for deleted groups will be withdrawn after three years. This presents all participants with a level playing field.

ALTERED LINES

GENERALLY, POLITICAL or internal administrative changes within a country are likely to have minimal effect on the way island groups are listed. However, alterations to country boundaries or names will be reflected in the island list, as will changes of sovereignty over islands (the Penguin Islands are an example). Fortunately such changes are relatively rare.

IOTA PLAQUE OF EXCELLENCE

THE IOTA PLAQUE of Excellence is available to those who reach the impressive heights of 750 confirmed island groups. Also on offer are 18 certificates. Shields can be added to the plaque for every 25 additional confirmed groups.

Furthermore, a single endorsement for mode and/or band can be made. The IOTA Committee accepts the need to encourage more IOTA operations on CW and RTTY and is actively promoting these.

IOTA CONTEST

THE 1995 IOTA Contest takes place over the weekend of 29/30 July. It is, as past competitors will confirm, a good humoured affair enjoyed by all. The 1993 and 1994 IOTA Contests were major successes. Many rare and fairly rare island groups were activated and there was a high level of participation. In 1994 over 150 island groups were reported active during the 24 hour period, more than enough to gain the basic certificate. There was an additional CW section that attracted much support.

The IOTA World Diploma - one of a series of 18 certificates.

30 YEARS ON

"GREAT VALUE" was David Rollitt's, G3XYP, verdict on the booklet *IOTA - 30 Years On*. He commented: "I really enjoyed reading about the various DXpeditions and putting a face to the callsigns. Congratulations to all for a fine publication, a must for all IOTA fans everywhere." The booklet can be obtained from RSGB HQ at £6 to members (see pages 90 and 91).

Alternatively, the special offer of an IOTA Directory and the Anniversary Booklet is still available from Roger Balister, G3KMA, who is QTHR. The price, for the two, including postage, is £11 or US$18 or 27IRCs within Europe or £13 or US$22 or 33IRCs outside Europe.

CHECKPOINTS

CHECKPOINTS HAVE now been established in several countries outside the UK where the numbers of IOTA enthusiasts are significant. This obviates the need to send QSL cards out of country, a matter that causes concern for many. There is an ongoing project to enhance the checkpoint computer systems in order to further reduce clerical burdens and application processing time. There are now checkpoints in Australia, France, Germany, Italy, Spain, UK(4) and USA(3).

FREQUENCIES

THE MAIN MEETING frequency is 14.260MHz. Other ones on SSB are 28.560, 28.460, 24.950, 21.260, 18.128, 7.055 and 3.755MHz. The CW frequencies are 28.040, 24.920, 21.040, 18.098, 14.040, 10.115 and 3.530MHz.

No specific frequency has been nominated for 7MHz CW but it is recommended that operations should include a frequency above 7.025MHz when the band is open to North America. The 14.260MHz frequency is used by a number of IOTA nets around the World, primarily for the passing of information about island activity, QSL routes, etc.

This and other nominated frequencies are not reserved exclusively either for IOTA nets or for the making of island contacts but are shared with others on a normal non-interference basis. ♦

RADCOM OPERATING FEATURE

RSGB IOTA Programme Annual Listings

by Roger Balister, G3KMA, RSGB IOTA Director

A BUMPER 32 additional stations have crossed the 750 Islands mark during the last 12 months, thus qualifying for the prestigious Plaque of Excellence. In total 38 have made it and a further 25 are within striking distance.

Originally, it was thought that, once they reached the 750 mark, some of the top scorers would quit to return to a more relaxed family routine! This seems not to be the case. As many as 27 of last year's top 30 scorers are still holding their places, although the order is a little different. Three stations hold the same top three positions as last year, Jean-Pierre Guillou, F9RM, followed by Livio Zenti, I1ZL, and Gianni Varetto, I1HYW. Quite an achievement! What is noticeable is that a number of stations have reached the 600 mark having started serious island chasing only three years ago. That shows that IOTA is not just for those who have been in island pile ups for years!

Last year we reported a big increase in participation in the Honour Roll and Annual Listing, from 352 to 509 members. This year the increase is even larger with 163 new members bringing the total to 672. Participation is on target to double in little more than two years. This scale of growth has been made manageable by the new fully computerised application procedure which removes the necessity for retyping of data at any stage of the processing routine as well as providing a high level of validation - see 'Program Focus' opposite.

Analysis of the listings continues to show significant increases in participation across the board with the USA, England, Italy, Germany, Spain and France leading the way. Prospects for continued growth in these countries are good, particularly following the appointment of local checkpoints in the last three named countries. For the future, a key area to watch will be Japan where major effort is being devoted to promoting IOTA - with plans well advanced for a Japanese language version of the Directory and Committee representation at the Tokyo Ham Fair in August. All three major Japanese monthly magazines now carry a monthly IOTA column written by Friends of IOTA. Finally, I have to say how pleasing it is to see over 100 G stations in the listings. This is a real milestone.

IOTA HONOUR ROLL - MAY 1995

Posn	Callsign	Total
1	F9RM	834
2	I1ZL	822
3	I1HYW	814
4	I1SNW	807
5	I1JQJ	806
5	VE3XN	806
5	9A2AA	806
8	W9DC	803
8	EA4MY	803
10	ON5KL	798
11	W9DWQ	796
12	GM3ITN	795
12	I8XTX	795
12	W4BAA	795
15	VE7IG	794
16	IK1AIG	792
17	G3AAE	790
18	ON5NT	787
18	DL8NU	787
20	OH2QQ	786
21	IK1GPG	785
22	ON6HE	784
22	G4WFZ	784
24	I8KNT	780
25	G3GIQ	778
26	I0OLK	777
27	K9PPY	775
28	IK1JJB	773
29	I2MWZ	771
30	IT9GAI	768
31	ON7EM	758
32	ON4AAC	757
33	I8ACB	755
34	FE6CYV	753
35	DK6NP	752
36	CT1UE	751
37	I8YRK	750
38	G3ZAY	749
39	G3ALI	748
39	DK1RV	748
41	ON4XL	742
41	OZ4RT	742
41	9A2TW	742
44	EA5AT	739
45	F6AXP	738
46	CT1ZW	731
47	OM3JW	730
48	G4RFV	729
49	ON4FU	721
50	I8YZP	717
51	KC8PG	713
52	K8DYZ	712
53	KD7SO	711
54	F2BS	706
54	F6DLM	706
56	G3VJP	705
56	K2VV	705
58	EA8AKN	704
58	F6AJA	704
60	F6BFH	703
61	F9GL	702
62	G8JM	701
63	DL8FL	700
64	I2FUG	698
65	WD8MGQ	695
66	G3XTT	685
67	OE3WWB	684
68	VE6VK	680
69	W9NZM	679
70	I4LCK	678
71	CT4NH	676
72	I1EEW	674
73	G3MLX	673
74	IK2MLY	670
74	EI7CC	670
76	F6DZU	667
77	I2VDX	663
77	YL1XZ	663
79	HB9RG	661
80	K6DT	658
81	GW3ARS	650
81	WB9EEE	650
83	W3KH	646
84	SM6CAS	644
85	WT2O	641
86	G3YAA	640
87	F9MD	638
88	G3NUG	637
88	W5BOS	637
90	I1CAW	631
91	F6CUK	625
92	EA5KB	624
92	OK1JKM	624
94	N7BZI	623
95	I1TBE	620
95	HB9AFI	620
97	W1ENE	618
98	G4LVQ	617
99	G3TOK	616
100	KA5W	611
100	W0MLY	611
102	DL7CW	609
103	HB9BVV	608
103	N6BOI	608
105	DK6NJ	607
105	K2EYJ	607
107	F6ELE	604
107	K5MK	604
109	KE4I	602
110	VK9NS	600
110	OE6MKG	600
112	ZL1ARY	593
113	ON4QP	586
114	S51TE	577
115	VE7IU	576
115	SM0DJZ	576
117	IK2IGX	572
118	IK8TWV	571
119	N5OUE	562
120	IK4CWP	559
120	HA0DU	559
122	DL8MAG	555
123	W2FXA	551
124	SK6PJ	547
125	VE6PW	546
126	N3CWP	544
127	CT1UD	541
128	KA5TQF	539
129	IK8JWA	529
130	I5DCE	525
131	DF2NS	521
132	K3FN	520
133	DL2SCQ	519
133	DL6ATM	519
135	ZL2VS	516
136	KA1DIG	515
137	F6FHO	514
138	DJ4XA	512
139	KM4RX	509
140	I2JSB	507
141	I2YWR	506
142	G0LRJ	505
142	CT1DIZ	505
144	G3OCA	503
145	GM0AGN	501
146	K5FNR	490
147	EA1KK	486
148	G4BWP	481
149	IK1NEG	479
150	N6PYN	477
151	I1ZXT	476
152	I2YDX	468
153	N6JM	465
154	IK1AOD	463
155	N4QQ	462
156	W5KN	461
156	KB8O	461
158	W9HAO	457
159	PY2DBU	456
160	ON7FK	453
160	N3ERM	453
160	G3EZZ	453
163	CT1RM	451
163	I1UKM	451
165	ON4ADN	449
166	DL3BUM	448
166	IK1QFM	448
168	KD1CT	447
168	CT1AHU	447
170	SM6CVX	445
171	DL1SCQ	442
172	DL1SDN	438
172	G3KYF	438
172	NN2C	438
175	G3ZQQ	437
176	G0NXJ	436
177	I2LXA	434
178	I1GEA	433
179	GM0KCY	432
180	G0KIK	430
180	N8EDQ	430
182	EA3KB	425
183	EA5OL	421
184	WF1N	420

TURN TO PAGE 52 FOR THE FULL 1995 LISTINGS

SWL NEWS

BOB TREACHER, BRS 32525
93 Elibank Road, Eltham, London SE9 1QJ

THIS IS NOT going to be another contest based column, but I must mention the RSGB's IOTA Contest on 29/30 July. Last year's event attracted scant support from British SWLs. By contrast, there were 24 overseas entries. Adjudicator Ian Buffham, G3TMA, would like to see a far stronger showing from British SWLs this time around.

The object of the event is to hear stations operating from islands. Some SWLs are already hooked on island chasing. If you are not one of them, take a listen during the contest and you soon will be! The top SWL heard 138 different islands in last year's event. Many of the other entrants heard 50 or 60. Much of the island activity is from Europe so you will not necessarily need a super efficient antenna system. Why not have a listen? It will be good practice for the Autumn contest season and my SWL Challenge!

ISWL 1995 ACTIVITY

THE CLUB CALLSIGN of the International Short Wave League (ISWL) will be active from different locations throughout the year. The operators will use GX4BJC/P. Any listener hearing the callsign will be eligible to receive a special QSL card. QSL information is either via the bureau or direct to G0DBX at 'Kenwood', London Road, Louth, Lincolnshire LN11 8QH enclosing an SASE.

'EASILOG' NEWS

IN RESPONSE to the item on Don Ward's, G0MDO, program in May's *SWL* column, David Whitaker, BRS25429, has sent me his views on the package. He explained that it has helped him ascertain what he has heard in the Pacific over the last 20 (or 20+) years. He has been able to come up with some fascinating information. For instance, he has heard: 48 different P29s on 28MHz; 81 different KH6s on 21MHz; 67 different FO8s on 14MHz; 11 different 9M8s on 7MHz; 25 different DUs on 3.5MHz.

Many more interesting facts have been presented, but this should give SWLs sufficient data to realise that G0MDO's package is most useful to the active SWL. Any SWL requiring further information should write to G0MDO, who is QTHR, enclosing an SASE.

While on computer topics, I have seen a copy of the *Venus Electronics Shareware Catalogue*. It lists several hundred amateur radio programs which are either 'Public Domain' or 'Shareware' for IBM PCs or compatibles. Many titles will interest the SWL. For further details send return postage only to Venus Electronics, 26 Pevensey Way, Frimley Green, Camberley, Surrey GU16 5YJ.

CQ AWARDS

MENTION OF these awards in May's *SWL* column has prompted several listeners to ask for an address so that more information can be obtained. Try Dorothy Johnson WB9RCY, who writes *CQ* Magazine's 'Awards' column. Her address is 333 South Lincoln Avenue, Mundelein, Illinois 60060, USA.

VK NEWS UPDATE

THANKS TO VK4TT and G3XWK, I now have access to the *1994 VK Callbook*. I will gladly send VK QSL information to anyone who requests it, providing return postage is supplied. It is interesting to note from the publication that there is a 'Heard All VK Call Areas' Award. Applicants need to log 22 QSOs as follows VK1, VK0 - one logging from each call area; VK2, 3, 4, 5, 6 and 7 - three loggings from each call area; and VK8, VK9 - one logging from each call area.

Loggings must be made after 1 January 1946. The cost is $US5.00 or 8 IRCs. The address you need for claiming the Awards is: Federal Awards Manager, Wireless Institute of Australia, P O Box 300, South Caulfield, Victoria 3162, Australia.

FROM AROUND THE SPECTRUM

PART OF THE way through his Far East adventure, David Whitaker, BRS25429, wrote to me from VK4. We will no doubt hear more when he returns home. He took a receiver with him and I understand he is hearing lots of Pacific DX which is just not heard in Europe these days.

Stan Porter, ex-BRS but now CT1DX1E [This is a Portuguese listeners 'callsign' - *Ed*] wrote from Indonesia on what seemed to be a World tour. He mentioned travelling via HK, CX, VE, BY and 9M2, looking forward to VK and P29. It was not clear from his postcard whether he had a receiver with him.

Mick Toms, BRS31976, has re-vamped his shack. He can now boast a Kenwood R-5000 as the main station receiver. With antenna work threatened during the summer months, Mick seems to be getting serious about his HF activity again. On VHF, he was giving the system an airing before the Es came along.

I have had relatively few VHF reports over the past couple of years, but there is plenty to interest listeners on these bands. 50MHz may not have F2 propagation to excite us yet, but the Sporadic-E (Es) season will be in full swing by the time you read this. On 144MHz, Es will give the most excitement but tropospheric propagation (assuming we get a few decent high pressure systems) will provide the 'bread and butter' with stations audible from near Europe and all over the UK. It would be interesting to have some fresh VHF reporters this year. Surely, some SWLs venture away from 14MHz during the summer months!

On HF, I have few reports this time. Several listeners mentioned the callsign changes in Kuwait. For a time all non-Kuwaitis were using 9K2/home callsign ie 9K2/N6BFM instead of 9K2ZZ, with 9K2ZZ re-issued to a Kuwaiti National. However, the situation has resolved itself and 9K2ZZ is once again being used by N6BFM. This upset QSL information, but the correct manager for 9K2ZZ is W8CNL. At home, there was much 'GR' excitement with huge pile-ups on many VE Day stations on 3.5MHz.

FIRST HAB OF 95

DENNIS, GW6JNE, provided an update on Heard All Britain matters. The first to claim the 1995 Jubilee Award was Chris Gibbs, who also qualified for the award for hearing 340 overseas bookholders.

FINALE

ALTHOUGH IT WAS scrapped some years ago, I have received entries for the CW leg of my SWL Challenge. If there is sufficient interest, the CW leg might return next year.

I have also received requests to revive the *SWL* column's All Time Countries Table. Again, whether or not this is restarted will depend on the amount of interest shown by SWLs.

My deadlines have been altered, reverting to an earlier date than has recently been the case. Please note the **September** deadline is **12 July**. ♦

Pierre Fournier, F-10095, entered the October 1994 SWL Challenge. His neat purpose-built shack in Versailles is certainly well equipped. Readers will notice a Kenwood R-5000 receiver, together with telephone, TV, computer and intercom.

NOVICE NEWS

MRS ESDE TYLER, G0AEC
43 Nest Est, Mytholmroyd, Hebden Bridge, W Yorks, HX7 5BH

A CHANGE OF premises for Pontypool Community and Education Centre seems to have inspired its first set of Novices; they all passed the March NRAE.

Novices who were attending the old centre before Christmas resumed studies at the purpose-built premises in February.

Among them was Jack Everson, a telegraphist during WW2 who used to read and send Morse at 25WPM. Others to make the grade were Gary Taylor plus Sarah and Joseph Faraday, aged 14 and 16 respectively. This makes the Faradays a fully radio-active family as dad Michael became GW7TLU early in '93 and mum Pauline earned 2E1DHM in the June exam last year.

Hopefully, the centre will serve a great many more Novices. However, the upheaval of moving premises resulted in only two students taking the course leading to the May exam. If there is a demand, a new course will start in September under the instruction of Con Lonsdale, GW0FJH, and Dave Williams, GW3XJA.

KIDLINK '95

BAD TIMING worked against Kidlink this year as the event clashed with VE Day activities. Not surprisingly, the commemoration took preference. All the same, there were Kidlink stations in operation.

Using the callsign GR0VED, Scarborough College supported Kidlink - as it always has in the past - and also took part in VE Day commemorations.

Another Kidlink station was set up at Thornhill Junior and Infants School with Peter Bateman, G3LCG, and Derek Allan, G0RZP, at the helm. The youngsters there heard European and American stations.

Meanwhile, Clive Harrison, GW0TWR, was at Crynallt Infants School and, along with Janet James, GW0KPD, her husband Ted, GW0NKF, and Mike Patterson, GW0TWF, helped youngsters to each take turns on the microphone. I spoke to eight of them, under the callsign GB0CIS, and all managed to beat the noise and tell me a little about themselves.

Clive promptly wrote to me - before my cards had even reached the school - and thanked all the G stations who had called in and praised their patience in speaking to the children.

I also managed a few words with Martin Vann, G3RLV, at Richmond School (GX0RYS) but there were no pupils around at the time.

To my knowledge there were no other stations in operation but Alan Betts, G0HIQ, subsequently rang to ask where I'd been hiding. Although conditions were not good, The Priory School was very busy, active on 40 and 80 metres also 2 metres packet.

PLEA ANSWERED

WITH A LITTLE help from this column, the search for instructors to help a group of youngsters learn about amateur radio has proven fruitful. An item in the *Novice News* column last November called on radio amateurs to help train a group of aspiring Novices at Lyndhurst Middle School, Borehamwood, Herts.

There was an update on the school in the February *Novice News* after it set up a special event station which raised money for the Children in Need Appeal, as well as showing parents and pupils what amateur radio was all about. It was this that paved the way for plans to train a group of children for the Novice licence.

Training is now under way thanks to Dave Seddon, G4VCO, and his team - Ron Ray, G2TA, Adrian Marshall, G6MHF, and Ian Hamilton, G0TCD. Sue Curliss, the teacher behind the request for help, said the instructors had shown both patience and gentleness with the children. Keen to join the Novice ranks herself, Sue is learning about amateur radio alongside her pupils.

It may be some time before the first Novice licences are earned, as the children must be competent and reasonably confident before they face the NRAE, but I will pass on any word of progress.

Although there have previously been very young Novices individually taught, this must be the first group venture in a school with mixed-ability pupils in the junior age range.

Anyone within striking distance of Borehamwood who has anything to spare which could be of use to the children - redundant callbooks, magazines, boards of components for recycling - would be gratefully received. You can either drop items into the school or give them a ring during school hours on 0181 953 7748.

A working session in progress at Lyndhurst Middle School, Borehamwood, Herts which now offers amateur radio training.

FRIENDLY RIVALS

IT WOULD APPEAR that a competitive element has crept into the Novice instruction arena. Of course, all instructors have reason to feel proud with more than 1500 Class 'B' and nearly 200 Class 'A' Novices listed in the *RSGB Callbook* (and that has been in print for some time). Nonetheless, some instructors seem motivated, in part, by county pride.

Derbyshire and Notts are apparently in contention for the title 'Top County for Novice Training'. The contest will make allowances for relative population size and is, in any case, intended as no more than lighthearted rivalry.

Notts will be hard to beat with consistency on their side. On the other hand, Derbyshire has a new senior instructor in Frank Whitehead, G4MLL, and he will be keen to make his mark. His predecessor, Roy Oakton, G0IWF, has had to bow to other pressures.

Roy has given total commitment to the scheme from the start and RSGB Project Year Co-ordinator Phil Mayer, G0KKL, paid tribute to his dedication and leadership.

In order to build on these high standards Frank needs help. If you live in the area, and would like to support Frank and help others along the way, you can contact him at 18 Bath Road, Mickleover, Derby DE3 5BW or on 01332 512080.

Meanwhile, if you are keen to help the Notts instructors, contact Julian Mayfield, G0LXX, at 9 Middelfell Way, Clifton Estate, Nottingham NG11 9JN or telephone 01159 211069.

NOVICE AWARDS

HAVE YOU EVER considered trying to win one of the awards that are available to Novices?

There are a number of awards which can be earned, resulting in a certificate. Some, like the Marconi Award, are concentrated into a brief period of time. Others, like the Worked All Britain Award, can be achieved at a more leisurely pace.

Another activity open to Novices is contesting. Novices will find that they are often welcome to help with logging, operating and generally being involved. From these events Novices gain experience, by being in contact with experts, and by trying for themselves.

Simon Kahn, G0STU, (who held the second Novice callsign - 2E1AAB) has supplied me with the list of events in which he will take part this year, exam revision permitting. Simon believes that all Novices would probably enjoy being involved - especially in the big events as part of a team. Novices would be able to gain experience in antenna-erecting and high speed operating. Though amateur radio is not considered a true sporting activity, relative fitness and endurance would be a great advantage!

Details of RSGB contests can be found in the *Contest Classified* section in *RadCom* while a wider selection is listed in the *RSGB Callbook*. As contests are publicised well in advance, there is plenty of time to plan ahead.

Ian Cornes, G4OUT, is the RSGB VHF/UHF Awards Manager. His address is 6 Haywood Heights, Little Haywood, Stafford ST18 0UR and he will send details in return for an SASE. ♦

QSL

JOHN HALL, G3KVA
Corfe Lodge, Ipswich Road, Long Stratton, Norfolk NR15 2TA.

JOHN WATSON, GJ3EML, tells me he thinks that an awful lot of time and money is wasted in QSLing. He says he gave up sending cards via the Bureau some years ago because of the expense and because he doesn't want certain countries confirmed hundreds of times over. He says there must be thousands of unwanted cards thrown away each year by Sub Managers. The latter is certainly true, but I know that many would disagree with his other views. From my experience at the RSGB HQ Open Day on 22 April, there are many members - and not all recently-licensed either - who thoroughly enjoy looking forward to their consignment of cards from the Bureau. A certain very well known G3 brought in what must have been 300 cards all neatly parcelled up ready for despatch.

Mr T J Chapman, G3PTQ, tells me that he still looks forward to receiving his cards from his Sub Manager. I get many letters from members on this subject. Some tell me QSLing is a waste of time and childish unless one wants a particular country confirming. Others say they still get a buzz out of sending and receiving cards. My view is 'live and let live' - why take a stand about something that is harmless fun and gives a great deal of pleasure to so many people? It's just the uncollected cards that are the problem, and if only people were more honest at the time of the QSO and indicated that they did not intend to QSL then life would be a great deal easier for the hardworking Sub Managers. I listened to a CW QSO between a W6 and an SP the other day. The W operator was quite specific about the fact that he didn't send QSL cards anymore and had not done so since 1965 - would that all operators were so up front.

NON-MEMBERS

WHILST ON the subject of using the bureau, there seems to be a widespread belief that if a non-member belongs to a club affiliated to the RSGB then that grants automatic free use of the bureau for personal QSL cards. Not so. Non-members using an affiliated club's callsign can utilise the bureau but *not* for their own personal QSL cards. OK?

MORE SCAMS

GILLIAN PARSONS, G0AOL, sent me a card received by her for a non-existent QSO with a Hungarian station. Accompanying the card was a sort of begging letter inviting participation in a 'business venture'. The letter ends with the words "I am waiting for your answer". If I get a similar letter then he will be waiting a long time!

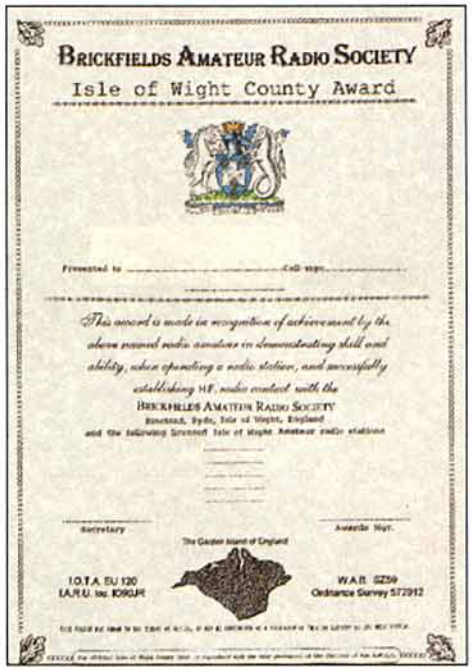
Malcom Jackson, G0FDE, tells me his call is being pirated, and he is not a happy person. He has not worked on HF since 1989 so the five cards he recently received for HF QSOs came as something of a surprise.

UKRAINIAN HELP?

JIM TURNER, G3AYZ, used to correspond frequently with Vlad, RB5SA, but has lost touch since the break up of the Soviet Union. Jim thinks he must have been allocated a new call and he doesn't know that either. I know this column is read in the Ukraine and elsewhere, so if anyone can help Jim with an address for the former RB5SA he would be eternally grateful. Jim is QTHR just down the road from me in Burston, Norfolk.

SABLE ISLAND

JOHN PIGGOTT, G2PT, sent in an interesting colour photograph (below) of a QSL card from Sable Island, off the coast of Canada, received by him for a QSO during the International Geophysical Year in 1954. The blue background shows the large number of ships wrecked en route to Halifax or Liverpool during the 19th century. In addition it records that two aircraft, a Hudson and a Liberator, crashed there during WWII. John wonders if there have been any QSOs with Sable Island in recent years and whether VE1ABV is still active. Does anyone know?


BRICKFIELDS AMATEUR RADIO SOCIETY

Isle of Wight County Award

Presented to _____ Call sign _____

This award is made in recognition of achievement by the above named radio amateur in demonstrating skill and ability, when operating a radio station, and successfully establishing HF radio contact with the BRICKFIELDS AMATEUR RADIO SOCIETY Rookstead, Ryde, Isle of Wight, England and the following Grossest Isle of Wight Amateur radio stations

Secretary — Awards Mgr.

The Greater Island of England

I.O.T.A. EU 120
I.A.R.U. loc. IO90JR

W.A.B. IZ59
Ordnance Survey 572912

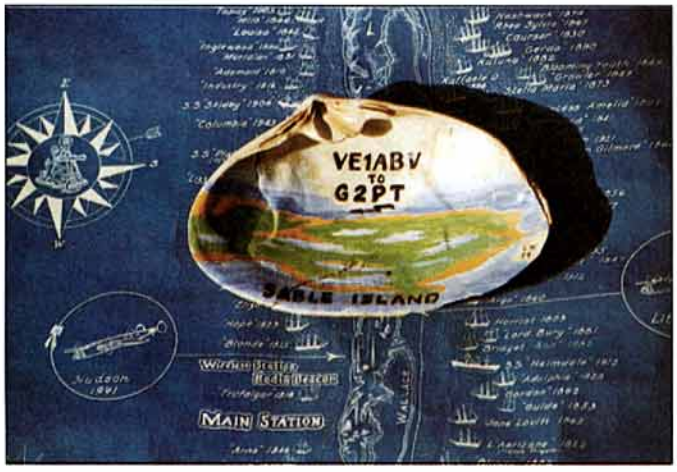
The hand-painted Isle of Wight County Award issued by the Brickfields Amateur Radio Society.

AWARDS

ALAN GARDNER, G0NTH, who is the awards manager for the Brickfields Amateur Radio Society (BARS) on the Isle of Wight, sent in details of the Isle of Wight County Award. The most attractive certificate is pictured above. The paper used is parchment-style A4 with the coat of arms hand-tinted in long-lasting acrylic paints. To obtain the award, you need five contacts on HF with licensed amateurs on the IoW, plus one contact with the HQ station of BARS. On the VHF / UHF bands, you need ten contacts with licensed amateurs on the IoW, plus one contact with the HQ station. The HQ station could be G0BAR or any special event station operating from the headquarters. The award is also available to SWLs and packet users. The cost is £3 and further details can be obtained from Alan Gardner, 137a Castle Road, Newport, Isle of Wight PO30 1DP.

SPECIAL EVENTS

BERT v d BERG, PA3GIO, wrote to say that he will be operating from Luttrell's Tower near Calshot in Hampshire, which was used by Marconi between 1912 and 1916. Bert will be on the air using the call G/PA3GIO/P from 13 to 18 August 1995. Any QSLs for Bert can go via the Bureau to his home call. He will reply using the very attractive card pictured below. ♦



Picture of 1954 QSL from VE1ABV on Sable Island.

Bert van der Berg will be following in Marconi's footsteps when he operates from Luttrell's Tower next month.

RADCOM OPERATING FEATURE

British Signals in Australia on 7MHz

by John Bazley, G3HCT* / VK4CJB

HAVING SPENT several months experimenting with phased arrays for 7MHz, I wanted to make some comparison tests between Bob Whelan, G3PJT, who was using a 4-square array, and other G stations using more sophisticated antennas than simple ground planes or trap verticals. [G3PJT's 4-square array is described in 'Phased Vertical LF Band Antennas' in the May and June 1995 *RadCom - Ed.*]

Comparisons

IN THE TWO WEEKS prior to the RSGB 7MHz DX CW contest I ran a daily sked with G3PJT, mainly on the long path, and occasionally via short path. Comparisons were made with Fred Handscombe, G4BWP, and Peter Chadwick, G3RZP. Fred was using a Cushcraft 402CD two-element loaded Yagi at 80ft, and Peter was using sloping dipoles around the tower, with a switching arrangement so that the dipoles not in use act as reflectors.

So how did they stack-up? The difference between G3PJT and G4BWP was a maximum of three-quarters of an 'S' unit in G4BWP's favour - the majority of the time between a quarter and half an 'S' unit. Between G3RZP and G3PJT there was a maximum difference of two 'S' units (the majority of the time one to one-and-a-quarter 'S' units), this time in G3PJT's favour. The phased vertical array was *very* impressive indeed.

*Brooklands, Ullenhall, Henley in Arden, Warwickshire, B95 5NW.

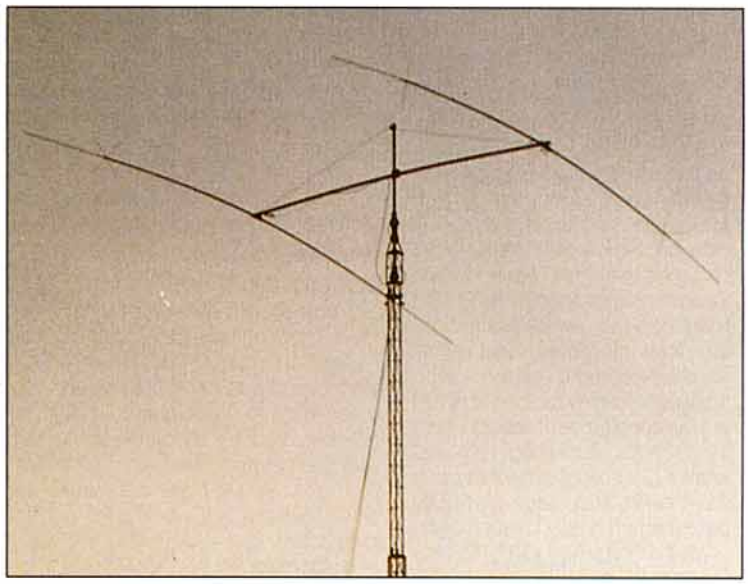
RSGB 7MHz Contest

UNFORTUNATELY Bob, G3PJT, had to make a trip to South Africa over the weekend of the RSGB 7MHz contest, so I was unable to compare his signals directly with other G stations heard during that event. However, the contest was a golden opportunity to get some comparative data on some of the other UK DXers!

There was no doubt about who had the strongest signal from G: Chris Swallow, G3VHB, and by a very clear margin. G3VHB was consistently three to five 'S' units above all other G stations, although there was one exception on the long path for a period of about fifteen minutes, when another G had a signal that equalled G3VHB - but more about that later.

Apart from G3VHB, I have divided the stations heard into three groups (**Table 1**).

On the Sunday morning of the contest (26 February) it was interesting sitting there listening, waiting for the long path to open. The following stations emerged at about the same time, 0647UTC: G3VHB, G4BUO, G0IVZ and G3TXF. By 0700, G3VHB had re-established his 3 to 5 'S' unit lead over the other stations, with one exception - G3HEJ, who was level-pegging with G3VHB for about 12 to 15 minutes.



The Cushcraft 402CD 40m beam, used by four of the stations with the biggest signals out of the UK in Australia.

The contest from a VK's point of view was at times very frustrating indeed, particularly when the band was open on the short path. At times, G signals were excellent, but all they were working was Europe. Time and time again one would receive "VK?", then the G would work another European!

Antennas and Locations

NOW FOR THE interesting bit! What antennas were being used by Groups A and B, and were there any special circumstances applicable to their QTH? But first - what was G3VHB using? His antenna was a Cushcraft 402CD (2-element loaded Yagi) at 85ft, fed with H100. His location is 200ft ASL, and for some reason it is exceptional, particularly as Chris states that the site is "cluttered at ground level with buildings". I had hoped to include a terrain profile but I did not receive the NGR from Chris.

Here are the antennas and locations used by the other stations in Groups A and B.

Group A

G4ODV: Antenna - three 1/2-wave slopers (NE, NW and SW) on 50ft tower, switched so that unused radiators act as reflectors. Location - 300ft ASL, five miles from the Atlantic (NW), 7 miles from English Channel (SE).

G3TBK: Antenna - three half-wave slopers (NE, SE, SW) on 68ft tower with two directors spaced 12ft in front of NE and SE dipoles. Location - 200ft ASL with good take-off in all directions.

G0IVZ: Antenna - Cushcraft 402CD at 68ft, fed with RG213. Location - 400ft ASL.

G3TXF: Antenna - Cushcraft 402CD at 65ft. Location - 600ft ASL with 'sea horizon' SSW-NNE.

Group A (Consistently between S7 and S9+)
G4ODV, G3TBK, G3TXF, G0IVZ.

Group B (Consistently between S5 and S7)
G3XTT, G4BUO, GM3POI, G3VYI, G3SJJ, G3ZEM.

Group C (Heard below S5)
G0ORH, G0LII, G0RGH/P, G0LZL, G0GWA/P, G0JQN, GM0UWT, GM0TTY, G0CKP, G2QT, G2RSA, G3ZDD, G3BBR, G3BPM, G3UFY, GW3YDX*, G3MXJ, G3VNG, G3GLL, G3KZR, G3HEJ, G3KNU, G3KDB, G3UOF, G3IGW, GM4TMS, G4KDL, G4IFB, G4TLS, G4PIQ, G4IQM, GW4HBK, G5LP, G5MY.

*I believe Ron was only active for a short period during the contest, for having heard him on other occasions from VK4 I know he should have been in Group A!

Table 1: Comparative signals of G stations in the RSGB 7MHz Contest.

Close-up of the homestead and HF antenna at the VK4CJB location on an 18,000 acre cattle station in Queensland.

General view of VK4CJB location, showing the lake and clear take-off.

Group B

G4BUO: Antenna - 4-Square phased vertical array quarter-wave spacing with homebrew Collins hybrid. Location - 330ft ASL with good take-off in all directions.
G3VYI: Antenna - vertically-polarised quad loop, top at 40ft, fed with 600Ω line. Location - On knoll with falling ground all directions except to the north, 330ft ASL.
G3XTT: Antenna - Cushcraft D4 (four-band rotary dipole) at 50ft. Location - 250ft ASL.
GM3POI: Antenna - Inverted-Vee with centre at 85ft. Location - excellent: 200ft ASL and sea within one mile in all directions.
G3SJJ: Antenna - Butternut HF2V vertical with 1000ft of radials on good clay soil with good take-off in all directions.
G3ZEM: Antenna - Inverted-Vee with centre at 85ft. Location - good: 400ft ASL, higher than most of surrounding area.

The Exception

I MENTIONED earlier that Derek, G3HEJ, equalled G3VHB's signal for about fifteen minutes on the long path at around 0700UTC. Derek was using a ground plane with the base at 28ft above ground and three radials, also elevated. There is no doubt that G3HEJ's elevated ground plane really worked!

So what was VK4CJB using? The antenna was a Cushcraft AP8A (multiband vertical) elevated 7ft above ground, with nine elevated radials. The location was on a cattle station with the homestead set in the middle of 18,000 acres. The homestead is on a small knoll surrounded for 270° by a 1000-acre lake, with a clear take-off in all directions, 350ft ASL.

May I take this opportunity of thanking all the operators who took the time to write explaining what they were using, in some cases in considerable detail. The information was very much appreciated. ♦

HF F-LAYER PROPAGATION PREDICTIONS FOR JULY 1995

The time is represented vertically at two-hour intervals UTC for each band, ie 00=0000, 02=0200, etc. The probability of signals being heard is given on a 0 (indicated by a dot) to 9 scale; the higher the number the greater the probability with 1 meaning 10 to 19 per cent of days, and so on. Additionally F-layer openings at 50MHz and 1.8MHz are indicated by a plus (+) sign in the 28 and 3.5MHz columns, with these latter bands having a probability of 9.

Time / GMT	28MHz 000001111122 024680246802	24MHz 000001111122 024680246802	21MHz 000001111122 024680246802	18MHz 000001111122 024680246802	14MHz 000001111122 024680246802	10MHz 000001111122 024680246802	7MHz 000001111122 024680246802	3.5MHz 000001111122 024680246802
** EUROPE								
MOSCOW	.....	.....	.....1...12.	...112111451	1.2456545785	6565444455789	7642222224688	43.....45
MALTA	.....	.....	.....23.	...122111561	1..4665458896	7456555556789	9864322235788	++4.....24+
GIBRALTAR	.....	.....	.....1.	....11...24.	1..1443336884	6226655555799	9865433335788	++42.....24+
ICELAND	.....	.....	.....	.....1.	1322236464	6234555556678	7765433334564	4542.....23
** ASIA								
OSAKA	.....	.....	.....	.....1111...	..1233223132	1..1211123631	241	.....
HONGKONG	.....	.....	.....1.....	...1121122..	..1233334533	2...1111246521	253	.....2.
BANGKOK	.....	.....	....11..1...	...1231132 1.	..1224335542	31...111247721	2.....255	22
SINGAPORE	.....	.....	....11.....	...223 21....	1.1234331...	31..1111221.	2.....244	23
NEW DELHI	.....	.....1..	...111..13..	..1223213 62.	1.2223335762	521..1112477	41.....256	24
TEHERAN	.....	.....21.	...1121.254.	..1333224761	1143333357 86	6431..1125778	731.....256	4.....24
COLOMBO	.....	.....	...1121.2...	..1224224...	..2233351 1.	321..1112354	51.....256	2.....24
BAHRAIN	.....1..	.....21.	...1121125 3.	..1333325762	2133223357 87	7531..1125778	741.....257	4.....24
CYPRUS	.....11.	.....1..32.	...2331 3661	..1455445883	4256655567 898	8764333346 89	8731 1..11367	+4.....35
ADEN	.....	.....1..11..	...1122234..	...3233356 11	3133223457 66	8641...12478	751.....257	42.....24
** OCEANIA								
SUVA/S	.....	.....	.....	.....1.	..1222...242	.1342111.342	..11....11.	.....
SUVA/L	.....	.....	.....	12	21.2.....44	11241....142	..12....12.	.....
WELLINGTON/S	.....	.....	.....	.....1.	1.22.....52	22342..11.63	..11....131	.....
WELLINGTON/L	.....	.....	.....	2	31.....4	3332.....33	.122....31	.....
SYDNEY/S	.....	.....	.....	...12.....	..2441..11.3	212421.12335	...1....252	.....2.
SYDNEY/L	.....	.....	.....	1.....1	41.1.....5	3214.....25	...2....42	.....
PERTH	.....	.....	...121.....	..1342.....	1.3453.....	4222211.123.	21.....253	24
HONOLULU	.....	.....	.....	.....11.	..1122..2321	.1343211231.	..12.....	.....
** AFRICA								
SEYCHELLES	.....	.....1...	...11.224...	...3223351..	..3322345 5..	..31..11243.	331.....255	42.....24
MAURITIUS	.....	.....	...1122 22...	...3344452..	..3434345 51.	1.42.1112454	612.....257	43.....24
NAIROBI	.....122..	.....122..	...11.2345..	...3213467..	..2422345 72.	1.52...12463	633.....256	54.....24
HARARE	.....11..	.....1123..	...1122356..	...3334567..	...5433457 3.	5.43111124 75	7441....257	542.....24
CAPETOWN	.....	.....	....11221...	...1334 43...	...4533443..	...42111241.	45.2....242	542.....24
LAGOS	.....13..	.....1251.	....1.2357 4.	...1313467 86.	11.5522357 81	76442...2477	7742....157	542.....24
ASCENSION Is	.....2..	.....142.	....21.1375.	....4212587.	....5323578 3	1...31..2478	6.....156	55.....24
DAKAR	.....12.	.....134.	....2112367 1	....4223478 3	42.3532236 87	8744 31..1378	7752....146	552.....24
LAS PALMAS	.....1.	.....13.	....2211146 2	1...5434378 5	6214765567 99	9756543335 89	8864211112 68	++3.....35
** S. AMERICA								
Sth SHETLAND	.....	.....	.....131..	.....353..	.....23563.	..1..1112463	5541....146	552.....24
FALKLAND Is	.....	.....2..	.....12252.	.....2447 5.	....13356 8.	..2..1112463	4542....136	552.....3
R DE JANEIRO	.....12.	.....24.	....1122 5 72	3234785	4....4333588	851.1111126 8	774.....36	552.....3
BUENOS AIRES	.....1.	.....23.	.....12247 2	1....1234685	62...3334578	8741.1111258	7752.....26	452.....3
LIMA	21	.....1111 43	2....22265	71.1213333 47	8733311 1..15	7752 1.....2	442.....	
BOGOTA	.....1.	133	2....1221255	61..1233224 6	8633211 1..14	6752 1.....1	342.....	
** N. AMERICA								
BARBADOS	11	....111.143	2....3221266	71.1143222 57	8733211...25	7752 1.....3	442.....	
JAMAICA	.....	.....	.....11 1135	2....1123236	61...2332236	7631.111...3	4752 1.....1	242.....
BERMUDA	.....	.....	12	2....1121135	61...3322246	7631211...24	5752 1.....1	242.....
NEW YORK	.....	.....	1	1....111.14	51...2222136	6631121 1..13	4752 1.....1	.42.....
MEXICO	.....	.....	1	1.....1.123	41....2321 24	4541..11...1	1552.....	.22.....
MONTREAL	.....	.....	1	1....111.13	51...2222235	6642121 1..23	3642 1.....1	.42.....
DENVER	.....	.....	.....	1	31....111112	3442.1111..1	1442 1.....	..2.....
LOS ANGELES	.....	.....	.....	.....	211....12112	2353 1...12..1	.242 1.....	..2.....
VANCOUVER	.....	.....	.....	.....	2.11....11112	2353211 12111	.242 1.....	.....
FAIRBANKS	.....	.....	.....	.....	1.12111111111	2234211 12221	..12.....	.....

The provisional mean sunspot number for May 1995 issued by the Sunspot Data Centre, Brussels was 14.7. The maximum daily sunspot number was 43 on 17 May and the minimum was 0 on 2, 23, 24, 25, 26, 27 May. The predicted smoothed sunspot numbers for July, August and September are respectively: (classical method) 17, 15, 15 (±4); (SIDC adjusted values) 11, 10, 9 (±2). April '95 SESC: Solar flux 77.7 Ap 14.0 Smoothed October '94 solar flux 80.4 Ap 15.0.

Contest Exchange

ANDY COOK, G4PIQ
Fishers Farm, Colchester Road, Tendring, Essex, CO16 9AA.
G4PIQ @ GB7MXM.#36.GBR.EU

I WRITE THIS column at the end of May just as the VHF/UHF DX season is getting under way. The season has started well this year with some good DX being worked on 70cm and 23cm during the May contest - "standby the SM, I'll take the SP first was heard!" Also, the 10GHz Trophy was run for the first time and seems to have attracted a very good entry. Although the trophy event itself only lasted eight hours, the concurrent IARU event ran for a full 24 hours, and during this period the Windbreakers & Hadrabs worked 73 stations on 10GHz. This is the sort of score people would have been pleased with on 1.3GHz some years ago. I understand that the first EME QSO has now been made on 24GHz - this band must surely feature more prominently in future DC-to-light contests.

It often seems that there are unexplained reasons why two apparently similar stations can consistently achieve quite different results in contests. The list of possible reasons why this could happen is very long, and must include all the obvious things like operator ability and experience. However, one factor which can easily be overlooked is station maintenance.

It's one thing to put an effective contest station together, but quite another to keep it operating on top form, particularly if you are like me and weren't quite as careful as you might have been with all the weatherproofing when you put it together in the first place. You may expect degradations on the antenna system to make themselves immediately apparent with big changes in SWR, pattern and performance, but many people's experiences suggest that the odd decibels can emerge very much unsuspected. As an example, I recently overhauled my 2m and 70cm antenna system and found a whole stack of problems.

On 2m, I was operating on three yagis instead of four with an open circuit inside the power splitter - this only changed the SWR from 1.1:1 to 1.2:1. I haven't been able to figure out why the perceived impedance change is so small, but several EME operators have reported similar experiences. I also found that one 30m length of semi-airspaced cable had taken on a little water and had 8dB loss at 70cm instead of 4dB - no wonder the pre-amp seemed a little quiet. Also, a length of heliax cable had just got an open circuit on the screen at a connector, but the conductor was in close enough contact to have enough capacitance to the connector body to have only 2dB loss and still present an acceptable SWR on transmit on 70cm. None of these appeared as obvious problems until I looked.

A few hours or days spent carefully checking everything from time to time can be worth a good few dB!

IOTA CONTEST

THE BIG HF EVENT of July is the IOTA (Islands on the Air) contest during the last weekend of the month. For a contest which has only taken place the past two years, it has established a remarkable international entry and this year should see further growth. The event covers 80 through 10m, and single operators can enter either CW only, SSB only, or mixed mode - multi-ops are limited to mixed mode. Additionally, for those people not having a full 24 hours to spare, you can enter the limited section with 12 hours of operation on only 3 bands. Working stations located on islands is what this contest is all about, with IOTA reference numbers forming the multipliers and extra points being gained for working island stations as opposed to non-island stations.

G STATIONS IN DEMAND

Great Britain is of course an island (mainland G/GM/GW = EU005, and mainland GI/EI = EU115), meaning that G stations are somewhat more in demand in this contest than in some others. Also, there are several islands around the UK which count as separate multipliers and if you are feeling a touch more adventurous you could think about mounting a DXpedition to one of these or even further afield if you feel the need for a little more sunshine! In the past, the leading stations on such islands have not had to use big systems to achieve a top score, often operating barefoot and/or with wire antennas - islands, of course, often have very good take-offs! Talking to one of your local IOTA enthusiasts (and there seem to be plenty around in the DX community) should result in details of what counts as a separate multiplier.

The rules are a little complex and if you are planning to activate an all time new IOTA island you need to start activity in the 24 hours prior to the contest to allow a new reference number to be issued. You would have to be pretty adventurous to plan to activate a new one from around the UK however, since I understand that only Rockall is still outstanding!

Software for logging and keeping track of multipliers is obviously something you need to think about since IOTA reference numbers aren't something which most of the logging packages can handle very effectively. The exception to this is Paul O'Kane's, EI5DI, Super Duper package, and Paul has developed a special version for the IOTA contest which is available as freeware. You can get this either by the traditional route of sending a blank disk and an SASE with IRCs to Paul, or there are several electronic routes for those of you who have access to the Internet or CompuServe [see this month's *HF News* column - *Ed*]. I am finding it fascinating how much information relevant to DX and contesting is beginning to appear on the Internet.

G0REP (right) and G3XZO seek out some early morning multipliers on 20 metres during last year's SSB Field Day. This year's event takes place on 2/3 September.

RULE CHANGES

IN JUNE *Radcom* I mentioned some changes to contests which the HFCC were thinking about. There have already been some definite moves on these thoughts in one area, and from 1996 the 21/28MHz SSB and CW contests and the 7MHz CW contest will have restricted sections with limitations on antenna system and power output. This should enable the 'normal' home station owners (those with 100W and a dipole and without 3 element yagis for 40m at 100ft) to stand a chance of winning their sections.

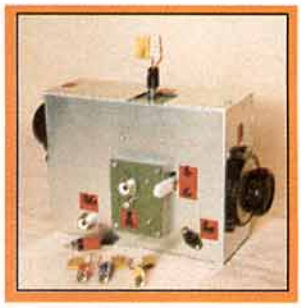
There are several good contests other than IOTA to have a crack at during July. If you are looking for something different from the run-of-the-mill CW or phone contests, BARTG hold an AMTOR/PACTOR contest on 80m through 10m on the weekend of 8/9 July, with AMTOR on the first day, and PACTOR on the second. Logs for this event should be sent to John Barber, G4SKA, PO Box 8, Tiverton, Devon EX16 5YU.

Higher up the spectrum, VHF NFD is at the start of the month, but if you haven't already planned to enter this one, it is now too late since pre-registration of the site was required. However, do not despair as the other big ones on the VHF side are the low power contests on 2m and 70cm. These are eight and six hour events respectively with a 25W output limit, designed so that many off the shelf rigs will fulfil the power requirements without the need for external linears. These are always popular contests and some remarkably good DX can be worked. Of course, if we have a repeat of last year's excellent conditions - when many QSOs over 1000km were made - there will be a lot of happy people. ♦

TURN TO PAGE 79 FOR CONTEST CLASSIFIED

RADCOM TECHNICAL FEATURE

RF Impedance Bridge For 2 - 30MHz



by Jack Gentle,G0RVN

WHAT? - NOT YET another impedance bridge! Well, there may be lots of reasonably priced, commercially available bridges on the amateur market and there is no shortage of articles describing how to make noise bridges but in my experience, which seems to be shared by others, none give the accuracy required for any kind of serious work. One of my requirements has long been to measure exactly what is going on at the feed point of an antenna from the shack, given a precise knowledge of the feeder. Previous attempts at such measurements have always left me with inconsistencies which I have been unable to resolve so I decided that something better was needed, but something a little less expensive than a professional General Radio bridge!

At the 1994 International HF Convention Bob Whelan, G3PJT, gave me the inspiration and subsequent help to have another go at producing the definitive DIY bridge. I did not succeed on the first try and the bridge described here represents the third attempt. However, the results which I have now achieved have more than satisfied my original objectives.

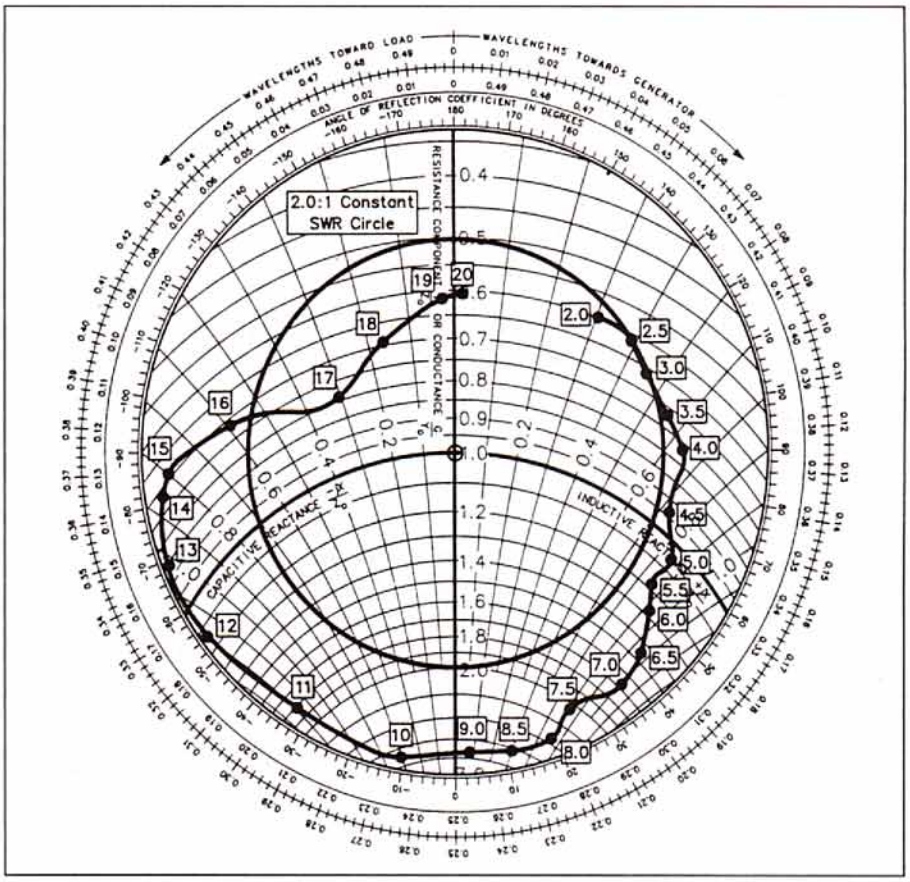
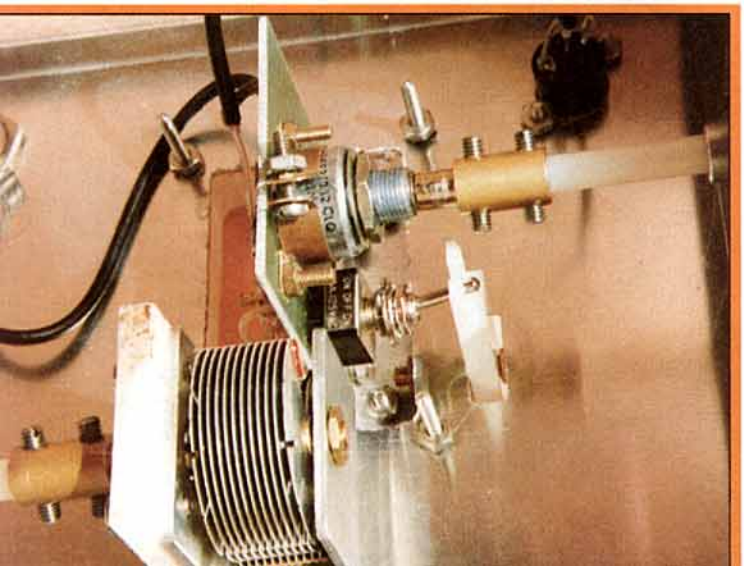


Fig 1: Impedance plot obtained with Tennatest admittance bridge. [Source: *Antenna Compendium, Vol 3*]

THE ACID TEST

W N CARRON [1] HAS suggested that the best way to test an impedance bridge is by using a piece of 50Ω coaxial cable approximately 10ft long and terminated in a 25Ω non-inductive resistor. This creates a standing wave of 2:1 and when the impedance is measured over a range of frequencies and is plotted on a Smith Chart the result should be a perfect circle (strictly speaking, this is only true for perfect loss-less coaxial cable whose characteristic impedance is purely resistive. However, for good quality coaxial cable and to a first approximation, his method is valid). Using this test cable he has reviewed the performance of both commercially available and one of his own early bridges and the results shown in **Fig 1, 2** and **3** are self-explanatory. The poor performance is, in part, due to the electrical problems which Carron highlights. But mechanical problems also contribute errors, in particular the failure to provide an adequate means of calibrating shaft rotation on the twocontrols.

*St Andrews House, St Andrews Drive, Norwich, NRA 6NH.

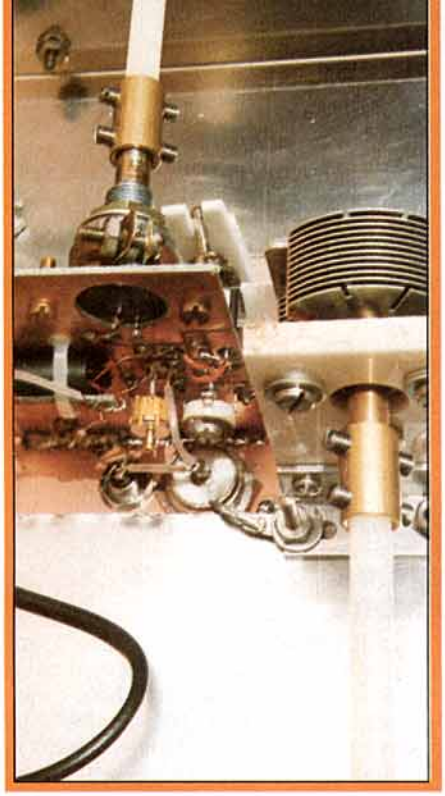


The controls are isolated by nylon rods.

The bridge described here and shown in the photographs is not the prettiest nor the most convenient of instruments to use. However, it does come impressively close to meeting the Carron test as can be seen from the results in **Table 1** and from the plot in **Fig 4** (note that my calculated figures in Table 1, which are shown as a solid line in Fig 4, allow for cable attenuation. Thus, instead of a circle, which assumes loss-less cable, the calculated figures show a slight spiral).

The circuit diagram **(Fig 5)** is an anglicised version of the admittance bridge described by Carron [2]. An admittance circuit is used so as to allow one side of both the capacitor and the variable resistor to be earthed and because admittance is measured and not impedance, some calculation is necessary to obtain results in a more usable form.

Good ergonomics in the external layout of controls have been sacrificed in order to get the best possible internal layout. The variable capacitor dial and variable resistor dial are



The PCB has 'islands' made by removing small strips of copper.

located at opposite ends of the box and a lever which operates a changeover switch is in the centre. Another inconvenience is that the results of a balance must undergo some calculation before data, which is easy to interpret, is obtained. Although it is possible to do this on a scientific calculator I have found that a spread sheet on a PC provides the simplest means of performing the calculations.

CIRCUIT DESCRIPTION

THE CIRCUIT IS almost simple enough to be self-explanatory but a few points are worth making. The 'unknown' is balanced by the resistance of RV1 and by the capacitance of C1. For a capacitive reactance in the 'unknown', C1 is switched to the side of the bridge opposite to the 'unknown'. When the 'unknown' is inductive, C1 is switched in parallel. The changeover switch used has a centre OFF position which is used during the initial set up procedure. C3 balances out any residual unbalanced capacitance in the bridge

Freq	Measured (Ω)		Calculated (Ω)	
MHz	Real	Imaginary	Real	Imaginary
2	26	7	26	7
3	27	11	27	11
4	28	15	29	15
5	30	18	30	18
6	33	23	33	22
7	37	26	36	26
8	43	30	40	29
9	48	32	46	32
10	52	34	52	35
12	68	33	69	35
14	85	22	88	24
16	91	2	97	0
18	62	-35	88	-24
20	53	-34	69	35
22	47	-30	53	-34
24	38	-24	41	-29
26	31	-17	34	-22
30	23	-4	27	-7

Table 1: Test results on calibration cable (10ft of UR67 terminated in 25.2Ω) compared with calculated values.

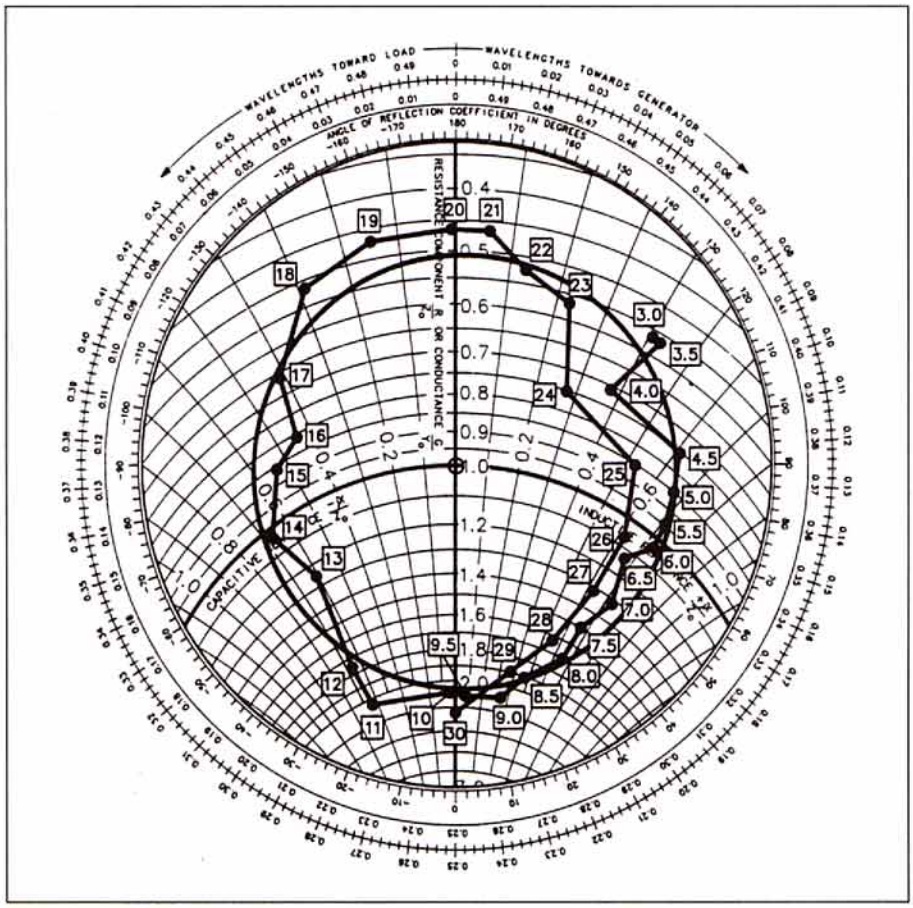


Fig 2: Impedance plot obtained with Palomar Engineers R-X noise bridge. [Source: *Antenna Compendium, Vol 3]*

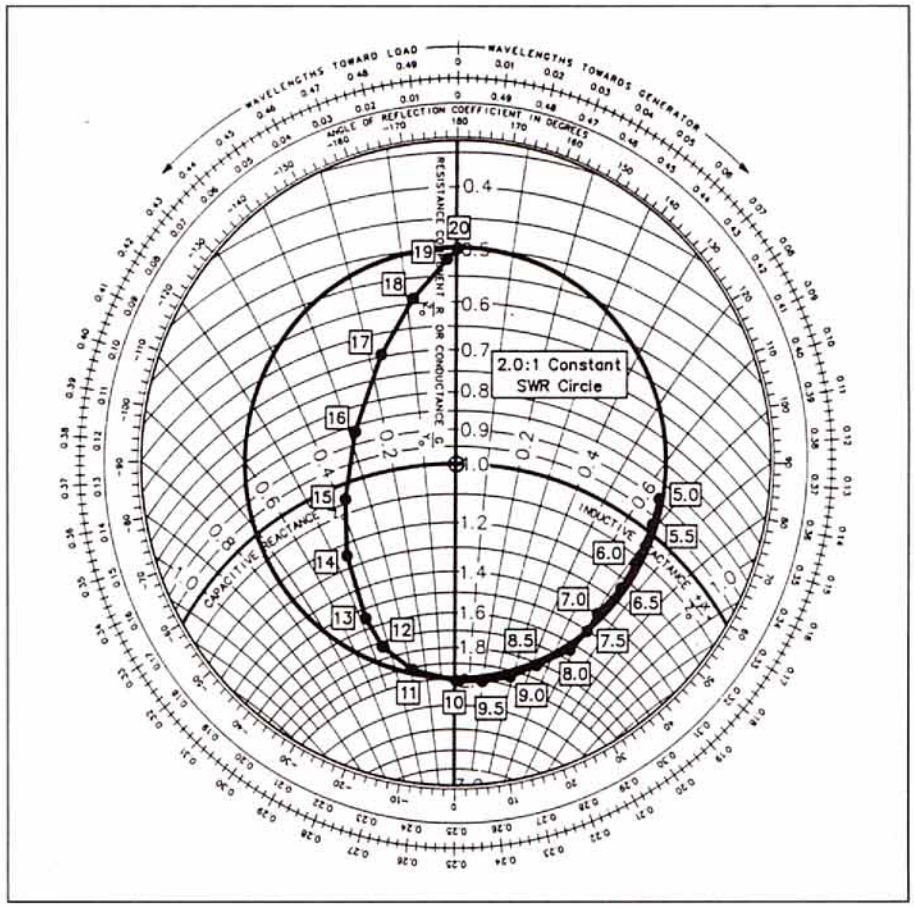


Fig 3: Impedance plot obtained with Carron's Twin-T admittance bridge. [Source: *Antenna Compendium, Vol 3]*

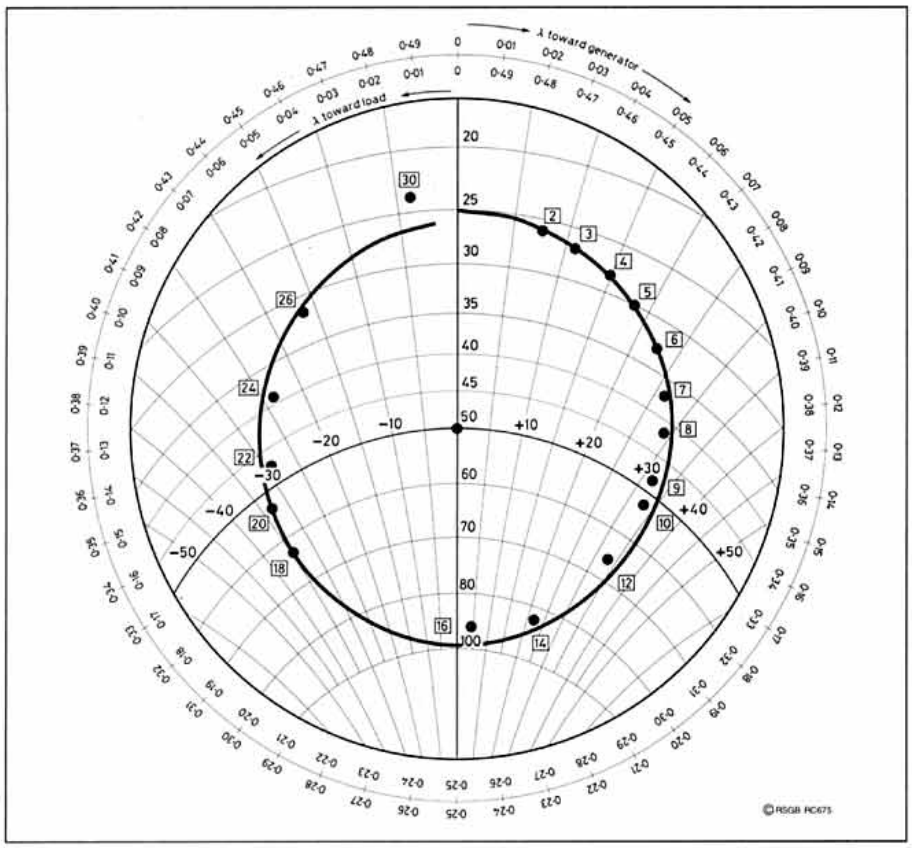


Fig 4: Comparisons between measured results on the bridge in this article and calculated values.

and may be placed either across the resistance or the 'unknown', whichever is necessary. In my case it was necessary to place it across the socket for the 'unknown'. C2 is used to balance out the sum of the strays and the minimum capacitance of C1. Noting that the first 15 dial divisions on the capacitance control show a very non-linear characteristic Bob, G3PJT, suggested that this capacitance could also be nulled with advantage and this is the way in which I finally calibrated my bridge.

A phono socket is connected in parallel with the variable capacitor to enable low reactances to be balanced by additional external fixed capacitors. A similar socket in parallel with the 'unknown' allows for an external resistor to be used when the resistive component of the 'unknown' is beyond the range of RV1.

CONSTRUCTION

THE CIRCUIT IS incredibly simple but don't be lulled into thinking that the mechanical construction is easy! The main points to bear in mind are those which would be used to construct a piece of VHF equipment. All leads must be kept short and all earth loops must be avoided. For these reasons both the potentiometer and variable capacitor were connected to the vernier slow motion dials with nylon rod. The variable capacitor was mounted on a piece of acrylic sheet and the potentiometer was mounted using a home made capacitor-type bracket directly onto a piece of copper clad PCB board to ensure that the return path for its track-to-casing stray capacitance was as short as possible. All other components were also mounted on this board which measured 50mm by 60mm.

The board was not etched to form the required connections but instead those parts which were intended not to conduct were scratched away using a broken hacksaw blade as shown in **Fig 6**. The remaining cladding provided an earth plane.

The bridge transformer was wound on an Amidon ferrite balun core BLN 43-2023 [3]. The primary consists of one turn of RG-174/U4 coax [4] wired as shown in **Fig 7**. The secondary is formed from three turns of bifilar winding of 26 SWG enamelled copper wire twisted 4 turns to the inch. The completed balun was held in place using a self-locking nylon strap which also held a small piece of copper clad board to act as a junction for the centre of the secondary winding. The unit was assembled in a Maplin aluminium box catalogue XB71 which measures 203mm by 152mm by 76mm.

The vernier slow motion drives used were Maplin RX41. These drives are not cheap and a more economic alternative using a clear plastic protractor and an epicyclic slow motion drive has been described in *Technical Topics* [5]. The overall assembly is shown in simplified form in **Fig 8** and in the photographs. In the original article by Carron a potentiometer of 250Ω was specified. In the UK I could only find either 470 or 100Ω and since some of the most critical measurements are on low impedance vertical antennas I chose a 100Ω Cermet type. In order to measure higher resistance values, I used an 82Ω resistor as a shunt which was housed in a phono plug. This is connected to a phono socket in parallel with the 'unknown' and is taken into account in the subsequent calculation (yet another good reason for using the spread sheet!)

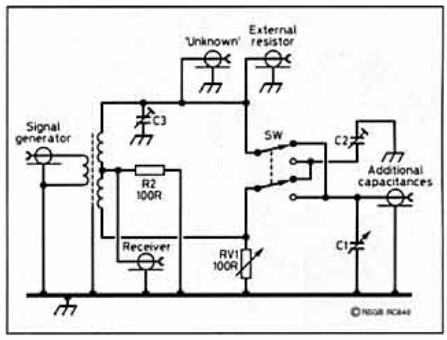


Fig 5: Admittance bridge circuit.

CALIBRATION OF THE BRIDGE

THE BRIDGE CALIBRATION is basically simple but is a little tedious and it is easy to make mistakes unless care is taken. Four major set-up procedures must be undertaken to calibrate for resistance and capacitance and to balance out strays and the residual capacitance of the variable capacitor.

Resistance calibration of RV1 is done before it is finally wired in circuit using a digitalonμmeter. I found that the first few degrees of rotation did not change resistance so I offset the shaft relative to the dial to ensure a change of resistance as soon as the dial reading left zero. I calibrated the dial at five division intervals and, instead of plotting the readings in the form of a graph, I entered them into a look-up table in a spread sheet on my PC. Between each of the five division steps I set the spread sheet for a linear interpolation so that both capacitance and resistance could be extracted directly for any dial reading.

Capacitance dial calibration is done through the phono socket normally used for adding fixed capacitance with the switch SW in its centre OFF position. If an accurate digital capacitance meter is available, the method is similar to that followed for the resistance dial. I was not fortunate enough to have such an instrument so the method which I used was based upon a measurement of frequency and the use of a few 1% silver mica capacitors. This method will be described in a subsequent article. Again the results of the calibration were put into the spread sheet.

To set the trimming capacitors C2 and C3 the bridge is connected both to a signal generator and to a communications receiver. The generator is set to 30MHz and amplitude

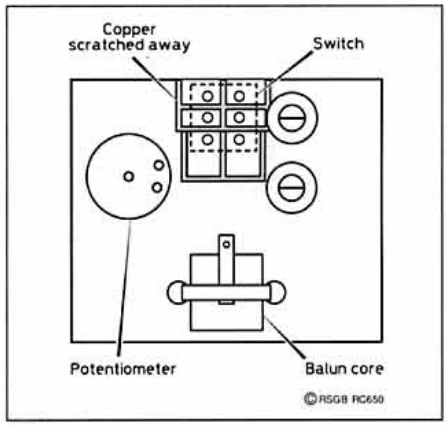


Fig 6: Layout showing the parts of the PCB removed by using a hacksaw blade.

modulated and its output is set to around 50mV. The unknown socket is terminated with a 50Ω non-inductive resistor and the switch SW is left in the centre OFF position. The control for RV1 is varied until a minimum is obtained on the S meter and then C3 is adjusted in conjunction with RV1 until a null is obtained. The nulls on this bridge are impressive and often take the receiver down to its noise level even with 50mV input to the bridge.

The next stage is to balance out the residual capacitance of C1. Set the dial to read 15 (the point from which reasonably linear readings occur) and with SW in either of its ON positions but everything else set as before, C2 is adjusted for a null. It may be necessary to make a slight adjustment to RV1 to get the best balance. Now, if SW1 is switched to the opposite position, the balance should remain unchanged. The bridge is now ready for use.

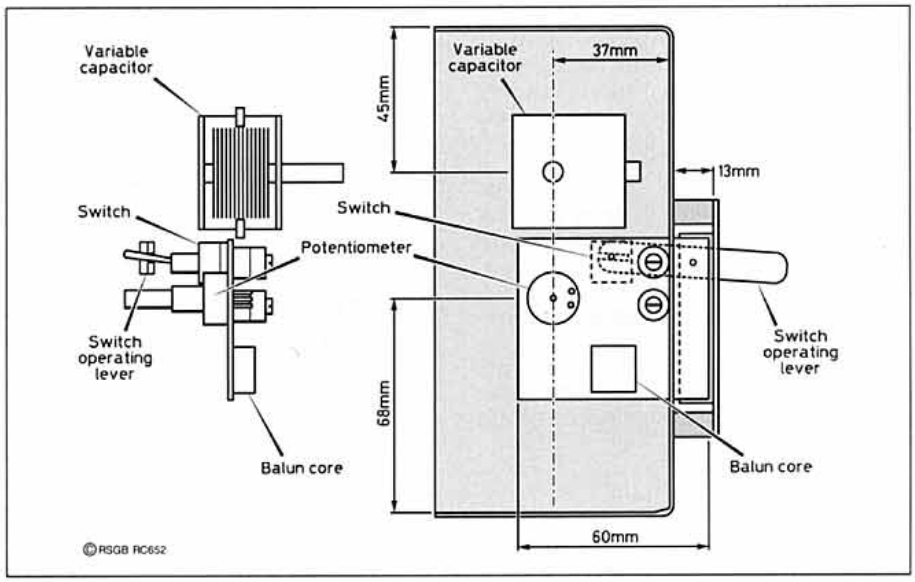


Fig 8: Assembly of the bridge.

USING THE BRIDGE

THE WAY I HAVE used the bridge is to feed it as in the set-up procedure, with an amplitude modulated signal and to monitor the balance with a receiver equipped with an S meter. This gives the advantage of being able to identify clearly the signal to be nulled from all the QRM picked up by the antenna and then to follow the final null both aurally and with the S meter. The null is impressive and you'll soon appreciate the very real need for good quality slow motion vernier drives.

Although Carron used a noise source and a receiver in the conventional way, I have not tried this method and cannot comment on how well it works. G3PJT tells me that he has tried this method but the results are not as good. One problem, which I believe is inherent in all noise bridges, is that noise is presented to the receiver at all frequencies other than that at which it is nulled. Unless care is taken this provides an opportunity for the non-linear characteristics in the receiver to create inter-modulation within the pass-band from both out-of-band noise and from the RF picked up on the antenna being measured. The net result of these effects is to broaden the null, sometimes to a point where it is unusable. The other reason I favour the signal generator method is that for me, Murphy's Law always puts some QRM directly on top of where I hope to find the noise null!

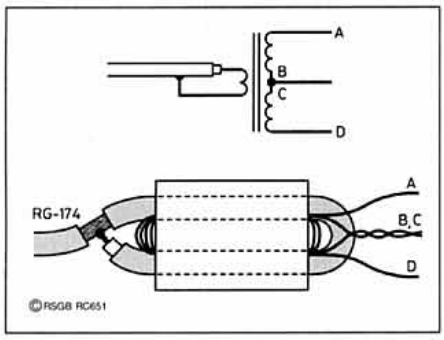


Fig 7: Construction of the bridge transformer.

CONVERSION OF THE RESULTS TO IMPEDANCE

TABLE 2 SHOWS THE results of a run on the calibration cable consisting of 10ft of UR67 terminated in 25Ω. The section shown boxed represents the readings taken directly from the bridge at each frequency and includes spaces to enter when the additional capacitors and additional 82Ω shunt resistor have been used. Also, a space is allowed to note the position of switch SW indicating whether the balance was obtained in the capacitive (-1) position or (+1) position. Columns (g) and (h), are the results of looking up the dial readings of RV1 and C1 and making allowances for the additional plug-ins.

Column (i) is the parallel reactance calculated from C_p and from frequency using:

$$X_p = \frac{1}{2 \times \pi \times f \times C_p}$$

The series resistance R_s and series reactance X_s in columns (j) and (k), which form the two parts of the series impedance $Z_s = R_s + jX_s$, are calculated from the following:

$$R_s = \frac{R_p \times X_p^2}{R_p^2 + X_p^2} \qquad X_s = \frac{R_p^2 \times X_p}{R_p^2 + X_p^2}$$

a	b	c	d	e	f	g	h	I	j	k
Freq	R Dial	Add R	C Dial	L+1 C-1	Add C	Rp	Cp	Xp	Rs	Xs
2.000	37.5	-	45	1	680	28	800	99	26	7
3.000	41.5	-	98	1	360	31	706	75	27	11
4.000	47	-	69.5	1	360	36	579	69	28	15
5.000	53	-	41	1	360	41	461	69	30	18
6.000	62	-	17	1	360	49	367	72	33	23
7.000	71.5	-	84	1	-	56	285	80	37	26
8.000	81	-	69	1	-	64	217	91	43	30
9.000	89	-	57	1	-	69	168	105	48	32
10.000	50	1	49	1	-	75	140	114	52	34
12.000	53	1	34	1	-	84	77	173	68	33
14.000	55	1	23	1	-	91	32	351	85	22
16.000	55	1	15	1	-	91	3	3979	91	2
18.000	52.5	1	31.5	-1	-	82	61	-145	62	-35
20.000	50	1	33	-1	-	75	67	-118	53	-34
22.000	86	-	33	-1	-	67	70	-104	47	-30
24.000	68	-	35	-1	-	53	78	-85	38	-24
26.000	51	-	36	-1	-	40	82	-75	31	-17
30.000	34	-	26	-1	-	24	41	-129	23	-4

Table 2: Measurements for calibration cable (10ft of UR67 terminated in 25.2Ω).

ACCURACY OF THE BRIDGE

A COMPARISON BETWEEN the measured results for the calibration cable and those obtained by calculation are shown in Table 1 and Fig 4. The electrical length of the cable was first measured on the bridge by setting SW1 to the centre OFF position and varying frequency until a null was obtained (at this point it would have been useful to have fed the bridge with a noise source to avoid having to track the signal generator with the receiver whilst looking for the null). In my case the frequency of a quarter wave length was 16.03MHz giving a cable length of 4.68 metres. This, together with the other characteristics of the UR67, were fed into the transmission line equations (see Appendix) which gave the results shown in Table 1.

The agreement between the readings were excellent and proved that the bridge is usable up to 30MHz. The agreement up to 14MHz was even better than I had hoped for and it led me to question why the results beyond 14MHz are not quite as good.

At 30MHz the difference is easily explained by calibration errors in the bridge because only a few pF error in capacitance makes a big error in reactance. At the other frequen-

cies I am inclined to believe that some of the difference arises from the fact the calibration cable characteristic impedance is not a purely resistive 50Ω as I had assumed. In measuring the characteristic impedance of my sample of cable using the method described by John Grebenkemper, KI6WX [6], I found that at 10MHz the cable was 49 - j0.5Ω. Since the reactive component will change with frequency, I should have repeated this test for the complete frequency range, - a tedious process. However, when I put the measured characteristic impedance into the transmission line equations I got an even better agreement at the higher frequencies. So I concluded that a better knowledge of the cable would be useful if the small differences are to be better explained.

USING THE BRIDGE

THE REFERENCE ABOVE gives good descriptions of how to use a bridge to measure transmission line parameters such as electrical length, attenuation and characteristic impedance and I have used these together with the procedures for antenna measurement and obtained good results. However, with this bridge it is necessary to avoid methods which call for open or short circuit cable terminations, such as the method described for electrical length measurement. These result in either a very high resistance being presented to the bridge, which it cannot balance, or a very low resistance for which it gives a poor null. In these cases I have replaced these terminations with a non matching resistor, for example 25Ω in the case of a 50Ω characteristic impedance. I have then looked for the frequency giving a balance of 25+j0 in the case where the cable length is equal to a multiple of ½ and for 100+j0 for a multiple of ¼.

CONCLUSION

IN CONCLUSION, the exercise of building this bridge has proved to me that using a simple circuit and tolerating a few inconveniences in making measurements, almost any amateur can make accurate measurements of impedance through the range of 2 to 30MHz.

COMPONENTS LIST

Resistors		
R1	100Ω carbon film resistor	
RV1	100Ω Cermet potentiometer	(Maplin YP03D)
Shunt Resistor	82Ω 0.25W	
Capacitors		
C1	Variable 10 to 365pF	(Maplin FF39N)
C2	22pF trimmer	(Maplin WL70)
C3	10pF trimmer	(Maplin WL69)
Silver Mica Capacitors (1%) to make up the following values:		
360pF		
680pF		
830pF	(680 + 150pF)	
1180pF	(1000 + 180pF)	
Additional Items		
SW1	Centre OFF changeover switch	(Maplin FH05)
Vernier slow motion drives		(Maplin RX41)
Aluminium Box		(Maplin XB71)
Transformer	see text	

Using the bridge described in this article, together with the spread sheets on the PC, I have achieved my objective of being able to measure impedance at the feed point of an antenna from the comfort of my shack - and I can be confident of the results!

Finally, I would like to acknowledge with thanks the helpful comments I have received from Bob, G3PJT, during the preparation of this article.

REFERENCES

[1] W N Carron, 'A Simple and Accurate Admittance Bridge', *Communications Quarterly*, Summer 1992.

[2] W N Carron, 'The Hybrid Junction Admittance Bridge', *Antenna Compendium*, Vol 3, ARRL (1992).

[3] Obtainable from Ferromagnetics, PO Box 577, Mold, Clwyd CH7 1AH.

[4] Obtainable from W H Westlake, West Park, Clawton, Holdsworthy, Devon EX22 6QN.

[5] 'Protractor Dials', *RadCom*, July 1993, page 53.

[6] *Antenna Book*, ARRL, 16th Edition, 1992, page 27.

[7] *Antenna Book*, ARRL, 16th Edition, 1992, pages 27 - 29. ♦

Next Month

A method of calibrating a variable capacitor will be described next month

APPENDIX

To calculate the impedance of the calibration cable Carron assumed that the cable is loss free and that its characteristic impedance is purely resistive. This simplifies the calculations. He gives the formula as:

$$Z_i = Z_0\left(\frac{Z_i\cos\theta + jZ_0\cos\theta}{Z_0\cos\theta + jZ_i\cos\theta}\right) \text{ where } Z_i = 25\Omega,\ Z_0 = 50\Omega \text{ and}$$

and where θ at a given frequency f is calculated by:

$$\theta = \frac{f}{f_{¼}} \times 90°$$

where $f_{¼}$ is the frequency at which the cable resonates at ¼ . This formula is easy to compute with a scientific calculator but is neglects the effects of cable loss and reactance. Since I had the benefit of a spread sheet and PC, I was able to use the full transmission line equations given in the *Antenna Book* [7]. The impedance looking into the cable is Zi and is given by

$$Z_i = Z_0\left(\frac{Z_i\cosh(\gamma l) + Z_0\sinh(\gamma l)}{Z_0\cosh(\gamma l) + Z_i\sinh(\gamma l)}\right)$$

where:

l = length of the line in radians

$\gamma = \alpha + j\beta$ = the complex propagation constant

α = attenuation constant in nepers per unit length

β = phase constant in radians per unit length.

The attenuation for coaxial cables is usually given in dB per 100ft for a given frequency. I decided to base my calculations upon a frequency of 10MHz and then to allow the program to work out the attenuation at any other frequency. In looking at the slope of attenuation versus frequency for a number of cables, I derived the following empirical expression for attenuation as a function of frequency (f in MHz)

$$A_f = \textit{anti}\log\left(0.548\times\log(f) + 0.548 + \log(A_{10})\right)$$

where A_{10} = attenuation at 10MHz.

Given the electrical length of the cable l_e and its velocity ratio V the two parts of γl are

$$\alpha l = \frac{3.281\times l_e\times V\times A_f}{869} \quad \text{and} \quad \beta l = \frac{2\pi\times f\times l_e}{300}$$

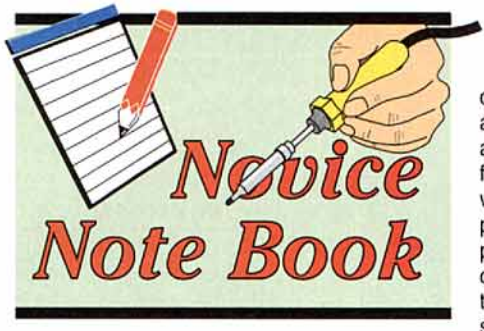
Finally to enter the hyperbolic functions $\sinh(\gamma)$ and $\cosh(\gamma)$ the following expansions below are used

$$\sinh(\alpha l + j\beta l) = \cos(\beta l)\sinh(\alpha l) + j\sin(\beta l)\cosh(\alpha l)$$

and

$$\cosh(\alpha l + j\beta l) = \cos(\beta l)\cosh(\alpha l) + j\sin(\beta l)\sinh(\alpha l)$$

Although it takes a little time to enter all these formulas in the spread sheet, it only has to be done once. Thereafter it provides a replacement for the Smith Chart and moreover it is easier to use, particularly if you want to take into account the effects of a reactive characteristic impedance and of line transmission loss.



IAN KEYSER, G3ROO
Rosemount, Church Whitfield, Dover,
Kent CT16 3HZ

THE NIPPER 80 METRE TRANSMITTER

THIS MONTHS PROJECT is an 80 metre crystal controlled CW transmitter. It should be possible to build it for less than a £5, and even less if you have access to a junk box! I have made it as reliable as I possibly can and yet maintained a degree of simplicity.

This circuit uses about 50 components but has a zero setting up procedure. This is preferable, for Novice use, to a circuit of twenty components with a complex setting up procedure.

One of the major problems of transmitter design is frequency stability. This design overcomes the problem by using a crystal oscillator. This has the disadvantage that the transmitter is fixed on one frequency, although this is not such a restriction if we use two or more crystals for the more popular Novice and QRP frequencies.

I use a crystal on the QRP frequency of 3650kHz and a convenient TV crystal on 3579kHz.

The circuit is shown in **Fig 1**. TR1 forms the oscillator in a very conventional design, and is keyed on and off with the Morse key. The base of TR2 is connected to earth through R5 (180R). Because there is no positive bias on the base, current will only flow during peaks of the input waveform.

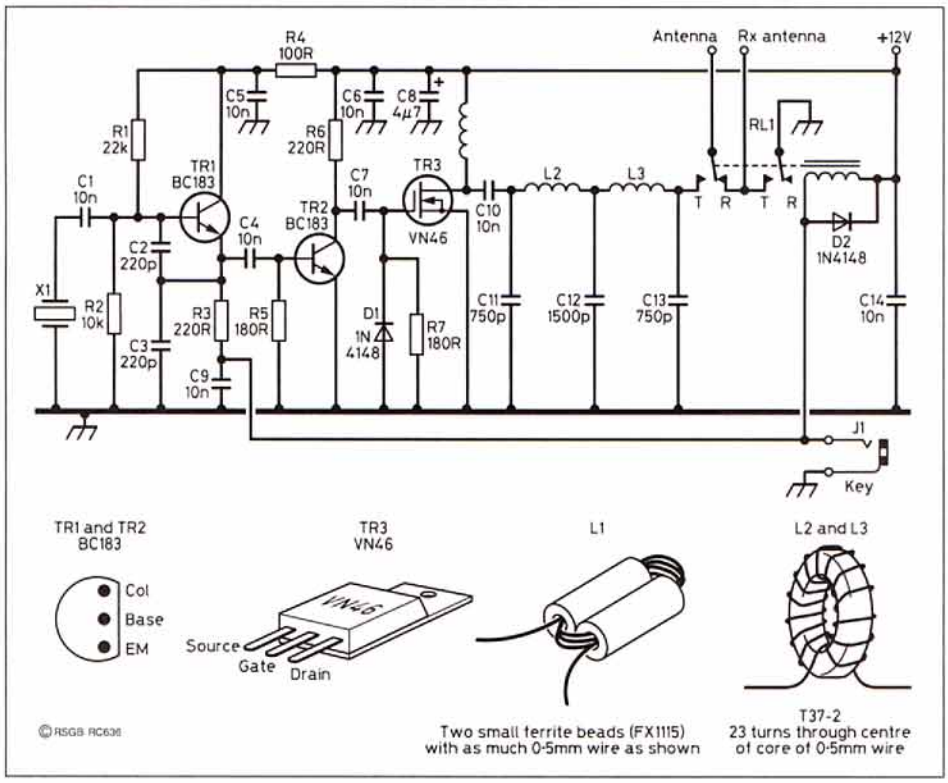
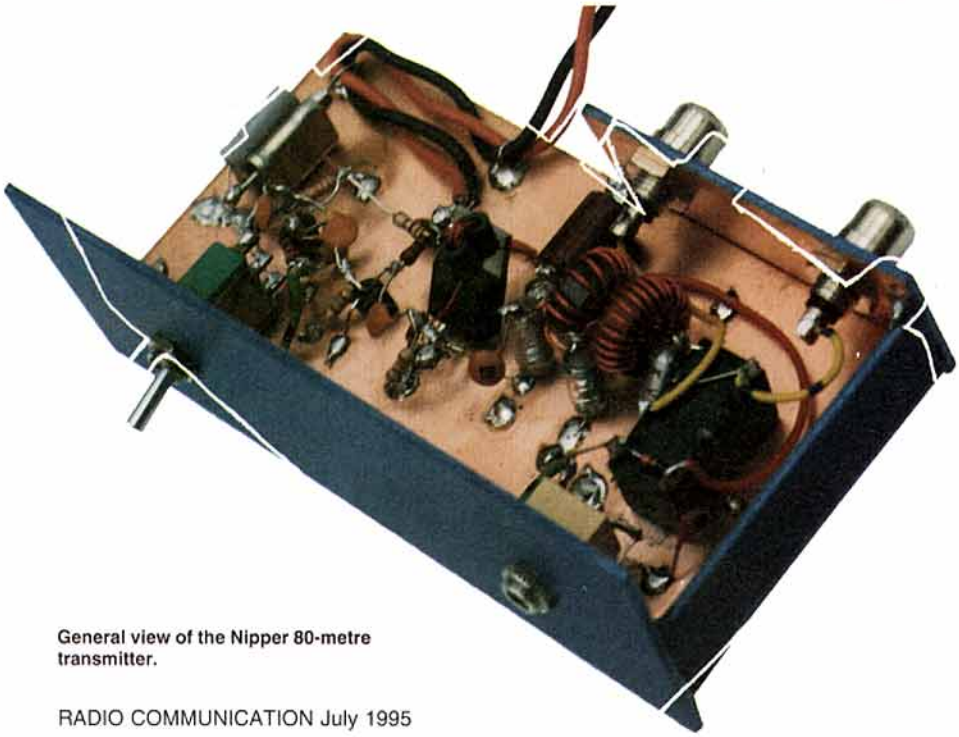


Fig 1: The Nipper 80-metre crystal controlled transmitter, circuit diagram.

The power amplifier stage, TR3, is an enhancement mode FET (Field Effect Transistor). It will draw no current unless the gate is held at a positive potential with respect to its source. There is a diode with its cathode connected to the gate of the FET and its anode connected to ground. If we now apply a large amplitude signal across the diode, from TR2, the negative half cycle of the signal will be shorted out by the diode but the positive half cycle will be unaffected. These positive half cycle pulses will charge the feed capacitor and will provide a DC bias to turn on the FET. This stage will further amplify the signal to provide a useful output power. This stage, as designed, will provide up to three watt of RF energy.

The output from TR3 is rich in harmonics. We can easily remove these unwanted harmonics by including a Low Pass Filter (LPF). This does exactly what it says, it passes all frequencies below its cut off frequency but will not pass any above. No circuit is perfect but I found that all harmonics were 50dB below the wanted signal after including the filter.

To change the aerial from the receiver input to the transmitter output during transmit I have used a small two pole changeover relay to make it automatic, this also shorts the receiver aerial to earth during transmit to protect the receiver input circuitry. The receiver should be muted during receive, but to start with I switched the AGC to "fast" and suffered the excess noise and used it as sidetone! You will notice that the 12 to 18 volt supply is permanently connected to the transmitter, even during receive. This is because the oscillator is turned on and off by the Morse key and the other two stages are in class B bias so draw no current - so why bother to switch the supply?



General view of the Nipper 80-metre transmitter.

CONSTRUCTION

THE CONSTRUCTION IS very simple, all the components that are connected to the earth in the diagram, see Fig 1, are soldered directly to a a small piece of single sided PCB material; these components in turn support components not connected to earth. The layout is shown in **Fig 2** and follows the circuit diagram almost exactly. This makes fault finding very simple as the vast majority of faults will consist of wiring errors.

TR1 and TR2 are mounted on their associated components with their wires uppermost. TR3 is suspended above the board surface by soldering its source lead to the copper surface as close to its body as possible and

CONTINUED ON PAGE 57

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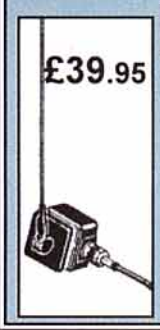

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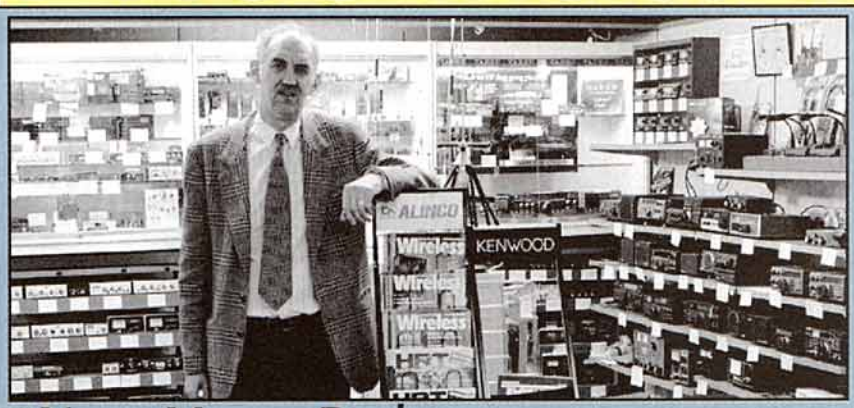

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by Phillip Smith, GW1XBG*

WOULD YOU like to get out of your shack and enjoy the British countryside? Are you competitive and interested in applying your knowledge of amateur radio to practical problems? Do you want to make new friends and enjoy a social life second to none? All this, and more, is enjoyed by many people every year as they take part in VHF Amateur Radio Direction Finding contests organised by clubs throughout the country.

VHF direction finding, or 'foxhunting', events are contests where the participants (known as the hunters or the hounds) have to locate a hidden transmitter (known as the fox) by using a receiver and a directional antenna. The person who finds the transmitter or transmitters first wins the contest.

Anyone can take part in foxhunting: you do not need an amateur radio licence, since participants are only operating a receiver. VHF foxhunting also has advantages over other forms of Amateur Radio Direction Finding: both classes of full licensees can operate the hidden transmitter, and unattended transmitter operation is allowed without restrictions. More importantly, VHF foxhunting can be accomplished using ready-made receivers. The majority of amateurs own a 144MHz transceiver and most of these are suitable for use on foxhunts.

Types of Events

NEWCOMERS TO foxhunting are recommended to attend events organised by the many established local DF groups throughout the country. There are also a number of annual VHF foxhunts designed to encourage national and inter-club competition, and some foxhunting weekends with organised camp sites. You could, however, set up your own foxhunting group. As a minimum for a competitive hunt, you would need two teams prepared to do the hunting and someone to hide and operate the transmitter.

Usually, VHF foxhunts are organised with one or two transmitters hidden in an area covering part, or all, of an Ordnance Survey Landranger map. This can cover an area of 40 x 40km, but is usually much smaller. Transmissions are made at regular intervals and the hunters take bearings on the signals using directional antennas. This is done by rotating the antenna while observing the receiver's S-meter and using a compass to measure the direction the antenna is pointing. This bearing is plotted on a map and the hunter then proceeds to another location somewhere along this plotted line to take another bearing.

The first few bearings will indicate the general area of the transmitter. Further bearings will lead either to the discovery of the transmitter which may be in a vehicle, or will indicate a particular area into which the hunter must enter on foot. Sometimes the transmitter can be cleverly hidden in dense woodland, or disguised as an innocent-looking object. The team that finds the transmitter (or both transmitters in the case of a 'double fox' event) in the shortest time, wins the contest.

Although most VHF foxhunts require the use of a car, some events are designed to be 'walking only' contests, in which case the designated search area is reduced appropriately. There are some events where searching in cars is practised over a relatively small area with very regular transmission and low power. These are ideal for beginners.

PHOTOGRAPH: GEOFFREY FOSTER, G8UKT

A beam is highly recommended for the hunter's antenna.

Equipment Required

FOR THE HIDDEN transmitter, any 144MHz FM transceiver can be used. All the operator has to do is either operate the transmit-

*35 Terrace Road, Mount Pleasant, Swansea, West Glamorgan SA1 5HN.

GEOFFREY FOSTER, GBUKT.

Phillip Smith, GW1XPG, and assistant at the Forest of Dean weekend 1994.

ter manually or to arrange for the PTT connection to be controlled by a microprocessor or timer unit. Any legal level of power can be used [but note the licence conditions regarding unattended operation - *Ed*] and the type of antenna is optional.

As for the hunter's receiver, most people will use commercially-available transceivers such as the 'walkie talkie' type FM handhelds or small mobile / base station transceivers rigged for portable use. These rigs should have an S-meter, although rigs without S-meters can still be used with some modification, or with the use of additional devices such as noise generators. If the rig has CW / SSB capability, then these modes will help to give more accurate bearings on very weak signals. The ubiquitous Yaesu FT-290 has all these features and is a popular and successful foxhunting rig.

Dual band 144 / 430MHz handheld transceivers are also popular. These sets can be used to take bearings on the third harmonic of the fox frequency as the hunter gets close to the transmitting antenna. As harmonics are relatively weak, they are easier to take bearings on.

While these transceivers are certainly practical for foxhunting, problems can occur when you try to locate a powerful transmitter that may only be a short distance from you. This is because commercial transceivers are designed for long distance communication where signals are expected to be very weak. As an RF gain control is absent on most modern 144MHz rigs, the extremely strong signals near a transmitting antenna can overload the receiver and prevent you from seeing any movement of the S-meter. One remedy is to build a simple attenuator that can be switched into the antenna coax line.

Some hunters have also built devices known as 'sniffers' which are often just 144MHz crystal sets with a DC amplifier and meter. They are basically very insensitive receivers that cope well within strong RF fields and can be switched into the directional antenna line when the hunter gets close to the fox.

Another serious problem is the breakthrough of strong RF signals directly into the receiver or through the antenna coax and connections. This can often be solved by placing the receiver in a metal container or wrapping it in aluminium foil. Anti-static component bags also work well. There is a solution for most problems, so almost any receiver can be used successfully, it's just a matter of experimenting and finding the best solution for your rig.

As for the directional antenna, a small beam such as the 2-element HB9CV is highly recommended, since it has good gain for weak signals and is small enough to be taken through dense undergrowth and stored in a small car full of foxhunters!

You will also need a car (or team up with someone who has transport), a map, compass, ruler and pencil etc for plotting bearings.

With this basic equipment, you can start practising by taking bearings on local repeaters or amateur stations. You should also try taking bearings on a transmitter which is only a few metres away from you, so you can identify any problems your equipment might have when operating in a strong signal environment.

Advanced Hunting

AFTER PARTICIPATING in a few competitive hunts, you will appreciate fully the technical nature of VHF foxhunting and the problems that can occur. In theory, your bearings should point directly at the transmitter, but factors such as the accuracy of the compass, antenna, and even the hunter himself can lead to errors! Also, VHF signals tend to reflect easily off hills and buildings, so you may end up taking a bearing on one of these 'bounces'.

One of the least understood problems of VHF foxhunting is that of 'local phasing'. This occurs when a bearing is taken in a built-up area, and it can be caused by the signal bouncing off nearby objects like houses, cars and hedgerows.

The effect of receiving these numerous bounced signals varies. If you are lucky, the main signal will still be stronger than the bounces, but usually they will show up as several peaks on the S-meter, or they will 'combine' and give an S-meter reading that barely moves as the antenna is rotated. Very often, the bounce signals will 'phase' witheach other so that a maximum S-meter reading is observed when the antenna is pointing at a reflected signal. This could lead the hunter off in the wrong direction.

One way to avoid this problem is to walk a few metres when taking a bearing, as this will help to average out the phasing effects and a predominant bearing should be observed, indicating the direction of the transmitter, However, the only reliable way around the problem is to move away from the area completely and find somewhere else, preferably high and in the open, and take another bearing.

You should always bear in mind that most bearings will not be completely accurate; you only use each bearing to indicate the general area to proceed to. To find the transmitter, you simply keep taking additional bearings, preferably at right angles to previous readings, and continually narrow down the possible area for the fox to be in. Make a mental note of the maximum S-meter reading for each bearing. This will indicate that you are getting closer to the transmitter.

Do not be daunted by these problems, as they actually add to the interest of a foxhunt. You will be able to overcome these 'technical hurdles' by experience and possibly by developing some additional equipment such as 'sniffers' and attenuators. Some ingenious work has been done by foxhunters and there is still scope for more development of DF hardware and techniques. Apart from being an absorbing and competitive challenge, foxhunting is also an ideal outlet for design and construction skills. This is an area where the average radio amateur has the chance of contributing some original and useful answers to technical problems. Computer buffs may be interested to know that any application of PCs to amateur radio direction finding problems will probably be pioneering work.

The Future

AT THE MOMENT, the rules used for a local VHF foxhunt depend on the club that is organising the event. However, it would be an advantage if all clubs could aim towards using standard rules. For example, if a standard frequency is used, then participants would be able to develop simple, lightweight receivers with a minimum of components. This could help more people get involved in the sport, particularly young people. To this end the RSGB ARDF Committee has adopted a set of simple rules to be used as a recommended standard. These were published in the January 1995 *RadCom*.

VHF foxhunting is steadily growing in popularity. Although still predominantly a local club activity, there are now some nationally advertised hunts held every year and even a foxhunting weekend which is held every July in the Forest of Dean [see *Contest Classified* June - *Ed*]. This event has a number of advanced foxhunts, a beginners 'walking only' session and even experimental hunts for IARU foxhunting (to be featured soon in *RadCom*).

Although some effort is required getting started in direction finding, you will soon start to enjoy the challenge. However, be warned, it is highly addictive and you may find it could change your whole amateur radio life. A handbook, describing all aspects of Amateur Radio Direction Finding, including practical circuits and designs, is available from RSGB HQ at a cost of £4.95. Why not give it a try this summer? ◆

PHOTOGRAPH: GEOFFREY FOSTER, GBUKT.

Graham Taylor, G3MDC, taking bearings on a night time walking foxhunt.

PRODUCT NEWS

Note: Product news is compiled from press releases sent in by the manufacturers and distributors concerned. Details are published in good faith but *Radio Communication* cannot be held responsible for false or exaggerated claims made in the source material.

THE RACE FOR HF transceiver miniaturisation goes on! Icom appears to have edged into the lead with the introduction of the **Icom IC-706 HF / VHF transceiver**. It is slightly smaller and lighter than both the Kenwood TS-50S and the Alinco DX-70H and, like the Alinco, it has a detachable front panel to make mobile installation a breeze. The IC-706 covers not only all the HF bands and 6m with 100W of power, but also covers the 2m band with 10W output. The general coverage receiver tunes continuously from 30kHz to 200MHz (specs guaranteed 0.5 - 30, 50 - 54 and 144 - 148MHz only). All modes - CW, SSB, AM, FM *and* FSK (RTTY) - are offered as standard, and there is even a wide FM mode (Rx only) so that even if *all* those bands are dead you can still listen to Radio 3! The IC-706 has tuning to 1Hz, giving an analog 'feel', dual VFOs, 101 memory channels and IF shift for interference rejection. For the SSB operator, VOX and a speech compressor are built-in, while for the CW operator an electronic keyer with variable weight control, CW reverse function to reduce adjacent interference, adjustable CW pitch from 300 - 900Hz and full break-in (QSK) are all standard. A narrow CW filter is available as an option. The IC-706 costs £1125 and stocks should be arriving from Japan this month.

Also new from Icom is the **IC-W31E, a dual band (2m / 70cm) handheld** with up to 5W output (from 13.8V DC). Unlike some other dual band handhelds, the IC-W31E is small and light enough to carry in your shirt pocket: just 57W x 125H x 31D, and weighing 340g. There are separate tuning dials for each band, keeping operation simple, a total of 100 memory channels, three levels of power output and CTCSS encode fitted as standard. The IC-W31E allows full crossband duplex operation, for 'telephone-style' QSOs.

Icom (UK) Ltd, Sea Street, Herne Bay, Kent CT6 8LD. Tel: 01227 741741; fax: 01227 741742.

ANTENNA ENTHUSIASTS take note! **Mosley USA** have introduced two new large multi-band beams to their 1995 range of HF beams. The **PRO-57-B-40** is the same as the established PRO-57-B, with the addition of a 40m dipole on the same boom. The antenna thus covers all bands from 10 - 40m, including the WARC bands, with a total of seven elements providing a claimed gain of up to 9.4dBd. The **PRO-67-C** is based on the established PRO-67-B, also covering 10, 12, 15, 17, 20 and 40m with 7 elements. The new 'C' model, however, gives a claimed gain of 7.0dBd from three elements active on 40m, compared with the 4.5dBd from two active elements on the 'B' model.

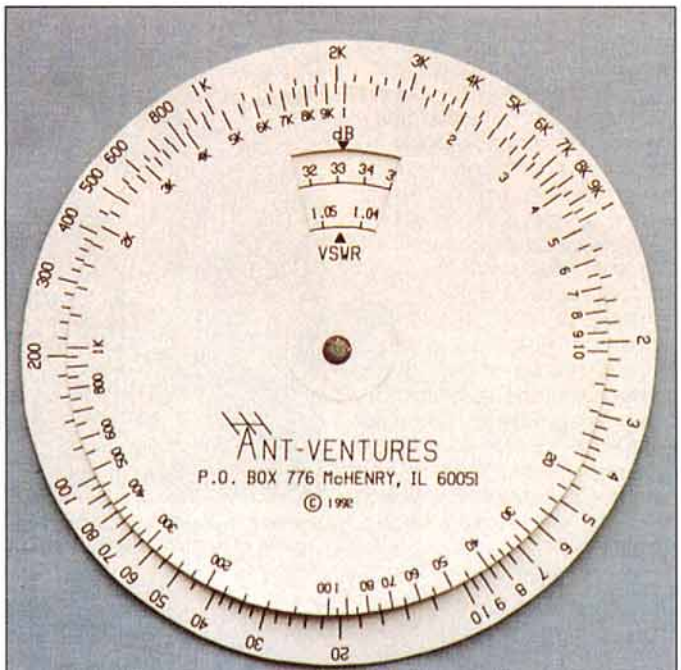
The **Delta-2** and **Delta-4** co-ax switches from **Alpha Delta Communications** set new standards for lightning surge protection, precision low-loss switching, and antenna grounding functions, all in a single product. Both the two-way and four-way switches are available with either SO239 'UHF' sockets or N-type connectors. All have a built-in arc plug cartridge surge protection system with a replaceable element which is easily accessible through the front panel. All unused circuits are automatically grounded and the centre 'off' position enables all circuits to be internally disconnected and grounded. These switches cost from £59.95 for the Delta-2 with SO239 connectors to £89.95 for the Delta-4 with N-type connectors. Replacement surge cartridges are £8.95 each.

Both the Mosley USA range of antennas, and the Alpha Delta co-ax switches, are available from:

Eastern Communications, Cavendish House, Happisburgh, Norfolk NR12 0RU, tel: 01692 650077; fax: 01692 650925.

ANT-VENTURES has recently announced the **Ant-Ventures VSWR Calculator** - the perfect accessory for your RF Wattmeter. The VSWR Calculator is made up of two concentric calibrated plastic circles which have been designed to make quick work of solving the formulas for calculating VSWR, return loss, feed line loss, amplifier gain etc. Here's an example of how it works: first measure your forward power and reflected power using your Wattmeter. Then align the forward power on the outer scale of the VSWR Calculator with the reflected power on the inner scale. Finally, simply read off the return loss and VSWR in the results window. Easy! The VSWR Calculator is available for just $6.70 in the USA: for further information on this and other Ant-Ventures products, and to check on the price in the UK, send a self-addressed envelope and a couple of IRCs to:

Ant-Ventures, P O Box 776, McHenry, IL 60051 - 0776, USA, or tel: 00 1 815 344 1702.



PLEASE MY FRIEND! Can you QSL? Next question, where do I get my cards printed? Informed opinion suggests that the **Adur Village Press** is rapidly becoming *the* place to go for QSL cards. Take note, this isn't just any old printing outfit. Well-known contester and QRP operator Chris Page, G4BUE, has set up a service especially for radio amateurs.

Chris has recently taken over as Editor of the *DX News Sheet* which is now being printed at Adur Village Press, so if you'd like a sample copy just let Chris know.

Perhaps you're needing personalised stationery, or looking for someone to print the club newsletter - Chris is your man. He'll sort you out a nice layout if you wish, and for an example of his work just pick up a copy of the First Class CW Operators Club magazine, *Focus*. RSGB members are particularly welcome, so if you need a service that's a cut above the rest, give him a call.

Adur Village Press, 'Alamosa', The Paddocks, Upper Beeding, Steyning, West Sussex BN44 3JW. Tel: 01903 879750, fax 01903 814594.

NEED MORE power when operating mobile, portable, or on a DXpedition? **Ameritron** has the answer. The **ALS-500M** is a 160 - 10m solid state mobile linear which requires less than 100W drive to produce up to 600W PEP output. Measuring only 3.5 x 9 x 15in, it works from a 13.8V DC car battery. - but you had better have a healthy battery! The price is £999. For DXpedition or portable operations where 240V mains is available, the **Ameritron ALS-600** may be just what is needed. It is also a 160 - 10m solid state amplifier and comes complete with a separate 50V 25A power supply. Providing up to 700W PEP output from a pair of FET power devices, features include SWR protection, overdrive protection, cross needle SWR and power metering and - being solid state - no tuning. The ALS-600 is £1575, including the power supply.

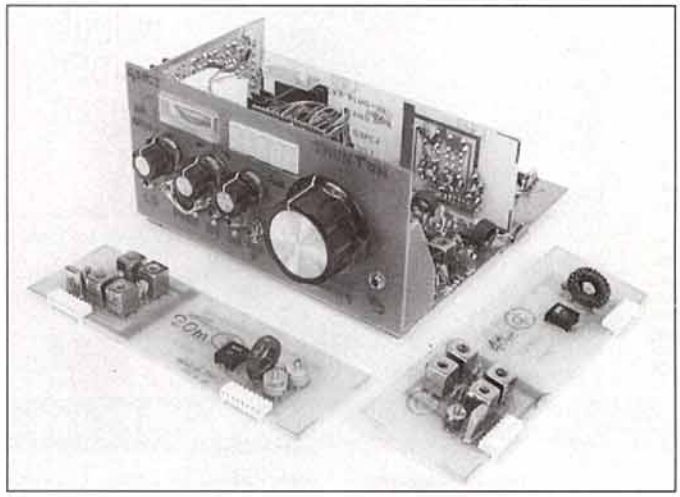
The new **Waters and Stanton Radio Communications Catalogue and Magazine** is now out. With 112 pages, it lists most of the wide range of radio equipment including HF, VHF and UHF transceivers, receivers, linear amplifiers and aerials, scanners, kits, power supplies, TNCs, SWR meters etc held in stock at Waters and Stanton's HQ. Profusely illustrated with black and white photos and line drawings or circuit diagrams on every page, the booklet includes a number of articles, most of which have not been published before, making it far more than just a product listing. It costs just £1.50.

Both of the Ameritron linear amplifiers and the Catalogue and Magazine are available from:

Waters and Stanton Electronics, 22 Main Road, Hockley, Essex SS5 4QS, tel: 01702 206835; fax: 01702 205843.

AN INNOVATIVE INVERTER which plugs into a vehicle cigar lighter and provides 230V mains power has been introduced by South Midlands Communications. The **Manson 125W Super Inverter**, which is fitted with a flush-mounted 13A square pin socket, is capable of running a portable TV, computer, camping lights, or anything requiring 230V at up to 550mA. It costs £69 from:

South Midlands Communications (SMC) Ltd, SM House, School Close, Chandlers Ford Industrial Estate, Eastleigh, Hants SO5 3BY, tel: 01703 255111; fax: 01703 263507.



IF YOUR REQUIREMENT is for a simple, QRP, **single band transceiver** at a real budget price, the **Taunton** may be your answer. The Taunton, part of the Somerset range of kits, is a superhet transceiver, capable of operation on any single HF band by means of plug-in band cards. The Taunton starts out as a basic 5W phone transceiver, but can be enhanced with the addition of digital readout or CW using either fixed frequency or tuneable CW filter kits. There is also an Optional Extras kit providing increased dynamic range through an AGC-controlled IF amplifier, 'S' meter, RIT etc. The special launch price is just £99 for the basic transceiver. For further details of this, and the other kits in the Somerset range, send an SASE to:

Walford Electronics, Upton Bridge Farm, Long Sutton, Langport, Somerset TA10 9NJ. Tel / fax: 01458 241224.

GAREX ELECTRONICS and their associate company **Revco Electronics Ltd** have now moved to brand-new premises in Exeter, convenient for the M5 and Exeter by-pass. Garex supply PMR and amateur radio equipment, whilst Revco are one of the UK's oldest-established aerial manufacturers. Callers are welcome to visit the new premises, but since there are no showroom facilities at present they are requested to telephone first:

Garex Electronics, Unit 8, Sandpiper Court, Harrington Lane, Exeter EX4 8NS, tel: 01392 466899; fax: 01392 466887.

THE SUMMER 1995 **Cirkit electronic constructors catalogue** (ISSN 0955-1100) is now available. Listing everything from a 1W resistor to a 20MHz oscilloscope, or a pack of rubber grommets to AKD 2m and 4m mobile transceivers, the Cirkit catalogue costs £1.95 (and contains vouchers worth £21!)

Cirkit Distribution Ltd, Park Lane, Broxbourne, Herts EN10 7NQ. Tel Sales: 01992 448899; Switchboard: 01992 441306; fax: 01992 471314.

Just when you thought you had everything you ever wanted in Amateur Radio, Icom come along and spoil it. The new Icom IC-706 is so special there should be a new bank holiday put forward in celebration.

Be prepared for...

JUDGEMENT DAY

IC-706 or DX-70?

The IC-706 presents you with a problem, remember the old days when equipment for HF, 6 metres and 2 metres required a whole shack to house it? The excuse you've always used for taking up the spare bedroom for all your ham gear is out the window. Permanently. Get used to being allocated space under the staircase, or worse still in the corner of the bathroom. Icom have achieved the impossible by producing a little box no larger than two metre multimode, then filled it with 100 watts on HF, 100 watts on six and (for a design dare no doubt), tacked two metres into it as well. Optional narrow filters for SSB as well as CW? No problem! All modes included as standard of course.

Look below and see for yourself. I've compared it to the new ALINCO DX-70 so you can choose which way to go. Who said "I'll be back?" I think ICOM are wearing their biggest grins since the IC-202!

Icom IC-706

PRICED UNDER £1200

Frequency Range:	RX:30kHz-200.000MHz continuous
Transmit:	1.8-30MHz+50-54MHz+144-146MHz
Modes:	LSB/USB, CW, RTTY, (FSK), AM, FM and WFM (RX only).
Power:	1.8-30MHz 100W, 50-54MHz 100W 144-146MHz 10W
Dimensions:	167(W)*58(H)*200(D) mm
Weight:	2.5kg (5.8lb)
Memories:	101, incl. 9 Alphanumeric.
AUTO ATU available:	Yes, as option (external)
Removable Front Panel:	Yes

Alinco DX-70

PRICED UNDER £1100

Frequency Range:	150kHz-30MHz + 50-54MHz
Transmit:	1.8-30MHz+50-54MHz
Modes:	LSB/USB, CW, AM, FM
Power:	1.8-30MHz 100W, 50-54MHz 10W
Dimensions:	178(W)*58(H)*230(D) mm
Weight:	2.7Kg (6.0lb)
Memories:	100
AUTO ATU available:	No, manual only (external)
Removable Front Panel:	Yes

MARTIN LYNCH IS THE ONLY RETAILER WHO CAN OFFER THE IC-706 ON A FIVE YEAR WARRANTY

NO DEPOSIT

IC-706 - AVAILABLE WITH NO DEPOSIT + 18 PAYMENTS OF £65 PER MONTH - ZERO INTEREST

Figures based on current retail price of £1159, and includes £11 set-up fee.

YAESU, KENWOOD & ICOM PRICES SLASHED - LAST CHANCE - MASSIVE INCREASES DUE IN JULY

HF EQUIPMENT

ICOM		
IC707	LIST £889	ML PRICE.....£779
IC738	LIST £1649	ML PRICE.....£1439
IC736	LIST £1969	ML PRICE.....£1689
FT840	LIST £899	ML PRICE.....£729
YAESU		
FT900	LIST £1349	ML PRICE.....£1099
FT900AT	LIST £1549	ML PRICE.....£1249
FT990DC	LIST £1999	ML PRICE.....£1649
FT990AC	LIST £2299	ML PRICE.....£1799
FT1000	LIST £3699	ML PRICE.....£2899
FL7000	LIST £2299	ML PRICE.....£1949
FT767GX	LIST £1799 Display Model	ML PRICE.....£1299
FRG100	LIST £559	ML PRICE.....£449

KENWOOD		
TS50S	LIST £999	ML PRICE.....£889
TS450S	LIST £1399	ML PRICE.....£Phone
TS450SAT	LIST £1549	ML PRICE.....£1329
TS850S	LIST £1699	ML PRICE.....£ 1495
TS850SAT	LIST £1849	ML PRICE.....£1629
TS950SDX	LIST £3799	ML PRICE.....£3199

VHF/UHF MOBILE, BASE & HANDIE

ICOM		
IC281H	LIST £449	ML PRICE.....£Phone
IC2340H	LIST £689	ML PRICE.....£Phone
IC820H	LIST £1795	ML PRICE.....£1569
ICZ1E	LIST £529	ML PRICE.....£459

YAESU		
FT11R	LIST £299	ML PRICE.....£Phone
FT41R	LIST £339	ML PRICE.....£Phone
FT23R	LIST £269	ML PRICE.....£219
FT51R	LIST £499	ML PRICE.....£399
FT290RII	LIST £539	ML PRICE.....£429
FT690RII	LIST £539	ML PRICE.....£449
FT790RII	LIST £639	ML PRICE.....£539
FT850	LIST £749	ML PRICE.....£629
FT736R	LIST £1789	ML PRICE.....£1429
FT5100	LIST £629	ML PRICE.....£519
FT2500M	LIST £369	ML PRICE.....£299
KENWOOD		
TS790E	LIST £1849	ML PRICE.....£1629
TM255E	LIST £899	ML PRICE.....£799
TM455E	LIST £999	ML PRICE.....£889

TM742E	LIST £829	ML PRICE.....£739
TM733E	LIST £739	ML PRICE.....£649
TM251E	LIST £389	ML PRICE.....£349
TM455E	LIST £429	ML PRICE.....£389
TH79E	LIST £449	ML PRICE.....£399
TH22E	LIST £239	ML PRICE.....£219
TH42E	LIST £269	ML PRICE.....£239
ALINCO		
DRM06E	LIST £359	ML PRICE.....£289
DR150E	LIST £399	ML PRICE.....£329

REMEMBER ! ANYTHING OVER £200 WE CAN FINANCE, EVEN HEAVILY DISCOUNTED PRICES, USUALLY AT ZERO APR! JUST CALL OR WRITE FOR DETAILED INFORMATION.

MARTIN LYNCH G4HKS THE AMATEUR RADIO EXCHANGE CENTRE **140 - 142 NORTHFIELD AVENUE**

ICOM IC-775DSP - WITH FIVE YEARS WARRANTY!

First, a little history lesson... The new top of the range IC-775DSP is advanced today as the IC-701 was, fourteen years ago. Whilst the rest of the worlds Amateur Radio manufacturers were still producing sets with "VFO's", Icom steamed in with a world first - an HF transceiver with a REAL synthesizer. It was literally YEARS before the rest caught up. How long will it be with Icom's latest IC-775DSP - the worlds first HF Transceiver with proper Digital Signal Processing?

Icom's new baby really deserves six pages to describe the advance in design the new IC-775DSP has to offer. It has been designed from the ground up using serious high quality components and offers features and performance you'll find nowhere else.

The new IC-775DSP is so good, MARTIN LYNCH is arranging appointments to fully explain the operating features offered by the worlds most advanced HF Radio. Compare with the very best YAESU and KENWOOD can offer, with all three sitting side by side. To arrange a "test drive" call the LYNCH Sales Desk today. 0181 566 1120.

For those of you who can't visit the London Showroom, we would be delighted to send you details. Just call or write.

BULK PURCHASE ON FT-900AT

Buy a brand new, boxed FT-900AT from MARTIN LYNCH and **YAESU UK WILL GIVE YOU FREE FILTERS WORTH £179.00.** Offer ends 30th June 1995, or when we run out of stock, whichever is the sooner. Get dialling!!

FT-900AT with FREE filters. £1249.00 (List £1737.00)

ATTENTION FT-290R MK2 OWNERS!

Three years ago, muTek and LYNCH bought you an improved version of the Yaesu FT-736R. By installing the "RDX" boards the signal to noise and sensitivity on both two and seventy were greatly improved.
1995 brings another great muTek design - a newly developed "optimised" preamplifier for the Yaesu FT-290R mk2. The SLNA290S consists of a low loss relay for TX/RX switching, a low noise amplifier based on the BF998, a variable attenuator such that the gain can be varied without effecting the noise factor or dynamic performance of the L.N.A., and a matched filter to reject out of band signals.

Supplied with fitting instructions for the FT-290Rmk2 is £39.95 p&p £3.00 or fitted in our workshops for £79.00, + £7.50 return carriage.

DIGITAL FILTERS

TIMEWAVE DSP9+	£229.00
TIMEWAVE DSP9MK11	£179.00
TIMEWAVE DSP59	£279.00
JPS NTR1	£199.00
JPS NIR10	£399.00
MFJ 784	£239.00

CUSHCRAFT ANTENNAS

R7 VERTICAL	£369.00
R5 VERTICAL	£279.00
A4S 4ELE BEAM	£428.00
A3S 3ELE BEAM	£349.00
A3WS 18/24 BEAM	£275.00
D3WS 10/18/24	£179.00

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THE LOWEST PRICES, HIGHEST QUALITY

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TSB-3315	2/70 BASE 8.5/11.9db	£119.95
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TSB-3303	2/70 BASE 3.0/6.0db	£42.95
TSB-3301	2/70 BASE 6.5/9.0db	£74.95
TSB-3302	2/70 BASE 4.5/7.2db	£59.95
TSB-3302	2M BASE 6.5db	£37.95

MOBILE

TSM-1005	2M 7/8TH 5.2db MOBILE	£39.95
TSM-1320	2/70 2.1/3.8db MOBILE	£19.95
TSM-1326	2/70 2.1/5.0db MOBILE	£27.95
TSM-1332	2/70 4.5/7.2db MOBILE	£42.95
TSM-1607	2/70/23 2.8-8.8db MOBILE	£49.95

PRO-AM ANTENNAS

IF YOU WANT TO BE HEARD RUNNING MOBILE "HF", THEN CHOOSE THE FAMOUS "PRO-AM" RANGE FROM VALOR, USA.

PHF-160 Enormous 160M Centre Loaded Whip	£54.95
PHF-80 Almost as big 80m Centre Loaded Whip	£24.95
PHF-40 The muts nuts on 40m, at a mere	£22.95
PHF-20 The way to DX, (safely) on 20m	£19.95
PHF-15 You guessed it, the same but on 15m	£19.95
PHF-10 I'll give you one guess	£19.95
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CONTINUED FROM PAGE 29

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1	DE0MST	815	12	I1 - 21171	334
2	BRS8841	703	13	ONL768	249
3	W0 - 6437	632	14	WDX2TAU	223
4	BRS47426	585	15	EI - 982/G	183
5	DL9286	565	16	UA0 - 124 - 451	166
6	NL4276	456	17	OM3 - 28013	164
7	WDX3JFH	427	18	ONL5923	154
8	W0 - 20276	418	19	BRS944	131
9	DL20064	403	20	EA1033	123
10	DL312W	369	21	DE0KAY	116
11	BRS94761	337	21	DE3HLA	116

HONOUR ROLL/ANNUAL LISTING BY COUNTRY

W	179	UA	7	LU	2	HC	1
G	103	HA	5	OK	2	HK	1
I	94	PY	5	PA	2	IS0	1
DL	44	KL7	4	S5	2	LY	1
EA	27	OZ	4	SV	2	OM	1
F	22	UT	4	UA9	2	P29	1
SM	21	4X	4	VK	2	SP	1
VE	20	GW	3	CE	1	UC2	1
CT	17	OH	3	EA8	1	VK9	1
JA	17	ZL	3	EA9	1	VR2	1
ON	14	9A	3	FR	1	YL	1
HB	11	EI	2	GI	1	YO	1
OE	10	KH6	2	GJ	1	YU	1
GM	8	LA	2	H4	1		

IOTA ANNUAL LISTING - MAY 1995

Posn	Callsign	Total
185	WB3DNA	419
186	DJ8QP	418
186	OH3MIG	418
188	WF5E	415
189	IK1ADH	413
190	CT4UW	411
191	EA4KK	410
192	HA8XX	409
193	VE3NSZ	407
193	G3ZBA	407
195	AA9DX	405
195	IK7DBB	405
197	N6AWD	404
198	K8LJG	403
199	CT1BY	401
200	G3SJX	398
201	I8LEL	397
202	G3XON	391
203	K5BDX	389
204	OH2BBF	385
205	KV7L	383
206	SM6DHU	377
207	I0ZYA	374
208	AA7AV	373
209	W1OPB	368
210	G4KBX	365
210	GJ3LFJ	365
212	FE6ACV	364
212	IX1BGJ	364
214	SM4DDS	363
215	HH2HM/F	362
215	WD0FTD	362
217	VE7YL	361
218	ON4ON	360
219	IK0AZG	357
220	CT1EEB	355
221	I4CSP	352
222	WA2UZB	351
223	G3SMP	348
224	WQ5Y	347
225	AA5ZA	345
225	IK8CVZ	345
227	G3UAS	341
228	G0CGL	340
229	I2MQP	332
230	NE8Z	331
231	IK2ILH	330
232	I8WES	328
233	DL3ECK	327
233	IN3QCI	327
233	YT7DX	327
236	K9RHY	326
237	EA7ABW	325
237	ON7TK	325
237	G4GIR	325
240	CT1CQK	322
241	KN4BN	321
242	IK4PMA	320
242	G3DZS	320
244	WA8SAE	318
244	ON7LX	318
246	G3KAA	317
246	G4XRX	317
248	SM5BMB	316
249	DL9JI	315
250	G4CMT	314
250	G4XOP	314
252	HA3NS	313
253	G3AEZ	312
254	HB9BZA	311
254	KN1I	311
256	DL1ZN	310
257	CE7ZK	309
257	N5FW	309
257	W5AWT	309
260	OE1MEW	308
260	DK8UH	308
262	F5HNQ	307
262	GW3NXR	307
262	HB9CYH	307
262	KD7EC	307
262	CT1YH	307
267	AB5C	306
267	DL8YR	306
267	WW1V	306
267	JF1SEK	306
267	G0APV	306
267	I8IHG	306
267	W0GLG	306
267	I2PQW	306
275	G0MSM	305
275	OZ5MJ	305
277	S51RU	304
277	EA5BD	304
277	OZ5PA	304
280	VE2FVD	303
280	SM0AJU	303
280	HA1AG	303
283	W1KSZ	302
283	G2ATM	302
283	PA3EXX	302
286	G0MYC	301
286	G4YRR	301
288	4X4RE	300
288	AK5B	300
288	WA3HUP	300
288	N4UH	300
288	EA7OH	300
293	IK2ECN	297
294	IK8FUN	293
295	VE3ZZ	290
296	JN3SAC	286
297	IS0JMA	282
298	I0MOM	279
299	HB9CSA	276
300	VE3HO	272
300	N3CYD	272
302	N2AIF	270
302	KD6GC	270
304	G4FAM	269
305	GW4OFQ	268
306	G3PFS	267
306	G3SWH	267
308	NC6A	266
309	HC2HVE	265
310	EA3LS	264
311	SP6TPM	262
312	G4NXG/M	261
313	WA3L	260
313	G3PMR	260
315	EA1MO	259
315	G3VOF	259
317	KH6JEB	257
317	G4HJA	257
319	VE3BAZ	254
320	AB5EA	252
321	OE3SGA	251
322	SM5JE	250
323	EA7BR	243
323	SV1JA	243
323	DK7XX	243
326	DL6KVA	242
326	DF7GK	242
328	K7LAY	240
329	DL1AAU	239
329	RV6AF	239
329	UA6AF	239
329	IK2HKL	239
333	HB9BHY	237
333	G4OBK	237
335	G2FFO	236
336	WB1BVQ	235
336	K0IFL	235
336	G3VQO	235
336	DJ2MN	235
340	4X6ZK	234
340	WH6ASW	234
342	VK7BC	233
342	RB5MT	233
344	DL1EV	231
345	9A1BHI	230
345	PS7AB	230
347	IK7MXB	229
347	ON7DR	229
347	VE7LQH	229
347	IN3ASW	229
351	N7PIB	228
351	W0GAX	228
351	AB5EU	228
354	JH1IED	227
355	K6OHM	226
355	K0DEQ	226
357	CT4RH	224
358	G3TLG	223
359	K6BIA	222
360	W0BBT	221
360	WD0BNC	221
362	IK1PMR	219
363	SM5DUT	218
364	VE9HE	217
364	EA7SK	217
366	JA7QFU	215
366	YO3YC	215
366	JA8IYI	215
366	IK2HSW	215
366	WW8W	215
366	GM4KHE	215
366	DL3AOJ	215
373	DL2GAC	214
373	KA3TGY	214
373	KA5EJX	214
373	IT9VDQ	214
377	IK4HPU	213
377	LA3IBA	213
377	JH3AIU	213
377	FE1JSK	213
381	W4XQ	212
381	W1KKG	212
381	RA6YJ	212
384	G3LPS	211
384	UY5OQ	211
384	G4SSH	211
384	WB4UHN	211
388	I2EOW	210
388	G3YEC	210
388	SM1CNS	210
388	EA7CIW	210
392	JA3ANW	209
393	KD1HN	208
393	WA7OBH	208
395	KD9HT	207
396	W0CON	206
396	EA5YJ	206
396	AB4DU	206
399	KQ4YI	205
399	IK1SLE	205
399	OZ1ACB	205
399	KK6ZO	205
399	LY2BZ	205
404	I6DQE	204
404	DL1XE	204
406	KG6VI	203
406	DL9SC	203
406	OE3RE	203
406	NL7BY	203
410	JA7JI	202
410	KA1FOW	202
410	HB9BCK	202
410	JA2BXV	202
410	G3GMY	202
415	IK1HSR	201
415	AA7FL	201
415	HB9DDZ	201
415	W3YN	201
419	SM6BZE	200
419	N6ONO	200
419	UY5XE	200
419	G4MVA	200
423	N6WMF	199
424	KD1CO	198
425	IK2UEC	190
425	G0GRK	190
427	G0DVT	185
428	G4SDJ	184
429	DK1YP	182
429	W8WFN	182
429	KF8UN	182
432	SM2BQE	179
433	H44MS	178
433	HB9CEX	178
435	KE4DH	176
435	VE6EJ	176
437	EA3GHQ	175
438	WU1F	173
439	G3NOH	171
439	G3LSW	171
441	I7IJU	170
441	AD4KW	170
443	UA4ZA	169
443	HB9KT	169
445	PA0EHF	167
445	G8GG	167
447	IK4QJH	166
448	IT9JPK	165
449	G0PAJ	164
450	G0AHC	163
451	WB0YJT	162
452	WD9FEN	161
453	G3DPX	160
453	EI8AU	160
455	NQ7Q	159
455	DF7HX	159
455	KC9DS	159
455	NN7A	159
455	G3LHJ	159
460	EA5RC	155
460	GI0TJJ	155
460	FE1LMJ	155
463	IN3PEE	154
464	G3LCG	153
464	G4DJC	153
464	AA6WJ	153
467	AB4H	152
468	KJ5LJ	151
469	I8QJU	150
469	P29VMS	150
471	EA3EYR	148
471	IK2WAL	148
471	EA5GMZ	148
474	EA1EDF	147
474	N8KCG	147
474	NX9P	147
474	G0ARF	147
474	CT1BWW	147
479	DL8AAV	146
480	SM0BGM	145
480	EA5ZR	145
480	W9ZGP	145
483	IK4MSV	144
483	LU1JDL	144
485	KB8HNU	143
486	GM0LVI	142
487	F5PAC	141
487	WE9A	141
487	IK2MMF	141
487	W9HR	141
487	KW0U	141
492	CT1ESO	140
492	KE5OD	140
494	G3DCC	139
494	G4JFS	139
496	K1WNT	138
497	I8USE	137
497	AA1GG	137
497	IK2QPR	137
497	OE1RGB	137
501	G3KNU	136
501	G3IMK	136
501	N4VVR	136
501	K3LVO	136
505	PY8AJD	135
505	K6CJ	135
507	AB5EB	134
507	IK8SMZ	134
507	N5MBD	134
510	4X6UV	133
510	DL3BRA	133
510	NH6U	133
513	DL3EAY	132
513	I1FHA	132
513	GM4ELV	132
516	IT9JWV	131
517	WD6CKT	130
517	SM6TEU	130
517	K2YOF	130
517	JA1CKE	130
517	RZ1OA	130
522	GM4PVC	129
523	G3JTO	128
524	DK4MO	127
524	EA5GOU	127
524	SV1ACJ	127
524	G3WCY	127
524	G3WRD	127
524	IK2ECP	127
524	DL1NP	127
531	W1VXV	126
531	OE5AHL	126
533	G3GHY	125
533	N1KCE	125
533	LU5EWO	125
533	KD2NN	125
533	LA1JDA	125
533	F6DRA	125
533	KL7UR	125
540	JH1FTS	124
540	EA5GRN	124
540	WD6EYD	124
540	4X4VF	124
540	UT5EH	124
540	CT1QF	124
540	G8FF	124
547	G0OOF	123
547	JA2TK	123
547	G2FQR	123
547	G4POF	123
547	N5OVF	123
552	N8GFM	122
552	EA7CWV	122
552	DL6KY	122
552	G0KEY	122
552	OE1YGU	122
557	EA5GJM	121
557	SM3TLG	121
557	RW3PN	121
557	G3DEF	121
557	N3IHS	121
557	UA3AQO	121
557	KA2ANF	121
564	K1TG	120
564	G4DUW	120
564	WA4AUL	120
564	G3PJT	120
564	WB2RQX	120
564	WA5DTK	120
564	FR5ZN	120
564	HK3JJH	120
572	VE3PRU	119
572	IK4HLU	119
572	SM5LI	119
572	F5MPS	119
572	KJ6BW	119
577	NG7S	118
577	IK2FEO	118
577	GM3PGO	118
577	DJ6VM	118
577	W4QCU	118
582	G0DNV	117
582	N3PM	117
582	KK6JY	117
582	N9EXN	117
582	IK7OKB	117
587	G3MDH	116
587	SM7CNA	116
587	IK7CNX	116
587	DL4AO	116
587	IV3GOW	116
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595	SM5SVL	115
595	G3IZD	115
595	NU5V	115
595	G3JUL	115
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600	WV3G	114
605	N2LYV	113
605	CT1CVF	113
605	DJ0MBF	113
605	KB4VLO	113
609	DF6IC	112
609	G3DNF	112
611	KB2R	111
611	VR2GC	111
611	WS1F	111
611	VE2XLT	111
611	WA0GOZ	111
616	VE7PHF	110
616	PT2AZ	110
616	K4FDP	110
616	G0ABY	110
620	WA1MKS	109
620	F5KAI	109
620	UC2IO	109
620	IK7NXM	109
620	IK1CJO	109
620	DL9MFH	109
626	IK2AWT	108
626	EA9PY	108
628	JA1PAP	107
628	G4PZQ	107
628	KK4XL	107
628	G4ASL	107
632	IK1LAN	106
632	JH1VES	106
632	N3LBC	106
632	G3FIC	106
632	WH6ASW/KL7	106
632	G0FYX	106
632	UA9MCM	106
632	I1BRB	106
632	HA1AD	106
641	G4VXT	105
641	OK1FIW	105
641	KG7YQ	105
641	KI6VY	105
641	G3ZJF	105
641	G0AEV	105
647	JK7KIH	104
647	JR2THL	104
647	WA0CLR	104
647	VE9JK	104
647	K4JSG	104
647	N2KHH	104
647	VK6LC	104
647	K8VKI	104
647	WA3ELE	104
647	UW9SG	104
657	ZL1HS	103
657	N1LJA	103
657	DF4SA	103
660	KA5PVB	102
660	OE5BBL	102
660	G3RGD	102
660	IV3NZN	102
660	G2ART	102
660	WH6ASW/IM0	102
660	PR7CPK	102
660	WB0YEA	102
668	WL7EM	101
668	JH0FWV	101
668	G3CWW	101
668	KB6ISL	101
672	OE5BWN	100

RADCOM EQUIPMENT REVIEW

The Helikite Virtual Mast

By *Radcom* Technical Editor, Peter Dodd, G3LDO

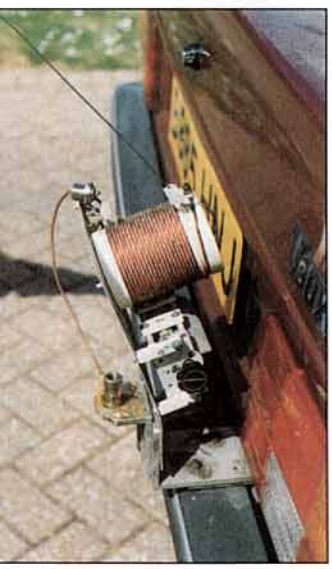
A HELIKITE IS a combination of a specially designed kite and a helium-filled mylar balloon; first described in *Product News, Radcom*, June 1995. The kite section is made from rip-stop nylon, which wraps around and protects the silver mylar balloon, see the photograph above. It is claimed to be able to fly in wind speeds from 0 to 10 on the Beaufort wind scale. Although designed primarily for agriculture as a hovering birdscarer it appeared to practical solution to providing temporary support to a long-wire vertical antenna.

This review describes my experiences of using the Helikite as a support for a low-band long-wire vertical antenna. The manufacturer suggested that the best method of using the Helikite as a lifting support was to use two kites in tandem. This doubles the lifting power and provides a more stable lifting platform.

MOBILE OPERATION

IT SEEMED SENSIBLE to try using the kites away from obstructions such as buildings and trees. In order to carry the kites and radio equipment to such a site required a car and suggested mobile operation, particularly as my vehicle was already fitted with mobile radio equipment (FT-707).

As a start I decided to try 80 metres using a half wavelength of 0.6mm plastic covered wire. I reasoned that a voltage fed half-wave would be the best DX antenna under the circumstances because it would reduce the ground losses normally associated with mobile operation. I constructed a simple ATSU arrangement, which was fixed to the rear of the car on the mobile mount bracket, see the photograph bottom left. The antenna and kite cord were connected at the kite end and run together. At the car the cord was tethered to the one of the door hinges and the antenna connected to the ASTU.



Top right: The kite section, made from rip-stop nylon, wraps around and protects the silver mylar balloon.
Left: The ASTU comprised a tapped parallel tuned circuit fixed to the mobile antenna mount.

15/4	0500	VE3YJ	3772	5/6	5/9	100	SSB	High down	HK Guelph / so w Toronto	Russ
	0530	KV7S	3779	3/3	5/7	"	"	"	ar 30m	Don
	0540	TI2CF	3799	5/9	5/9	"	"	"		
	0544	ZL1HY	3799	5/7	5/7	"	"	"		Walton Mike
	0600	ZL4AS	3799	5/5	5/6	"	"	"		Cliff

Fig 1: Log book extract for the first hour of Helikite operation on 14 April 1995.

The QTH for the first tests was a car park on South-downs Way, an area of the South Downs overlooking West Worthing.

Because I feel that the only real test of an antenna is working DX it was necessary for me to be operational at around daybreak for any chance of a DX contact on 80 metres. It was dark and there was quite a strong wind blowing. I managed to launch the two kites in tandem but the antenna wire got into an awful tangle. This took quite a lot of sorting out in the dark because the wire was covered in black plastic insulation. By the time the antenna wire was sorted out, the kites flying properly and the antenna connected to the ASTU it was just getting light.

I took a listen around but there was no real DX. At this point the wind started to decrease and change direction. The kites lost some altitude and were in danger of being entangled in some nearby trees, not at first noticed in the darkness. I drove the car, with the antenna system still connected, to another area of the car park, clear of trees, and started operating again listening for SSB signals at the top end of the band. The first DX contact was with VE3YJ who gave me a 5/6 report. This was followed by other DX contacts shown in a sample of the logbook in **Fig 1.**

During the period of operation the wind dropped to zero but the kites kept flying, although the height was reduced. However the top quarter-wavelength of the antenna was substantially vertical and there was no noticeable reduction in performance. At the time I was operating in the down-wind side of the hill so there was probably a downdraft in the airflow that reduced the height of Helikites. They certainly flew in what appeared to be zero wind.

FIXED SITE

NEXT, THE HELIKITE system was tried from the top of the RSGB HQ building. Initially the kites were without the antenna attached and they seemed to fly quite well. As a result of this test flight I then decided to use the Helikit system to support an 80-metre halfwave antenna to give a good 3.5MHz signal for the special event station GB100IMD. However, on the night, it proved impossible to launch the kites in the dark, with a turbulent wind and the ajacent RSGB antenna structures.

WHAT ABOUT THE HELIUM?

THE HELIUM IS supplied by Lindgas and must be paid for separately. It comes in the form of balloon gas which is about 98% helium and 2% air. The helium comes in a hired 65cm tall cylinder which is not heavy and is easy to move. The cylinder and gas can be obtained from regional depots listed in the information that comes with the Helikites. A cylinder will fill about 12 balloons although in practice you only need to fill two, and top them up weekly with a small amount of gas.

GENERAL NOTES

WIND SPEED INCREASES with height; weather forecasts give wind speeds as measured at 33ft (10m) above the ground where it will be about one third faster than at ground level. Even when there appears to be no wind at all there will often be some wind once clear of ground level.

Helikites can be stacked. The first kite is launched and the line is then attached to a second kite, so that the two kites fly about 60ft (20m) apart. This allows the first kite to find, and fly in, the stronger and more stable air stream that occurs at some distance above the ground.

Air Traffic Control Regulations state that the maximum height a kite or balloon can be flown, without notification, is 60m. The Helikite has quite a lot of drag so it tends to fly at around 45 degrees from the vertical. In practice this means that you can use a use a 130ft (40m) antenna without any problem.

CONTINUED ON PAGE 55

CONTINUED FROM P53

SAFETY

IN COMMON WITH any other kite flying activity Helikites should *not* be flown anywhere near overhead power lines, over buildings or roads.

Never fly the Helikite during electrical storms. If an electrical storm brews up while the kite is aloft disconnect the rig and try to get the kite down. If the storm comes upon you very quickly then just disconnect the rig and don't go near the kite antenna until the storm has finished.

CONCLUSIONS

THE TWO KITES as described certainly flew in what appeared to be zero wind, a condition that no other kite would have flown in. However, they did have a struggle carrying the 80m half-wave of 0.6mm plastic covered wire in low wind conditions. Enamelled covered 18 or 20SWG wire would be much lighter. The nylon control line takes all the strain. Even when the antenna wire sagged, a halfwave vertical end fed antenna performed very well.

The Helikite becomes rather unstable in high winds. This instability can be minimised by using a drogue or tail.

Helikites have to be transported in an inflated condition. They float around inside the car unless fixed to the floor or seat of the vehicle with a weight. When not in use I leave them parked on the ceiling of the garage. A Helikite must always be tethered otherwise it is gone forever.

Using a Helikite as a method of circumventing antenna planning restrictions seemed attractive. I tried launching the kites from my back garden. They rose above the houses and trees but were buffeted about by wind turbulence until well clear of obstructions. I felt that this was not a solution for supporting an antenna from a suburban site.

A Helikite lifting kit can be obtained from Allsopp Helikites, Cheshunt Lodge, Chalford, Stroud, Glos, GL6 8NW, tel: 01453 886515. It comprises two kites, balloons, drogues, several rolls of line and four spare balloons. The cost is £210.32 plus £5 P&P. Helium is available as described above at £30 per cylinder, with a cylinder rental of £26 for 12 months. Additionally you will need an inflator at £19.50. Helium prices are exclusive of VAT. ♦

Technical Update

IN JUNE 1995 *Technical Update* we published a letter from Denis Walker, G3OLM regarding the article on LF mobile antenna design by R Bearne, G4DUA. This letter was wrongly attributed to P L Stride, G2BUY.

Our apologies to both G3OLM and G2BUY - *Ed.*

EUROTEK MAY 95, INVERTED L END FED ANTENNAS

IN HIS ARTICLE (p65), DJ1ZB refers in his notes to a similar article by myself 'Bring back the end fed' (*RadCom* 2/89) and adds "Beware of the underrated capacitors mentioned".

I would respectfully like to point out that in his circuit the capacitors are fitted in high voltage positions away from the feed point and would therefore need to be high voltage types of at least 1000V rating. In my circuit the capacitors are in a low impedance series circuit, and as such are not subjected to high voltages when correctly tuned. Certainly, during the 12 month period of using my end fed I never experienced any problems of capacitor breakdown.

During the past year I have experimented at some length with end fed antennas using different types of home brew HF transformers, a method which does away with the need for capacitors and relays and makes the end fed even more attractive.

L B Uphill, G3UCE

GRAPHIC METHOD OF CALCULATING Z, FEB 95

THE EQUATIONS on p64 column 3 giving the values of the normalised resistance and reactance corresponding to the centre of the SWR circle are incorrect and should read

$$R_o = \frac{(S+\frac{1}{S})}{2} \text{ and } X_{max} = \frac{(S-\frac{1}{S})}{2}$$

In the caption to the diagram contained in the sidebar, p65, the portion of the reflected power should be p^2 and not simply p since this power is proportional to the product of the magnetic and electric components of the reflected wave.

At the end of the side bar the equation for the reactive component of the input impedance should read:

$$X_i = \frac{(X_t + T)(1 - X_t T) - TR_t^2}{(1 - X_t T)^2 + (TR_t)^2}$$

Note that to refer the impedance forward from the measurement point to a point nearer the aerial the formulas given at the end of the sidebar apply but T is given a negative value.

A J Harwood, C Eng, MIEE, G4HHZ

RETURN LOSS, TT, JUNE 95

IN THE DESCRIPTION of Closely Coupled Resonators, *Technical Topics*, June 95 the expression 'return loss' was used. I wonder if many other readers apart from myself were unfamiliar with return loss? I had to look it up before I could interpret the graphs.

The term 'return loss' refers to the loss of reflected power when compared with forward power and is defined by the equation:

RL = -10 Log (returning power)/(outgoing power)

A large return loss implies good matching of load to line with only a small fraction of the forward power being reflected; ie the returning power has suffered a large loss. In the ideal case of a perfectly matched line the returned power fraction is zero, and the return loss is an infinite number of dB. At the other extreme, if the line is terminated in a perfect reflector and *all* the forward power is returned, the returned power fraction is unity so the return loss is 0 dB. The horizontal trace in Fig 4 of *TT* is the zero dB line.

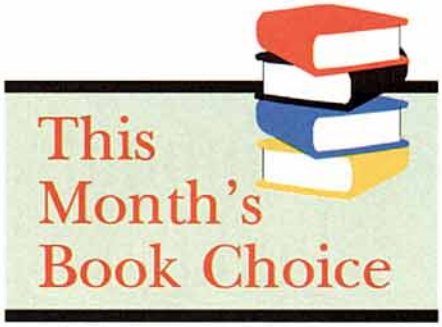
Geoffrey Billington, G3EAE

[Return Loss is described in the *VHF/UHF DX Book*, edited by Ian White, G3SEK, see page 89 - *Ed*]

TUNED RADIO FREQUENCY RECEIVER, MAY/JUNE 95

G3DXN SUGGESTS THAT the regenerative detector is a TRF receiver. I disagree. If TRF means a tuned radio-frequency circuit, then even a crystal set would have qualified. It must mean tuned radio-frequency stage.

John B Roscoe, G4QK



Described by HQ Staff

PRACTICAL TRANSMITTERS FOR NOVICES

by John Case, GW4HWR.
125 pages 245 x 184mm.
Published by the RSGB at £9.53 (£8.10 to members).
ISBN 1 872309 21 6

ANOTHER IN THE SERIES of beginners' books produced by the RSGB as part of Project YEAR, Practical Transmitters for Novices will appeal not only to the Novice licensee but also to anyone with an interest in amateur radio construction.

It has ten chapters: Methods of construction; How to make an RF probe and an absorption wavemeter; Some simple oscillators; Amplifiers and filters, An 80m CW transmitter, Modulation and modulators, A double sideband transmitter for Top Band; A frequency modulated transmitter for 50MHz; Transmitters and test equipment for the 1.3GHz band; and Transmitters and test equipment for the 10GHz band.

Two appendices cover: Tools and how to use them; and Suppliers of components.

The author is well known for his work with Novices and for his sound knowledge of workshop practice. This comes through in the book as the theory and practical side of transmitter construction is described. The emphasis is on learning by hands-on experience.

Each project is supported by copious constructional diagrams and, in most cases, a PCB foil pattern.

Several of the Novice bands are covered and, unlike many 'simple transmitters' books, the projects are not just for HF CW.

HF phone operation is accomplished with a seven transistor, three chip, DSB transmitter complete with aerial change-over components. The HF transmitters are crystal controlled but very full details are given of how to build a VFO covering from 1.78 to 30MHz.

Whilst there is little point in building for 432MHz (modifying PMR sets being the preferred option), 50MHz retains some of the simplicity of HF construction. The 6m FM transmitter runs up to 1W and construction details are preceded by how to build a suitable VHF wavemeter.

The most remarkable thing about *Practical Transmitters for Novices* is its 54 pages of 'microwaves for beginners'. This would appeal very much to the accomplished constructor who wants to get going on 1.3 or 10GHz. Both narrowband and wideband techniques are described, as well as the necessary (home brew) test equipment. Many of the projects are supported by kits available from the RSGB Microwave Committee Components Service.

Practical Transmitters for Novices is a common-sense guide to transmitter building and is equally suitable for all classes of radio amateur. If you have just qualified as a Class B Novice or are a world-weary G3 there's something here for you.

Reviewed by
R W Micklewright, G3MYM

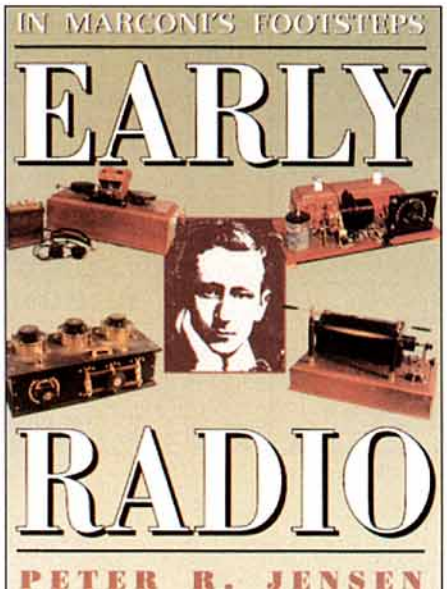
IN MARCONI'S FOOTSTEPS - EARLY RADIO

By Peter R Jensen
Published by Kangaroo Press Pty Ltd (Australia) 1995. 176 pages A4 hardback.
Available in the UK at £28 inc UK P&P from G C Arnold Partners, 9 Wetherby Close, Broadstone, Dorset BH18 8JB.
ISBN 0 86417 607 4

IN MARCONI'S FOOTSTEPS - Early Radio deals with non-amateur spark radio history, and covers the period 1894 - 1920. There are three themes to the book: the story and technology of radio communication from 1894 to 1920, centred mainly on the work of Marconi, plus the author's account of visits to various locations of Marconi radio history and detailed descriptions of how to make working replicas of pre-valve radio equipment.

The book is lavishly illustrated with photographs and diagrams, and has an excellent index and an easily readable style. Several of the photographs are in colour, and both the photographs and the text are set in chronological order. A pleasing aspect of the photographs is the 'then and now' shots of some of the historic radio sites. These are especially interesting in those cases where the later photograph has been taken from more or less the same camera position as the earlier one was. An example of this are the shots of the transmitting station site at Poldhu in Cornwall taken in 1901 and in 1992.

Marconi's development of radio in the 1890s is described in depth, along with the author's visits to most of the story's locations. There is a detailed account of how the first radio signal to cross the Atlantic was transmitted from Poldhu in Cornwall to St Johns in Newfoundland in 1901, and the book also describes the former Marconi stations at Clifden on the west coast of Ireland and at Caernarfon in Wales. Also, the author recounts his visits to the sites at Poldhu, Clifden and Caernarfon. A whole chapter is devoted to the radio aspects of the 1912 Titanic tragedy, and includes details of the radio equipment used on the ill-fated cruise liner.



The second half of the book describes how to make working replicas of pre-valve radio equipment, based on the author's own first-hand experience. A technical history of each device is also given. The construction projects include a coherer, multiple tuner, magnetic detector, and a crystal set.

In Marconi's footsteps - Early Radio is a history, travel, technical and construction book all in one, and it should appeal to anyone interested in the history of radio, pre-1920 radio circuits, or in making working replicas of pre-valve radio equipment.

Described by HQ Staff

TEST EQUIPMENT FOR THE RADIO AMATEUR

by Clive Smith, PhD, BSc(Eng), G4FZH.
170 pages, 245 x 184mm.
Published by the RSGB at £9.00 (£7.65 to members).
ISBN 1 872309 23 2

EVERYONE NEEDS to make measurements and to monitor the performance of their station. In *Test Equipment for the Radio Amateur* Clive Smith covers not only the theory but also the practice of test gear and measurement.

Chapters include: Current and voltage measurements; The oscilloscope; Frequency measurements; Wavemeters and analysers; RF power measurements; Antenna and transmission line measurements; Noise measurements; Component measurements; Signal sources and attenuators; Modulation measurements; and Power supplies.

The book starts with a very handy list of abbreviations and ends with 25 pages of PCB foil patterns and component layout diagrams for the various construction projects. An appendix deals with a list of items of surplus commercial test gear, together with what each model does and some advice on buying such equipment.

A chapter entitled 'Reference data' includes component colour codes (for capacitors and inductors as well as resistors), semiconductor and IC numbering, wire number equivalents and coax and connector information.

Projects range from a simple RF probe and a digital voltmeter, to a 600MHz frequency counter and the famous G4PMK Simple Spectrum Analyser originally published in *RadCom*. Another popular item from *RadCom* is the G3WPO FET Dip Oscillator.

There are well over 500 diagrams and illustrations, making this a very accessible book. It is both a good read and an invaluable reference work and is likely to find a place on the bookshelf of most active radio amateurs this year. ♦

CONTINUED FROM P43

bending the gate and drain leads clear of the copper. At first I thought that a heatsink would be required but in practice I have found that under normal CW operation this is not necessary.

Component leads can be twisted together to form a mechanical joint prior to soldering, but if you fear that you might need to take the circuit apart use the hint of the month described in the March 95 *NN*.

Since building the transmitter I have already carried out one modification, I have included a toggle switch to switch between the two crystals I have available (see photograph).

Contacts to date on the 'The Nipper' include PA3AAF, DL1NF and 2E0AGP If you build this little set I am sure that you will have at least as much fun on 80m with it as I have had in the last week! ♦

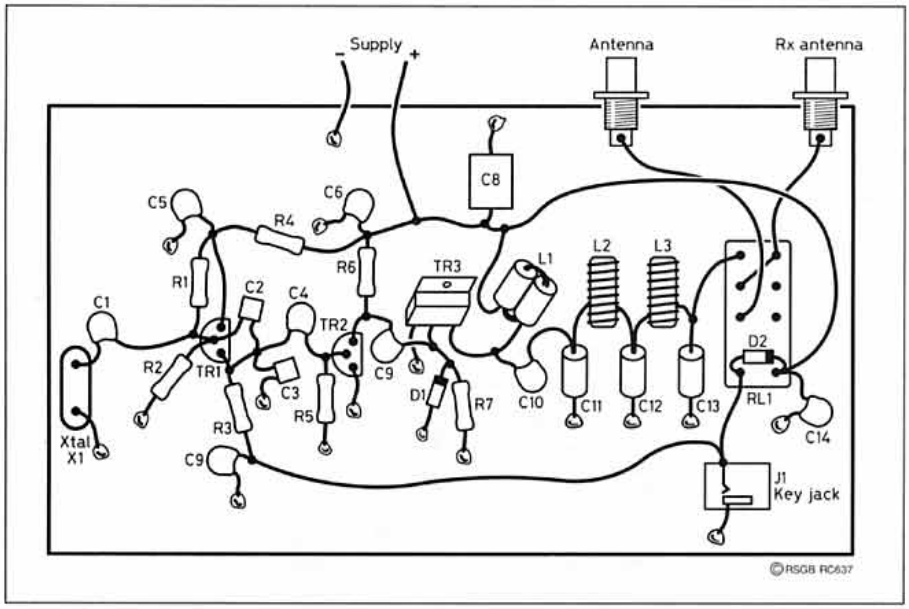


Fig 2: The Nipper 80-metre crystal controlled transmitter, component layout.

COMPONENTS LIST

Resistors

R1	22k
R2	10k
R3, R6	220R
R4	100R
R5, R7	180R

Capacitors

C1, C4, C5, C6, C7, C9, C10, C14	10n ceramic
C2, C3	220pF
C8	4µ7, electrolytic, 25V min
C11, C13	750pF, 25V min
C12	1500pF, 25V min

Inductors

L1	2 x FX1115 with as many turns as possible.
L2, L3	T37-2, 23 turns (see Fig 1 and text).

Semiconductors

D1, D2	1N4148
TR1, TR2	BC183
TR3	VN46

Additional Items

X1	3560 or/and 3579kHz TV crystal, or for frequency required.
J1	3.5mm jack socket

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Buckmaster April 1995 Worldwide Callbook on CD + loads of Amateur radio software etc.		£39.95
Siskin Mini-Pak budget Packet modem, includes ready-made leads, software etc.	~~£69.95~~	£59.95
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IDEAS FROM ABROAD

REPORTED BY
ERWIN DAVID, G4LQI

The aim of **the biggest Dutch radio fleamarket**, at 's Hertogenbosch in March of each year, is the fostering of home construction and experimentation. G4LQI went there to look for items not seen at recent UK rallies.

THIS DUTCH FLEAMARKET differs from those visited in the UK and Germany. To safeguard its traditional character (this was the 20th time at this venue) new radios cannot be exhibited or sold here. The emphasis is on used equipment, including second-hand amateur gear, test equipment and computers as well as vintage broadcast receivers. New instruments, components, tools, books and, surprisingly, antennas are permitted. There also was a large selection of software and CDs.

WYSIWYG

WHAT YOU SEE IS what you get, and the Dutch do not mince words about it. One trader displayed a sign:

NO REFUND OR EXCHANGE WITHOUT WRITTEN GUARANTEE: WE DO NOT GIVE WRITTEN GUARANTEES

Another trader, pen in cheek, threatened to be a spoilsport. On a vintage Marconi-built ex-Admiralty receiver he had placed a sign:

TOUCHING 50 CENTS -
KNOB TWISTING ONE GUILDER

Also interesting from a UK point of view is the restricted possession of transmitting equipment. In the Netherlands, traders must be licenced to hold such gear and buyers must show their licence and have their purchase recorded. CEPT licences are accepted.

THANKS FOR THE MEMORY

DURING WW2, THE NAZI occupiers forced Dutch radio stations to broadcast only news with a German slant. For the 'real' news, we listened to the BBC in English and to its Dutch service, *Radio Oranje*. When the Germans started jamming these broadcasts, MF loop antennas would null out the QRM but later, when interference started coming from several directions at once, the loops were useless.

The BBC also broadcast in the 25, 31, 41 and 49m shortwave bands, of which at least one generally remained Q5 because of skip differences between the sending and jamming stations. However, few home radios covered the HF bands and, eventually, all (registered) radios were confiscated anyway. Building shortwave receivers became the patriotic thing to do and how to do it was learned from *The Boy's Radio Book* by Leonard de Vries. Surprisingly, it remained freely available.

As this book has led directly to my hobby, and my career, I had wanted a copy ever since I retired. I looked for and found one at this fleamarket, but it had just been bought by someone else! Well, there is always next year . . .

TECHNICAL ITEMS

I SAW TWO ANTENNAS which were new to me. A vertically polarized dual-band antenna with broad-side gain from several in-phase vee - shaped telescopic elements is offered by DL4KCJ. [1] The two-element version, **Fig 1**, is said to have a gain of 3dBd on 145 and 6.5dBd on 435MHz; for the four-element version 5.3dBd and 7.6dBd respectively are claimed. The elements resonate on a half-wavelength on VHF and one-and-a-half wavelengths on UHF. The high gain on UHF may be explained by looking at the shape as a rough approximation of Landstorfer's bell-shaped one and a half wavelength 'optimized' dipole [2].

PA3EPS [3] offered what he calls a **3-element HB9CV**, in 145 or 435MHz versions. He stated that this antenna was devised for direction finding [4] and later used [5] in a crossed-beam design for horizontal, vertical and circular polarization [6] from which **Fig 2** was derived. PA3EPS submitted his prototype at the 1994 antenna test day in Meppel [7] where it was found to have a forward gain of 6.2dBd and a F/B ratio of 12dB. That gain figure is good but I believe the F/B capable of improvement.

NOTES

[1] DL4KCJ, SMB Elektronik, Mainzerstrasse 186, D-53179 Bonn-Mehlem, tel 0049 228 858686, fax 0049 228 858570.

[2] IEE Conference Publication No 169, pp 132-141, summarized by G3VA in *Technical Topics, RadCom* 12/82.

[3] EPS Antennas, Hengelosestraat 91, NL-7572BN Oldenzaal, tel and fax 0031-5410 20829.

[4] N van Eikema Hommes, NL-5005, 'Improved HB9CV antenna for 2m', *Electron* (NL) 1/76.

[5] G J Slieker, PE0CJS, 'The extended crossed HB9CV antenna, *CQ-PA* (NL).

[6] *Radio Communication Handbook*, 6th edition RSGB, p 13.25ff.

[7] The Meppel antenna range and test method was described in *Eurotek* 9/92 and is based on techniques recommended by Dr Wayne Overbeck, N6NB, in the *ARRL Antenna Compendium*. ♦

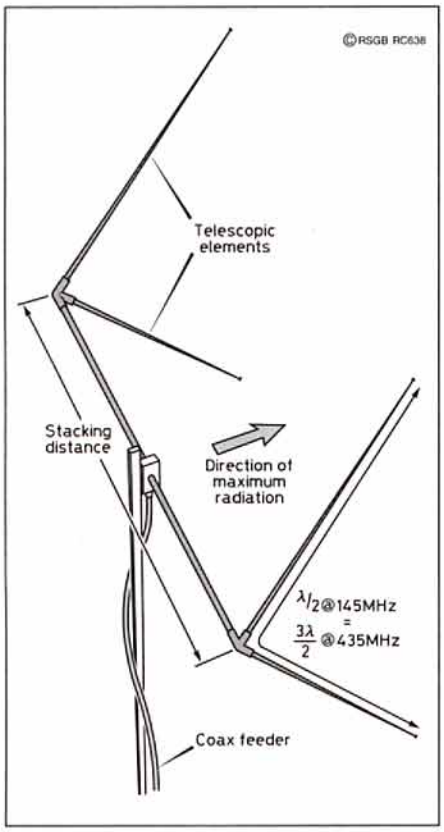

Fig 1: DL4KCJs antenna uses vee-shaped dipoles resonant on both 145 and 435MHz and giving extra gain and F/B ratio on UHF. Versions with two or four elements in phase are available.

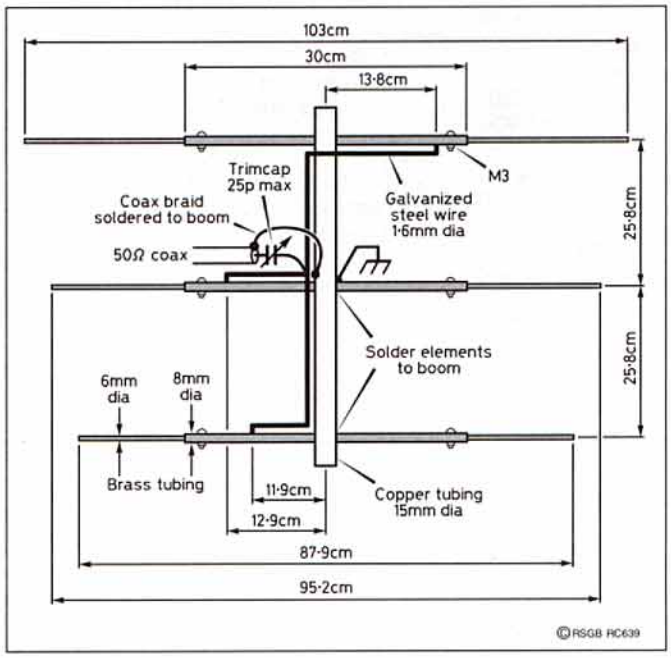

Fig 2: PA3EPS offers 145 and 435MHz versions of a '3-element HB9CV'.

PRECISE COAX LENGTHS

HOW DO I CUT several pieces of coaxial cable precisely to the same electrical length?

IT HAD TO HAPPEN; this item was already well under way when May *RadCom* arrived with that interesting article by Bob Whelan, G3PJT on phased vertical antennas. Bob covered some of the same ground as I had intended to, so I've revised this to complement his article.

The need for identical lengths of coax arises whenever you need to feed two antennas together, or make a coaxial balun or a phasing network for a directional array or for circular polarization. Usually you need a precise number of electrical half-wavelengths or quarter-wavelengths. The physical lengths of cable required can be anything from say 53m (an electrical half-wavelength on Top Band) down to 40mm, an electrical quarter-wave for 1.3GHz. Whatever the wavelength, the obvious answer - "use a ruler" - doesn't always work. Even if you know the velocity factor of the cable in question, it's often difficult to measure an accurate length, especially if your steel tape is as flexible as the cable itself. Moreover, the velocity factor of the cable may well vary slightly from the catalogue value, so the whole problem isn't quite as straightforward as it seems.

The method that G3PJT described has been published before in many places, with some variations according to the frequency involved. It allows you to cut coaxial cable to a precise number of electrical half or quarter-wavelengths, regardless of the physical length involved. For a long length, you don't even need to uncoil the roll.

Begin by putting a plug on one end. Then connect the cable to a T-adaptor between the VSWR meter and a dummy load (**Fig 1**). The VSWR meter is fed from your transmitter, at sufficiently low power that the transmitter won't be damaged by strange load impedances. One or two watts is usually plenty. Without the cable connected at the T, the VSWR meter 'sees' the matched dummy load, so the indicated VSWR should be very low. If you connect a random length of cable at the T, its reactance appears in shunt across the dummy load and the VSWR will rise. The exception is when the shunt reactance at the end of the cable is very high, almost as high as if the cable were unplugged. This only happens in two circumstances: when the cable is an exact electrical half-wave long and open-circuited at the far end; or when it is an exact electrical quarter-wave long and shorted at the far end. The situation repeats itself every half-wavelength with the open-circuited

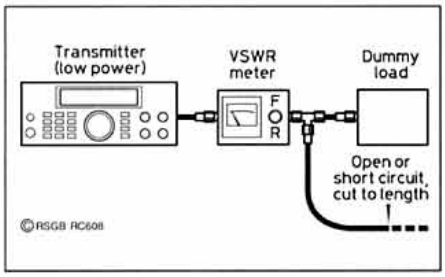

Fig 1: Simple technique for cutting coaxial cable to a precise multiple of an electrical half or quarter-wavelength. Trim the end of the cable to show minimum VSWR.

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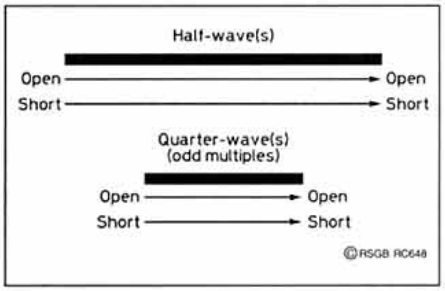


Fig 2: (a) An electrical half-wave (or any multiple) shows the same impedance at its far end. (b) An electrical quarter-wave (or any odd multiple) shows the 'opposite' impedance at its far end.

cable, and for odd numbers of quarter-wavelengths with shorted cable (**Fig 2**).

Let's take the half-wave example first. All you have to do is plug in an over-length cable, and snip short lengths off the open-circuited end until the 'reflected' reading on the VSWR meter falls back to zero. And there you have an exact electrical half-wavelength.

WHAT IF I cut off too much?

THERE ARE THREE possibilities here. One is to start again with another cable, using the first length for guidance, and make sure to cut off shorter pieces next time! For UHF cables you can even file or grind the end away, taking care to remove any loose copper.

The second possibility is to move your transmitter a few percent lower in frequency, and when you find you've cut off too much for that longer wavelength, move back up to the frequency you first thought of. (This is a legitimate and very worthwhile reason to modify a general-coverage transceiver so that it can be used as a signal source outside of the amateur bands. It's not illegal to use such a device *into a dummy load.*) The third possibility is that the exact length actually doesn't matter, as I'll explain later.

Returning to the quarter-wave case, which was what G3PJT needed, you have to progressively short-circuit the cable, which is not as easy as just snipping an open-circuited end. Rather than strip and twist the inner and outer conductors together each time you cut the cable, a quick way to explore is to short the cable by pushing in a large, sharp pin (an old-fashioned hatpin is ideal). If you're careful, this won't significantly damage the cable, so long as you remember to waterproof any extra pinpricks that you made beyond the final cut. The pin won't provide a very accurate short-circuit at VHF/UHF, so you'll still need to strip the cable for the last few cuts to find the exact length. With these techniques and a little patience you can easily cut a cable to within 1% of the nearest electrical quarter or half-wavelength, regardless of the overall electrical length of the cable. If you need something different than an exact quarter or half-wave, calculate the frequency at which the length you need is resonant in either of those two modes, and carry on from there.

The accuracy of these techniques will depend on the your dummy load and VSWR meter, but generally it will be very good indeed. I mentioned earlier that the exact length of the cable may not matter. The reason for this is that when you're cutting two or more cables to the same length for use in a phasing harness, it's much more important for all the lengths to be identical than to be accurately resonant. When you fit connectors to the cut ends, just take care to treat each cable the same. Use a ruler to measure how much you strip off the outer and inner conductors (instead of 'eyeballing' it like you usually do) and you'll finish up with a very accurately matched set of cables. When measuring-up to fit the plug, you may also be able to compensate for having cut one cable a little too short.

Looking ahead, it pays to cut one more matched cable than you need right now, and not fit a second connector to the most accurate length. Instead, store it away unused in the loft, in case you ever need to cut a matched replacement length because sooner or later you're going to need to. If it isn't the rain that does damage to the cables outside, it'll probably be the lawnmower.

If your cables are reasonably short, as they will be at VHF/UHF, G0RUZ offers a quicker method of cutting the additional cables to the same length as the first. The reference cable measured using the set-up in Fig 1 already has a connector fitted, so find a piece of suitable metal tubing and slip the reference

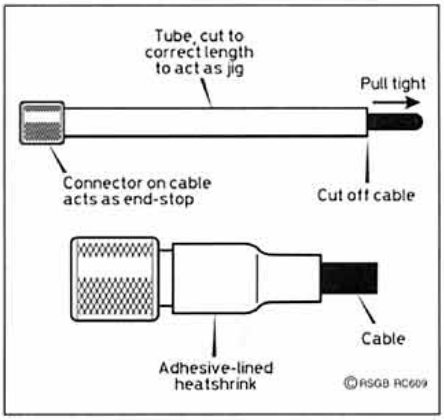


Fig 3: A simple jig for cutting more pieces to cable to the same length. Use adhesive-lined heatshrink sleeving to seal the cable to the plug.

IF YOU HAVE NEW QUESTIONS, or any comments to add to this month's column, I'd be very pleased to hear from you by mail, packet or E-mail (see head of column). But please remember that I can **only** answer questions through this column, so they need to be on topics of **general** interest.

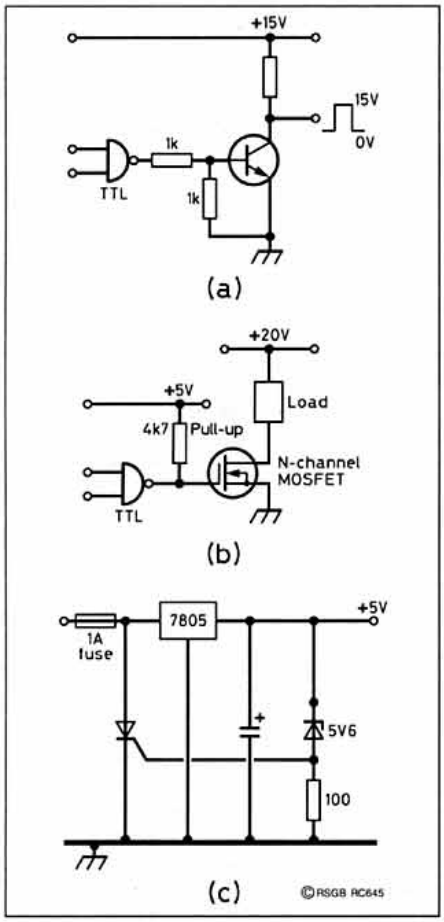


Fig 4: Corrected circuits from Fig 1 last month: (a) and (b) TTL interfacing; (c) Power supply crowbar.

cable inside until the connector butts against the far end. Then use long-nosed pliers to pull the reference cable tight, and trim the tubing to be flush with the cut end. You now have a simple jig for cutting all the rest of the cables (**Fig 3**). Slide in another length of cable with a connector already fitted, pull the connector up tight against the far end of the tube and cut the free end of the cable flush with the end of the tube. Then do the same for all the other pieces. Checking these newly-cut cables by the electrical method showed that they were all very close to the correct electrical length. Despite production variations in velocity factor, you can be quite confident that good-quality cable will not vary between short pieces cut from the same original batch.

A good way to waterproof and strengthen the joint between a connector and its cable is to use adhesive-lined heatshrink sleeving. The 19mm size (Farnell 143-715) will slip over either an N plug or a PL259 and shrink down firmly onto both the connector and the URM67/RG213 cable. The 18mm size (RS/Electromail 157-3824) will slip over a PL259, but remember to put the sleeving on the cable before fitting an N plug. When you apply the heat gun, the hot-melt adhesive inside the sleeving gives a firmer fixing and a waterproof seal between the cable and the plug.

CIRCUIT ERROR ANSWERS

HERE ARE THE ANSWERS to the five 'bad circuits' from The Art of Electronics, *shown last month in Figs a-e.*

CIRCUITS (a) and (b) are failed attempts to interface a TTL logic output to a switching transistor. The bipolar circuit in (a) overloads the TTL device because its 3.5V logic-high output is shorted to ground by the transistor's base-emitter diode. That circuit needs a series resistor to limit the output current into the transistor base, and preferably also a resistor from base to ground to help the transistor turn off. **Fig 4a** shows typical values.

The circuit in (b) won't work because an N-channel JFET is the wrong type of FET. The logic-high TTL output will forward-bias the gate-source diode, leading to the same problems as circuit (a); and when the TTL output goes to its logic-low potential of a fraction of a volt, that kind of FET won't switch off. The right FET for this circuit is an enhancement-mode N-channel MOSFET, which won't turn on until the gate voltage rises to +2V or more. Since TTL's minimum guaranteed logic-high voltage is only 2.4V, it may be necessary to use an external 'pull-up' resistor connected to the +5V TTL supply rail (**Fig 4b**). *The Art of Electronics* (see my mini-review in last month's column) has an excellent section on interfacing between different logic families and other external devices.

Circuit (c) is a disastrous attempt to get a minus 15V regulated supply from the positive output of the bridge rectifier. The less said about that, the better!

Circuit (d) is a simple drawing or wiring error - the non-inverting (+) and inverting (-) inputs of the op-amp are transposed. Depending on what happens at the input when supply voltage is first applied, this circuit will 'latch up' with its output either fully positive or fully negative, and won't do anything else.

Circuit (e) is supposed to be a 'crowbar' circuit to protect downstream components from a failure in the 7805 regulator leading to excessive voltage. It uses the right components, but in the wrong places. When excessive output voltage makes the 5.6V zener conduct and triggers the SCR, the intention is to blow a fuse in the input supply to the voltage regulator. **Fig 4c** outlines how such a 'crowbar' overvoltage protection circuit should be wired, and there's more on this topic in the *In Practice* columns for November 1993 and January 1994.

If any of these circuits still seem obscure to you, take a look at *The Art of Electronics*. It's a big and expensive book, and some of it is quite advanced; but when you do need to look up something about general electronics you can be pretty sure it's there. *The Art of Electronics* sits on my bookshelf right next to the 1995 *ARRL Handbook*. While this classic title can vary considerably in its editorial approach between one annual edition and the next, this year's totally revised edition clearly has 'a mission to explain'. It's an excellent up-to-date reference book about all aspects of amateur radio.

AUTOMATIC LEVEL CONTROL

How does ALC work?

ALC STANDS FOR Automatic Level Control, and is a way of preventing excessive RF drive to the PA stages of your transmitter. By 'excessive' I mean a level of drive which will cause either distortion of SSB signals, increased levels of harmonics or physical damage to the final stages. **Fig 5** shows the basic concept. It's a feedback control system very much like the AGC in your receiver. A DC control signal is derived from either the input or the output of the final amplifier, and fed back into the exciter to reduce the gain somewhere in the low-level stages. In the case of SSB or keyed CW the ALC signal is varying, so the time-constants in the ALC loop are designed to react quickly to the highest output signal and then hold the required ALC level for some time afterwards. Usually ALC is threshold-activated, which means that no ALC is applied until the output signals exceed a certain threshold level in the ALC detector. The result of all this is that no matter how loud you shout into the microphone, the RF output cannot exceed the level set by the ALC loop. Nonetheless, there are limits to the effectiveness of ALC, as outlined later.

Another use for the ALC loop is to reduce the drive level when a detector at the output of the transmitter senses an unacceptably high VSWR. Although this feature is not shown in Fig 5, it is very commonly used to avoid damage to solid-state final amplifiers.

All modern HF and VHF multimode transceivers have an internal ALC system, often linked to the RF POWER control. This front-panel control introduces a constant DC bias into the ALC system to permanently reduce the level of drive. However, many transceivers also have an input for an ALC signal from an external power amplifier.

To understand what kind of external ALC signal is required, we need to dip into history. The first ALC circuits date back to HF exciters using valves, and it was very convenient to control the gain of an amplifier stage in the exciter by applying a few volts of negative bias to its control grid. Linear amplifiers following these exciters were designed to produce a suitable ALC signal, so 'a few volts negative' became an industry standard. Today, the valve exciters have been replaced by solid-state transceivers, but people tend to keep the same HF linear amplifiers. As a result, the EXT ALC inputs of modern HF solid-state transceivers still have to accept a

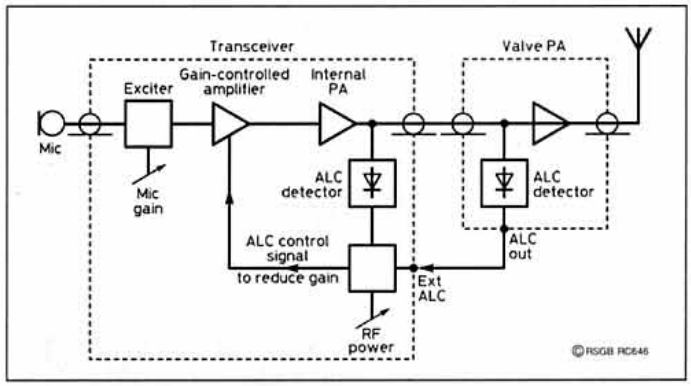


Fig 5: Typical configuration of ALC system in an HF transceiver used with an external PA. ALC detection is at the output for most solid-state PAs, and at the input for most valve PAs.

negative-going voltage, and that standard seems here to stay. Unfortunately there are no comparable industry standards for VHF/UHF transceivers and their add-on linear amplifiers. Although some transceivers may have an EXT ALC input, ALC outputs from either solid-state 'bricks' or valve PAs are quite rare. To ensure that the ALC signal from the final amplifier will always control the ALC loop, the transceiver's own ALC circuit is usually designed to react more readily to an external input than to its own internal ALC detector.

Fig 6 shows some typical ALC detectors for HF linear amplifiers using valves. The detector is normally located at the input rather than the output of a valve PA to provide some protection to the control grid. **Fig 6a** is a very basic diode rectifier fed from the RF input via a capacitive divider. C1 and C2 are proportioned to provide the correct level of negative rectified DC. This circuit has the major drawback that there is some ALC action at all but the very lowest drive levels - in other words, ALC is acting all the time, which isn't really what we want. **Fig 6b** is an improved circuit that is very common (give or take the usual minor variations on diode RF detector circuits). The potential divider R1-R2 is fed from a convenient positive supply, and is wired to reverse-bias the RF detector diode D1. There is no ALC output at all until the peak RF signal is large enough to overcome this reverse bias, after which the ALC signal goes increasingly negative. The component values are chosen to provide a healthy ALC voltage well before there is any risk of damage to the valve.

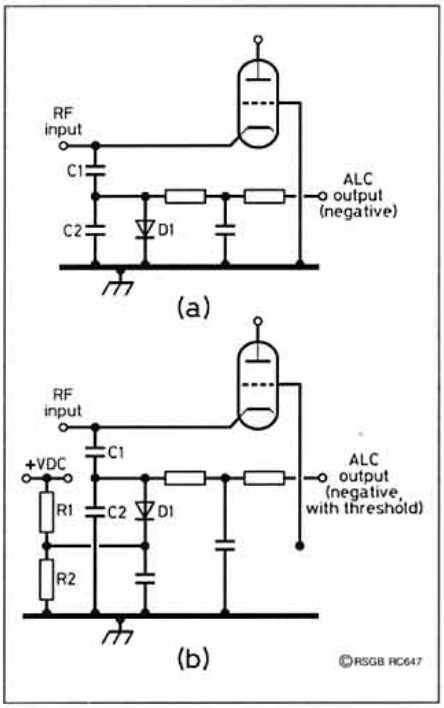


Fig 6: Typical ALC detector circuits. (a) Simplest circuit without threshold. (b) R1-R2 provides a threshold below which there is no ALC output. Unmarked components are mainly for RF bypassing.

MISUSE OF ALC

ALC IS NOT INTENDED as a form of speech processing, or to correct grossly excessive levels of drive. Remember that it's a feedback system, and it can only begin to react after the final is being overdriven. Each time this happens, there will always be a brief moment before the ALC loop 'catches hold' and reduces the drive. These spikes of overdrive can cause severe sideband splatter and may even damage the external PA.

When the transmitter is working properly, the ALC should be operating only on speech peaks - not all the time. The output power of the transceiver needs to be broadly compatible with the drive power requirements of the external linear. For example, a typical '100W' HF transceiver driving a linear requiring 50-70W for full output will be nicely controlled by an industry-standard ALC feedback signal from the linear. When your MIC GAIN control is set correctly, the ALC meter on the transceiver should just pop-up occasionally on speech peaks. However, if you are using speech processing in the transceiver, the drive level spends a lot of time quite close to its peak value, so there may be only a narrow range between no ALC action and almost full-time ALC. If so, you must turn down the output of the speech processor until the ALC hardly ever operates. Used that way, it's the speech processor that primarily determines your maximum RF output level, with the ALC acting only as a 'long-stop' to catch any transient peaks. ♦

RSGB National Mobile Rally

SUNDAY 6 AUGUST 1995 OPEN 10AM

WOBURN ABBEY, BEDFORDSHIRE

HOW TO GET TO THE WOBURN RALLY

Via the M1 - leave the M1 from north or south at junction 13, not 12 as signposted, and then follow signposts through Husborne 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.

(COACH PARK SITE AVAILABLE)

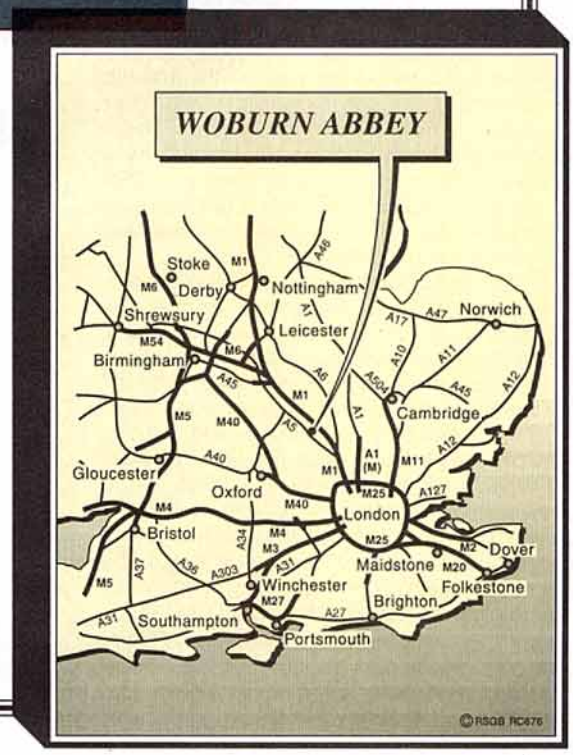
- **LARGE TRADE EXHIBITION (23,000 SQ FT)**
- **LARGE RSGB BOOKSTALL**
- **ALL UNDER COVER**

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 £5 per vehicle (including passengers), or £2.50 per vehicle (with single occupant).

Limited overnight caravan stay at £4 per night. Booking forms available from Norman Miller, G3MVV.

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

All enquiries regarding this event should be made to Norman Miller, G3MVV, 180 Warley Hill, Brentwood, Essex, CM14 5HF; Tel:01277 225563.



RADCOM TECHNICAL FEATURE

Practical Antenna Polar Diagrams

by George Brown, BSc, PhD, CEng, FIEE, G1VCY*

WE ALL STUDY the polar diagrams of the antennas offered by various manufacturers, either before purchase, or purely as a matter of general interest. Some offer theoretical diagrams, some offer none at all. When we install a commercially-available or home-brew beam, have we any idea of how it really performs in situ? This article sets out to answer that question in general terms, and to provide information to enable anyone interested to make similar measurements.

INTRODUCTION

A POLAR DIAGRAM IS a graphical representation of how an antenna should perform, both for transmitting and receiving. All antennas have directional properties, and these are usually presented graphically in the plane of the electric field and in the plane of the magnetic field. For a horizontally-polarised VHF or UHF beam, it is the polar diagram in the electric field plane (ie horizontally) that illustrates the directivity of the beam, showing where the minor lobes lie in relation to the main lobe, and their relative magnitudes.

Antenna manufacturers' sales literature often includes a polar diagram. A buyer should check this literature to find out exactly how the polar diagram was derived. More often than not, the polar diagram shown is the output of an obliging computer program which has been fed with the element geometry. Diagrams obtained in this way are theoretically perfect, and relate to the real antenna in free space, at infinite distances from all obstructions (sometimes including the ground). If you are in the enviable situation that your QTH satisfies these criteria, and the diagram itself pleases you, the antenna will, upon erection, perform as predicted.

For those of us in less favourable locations, a theoretical polar diagram can be used only as a guide. The presence of the ground, surrounding buildings, and the elevation of the antenna will all serve to modify the expected performance. This article does *not* set out to measure beamwidths and front-to-back ratios, but to plot the effective polar diagram of an antenna in normal use, a diagram calibrated, not in decibels, but in S-meter units. In this way, the user has a more meaningful grasp of how the strength of a given station varies, depending upon the orientation of the beam relative to it. The method also shows how the radiation pattern is changed by altering the elevation of the antenna.

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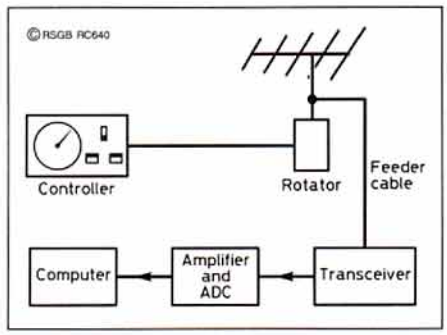

Fig 1: The system used for plotting polar diagrams

METHOD

THE MEASUREMENT technique is to use a signal, on the two-metre band, from a local amateur station or repeater, and to measure the signal strength while rotating the antenna under test. A Kenwood TS-790E was used as the field strength measuring instrument.

The measurements are made simply (and without opening the case) because pin six of the ACC2 socket provides an analogue voltage proportional to the S-meter reading. Other transceivers may provide the same facility; if not, connection is usually possible to the terminals of the S-meter itself, once the case has been removed.

A word of warning about interfacing the S-meter with either a DC amplifier or with the ADC itself. Some S-meters may not have one grounded connection, in which case a connection to any external circuitry which is grounded will be potentially dangerous! It is strongly advised that the circuit diagram be carefully studied if you are going to open the case and make direct connection to the meter itself. Connection to a DIN-plug on the back of a transceiver is inherently safer, but the manual should be checked first as a matter of good working practice, to ascertain the output voltage range and output impedance. Finally, if you are contemplating either approach on a transceiver which is still under the manufacturer's warranty, remember that this warranty will be invalidated should you have an accident which damages the transceiver.

This S-meter voltage (with DC amplification where necessary) is then fed to a simple Analogue-to-Digital Converter (ADC) interface to an IBM PC or clone. Such converters can be built by those suitably inclined; otherwise, the author can recommend the ADC-10 from Pico Technology [1]. This unit is contained inside a 25-way D shell which plugs into the printer port and operates with the software provided. Drivers, supplied for Pascal, C and BASIC, enable the user to write his own progam to display and store the S-meter output.

The only other practical information needed is the time for the antenna rotator to cover 360°. The rotation time for the Kenpro KR-400RC used in these tests is 62 seconds. You will also need the co-operation from a nearby amateur radio station to produce a carrier. As the antenna rotates from one end stop to the other, the progam samples the ADC output and displays it on the screen in real time, producing a polar diagram in 62 seconds! This can subsequently be scaled and smoothed to produce the final printed evidence. A block diagram of the system is shown in **Fig 1**.

PROGRAM REQUIREMENTS

THESE ARE relatively simple.

SAMPLING RATE

Once the period of the antenna rotator has been determined, the progam must sample the S-meter voltage at regular time (and hence, at regular angular) intervals. For example, if the sampling rate is r per second, and the rotator period is t seconds, then the angle traversed between samples is θ, given by:

$$\theta = \frac{1}{r \times t} \times 360^{\circ}$$

As in all measurements, a compromise is involved here: if the sampling rate is too low,

SOFTWARE

COMPUTER PROGRAMS implementing the polar diagram plotting and smoothing routines are available from the author. These executable programs require a PC or PC-compatible computer with 640kB of RAM, capable of 640 x 480-pixel graphics. Send a formatted 720kB or 1.44MB 3.5in disk (in a suitable mailer), with a cheque for £12.00 to the author at the address given at the foot of this page.

A polar diagram plotting program that uses the ADC-10 is included with the disk of software accompanying the *Antenna Compendium* Vol 4 [2]. This software is documented BASIC source code.

the polar diagram will not show sharp nulls accurately; if it is too fast, there is a danger of exceeding the speed at which the ADC will operate, or there may be speed limitations imposed by an interpreter or compiler. The author finds a sampling rate of 10 per second using a compiled progam quite adequate. Using the above formula, with a rotator period of 62 seconds, the angle θ is 0.58°.

ANALOGUE SETUP

If interfaces such as the Pico Technology ADC-10 are being used, a simple DC amplifier (using an LM741-type operational amplifier) is needed, in order that the full 8-bit dynamic range of 5V is utilised, given the 200mV or so coming from the transceiver.

With this amplifier in operation, the beam is turned to give the maximum indication on the S-meter when receiving the carrier of a local amateur station. The measurements are made on FM, so the operator of the local station can talk to you (and identify his transmission) while you are plotting your curve. The S-meter must *not* be showing an end-stop reading, so the local station output power needs to be adjusted until this condition is met. Then set the amplifier to give just less than 5V output; a simple bar graph display can be incorporated into the program to facilitate this adjustment. Once this is done, rotate the antenna to one of its limits, and you are ready to begin.

PROGAM OPERATION

Some method must be devised to start the plotting program and the rotator at the same time. My program produces a bleep to indicate when the rotator should be started. An option is usefully provided to enable the program to handle clockwise and anti-clockwise rotation. The plotting routine in the program moves the angular position of the displayed point in sympathy with the calculated position of the rotator, and the sampled voltage from the ADC determines the distance of the plotted point from the display centre, giving a real-time polar display to 0.58° resolution. Such a display is shown in **Fig 2**. While this is happening, each sampled ADC voltage is put into an array and, at the end of the program, this array can be saved to disc for future processing of the curve.

INTERPRETING THE POLAR DIAGRAM

The graticule provided in Fig 2 needs some explanation, since it is one of the novel aspects of this display. The angular divisions are 30°, and require no further explanation. The circular markings represent normal S-meter readings. Working from the centre outwards, there are circles for S1, S2, S3, S4, S5, S6, S7, S8, S9, S9+10dB, S9+20dB and S9+30dB, the outside ring representing S9+35dB.

Without wishing to become involved in the differences between S-meter behaviour on SSB and on FM (see almost any Peter Hart Review in *RadCom*), the following valid points can be made. Firstly, for this particular antenna, the range of signal strengths produced lies between S9+35dB at the maximum, and S1 at the two deepest 'nulls'. Secondly, the curve is highly asymmetrical; this will be shown later to be due mainly to the limited elevation of the beam.

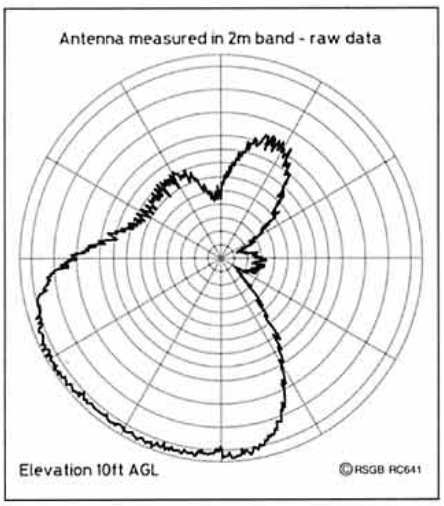

Fig 2: Two-metre antenna polar diagram, elevation 10ft, raw data.

PROCESSING THE RESULTS

Essentially, all the information needed is contained in Fig 2. However, the data can be presented in a rather more attractive way by 'smoothing out' the noise in the curve as plotted. The simplest way of doing this is to use the individual results, stored in the disc file, in a second program which produces a controllable, smoothed output. The results of using this software smoothing are shown by comparing the unsmoothed result in Fig 2 with the smoothed result in **Fig 3**.

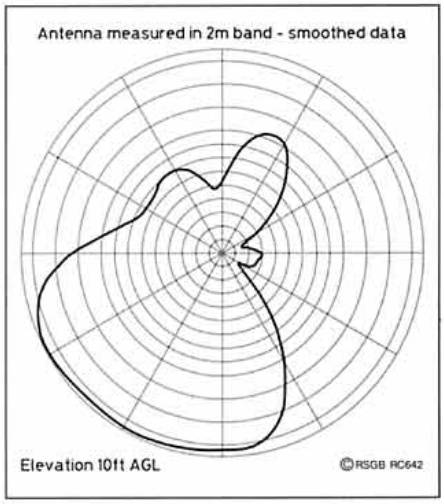

Fig 3: Two-metre antenna polar diagram, elevation 10ft, smoothed data.

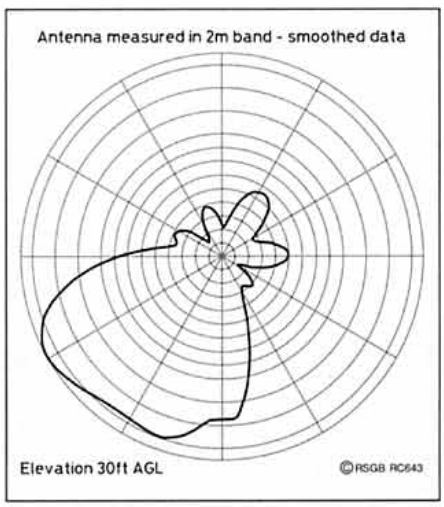

Fig 4: Two-metre antenna polar diagram, elevation 30ft, smoothed data.

GENERAL POINTS

THE PLOT OF Fig 3 shows marked asymmetry, and there is evidence of three minor lobes at angles of about 25°, 92° and 320° relative to due north. The lobe at the back of the beam produces a signal about 2dB over S9. These measurements were made at a beam elevation of about 10ft, ie with the mast retracted. The obvious distortion of the polar diagram is almost certainly due to reflections from the ground and from nearby buildings.

With the beam at about 30ft, the smoothed plot of **Fig 4** was produced. This is quite different. There is now evidence of five minor lobes, and some readers may argue that there are traces of the major lobe having three components, in which case the polar diagram would have one main lobe and seven minor lobes. The lobe at the back of the beam now produces a signal between S5 and S6. Since all received signals are larger at 30ft elevation than they are at 10ft, the co-operating station needs to turn down his RF output until the S-meter reading is not saturated. The two plots of Fig 3 and Fig 4 have been normalised to give exactly the same maximum reading. The greater the elevation, the closer the displayed curve would be to the maker's claims.

Finally, when choosing a station to provide your source of RF, don't choose a station that is *too close*. Choose a station several miles away. He must be far enough away to be in what is called the 'far field' region of your antenna, but not so far away that the polarization of his signals should be significantly changed. The influence of reflections on the diagram can be estimated by repeating the measurements using signals from a different station, preferably on a heading that differs by at least 60° from the first.

For the author's tests in Essex, a station in the north of Kent was used.

Many readers will be looking at the diagrams and wondering what sort of antenna produced them, since they do not characterise what might be termed the 'Contester's Dream'. It is a multi-band design, hence the odd shape of the horizontal radiation pattern. It is for such antennas (and all home-brew designs) that this type of measuring system comes into its own.

NOTES

[1] ADC-10 £49.00, from Pico Technology Ltd, Broadway House, 149 - 151 St Neots Road, Hardwick, Cabridge CB3 7QJ, tel 01954 211716.

[2] *The Antenna Compendium* Vol 4, (ARRL), see RSGB books, page 89. ♦

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• See also Icom's display on the inside back cover.

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RF SWITCHING DIODES CONTROVERSY

AN APRIL *TT* item ('RF Switching and Tuning Diodes', p63) drew attention to the series of QST articles by Dr Ulrich Rohde, KA2WEU/DJ2LR - recognised world-wide as a leading professional expert in HF receiver design - supplemented in a separate *QST* article by measurements made by Tom Thomson, WOIWJ. These highlighted the shortcomings of some general purpose PN and PIN diodes used for RF switching in some popular amateur HF transceivers. Dr Rohde pointed out that the second order IMD performance could be improved in such cases by substitution of PIN diodes specifically designed for RF purposes, and in particular recommended the Hewlett Packard HP5082-3081.

In part three of his article (*QST*, July 1994) Dr Rohde gave results of measurements made on unmodified and modified transceivers - an ICOM IC-765, a Yaesu FT890 and a Kenwood TS-50. These measurements suggested significant improvements in second and third order IMD performance. He also evaluated the second-order IMD performance of several other transceivers including Collins KWM-390, TS950SDX, Ten-Tec OMNI VI (second order intercept +43dBm) and FT-1000. But he did not appear to specify which, if any, of this second group would or would not benefit from diode replacement. As a result of his findings, ARRL decided that they would include second-order IMD measurements in future *QST* Equipment Reviews.

This is highlighted in a letter from Dave Farn, G4HRY, who reported the unfortunate experience of G4KPT who replaced all 40 switching diodes in his Omni VI only to find that sensitivity had suffered. As a result, G4HRY has now replaced the original diodes and believes that "the validity of the original articles is brought into doubt". G4HRY, however, was not able to check on second-order IMD performance before or aftermodification.

While I am sure that Dr Rohde could provide a convincing reply to his criticisms, G4HRY does make some comments that deserve to be aired. He writes:

"G4KPT read the *QST* articles and as the OMNI VI was specifically mentioned, decided to replace all of the switching diodes in the transceiver front end with HP5082-3081 types. He obtained 40 diodes at a cost of about £1 each and did the modification. This is where the trouble started.

Freq	BA482	HP3081	BAT85	1N4148	BA439	IN4007
1.8MHz	-0.6	-0.9				
3.5MHz	-0.4	-0.75				
7MHz	-0.2	-0.7	-0.6	-0.7	-0.55	-0.5
10MHz	-0.3	-0.8				
14MHz	-0.2	-0.9				
18MHz	-0.3	-0.8				
21MHz	-0.3	-0.9				
24.5MHz	-0.3	-0.9				
28MHz	-0.3	-0.98	-0.6	-0.7	-0.55	-0.5

Table 1: G4HRY's measurements of diode loss (dB) in 50Ω transmission path with 10mA forward bias.

"After completing the modification he noticed that the receiver seemed a little deaf and the S-meter could no longer be calibrated. Thinking he had introduced a fault, he brought the set to me for a second opinion. Tests showed the sensitivity was at least 5dB worse than another OMNI VI. I could not find a hard fault with the rig and decided that, as it had worked well before modification, it was probably something to do with the new diodes. To prove this I built the small jig shown in **Fig 1**. This enabled diode through-loss to be measured in a 50Ω system which can be equated to diode RF resistance. The jig was used to measure the BA482 types and then the HP PIN diodes. Out of interest, I took a quick look at a variety of other general purpose diodes and this indicated that in respect of through-loss, the original diodes selected by Ten-Tec were a good choice: see **Table 1**.

"The receive RF path of the OMNI VI includes 5 diodes before the 1st RF amplifier. The first two isolate the transmitter from the receiver input, the next two select the appropriate bandpass filter. The final diode in the chain feeds the input of the RF amplifier in the Tx/Rx switching. The RF amplifier has 54 parallel-connected FETs with an input impedance of about 22Ω. The losses at this point would therefore be higher than those measured in 50Ω. Changing the diodes to HP 3091 types had introduced about 4dB additional loss which was clearly not acceptable. G4PKT had also changed diodes on the 1st IF board between the IF roofing filter and the narrow IF filters; this accounted for further losses.

"When all diodes were restored to the original BA482 type normal operation was restored - a task taking days to achieve. I realise that the original purpose of the exercise was to reduce 2nd order effects ascribed to the switching diodes. My existing test equipment introduces more 2nd order products than the diodes. Better isolation is required between the test oscillators and the hybrid combiner and I hope to follow this up soon.

"As a result of this exercise, I came to the following conclusions:

(1) Owners should consider carefully before attacking expensive transceivers. Only consider making modification if technically competent and equipped to measure the results. The actual circuit configuration should be considered to judge the likely effects of a modification. It may prove to induce high losses and will almost certainly effect filter termination impedance's required realignment. Some modern filters have fixed values and therefore performance on receive and transmit could be compromised.

"(2) The validity of the original articles is brought into doubt. If the author did not consider the effect of an extra 4dB of loss inserted before the first mixer, the resulting improvement in intermod performance credited to the use of PIN diodes may be a false assumption. Building a 4dB input attenuator is much cheaper than changing all those diodes!

"(3) Considering specifically the OMNI VI, rather than changing diodes, performance would probably be enhanced by implementing better matching of the 1st mixer. The IF port has no diplexer and the buffer amplifier has only a 20dB return loss at 9MHz. The LO port is fed directly from the LO power amplifier without any attempt at matching. Better filtering at the RF signal input would reduce 2nd order effects."

G4HRY is particularly concerned by the unquestioning faith often put in published articles, including *QST* and *RadCom*. He urges others to follow his own philosophy and become professional sceptics!

In his three-part article, Dr Rohde noted that second-order IMD products change 2dB for every decibel of input-signal change, and appear at frequencies that result from the

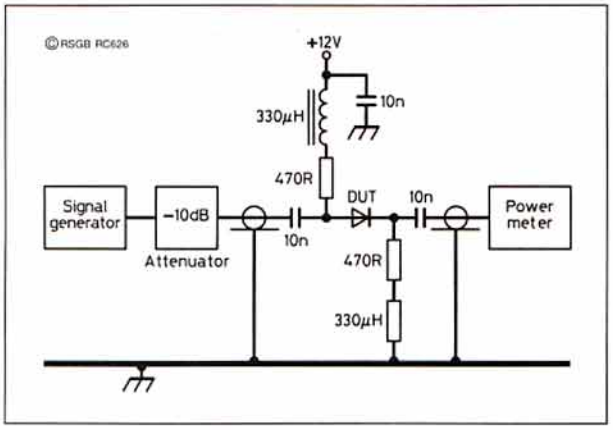

Fig 1: Test set up used by G4HRY to measure the insertion loss of various diodes.

Diode Type	Bias conditions per diode				
	Reverse	0mA	5mA	10mA	20mA
1N4153	75	75	2	1	0.5
MPN3700	70	55	0.1	0.1	0.1
BAR17	75	70	0.3	0.1	0.1
1N4007	35	20	0.1	0.1	0.1

Table 2(a): WOIVJ's Diode Switch insertion loss (dB) at 10MHz

Diode Type	Bias conditions per diode				
	Reverse	0mA	5mA	10mA	20mA
1N4153	>80	>80	18	30	42
MPN3700	>80	80	66	70	72
BAR17	>80	>80	60	70	75
1N4007	>80	40	>80	>80	>80

Table 2(b): diode switch second-order intercept point (IP2) dBm

Diode Type	Bias conditions per diode				
	Reverse	0mA	5mA	10mA	20mA
1N4153	>50	>50	20	30	37
MPN3700	>50	47	>50	>50	>50
BAR17	>50	50	>50	>50	>50
1n4007	>50	35	>50	>50	>50

Table 2(c):diode switch third-order intercept points (IP3), dBm

simple addition and subtraction of input-signal frequencies. His introductory notes on switching diodes were as follows:

"The receiver sections of amateur MF/HF transceivers generally use diode-switched front-end filtering. The switching diodes used have low junction capacitance and can typically handle medium DC levels (10 to 100mA). These characteristics are important because we want these diodes to contribute minimal loss when turned on and leak very little RF when turned off.

"The two-tone, third-order MD dynamic-range testing routinely done to amateur transceivers seems to point up no weakness in these switching diodes. In real life, however, a huge number of signals simultaneously appear at a transceiver's antenna connector. Periodically, their voltages all sum in phase producing, for short durations, enough voltage to change the bias of the diode at the input of the filter in use. This causes intermodulation distortion - generally ,second-order IMD. This is ironic for two reasons: First, this diode-generated IMD generates exactly the interference the filters switched by the diodes are supposed to prevent! Second, amateur radio equipment reviews have long let second-order front-end IMD go unmeasured because we have long assumed that our radios front-end filtering reduces this IMD to a non problem. Later, I will present measurement results that prove that second-order IMD is a very real problem today. (The test jig used by WOIVJ is shown in **Fig 2** with some of the results in **Table 2** - *G3VA*).

"The best way to avoid switching-diode IMD is to switch the filters with relays instead of diodes, and military and commercial gear generally take this approach. Relays are costly, however. A less expensive workaround that is acceptably good for amateur radio equipment is to use diodes - PIN diodes - designed for this application. The two best-known US manufacturers of PIN diodes for this type of low-frequency application are Hewlett-Packard and Alphas Industries. The best diode for the shortwave range is the HP 8052-3081 . . ."

Harry Leeming, G3LLL, was also concerned at the idea of using RF PIN diodes. He writes: "It is all very well testing equipment when new, but how well do the modern Schottky (hot-carrier) diodes stand up in service? Take, for example, the FT75. These have a reputation of being noisy on receive. Indeed, on many samples if you switch in the RF preamp, the noise comes up more than the signal. Check the dozen diodes around the input to the band pass filters and the Tx/Rx switching and up to half of them are likely to be found leaky. (They are ISS97 Schottky-barrier diodes).

"Despite their being 'yesterday's technology' I replace these diodes with IN4148 or similar. The receiver then becomes as good as new, and usually stays that way. I wonder if anyone can suggest modest-priced diodes that are better than the 1N4148 and will stand up in service? Meanwhile, I am unable to detect any difference between a new FT757 and one that has had 1N4148s fitted".

My own feeling is that the experiences of both G4HRY and G3LLL highlight an increasingly serious problem involving modern technology. Without the most advanced (and expensive) laboratory test equipment, it is extremely difficult to evaluate fully the performance of equipment. With equipment which is new, or has been in service for some months, it is hard to assess how important these laboratory measurements are likely to prove in normal operational use on the amateur bands. In the case of HF receivers/transceivers, the 'old technology' of variable-capacitor tuned RF filtering with mechanical wavechange switching did have significant advantages over current broadband 'low-pass' or even sub-octave bandpass filtering. However, the 'old technology' was not without its own problems and costs.

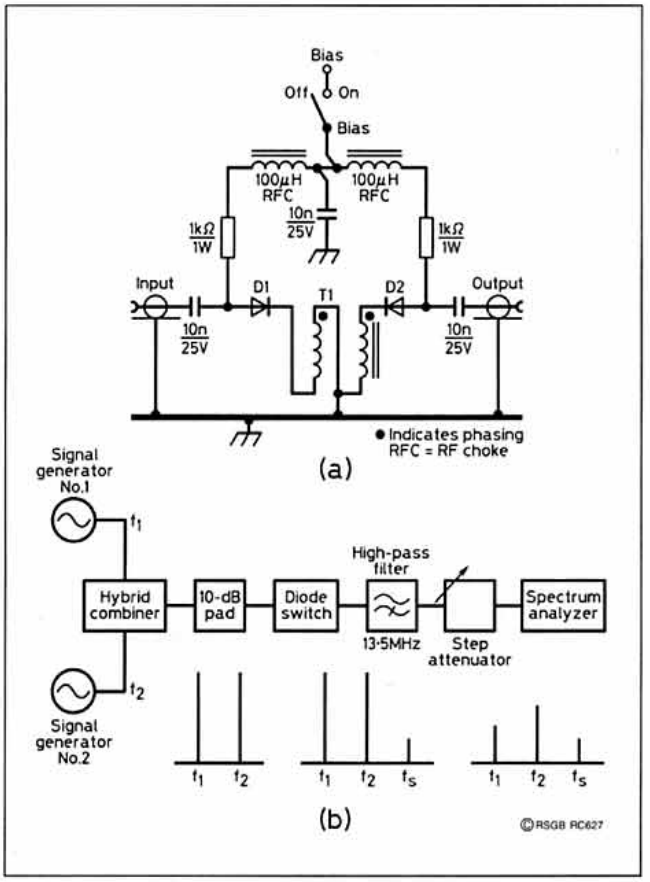

Fig 2: (a) The diode switch used by WOIVJ for his tests. D1 and D2, the diodes under test, included PN and PIN (power-rectifier and RF-specified) types. Capacitors are disc or monolithic ceramics. T1 consists of 11 bifiliar turns of Nr28 enamelled wire on an FT-37-43 ferrite toroidal form; the inductance of each winding is about 50uH. (b) Set up for measuring the diode switch's second - and third-order intercept points.

L, T & OTHER MATCHING NETWORKS

RECENT ITEMS IN *TT* and elsewhere have drawn attention to the power losses that can be involved in otherwise effective ATU matching networks. It was therefore interesting to read a three-part article, 'An L of a Network' by Graham Thornton, VK3IY, (*Amateur Radio*, March, April and May 1995) and subtitled 'all you wanted to know about the L-Match, but were afraid to ask'. This is introduced as follows:

"The simplest solution to the problem of transforming a complex load impedance into a pure resistance is an L network. It consists of just two components, a variable capacitor and an adjustable inductor. Since load resistance and load reactance are independent variables, it is not possible to have any practical ATU with less than two adjustments. The L-Match (**Figs 3** and **4**) may be seen as the progenitor of all other ATUs. Correctly applied, it can deal with a wide range of impedances: this may come as a surprise, considering its simplicity. It is par-

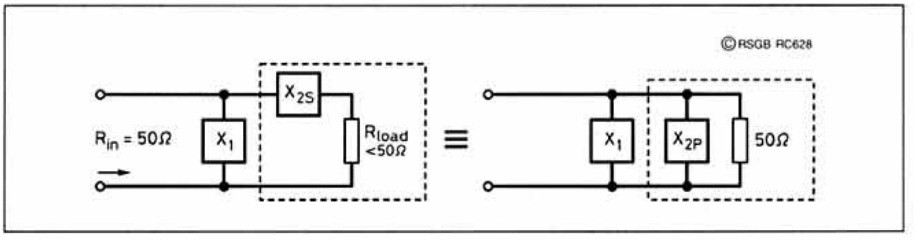

Fig 3: Practical circuit (left) and parallel equivalent circuit for the low-resistance-output case of an L network. Note that, for resonance, X1 and X2P must be conjugate reactors; ie same magnitude but opposite sign. If the concepts implicit in this and the following diagrams can be grasped, VK3IY considers that your understanding of the topic, and ATUs in general, will take a giant leap forward!

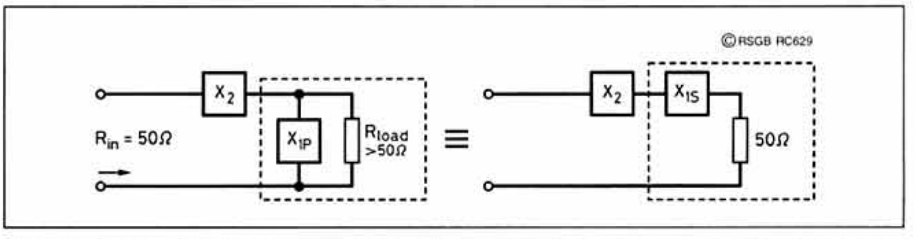

Fig 4: Practical circuit (left) and series equivalent circuit for the high resistance output case. Note that, for resonance, X2 and X1S must be conjugate reactors.

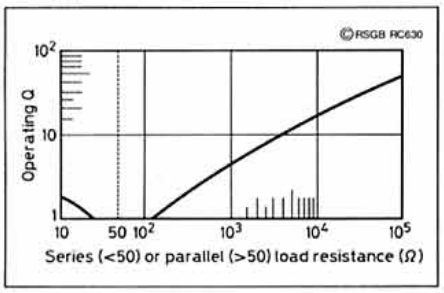

Fig 5: Network systems operating Q.

ticularly useful for unbalanced loads such as random wires, yacht backstays and mobile whips.

"The design, if done from first principles, involves quite a lot of mathematical manipulation which, at best, is tedious and, for some amateurs, utterly forbidding. This article seeks to simplify matters by using a graphical approach. After all, we are designing an adjustable device and high precision is not justified. Ball park answers are all we need. The same approach is used to investigate operating Q, insertion loss and the peak voltage developed across the capacitor. As we shall see, each load problem has at least two solutions; sometimes four . . ."

Part 3 discusses power rating, system operating Q, insertion loss and a general round-up. In view of current interest, the following extract is confined largely to VK31Y's comments on insertion loss. He writes:

"There is a price to pay for everything and some energy is wasted within the network itself. This treatment assumes that the loss is confined to the inductor. We can draw some consolation from the fact that low operating Q implies low losses.

"In general, the insertion loss depends both on the unloaded Q of the inductor and on the operating Q. The greater the former quantity, the lower the loss will be. The converse applies to the latter. If no means of measuring Q is to hand, we need to indulge in some 'guestimation' . . . If the inductor is of considerable diameter, not too long in proportion and substantially air-spaced we can take a stab at a Q of 150. If it's wound on a somewhat lossy former, we can claim a Q of about 50. For cases in between, let's say 100 (these perhaps err on the conservative case).

"The efficiency of the circuit may be expressed as:

$$\eta = \frac{Q_{UNLOADED} - Q_{LOADED}}{Q_{LOADED}}$$

and insertion loss as:

$$10\text{Log}_{10}\,\eta \text{ dB}$$

"**Fig 5** shows a plot of insertion loss for the three values of Q. This shows that for most practical situations, the loss (being less than 1dB) is insignificant. It also means (providing the network operating Q is reasonably low: see **Fig 6**) we don't have to be too fussy about the design of the inductor, with respect to efficiency."

In his concluding summary, VK3IY stresses that the L-match can cover a wide range of load impedances with high efficiency and has one of the greatest virtues possible in any equipment - simplicity. Lack of harmonic rejection is the one deficiency. He notes that more complex ATUs, if they can be reduced to equivalent L networks, may be handled by the procedures given for the L-network. Since his treatment assumes some knowledge of the load impedance that is to be matched, he provides a thumb-nail sketch of the values likely to be met in practice:

"For antennas shorter than a quarter-wave, the resistive component varies from about 5Ω to 36Ω at resonance. Its reactance may be as high as 1000Ω capacitive (the thinner the element the greater the reactance), diminishing to zero as resonance is approached. A counterpoise, if mostly horizontal and not too high, would have the same reactance but zero resistance. Simply add its reactance (algebraically) to that of the antenna. Longer antennas have an inductive reactance increasing from a few hundred ohms to some 2000Ω or so for a thin antenna, and perhaps 500Ω or so for a thick one. Resistance over this range may vary from about 40Ω just above resonance to some thousands at half wave resonance."

The item 'The T-network antenna tuner' in the April *TT*, illustrated a 'vernier-type' switched inductor as an alternative to a more expensive roller-coaster inductor (incidentally in Fig 9 the rotor arm of the 12-position switch should of course be shown as connected to contact '10'). Some alternative means of providing an adjustable inductance have been reported by readers.

Jesper Fogh Bang, 0Z1XB, writes: "I have made a number of experiments with antenna tuners over the years. One of my favourites is the Z-match but the network tuner is also very useful. I do however, find the conventionally switched inductor too coarse in its use at certain settings and a roller coaster inductor is rather expensive. During my experiments I have found that a variable capacitor in series with a coil acts smoothly as a roller coaster inductor: **Fig 7**. It may be that losses increase

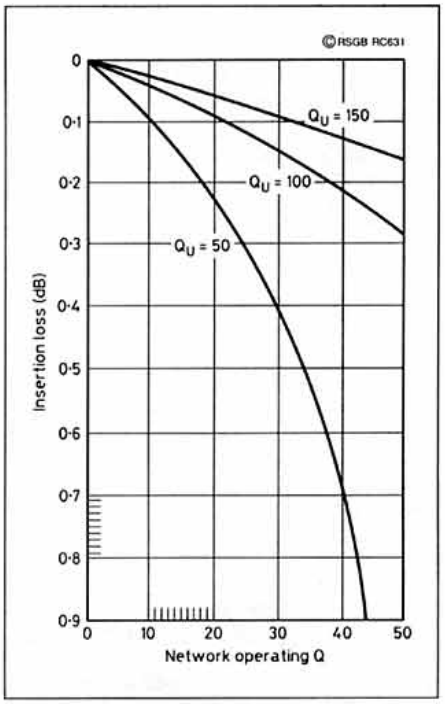

Fig 6: Insertion loss for three values of unloaded, showing that the inductance Q has insignificant effect at low network operating Q but becomes increasingly important at higher operating Q.

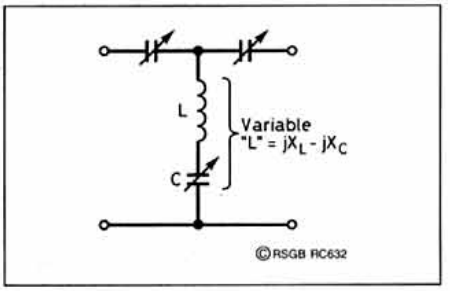

Fig 7: OZ1XB finds that a variable capacitor in series with a coil acts smoothly as a roller coaster inductor.

with this setup, but you sometimes have to sacrifice something for convenience (and money)!"

John Roscoe, G4QK, writes: "The roller-coaster is expensive, and switches are - well, switches. What's wrong with the good old 'variometer'. Twiddling one coil inside another with a range of L1 + L2 to L1 - L2 should be enough and there are no contacts to worry about. They were used in both British and American (and German) rigs in WW2; and I came back from Egypt with a nice ceramic one 'liberated' from a crashed Italian plane.

There were in fact several *TT* items during 1987 on variometers including an illustration of one of the excellent Lorenz units used in German FuG10 aircraft transmitters (*TT Scrapbook*, 1985-89, p202). Undoubtedly these were extremely good devices for antenna matching networks. But not to be found in many junk boxes, and it would probably not be easy to make one as good as the WW2 devices. Having written that, someone may come up with an easy-to-build variometer design!

CUTTING THE COSTS OF AMATEUR RADIO

THOSE OF US WHO entered the hobby of Amateur Radio as schoolboys in the days when pocket money was doled out in pence rather than pounds were able to get on the air by using components salvaged from thrown-out broadcast receivers plus a few additional short-wave components marketed by Eddystone, Raymart, Formo etc. Quartz crystals (about ten shillings [50p] including the frequency calibration certificates required by the Post Office licensing authority), mains transformers and power triodes such as the Taylor T-20 required careful planning of birthday and Christmas presents! But the total cost of entry for amplitude-modulation and CW could be kept to under about £10.

Then came the era of war-surplus equipment from which could be salvaged high-grade components, valves and metal cabinets that must have cost the Government many pounds but often available for a few shillings or at most a few pounds. It was not until the rapid spread of SSB, in the 1950s and early 1960s, that the shortcomings of receivers and transmitters designed for AM/CW began to drive up costs.

But in the late 1960s, HF SSB/CW factory-built receivers and transceivers, many Japanese built but marketed under such names as Sommerkamp and Lafayette, were beginning to appear at relatively attractive prices. For

example, in 1967 the 'Lafayette' HA-500 amateur-band receiver with two mechanical filters, product detector and crystal calibrator cost some 42 guineas (for the younger generation a guinea was 21 shillings, ie £1.05p), a Sommerkamp (Yaesu) FT-100 150-watt PEP transceiver £180, the British firm of KW Electronics ((Rowley Shears', G8KW, company) offered the KW2000A complete with PSU for £220, while Heathkit had the single-band HWl2 (3.5MHz) and HW32 (14MHz) 200-watt PEP-input SSB kits for £53.10s (assembled £68).

With a wire antenna slung over a tree-branch, costing shillings rather than pounds, and with 'deferred terms' usually available an effective HF station could he put together without negotiating a second mortgage! The schoolboy could still find plenty of salvaged components for recycling, or acquire, at reasonable cost, the separate transmitters and receivers discarded by others in the rush to transceivers, and then to solid-state with bells and whistles at prices beginning to break through the £1000 barrier.

Costs continued to climb not only because of rapid inflation but also because of the extra cost of building in the extra WARC HF bands (10, 18 and 24MHz), international authorisation of 1.8MHz, frequency synthesizers with memories, digital read-out, automatic ATUs etc etc. While it can be argued, fairly, that in terms of real-money costs, HF transceivers remain excellent value for money, current prices certainly impose a formidable 'cost of entry' barrier for the newcomer to HF. The only alternative is for the operator to be confined to QRP CW operation from simple equipment assembled from the many available kits. But, even as a dedicated CW enthusiast, I have to admit that the attraction for most newcomers is SSB at reasonably high power. Enthusiasm for QRP CW tends to come later.

With the addition of l44MHz to Class B licences (originally introduced in 1964 for 420MHz and above), the majority entered amateur radio via VHF. HF began to be regarded by newcomers as a high-cost no-go area. But with the aid of surface-mount technology, more bands and modes are being crammed into VHF/UHF hand-helds. The result is that entry costs even into VHF-only are no longer within the reach of many would-be amateurs.

In the October issue of *Practical Wireless*, Tex Swann, G1TEX has an article "VHF Operation – It needn't cost an arm and a leg" in which he suggests some ways of getting going above HF cheaply, including the use of second-hand, surplus, home-brew and modification of commercial equipment. He introduces these ideas as: "I've heard it said that amateur radio is becoming less of a hobby for two reasons. The first is that electronics is seen with 'chuck-a-chip-at-it' as the answer to all problems. The second comes partly from the first; users are becoming sated with bells and whistles. This year's model has a tambourine and triangle; but beware the engineers are working on a full orchestra in next year's model! With £2500 to spend anyone can start a hobby. But merely throwing money at an interest doesn't maintain the pastime. A hobby needs to spur us on to other things, not just deeper into the bank manager's profits."

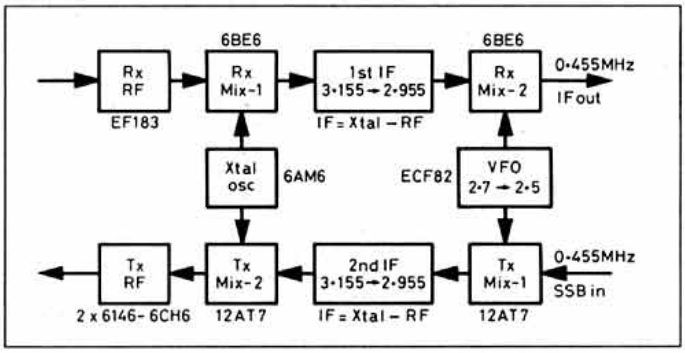

Fig 8: The basic mixing system of the 1960s KW2000 series of HF transceivers that still provide a low-cost entry into 100 watt HF SSB/CW operation.

Stephen Dyke, G3ROZ, has similar beliefs about HF. He writes: "To be a radio amateur you first pass the RAE and (if you like HF) the Morse test; then visit the local 'emporium', come away with a load of expensive kit courtesy of the finance company, install it and start collecting cards for DXCC. Right? Wrong! That hobby is *not* 'amateur radio', it is 'radio DX-ing' and always has been. This is not to say radio DXing is not fun, or that those who concentrate solely on it are somehow 'lesser men' . . . . they are not . . . . but it is a different hobby requiring different skills and different equipment."

G3ROZ has put on record a detailed description of a project designed to put a newcomer or Class B licensee firmly on the road to 'amateur radio' not with a QRP rig but with 100 watts SSB/CW on all amateur frequencies (including WARC bands) from 1.8 to 29MHz for a total outlay of under £250 and, if followed careful, results in a transceiver which should be readily disposable for more than it cost if or when the owner later succumbs to the appeal of radio DXing with bells and whistles all-solid-state gear.

G3ROZ writes: "How is it done? In the 1960s, KW Electronics produced the '2000' series of SSB/HF valved transceivers which sold widely in the UK and elsewhere. The 2000, 2000A and 2000B versions all covered eleven 200kHz segments within the (then) six HF bands. This gave all of the 1.8MHz, 3.5MHz, 7MHz and 14MHz bands, plus 400kHz on 21MHz (two segments, 21,000-21,200 and 21,300-21,500kHz) and 600kHz on 28MHz (28,000-28,200, 28,400-28,600 and 28,600-28,800kHz).

"These transceivers are wonderful from an amateur radio point of view. Virtually all of the components were standard and nearly all (apart from the Japanese-made mechanical filter) are still to be found in the RS (Radiospares) and Maplin catalogues, including wavechange switch wafers. The design is basic, parts are accessible and available. They can be aligned or repaired by an amateur with the testgear found in the average shack. They are everything an amateur's transceiver should be . . . . everything the current offerings from the Japanese firms are not!

As the owner of an unmodified KW2000A, I would not wax quite as lyrical about these transceivers as G3ROZ, but they certainly represent a useful means of getting on HF at relatively low cost. Mine, in nearly new condition cost me £l40 about ten years ago and has proved extremely good value for money, despite one or two annoying features, such as the trouble-prone tuning drive (changed on the KW2000B).

G3ROZ states: "Buy a KW2000A or B (two 6146 output valves) if you want 100 watts of RF; the KW2000 (single 6146) if satisfied with 50 watts. They are frequently offered in Members Ads [see pp 66, 67 –*Ed*] or elsewhere for about £160 in good order, or as low as about £40 in grim as-seen, not-working condition. Don't pay more than £160 even if a few owners who read these notes decide they should ask more . . . . these rigs are now around 30 years old and will usually need work to get them back to their original specification. Newcomers may value advice from an experienced amateur when contemplating purchase."

G3ROZ's description of how to correct the effects of old age and then to modify the equipment to cover the three WARC bands, to complete coverage of 21MHz, and, if required, all or at least more of the 28MHz band occupies some 20 pages of typescript, ten diagrams and several tables, 33 sheets in all, and clearly cannot be squeezed into *TT*. **Fig 8** shows the basic mixing processes of the KW2000 series.

In brief, to extend frequency coverage, he adds an external crystal-controlled oscillator with eleven switch positions. The main bandswitch on the modified rig covers the 200kHz segments immediately above: 1.8, 3.5, 3.7, 7.0, 10.0, 14.0, 14.2, 18.0, 21.0, 24.8 and 28.0MHz. Then, with this bandswitch turned to the 21.0 or 28.0 positions, the external oscillator gives 21.2, 21.4, 28.2, 28.4, 28.6, 28.8MHz segments (as implemented by G3ROZ) but extendable to 29.0, 29.2, 29.4, 29.6MHz positions for those prepared to purchase the four additional crystals at about £5.50p each. G3ROZ recommends McKnight Fordahl Ltd, from whom he has had excellent service, as a source of crystals.

It is perhaps worth pointing out, that the transceiver can be modified to cover all HF CW-only frequencies without an external oscillator, by fitting just three new crystals and three new anode resonating coils for the existing crystal oscillator in place of phone segments. But be warned that the audio-tone keying system of these transceivers results in a distinctive, although not really unpleasant, note (modifications for carrier keying were described some years ago in *Short-Wave Magazine*).

From Fig 8, it can be seen that the output of the crystal oscillator for any band is the lower segment edge frequency plus 3.155MHz; however the crystal itself is half the output frequency on all bands above and including 14MHz; thus 13.155MHz is required for 10MHz but 10.5775MHz for 18.0MHz and 13.9775MHz for 24.8MHz. G3ROZ (13 Abbey Grove, Sandy, Beds SGl9 lQP) may be prepared to supply photocopies of the 33 A4 sheets of his detailed blow-by-blow description for those prepared to pay the copying costs etc.

The ease and low cost of repair of these old

COHN CRYSTAL LADDER FILTERS

A NUMBER OF MULTI-POLE high-performance SSB and CW crystal ladder filters were described in *TT*, July 1994, pp56-67 and January 1994, pp38-39. These used the Chebyshev approach optimised to provide the best stopband attenuation (steepest skirt response), together with the design coefficients needed to determine the value of the coupling capacitors. There are, however, other possible approaches. These include Butterworth bandpass filters designed to provide optimum flatness at the centre frequency, or the compromise Cohn ('minimum-loss') filter which is optimised to exhibit minimum insertion less when built with practical resonators, while preserving a reasonably good shape factor. Cohn filters, with LC tuned circuits, have been used in the front-ends of a number of receiver projects, including the G3PDM high-performance, hybrid (valve/semiconductor) receiver of the 1970s.

Some years ago, Wes Hayward, W7ZOI, in 'Designing and Building Simple Crystal Filters' (*QST*, July 1987, pp24-29), showed how simple and inexpensive crystal filters that perform well at a fraction of the cost of commercial crystal lattice filters could be implemented using the Cohn approach, without involving capacitor coefficients. All capacitors are of equal value and all crystals have the same resonant frequency.

Although for purists this approach may seem a compromise, one notes that Cohn ladder crystal filters now figure frequently in home-brew receiver projects. The Cohn filters are more symmetrical, making them very attractive for narrow-band CW filters but not ruling out their use as SSB filters. As W7ZOI put it: "The Cohn filter, crystal

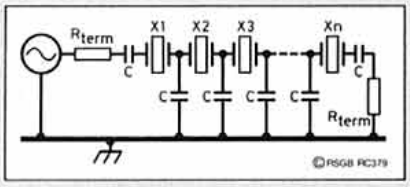

Fig 9: Generalised Cohn crystal ladder filter suitable for empirical construction. Note all capacitors are of equal value. All crystals have the same resonant frequency.

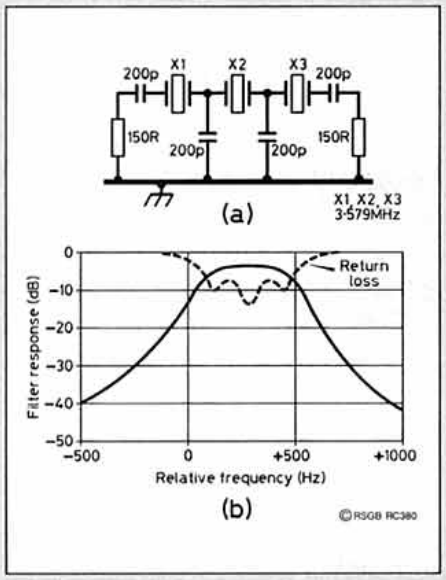

Fig 10. (a) Simple Cohn CW filter using three 3.579 NTSC colour-burst crystals. (b) Frequency response. Dotted input return loss indicates the quality of the impedance match.

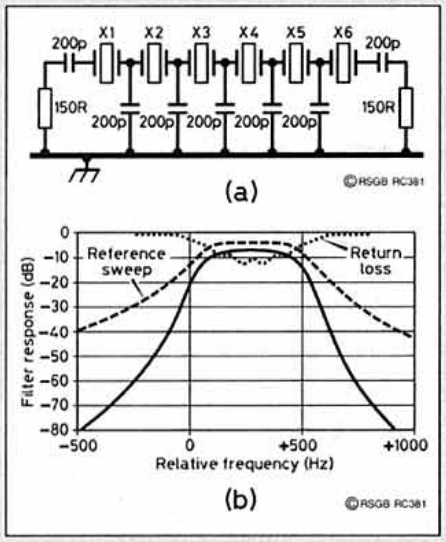

Fig 11: (a) Cohn filter with six 3.579MHz crystals. (b) Frequency response. The reference sweep shows the response of the three-crystal filter and this indicates the improved characteristics at the expense of some extra insertion loss.

or otherwise, is a rather simple circuit. This becomes more apparent when we view the filter using coupled-resonator methods. All normalised coupling coefficients are equal. Moreover, the normalised end-section loaded-Q factor is the reciprocal of the coupling coefficient.

The practical simplification becomes apparent if we examine the generalised crystal filter shown in **Fig 9**. All capacitors are of equal value. The shunt capacitors are coupling elements while the series capacitors in the filter end sections are included to properly tune the circuit.

"The 1987 *QST* article included practical designs based on three (**Fig 10**), four and six (**Fig 11**) crystals implemented either by W7ZOI Bruce Williams, WA6IVC ARRL. They used low-cost American NTSC colour-burst 3.579mhz crystals or rather more expensive 4.000Mhz crystals. Terminating impedances for practical CW filters at these frequencies may be as low as 50Ω and 200 - to 500Ω for SSB filters. **Fig 12** shows one way in which a filter can be incorporated in a receiver so that terminations can be arranged to achieve the proper filter shapes.

Michael O'Beirne, G8MOB notes early professional use of a two-crystal (Chebyshev) ladder filter in the Racal RA1772 (a 1972 design) receiver. A 1.4MHz filter is placed at the input to the 1.4MHz amplifier which feeds the product detectors, and used to select the 7th harmonic from the 200kHz square wave spectrum.

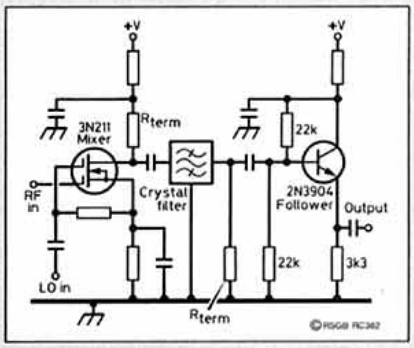

Fig 12: Showing one method of connecting a ladder filter, with correct terminations, in a receiver

valve equipments was brought home to me recently when a fault developed in the receiver section of my KW2000A (I tend to use it as a receiver-only) with no signals but a curious random clicking. With a little patience this was traced to the 6BE6 first mixer having gone 'soft' and ionized, a very unusual fault for a small-signal valve. Although my junk box contains no 6BE6s, these (and all the other valve-types used in the KW2000-series) are still readily available from such firms as Langrex Supplies Ltd of Croydon. A new valve plugged in restored the receiver to full life at a total cost of £1.50 for the valve, plus £1 p&p and 44p VAT. Not a bad repair bill for ten years use! The few other faults have been repaired at no cost with junk-box components. ♦

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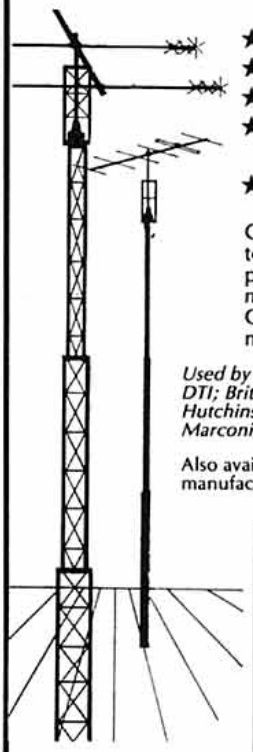

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UR95, 2.3mm, 50 ohm, mini nylon coax	30p/m		
UR111, 2.3mm, 75 ohm PTFE mini coax	40p/m		
UR57, 10.3mm, 75 ohm low loss coax	70p/m		
UR70, 6mm dia, 75 ohm transmitting coax	30p/m		
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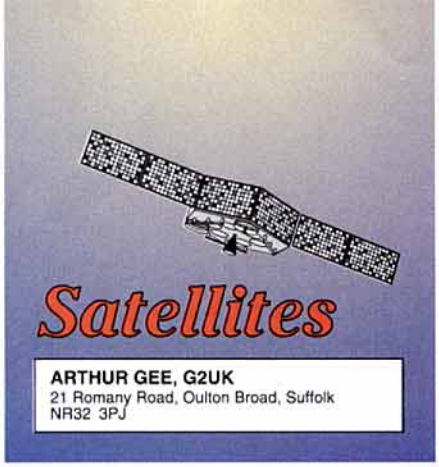


Satellites

ARTHUR GEE, G2UK
21 Romany Road, Oulton Broad, Suffolk NR32 3PJ

ONE OF THE pleasures of writing this column is that I receive a number of newsletters, magazines and letters (pictured right) from other satellite groups and enthusiasts. One I receive regularly is the *Belamsat Newsletter* edited by Pat Hamptaux, ON1HKP, from the Belgium Satellite Group. The last issue included a reprint from the American *AMSAT Journal*, by Philip Chien, KC4YER, on an aspect of the Phase 3D project rarely described.

This relates to the cleanroom required for spacecraft construction. Hitachi Data Systems donated a 20ft x 20ft building for conversion to a cleanroom which would provide a clean environment with less than 10,000 five micron particles per cubic foot of air. The building's roof has eight fans with extremely fine filters. Two doors enclose an 'airlock'. Inside the cleanroom strict 'contamination rules' are enforced with no food, drink or smoking allowed. Gloves and caps must be worn and boots must pass through a scrubber to remove dirt. A team of about 10 volunteers spent over 1000 hours assembling this facility in time for the space-frame's arrival from the Weber State University.

Integration of the sub-assemblies into the space-frame required some legal formalities because they came from several countries including Germany, Japan, Finland, United Kingdom, Slovenia, the Czech Republic, Belgium, Hungary and South Africa, all of which constructed items for the Phase 3D project. They had to be cleared through the Foreign Trade Zone facility at the Orlando International Airport.

LAUNCH FAILURE PROBE

MUCH SPECULATION has arisen in the wake of the Techsat and Un-Amsat launch failure. First reports stated that the fault occurred when the launch vehicle exploded, the satellites falling into the sea.

In the April *Oscar News* Richard Limebear, G3RWL, reported that: "Further information about the launch failure is now to hand. Apparently the failure was because the fourth stage did not burn completely so the fifth stage was not triggered, the fourth stage quenched 12 seconds before it was supposed to be exhausted. It is also understood that the debris fell on land, not in the sea, and the landing site is known but if salvage is attempted the components will not be reusable (not surprising after falling about 600km!) Russian authorities are still claiming the Un-Amsat (the so-called Mexican spacecraft) was a Russian satellite which had Mexican participation. Details of this are vague and further verification of ownership would be welcome from anyone who knows.

"The third payload was a dummy. I have seen the photographs; it was a plain cylinder. Launch was from a fixed mobile launcher tube which, apparently, erects hydraulically from horizontal to vertical in about 13 seconds. The launch vehicle is then lifted vertically before main motor ignition.

"The Israelis are, I understand, already building two more Techsat-1 class spacecraft; more or less copies of the first one. There is no indication of a replacement launch but it is notable that Russian officials are now saying that there was no clause for financial compensation in the launch agreement. At the launch site, however, Israeli staff were told by Russians that another launch would be provided.

"This information is a collation of data from 4X1AS, Geoff Perry and Reuters whom we thank."

ECLIPSES

MEMBERS WILL have seen Pat Gowen's report on the effect of eclipses on the operating voltages in RS-15 and the intermittent function of its transponder and beacon when the eclipse lasted longer than 15 minutes (*RadCom*, May 1995, page 78). This prompted Vin Thompson, G4ULS, to report on observations he had collated on this phenomenon, specifically the effects on parts of the orbit over the UK rather than the proportion of a whole orbit which was affected by eclipse. Pat's observations warned of possible consequences of successive charge/discharge cycles on the life of the satellite's batteries. He stressed the need to avoid misuse at times when eclipses were occurring and pointed out that the use of excessive power at any time would aggravate the situation.

Enlarging on Pat's observation, Vin stated: "Since the pattern of passes and effects of the solar cycle are quite different in other parts of the World, it is thought inappropriate to give the main report wide circulation. Nevertheless, those of you who are interested in RS-15 may wish to consider the impact in your part of the World."

Vin has circulated a table for the next five years which provides an illustrative summary of the combination of solar cycle/acquisition periods (**Table 1**). Those interested in this topic will find more about it in the April issue of *Oscar News*.

Despite the general view that RS-15 is not providing the good communication facilities expected, reports are coming in of very good contacts from some RS-15 enthusiasts. Among them is Dave Rowan, G4CUO, who has worked 39 USA states. Pat, G3IOR, is also full of praise for its possibilities, having worked a very respectable amount of DX. Its transponder does seem much stronger now, though it does not come up to the strength of the beacon yet. Maybe now that we have not got Techsat and Un-Amsat to distract our attention, more activity will be directed towards RS-15.

Dave feels much of the difficulty with RS-15 is due to QRM from stations running too much power. He says if you listen to the satellite when it is over the USA there is much less interference to it than when it is over Europe.

For those who use an Oscarlocator for their orbital predictions, there is now an overlay for RS-15. Send a £1 coin to AMSAT-UK and you will get one in a tube! ♦

Date (a)	First AOS (b)	Last LOS (b)	Number of passes	Passes Affected	Eclipse Duration (Minutes) 1, 2, 3, 4, 5, 6, 7
1995					
SE	1237	0416	8	4	6, 14, 17, 12
SS	2034	1213	8	2	6, 4
AE	0503	2113	8	0	
WS	1334	0511	8	7	1, 6, 13, 20, 26, 26, 7
1996					
SE	2207	1146	7	4	14, 15, 11, 3
SS	0641	2020	7	0	
AE	1441	0420	7	4	4, 11, 14, 14,
WS	2118	1254	8	5	12, 23, 22, 15, 8
1997					
SE	0658	2036	7	0	
SS	1501	0439	7	0	
AE	2339	1316	7	2	12, 7
WS	0618	2153	8	0	
1998					
SE	1528	0505	7	0	
SS	0008	1345	7	1	4
AE	0815	2152	7	0	
WS	1457	0633	8	7	5, 10, 16, 23, 24, 22, 14
1999					
SE	0044	1422	7	3	9, 9, 4
SS	0853	2231	7	0	
AE	1703	0641	7	0	
WS	0019	1556	8	4	11, 14, 11, 5

Notes:- (a) SE = Spring Equinox, SS = Summer Solstice, AE = Autumn Equinox, WS = Winter Solstice. (b) UTC

Solar Cycle/Acquisition Period relationship produces a repeated coincidence of about three years. In the study, the details of the Acquisition Period at 23 February 1995 were seen to be repeated within 10 minutes and a degree or two of AZ/EL at 7 March 1998.

Table 1: Summary of the combination of solar cycle/acquisition periods prepared by Vin Thompson, G4ULS.

THIS YEAR'S AMSAT-UK colloquium - between 27 and 30 July - will pay special attention to the operation of amateur spacecraft and helping beginners get started. Held at the University of Surrey, Guildford, the event will include the usual series of lectures along with workshop presentations in a fully functioning groundstation.

There will also be the usual social events including a pub quiz, a barbecue and a banquet with cabaret entertainment. Those wishing to attend should send an SASE without delay to AMSAT-UK, London E12 5EQ requesting an application form.

Microwaves

MIKE DIXON, G3PFR
'Woodstock', Gazebank, Norley, Warrington, Cheshire WA6 8LL

SPANNING A DISTANCE of about 205km - mainly over sea path - Simon Freeman, G3LQR, (Woodbridge, Suffolk) made contact with Hans, PA0EHG/P, on the 24GHz band On 23 March 1995. A super-refraction duct which formed under settled anticyclonic weather conditions enabled 5/5, 5/5 reports to be exchanged. PA0EHG's beacon on 24192MHz, at about 210km, was heard by Simon on both 21 and 23 March, with the contact taking place at 2200UTC on the 23rd. This QSO set two new records; a G to PA first for the band and a new UK DX record. Simon's equipment runs 50mW to a 14in (355mm) dish on transmit and a separate receiver fed from a 48in (1.22m) dish, whilst PA0EHG's equipment runs 80mW to a 19in (500mm) dish on both receive and transmit. Hans' signals were also heard by Sam, G4DDK, a little further inland nearer Ipswich, but no two-way contact resulted, Sam's 10mW of narrowband not being sufficient to make it.

However, in the fine, settled weather at the end of April, Sam (running 125mW) made contact with ON6UG/P twice, at 157km and also at 210km, again setting two new records - G to ON first for the band and another UK DX record! At the time of the contact, 10GHz was used as talkback and the 10GHz signals were reported to be so strong as to cause receiver front-end overload! Congratulations to all stations for their magnificent efforts. I expect we'll hear of many more contacts across the North Sea on this fascinating band.

In the last *Microwaves* column (*Radcom*, May 1995, p76), I mentioned that 24048MHz was adopted formally as the IARU Region 1 preferred narrowband operating frequency, within the Amateur Primary part of the band. Charlie, G3WDG, has come back with the news that he knows of no-one in the UK who is building for that frequency. They are, it seems, choosing to stay with the 24192MHz frequency on which most of the nearer European stations work and where, indeed, the G/PA first took place. He also indicated that the RA has issued a licence for a new 24GHz beacon, GB3DUN (Dunstable), on 24192MHz. This appears to stem from the well known 24GHz designs of DB6NT and the preference of German stations for the higher frequency. Had the move to 24048MHz taken place too early, in an unco-ordinated manner, then the recent impressive contacts across the North Sea might not have happened! Nevertheless, I believe that the change will take place, when the time is right. DB6NT has been awarded the IARU Region 1 Medal for his outstanding work as a consequence of his design work on this and all the higher millimetre bands, as well as encouraging much activity.

Charlie and Petra Suckling, G3WDG and G4KGC, have recently set up a 1W 'personal beacon' on 24192MHz and will put it on, by request, for reception trials. Their first tests were with G3UYM/P at 45km, who heard the beacon at good signal strength. Another trial with a DB6NT multiplier module running about 2mW output was also heard well over the same path. Since the first test, optimising the dish has gained about 6dB and tests were carried out to G3LQR and G4DDK, both operating from home. Neither station can hear the beacon under normal conditions, but recent tropo conditions lifted signals to about 20dBn over the 130-140km paths. Signals were up to 25dBn on rain scatter at G3LQR's location. On all occasions when the 24GHz path opened, the Martlesham 10GHz beacon GB3MHX was audible at the Rushden end. This is not normally the case! The beacon has also been heard over a 40km path, to Letchworth, by G3UYM/P, G3PYB/P and G8DKK/P. Charlie commented: "The 50 - 100mW obtainable from the DB6NT technology should be sufficient to make contacts - from home."

G3BNL/P, near Daventry, has also received the beacon at 59++. Charlie reported good progress with the G3WDG009 2.4GHz to 12GHz multiplier/PA, all eight first 'beta' models giving 50-75mW output when carefully tuned. The next generation 'release' is about to be beta tested - incorporating improved tuning! DB6NT PCBs (*DUBUS*) for 24, 47, 76, 145 and 241GHz and a few small offset-feed dishes of the type being used by Charlie and Petra on 24GHz are available, as is a template for a feed horn to suit.

Charlie has also published a set of five short 10/24GHz *Technical Notes* at £1.50 each, the proceeds to go to charity. Cheques should be made payable to the British Heart Foundation. The titles are:

95/1: A fixed-short launcher for use with the DB6NT 24GHz designs.
95/2: Experiences with the DB6NT 12/24GHz multiplier.
95/3: 10 and 24GHz loads and attenuators using lossy rubber.
95/4: A waveguide filter for use with the DB6NT Mk2 24GHz transverter.
95/5: A 3dB hybrid coupler for 10GHz.

Using the latter, Charlie has successfully combined the outputs of two solid-state 10GHz nominal 5W power amplifiers to produce over 9W output (see the item on EME). For details of any of the above, contact the Microwave Committee Components Service, 314A, Newton Road, Rushden, Northants NN10 0SY.

EME ACTIVITY UPDATE

SO FAR THIS YEAR EME activity at G3WDG/G4KGC has been low. WA7CJO has been worked on three occasions, twice in March and once in April. The first of the March contacts took place during a visit from G3LQR and G4DDK and the second used a solid-

RSGB President Clive Trotman, GW4YKL, presents the Windbreakers & Hadrabs Contest Group with the VHF Contests Committee Cup, the G6ZR Memorial Trophy and the Surrey Trophy at the 1995 RSGB VHF Convention. The group had won the 1.3GHz and the 2.3GHz Contests and the Open Section of VHF NFD.

state PA (mentioned above) to get an 'M' report from the USA. Own echoes were described as being quite reasonable as well. The back-to-back splitter/combiner loss amounted to about 0.4dB, and the combined amplifiers were described as "very tame", each biassing up as normal; as when operated individually.

Charlie is working on an improved dish mount (a 10ft length of 6.5in diameter steel piping!) in order to overcome present azimuth restrictions, a fairly major engineering task which he hopes to complete this summer. On the other side of the World, VK2ALU has taken delivery of a 3.4m dish which he intends to use, trailer mounted for his EME work! GM4ISM is currently testing the receive performance of the EME system he is developing and heard Charlie's signals while working WA7CJO on 2 April, at 'M' report, on a 6ft dish with the Moon at near-apogee. When finished, he will have 40W available. The VK3UM Moon prediction/tracking program is highly recommended! On 8 April, Mark, GM4ISM, worked DJ9FJ (0/0), G3WDG and G4KGC (M/M) and WA7CJO (M/M) for three GM 'firsts'. SM7DHN was also heard but not worked. Mark's equipment runs 40W to a 6ft (1.9m) dish with a modified Philips SAT-TV LNB preamp (NF, about 1dB).

Band GHz	Pos	Callsign	Locator	Squares	Countries	Best DX (km)
10	1	G3WDG	IO92RG	46	14	1135
	2	G4KGC	IO92RG	39	14	1135
	3	G4FCD	IO91KX	38	13	1062
	4	G4BRK	IO91DP	31	10	1115
	5	G4BCH/P	IO90JO	25	7	1177*
	6	G8APZ	JO01DO	25	8	1026
	7	G3FYX/P	IO91GI	23	787	
	8	G3KEU/P	IO91GI	22	787	
	9	G3GNR	IO70WT	20	8	819
	10	G4DDK	JO02PA	20	684	
	11	G4LDR	IO91EC	18	1118	
	12	G3BNL	IO92KA	18	1027	
	13	G3JMY	IO81RM	17	1137	
	14	G4KNZ	IO91PJ	17	6	1052
	15	G4MAP	IO82WJ	16	309	
	16	G8DKK	IO91VX	15	5	578
	17	G8KQW/P	IO91GA	15	390	
	18	G3PHO/P	IO93EH	15	4	338
	=19	G8LSD/P	IO90TV	15	4	304
	=19	G3JMB/P	IO90TV	15	4	304
	21	G4PMK	IO93GT	14	958	
	22	G4RFR/P	IO80UU	14	414	
	23	G4JNT	IO91IV	14	4	339
	24	G3UKV	IO82RR	13	6	494
	25	G8AGN/P	IO93EH	12	338	
	26	GW4MAP/P	IO82JG	11	311	
	27	G3NWU	IO94JQ	10	3	433
	28	G3ZME/P	IO82QL	10	270	
	29	G0API	IO80XS	9	405	
	30	G0API/P	IO80UU	8	277	
	31	G3PHO	IO93GJ	4	3	618
	32	G3JMB	IO91WA	4	1	48
	33	G3NWU/P	IO94MJ	3	290	
24	1	G3PHO/P	IO93AD	3	2	126
	2	G4KNZ/P	IO83RO	3		120

* = UK Record

Table 1: Operating Ladder positions for April 1995.

10GHZ FREQUENCIES FACE UNCERTAIN FUTURE

AT THE END OF MARCH, in the wake of the CEPT/ERO DSI Phase II document (mentioned in the May *RadCom* leader), a press notice from the DTI Technology Minister Ian Taylor announced "a new strategy for the use of the radio spectrum". This strategy, it was revealed, would "highlight opportunities for entrepreneurs in the rapidly expanding markets for radio-based products and services". The statement also touched on issues such as digital broadcasting and 'local loop radio services' ie wireless LANS/telephone links. This is possibly a reference to the much hyped 'super-highway', representing yet another sell-off of a limited natural resource!

It is barely two years since the same Government Department was recommending the use of cable or optical fibre techniques for this purpose or, failing that, the use of frequencies in the millimetre bands (above 30GHz). Meanwhile, the CEPT/ERO DSI Phase II recommendation is for a harmonised allocation between 225 and 400MHz. It has become clear that the target for such activities in the UK is 10150 to 10300MHz - right in the middle of one of the most active parts of the much valued 10GHz amateur band! These are the frequencies used for ATV and other wideband activities.

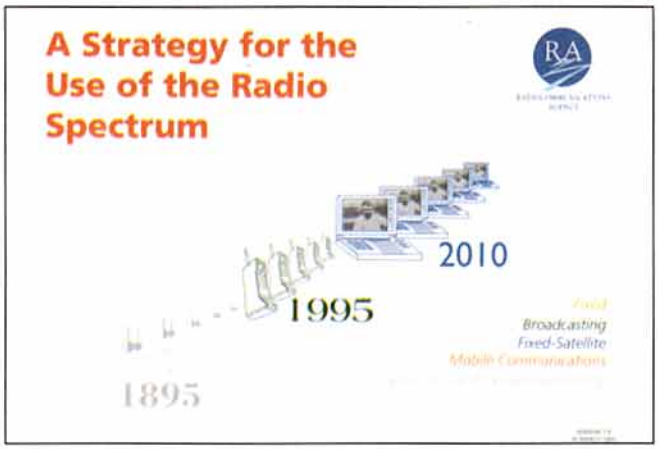
There can be little doubt that cable or optical fibre technology offer a considerable degree of integrity and security, whereas radio data-links offer little security from 'eavesdropping'. I also find it hard to reconcile the CEPT/ERO DSI Phase II statement that "there are currently about three million amateurs in 170 countries, growing at a steady rate of 7% per annum which will lead to a total of 7.5 million in the year 2008" with the wholesale (actual or effective) removal of much of the spectrum presently allocated to amateurs. This proposed loss of the middle of the band should be considered with other proposed spectrum losses. For instance, ATV in the 70cm band is barely possible now and will be effectively stopped if that band is cut down to 6MHz wide (432 - 438MHz). ATV in the 1.3GHz band has problems *vis-a-vis* CAA radar. Elsewhere, the greater part of the 2.3GHz band is also to be given over to wireless LANS (the US appear to want 2.31 to 2.36GHz for digital audio broadcasting and other parts of the band for wireless LANS, while the RA wants 2.400 to 2.460GHz for LANS). Meanwhile, there is ENG/OB (Electronic News Gathering and Outside Broadcast) satellite interest in the 3.4 - 3.6GHz band and the 5.6 to 5.8GHz band and, now, local loop wireless links in the 10GHz band! Many of the proposed UK changes appear to be contrary to the recommendations of the CEPT/ERO.

Even the introduction of Channel 5 TV broadcasting is contrary to the CEPT recommendation that there should be no expansion of analogue channels in band IV/V, specifying that the only way in which the number of channels could be expanded is by using digital modulation!

If, like me, you are seriously concerned with the 'market forces spectrum auction' philosophy of spectrum allocation, you would be well advised to get hold of a copy of the RA document *A Strategy for the Use of the Radio Spectrum* (Version 1, March, 1995), available on request from The Library and Information Service, Radio Communication Agency, Room 605, Waterloo Bridge House, Waterloo Road, London SE1 8UA (tel 0171 215 2072). Read it, digest it and then please make comment to myself and/or Julian Gannaway, G3YGF, both QTHR. Comments on the proposals in this document must reach the RA by 29 September this year but please help us to ensure that we endeavour to put forward a co-ordinated, consensus comment. The logic of adopting this approach is supported by the 'Happenings' column in the March issue of *QST*. The ARRL (who, of course, represent rather more amateurs than we have in the UK - by a factor of nearly 10!) appear to have successfully challenged the 'auction' of spectrum (at 2.3GHz) as opposed to 'allocation' of the spectrum by the FCC.

You might also like to raise the matter with your MP because it seems that the only means that amateurs have to defend their own long-term interests (not just in the UK but World-wide also) is to lobby their elected representatives as American amateurs obviously have!

Perhaps we are perceived to have too much spectrum available - certainly the amateur UHF and microwave bands (even some of the VHF bands!) bands may appear to be quiet, but then so do many of the Primary user bands when viewed with a spectrum analyser!

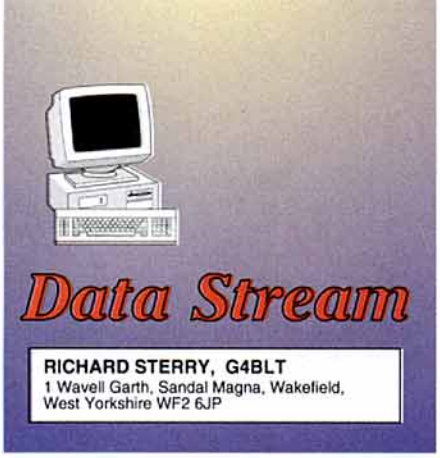


The document *A Strategy for the Use of the Radio Spectrum* is available from the Radiocommunication Agency (see '10GHz Frequencies Face Uncertain Future' for details).

THE LADDERS

TABLE 1 GIVES THE current positions (as at early April) in the All Time Squares and Countries DX Ladder on the 10 and 24GHz bands. My thanks to the *Microwave Newsletter* editors for providing me with this information. There is no 1995 Operating Ladder as yet!

● In the last *Microwaves* Column (*Radcom*, May 1995, p76) the two photographs relating to the 'West Country Activity' item were inadvertently switched. As a result, they were positioned above each other's captions. Our apologies to readers and to G3GNR for the mix-up. ♦



Data Stream

RICHARD STERRY, G4BLT
1 Wavell Garth, Sandal Magna, Wakefield,
West Yorkshire WF2 6JP

I HAVE A STRANGE feeling of *deja-vu* as I write this month's column. There's a good reason for this as I have already written it once already! Take my advice and back up your hard disk drive immediately if it starts to show any signs of misbehaving; I think you can guess the rest. Still, at least hard disk drives are now ridiculously cheap, and one now talks casually in terms of hundreds of Mb rather than tens.

This will be the last *Data Stream* column that I write as I need to devote more time to other matters. It's been an interesting and enjoyable four years, and I know I am leaving the column in good hands. I wish every success to Roger Cooke, G3LDI, whose callsign may be familiar to those of you active on packet radio.

I have relied on many people who have passed on useful information, answered queries, vetted articles, and so on. Their help has been invaluable, and I only wish there was space to acknowledge each of them. Many thanks to all of you.

SPOTLIGHT ON TCP/IP

THE DEFINITIVE WORK on the subject of TCP/IP in amateur radio is undoubtedly *NOSintro* by Ian Wade, G3NRW [available from RSGB sales - *Ed*]. However, David Norris, G4TUP, felt that there was still a place for something briefer and easier to read, as a gentler introduction to TCP/IP. So, he has produced an A4 book of 36 pages, entitled *The WHY? and HOW? of TCP/IP*. It deals with one aspect of TCP/IP, namely the popular JNOS on the IBM compatible platform, which simplifies some of the explanations considerably. David comments that his book "concentrates on getting you on the air with the minimum of fuss and without getting bogged down in unnecessary commands".

I have read a draft copy, and it certainly seems clearly laid out, with introductions to each chapter, and there is detailed help on getting the configuration correct (this is usually the hardest part). There are several useful appendices, including one with details of regional IP co-ordinators so you can obtain an IP address (essential before you go on-air). Indeed, David is IP co-ordinator for the North-West of England and the Isle of Man.

The book costs £5.95, inclusive of UK postage, and is available direct from David Norris, G4TUP, 148 Sefton Street, Southport, Lancs PR8 5DA. The extra postage required for outside the UK is £1.00 for Europe, and £1.75 for the rest of the World.

WHITE PAGES SERVERS

IN THE MAY *Data Stream* column I described how to use the White Pages facility to find out the packet address of a known callsign. I did not list the regional servers, as these were never 'officially' recognised. However, in practice they are as follows:

Region 1	GB7CYM	(York)
Region 2	GB7BAD	(Nottingham)
Region 3	GB7DEO	(Feltham)
Region 4	GB7BNM	(Bournemouth)
Region 5	GB7ABB	(Caernarfon)
		(North Wales only)
Region 6	GB7WRI	(Randalstown, N I)
Region 7	GB7JSC	(Bothwell)
Region 8	EI7GM	(Dublin, ROI)

These regional servers exchange data with the national server, GB7BBS, so they should all have the same information. Note that these regions correspond to RSGB zones A to G, plus the Republic of Ireland. You will find your local region number as the first digit in the two-digit area identifier in your packet address. For example, my area is #19 so I am in region 1.

With north to south communication difficult in Wales, GB7ABB should be used only by stations in the north. Unless you are advised otherwise, I suggest that mid-Wales stations should use GB7BBS, and South Wales stations GB7BNM, for WP queries.

Clearly, if you skip from BBS to BBS, you can confuse the WP system so it's best to send all your mail from one 'home' BBS to avoid this. Situations arise where two adjacent BBSs each 'think' that a user 'lives' at the other, resulting in what is known as 'ping-ponging'. Also, it means that the user has to log on to more than one BBS to check for mail.

If you operate from a location away from the home station, then you do have a problem, as the WP information is bound to be confused. Even if mail is being sent to your alternative BBS by the end of your stay, it will probably continue to arrive after you have left for home! I don't have a solution to this one, I'm afraid. Any suggestions?

PACKET FOR WINDOWS

PACKET TNC driver programs for running under MS Windows are appearing at a swift rate now. As far as I know the first British contribution is UltraPak v2.1 by Tim Kearsley, G4WFT.

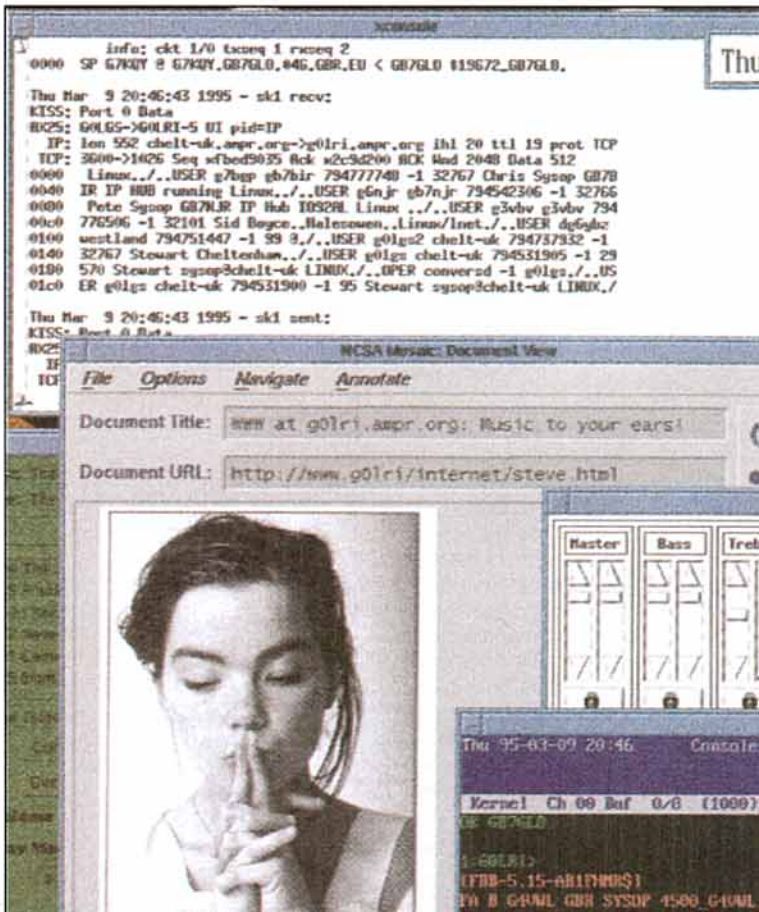
The program seems extremely comprehensive, with far too many features for me to list here. Suffice to say it is suitable for almost all TNCs, has multiple stream switching with independent receive windows for each, and supports YAPP binary file transfer. The program is available as a fully functional unregistered version, which differs from the full registered version only in that it is limited to sessions of 30 minutes, though you can restart as many times as you like. The unregistered version is 'converted' to an unrestricted one using a registration number and software key, available from Paul, QTHR, on payment of £20. A manual on disc is also provided to registered users.

To obtain unregistered copies you can write to Paul, QTHR, enclosing a blank formatted 3.5in disc and return postage and mailer, or you can obtain it from *Practical Wireless* (Bits & Bytes) or from Venus Electronics (see this month's *SWL* column for the address). If you are equipped with a landline modem, you can obtain a copy from Ted Batts', G8LWY, BBS on 0181 547 1479, or on Internet by FTP (File Transfer Protocol) from demon.co.uk as /pub/ham/upak21.zip and also from various other ftp sites Worldwide. Tim can be contacted on Packet @ GB7LWB, or on Internet, tim@cirrus.demon.co.uk .

ALTERNATIVE OS FOR IBM

IN MAY'S *DATA STREAM*, I mentioned the OS/2 operating system for IBM 'PC' compatibles, to illustrate that there is more to these 'platforms' than MS/PC/DRDOS and MS Windows. Another, rather different, operating system is called Linux which is available free under the rather lengthy terms of the GNU General Public License of the Free Software Foundation. The software itself is a Unix clone written from scratch by Linus Torvalds originally, but now many others are involved. Its features include 'true' multitasking (the definition of which is debatable), multi-user, virtual memory, shared libraries, proper memory management, TCP/IP networking, and great 'robustness' even when many simultaneous applications are running. It has great potential for amateur radio, as AX25, NET/ROM and TCP/IP are all built-in

SCREENSHOT: COURTESY OF G0LRI



Detail of part of a screen showing several applications multi-tasking under X Windows and Linux.

to the OS, and many users are taking full advantage of this. Indeed, some TCP/IP mailboxes are running under Linux.

Linux was originally developed for IBM PC compatibles from the 386 upwards (definitely not 286s I'm afraid) but I hear that there are proposals to port it to other platforms such as the Apple Macintosh, and also for the Commodore Amiga, and Acorn RISC machines. However, for the moment it is an OS for IBM compatibles only. It is possible to arrange that the machine can boot up in either Linux or DOS/Windows, as required. Separate DOS and Windows emulators are also available for Linux if you want to try that approach, and you can, for example, run Windows under the latest DOS emulator. There are certain hardware stipulations, rather too lengthy for this column, but see my reference to FAQs below.

Linux is considerably more versatile and sophisticated than MSDOS, with the Graphical User Interface being provided by X Windows, in a roughly similar way to that in which MS Windows provides a GUI for MSDOS.

There are various programming languages such as C++ available for Linux, as well as many programs and applications. In the main, these are available free, this being the main philosophy in the Linux domain, which is heartening. Linux is available via FTP (file transfer) on Internet, from some landline BBSs, and from PD libraries. It is constantly evolving, so many different versions may be in circulation. Perhaps the best way to get hold of Linux in a relatively 'ready to go' form, with lots of extras, is on a set of CD-ROMs, obtainable from various computer outlets and CD-ROM sources. The cost is around £20, and the CDs are far more convenient than a large pile of floppies.

If you have difficulty in obtaining further information about Linux, then I have some files of Frequently Asked Questions (FAQs), plus information on the required hardware. Please send me a formatted 720k or 1.44Mb disc, with return postage and return address label and reusable mailer. The files are plain ASCII text which you can read in a text editor or word processor application. Alternatively, I can send you them via Internet E-mail if you contact me, but they're a bit lengthy for packet. The general advice from Linux users is that although there is a steep learning curve to be overcome, dedication to this task will bring rich rewards!

USING 9600 BPS TNCS

COMMERCIAL TNCS FOR higher-speed operation (9600bps) are now widely available at fairly competitive prices, including the Kantronics KPC-9612, the PacComm 9600 Sprint, the Symtek TNC-2H and the AEA PK-96. Previously, it was necessary to build a G3RUH 9600 modem board, and interface this to the modem-disconnect header on a TNC2 clone PCB, eg a Tiny-2, BSX2 etc. Though the RUH is still the definitive 9600 modem, the move towards ready-built 9600-only TNCs (such as the TNC-2H) and dual speed 1200/9600 TNCs (like the others mentioned above) was inevitable.

I have had a Kantronics KPC-9612 on loan from Lowe Electronics for some time, and this is in effect a dual KPC-3, with separate 1200 and 9600 ports. Each port has its own Xmit (PTT) and Rcv (DCD) LEDs, but the Con, Sta and Mail LEDs are common. In 1200bps use, it is virtually identical to a KPC-3 or KAM(Plus) in packet mode. Switching between ports is simply a matter of issuing a PORT command, or else using a Streamswitch character which is different for 1200 and 9600 operation. Also, it is possible to specify which port mail forwarding should be initiated on.

You can interface each port to a separate radio, and any valid incoming data will be displayed whichever port it comes in on; ie it auto detects. Alternatively, you can follow my approach, and interface both TNC ports to the same radio, so that it is possible to switch from 1200bps packet on 144.550MHz to 9600 operation on 144.525, on the same radio, and with the minimum of fuss. I interfaced the 1200 port to the microphone socket of the transceiver (an old Icom IC240, my favourite rig of all time) and the 9600 port to spare pins on the accessory socket on the rear panel.

Unlike 1200bps operation, where you can feed TNC transmit audio straight into the mic input on the rig, and take receive audio from the volume control or loudspeaker output, 9600 modems must bypass all the audio stages. Transmit audio must be fed directly to the modulator varicap diode, and receive audio must be taken directly from the FM discriminator output. So, unless you have a very modern rig with a special 9600 interface socket, you are going to need to do some soldering. The book by Mike Mansfield, G6AWD, *High Speed Packet Radio Transceiver Connections*, which I reviewed in the July 1994 *Data Stream* column, contains modification details on many popular radios. However, if you want details of the IC240 modification, send me an SASE, as these are not (yet) in the book as far as I know.

Once you have the interfacing sorted out, you still have a further problem; you must be careful to set up the transmit deviation correctly, as you will have bypassed all the in-built limiting circuitry. With 1200 operation it is simple to check the outgoing signal; just monitor on a separate receiver, and compare the tone and volume of your own signal to others on the frequency. If you gradually reduce the audio level from the TNC to the radio, until the signal sounds slightly less harsh, and slightly quieter, than most of the others, then you'll probably have achieved around 3kHz deviation, and won't be driving the limiting circuits hard, if at all.

However, it isn't quite so easy at 9600bps, as it doesn't sound anything remotely like 1200 packet. It sounds like a soft hiss, very much like white noise, and on first hearing it you could be forgiven for thinking that it was an unmodulated carrier. It is very hard to judge the deviation level by ear, even when comparing it with other 9600 signals. I got round this problem by connecting an oscilloscope to the audio output of a separate receiver, so I could see the modulation on the screen, and could compare my own signal with others, both on 1200 and 9600 channels. This was successful, and when I later checked with a mobile test set, I found that the deviation was almost spot-on 3kHz.

The next problem is that initially, 9600 operation was confined to dedicated links, and so the equipment for both ends of the link could be set up, tested, and optimised 'on the bench' prior to installation in the field. However, the situation with multiple users on a shared channel is different. The KPC-9612 has internally adjustable receive equalisation, and I found that the optimum setting varied from station to station. On the other hand, other types of 9600 TNC have the facility to adjust the transmit characteristics via links, or in the case of RUH modems (and some others) you can take a series of measurements and create a new EPROM for the transmit characteristics. However, they may not have the facility to adjust the receive equalisation. This does not imply that there is anything 'wrong' with any of the TNCs, but it does illustrate the point that 9600 operation isn't as straightforward and uncritical as 1200.

So, I suspect that problems are going to be encountered when users try to connect to other 9600 users, rather than just to their local 9600 BBS or node; in some cases the link will work without adjustment, and in others it may not. It's too early to see how much of a problem this is going to be in practice. However, when you do have a link working well, it's very rewarding to see the speed with which text appears on the screen, and 1200bps on a shared frequency does seem terribly slow by comparison!

I am very grateful to Lowe Electronics Ltd for the loan of the KPC-9612, and I was sorry to part with it.

INGOCOM/EMBAYCOM DISK

IF YOU HAVE BEEN unable to obtain a copy of the Ingocom program (like Baycom) for the Atari ST/STE, mentioned in the March and May *Data Stream* columns, then I can provide one in return for a blank Atari formatted 720k disc, plus return postage and address label and reusable mailer. The program and documentation are in the form of a self-extracting TOS archive. Alternatively, I can send it via E-mail if you contact me on the Internet, as it is only 33k long, but please don't ask me to send it via packet!

Similarly, if you have been unable to get hold of the Embaycom program for IBM compatibles, as mentioned in May's *Data Stream*, then I can provide one on the same terms, though the disc should be IBM formatted 720k or 1.44Mb as convenient. Again, I can send it via E-mail if you prefer, as the .ZIP archive is only 7k long. The programs have only minimum documentation I'm afraid, as the originals were in Russian, but there is a small get-you-going help file written in English. The authors are said to be UA9AJ or UZ4FXT, rather than RT4UZ/UT2UZ. ♦

NEW DATA STREAM COLUMNIST

WITH EFFECT from the September *Data Stream*, the column will be written by well-known datacomms operator Roger Cooke, G3LDI. Roger currently writes the 'Packet Panorama' column in *Practical Wireless*, and will continue to do so. Those who read both magazines will be reassured that the two columns will be quite different. I am sure that members will join me in thanking Rick Sterry for enlightening us on the subject of datacomms and computers for the last four years. ***Editor***

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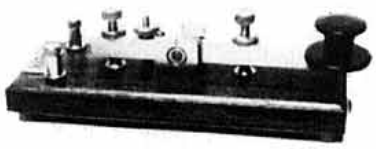

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CONTEST CLASSIFIED

All rules should be read in conjunction with the General Rules published in *Contest Classified*

VHF RESULTS

23 / 13CM TROPHY 1994

There was a good increase in entries over the 1993 contest, and this was in spite of what most people found to be lousy conditions. I say most people since, once again, the Windbreakers & Hadrabs CG, G4JAR/P, seemed to have their own private opening on 23cm, working several OK stations and a number of very distant German stations. None of the other nearby stations heard a whisper! On 13cm, G4DSF/P were only able to use a tripod mounted dish this year and proved that sheep scatter isn't very effective, but the booby prize definitely goes to G4XUM/P who, as they came to put the 13cm station together, realised that they had left the amplifier at home, 250 miles away! Surprisingly enough they were able to borrow another from a local, but clearly nothing was intended to be that easy since after one QSO, the rig produced a spike up the transverter receive input and killed the mixer device!

Both the 13cm and 23cm trophies go to the Windbreakers and Hadrabs group, and certificates go to the winners and runners-up in each section. Congratulations to all involved.

Andy Cook, G4PIQ

1296MHZ MULTI-OPERATOR

Pos	Callsign	Score	QSO	Loc	Pwr	Ant	Best DX	km
1	G4VIX/P	31879	93	01PU	300	4 x 55Y	OK2KFK/P	1242
2	G4XUM/P	15474	65	01QX	400	12 x 23Y	DL5GBG/P	612
3	G4IEV/P	10270	53	01KJ	400	2.4m	PA6C	428
4	G3CKR/P	8182	44	93AD	150	4 x 55Y + 2.5m	DF0HS/P	595
5	G0ALE/P	8038	38	01QE	400	2.0m	PI4GN	450
6	G3OHM/P	6145	42	92GB	120	4 x 55Y	DF0HS/P	531
7	G4BRA/P	4307	26	91GI	80	2 x 55Y	DF0HS/P	524
8	G4DSP/P	3510	18	03CE	200	2m	DF0HS/P	465

1296MHZ SINGLE OPERATOR

Pos	Callsign	Score	QSO	Loc	Pwr	Ant	Best DX	km
1	G3XDY	9587	47	02OB	300	8 x 23Y	DJ6JJ	406
2	G3MEH	6648	42	91QS	100	2 x 50QLY	DF0HS/P	469
3	G8NEY	3305	18	81VK	250	55Y	PE0MAR/P	440
4	G8VOI/P	3187	18	90MX	40	4 x 26QLY	OS4CP/A	397
5	G6HKM	2020	17	01FT	10	43Y	DF0HS/P	397
6	G3JYP	1509	6	84SN	35	2m	F6IFR	597
7	G8ZQB	1300	13	92JN	100	40QLY	G4IEV/P	192
8	G6SPS	1285	17	01IS	18	2 x 23Y	PE0MAR/P	236
9	G6MXL	799	4	80XR	10	23Y	F6HPP/P	414

2320MHZ MULTI-OPERATOR

Pos	Callsign	Score	QSO	Loc	Pwr	Ant	Best DX	km
1	G4VIX/P	3801	19	01PU	60	66QLY	DK2MN/P	412
2	G3CKR/P	2186	10	93AD	40	2.5m	PE0MAR/P	431
3	G4DSF/P	1941	12	01KJ	25	1.2m	ON7YK	370
4	G4BRA/P	1454	8	91GI	10	1.5m	PE0MAR/P	391
5	G4DSP/P	1424	8	03CE	10	2m	PE0MAR/P	296
6	G0ALE/P	1230	7	01QE	30	1.6m	G3CKR/P	315
7	G4OHM/P	629	5	92GB	20	1.2m	G4VIX/P	190
8	G4XUM/P	51	1	01QX	20	1.5m	G6SPS	51

2320MHZ SINGLE OPERATOR

Pos	Callsign	Score	QSO	Loc	Pwr	Ant	Best DX	km
1	G8VOI/P	967	5	90MX	3	1.4m	PE0MAR/P	369
2	G8ZQB	600	6	92JN	8	1.6m	G4VIX/P	187

432MHZ CUMULATIVE CONTEST 1994

There was an encouraging increase in the number of entrants to this year's contest with double the number of entrants in the Open section and an increase of 20% in the Single Operator section. Although there were some Novice stations active during the contest, it was unfortunate that none decided to enter. Several stations reported working their 'lifetime best' DX during the first session on 12 October with stations from DL, OZ, PA, and SP appearing in many logs. Typical comments about this first session were "Excellent propagation" and "DX was fantastic". Conditions for the second and third sessions were generally considered to be flat to very poor, but the fourth session coincided with more good propagation into DL, HB9, OE and PA.

Congratulations to the Warrington Contest Group, G3CKR/P, and to Mike Ellis, G4UDE, who won their respective sections. The runners-up were the Northumberland Contest Group, G8PNN/P, in the Open section, and Andy Cook, G4PIQ, in the Single Operator section. Certificates were also awarded to PA0GHB and PE1EWR, the first and second in the Overseas section, and to Roger Piper, G3MEH, the leading UK station running 25W or less to a single antenna. Thanks are extended to G6IQM who submitted a checklog. Hopefully the extremely good conditions will be repeated next year, but the VHFCC cannot guarantee it!

Ian L Cornes, G4OUT

SINGLE OPERATOR NORMALISED RESULTS

	Call	Score	Ant.	Pwr	12/10	27/10	11/11	28/11	13/12	Best DX	Km
1.	G4UDE	3000	2x20	400	4700	279	302	2216	303	SP2DDV	1413
2.	G4PIQ	2494	26el	300	2605	0	0	2084	304	SP2NJI	1225
3.	G8FBG	2253	2x28	400	0	0	358	649	292	DG0PT	860
4.	G0TDF	2180	21el	100	2780	227	243	1425	209	OE5VRL	1221
5.	G8NEY	2145	2x21	400	2200	211	237	1326	221	SP2NJI	1454
6.	G8CRN	1874	4x17	400	1916	149	188	1694	175	SP2NJJ	1261
7.	PA0GHB	1509	30el	10	1433	188	0	760	155	OE5VRL	877
8.	G3MEH	1179	48el	20	1267	128	0	888	97	DJ9PE	954
9.	G0MLY	1169	21el	75	0	0	137	634	152	DK0OG	1128
10	G7AZP	852	16el	100	479	0	137	319	99	OZ2LD	1017
11	G3RHH	830	21el	25	0	79	71	175	106	DL8LE	929
12	G0MYE	794	24el	400	445	107	81	135	56	DF0RB	774
13	G3YHF	793	19el	10	615	76	91	0	81	DL3BWW	1116
14	PE1EWR	749	21el	30	89	126	0	206	62	G4UDE	478
15	G3FIJ	577	19el	15	51	56	50	167	72	DL8LE	724
16	G3JJZ	440	19el	25	183	60	62	114	0	HB9AMH/P	564
17	G8ATD	381	10el	80	67	0	66	79	49	F6CBH	340

OPEN SECTION NORMALISED RESULTS

	Call	Score	Ant.	Pwr	12/10	27/10	11/11	28/11	13/12	Best DX	Km
1.	G3CKR/P	3000	2x21	400	4260	376	383	0	0	SP2NJI	1416
2.	G8PNN/P	2298	2x21	70	3963	196	324	0	Not/P	DL9USA	1158
3.	G4HWA	1983	4x21	400	1573	188	185	2039	0	SP2DDV	1271
4.	G8OHM	1694	24el	300	2288	150	41	1172	89	SP2NJI	1416
5.	G4BAH/P	1625	4x19	350	0	0	0	1274	153	OE2UKL	957
6.	G4HRY/P	1341	21el	300	1343	198	191	0	0	SP2DDV	1298
7.	G4JZF/M	867	NB1	25	804	63	77	148	73	DL3BWW	1110
8.	G7SEN/P	720	5el	10	468	60	97	255	47	HB9AMH/P	839
9.	G1COW/P	587	17el	25	564	46	103	378	0	DL4MEA	901
10.	G4DDL/P	508	19el	5	658	94	0	212	0	DK1PZ	732

NB1 - 5/8 over 5/8 mobile antenna horizontally polarised.

UHF / SHF CONTEST OCTOBER 1994

Overall entries to this contest are up once again, although interest is very much dominated by low band activity (that is if you can call 2.3GHz a low band!) with a smattering of 10GHz. Conditions were in general poor on Saturday improving to average on Sunday, and unfortunately, there wasn't even any rain scatter on 10GHz to make up for the lack of anything else of interest! Special mention should be made of Bob Reeves, G8VOI, and his one man multi-band portable station which was by no means small and enabled him to take the single operator section with around six hours operation on the Saturday evening. In the Multi-Operator section, congratulations to the Windbreakers & Hadrabs for a magnificent effort once again.

Andy Cook, G4PIQ

SINGLE OPERATOR OVERALL RESULTS

Pos	Call	Loc	432 MHz	1.3 GHz	2.3 GHz	3.4 GHz	5.7 GHz	10 GHz	24 GHz	Total
1	G8VOI/P	90MX	255	191	799	0	0	1000	0	2245
2	G3XDY	02OB	632	1000	0	0	0	0	0	1632
3	G8ZQB	92JN	101	189	1000	0	0	0	0	1291
4	GJ4ZUK/P	89WF	1000	0	0	0	0	0	0	1000
5	G4PIQ	01MU	679	0	0	0	0	0	0	679
6	G3MEH	91QS	0	399	0	0	0	0	0	399
7	G8NEY	81VK	0	198	0	0	0	0	0	198
8	G6MXL	80XR	105	48	0	0	0	0	0	153
9	G6HKM	01FT	0	121	0	0	0	0	0	121
10	G0MYE	91PV	102	0	0	0	0	0	0	102
11	G3JYP	84SN	0	91	0	0	0	0	0	91
12	G6SPS	01IS	0	77	0	0	0	0	0	77
13	G3YHF	92BK	37	0	0	0	0	0	0	37

MULTI-OPERATOR OVERALL RESULTS

Pos	Group	Loc	432 MHz	1.3 GHz	2.3 GHz	3.4 GHz	5.7 GHz	10 GHz	24 GHz	Total
1	Windbreakers & Hadrabs CG	01PU	1000	1000	1000	1000	1000	1000	1000	7000
2	Tatsfield ARTS	01QE	0	269	569	0	0	287	0	1125
3	Warrington CG	93AD	332	145	299	0	0	0	0	776
4	Bracknell ARC	91GI	318	153	229	0	0	65	0	764
5	Three Spires	01KJ	5	182	266	0	0	59	0	512
6	South Birmingham RS	92GB	174	167	147	0	0	0	0	488
7	The Northern Lights	01QX	0	274	7	0	0	0	0	281
8	Spalding & DARS	03CE	0	62	195	0	0	0	0	257

432MHZ SINGLE OPERATOR

Pos	Callsign	Score	Norm	QSO	Loc	Pwr	Ant	Best DX	km
1	GJ4ZUK/P	1216	1000	84	89WF	100	17Y	DL6FBL	876
2	G4PIQ	826	679	72	01MU	300	26Y	HB9SUL/P	779
3	G3XDY	769	632	55	02OB	250	21Y	DL0UL/P	715
4	G8VOI/P	310	255	34	90MX	100	19Y	F/OK2KKW/P	653
5	G6MXL	128	105	14	80XR	60	21Y	PA3BPC/P	583
6	G0MYE	124	102	20	91PV	400	24Y	F6CTT	447
7	G8ZQB	123	101	20	92JN	25	19Y	F6HPP/P	482
8	G3YHF	45	37	7	92BK	10	19Y	F6CTT	506

432MHZ MULTI-OPERATOR

Pos	Callsign	Score	Norm	QSO	Loc	Pwr	Ant	Best DX	km
1	G4VIX/P	4254	1000	314	01PU	400	8 x 21Y	DL0WSW/P	870
2	G8XVJ/P	1412	332	130	93AD	400	2 x 30Y	F/OK2KKW/P	832
3	G4BRA/P	1351	318	157	91GI	400	4 x 21Y	F1FEN/P	807
4	G8OHM/P	742	174	104	92GB	300	21Y	F/OK2KKW/P	739
5	G4IEV/P	21	5	3	01KJ	25	18Y	OS4CP/A	273

1296MHZ SINGLE OPERATOR

Pos	Callsign	Score	Norm	QSO	Loc	Pwr	Ant	Best DX	km
1	G3XDY	16665	1000	66	02OB	300	8 x 23Y	DL5GBG/P	628
2	G3MEH	6648	399	42	91QS	100	2 x 50QLY	DF0HS/P	469
3	G8NEY	3305	198	18	81VK	250	55Y	PE0MAR/P	440
4	G8VOI/P	3187	191	18	90MX	40	4 x 26QLY	OS4CP/A	397
5	G8ZQB	3158	189	20	92JN	100	40QLY	F6HPP/P	482
6	G6HKM	2020	121	17	01FT	10	43Y	DF0HS/P	397
7	G3JYP	1509	91	6	84SN	35	2m	F6IFR	597
8	G6SPS	1285	77	17	01IS	18	2 x 23Y	PE0MAR/P	236
9	G6MXL	799	48	4	80XR	10	23Y	F6HPP/P	414

1296MHZ MULTI-OPERATOR

Pos	Callsign	Score	Norm	QSO	Loc	Pwr	Ant	Best DX	km
1	G4VIX/P	56403	1000	154	01PU	300	4 x 55Y	OK2KFK/P	1242
2	G4XUM/P	15474	274	65	01QX	400	12 x 23Y	DL5GBG/P	612
3	G0ALE/P	15166	269	59	01QE	400	2.0m	DL0MI	537
4	G4IEV/P	10270	182	53	01KJ	400	2.4m	PA6C	428
5	G3OHM/P	9393	167	57	92GB	120	4 x 55Y	DF0HS/P	531
6	G4BRA/P	8612	153	46	91GI	80	2 x 55Y	DF0HS/P	524
7	G3CKR/P	8182	145	44	93AD	150	4 x 55Y + 2.5m	DF0HS/P	595
8	G4DSP/P	3510	62	18	03CE	200	2m	DF0HS/P	465

2320MHZ SINGLE OPERATOR

Pos	Callsign	Score	Norm	QSO	Loc	Pwr	Ant	Best DX	km
1	G8ZQB	1211	1000	9	92JN	8	1.6m	PE0MAR/P	367
2	G8VOI/P	967	799	5	90MX	3	1.4m	PE0MAR/P	369
3	G6MXL	0	0	0	80XR	1	25Y		

2320MHZ MULTI-OPERATOR

Pos	Callsign	Score	Norm	QSO	Loc	Pwr	Ant	Best DX	km
1	G4VIX/P	7299	1000	32	01PU	60	66QLY	DL0MI	526
2	G0ALE/P	4153	569	18	01QE	30	1.6m	PA0BAT	362
3	G3CKR/P	2186	299	10	93AD	40	2.5m	PE0MAR/P	431
4	G4DSF/P	1941	266	12	01KJ	25	1.2m	ON7YK	370
5	G4BRA/P	1671	229	10	91GI	10	1.5m	PE0MAR/P	391
6	G4DSP/P	1424	195	8	03CE	10	2m	PE0MAR/P	296
7	G4OHM/P	1076	147	8	92GB	20	1.2m	G0ALE/P	218
8	G4XUM/P	51	7	1	01QX	20	1.5m	G6SPS	51

3400MHZ MULTI-OPERATOR

Pos	Callsign	Score	Norm	QSO	Loc	Pwr	Ant	Best DX	km
1	G4VIX/P	1934	1000	9	01PU	7	1.4m	DJ6JJ	397

5700MHZ MULTI-OPERATOR

Pos	Callsign	Score	Norm	QSO	Loc	Pwr	Ant	Best DX	km
1	G4VIX/P	1820	1000	9	01PU	20	1.4m	PA0BAT	354

10368MHZ SINGLE OPERATOR

Pos	Callsign	Score	Norm	QSO	Loc	Pwr	Ant	Best DX	km
1	G8VOI/P	574	1000	4	90MX	0.12	0.45m	F6DKW	338

10368MHZ MULTI-OPERATOR

Pos	Callsign	Score	Norm	QSO	Loc	Pwr	Ant	Best DX	km
1	G4VIX/P	3564	1000	18	01PU	70	0.3m	DF9LN	451
2	G4ALE/P	1024	287	5	01QE	0.5	0.8m	F5HRY	287
3	G4BRA/P	230	65	3	91GI	0.01	0.5m	G4KGC	120
4	G3YKI/P	210	59	2	01KJ	0.3	0.3m	G4FCD	152

24000MHZ MULTI-OPERATOR

Pos	Callsign	Score	Norm	QSO	Loc	Pwr	Ant	Best DX	km
1	G4VIX/P	7	1000	1	01PU	0.007	0.3m	G0TJN/P	7

VHF RULES

144MHZ CW MARCONI / RSGB 24 HOUR

4 / 5 November, 1400 - 1400UTC

General rules apply. 1pt per kilometre.

Sections: S single operator fixed, O all others, L listeners. Logs for Marconi contest will be forwarded. Please two cover sheets and two copies of the log if you are entering both RSGB 24h and Marconi 24h contests. You can enter either the 6h or 24h contest, but NOT both.

Adjudicator: For 6h and 24h contests: S Thompson, 8 Nant Lais, Corntown, Bridgend CF35 5SA.

144MHZ AFS AND FIXED AND SWL

3 December, 0900 - 1700UTC

General rules apply.

Sections: AFS. The contest is open to individual entrants (who must be RSGB members), or teams made up of a number of operators who must all be members of the same affiliated society (but do not have to be RSGB members themselves). All members of a team must operate from within 50km of the normal meeting place of the society. No station may represent more than one society. No operator is allowed to use more than one callsign during the contest. In the case of national societies each team must define a separate meeting place and each team member must operate within 50km of that designated meeting place. Multiple teams are encouraged from both national and local societies. The best three scores of each team will be used to form the entry, all team members' logs must be included as the results may be downgraded if logging errors occur, ie the 4th placed member may well have higher points after adjudication than those notionally above. Clubs or groups can submit as many teams as they wish, please mark entries team A, B, C etc.

Sections: S Single operator, M Multi operator, L Listeners.

Adjudicator: I Pawson, 3 Orion, Bracknell, Berks RG12 4YX.

STOP PRESS . . .

COLCHESTER/CHELMSFORD Top Band Qualifying Event: Date 23 July 1995; Map 155 (Bury St Edmonds); Assembly 1300 for start at 1320; Location Great Green, SE of Bury St Edmonds off A134; NGR 916559. Competitors requiring tea should call Phil Cunningham on 01206 393737 by 15 July.

VHF CONTESTS CALENDAR

1/2 July	VHF Field Day (May 95)
2 July	3rd 144MHz Backpackers (April 95, page 83)
9 July	2nd 50MHz Backpackers (April 95, page 83)
22 July	144MHz Low Power / SWL (May 95)
23 July	432MHz Low Power / SWL (May 95)
20 Aug	432MHz Fixed / SWL (May 95)
29 Aug	144MHz CW Cumulatives (May 95)
2/3 Sep	144MHz Trophy / SWL (Jun 95)
3 Sep	4th 144MHz Backpackers (April 95, page 83)
13 Sep	144MHz CW Cumulatives (May 95)

HF CONTESTS CALENDAR

8 / 9 Jul	IARU Radiosport (Mixed Mode) (July 95 p20)
8 / 9 Jul	RSGB SWL (Mixed Mode) (June 95 p32)
16 Jul	Low Power Field Day (CW) (May 95)
29 / 30 Jul	IOTA (Mixed Mode) (Mar 95)
6 Aug	RoPoCo 2 (CW) (Apr 95)
12 / 13 Aug	WAE-DX (CW)
2/3 Sep	SSB Field Day (Jun 95)
1 Oct	21/28 SSB (Jun 95)
15 Oct	21/28 CW (Jun 95)
28/29 Oct	CQ WW DX SSB

HF RESULTS

AFFILIATED SOCIETIES (AFS) CONTEST JANUARY 1995

CW SECTION INDIVIDUAL LISTING

Posn	Call	Qs	Pnts
1	G3ZEM	302	2966
2	G3NKC	296	2948
3	G4BUO	296	2942
4	G4DJX	295	2929
5	G3KDB	293	2912
6	G3SJJ	292	2877
7	G4BJM	283	2815
8	G4MBC	280	2769
9	G3KHZ	272	2693
10	G3VMW	271	2689
11	G3TMA	272	2688
12	GW3YDX	272	2685
13	G3OZF	269	2672
14	G4OBK	265	2624
15	G3TBK	266	2610
16	G3NKS	261	2607
17	G3UOL	264	2598
18	G4IFB	256	2545
19	G3RIR	258	2544
20	G5LP	257	2536
21	G3UFY	256	2535
22	G3VHB	254	2534
23	G3HEJ	253	2521
24	G4PIQ	253	2496
25	G3KAF	253	2495
26	G4ARI	253	2494
27	G3MXJ	250	2488
28	G3LET	252	2480
29	G3SJX	252	2472
30	G0IVZ	249	2468
31	G3WGV	249	2458
32	G3XTT	248	2456
33	G3BFP	247	2436
34	G3PSM	248	2428
35	G3NOH	244	2425
36	G4TLS	240	2368
37	G3SDC	240	2359
38	G3WYK	237	2346
39	G3RWL	234	2328
40	G3RXP	234	2325
41	G4DBN	238	2321
42	G3VYI	236	2319
43	G4JGV	233	2311
44	G3XVR	234	2304
45	G3RQZ	231	2284
46	G0ORH	232	2282
47	G3PJT	230	2265
48	G4BCA	229	2251
49	G3WSC	225	2235
50	G3GLL	225	2231
51	G4EOF	227	2231
52	G4CZB	224	2217
53	G4MVA	222	2194
54	G3PDL	219	2158
55	G4WVX	217	2131
56	G0OGN	217	2124
57	G3UJV	216	2114
58	G3YEC	211	2107
59	G3SVW	214	2104
60	G4AAL	225	2085
61	G4ZFE	208	2064
62	G3WUX	207	2043
63	G3RSD	206	2039
64	G4KGG	206	2038
65	G3PIA	206	2031
66	G4PDQ	204	2025
67	G3UKF	205	2024
68	G3LIK	204	2024
69	G3IZD	204	2021
70	G3ZVW	206	2016
71	G3WZT	204	2008
72	G4SFO	205	2001
73	G0LZL	201	1991
74	G4TSH/P	199	1961
75	G3RVM	196	1948
76	G4RGK	194	1920
77	G3PDH	193	1911
78	G3GRO	192	1905
79	G4ERW	189	1853
80	G3MXH	189	1851
81	G3OGP	187	1838
82	G4OGB	187	1831
83	G4ALR	186	1821
84	G0JQN	184	1819
85	G4ALE	182	1796
86	G3RTU/P	180	1785
87	G4ODV	179	1766
88	G4YYR	190	1764
89	G3KKQ	176	1748
90	G4IUZ	177	1738
91	G0EFO	177	1734
92	G3OLX	174	1724
93	G3SWC	174	1716
94	G3UKV	173	1714
95	G4SCL	176	1714
96	GM0GNK	198	1709
97	G3ASR	174	1704
98	G2AFV	172	1699
99	G3EBK	172	1694
100	G3ZDW	169	1674
101	G3YAJ	169	1671
102	G4GIR	163	1598
103	G3XZG	162	1597
104	G3XZO	162	1596
105	GM4SID	158	1574
106	G3JUZ	158	1561
107	G4EYE	158	1561
108	G3JTG	156	1557
109	G3TKF	159	1556
110	G3UGB	159	1555
111	G3SHF	158	1554
112	G3YLC	158	1546
113	G0ADH	155	1529
114	G3JNB	157	1524
115	G3XSV	154	1506
116	GW3WWN	149	1475
117	G3VNG	151	1474
118	G0OPB	151	1472
119	G3KNU	149	1472
120	G3JFF	151	1467
121	G3ZGC	149	1461
122	G0TYA/P	152	1457
123	G2AA	149	1451
124	G3VRY	146	1436
125	G4KZD	147	1434
126	G4RCG	146	1434
127	G3OAG	146	1426
128	GM4FDM	145	1426
129	G0DVJ	142	1389
130	G0PNT	140	1362
131	G3SHY	138	1354
132	G3GC	138	1346
133	G4FAS	136	1342
134	G3YHV	137	1341
135	G3MCK	134	1334
136	G3AWR	133	1327
137	G4HMD	138	1324
138	G3LCK	138	1314
139	G3RZF	133	1306
140	G4KDL	133	1288
141	G3KKJ	134	1287
142	G3HZL	131	1285
143	G3MCX	128	1264
144	G0ASA	132	1257
145	G0JQI	129	1254
146	GM3WTA	139	1254
147	G3MA	129	1251
148	G3HQH	125	1247
149	G4PZQ	126	1245
150	G3LQI	139	1244
151	G3HFG	127	1236
152	G3HVX	124	1231
153	G3TXZ	123	1214
154	G3UNJ	124	1212
155	G3KTZ	125	1211
156	G3NVO	125	1203
157	G4FCH	120	1200
158	G3TIK	123	1198
159	G3SEY	121	1191
160	G4HSD	123	1191
161	G4SLE	122	1168
162	G3ICO	118	1156
163	G4FRN	115	1147
164	GM3UM	116	1147
165	G3TWG	119	1146
166	GW3HCL	116	1145
167	G3JSR	138	1137
168	G3YXX	115	1131
169	G4TNI	114	1125
170	G3EPV	113	1118
171	G3XTZ	114	1116
172	G3XMM	112	1097
173	G4EIX	111	1097
174	G3YYF	109	1081
175	G4RCD	108	1074
176	G0GMS	110	1073
177	G3DIC	108	1068
178	G4IP	105	1047
171	G4USW	109	1044
180	G0MBQ	105	1034
181	G0DHZ	106	1024
182	GW3RXD	103	1021
183	G4BJU	104	1019
184	G0SGY	105	1018
185	G0BZF	104	1017
186	G4DDX	103	998
187	G0FQT	105	997
188	G0DID	101	990
189	G3III	100	985
190	G4YJQ	102	984
191	GM4AFF/P	100	981
192	GM3CFS	99	977
193	G3ZKN	103	974
194	G0CUT	102	969
195	G5MY	99	966
196	GM3DZB	101	964
197	GW4HBK	97	964
198	G0JNZ	100	949
199	G3ZDD	95	931
200	G4XHE	95	931
201	G3SET	93	918
202	G3RFH	93	917
203	G3SVL	91	910
204	G3LNK	92	907
205	G0CBJ	96	905
206	GW4XQK	91	904
207	G3FNM	91	901
208	G3LCS	93	896
209	GW3VVC	94	894
210	G4HSJ	90	891
211	G4BXL	88	868
212	G0PPO	88	864
213	G4DYC	89	862
214	G0ECJ	86	857
215	G3LHJ	86	851
216	G4WBX	87	851
217	G3GMM	85	841
218	G8TB	86	835
219	G3LVW	88	834
220	G0NOB	85	831
221	G3YLA	84	830
222	G0RPW	85	824
223	G3BSN/P	86	824
224	GW3EIZ	84	821
225	G0PMS	82	817
226	G0HDV	82	814
227	GW4BLE	82	795
228	G0IGP	80	794
229	G4SYC	80	791
230	GW3KYA	83	788
231	G8NT	80	787
232	G8GS	80	782
233	G3TRU	80	780
234	G4IGY	82	780
235	G3YOL	79	778
236	GM4TMS	81	777
237	GM4OBD	78	774
238	GM4ZRR/P	78	774
239	GM3WIJ	77	767
240	G3YIA	77	764
241	G0OXT	77	758
242	GM4UYE	77	754
243	GW0KYY	79	754
244	G3TLI	78	750
245	G4PTE	75	740
246	G3TPJ	87	736
247	G0GLB	76	733
248	G0CDO	75	732
249	G3VW	76	731
250	GM0KAE	74	731
251	GW4WAN	76	728
252	G3VIR	73	718
253	G3FFH	72	711
254	G0RDO	83	705
255	2E0AJE	70	692
256	G0HGA	69	678
257	2E0ACY	68	674
258	G0FOD	70	670
259	G0HUZ	68	670
260	G0LKO	68	670
261	G0PDZ	69	656
262	G0HAL	66	654
263	G0NID	65	641
264	G0PNU	67	639
265	G0RXN	66	638
266	G4OAY	65	637
267	G3WFM	65	628
268	G3WNI	99	628
269	G4CBQ	65	625
270	GW0MOW/P	63	620
271	G8IB	62	608
272	G3MEH	61	604
273	G3TQF	61	600
274	G0UKX	60	597
275	GM0JKF	61	590
276	G0PQU	61	585
277	G0SDA	60	584
278	G3ZFE	60	582
279	G4DVV	59	578
280	G0LHZ	60	572
281	GW4KVJ	59	564
282	G4CQI	67	560
283	G3SZS	55	547
284	G3NCL	58	544
285	G0JNI	57	528
286	G4ZBT	65	524
287	G0KMC	53	521
288	G3URA	55	517
289	G0HDJ	53	514
290	GM0TYY	52	490
291	G4JWK	50	487
292	G3KSK	50	480
293	G3HKO	48	474
294	G3ZBU	48	474
295	GM4BKV	50	474
296	G3EAO	48	467
297	G3DOT	47	457
298	G0KJN	47	454
299	G0PUB	47	448
300	GW0TAF	46	444
301	G0TIB	47	442
302	G3GHN/P	47	438
303	G0GAZ	45	437
304	G4RBE	44	434
305	G3YCH	41	400
306	G0RQY	40	397
304	G4ELY	40	394
308	GM3UU	41	391
309	G3GUL	41	385
310	G4IVJ	42	384
311	G0UML	40	381
312	G4ISO	40	380
313	G2FQP	52	368
314	G3DQY	38	356
315	G4FTP	36	334
316	G3FGD	33	324
317	GW0SGG	31	304
318	G3XKD	29	278
319	G0SCP	27	267
320	G0THX	27	261
321	GM3PIP	27	260
322	G4CFO	25	244
323	G3WPK	24	234
324	G4WWK	24	228
325	G3AAT	22	220
326	GM4DGT	23	214
327	G0JVG	23	212
328	G3OZY	20	200
329	G3XYZ/P	20	188
330	G0UMS	19	177
331	G0VKT	18	177
332	G4BSO	17	170
333	G0PNL	18	167
334	G0UYE	17	167
335	G4REH	17	167
336	G0UPU	16	157
337	G0FYX	15	144
338	G0NMN	14	121
339	GM0ULK	13	114
340	G4DXW	10	97
341	G0OXH	9	71
342	G0RXP	5	50
343	G0SHC	3	30

SSB SECTION INDIVIDUAL LISTING

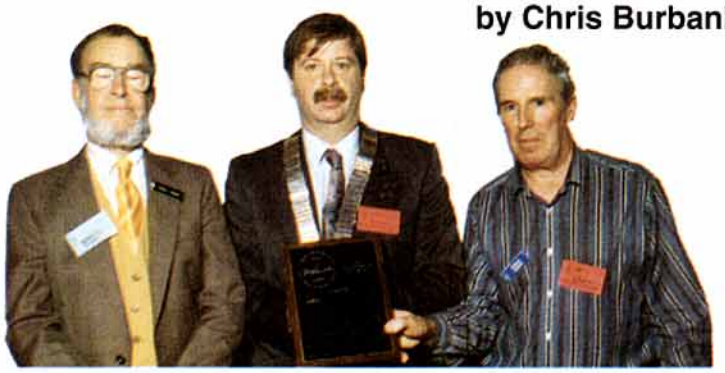
Posn	Call	Qs	Pnts
1	G4PIQ	420	4161
2	G3VHB	378	3754
3	G3NLY	366	3631
4	G4MBC	362	3594
5	G3NAS	350	3477
6	G4CBQ	348	3459
7	G3OZF	346	3429
8	G4CNY	344	3410
9	G0KPW	334	3314
10	G3SJJ	327	3241
11	G3RTE	314	3114
12	G5LP	307	3051
13	G6RC	306	3025
14	G4TSH/P	306	3019
15	GW4BLE	295	2931
16	G/OZ7SM	288	2868
17	G4TLS	287	2851
18	G4MRS	288	2831
19	G3WZT	286	2824
20	G3TCQ	285	2821
21	G4ALR	272	2694
22	GM4TMS	263	2611
23	G3WGV	256	2547
24	G4ERW	256	2526
25	GW0ARK	254	2504
26	G3XZO	241	2395
27	G0ATX	243	2394
28	G4KZD	240	2385
29	G3VKW	238	2351
30	G3WHK	236	2337
31	G3GHN	237	2327
32	G3RVM	235	2307
33	G3MXH	228	2262
34	G4AAL	239	2254
35	G0ORH	225	2229
36	GW4YMJ	215	2109
37	G0ODQ	210	2081
38	G0OPB	210	2074
39	G3NOF	210	2069
40	G3PIA	203	2011
41	G3WUX	203	2009
42	G0PPO	202	2001
43	G4VZR	202	2001
44	G3GRO	202	1999
45	G3ZDW	198	1962
46	G3LIK	198	1937
47	G0IVZ	186	1841
48	G3YLC	187	1837
49	G4LRP/P	174	1728
50	G4PDQ	176	1726
51	G3JFF	173	1709
52	G0NYL	172	1705
53	G0CBJ	163	1594
54	G0MZK/P	157	1555
55	G3FFH	154	1521
56	G4MET	153	1518
57	G2AFV	150	1481
58	G4KDC	150	1470
59	G3XYZ	150	1469
60	G3EPV	146	1437
61	G0ADH	141	1398
62	G3MA	140	1384
63	G0CDO	140	1364
64	G0RXN	134	1324
65	G3HVX	131	1295
66	G3YSX	132	1287
67	G3HFG	152	1274
68	G3UKV	130	1273
69	G3SVL	129	1269
70	G2AA	125	1241
71	G0BZF	125	1234
72	G0ASA	124	1224
73	G0CUT	121	1194
74	G3NVO	121	1191
75	G3NKS	119	1181
76	G3LHJ	118	1164
77	G4RCD	117	1149
78	G4EIX	116	1137
79	G3WNI	114	1125
80	G3XTZ	114	1124
81	G4EBK	111	1101
82	G0PNU	109	1077
83	G0CTQ	108	1068
84	G3YOL	108	1059
85	G4IUT	107	1055
86	G0UWZ/P	106	1051
87	G4RUL	122	997
88	G3RAF	101	994
89	G0VAK	99	984
90	G3FNM	100	977
91	G0LZL	97	957
92	G3VNG	96	947
93	G0FYX	96	945
94	G3HZL	96	939
95	G3BIT	94	925
96	G3COR	93	921
97	G0TYA/P	94	919
98	GW3WWN	93	918
99	G3YCH	93	909
100	G3ENI	91	904
101	G3ZKN	91	901
102	G3VIR	92	897
103	G4KHF	92	894
104	G0HFU	90	891
105	G3YYF	91	887
106	G0DCG	90	885
107	G0HDV	88	874
108	G0GCI	88	871
109	G0SOM	87	869
110	G3SNU	88	859
111	G0MEE	86	848
112	G4OGB	86	842
113	G4OYY	96	840
114	G4PQS	85	835
115	G4UEL	85	831
116	G0BFJ	85	830
117	G3MEH	84	825
118	G0UKJ	83	821
119	G0FQT	82	799
120	G4YJQ	78	771
121	G0CCS	79	769
122	G0RJJ	77	764
123	G4JSN	78	757
124	G4VEL	77	749
125	G0IIQ	76	748
126	G4OZG	76	745
127	G4DTA	74	737
128	G4IVJ	74	728
129	G8IB	74	727
130	G4BXL	75	724
131	G3SBV/P	74	719
132	G0ASZ	84	719
133	G4SJZ	73	718
134	G0EVA	74	715
135	G3DIC	72	708
136	G0DAY	71	698
137	G0BRV	70	690
138	G0UUM	70	682
139	G0THY	67	664
140	G0UXM	67	646
141	G3PGT	65	641
142	G3AGF	64	637
143	G0PDZ	65	631
144	G0SHC	65	629
145	G4TUB	62	602
146	G4SQC	62	600
147	G0DBU/P	62	599
148	GW0RYT	61	598
149	G4ZBT	61	594
150	G3TXZ	62	594
151	G0JVG	61	592
152	GW0KPD	59	571
153	G0OJP	59	571
154	G4CFO	57	555
155	G8NT	56	551
156	G0STE	57	550
157	G3AAT	56	545
158	G4MBJ	54	528
159	G0MHZ	53	527
160	G0TEB	52	501
161	G0UHM	52	501
162	G0NOA	50	491
163	G3OZY	50	488
164	G4PDQ	50	487
165	G3MIZ	49	487
166	G0VBB	49	484
167	G0FTB	47	458
168	G3WPK	45	447
169	G4JBL	44	431
170	G0UYE	43	420
171	G3KSK	43	411
172	G0ATG	42	410
173	G3TAD	41	400
174	G4GUD	40	400
175	G3DQY	50	390
176	G0JWL	39	390
177	G3JXA	40	390
178	G0MQL	38	359
179	G0RUS	36	350
180	G4BLS	35	338
181	G3SHY	30	288
182	G0MKF	52	288
183	G3WWT	27	267
184	G0OXH	24	230
185	G4PTE	23	227
186	GM0UUB	22	220
187	GM0TTY	19	187
188	G0UPU	17	167
189	G0NKX	10	97
190	G3ICO	7	70
191	G3VGG	3	30

TURN TO PAGE 82 FOR THE CLUB LISTINGS AND A FULL REPORT ON THE 1995 AFS CONTESTS ➤

RADCOM CONTEST FEATURE

RSGB Affiliated Societies AFS Contests '95

by Chris Burbanks, G3SJJ*



The Flight Refuelling ARS plaque is awarded to the leading club in the SSB AFS. In 1995, as in 1994, it was won by a Lichfield ARS team: from left to right, Roger Smethers, G3NLY; 1994 RSGB President Ian Suart, GM4AUP; Keith Ginder, G3NAS.

WITH SO many interesting and positive aspects of this year's events to report, it was difficult to know where to begin - the increased entry, record scores, or impact from the revised start times, not to mention the Japanese station worked by G4PIQ at 1530!

Over the past few years, the HF Contests Committee have monitored the activity of newer-licensed amateurs in RSGB events. A simple way of providing easy identification was to take the introduction of the G0 series of callsigns, which were first issued in 1985. It is pleasing to note the steadily-rising trend in G0 entries, in both the CW and SSB events. Indeed, my own SSB log shows that 33% of the contacts were with G0-series calls.

Fig 1 demonstrates the rising popularity of the SSB section, and **Fig 2** that CW still retains a very strong following. Our report on the 1993 event mentions poor propagation, which may account for the dip in CW entries received in that year. Another interesting observation is that only two G0s appear in the top 100 CW entrants; SSB fares somewhat better with 23.

*16 Cotgrave Rd, Plumtree, Nottingham NG12 5NX.

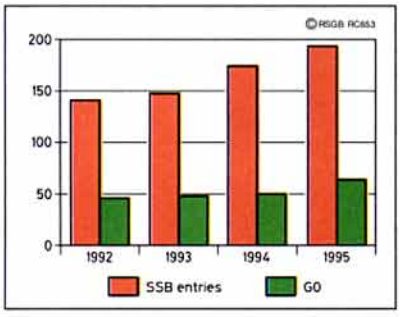


Fig 1: Graph showing increasing entries in SSB AFS, overall and by G0 callsigns.

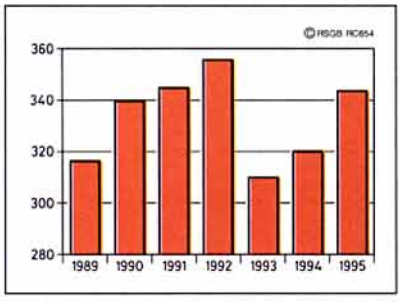


Fig 2: Number of entries to CW AFS contest.

Record Scores

THE FULL INDIVIDUAL listings are shown in *Contest Classified*. For quite a few years now the leading CW operators have been chasing the elusive 300 contacts barrier. Whilst several have managed it before duplicate contacts have been taken into account, Bob Henderson, G3ZEM, can now claim to be the first to have reached that target on a net number of contacts. He also won the Marconi Trophy, awarded to the leading individual in the AFS CW Contest. Congratulations, Bob.

On SSB, Andy Cook, G4PIQ, again takes the RSGB Lichfield Trophy for the leading individual in the AFS SSB contest, with an amazing 420 contacts, including that now-legendary Japanese QSO. He averaged 105 contacts per hour - what a target to beat! Congratulations also go to Andy.

AFS is not a long contest and can be likened to a 100m sprint. Four hours of pure concentration

SSB SECTION CLUB LISTING

Posn	Group	Participating stations	Score
1	Lichfield ARS A	G3VHB, G3NLY, G3NAS	10862
2	Martelsham DX & CG	G4PIQ, G0KPW, G4MRS	10306
3	Mid-Beds Contest Ass.	G4MBC, G5LP, G4ALR	9339
4	Chiltern DX Club	G3OZF, G3RTE, G3VKW	8894
5	Horsham ARC	G3WZT, G4TLS, G4LRP/P	7403
6	Lichfield ARS B	G4CBQ, G/OZ7SM, G0DAY	7025
7	Hereford ARS A	G4CNY, G4MET, G3EPV	6365
8	Crawley ARC	G6RC, G3GRO, G3YSX	6311
9	Blackwood ARS	GW0ARK, GW4BLE, GW0RYT	6033
10	Stratford on Avon & DARS	G0CDO, G3XZO, G3MXH	6021
11	Stroud & DARS	G4VZR, G0ATX, G0MZK/P	5950
12	Sutton & Cheam RS	G4ERW, G3WHK, G0PNU	5940
13	Newbury & DARS A	G3RVM, G0ORH, G3NVO	5727
14	RAFARS North Luffenham	G3TCQ, G3ZDW, G4BXL	5507
15	Echelford ARS A	G4TSH/P, G0BZF, G4RCD	5402
16	Clifton ARS A	G3GHN, G0PPO, G0DCG	5213
17	Aylesbury Vale RS A	G0ODQ, G3YLC, G0CUT	5112
18	Reading & DARC	G3WGV, G0OPB	4621
19	Horndean & DARC A	G3LIK, G3JFF, G0FYX	4600
20	Southgate ARC A	G4KZD, G0ASA, G0MEE	4457
21	Torbay ARS A	G0IVZ, G3HFG, G3LHJ	4299
22	South Notts ARC	G3SJJ, G0SOM	4110
23	Harwell ARS	G3PIA, G0ADH, G0THY	4073
24	Port Talbot ARC	GW4YMJ, GW3WWN, GW0KPD	3598
25	Yeovil ARC A	G3NOF, G3CQR, G0JVG	3582
26	South Manchester	G0CBJ, G3FNM, G0LZL	3528
27	Telford & District ARS A	G3UKV, G4EIX, G4IUT	3465
28	Scunthorpe ARC	G0NYL, G4OGB, G0HDV	3421
29	Gloucester ARS	G0TYA/P, G3MA, G3ZKN	3204
30	Axe Vale ARC A	G3FFH, G4OYY, G4PQS	3196
31	Kings Lynn ARC A	G3XYZ, G4KHF, G0CCS	3132
32	Cheltenham ARA	G4PDQ, G3NKS, G0UPU	3074
33	Stirling & DARC	GM4TMS, GM0TTY, GM0UUB	3018
34	Bromsgrove & DARC	G4AAL, G4IVJ, G3VGG	3012
35	Southdown ARS A	G3SVL, G4RUL, G3AGF	2903
36	Torbay ARS B	G0UWZ/P, G3BIT, G3YCH	2885
37	Hereford ARS B	G3HVX, G4JSN, G4SJZ	2770
38	Radio Club of Thanet A	G0CTQ, G0RJJ, G4DTA	2569
39	Edgeware & District RS	G3WUX, G3SHY, G0OXH	2527
40	Crowborough & DARS	G0NOA, G0RXN, G3TXZ	2409
41	Grimsby ARS A	G4EBK, G0IIQ, G4CFO	2404
42	Kings Lynn ARC B	G4VEL, G4OZG, G0UUM	2176
43	Denby Dale ARS	G0BFJ, G0EVA, G0DBU/P	2144
44	RNARS London	G3YYF, G8IB, G3OZY	2102
45	Clifton ARS B	G3SBV/P, G0UXM, G0POZ	1996
46	Axe Vale ARC B	G3DIC, G3PGT, G0TEB	1850
47	Echelford ARS A	G3XTZ, G3WPK, G3WWT	1838
48	Horndean & DARC B	G0ASZ, G3AAT, G0UHM	1765
49	Harwich ARG	G4YJQ, G0VAK	1755
50	Farnborough & DARS	G3VIR, G4UEL	1728
51	Kings Lynn ARC C	G0SHC, G0OJP, G0MQL	1559
52	RAFARS Finningley	G2AFV	1481
53	Lowestoft RC	G4KDC	1470
54	Yeovil ARC B	G4PDG, G3MIZ, G4JBL	1405
55	Clifton ARS C	G0UKJ, G0STE	1371
56	Aylesbury Vale RS B	G3MEH, G0MHZ	1352
57	Thames Valley ARTS	G3ENI, G3JXA	1294
58	Torbay ARS C	G3SNU, G0MKF	1247
59	Leicester RS	G2AA	1241
60	Hereford ARS C	G4TUB, G4MBJ	1130
61	Taunton & DARC	G3WNI	1125
62	Radio Club of Thanet B	G0FTB, G4GUD, G4PTE	1085
63	Weston Super Mare RS	G3YOL	1059
64	Bristol ARC	G3TAD, G4ZBT	994
65	RAFARS Halton	G3RAF	994
66	RNARS Plymouth	G3VNG	947
67	RNARS Liverpool	G3HZL	939
68	Newbury & DARS B	G0HFU	891
69	West Kent ARS	G0GCI	871
70	Horndean & DARC C	G0ATG, G0JWL	800
71	Southgate ARC B	G0FQT	799
72	Southdown ARS B	G3DQY, G4BLS	728
73	Bromley & DARS	G0BRV	690
74	RAFARS Halton	G4SQC	600
75	Yeovil ARC C	G3KSK, G0NKX, G3ICO	578
76	RNARS Lowestoft	G8NT	551
77	Dacorum ARTS	G0VBB	484
78	Telford & DARS B	G0UYE	420
79	Grimsby ARS B	G0RUS	350

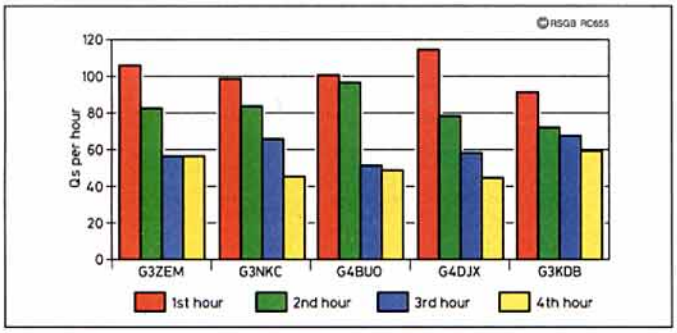


Fig 3: Rates in QSOs per hour of leading five stations, CW.

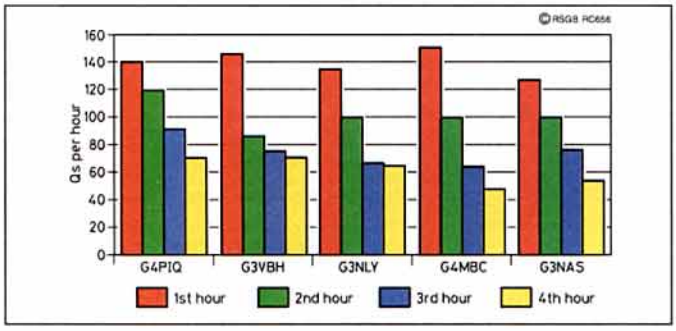


Fig 4: Rates in QSOs per hour of leading five stations, SSB.

are required to achieve a high score. Hourly contact rates of the top five individual stations in each event are shown in **Figs 3 and 4**. A glance at the position tabulation will demonstrate the need for 100% concentration: in the CW leg, places 2 to 6 are separated by just four contacts and at an average of 1.2 contacts per minute, lapses totalling 3.5 minutes during the event make a significant difference. A special mention for G4MBC, operated by G4BWP, who made the highest hourly rate of 150, ie 2.5 contacts per minute!

In the club listings, Lichfield ARS 'A' teams once again led the field in both legs. The Yorkshire DX Cluster Group and Martlesham DX and Contest Group mounted strong challenges for the CW and SSB events respectively. An effective attack from north and south of Lichfield!

Location

ACROSS THE Atlantic, there are numerous arguments about the advantage of geographical positioning within the States for the major contests. Closer to home, it is becoming apparent where the best European locations are in the IOTA contest. So it is not surprising that AFS has for some time generated considerable discussion on preferable UK areas. At the beginning of the contest, central England has immediate propagation to the south and north and this must account to some extent for the domination by groups in this part of the country.

In Scotland the first hour is almost dead, whereas towards the end, southern stations experience interference from the continent. It would take a major rewrite of the rules to create an event in which all areas of the country had an even chance, but the hour change in the start time helped to redress the balance a little. As GM4SID remarked, "what I want to see is everyone having an enjoyable contest with a steady flow of contacts, each according to their own ability, and we had that this year." This was not painlessly achieved, though, as now the southern stations complain that the continental noise starts even earlier! It was certainly noticeable in the SSB leg that in the last hour G stations were considerably weaker whilst European stations were strong. We will retain the later start time for both events next year, but will review the situation again after the contest.

Logging

THE CONTEST WAS 100% computer-checked by Chris Swallow, G3VHB, using software he has developed himself. Many logs were received on disk and we are grateful for that: the remaining paper logs had to be keyed-in by hand using up much of Chris's valuable spare time. It was obvious that hand-written logs produced more unmarked duplicates than computer-generated ones.

It is in clubs' own interests to submit as many logs as possible on disk. As well as alleviating the unmarked dupe problem, time and money can be saved. Even if some of the team have hand written their logs, 150 contacts can easily be keyed into EI5DI's Super Duper program in an hour afterwards with just a bit more time to produce the (callsign).LOG file and summary sheet. A typical club entry in both events might consist of five xxxxx.LOG files in a directory named CW and three xxxxx.LOG files in a directory named SSB. One disk, ten sheets of A4, ie one summary sheet per log plus two overall declaration sheets. No hard copy of log sheets required! For those groups just not able to gain the use of a computer, we will still accept paper logs. ♦

Chris Burbanks, G3SJJ, at the computer keyboard. The Marconi Trophy is sitting on the window-sill.

CW SECTION CLUB LISTING

Pos	Group	Participating stations	Score
1	Lichfield ARS A	G3KDB, G3NKC, G3SJJ, G3VHB, GW3YDX	13956
2	Yorkshire DX Cluster Gp	G3PSM, G3VMW, G3ZEM, G4DBN, G4OBK	13028
3	Chiltern DX Club	G3MXJ, G3OZF, G4BUO, G4IFB, G4WVX	12778
4	Mid-Beds Contest Ass. A	G4ALR, G4BJM, G4MBC, G4PIQ, G5LP	12437
5	De-Montford Uni ARS A	G3RIR, G3SDC, G4ARI, G4BCA, G4JGV	11959
6	Addiscombe ARS	G3RQZ, G3SJX, G3UFY, G3VYI, G4ALE	11406
7	Southgate ARC A	G0ASA, G3RWL, G3UOL, G3ZVW, G4KZD	9633
8	Crawley ARC	G3GRO, G3JKF, G3LET, G3WSC, G4XHE	9575
9	De-Montford Uni. ARS B	G4CZB, G4EOF, G4SCL, G4ZFE, G5MY	9192
10	Grimsby ARS	G3DOT, G3EBK, G3RSD, G3RXP, G3TBK	9125
11	Horsham ARC A	G0GMS, G3OGP, G3SWC, G3WZT, G4TLS	9003
12	Greater Peterborough ARS	G3KHZ, G3PJT, G3TMA, G4DXW, G4PZQ	8988
13	Cheltenham ARA A	G3NKS, G3SZS, G3XMM, G3XVR, G4PDQ	8580
14	Edgware & District RS A	G3ASR, G3SHY, G3WUX, G4HMD, G4IUZ	8163
15	Reading & District A	2E0ACY, G0OPB, G0RPW, G3WGV, G3XTT	7884
16	Scunthorpe ARC	G0HDV, G3JGB, G3KNU, G3PDL, G4OGB	7830
17	RNARS Colchester	G0DID, G3GLL, G3YAJ, G3YEC, G8NT	7786
18	Stockport RS A	G0JQI, G3KAF, G3SHF, G4BJU, G4FAS	7664
19	Maidenhead & District A	G3RZF, G3SET, G3TWG, G3WYK, G4RGK	7636
20	Verulam ARC	G3NOH, G3UJV, G4DJX	7468
21	Newbury & District ARS	G0ORH, G0RQY, G3NVO, G3RVM, G3ZGC	7291
22	Stratford on Avon & DARS	G0CDO, G0OGN, G3III, G3MXH, G3XZO	7288
23	Echelford ARS A	G3KKQ, G3MCK, G3XTZ, G4RCD, G4TSH/P	7233
24	City of Bristol Group	G0JQN, G3TKF, G3XSV, G3YHV, G4DVV	6800
25	Sutton & Cheam RS	G0PNT, G0PNU, G3OLX, G4ERW, G4HSD	6769
26	South Manchester RC A	G0CBJ, G0LZL, G0NID, G3FNM, G3SVW	6542
27	RNARS Portsmouth	G0FOD, G0LKO, G3JFF, G3JTG, G3LIK	6388
28	Torbay ARS A	G0IVZ, G0JNZ, G0NOB, G3HFG, G3LHJ	6335
29	Gloucester ARS	G0ECJ, G0TYA/P, G3MA, G3ZKN, G4YYR	6303
30	Hereford ARS A	G0PMS, G3EPV, G3HVX, G3LCK, G4HSJ	5371
31	RNARS Middlesbrough	G3AWR, G3HKO, G4FCH, G4MVA	5195
32	RNARS Birmingham	G4IP, G4SFO, G4TNI, G8IB	4781
33	Norfolk ARC	G0UML, G3JNB, G3PDH, G4DYC	4678
34	RAFARS North Luffenham	G3ZDW, G4BXL, G4KGG	4580
35	Guildford & District RS	G0EFO, G3YXX, G3ZDD, G8GS	4578
36	Surrey RCC	G3BFP, G3MCX, G8TB	4535
37	Harwich ARG	G0SCP, G4FTP, G4EYE, G4YJQ, G0DVJ	4535
38	Aberdeen ARS A	GM0JKF, GM4AFF/PGM4BKV, GM4SID, GM4ZRR/P	4393
39	RNARS Barrow	G3IZD, G3KKJ, G4USW	4352
40	Harwell ARS	G0ADH, G0GLB, G3PIA	4263
41	RNARS London	G3LCS, G3OZY, G3YYF, G4FRN, G4PTE	4064
42	Telford & District ARS	G0SGY, G0UYE, G3UKV, G4EIX	3996
43	RAFARS Halton	G0HGA, G3HEJ, G3VIR	3917
44	RNARS Liverpool	G3HQH, G3HZL, G3RFH, G4RBE	3883
45	Red Dragon CG	GW3EIZ, GW3HCL, GW3RXD, GW3VVC	3881
46	Yeovil ARC A	G0HDJ, G3FGD, G3GC, G3ICO, G3KSK	3820
47	North Wakefield	2E0AJE, G3SEY, G4JWK, G4RCG	3804
48	Blackwood ARS	GW0MOW/PGW3KYA, GW4BLE, GW4HBK, GW4KVJ	3731
49	Port Talbot ARC	GW0KYY, GW0SGG, GW0TAF, GW3WWN, GW4WAN	3705
50	Aylesbury Vale RS	G0CUT, G0KMC, G3MEH, G3YLC	3640
51	Chesham & District ARS	G3NCL, G3VRY, G3XZG	3577
52	Clifton ARS	G0HUZ, G0PDZ, G0PPO, G3BSN/P, G3GHN/P	3452
53	Bury Radio Society	G0PNL, G3OAG, G3RTU/P	3378
54	Axe Vale ARC	G3DIC, G3FFH, G3VW, G4WBX	3361
55	Worthing & District ARC	G3LQI, G4OAY, G4SLE	3049
56	Stirling & District ARS	GM0KAE, GM0TYY, GM4DGT, GM4TMS, GM4UYE	2966
57	Inverclyde ARG	GM0GNK, GM3WTA	2963
58	Banff & District ARC	GM3DZB, GM3PIP, GM3WIJ, GM4OBD	2765
59	Southgate ARC B	G0FQT, G3GUL, G3KTZ	2593
60	Horndean & District ARC	G0DHZ, G0FYX, G0MBQ, G0RXP, G3AAT	2472
61	Bromsgrove & DARC	G4AAL, G4IVJ	2469
62	Cheshunt & District	G3TIK, G3URA, G3WFM	2343
63	Stockport RS B	G0HAL, G3GMM, G4SYC	2286
64	Stevenage & District ARS	G0GAZ, G0KJN, G4DDX, G4ISO	2269
65	Southdown ARS	G0THX, G3DQY, G3SVL, G3ZFE	2109
66	Leicester Radio Society	G2AA, G3TQF	2051
67	Taunton & District	G0UKX, G3TRU, G3WNI	2005
68	Echelford ARS B	G0BZF, G3EAO, G3WPK, G4WWK	1946
69	Havering & District ARC	G3JSR, G3TPJ	1873
70	Torbay ARS B	G0OXT, G0RDO, G3YCH	1863
71	Crowborough & DARS	G0RXN, G3TXZ	1852
72	Cornish RAC	G4ODV	1766
73	Reading & District B	G0LHZ, G0NMN, G0PUB, G0VKT, G4ELY	1712
74	RAFARS Yorks	G2AFV	1699
75	Mid-Beds Contest Ass. B	G4GIR	1598
76	Anglia TV QRP	G3YIA, G3YLA	1594
77	Bromley & DARS	G3JJZ	1561
78	Hornsea ARC	G3TLI, G4IGY	1530
79	RNARS Plymouth	G3VNG	1474
80	Bristol ARC	G2FQP, G4CQI, G4ZBT	1452
81	RNARS Nottingham	G0JNI, G3LNK	1435
82	Paisley ARC	GM4FDM	1426
83	Lowestoft RC	G4KDL	1288
84	Hoddesdon RC	G3JNJ	1212
85	RNARS Rosyth	GM3UM	1147
86	RNARS Thurso	GM3CFS	977
87	Weston-Super-Mare RS	G3YOL, G4REH	945
88	RNARS Swansea	GW4XQK	904
89	Edgware & District RS B	G0IGP, G0OXH	865
90	Maidenhead & District B	G3LVW	834
91	Kings Lynn ARC	G0SDA, G0SHC, G3XYZ/P	802
92	Lichfield ARS B	G4CBQ	625
93	South Manchester RC B	G0PQU	585
94	Aberdeen ARS B	GM0ULK, GM3UU	505
95	Horsham ARC B	G3ZBU	474
96	South Birmingham RS	G0TIB	442
97	Cheltenham ARA B	G0UPU, G3XKD	435
98	Yeovil ARC B	G0JVG, G0UMS	389
99	Grimsby B	G4CFO	244
100	Hereford ARS B	G4BSO	170

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RSGB Members wishing to place an advertisement in this section must use the official form incorporated on the label carrier of Radio Communication. This will prove membership and must be for the current month. No acknowledgment will be sent. Ads not clearly worded, or which do not comply with these conditions will be returned. If an ad is cancelled no refund will be due. An advertisement longer than 60 words will be charged pro rata. Trade or business ads, even from members, will not be accepted. Traders who wish to use this facility must send a signed declaration that the items for sale are part of, or intended for, their own personal amateur station. The RSGB reserves the right to refuse ads, and accepts no responsibility for errors or omissions, or for the quality of goods for sale or exchange. Each advertisement must be accompanied by the correct remittance, as a credit card payment, cheque or postal order made payable to the Radio Society of Great Britain. Please note that because this is a subsidised service to members, no correspondence can be entered into. Licensed members are asked to use their callsign and QTHR, provided their address in the current edition of the RSGB Amateur Callbook is correct. RS members will have to provide their name and address or telephone number. Please include your town and phone number in the free boxes provided to assist readers. Advertisements will be placed in the first available edition of *RadCom*.

Warning: *Members are advised to ensure that the equipment they intend to purchase is not subject to a current hire purchase agreement. The 'purchase' of goods legally owned by a finance company could result in the 'purchaser' losing both the goods and the cash paid.*

FOR SALE

ICOM 735 tcvr fitted with 500Hz CW filter. Complete with matching PSU PS55 & automatic ATU AT150. exc condx, complete with mic, leads, spare mans & original packing; £775. G3KWK, QTHR, 01527 541502 (Redditch).

ICOM VT200T 4 meter 40 channel scanning tcvr as new, bxd; £150. Datong morse tutor; £35. Star master keyer; £30. High mound paddles on marble base; £20. 0191 416 8211 (Washington).

KENWOOD 450S tcvr, fitted : auto ATU, voice synthesizer complete with hand mic & MC60 desk mic, all bxd, man, immaculate condx, used receive only; £1,000 or near offer. Contact John, G7SQJ. QTHR. (York). 01904 760271.

KENWOOD TH78E 2m/70cms dual band hand held CTCSS module spkr, mic, complete with case, perfect condx, man, bxd charger; £355. Also spare PB17-700 MAH 12V NiCad & case; £50. Roy, G4ZIH, 0181 473 8245 (Lewisham).

KENWOOD TS450S & PS33 new; £1,200 on 16.1.93 as new; £850 with manuals. (Alsager) 01270 882807.

LOWE HF225 Europa Rx fully equipped; £420 signal R535 VHF/UHF airband scanner; £220 Datong FL3 multimode with man and auto notches; £100. RF systems antenna switch/filter/splitter/combiner/attenuator; £90. Global AT100 ATU; £60. Palomar Rx100 noise bridge; £50. RF systems magnetic long wire balun (Rx only); £26. Ex WD Passive preselector 2.27MHz; £20 Datong broadband pre-amp; £15 all vgc. Complete with manuals. 01506 653311 (Bathgate, W Lothian).

MIZUHO 80m QRP MX-3.55 CW/SSB ideal for novice (2W) with NiCads, extra crystal; £150. G3LBA, 01865 821503 (Abingdon).

PANASONIC NV-MS4 super VHS professional camcorder, as new in box, current price £1550, sell £550, TeKtronix type 891 Spectrum analyser to 40Ghz, vgc; £650. Tel Philip, G4ZOW, office hours, 01582 461952 (Harpenden).

SILENT key G4IKE. TS930S plus PSU; £700. HF minibeam plus rotator; £140. PK232 Pacratt; £120. Contact G4SXE, QTHR. 01283 814880 (Burton on Trent).

SPECTRUM analyzer. HP141T storage display (good tube) + 8552A I/F, 8553B 1kHz-110MHz, 8554L 10kHz-1250MHz. Gwo, some mans; £400 ono. Buyer collects. G7KOU, QTHR 01276 29692 (eves) (Camberley).

TEN-TEC: Corsair II (all HF bands), C/W 260 mains power supply/speaker. Electret mic; dummy load; £600. ATU MFJ-949D; £50. Highmound key, new; £20. Wavemeter class C c/w spare crystal and manual; £18. G2DYM anti/TVI antenna HP80/10 (used only indoors); £25. "Variac" transfomer 230V in 0-260V 8 amp out; £10. HF choke Balun; £20. Operators swivel chair vgc; £12.00. Misc cables Westflex 103, HD 75ohm twin Baluns etc. A complete station "ready to go". Prefer buyer collect. 01424 215983 (Bexhill-on-Sea).

TR9130 2m multimode tcvr, with B09 system base, Sp120 spkr & mic vgc; £350 ono. SF250 frequency counter & SWR metre 10-100W. Hirschman rotator. Jaybeam Q4/2m quad antenna. GPV-144DX Colinear. Himound HH-808 Morse key, marble base. Sun KG-208 2m Colinear. (Silent key sale) offers to G4CNY, QTHR. 01432 273237 (Hereford).

TRIO TS530S good condx with MC35-S mic, original packing & man.; £400. Yamaha PSR-50 keyboard; £50. Please phone after 7.30pm. 01793 870681 (Swindon).

TS450S Kenwood + PS33, with mans, new; 16.1.93 cost £1,200 sell for £850. Rarely used. Buyer collects. 01270 882807 (Alsager, Staffs).

YAESU FT290R multimode in excellent condx, bxd with spkr, mic, soft case, & carrying strap; £220. Tel; G1HAB, 0191 267 8811 (Tyneside)

YAESU FT51 R dual band handle 2xFNB38 (5W) batteries, NC50 dual battery desktop rapid charger, PA10 mobile power/charger unit, soft case, bxd, mans. Mint condx, less than 1 month old. Cost £750. No splits, whole lot for £550 cash. Nick, G4WKU, 01703 660149 / 0973 221646.

10in diameter. Precision spun aluminium Parabolic dish. Complete with alloy mount & horn feed. 1 degree beamwidth @ 7.5GHz. Buyer collects; £100 ono. G4JUM, QTHR, 01372 813694 or 01737 213468 (Surrey).

30ft lattice tower 3 sections; £75 ono. Trio 2m FM with mounting bracket charger etc; £75 ono. G7TGY, 01273 477998 (Lewes).

500MB Wangtek tape drive with SCS1-2 I/F unused. Complete with Adaptec 1510 SCSI I/F card complete with device drivers; £250. (Tape backup software not included). Adaptec 1542CF SCSI-2 and floppy controller bus mastering; £100. Video card. Compaq Qvision 2000 2Mb video-ram 16bit ISA bus mastering; £85 with drivers & manuals. Intel fax modem 9600 fax 2400 data all-soft handscanner interface; £75. bxd, mint condx. 0956 544202 (NW London).

AEA PK-88 packet modem; £85. MFJ-945D mobile tuner 300W; £50. Both with full documentation & bxd. G3MUL, 01636 525 513 (Newark).

ALTRON 4 section Lattice tower 40ft nominal height. Only 14ft nested. Autobrake winches. Base plate mounting. Nearly new; £425. 01206 240700 (Colchester).

ALTRON S332 telescopic tiltover wallmount tower complete with custom built support for mounting to garage or bungalow wall. New unused. Ring for details; £350. Manson EP925 PSU new unused; £70. Heme 1000p clip on multimeter see RS catalogue 219-620 for similar spec as new; £150. Pair unused GE 6146B & 12EY7 valves suitable for Kenwood trio range; £35. G3KNG, 01902 843134 (Codsall).

ALTRON tower. Three section. Two winches. Head unit + G600 rotator heavy duty + wall mounting brackets. Excellent condx; £300. 0115 925 8336 (Nottingham).

ANTENNA tower 40ft galvanised 2 section telescopic tilt over with head unit, base mounted, with extra un-used ground post, 2 winches, good condx also Mosley 3 element TA33JR Tri-bander; £400. Would split, will consider Px 2 metre mobile. 01723 362537 (Scarborough).

BAKELITE 1940s radio - Philco A-547B; £25. Weston S67 Dynamometer watt meter 0-750W; £15. Microvitec CUB RGB 14in monitor; £15. Wayne - Kerr B601 RF bridge; £15. All equipment gwo characterful collectors items. G4OEP, QTHR, 0117 9428594 (Bristol).

BBC Master 128/T 3.5in disc drive, two cub colour monitors, Canon A55 printer, Panasonic KX-P1081 printer, both dot matrix. All pristine. Open to offers. Must collect. Vince, G6IQL, QTHR, 0121 475 3231 (Birmingham).

BRAND new 2C39A; £10. Ex-equip 4CX250BC; £8.00 QQVO640A; £8. 3E29; £5. QQV0310; £3. 4XI50G; £6. Pye F401 base station as new xtalled 70.26 CW deskcontroller & mic; £40. Tait T198 VHF HI PMR FM; £30. Icom Ichio hand held; £195. Tait T535 Hi band mobile; £150. Eddystone 680X Rx gwo; £100. AVO 8 gwo; £50. Tait T336 Tx; £100. Bird 61 Termaline; £40. Tel; 01354 741168 (March, Cambs).

BUTTERNUT HF5B 5-band butterfly beam plus EMOTO 103SAX rotator; £110. Buyer collects or carriage arranged. GM3AKM, QTHR. 0131 336 5070 (Edinburgh).

CAPCO 300 ATU; £150. Burndept 70cm calling frequency xtal and rechargeable batteries; £35 each or £60 for two. TF2015 10MHz - 520MHz signal generator; £95.00. 2Mbytes extended memory suitable for most 286 computers; £25. Ring 01504 352804 (after 5pm). Postage extra. GI0SFT. (Londonderry).

CHELCOM 70cm Colinear aerial for sale; £25. G1OUP. 01204 706488 (Bolton).

CLANSMAN RT354; £75. Clansman linear amplifier 250W; £150. STR 18 Tx4188 2.8-18MHz; £25. Suppy init No24 for Rx216; £15. Tx/Rx 2002 new bxd; £15. Larkspur A41 Mk2 with antenna handset; £45. CII Tx and PSO 28V; £70. Collins TR5/ARC52 28V complete with control box leads; £80. Faz sideband converter for B40, B41 receivers mains operated; £25. Larkspur audio amplifier, 28V; £18. Tel 251218. (Waterlooville, Hants).

COLLINS 390A first class condx built in prodictor excellent performance. SP230 with filters, workshop man. Inspect & collect; £450. 0181 813 9193 (London).

DIAMOND SX200 HF-VHF SWR-PWR meter 2.5/20/200 RMS-PEP for -REF SWR 1 week use mint condx, warranty cost; £94 accept £74, include carr. 01286 675264 (Caernarfon).

EARLY 1930s Xtal detector cats whisker, small tin containing 4 spare xtals, Brandes superior headphones same era; £50. Early reel to reel tape recorder and radio in lovely wooden polished case; £20 + carriage. G4DVH (Cumbria) 01229 584466. salCOM IC245 2 metre 10W multimode tcvr; £160 ono. Yaesu 230R 2 metre FM. 25W tcvr (12.5KHz steps); £90 ono. G7RVP, QTHR. (Norfolk).

FT 290 MK1 mobiles mount carrying case linear amp power supply unit; £295. G7SSW. 01782 814729 after 7.30pm. (Stoke).

FT101E with narrow CW filter Rx ok but Tx faulty; £120 ono. G3LGW, QTHR, 01758 712675 (Gwynedd).

FT736R Yaesu multi mode SSB/FM/CW 2m/70cm tcvr. Exceptionally good condx. 25W + output bxd, CW documents. Bargain at £1100. Can deliver. 01705 593537 (Petersfield, Hants).

FT747-GX with FM board, mobile mounting bracket & mic; £550. G3ZLS, 9-5pm. 01392 413479 (Exeter).

FT747GX HF tcvr mint condx, never used on Tx; £375. Also FT23R 144MHz handheld with SMC rapid charge unit; £125. G8BCL (office) 01296 434455 (home) 01844 208074 (Aylesbury).

FT840 tcvr. Mint condx. Must go to pay for FT990; £600. Matching ATU FC.10; £200. Both together £725. FT51R dual-band handhelds as new; £300. Cushcraft R3 vertical, 20m-10m inc WARC. As new; £195. Malcolm, G4TJK, 01256 766558 (Hook, Hants).

G3TSO HF tcvr half completed project DCBS VFO chassis built documentation; £150. MFJ 20 meter CW tcvr; £120. MFJ worldband TRFRX; £40. RA17L gwo spare valves, man; £120. Alan, G0KMC, QTHR. Phone 01296 658037 (eves, w/ends). (Aylesbury).

GALVANISED heavy duty triangular mast section, five (plug one half buried, free!) 12ft 6in long 14in sides. £100 or haggle. 01926 842061. (Warwick).

GAP challenger DXVI; £110 ono. Commodore 64 with tape drive bxd, mans; £25. Or may Px for Amstrad 8512 programmes WHY? G7MZL 01892 542 884 (Tunbridge Wells).

GARAGE sale, radio equipment, test gear, scopes, antennas, components. Bargains 15-16 July. G3BAC, QTHR road opposite war memorial Meopham Green. 01474 812049 (Nr Gravesend).

HALLICRAFTER HT37 plus Mic; £80 KW201 Rx; £85. Both FB, condx fine vintage pair in regular use. KW2000A PSU mic included ditto condx use; £120. Also HRO MX with coils PSU wkg FB; £60. R1155 not used recently restorable; £25. G3JRS. 01509 672042 (Nottingham).

HEATHKIT HW100 gwo with metered PSU some spare valves. G3PLT, £100. 01934 812498 (Weston Super Mare).

HEATHKIT mans; £5 ea. Scopes Solartron CD1016; £30. Tubes VCR97. 5BHP2; £10 ea. Commodore 8032 K computer; £25. Vic 20; £10. 0181 883 3474 G0IPT (London).

ICOM 229E mobile tcvr, 20 memories, 4 power settings, with option for DTMF CW mobile bracket (unused) mic, instructions. As new; £250 ono. 01625 531154 (Wilmslow).

ICOM 251E 2mtr M/M fitted Mutek FE board. Icom 451E 70cm M/M fitted Mutek pre-amp board both excellent condx, boxes, mans, QRO transformers 2000 + volts 1.1 amp used for 4x4-400 weighs 52kg, 2000 + volts used for 4-500. Valves bases heater transformers, various other items. Offers please. Dave G0DZJ. 01445 282168. (Broughton Astley).

ICOM 740 mint condx plus Tokyo HC400L ATU; £450 ono. 0181 575 7984 (London).

ICOM 751A HF tcvr CR64 high stability filter fitted. RC10 frequency pad controller. Voice synthesizer unit fitted. Icom IC 500 automatic antenna tuner. Icom IC15 power supply; £950. or Icom IC765 has the lot; £15. Take your pick I only need one. Alan, G4YYD, QTHR, 0161 797 7893 (Bury, Lancs).

ICOM IC-2KLPS, power supply; £250. Icom IC-2KH linear amplifier; £600. Yaesu FT-727R 2m/70cm FM tcvr; £220. Tokyo HL-82V 144MHz power amplifier; £60. PK-88 packet controller (brand new); £250. CTE linear amplifier; £50. Kuranishi RF dummy load; £5. Yaesu NC-15 charger/adapter; £40. Sabtronics 8610A frequency counter; £20. Solartron SRS 153S power unit; £25. Farnell 830/10 stabilised power supply; £75. Antenna rotator unit; £30. Farnell F2668 PUI64B £25. Brother HR10 printer £30. Marconi TF995A/FM/AM signal generator; £10. Marconi TF868 universal bridge; £10. Must sell. 01628 483488 (Marlow).

ICOM IC-575H 6/10m bxd; £875. TS-430S HFGC Rx new boxed; £495. ICW2 h/h ext Rx, bxd; £265. Hallicrafters SR-400 HF tcvr, PSU, man, vgc; £250. G4AFY. 01562 747480 (Kidderminster).

ICOM IC290A 2 metre FM/SSB/CW 1 & 10W mic; £210, Sony ICF7600 SW Rx Am/FM/SSB 150kHz - 30MHz; £75, Sony SW Rx SW1+ active ANT + case; £100. G3LBA, 01865 821503 (Abingdon).

ICOM IC402 3W 70cm tcvr SSB/CW bxd vgc; £200. BNOS LPM144 -10 - 100 linear amp 100w & pre amp, vgc; £110. M/M 144/30 LS 2m 30W linear/pre-amp 1W/3W input vgc; £70. Scopex twin trace oscilloscope & probes. vgc; £65. Mainline Spectrum analyser kit, 50MHz-890MHz new, unopened; £50. Tel David, 01778 425367 (Lincs).

ICOM R7000 receiver; £350. Microwave Modules 432/28 transverter switched 432-436; £90. MM rcvr converter 432MHz; £10. FRG-7 receiver; £80. 01843 601845 (Broadstairs).

ICOM R71E 0.1-30.0 MHz HF rcvr fitted with EX-257 FM board, RC-11 Remote controller, FL-44A SSB filter, FL-32A CW (500Hz) filter and EX-310 Voice Synthesizer, with factory service man; £600. Icom R7000 25-1999.999MHz VHF/UHF rcvr, in gwo; £650. Marconi VHF Signal Generator TF 1064B/5M. 68-450MHz with IF crystals for 455KHz, 2MHz and 10.7MHz; £150. Marconi AF Power Meter TF 893A; £65. Marconi Audio Test Set TF 894; £60. Tandy Mono Monitor VM2 Model 26-3211; £50. Technics Quartz Synthesizer FM/AM Stereo Tuner ST-S6; £75. Tel: 01273 680444 (Brighton).

KAMPLUS TNC dual port HF/VHF with pactor, G-tor, packet. Mint with latest Kagold software; £300. Malcolm, G4TJK 01256 766558 (Hook, Hants).

KENWOOD TH25E two metre hand-held with spkr mic (no rubber duck); £120 or swap for KPC 4 with extra cash. 01446 781438 (Cowbridge).

KENWOOD TH78E dual band h/held tcvr with battery charger, CTCSS module, speaker, mic, 1 PB13 I PR17 batteries. Cases to fit

both. Boxed mans perfect condx as new; £325. 1 ATU tuner. MFJ 948 bxd as new; £75. David, G0VNO (01952) 408761 (Telford).

KENWOOD TM732 E dualband mobile with detachable head 50W on 2mtrs 35W/70cms mint condx; £550 ono. Phone Ken 01536 742263 (Northants).

KENWOOD Trio TS830S tcvr with matching AT230 CW filter 9 HF bands mic handbook. Both perfect; £660. G4JFU, QTHR, 01726 812571 (St Austell).

KENWOOD TS 440s with auto tuner; £700. Kenwood PS 50 matching power supply; £95. Kenwood SP230 spkr; £30. Drake 75HF linear amplifier; £500. Drake MN2000 ATU; £250. Icom IC 2400E (2 & 70); £295. Icom IC R7000 VHF/UHF receiver; £695. Phone; 01923 893929 (St Albans).

KENWOOD TS440S HF Tx/Rx Gen coverage auto-ATU narrow SSB/CW filters, man, box; £725 also TS140S; £580. Both exc condx. Also IC2E 2m h/held Tx/Rx case etc. Mint; £120. G3TCO. Evenings or w/e only. 0117 9681068 (Bristol).

KENWOOD TS680S HF/6m trcvr CW filter bxd man, very good condx; £650, G4OBK, QTHR. 01723 370532 (Scarborough).

KENWOOD TS850SAT tcvr approx two years old SP31 external speaker. PS33 power unit. Bereavement forces sale; £1,250. 01606 47767 (Northwich).

KENWOOD TS950S HF tcvr with narrow SSB filter and MC60 mic; £1700. Diamond DP-CP5 vertical antenna with trap radials; £100. 01403 253349 (Horsham).

LINEAR amp Heathkit SB201. Good condx; £385. 2m Microwave Modules linear 30W; £45. Microset PT120 13.5V 20A PSU; £75. G3KWK, 01527 541502 (Redditch).

LINEAR amplifier (HF) KW600. 600W. Manual with circuit. Buyer collects; £195 cash. G3GVV (Tonbridge, Kent) 01732 353360.

LOWE H125 general coverage rcvr, with Pad Unit. Little used; £250 ono. G4NBU. 01962 869155 (Winchester).

MATRIX printer Micro line; £25. PK12 TNC £100. Goodmans Hi Fi 80W £250. Realm Quartz wrist watch £20. Praktica camera, auto flash £15. 0181 806 4470 (Clapton Common).

MFJ 949D deluxe versatuner £100. Diawa 606k all mode active filter £45. both good condx. Keith, G0RQF, QTHR, (Hereford). 01432 276545.

MICROWAVE Modules 144MHz 100W amplifier 10W drive; £80. Palomar Rx noise bridge; £40. Kenwood grid dip meter; £40. Mirage MP1 2kW SWR bridge; £50. Peter, G3ZSS. 01932 863552 (Surrey).

MOVING QTH must reluctantly sell 60ft telescopic tower with electric winch; £475 Hy-Gain TH7; £350 Daiwa multi-torque rotator with all 4 motors fitted offers or for £98,000 you could have my complete QTH 3 bed Bungalow DG oil CH fitted kitchen, dining room, utility lounge, coloured bathroom suite second WC. Stuart, G4CPJ 01636 892301 (Nottinghamshire).

OSCILLOSCOPE dual trace DC to 15MHz; £55. R1155B, R1155A, and second R1155B for spares; £140 the lot. STC12D VHF Tx/Rx for conversion; £20. Trio TR7730 2m FM tcvr; £150. Yaesu FT2700RH 2m/70cm tcvr; £250. Pye Westminister W15FM 10ch; £25. Teleton VHF/UHF TV; £15. Airmed headphones and mic; £10. All ono. Student nurse needs the money! G0HVW, 01638 510220 (Mildenhall).

PK12 £100 +pp (IC251E) £300 + pp Leads; £25. for PK12 (2 htr-cable satalite Goodmans Hi Fi, 80W (collector) morse talker Microwave MMS1; £30 + pp. 0181 806 4470 (Clapton Common).

PYE F401 base xtalled 70.26 gwo. C/W desk controller, mic; £40. My T336/T335 low band FM Tx/Rx units exchange for T356/T355 tait hi-band units or sell offers? 6 ele Yagi by "C+S Antennas" Heavy duty commercial type 144-148 MHz; £28 new. Bird termaline watt meter; £35 icom IC701 HF tcvr + PSU; £285. ideal / M rig. IC245E 2 metre mobile FM/SSB; £180. 01354 741168 (March, Cambs).

QRT sale. Everything must go. Kenwood TS530SP, MC35S, CW filter, bxd, mint condx; £450. SP230; £25. SPC transmatch ASTU (home made) and 50 ohm dummy load; £40. LF30A low pass filter; £20. Buy all above for £500. Standard C58, case, mobile, mic, quarter wave mag mount; £140. MML144/25 linear; £20. FRDX500 HF/VHF receiver (all mode): £40. Twin PSU 13.8VDC 10 amps & 3-35VDC 2 amps regulated/metered; £40. Unfinished project. White Rose receiver PCBs & components; £25. 15-30ft raisable mast and heavy duty winch; £75 ono. Any offers considered on the following. Operating desk & chair. D M M mains/battery operation, 15m cubical quad frame. Buyer collects or pays carriage on all items. Bill, G4WUS 01287 642596, after 6pm (Guisborough).

RN ELECTRONICS 6mtr/multimode transverter 10 to 6 mtrs input-10W out 25W/PEP 20W/CW/FM also 10mtr/multimode converted, CB RA authorised both mint condx package sale; £160. GW0LTH, QTHR. 01495 221655 (Blackwood).

R5000 rcvr with two CW filters; £575. Heathkit HW9 with WARC bands; £240. Would consider exchanging either for large stock of valve components (B9A/B7G ERA). Also selling aluminium sheets 19in x 10.5in x 3mm thick. Makes sturdy front panels; £10 including postage. G3WCE, QTHR, 01603 250910 (Norwich).

RACAL RA117 Rx & RA137A LF convertor in cse; £280. RA117 Rx; £220. Contact Rob, G0HJR. 01526 322491 (Metheringham).

RACAL RA17 with matching Tx79G, SSB unit, change over unit. RA17L; £250 the lot. Must be collected. 01525 371152. (Leighton Buzzard).

RENOVATION project nearing completion 2/3 bedroomed detached house, services, rural Charente maritime France with one former farm on one acre of grounds, offers over £29,500. Details F/G3XMY, QTHR. Chez Goribon, Nievl Le Virouil 17150. Would consider exchange similar house to renovate Fife/Stirling area of Scotland. Top band dipole included in sale. 01033 46861198 (Mirambeau).

SCANNER AOR AR2000 500 kHz to 1.3GHz no gaps. Bxd with charger & NiCads; £190 ono. Phone Mike, 01945 861127 (Wisbech, Cambs).

SEM tranzmatch ATU with Ezitune 1.8 to 30MHz; £75. 0161 320 6941 (Manchester).

SEVERAL elderly domestic radios one pre 1939 numerous old radio books. SAE list. G3OEP, QTHR. 01493 662323 (Gt Yarmouth).

SHACK clearance! Yaesu FT-101E including WARC bands, narrow CW filter, remote VFO, speaker; £230. FT230 2m mobile 20W FM; £100 FRG-7 GC Rx with FM conversion; £70. HF mobile linear amp 100W all bands; £60. Racal RA-17 needs some work; £50. Eddystone 840; £40, 6ft 19inch rack; £50 HB SPC transmatch ATU 150w matches aything!; £15. G0OPL, QTHR (1995). Ansaphone - leave message; 01952 404251 (Telford).

SILENT key G3ESH. AVO8; £50. AVO7; £45. Millen Dipper 90652; £60. Advance audio generator JI; £20. Taylor Am/FM Siggen 6.1A; £130 Racal digital multimeter 4003; £50. BNOS 12/25A power supply; £75. Curtis keyer; £50. Palomar keyer; £40. Kodak Retina 2A; £50. Regent 10x50 binoculars; £30. IBM Golfball typewriter; £30. Various mics from £20. All ono. G8DPS, QTHR. 0181 399 8787 (Surbiton).

SILENT key GM4TSI. Trio/Kenwood TS830S. New condx CW hand mic, hand book. Phone Doug, GM2BWF, QTHR. 01786 824207 (Dunblane).

STRUMECH tower. (Aerial at 38ft). TET HB33SP KW400 rotator gwo. + ele 2m quad; £450. Dave, G4NZY, 0121 427 1788 (Birmingham).

TEN GHz tellurometer model MRA3, MkII Duplex voice and distance measurement. Service manual & test record; £60. Altron AT42 tower ground hinge head unit 2 winches etc; £350. SSM VHF transverter to suit valved PA Yaesu rigs. Clean with manual & circuits plugs etc; £30. 0181 462 2837 (Hayes, Bromley).

TEN TEC OMNI 6, PSU, all filters, desk mic, voice synth; £2,500. TH7; £500. Jaybeam TB3 long boom option; £200. All vgc. 01691 831111 (Oswestry).

TL922 still under warranty, immaculate; £1200 FT209 2m handheld, trickle charger, NC15 base charger, bxd; £100. Autotraker satellite antenna/rig controller, new with software; £80 S-band 88 ele loop Yagi; £40 Meteosat 36 ele loop Yagi; £40. Timestep 137MHz preamp; £20. G4JBH. 01935 28341 (Yeovil).

TONO 777 RTTY Amtor decoder: £100, Tokyo 35W 2m FM/SSB amp Gasfet RFVOX; £60, Bencher Iambic paddle; £25. Attn military collectors PRC 6-6/6 8-9-10 available with spare tubes & accessories & some HT batteries. Call if interested. G3LBA, 01865 821503 (Abingdon).

TRIO AT230 ATU vgc, man, bxd; £110. Sony ICF2001 Rx vgc, man, £80. Sony AC122 power adaptor; £8. G3ZTZ, QTHR. 01276 25430 (Camberley).

TRIO R600 rcvr. Excellent condx. Full working order + man; £190. Buyer collects. 01527 861730 (Worcs).

TRIO TS-711/A/E 2mtr multimode bxd as new with mic and mans. Perfect condx; £350 ono. John, G1BPN, QTHR 01995 671038 (Nr Preston).

TRIO TS450SAT 30 amp PSU, CW filter; £1100. Trio TS520 Tx needs attn; £100. Icom IC201 2m multi mode; £100. 01509 266316 (Loughborough).

TS 711E two metre multi mode tcvr, voice unit, mint condx, bxd: £550 ono. 01952 618016 (Telford).

TS130S 10-80m 100W inc WARC bands mic, man, bxd; £400. Alinco DJ160T 2m FM handheld charger, man, bxd; £85. Buyer collects. G4NUM, QTHR. 01132686016 (Leeds).

VERSATOWER 20ft base section with 7ft header unit rotator cage, with winches and lattice base post. Ideal for a first 35ft to 40ft tower. Can supply info for planning etc. £80 ono for quick sale. Bought as mistake. Phone Peter, 01772 742422 (Preston).

VERSATOWER 40ft wall mounted head unit winches base mount. Buyer collects; £250. G4CMU, 01737 354497 (Banstead).

WRASSE SC-1 colour SS TV/fax converter as new; £125. PK232 MBX TNC + Pactor and software as new; £150. G4SWD 01892 653485 (East Sussex).

YAESU 757GX comp with man, mic, power lead include Manson EP295 25 amp. PSU all mint condx; £600. Bill. 01689 876733 (Orpington).

YAESU FT290R with 2 by MMB11 mobile mounts & YM48 condensor mic & image power supply with man; £250. GIDBL, QTHR, 01477 535196 (Holmes Chapel).

YAESU FT4700 5W-10W VHF/UHF dual band tcvr. Home brew tone burst Heatherlite mic and control 2m/70cms duplexer; £350. G0GZS, 01708 228896 (Upminster).

YAESU FT4700 dual band mobile superb condx, books; £425. Alinco DJ560 dualband hand-held extended receive CW car adapter man, spkr/mic superb condx; £250. Yaesu FT290R mk I. All mode 2 mtrs; £225. Yaesu G400RC rotator £170. 01662 251485 (Omagh).

YAESU Tx/Rx 757 GX P.U Yaesu FP757GX mic Yaesu MHIB8, mans; £550. Buyer collects. (Surrey/NE Hants border). 01428 712031.

YUPITERU 7100 scanner; £275 or exchange for general coverage rcvr Kenwood TS530S; £500 or part exchange for general coverage tcvr Eddystone 940 revalved offers all come with handbooks and include postage. Tel/fax 01851 810899. G4JNW (Western Isles).

EXCHANGE

GRC9 (angry nine) tcvr complete working. Swap for Racal Syncal 30 or other interesting gear. W.H.Y. Jim, G4XWD, (not QTHR) 01692 630285. (Norwich).

BLIND amateur cannot see display FT747GX wishes exchange for TS530 with which he is familiar. Please contact G3DYY, QTHR. 01487 841558. (Nr Hungtingdon).

HAVE Create V dipole CV730V-1 40, 20, 15, 10m unused and still bxd, would swop for TNC gwo with cables & instructions. G4MNB, 01793 826325 (Swindon).

SMART 2 phase-R burglar alarm with built in PIR detector, so ideal for single flat/bedsit without expansion, unused! List price; £79.99 sell for £45, swap for SEM QRM eliminator Mk II in same mint & bxd condx, or alternatively part-ex for 160/80m or 80/40m magnetic loop (Capco). If you can deliver. (RDP can come to view locally, but not collect). Keith, G0OZK, 0161 477 5303 (Stockport).

WANTED

FOLLOWING valves required to keep my old rigs heating the shack. 6AZ8. 6BN8. 6CL6. 6DC6. 6EB8. 6U8A. 6146. Please look in your redundant spares, your help is appreciated. Reasonable prices paid. Please write, Terry, 7, Cavendish Drive, Clowne, Chesterfield, Derbys.

BOUND volumes RadCom 1988 onwards. Valves; 6BJ7 6AZ8. Hammarlund HQ110 handbook/circuit. HP 8554B. G3GIQ, QTHR. 0181 567 6389.

CIRCUIT information multi chip control board "Fuel Boss" central heating. G4RL, QTHR. 01228 513 554 (Carlisle).

CUSHCRAFT R5 vertical antenna, preferably bxd if not local, & mark II model, but all considered. Only gwo please. 01625 531154 (Wilmslow).

DATONG FL1/2/3. Also Ten Tec Scout or similar. Memory keyer. Also Iambic key. 0171 935 7119, week days (London).

DESPERATELY needed by enthusiastic beginner, owners manual for Atlas model 350 XL tcvr with ALLX OSC model 311. Fair price & costs willingly paid for original or photocopy any help gratefully appreciated. Martin Lowther, 01241 828940 (Arbroath).

EDDYSTONE any model any condx. Clarke & Smith. Camper & Nicholson-Gosport. Dead or alive Collection possible Fax 01372 454381 or 0374 128170 (Surrey).

FDK 2m to 70cm transverter or 70cm multimode tcvr must be gwo & sensible price! WHY? G7TGY, 01273 477998 (Lewes).

HANDBOOK, circuits, component valves, etc for RF sig generators Advance E1, Murphy M3 AVO, Universal bridge, Telequipment scope 720, Taylor scope 31A. All costs, postage refunded. National HRO coils, all types. Any condition, even parts! Might even buy HRO if cheap enough! State condition and prices delivered to EFC Owen, 28 Chartfield Road, Reigate, Surrey RH2 7JZ.

HEATHKIT SB620 or any info. Info for Codar CR70A handbook, WHY, KW EEZE match. 01269 871382 (Llanelli).

HELP required by school starting an amateur radio club. Anything that you don't want that we could use would be very much appreciated. We need equipment, books, assistance WHY? If you can help contact Brian Shepherd, G7TMZ, Buttershaw Upper School, 01274 676285 (Bradford).

ICOM IC-202 2m SSB tcvr or similar. Steven, GM7TMT. 01856 873920 (Kirkwall, Orkney).

KENWOOD antenna tuner type AT230. Preferably near enough to collect by car. Peter, G0VVK, (QTHR as G7BNU). 01274 573233 (Bradford).

MANUAL for Schlumberger/Enertec 2712 universal counter required for purchase or copy. Pye modulation meter MM1 also. Phone Mike, GITFK, 01223 872258 (Cambridge).

QUAD, Leak, Radford, etc valve Hi-Hi. Also Eddystone receivers, working or not. Will pay cash + collect. 01245 381961 (Chelmsford).

RACAL speedrace equipment: MA228 exciter, RTA191 rcvr. TA349 linear amp. Cabinets 19in picture frame & table top. RA63 SSB adapter. Creed 75 teleprinter with tape transmitter & reperforator attachments, four row keyboard, silence cover. Toolkit 75. Siemens T-100 teleprinter spares & tool kit. AT&E TDMS-10. Nigel Boyd, G0UGD, 2 Church Close, Eastbourne, East Sussex BN20 9QY.

RII55 Rx, also WS19, must be complete & working, C11 SSB version, any other ex mil tcvrs WHY? Stuart, 01384 872157.

VERSATOWER (Strumech) trailer mounted. Good home waiting. Also KLM-KT34A or Gem quad. XYL's answer machine when unavailable. Robert, G0HGW. 01223 263372 (Cambridge).

WANTED windup mast 40-60 ft Northern England if possible. Needs to be strong. Exposed QTH with high wind factor. Tony, 0176 8361262 (Cumbria).

EVENTS DIARY

CLUB NEWS

DEADLINE - Items for inclusion in the September 1995 issue must be sent to HQ marked "Club News - DIARY", to be received by 23 July latest. If news is received by the published deadline, it should 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.

NOTE: This is primarily a service for clubs affiliated to the RSGB, to whom priority will be given.

AVON

RSGB CITY OF BRISTOL Group - 25, Talk 'The Internet'. Details 0117 9672124.

SOUTH BRISTOL ARC - 5, 10 metres activity evening; 12, Talk 'Gardening with Aerials and Flowers'; 19, Club 'Bullseye' Contest; 26, 70cm Activity Evening; August 2, Magazine Evening - Donate or Exchange; 9, Computer Shareware. Details 01275 834282.

BEDFORDSHIRE

SHEFFORD & DARS - 1/2, VHF/UHF field day contest; 13, Mobile DF hunt; 20, Barbecue. Details 01462 700618.

BERKSHIRE

BRACKNELL ARC - 8, Barbecue; 12, HF Radio; August 9, Radio Treasure Hunt. Details 01344 420577.

READING & DARC - 16, McMichael Rally and talk-in. Details 01734 698274 (eves).

BUCKINGHAMSHIRE

AYLESBURY VALE RS - 5, Talk 'Operating Techniques' by I Eamus. Details 01296 437720.

CHESHIRE

CHESTER & DARS - 11, Barbecue; 18, Fox hunt; 25, Surplus Equipment Sale. Details 051 608 3229.

WARRINGTON ARC - 2, Quiz night; 18, Talk 'Superlinear Receivers' by Colin Horrabin, G3BSI; 25, Talk 'The PC and Internet Revisited' by Dave, G7TLT. Details 01925 762722.

CORNWALL

CORNISH ARC - 6, Preparations for the Cornish ARC Radio Rally & Computer Fair. Details 01209 820118.

SALTASH & DARC - 21, Skittles night; 29, Annual river trip to the River Yealm; August 4, HF Field Day planning. Details 01752 844321.

DERBYSHIRE

BUXTON RA - 11, Talk 'PMR/EPROM Conversion' by Mike, G0TGS; August 8, Quiz night. Details 01298 25506.

DERBY & DARC - 5, Junk sale; 19, Talk 'The Internet - How It Works' by Cindy Copsey of INNOTTS; August 2, Junk sale; 9, Rally preparation meeting. Details 01773 852475.

SOUTH NORMANTON, ALFRETON & DARC - 7, 70cm Fox hunt; 10, Talk 'Barundi' by Lorri Partington; 17, Junk sale; 24, Talk 'Railways and the Mail' by Harold Wilson; August 9, Committee meeting; 14, On the air evening. Details 01773 521456.

DEVON

EXMOUTH ARC - 5, Visit to Devon Fire & Rescue HQ Control Room; 19, Fox hunt. Details 01395 279574.

TORBAY ARS - 21, Talk 'Modern Telecommunications' by John, G3YCH. Details 01803 526762.

DORSET

BLACKMORE VALE RS - 11, Satellite Working & Demonstration; 25, Barbecue. Details 01935 814055.

EAST SUSSEX

HASTINGS E & RC - 19, Equipment auction. Details 01424 830454.

SOUTHDOWN ARS - 3, Barbecue; 9, Sussex Mobile Rally; August 7, Short presentations by members. Details 01825 763022.

ESSEX

CHELMSFORD ARS - 4, Talk 'The Industrial and Science Museum' by Dr Geoff Bowles; August 1, Talk 'A Computer aided Look at the G5RV Antenna and Feeder System on all HF Bands'. Details 01245 256654.

COLCHESTER RADIO AMATEURS - 13, Talk 'Operating QRP' by Dave Penn, G3PEN.

FIFE

GLENROTHES & DARC - August 9, Presentation on Novice Courses. Details 01592 265789.

GRAMPIAN

ABERDEEN ARS - 7, Junk sale. Details 01569 731177.

GREATER LONDON

ACTON, BRENTFORD & CHISWICK RC - .18, Low power field day results. Details 0181 992 3778.

BROMLEY & DARS - 18, Short talks. Details 0181 777 0420.

COULSDON ATS - 10, Quiz night; August 14, Barbecue. Details 0181 684 0610.

CRAY VALLEY RS - 6, Talk 'Meridian UHF'; 20, Talk 'Camcorder Techniques' by G0JBT; August 3, On the air evening. Details 0171 739 5057 (office hours only).

CRYSTAL PALACE & DRC - 15, Annual outing. Details 0181 699 5732 or 01737 552170.

DARENTH VALLEY RS - 12, DF competition; 26, On the air evening. Details 01689 826846.

SOUTHGATE ARC - 13, Talk 'Hints & Tips from Industry for Homebrew' by George Squires, G7HGS; 27, On the air evening; August 10, Barbecue. Details 0181 360 2453.

SUTTON RS - 20, Talk 'Moonbounce' by Peter Blair, G3LTF. Details 0181 644 9945.

WIMBLEDON & DARS - 14, Construction display; 28, Camp Briefing; August 6, Summer camp; 11, On the air evening. Details 0737 351313.

GREATER MANCHESTER

BURY RS - Please note the club's contact number is 0161 762 9308.

ECCLES & DARS - 4, Talk 'Videotape Editing' by G0KLF; August 1, Talk 'PME' by G6FEI. Details 0161 773 7899.

SOUTH MANCHESTER RC - 7, Radio Clinic; 14, Amateur TV. Details 0161 969 1964.

WIGAN-DOUGLAS VALLEY ARS - The club is currently meeting at the temporary location of The Hesketh Arms, Shevington, Wigan. Details 01924 211397.

GWYNEDD

DRAGON ARC - 17, The secretary's evening; August 7, Demonstration of home brew equipment. Details 01248 600963.

HAMPSHIRE

BASINGSTOKE ARC - 30, 2m direction finding competition. Details 01256 25517.

HORNDEAN & DARC - 25, Talk 'Low Power Radios for Telemetry'. Details 01705 472846.

ITCHEN VALLEY ARC - 14, Talk 'Introduction to Packet - the Basics' by Brain, G0UKB; 28, Construction night. Details 01703 813827.

THREE COUNTIES ARC - 5, Talk on fibre optics; 8/9, Trip to France; 19, Global Positioning System; August 2, Construction competition. Details 01428 606298.

WINCHESTER ARC - 21, Talk 'Antennas' by Dave, G0AYD. Details 01962 860807.

HEREFORD AND WORCESTER

BROMSGROVE ARS - 11, 2 Metres DF hunt; 25, Talk on test equipment; August 8, Talk on technical topics. Details 01527 542266.

DROITWICH ARC - 4, Talk 'Creepy Crawlies, Snakes and Things' by Allan Wilkie. Details 01905 778794.

HERTFORDSHIRE

CHESHUNT & DARC - 19, Portable evening on Bass Hill Common; August 2, Junk Sale. Details 01992 464795.

HARPENDEN ARC -. Details 01707 372044.

HODDESDON RC - 6, On the air evening; 20, Visit to Hertfordshire Police HQ. Details 01992 460841.

WELWYN - HATFIELD ARC - 3, Mystery Tour; 17, RSGB video and WHARC constructors competition. Details 01920 462241 (eves) or 0181 982 7298 (day).

HUMBERSIDE

GRIMSBY ARS - 6, Treasure hunt; 20, Visit to Humber Radio; August 3, Talk 'Data Bases' by Chris, G7BRZ. Details 01472 825899.

HORNSEA ARC - 12, Barbecue; 19, Talk 'Innishmann DXpedition' by G7NNT; 26, Talk 'Transmission Lines' by G1YVL; August 9, Talk 'The Buccaneer' by G3RMX. Details 01964 562258.

KENT

EAST KENT RS - 7, Barbecue; 21, Portable operating night. Details 01277 743070.

LANCASHIRE

PRESTON ARS - 6, Fox Hunt; August 3, Check of the society's equipment. Details 01772 686708.

THORNTON CLEVELEYS ARS - 3, Barbecue; 10, Talk by North-West Water; 17, 2m Fox hunt; 24, Surplus equipment auction. Details 01253 853554.

LEICESTERSHIRE

LEICESTER RS - 3, Night on the air; 10, Committee meeting and night on the air; 17, Shareware swap evening; 24, On the air evening; 31, Talk 'IBM PCs - How Do They Work?' by Tom, G4RLC; August 7, Junk sale; 14; Committee evening and night on the air. Details 0116 2917250.

MERSEYSIDE

LIVERPOOL & DARS - 4, Aerial Planning; 11, On the air evening; 18, Quiz; 25, Surplus sale. Details 0151 722 1178.

WIRRAL ARS - 1, Special event station to celebrate 200th anniversary of the Borough of Ellesmere Port and Neston; 5, DF contest; 19, Talk 'Introduction to ATV' by Brian Copeland; August 2, Visit to RARE. Details 0151 644 6094.

NORFOLK

ARC OF FAKENHAM - 1/2, GB100 NT - Oxborough Hall special event station; . Details 01485 528633.

NORFOLK ARC - 5, Night on the air; 12, DF Hunt; 19, On the air evening; 26, Video screening of Old Norwich Jack, G3NJQ; August 2, On the air evening; 6, Club trip to Woburn Abbey; 9, Talk 'Science for All' by Arnold, G3PTB. Details 01603 789792.

NOTTINGHAMSHIRE

MANSFIELD ARS - 10, Talk 'Parachute Mobile - A Novel Way of Transmitting While Parachuting to Earth' by Roy, G4CMT; August 14, Ashfield Show preparation. Details 01623 792243 or 01623 423697.

WORKSOP ARS - 25, Treasure hunt. Details 01909 487741.

SHROPSHIRE

OWESTRY & DARC - The club now meets the first and third Wednesdays each month. Details 01691 830328.

SALOP ARS - 1/2, NFD; 13, Packet radio with SPUG; 20, Fox hunt; August 3, Visit to Shropshire Star. Details G7SBD QTHR or @ GB7PMB.

TELFORD & DARS - 1/2, Participation in the VHF NFD. Details 01952 588878.

SOMERSET

TAUNTON & DARS - Talk 'Application of Ionising Radiation' by Graham, G0GTR; 21, Talk 'How I Got into Amateur Radio' by Doug, G5JJ. Details 01823 680 778.

WEST SOMERSET ARC - 4, Videos followed by a discussion; August 1, Multi choice marker. Details 01984 631470.

YEOVIL ARC - 6, Talk 'A QRP Expedition to Herm Island' by G3ICO; 13, Talk 'Alternative Hobbies' by G3KSK; 20, Talk 'Two Metre Rigs' by G7SDD; 27, Committee meeting and on the air evening; August 3, Club Project - the Taunton HF Multiband Rig by G3PCJ; 10, Talk by RSGB RLO G4NQI. Details 01935 813054.

SOUTH YORKSHIRE

BARNSLEY & DARC - 3, Junk sale; 17, Talk 'Cameras' by Des, G3PTV. Details 01226 716339.

DRONFIELD & DARC - 5, Quiz night; 12, Fox hunt; 19, On the air evening; 26, Fox hunt; July 3, Treasure hunt; 10, Fox hunt; 17, Barbecue; 31, Fox hunt; August 7, On the air evening; 14, Joint fox hunt with Sheffield ARC. Details 01246 290250.

SHEFFIELD ARC - 3, Talk 'DX Hunting' by Don, G4KXW; 4, Raynet meeting; 11, Ten pin bowling; 17, Visit to Radio Sheffield; 24, Quiz; 25, Swimming; 31, Committee meeting. Details 0114 244 6282 or G0JJR @ GB7CWS.

SUFFOLK

BURY ST EDMUNDS ARS - 11, Talk 'Amateur Satellites - including the new RS15' by Pat, G3IOR. Details 01284 728418.

FELIXSTOWE & DARS - 2, Special event station - Landgard Fort Museum using GB2FX; 8, Special event station - Orwell Park School Open Day; 9, Kite flying, HF operation and picnic; 23, DF hunt; August 6, Visit to Woburn Rally. Details 01394 273507.

IPSWICH RC - 5, Contest logging software practice; 12, Barbecue; 22, 2m contest; 26, CW practice evening. Details 01473 644522.

SUDBURY & DRA - 4, Talk 'Operating QRP' by Dave, G3PEN. Details 01787 313212 (before 10pm).

SURREY

SURREY RADIO CONTACT CLUB - 3, Talk 'Acoustic Audio' by Brian Davis, G3OYU; August 7, Barbecue. Details 0181 668 7517.

WARWICKSHIRE

MID WARWICKSHIRE ARS - 11, Fox Hunt; 25, Visit to Campion Hills Water Treatment Plant. Details 01926 424465.

STRATFORD Upon AVON & DARS - 24, Construction competition. Details 01789 740073.

WEST MIDLANDS

STOURBRIDGE & DARS - 3, Portable on the air night. Details G7HEZ @ GB7PZT or 01384 374354.

WEST SUSSEX

CHICHESTER & DARC - 4, Open Evening. Details 01243 573541

WORTHING & DARC - 19, Talk 'Christmas in Australia' by G7SUG; August 2, Talk 'Packet Radio' by G8DHE. Details 01903 753893.

WEST YORKSHIRE

DENBY DALE & DARS - 5, Talk 'Simple and Unusual Aerials' by Gerald, G3SDY; 19, Talk 'Free and Easy - Huddersfield Holiday' by Paul, G0LVV; August 2, Sommer Camp meeting; 6, Woburn Rally coach trip. Details 01484 547553.

HALIFAX & DARS - 4, Visit to Menwith Hill. Details 01422 202306.

KEIGHLEY ARS - 13, Packet on the air; 27, Fox hunt. Details 01274 496222.

WAKEFIELD & DRS - 4, Video of the Northern Cross Rally 95; 11, Treasure Hunt; 18, Talk 'Pressure Vessels' by G7JTH. Details 0113 282 5519.

WILTSHIRE

TROWBRIDGE & DARC - 5, Summer skittles party; 19, CW tuition. Details 01225 864698 (evenings).

CONGRATULATIONS

To the following who our records show as having reached fifty years continuous RSGB membership this month:

Mr R H B West, GW2DPD
Mr R L Barrett, G2FQS
Mr J P Wilson, GW3BGP
Mr J F Stratfull, G3IJS
Mr A H Thompson, RS10411

RALLIES AND EVENTS

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

2 JULY

The 6th YORK Radio Rally - Tattersall Building, York Racecourse, York. Doors open at 10am. Admission £1.50. Children accompanied with adult free. Ample Free parking. Amateur radio, electronics and computers, Morse tests and repeater groups plus refreshments and a licensed bar. Talk-in on S22. Details Dave, G7FGA 01904 790079.

7 - 9 JULY

AMATEUR RADIO CARAVAN & CAMPING CLUB Rally - Brooksby Agricultural College, Leics. Details G4LWA QTHR, tel: 01494 531755.

8 JULY

CORNISH Radio Rally and Computer Fair - Penair School, Truro. Doors open at 10.30am. Large hall with trade stands, bring and buy, official Morse test, free parking, talk-in on S22. Information & booking Ken, G0FIC 01209 821073.

9 JULY

SUSSEX Amateur Radio & Computer Fair - Brighton Racecourse, Sussex. Open 10.30am to 4pm. Admission £1.50. Features include trade stands, giant bring and buy, free parking, bar and picnic areas. Talk-in assistance available on S22. Information and booking Ron, G8VEH 01903 763978 or 0273 417756 office hours.

16 JULY

NORFOLK RAYNET BARFORD Rally - Village Hall, Barford, on B1108, Norwith to Watton Road. Open from 10.30am to 3.30pm. With trade stands, raffle, refreshments etc. Free car parking and talk-in on S22. Details 01603 625833 (day) or 01362 820820 (evenings).

RAIBC Romsey Picnic - Broadlands, Romsey. All members, families, friends and supporters welcome. With grand draw, junk sale and refreshments. Talk-in on S22. Details John, G4COM, 01703 693017.

12TH McMICHAEL RALLY - Haymill Youth and Community Centre, Burnham Lane, Slough, near Burnham Railway Station. Doors open at 10.30am. Admission £1.50. Includes car boot sale (no advance bookings) at £7 per pitch on the day. Also talk-in on S22. For trade bookings contact Chris, G0MZN 01734 874870 or Ed, G7PRS 01734 411117. General details from Dave, G3SET on 01628 486554.

22 JULY

AIR FORMATION Open Day - Colerne Airfield. The 12th, 15th and 18th Air Formation Signals Regiments Association will be exhibiting a caravan/awning display about the Bar-None Motorcycle Club as well as the association's activities in the Middle east during 1945 - 47. GB4AFS will be active on various bands. All applications etc to Geoff Baldry on 01225 743240 x5256.

23 JULY

COLCHESTER Radio & Computer Rally - St Helena School, Sheepen Road, Colchester, adjacent to the Colchester Inner bypass Avenue of Remembrance. Doors open 10am - 4pm. Wide range of radio and computer traders, amateur radio car boot sale and bring and buy. Refreshments and licensed bar. RSGB Morse tests on demand but two passport size photographs must be produced. Admission £1.50 with ample free parking space and easy access for wheelchairs. Talk-in on S22. Details Richard, G7BIV, 01376 571239.

2nd HUMBER BRIDGE Amateur Radio Rally - The Exhibition Centre, Freightliner Road, Off Clive Sullivan Way, Hull, East Yorkshire. Opens 11am (10.30am for disabled visitors). Easy access one mile from the bridge with on site parking 700 cars. The event will centre on two large halls with a bring and buy sale plus full disabled access, talk-in, bar and cafe. Morse tests available on demand from 10-1.30pm but two photographs must be produced. Details or bookings Roly, G0UKS 01482 837042.

THE OUTDOOR BOAT AND LEISURE SHOW - Powderham Castle, Nr Exeter, Devon. The event will feature a large amateur radio section of new and used equipment. More than 2,000 exhibitor spaces are available on the 25 acre show ground with an additional 25 acres of parking. Details 01626 890243.

27 - 30 JULY (THURSDAY - SUNDAY)

AMSAT-UK Colloquium - The University of Surrey, Guildford. Details Ron, G3AAJ 0181 989 6741. See page 73.

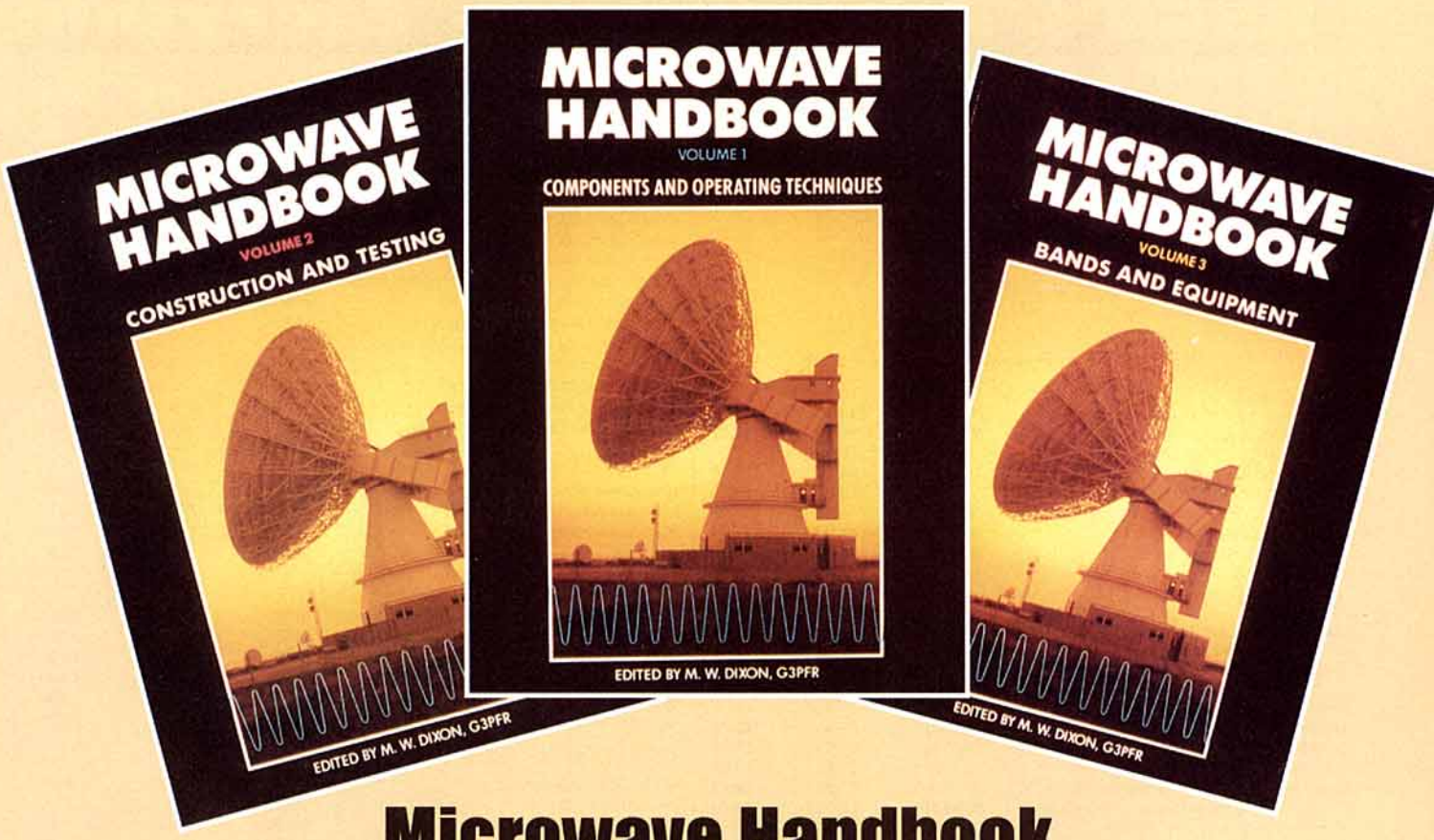
28 JULY - 5 AUG

AMATEUR RADIO CARAVAN & CAMPING CLUB Rally - Lytchett Matravers, Dorset. Details G4LWA QTHR, tel 01494 531755.

30 JULY

RUGBY ATS 7th Annual Amateur Radio Rally - BP Truckstop on A5, three miles east of Rugby, 2.5 miles north west from M1 junction 18. Open from 10am. Admission £1 per car. Talk-in on S22 by GB7RRR. Pitches are £7 pre-booked or £10 on the day. Details 01455 552449. For bookings 01788 824214.

CONTINUES ON P92



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● 1995 Super Frequency List on CD-ROM (Klingenfuss) (See review, *RadCom*, May 95)	**£22.00**
● ARRL Radio Designer (ARRL)	**£118.91**

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Radio Society of Great Britain
Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE

CONTINUED FROM P88

SCARBOROUGH ARS Radio Electronics and Computer Fair - Details Ross, G4ZNZ 01377 257074.

6 AUGUST

RSGB WOBURN Rally - Woburn Abbey, Bedfordshire. M1 Junction 13 follow signs for 'Woburn Park' of 'The Abbey'. Doors open at 10am. Over 100 exhibitors and large RSGB bookstall. Talk-in stations by Dunstable Downs RC. Details from Norman Miller, G3MVV, 01277 225563.

13 AUGUST

38th ANNUAL DERBY Mobile Rally -. Details 0332 556875.

FLIGHT REFUELLING ARS Hamfest'95 - Flight Refuelling Sports Ground, Merley, Wimborne, Dorset. Doors open from 10am to 5pm. Includes the usual mix of traders, bring and buy, craft exhibitors, car boot sale and field events. Overnight camping facilities available for Saturday 12 August. Talk-in on S22. Please note new traffic routing and follow signs. Details Richard Hogan, G4VCQ 01202 691021.

18 AUGUST

COCKENZIE & PORT SETON ARC Radio Junk Night - Tables will be provided on a first come first serve basis (no charge for the table). Raffle at approx 8.30pm. Entry fee is £1 for all persons. Refreshments available. All the money raised is to be donated to the British Heart Foundation. Details Bob, GM4UYZ on 01875 811723 or via GB7EDN.

19 - 20 AUGUST

STAFFORD Amateur Radio and Computer Show (incorporating RSGB National Convention) - The County Showground, Stafford. open from 10am to 5pm on both days. Large trade presence plus special interest groups, Morse tests, talk-in, bring and buy, lectures each day. Other attractions include free parking, bars and catering plus free stands available to radio/computer clubs and societies. Details 01923 893929.

20 AUGUST

6th GREAT EASTERN Rally - The Cattle Market, Hardwick Narrows, Nr Kings Lynn. Opens at 10am (9.45am for the disabled). Features outdoor car boot area, bring and buy sale, talk-in on S22. With a spacious indoor area with national exhibitors. Easy access for the disabled plus free parking and refreshments. Details Ian, G0BMS 01553 765614 or at GB7OPC.

WEST MANCHESTER Radio Clubs 'Red Rose' Rally - Silverwell St. Details Albert, G7RZW 01204 62980.

25 - 28 AUGUST

AMATEUR RADIO CARAVAN & CAMPING CLUB Rally - Stratford upon Avon, Warwickshire. Details G4LWA QTHR, tel: 01494 531755.

27 AUGUST

TORBAY ARS ANNUAL Mobile Rally - Clenon Valley Leisure Centre, Paignton, Devon. Doors open at 10am. With trade stands, bring and buy, special interest displays, use of leisure facilities, restaurant and bar. Family attractions include the beach, boating lake, steam railway and flume water park only four minutes walk away. Details John, G3YCH, QTHR on 01803 842178.

EAST COAST Amateur Radio & Computer Rally - Details 01473 272002.

28 AUGUST

HUNTINGDONSHIRE AMATEUR RADIO SOCIETY Seventh Annual Bank Holiday Monday Rally - St Peter's Road, Huntingdon, Cambridgeshire. Doors open at 10am. Admission is £1. Refreshments available. Features two halls and a car boot sale on hardstanding surface. Details David, G7DIU 01480 431333.

2 SEPTEMBER

ANNUAL WIGHT WIRELESS Rally - National Wireless Museum, Arreton Manor, Newport, IOW. Open between 11am and 5pm. Free admission to the Wireless Museum and the extensive gardens plus free parking. Also, no charge for trade stands or the bring and buy sale. Collection for the Radio Invalid and Blind Club. Refreshments from the Cafeteria and talk-in on S22. Details Douglas, G3KPO 01983 567665.

3 SEPTEMBER

BRISTOL RADIO RALLY - Doors open from 10am until 4pm. Admission £1 and free to accompanied children under 12. Features include more than 100 tables with table hire at £15 each, a large bring and buy sale, refreshments, ample under cover parking and talk-in on S22 Details Muriel, G4YZR 01275 834282 (24 hour answerphone.)

18th TELFORD Rally - Telford Exhibition and Racquet Centre, Telford. Easy access from M54 - well sign posted. Free parking, trade stands, flea market, bring and buy, special interest groups and RSGB in attendance. Conference room available if required. Details 01952 588878 or 01743 249943. Traders only contact Jim on 01952 684173.

VANGE ARS Rally - Details Stuart, G1VWB 01375 859632.

8 - 10 SEPTEMBER

AMATEUR RADIO CARAVAN & CAMPING CLUB Rally - Details G4LWA, QTHR, tel 01494 531755.

9 SEPTEMBER

BALLYMENA ARC Annual Rally - Ballee High School. Details GI4HCN, QTHR, tel 01266 659769.

9 / 10 SEPTEMBER

RSGB 1995 International HF Convention - A full Convention Prospectus will be available shortly, which will include an advance booking form. Send and SAE to: Marcia Brimson, RSGB HQ, Lambda House, Cranborne Road, Potters Bar, Hertfordshire EN6 3JE, UK.

10 SEPTEMBER

BARTG Rally - Sandown Exhibition Centre, Sandown Park Racecourse, Esher, Surrey. Ten minutes from junc 10 of the M25. Set in a large, spacious hall with plenty of free parking. Most aspects of radio catered for with a special emphasis on Data Communications. Other features include more than 250 tables with computers, computer peripherals, software, books, publications, aerials, kits, components and test equipment. Details Peter Nichol, 38 Mitten Ave., Rubery, Rednal, Birmingham. B45 0JB tel 0121 680 5963.

THE 14th LINCOLN HAMFEST - Lincolnshire Showground. Entry is £1.50. Morse tests available plus all the usual attractions. Details Sue, G8VGF 01522 525760.

SOUTHEND & DRS 75th Anniversary Radio & Computer Rally - ***New Venue*** Cliffs Pavilion, Southend-on-Sea. Admission £1.50, concessions £1. Doors open at 10am. Parking plus refreshments from Maritime Bar. Morse tests available on demand but two photographs must be provided. RSGB in attendance and a display of historic radios from the Essex police. Talk-in on S22. Details Ron, G0UAW on 01702 353676 or fax Martin, G0OQR on 01702 602271.

17 SEPTEMBER

CENTRAL LANCASTER Radio Rally - Central Lancaster High School, Crag Road, Lancaster, five minutes from junc 34 of the M6. Doors open at 10.30am. Entrance fee is £1.00. Features include the usual traders, special interest groups, bring and buy plus refreshments. Details Susan 01524 64239 or 01384 896199.

PETERBOROUGH RADIO & ELECTRONICS SOCIETY East of England Rally - Peterborough Showground. Easy access from A1, A605, A47. Trade stands, radio car boot sale and plenty of free parking. Plus full parking and bar. Doors open at 10.30am, 10am for disabled visitors with talk-in on S22 via G3DQW. Admission £1. Details Vince, G8NGZ on 01733 331211.

23 SEPTEMBER

RADIO AMATEUR TABLE TOP SALE - St Mary's Hall, Reddish, Stockport. Starts 10am with talk-on on S22. Details John, G4ILA on 0161 477 6702.

24 SEPTEMBER

HARLOW AR AND COMPUTER SHOW - Harlow Sports Centre. Easy access off junc 7 of the M11, A414. Doors open at 10.30am. The large ground floor main hall will feature a selection of traders both old and new with products ranging from complete radio/computer systems through to software, electronic components and second hand equipment. There will also be a special interest area and a large club bring and buy stall. All car parking and free and there is talk-in on S22 and 70cm SU22 by G7REF. Full facilities for the disabled plus parking next to the entrance. Details Mike, G7BNF on 0850 487863.

NORTH WAKEFIELD Radio Club Rally - Outwood Grange School, Potovens Lane, Outwood, Wakefield. Doors open at 11am, 10.30am for the disabled. With traders of radio, peripherals and computers. Also features special interest groups, repeater groups, bring and buy sale, canteen facilities, licensed bar and Morse tests on demand with two photos needed. Details John, G4RCG on 01924 362144 or John, G0EVT 01924 825443.

THE THREE COUNTIES Radio Rally, Malvern Worcs - Details & bookings Eddie, G4POZ on 01905 773181.

29 SEPTEMBER-1 OCTOBER

WACRAL 1995 CONFERENCE - Highbury Hotel, Weston-Super-Mare. On air activities with G3NJB. Cost will be £70 including meals and accommodation. Details G4EZU, 124 Darnley Road, Gravesend, DA11 0SN.

AMATEUR RADIO CARAVAN & CAMPING CLUB Rally - Thurlaston, Leics. (AGM). Details G4LWA QTHR, tel 01494 531755.

1 OCTOBER

THE GREAT LUMLEY Amateur Radio Rally - Details G1JQT on 0207 237927.

8 OCTOBER

COMPUTERCATIONS 95 Computer & Radio Rally - Details 01803 522216.

KIDDERMINSTER & DARS Rally - Details G8JTL on 01384 894019.

SOUTH DEVON RC Rally - Details 01803 522995.

13-15 OCTOBER

AR CARAVAN & CAMPING CLUB Rally - Elkington, Nr Welford, Northants. Details G4LWA QTHR, tel 01494 531755.

20/21 OCTOBER

LEICESTER AR Exhibition - Details Frank, G4PDZ on 0116 287 1086.

29 OCTOBER

HORNSEA ARC Rally - Details Duncan, G3TLI on 01964 532588.

4 / 5 NOVEMBER

NORTH WALES Radio/Computer Rally - Details Barry Mee, GW7EXH on 01745 591704.

12 NOVEMBER

THE GREAT NORTHERN Hamfest - Details Ernie, G4LUE on 01386 748958.

MARS-STOCKLAND Radio/Computer Rally - Details Norman, G8BHE on 0121 422 9787.

19 NOVEMBER

BISHOP AUCKLAND RAC Rally - Details Mike Shield 01388 766264.

26 NOVEMBER

BRIDGEND & DARC Radio Rally - Details Mike, GW7NIS on 01656 722199.

WEST MANCHESTER Radio Club's 'Winter' Rally - Details Albert, G7RZW 01204 62980.

3 DECEMBER

THAMES VALLEY Electronics Rally - Details 01494 450504.

VERULAM ARC Rally - Details Ian, G0PAU on 01923 222284.

4 FEBRUARY

LANCASTRIAN Rally - Details Sue Griffin on 01374 290088.

SOUTH ESSEX ARS Radio Rally - Details David, G4UVJ on 01268 697978.

17 MARCH

TIVERTON SOUTH RADIO's 10th Rally - Details 5 Butter Leigh Drive, Tiverton, Devon EX16 4PN.

12 MAY

DRAYTON MANOR Radio & Computer Rally - Details Norman, G8BHE 0121 422 9787 (evenings).

GB CALLS

The list below shows special event stations licensed for operation during this month. The information was taken from the HQ computer. These callsigns are valid for use from the date given but the period of operation may vary from 1-28 days.

JULY

1	GB0CDN	Coastal Defence Needles
	GB0DSF	Dosthill School Fete
	GB1CED	St Cedd
	GB1WC	Ware Carnival
	GB100NT	National Trust
	GB125BRC	British Red Cross 125th Year
	GB2AFU	Air Force Uxbridge
	GB2BLE	Bristol Lundy Expedition
	GB2DTS	Dagenham Town Show
	GB2FX	Felixstowe & DARS
	GB2OD	Siemens Plessey Open Day
	GB2WAD	Waddington
	GB4FT	Fordown Tower
	GB4OOO	Ormskirk Occasional Opps
	GB4WSF	Wick School Fete
	GB5EPN	Ellesmere Port & Neston
	GB5LI	Lundy Island
2	GB2CHG	Cupar Highland Games
4	GB2RVS	Rettendon Village Show
5	GB2SWC	Saffron Waldon Crank Up
	GB4AFS	Air Formation Signals
6	GB2RCC	Radio & Caravan Club
7	GB100NT	National Trust Centenary Year
	GB2FAC	Francis Asbury Celebrations
	GB5SR	Stellar Radio Net
8	GB4SSF	Stanway School Fair
	GB4SUK	Sharp Co Uk
10	GB2SHS	Sacred Heart School
	GB4ATC	Air Training Corps
	GB8RT	Royal Tournament
13	GB1GP	Grand Prix
14	GB1CDC	Cromwell District Cubs
	GB125BRC	British Red Cross 125th Year
	GB2RYF	Romiley Young Farmers
	GB2SD	Stowmarket District
	GB2SWG	Sussex West Guides
	GB2TAC	Town and Country
	GB4BEW	Birds Eye Walls
	GB4VEC	Victory in Europe Celebration
	GB5WF	Wolverly Festival
15	GB0ESS	Emergency Services Southend
	GB0RSA	Royal Signals Association
	GB0SRA	Southend Radio Anniversary
	GB100NT	National Trust Centenary Year
	GB4OM	Oldham Museum
	GB5OVE	Victory in Europe Celebration
16	GB0WMF	West Midlands Fire
17	GB4YAM	Yamaha
18	GB2CDU	Coastal Defence 'U'
19	GB2TAM	Tangmere Air Museum
21	GB4EPH	Elderly Peoples Home
22	GB0PCB	Powder Castle Boatshow
	GB100NT	National Trust Centenary Year
23	GB2HBR	Second Humberside Rally
24	GB2GAC	Glos' Hire Aviation Collection
27	GB2RCC	Radio & Caravan Club

SILENT KEYS

WE REGRET to record the passing of the following radio amateurs:

G0EEU	Mr S S Heywood	25.4.95
G0LFB	Mr B C Rowe	20.4.95
G0LON	Mr G Birch	20.1.95
G0ORZ	Mr P R Sutton	24.3.95
G1FLX	Mr S Pickstone	
G1FLZ	Mr N P H Riley	11.4.95
G2DSV	Mr W A E Holl	6.3.95
G3HMN	Mr K S Hart	April 1995
G3XRV	Mr C W Mallett	4.4.95
G6OLX	Mr J T White	14.3.95
G6WYJ	Mr F Edwards	19.4.95
G7TEH	Mr F Sorrell	22.3.95
G8UQ	Mr H C Aldred	2.4.95
GU2ASO	Mr G H Smith	5.3.95
HB9AWP	Mr R W Peel	20.3.95
RS30612	Mr A G Buckingham	7.4.95
RS93127	Mr S I Shepard	21.2.95
RS96194	Mr J H Smalley	
2E1CPU	Mr A Sykes	14.4.95

VE Day Commemorated

Yeovil Exhibition

THE YEOVIL AMATEUR Radio Club operated the special event station GR0VEY over a period of nine days to commemorate the 50th anniversary of VE Day in May. In all, 555 contacts were made with 85 countries on HF SSB and CW, with a few QSOs on VHF FM. Contacts included Canadian, Maltese, Dutch, French and Russian VE Day special event stations.

On VE Day itself, 8 May, YARC set up an exhibition station open to the general public in Yeovil town car park. WWII-vintage equipment was used to make contact with a number of stations, including TM5ORB/P, representing the Maquis of Morvan, in the Monts du Morvan area of France.

Captain Vic Charlbois visited the ATC station which he had contacted from his airplane the day before. He is pictured with Air Cadet Civilian Instructor Sue Butler, who is an air traffic controller.

ATC in Hyde Park

The RSGB shared a tent with the Air Training Corps at the VE Day 50th Anniversary Show at Hyde Park (see last month's *RadCom News*). GB4VEC was operated by cadets, many of whom had Novice licenses, under the supervision of Tony Selmes, G4KLF, and Ray Degg, G0JOD.

One visitor used a mobile phone to set up a QSO between GB4VEC and a friend at home in Athens. Air Cadet frequencies were used to make many HF contacts with aircraft.

The Hyde Park display was supported by many companies and individuals. The following are thanked for their assistance: Icom (UK) for the loan of radios; David Taylor of Strumech Versatower for the loan of the mast; Ian Philips, G0RDI, for transporting the mast; West London repeater Group; Whitton ARG; and Alan Hobbs, G8GOJ, and 1924 (Shirley) ATC Squadron for the loan of the T1154/R1155.

The close links between the ATC and amateur radio go back 50 years. Former RSGB Secretary John Clarricoats, G6CL, was a Flight Lieutenant Signals Officer in the Southgate ATC in the forties, teaching radio, and remained connected with the Corps until his death.

● THE AIR TRAINING CORPS will, once again, be running special event amateur radio stations alongside their own comms demonstration at the Royal Tournament. GB4ATC, G3ATC and GB8RT will be on the air 1000 - 2100UTC during the event which takes place 18 - 29 July.

PHOTOGRAPH: G4PDG

Peter Burridge, G3CQR, operating GR0VEY on VE Day, 50 years on. The transmitter is a WWII 16W input B2 clandestine suitcase set, with a CR100 receiver. To the right is an RCA AR88 receiver.

Stockport Radio Society History

TO CELEBRATE the 75th anniversary of its founding, Laurie Newman, G4ZDO, has produced *A Brief History of Stockport Radio Society*. This A4-format book has 32 pages of text and 32 pages crammed with photographs of equipment, operators, and copies of fascinating original documents dating from the early 1920s up to the present.

The book was produced primarily for members and friends of the society and to tell the story of the society to the townspeople of Stockport, but it will be enjoyed by anyone with even a passing interest in the history of amateur radio. You can obtain a copy for £6, which includes postage and packing, direct from, Laurie Newman, G4ZDO, QTHR. Cheques should be made payable to 'Stockport RadioSociety'.

You Can Fly on a Satellite

WELL, NOT QUITE - but your name and callsign could be included on a plaque which will fly on the innovative Phase 3D satellite due for launch next year.

The offer is open to those sending in a larger than average donation to the P3D fund. To qualify, individuals should send £150 or more, and commercial organisations £5,000 or more. The plaque will be photographed and a copy sent, together with a certificate, to the donor after the launch. Publicity will be given to the first three to make donations in each category after May 95. Those having already donated large amounts will be included on the plaque.

Donations *of any size* are welcomed and a certificate of thanks will be sent *if requested*.

Send your contribution to: Ron Broadbent, MBE, G3AAJ; 94 Herongate Road; Wanstead Park; London E12 5EQ. Credit card donations can be made by calling 0181 989 6741, or by fax to 0181 989 3430; Compu-Serve100024, 614; or Internet R.BROADBENT @EE. SURREY.AC.UK.

Morse Testing Now at HQ

ARRANGEMENTS HAVE BEEN made for Morse Tests to be available on demand whenever RSGB Headquarters is open on a Saturday, ie the third Saturday in each month from 10am to 4pm. Candidates need not book but must bring with them the test fee (£18 for 12WPM or £13 for 5WPM) and two passport-type photos.

Get Abreast of RSGB Business

FOR SOME TIME the Society has issued its RLOs with a quarterly *RLO Newsletter* containing all the latest information on the workings of all the Society's committees, and news from HQ. It is an invaluable document if you want to keep abreast of the latest news concerning the work of the Society on behalf of the amateur radio community both within the UK and in IARU Region 1. This newsletter is now available to members at a cost of £6.00 per annum inclusive of postage. See our *Book List* on pages 90/91 for how to order it.

Royal Signals Celebrate 75th

THE END OF JUNE sees the 75th Anniversary of the Royal Signals and a special event station, GB75RS, will operate from Scarborough on 28 June as well as for 36 hours prior to, and during, the Royal Signals Amateur Radio Society's AGM in Blandford on 8/9 July. The station will operate on all main RSARS frequencies on HF CW, SSB and RTTY, as well as 2m FM and SSB.

Friendship Club

IN MARCH *RadCom News*, we ran a story asking for volunteers to revive the Club of Friendship, founded in 1987 by Ken Norvall, G3IFN, to promote links between Russia and the UK. The prospective new co-ordinator is Howard Ketley, G1JGY, who would like to hear from anyone interested in the project. Write to him, QTHR, or call/fax 01623 423697.

STELAR Guides Teachers

WITH A VIEW to taking amateur radio into their classrooms, 17 teachers attended a four day RAE course in April. The course,at Kenwood's HQ near Watford, was organised by STELAR (Science and Technology through Educational Links with Amateur Radio).

The training was headed by STELAR chairman Richard Horton, G3XWH, and Hilary Claytonsmith, G4JKS. Lecturers included David Evans, G3OUF; RSGB President Clive Trotman, GW4YKL; Alan Wright, G0KRU and David Lauder, G0SNO.The training and accommodation costs were covered by Trio - Kenwood UK Ltd.

The LAST WORD

CONTESTS CONTINUED

I heartily agree with those correspondents (*The Last Word*, June 1995), who bemoan the lack of recreational bandwidth during contest periods. Since there now seems to be some form of contest just about every weekend, this leaves those of us who are only able to operate at weekends and / or with modest (not necessarily QRP) power levels with increasingly few contacts. Very often I resort to the off switch in sheer frustration, having spent lengthy periods scanning bands bereft of anything other than contest traffic. In an attempt to provide some constructive input I would like to propose the following. Given that:

Many amateurs work during the week and are unable to operate other than at weekends and holiday periods,

There seems to be a contest pretty much every other weekend,

The bands are overloaded with contest stations during contest periods with little scope for casual / recreational contacts,

Contesters take contests (very?) seriously and run efficient, high-powered stations, often many months in the planning,

Not all contesters enter all contests (thank goodness!),

- why not, given the contesters dedication, move contests away from weekends to quieter midweek spots, freeing the bands at weekends for more (traditional) recreational contacts and DX hunting? Considering the relatively few contests any one contester is likely to enter in earnest it doesn't seem unreasonable that they should devote a day or two's leave from work to achieve this. At least this way those who want to compete can do so whilst still allowing everyone the freedom of the bands at weekends.

Dean Barnes, G0RIF

. . . I read with interest the comments on contesting. When I was President of the RSGB in 1993, I raised this matter while on my 'official visit' to the USA, and the response was something on these lines:-

'The major contests such as WPX, ARRL DX and *CQ* WW usually see about 35,000 (yes - thirty-five thousand) callsigns active during them. The anti-contesters are a minority of the active HF band operators, the US amateur is not allowed SSB below 14150 or 21200, and the policing of any contest-free segment would not be practicable in view of the levels of activity'.

While the number of amateurs taking part in these contests far exceeds the total number of active HF amateurs in the UK, and even the total membership of RSGB, the majority vote will have it.

Note that the RSGB 'contest-free segment' works because fewer people are active than in the really big contests: its introduction was a well-thought response to the problems of band occupancy. Personally, I believe that the RSGB HF Contest Committee has consistently shown itself, over a number of years, to be far more forward-thinking and aware of trends and the requirements of both contesters and non-contesters alike than any other amateur radio organisation.

Peter E Chadwick, G3RZP

CALLSIGN NUMBER PLATES

I refer to the letter from the DVLA 'explaining' why I cannot have my callsign on my car number plate (*RadCom News* April 1995). A moment's examination of their statement shows it up for the drivel it is.

Firstly, they claim a special Act of Parliament would be needed. Codswallop. If they can issue G1LLY without such an Act, they can issue G3UGK. Secondly, they have been charged by Parliament with maximising revenue. I suggest that the only person in the world likely to want G3UGK is me, and the arrogance with which the DVLA assumes I would not be prepared to pay the best market price for it is insulting. Thirdly, they wish to protect me from exploitation. I resent strongly being patronised in such a manner: I am quite capable of looking after my own interests, and I don't need nanny DVLA doing it for me.

Up to now I have been quite content to let the Society carry on negotiating on my behalf, but now that the RSGB has surrendered I intend to pursue the matter for myself. My next letter will be to my Member of Parliament. To all those who might feel this is a fuss about nothing, and merely demonstrates a wish to show off, I would say that I worked hard for my callsign and I'm proud of it.

P R Cragg, G3UGK

COMFORTABLE KEYING

Having discovered a way to ease the strain of long periods of sending with a straight key, I would like to impart this information to others, for what it is worth.

Try sitting upright, knees together with forearm resting along the thigh. Elbow close to the hip and the hand (thumb and fingers together) placed palm down against the leg. It is important that the hand be flat and parallel to the floor. After holding this position for a few seconds, relax the hand and forearm completely. You will find that the hand moves to an angle of about 30° and that it has been an effort to hold the radius and ulna bones twisted out of the relaxed position, with the hand held flat down.

The answer is a stand for the key, tilted over to the required angle. A few pieces of hardwood, some lead to make it stable and a bit of suede underneath to stop slipping did the job. As a refinement I added a brass catch to prevent the key lifting. With the hand in this position, it is quite amazing what a difference it has made to the feel of the key and how much more comfortable it is to use. But then maybe I am just getting old.

W A Slater, G0UUC

STRUNG ALONG

The Y station shown (*Radio Communication*, June 1995, page 49) is incomplete. A cord threaded through one outer coil handle, round the tuning knob, and out through the other handle allowed the operator to sit back with his feet up and search a narrow band by pulling the cord to and fro'. Well on in WWII the HRO receivers delivered to the Y service were still equipped with bandspread on 3.5, 7, 14 and 28Mc/s [MHz] - unlike the one shown in the photograph. The receivers were pretty deaf above 15Mc/s, but fortunately the German navy, at least, rarely used their 16Mc/s band.

J Roscoe, G4QK

GAS SUSPENSION

I have on rare occasions worked stations using wire antennas suspended from kites. This has set me wondering if anyone has experimented with antennas suspended from gas-filled balloons. I seem to remember reading many years ago about someone using a long-wire hooked up to a barrage balloon to work DX on top band, but have not come across anything since. [See the review of the Helikite on page 53 - *Ed*]

Frank Wingfield G4KVV

60 YEARS ON

I read with interest Constance Hall's letter (*The Last Word*, May 1995) and remember seeing a picture of the G8LY 28MHz breadboard transmitter in mid-1935.

On my wall hangs an RSGB membership certificate dated 27 July 1934 and gives my number as BRS 1499. It is signed by Arthur Watts. I wonder how many members have been with the RSGB for 60 years or more?

F A Jefferies, G8PX

Please note that the views expressed in *The Last Word* are not necessarily those of the RSGB. We reserve the right to edit letters for publication. All letters are acknowledged and may be passed to the relevant department or committee.

NOVICES

I felt that someone ought to point out to Mr Purcell (*The Last Word*, May 1995) the real concept of a Novice licence. Correct me if I am wrong, but the idea of introducing a Novice licence was to provide a stepping-stone to becoming a *full* licensed amateur. If we were to allow further band / mode allocations to Novices it would detract from the main reasoning of this type of licence and create more of a complacent, apathetic attitude that is sadly becoming all too familiar within our hobby.

To allow the Novices an easy route into our bands is sadly yet another slap in the face to B licence holders who did bother to study for the proper RAE and yet sadly cannot access the HF bands without supervision, neither can they have the facilities and privileges that the Novices have until they have held a B licence for 12 months.

I personally feel that Novices were given too much too soon and that what incentive to work for further bands / modes they may have could be eradicated if the Society allows them to become as complacent about amateur radio as 2E0AHU seems to be. If you want anything from life at least be prepared to work for it, handouts are greedily accepted but very seldom appreciated or valued.

Steve G Bryan, G1SGB / G0SGB

. . . I think John, 2E0AHU, misses the point of the Novice licence. It is intended for those who wish to experiment with home-brew radio hardware as part of the learning process which leads to the full Class A licence. It is intended for those entering the hobby of amateur radio, *not* DXing (it was, you recall, so unusual for a Novice to obtain a DX award that some people just didn't believe it possible at all!)

Where do we begin learning practical amateur radio? On 160m, like virtually every G3 did, because it's the easiest band, with next to no test gear required. Nobody used to begin with VHF!

It stands to reason that anyone with amateur radio interests will only stay a Novice as long as it takes to reach the 12WPM CW standard, and then will upgrade to the Class A. The practical experience gained by a Novice will soon put them well above the knowledge level required to pass the RAE, so numbers will always be low. However, I do agree with John that Novice segments should exist in all the HF bands.

Stephen Dyke, G3ROZ

. . . I too deplore attacks on Novice licensees and would gladly work them, but I have hardly ever heard a Novice station. On HF there are only a few hundred callsigns, presumably centred on the Home Counties. I would have to receive them from 1.95 - 2.0 or 28.3 - 28.5MHz, they using 3W. On VHF, there is 6m, where I will hear nothing until Es manifests itself. 2m is not allowed, although around here we could do with some more stations, Novices or otherwise. For 70cm I have no transceiver, but my little receiver tells me there is nothing doing there anyway. If people who *do* want to work them can't, it can't be much fun. So, what is needed?

Leave the Novice licence as it is (but allow 2m, at least in the tribal areas) - I expect it is OK for some, especially proteges of existing amateurs who can teach the aspirants themselves or at least drag them to a club.

But there could be another form of licence to afford an entirely new 'catchment area':

1. It would require commercial equipment, subject to a reasonable form of type of approval.
2. Power should be at least 10W and more bands made available.
3. I'm sorry to have to upset some people, but the Morse deterrent *must* be excluded - there is a 10W no-code licence in Japan and over a million licensees (most Japanese are not in the *Callbook*, and 10W versions of well-known rigs abound). Access of one twentieth of that number would be quite a reinforcement in the UK.
4. The examination should consist of papers allowing a candidate to demonstrate that he could assemble a station competently with an approved rig, show understanding of what he would be doing, and that he could operate in a civilised manner.

I claim to grind no personal axe. I have my A licence. In a decade or so I probably won't be around anyway. But I trust a lot of your readers will be, and if amateur radio is by then drastically curtailed because there are too few to constitute an effective lobby, will it not be because there has not been a sufficiently attractive mode of entry? We are going to have to inform, inspire and enable more people, instead of putting off many of those who would like to come in, as in the past.

Alex (Sandy) Dick, GM0IRZ

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Zone C (SE England and East Anglia): Neil Lasher, G6HIU, 8 Highwood Grove, Mill Hill, London NW7 3LY. Tel: 0181 201 1578.

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Zone F (Northern Ireland): Ian Kyle, GI8AYZ, 1 Portulla Drive, Pond Park Road, Lisburn, Co Antrim BT28 3JS. Tel: 01846 665034.

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For general advice and details on local clubs, or if you don't know who to contact:

Your **RSGB Liaison Officer** see January and February *At Your Service.*

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Audio Visual Library: Coordinator – David Simmonds, G3JKB, QTHR.

Awards: For contest awards, refer to the appropriate contest committee. For other awards, enquiries and applications go to the: HF Awards Manager – Fred Handscombe, G4BWP; IOTA (Islands on the Air) Awards Manager – Roger Ballister, G3KMA or VHF (and Microwave) Awards Manager – Ian L Cornes, G4OUT. Trophies Manager – David Simmonds, G3JKB.

Band Plans and operating practices: See the *RSGB Call Book* or April 95 *RadCom* for latest bandplans. For policy, contact the appropriate spectrum manager or committee chairman: HF Committee Chairman – David Evans, G3OUF, QTHR; VHF Committee Chairman – Peter Burden, G3UBX, QTHR; Microwave Committee Chairman – Steve Davies, G4KNZ, QTHR; HF Manager – Post vacant; VHF Manager – Dave Butler, G4ASR; Microwave Manager – Mike Dixon, G3PFR.

Beacons: HF Beacon Coordinator – Prof Martin Harrison, G3USF, QTHR. VHF Beacon Coordinator – John Wilson, G3UUT, QTHR. Microwave Beacon Coordinator – Graham Murchie, G4FSG, QTHR.

RSGB Contests: First contact the appropriate contest adjudicator (see the contest rules). For policy, contact the respective Committee Chairman: HF Contest Committee – Chris Burbanks, G3SJJ, QTHR; VHF Contest Committee – David Johnson, G4DHF, QTHR; ARDF (direction finding) Committee – Post vacant.

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QSL Bureau: Outgoing cards – PO Box 1773, Potters Bar, Herts, EN6 3EP. Incoming cards – your QSL submanager (see *RSGB Call Book* or November *RadCom,* p91 for a list). QSL Bureau Liaison Officer – John Hall, G3KVA.

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The whole world's going digital and ICOM are no exception... read on

There can be no doubt as to the amazing clarity of digital audio, well ICOM have now introduced this technology into their latest HF transceiver, and boy what a result!:

- Excellent SSB Tx signals that analog simply cannot compete with are produced by signal control at modulation stage.
- Digital noise-reduction at demodulation stage gives crystal clear signals, digital technology working for the serious DX'er.
- Twin Passband tuning shifts centre frequencies on 455kHz and 9MHz separately or together.
- CW Reverse mode flips carrier point from USB to LSB..
- Manual IF Notch gives great frequency characteristics and attenuation of more than 45dB.
- Manual Audio Peak Filter.
- Noise Blanker and adjustable AGC.
- 200 watts output power from MOS-FET finals.
- Newly developed mixer-less PLL to improve DDS system.
- 1Hz tuning, 3 grade selectivity, high performance Rx and much more!

ICOM

ICOM manufacture a full range of base-stations, mobiles and handheld transceivers and receivers to cover all popular Ham frequencies... and beyond. No matter what your requirements, ICOM have the radio for you.

For the full picture and details of your local authorised Icom dealer contact:

Icom (UK) Ltd. Sea Street Herne Bay Kent CT6 8LD.

General Operator: 01227 743000. Sales & Service: 01227 741741. Fax: 01227 741742.

NEW DUAL BAND

Dual Band Mobile FT-8500

Never before has Yaesu technology changed an industry so dramatically.

"With the Smart Controller Mic, all the radio functions are in your hand."

"And, look, the digital voltage display monitors my car battery voltage!"

"Spectra-Analyzer lets me check out channel activity in UHF, VHF and keep track of my favourite repeaters, too."

"Yaesu did it again!"

Rear-panel data jack for packet with 6-pin connections for Data Input, PTT, 9600 bps and 1200 bps Receive Data, Squelch Status, Ground.

ACTUAL SIZE
140x40x160mm (5.6"x1.6"x6.4")

Rotary Dial Selector Knob
Select memories and other settings according to the current mode functions.

Specifications

- **Frequency Coverage:**
  2m RX: 110-174 MHz
  TX: 144-146 MHz
  70 cm RX: 420-500 MHz
  TX: 430-440 MHz
- Spectra-Analyzer™ w/adjustable signal width, spacing & span markers
- 6-Character Alpha-Numeric Display
- 110 Memories (in 5 memory banks)
- Omni-Glow™ Display
- Digital voltage display
- Selectable 1200/9600 baud
- 3-Level Auto-Mute w/Mute Timer
- V+V, U+U, V+U Dual Receive
- 3 Power Output Levels
  2 m 50/10/5 Watt
  70 cm 35/10/5 Watt
- Built-in Auto Power Off (APO) and Time-out Timer (TOT)
- MIL-STD 810/C Rating
- 9 Memory DTMF Autodialer
- Handy Cloning Feature
- 3 Scanning Modes w/ Clear Scan
- Adjustable LCD Contrast/ Brightness Control
- **Accessories:**
  Consult your local Yaesu dealer.

Omni-Glow™ LCD Dual-Band Display

VHF&VHF, UHF&UHF, VHF&UHF
Select three dual band configurations. Menu loop contains 13 headings and 53 transceiver settings. Shown with custom 6-character alpha-numeric code.

Spectra-Analyzer™ displays station activity above and below the current operating channel. In Memory Recall, display signal strength of programmed channels.

Built-in digital voltage display monitors automobile battery voltage. Menu-Selectable Packet Baud Rate. Choose 1200 or 9600 bps.

The FT-8500 and Smart Controller™ Microphone demonstrates Yaesu's world leadership position in 2-way radio communication again! With just four simple flicks of the Smart Controller™ Microphone "joystick"-type lever, you command over 50 separate functions from the palm of your hand! The FT-8500 defines "high-tech" in mobile radio engineering.

The Smart Controller™ Microphone isn't the only engineering advancement. Watch the unique Spectra-Analyzer™ exhibit station activity above and below your current operating channel, and the digital voltage readout monitor your car battery voltage big and bold in the Omni-Glow™ display. In V+V, U+U or V+U view frequencies and custom alpha-numeric messages at the same time. Other features include handy cloning, selectable 1200/9600 baud, and a rear-panel data jack for packet! All of this and more in the deluxe, compact FT-8500.

The extraordinary FT-8500 Dual Band Mobile is at your Yaesu dealer now. Find out how this dramatic change will affect mobile technology for you from this day forward.

YAESU

Performance without compromise.™

YAESU UK LTD. Unit 2, Maple Grove Business Centre, Lawrence Rd., Hounslow, Middlesex, TW4 6DR

Specifications subject to change without notice. Specifications guaranteed only within amateur bands. Some accessories and/or options are standard in certain areas. Check with your local Yaesu dealer for specific details.