Volume 66 No 12. Price: £3.50

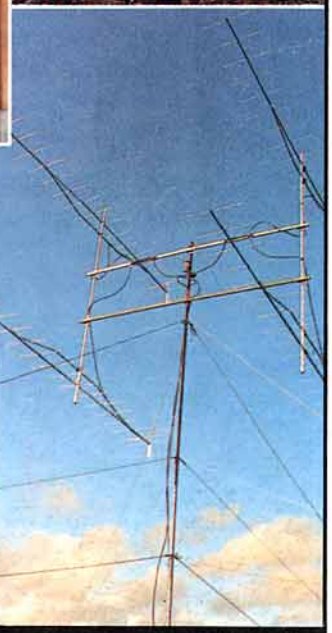
RadCommunication

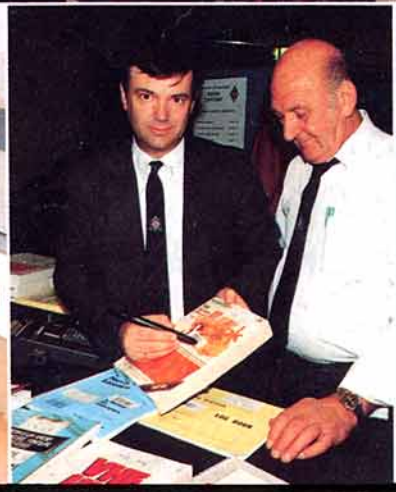
The Journal of the Radio Society of Great Britain

Serving Amateur Radio

December 1990

RadCom looks back on 1990 *(see page 3)* *. . .*





. . . and looks forward to an even brighter 1991 *(see page 7)*

KENWOOD

TH-77E 2M and 70cm FM HANDHELD TRANSCEIVER

THE SMALLEST DUAL BANDER IN THE WORLD — AND LIGHT TOO!

It is incredible how many features Kenwood have included in their latest range of handhelds whilst improving ease of use, size and weight.

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RF Output: From 500mW to a powerful 5W. The battery pack supplied gives 2W output on VHF and 1.5W on UHF.

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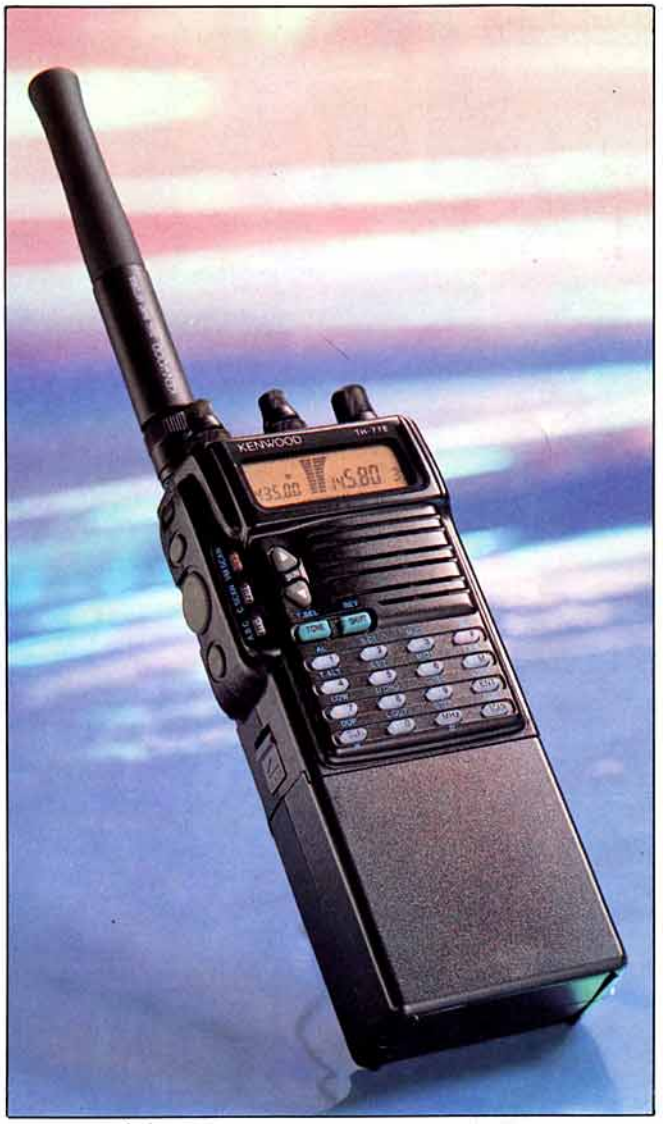
VFO's: There are two. For added convenience they include frequency step, tone frequency and repeater information and are programmable for a range of frequency steps.



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TH-77E.....£389

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N.B. for all other RSGB telephone numbers see page four.

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

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Radio Communication

Volume 66 No 12

December 1990

The Journal of the Radio Society of Great Britain

Cover picture: AMATEUR RADIO IN 1990

Negotiations:
The IARU Region 1 Conference held in Torremolinos in April

Youth:
One of the visitors at Trafford Amateur Radio Club's special event station.

Enterprise:
Tony Johnstone, G4OGP, with his CapCo Loop at the RSGB National Convention

Friendship:
Lagan Valley Amateur Radio Society entertain UV3DPP in a year which saw the end of the cold war.
l to r: GI7CML, GI4LKG, UV3DPP, GI4NTO, GI0DVU, GI4TVV, GI1GKI

Construction:
G3TSO's Antenna Tuner featured in the September edition of *RadCom*

Travel:
The 3Y5X DXpedition to Bouvet Island - August RadCom's cover story

Serving the community:
North Wilts Raynet raised £750 for the Radio Amateurs' Invalid and Blind Club by means of a sponsored canoe paddle. RAIBC Chairman Johnny Clinch, G3MJK, is seen with the cheque

Honours:
Raynet Controller, Alex Anderson, GM4VIR, displaying the MBE presented to him in recognition of the work of Dumfries and Galloway Raynet at the scene of the Lockerbie disaster. Pictured with him are Mrs H Cameron, GM4VIS and Mr J Young, GM6LYJ, Secretary and Deputy Controller of the Raynet Group

Convention:
The RSGB's National Convention and Exhibition in a newly built part of the National Exhibition Centre

Books:
RSGB Secretary David Evans, G3OUF, and Despatch Dept Manager, Bert Mair, on the Book Stand at the HF Convention

Operating:
The Derbyshire Hills Contest Group's 4x19 2m array which was left standing after the station and tent were destroyed by a force 9 gale. April's VHF/UHF column showed the damage.

RADIO SOCIETY OF GREAT BRITAIN

THE NATIONAL SOCIETY WHICH REPRESENTS UK RADIO AMATEURS
Founded in 1913 incorporated 1926. Limited by guarantee
Member society of the international Amateur Radio Union

PATRON: HRH PRINCE PHILIP, DUKE OF EDINBURGH, KG

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

Headquarters and registered office:
Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE
Telex 9312 130923 (RSGB)
Electronic Mail Via Dialcom/Telecom Gold: 87 CQQ093
Fax: 0707 45105
Telephone: 0707 49855 - Members Hotline and book orders
0707 49805 - Subscriptions queries
0707 59260 - *Radio Communication* only
Secretary: David Evans, MSAE, CPL, G3OUF

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Zone G I D Suart, GM4AUP

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Intruder watch (IARUMS): Martin Atherton, G3ZAY
Morse practice co-ordinator: Mike Thayne, G3GMS
Audio visual library co-ordinator: David Simmonds, G3JKB

Correspondence to honorary offices should be passed directly to them (QTHR), not to RSGB HQ.

ANNUAL SUBCRIPTION RATES
Once-off joining fee: £1.50
Corporate members: UK and overseas (Radio Communication by surface post): **£30.00**
UK associate member under 18: £12.75. Family member: £11.95
UK students over 18 and under 25: £19.20 (Applications should give applicant's age at last renewal date and include evidence of student status)
Affiliated club or society/registered group (UK): £30.00 (including Radio Communication): **£17.95** (excluding Radio Communication) (Subscriptions include VAT where applicable)

Membership application forms available from RSGB HQ

More for Morse

The RSGB Morse Test Service carries out between 1,500 and 2,000 Morse Tests each year, thanks to several hundred volunteer examiners.

During 1991, Novice Morse Tests at 5WPM will be handled, though please do not apply as this service is not yet available.

With effect from 1 December 1990, the fee for RSGB Morse Tests will be £13.

Note that all Morse Tests, even those which are held at public events such as rallies and conventions, must be booked in advance. Applicants should write for an up to date list of test centres to: RSGB HQ (Morse Tests), Lambda House, Cranborne Road, POTTERS BAR, Herts, EN6 3JE.

Novice Licence

The examination

The City and Guilds of London Institute has won the contract to carry out the Novice Licence Examination. C&G were able to offer the examination at £8.95. The Society understands that the first Novice Examination will take place in the late Spring of 1991, though this is subject to confirmation.

Instructors

The Training and Education Advisory Group would like to thank all those who have returned their applications to become Instructors for the Novice Licence. Owing to the volume of response, individual applications will not be acknowledged. However, Senior County Instructors are being appointed at present and they will contact applicants in their counties before the end of December. It is envisaged that the training scheme will begin in January.

Vacancy

HF Committee

The HF Committee is looking for a new **Coordinator** for the **IARU Monitoring System (formerly Intruder Watch).** Details of the job are available by contacting the present holder of the post: Martin Atherton, G3ZAY, 41 Enniskillen Road, Cambridge, CB4 1SQ; tel 0223 424714.

New HFC Chairman

Dr P J Whelan, G3PJT, has been appointed by Council as the new Chairman of the HF Committee. He supersedes Martin Atherton, G3ZAY, who is thanked for his work as Chairman for a number of years.

1991 National Convention

The date for the RSGB's 1991 National Convention has been confirmed for Sat/Sun, 27/28 April 1991. The venue will be the National Exhibition Centre. All enquiries should go direct to the Chairman of the RSGB's Exhibition and Rally Committee, Norman Miller, G3MVV, at 'Avon', Gardiners Lane, Crays Hill, Billericay, Essex CM11 2XA or on 0277 225563.

Mailing Shot to non-members

During November, the RSGB sent out a mailing shot to a large number of UK licensed radio amateurs who are not yet members of the RSGB. We pointed out that the Society is the only UK organisation working on their behalf on key amateur licensing issues; the amateur radio involvement at the next major World Administrative Radio Conference in 1992 and the future status of amateur radio.

We said that members had the satisfaction of knowing that through their support they were assisting all UK amateurs by doing their share for everyone.

Inevitably, some existing members may receive a copy of the mailshot. If you do, please pass it on to a local SWL or take it down to your local radio club. Quite obviously, the more support that the Society enjoys, the more cost-effective the RSGB can become for its members. Thank you for your kind co-operation.

1991 Presidential Installation

The RSGB's 1991 President, John Case, GW4HWR, will be installed at an evening reception and dinner at Cardiff Castle. The date is Saturday 12 January 1991. Tickets for this prestigious event are priced at £16 per head. Any member may attend. Requests for tickets should be addressed to "The Secretary", RSGB HQ, Cranborne Road, Potters Bar, Herts, EN6 3JE.

New Sussex RLO

Following the retirement of West Sussex RLO Kim Newland, G7AIE, the RLO for East Sussex has agreed to cover both halves of the county. He is Jim Harris, G4DRV, Eastfold, Henfold Lane, Beare Green, Dorking, RH5 4RW; tel 0306 77236.

VHF Frequency Registration Service

The RSGB's VHF Committee is setting up a Frequency Registration Service to assist the efficient utilisation of the VHF spectrum, and to ensure that conflicts over frequency usage do not occur. Committee member Dave Lemin, G4TDL, explains the purpose of the scheme:

"This is a service to all amateur users of the VHF bands. It is run by the Society's VHF Committee with the purpose of maintaining a register of all known uses of the VHF bands. There are several benefits from this to members of the amateur community.

"Any organisation or person looking for an unused frequency in their own area can immediately find out what is available. This should help avoid conflicts and interference, and encourage more efficient use of spectrum space.

"It will enable those not familiar with a band to quickly find the parts of the bands that have the type of activity they are most interested in.

"The service is NOT a method by which individuals or groups can claim a right to a private frequency for their own benefit. The amateur community has a long tradition of responsible co-operation and the introduction of a Frequency Register should not change this. It will help responsible individuals and groups avoid conflicts by selecting frequencies that are not customarily used for other purposes.

"All amateurs and short wave listeners could find this service of benefit, but its success will depend on everyone co-operating by sending in information, and then continuing to keep it up to date. The master copy of the data will be held on computer and will be available to users in either computer or printed format.

"The whole nature of the register is to collect information together in one place so that anyone requiring access to it will know where to look. In order that the data is as comprehensive as possible, information can be registered by anyone. Therefore if YOU are aware of a particular use of any frequency, please tell us about it!

"The best way to tell us about frequency usage is on a form which you can get by sending an SAE to: VHF Frequency Registrar, Dave Lemin, 'Inyanga', 3 Goughs Lane, Bracknell, Berkshire, RG12 2JR. "

Seasons Greetings from the President, Council, and Staff

John Greenwell, G3AEZ

Zone C Council member John Greenwell, G3AEZ, asks that members in Zone C with queries on RSGB matters telephone him between 6pm and 11pm Monday to Friday, and any time during the day at weekends, in preference to writing to him. John's telephone number is (0306) 77236.

Vicki Williams

The Society records with sorrow the death of one of its HQ staff, Vicki Williams, who died of leukaemia in September. Vicki joined the RSGB staff in 1976 as the operator of the Society's first computer. Vicki processed book orders and subscription payments as well as being in charge of the day to day operating of the HQ computer. She was a most meticulous worker and will be sadly missed by her colleagues. To Vicki's parents, Ann and David, and to her brother, Chris, G4FXQ, we send our sincere condolences.

Votes due NOW!

A reminder that votes for RSGB Council elections (see inserts with November *RadCom*) must arrive at RSGB HQ by 4.30pm on Friday 30 November - and remember that this year the envelope needs a stamp.

Council Brief

19 July 1990

- John Case, GW4HWR, was elected President for 1991.
- Nominations for the Founders Trophy, the Calcutta Key and other awards were considered by Council.
- Council initiated a new programme to enable the Society to thank volunteers for their work.
- A 'Towards 2000' group was formed. Its brief was to discuss trends in amateur radio operating over the next decade as a basis for future Society policy. G3AEZ would chair the meetings of the Group.
- G3GJW undertook the finalisation of the RSGB's *Green Book* which contained standing orders and Committee and Officer terms of reference, etc.
- IARU proposals concerning its constitutions were discussed. Council agreed to the proposal to terminate the membership of the Burma ARTS from the IARU as it no longer existed.
- International Entry standards for amateur radio were discussed.
- Council agreed to hold the next RSGB National Convention at the National Exhibition Centre on 27/28 April 1991. G3AEZ would join the Exhibitions and Rallies Committee.
- Council agreed to a revaluation of Lambda House as its value in the accounts was now very much out of date.
- The overall trading position of the Society was discussed in the context of the UK economy. The Honorary Treasurer was looking to the Financial Controller to improve the financial situation for the Society and clearly the financial aspects of the Society's operations would need to take precedence at present.
- The Secretary reported: a) that there were continuing changes in the role of HQ staff because during the past year staff numbers had dropped by 10. b) on the new direct telephone numbers to the HQ departments. c) other recent improvements in general financial administration. d) plans to improve newsletter software.
- Council noted that a meeting had taken place recently between AROS (Amateur Radio Observation Service) and the RA.
- Council discussed the possibility of having an amateur radio representative on the UK delegation at the 1992 World Administrative Radio Conference. In 1979 RSGB was one of eight countries who had provided an amateur radio delegate to its administration.
- Council agreed that following the recent illness of G2PA, G3JKB would take over the Audio Visual Library. Also G3NAQ would become the new Chairman of the Propagation Studies Committee, taking over from G3LTP who was standing down after many years of excellent service.
- Other matters discussed included: Raynet procedures and the Raynet Controllers' net frequency, information on deceased members in *RadCom*, membership fees, programming effort at HQ and software development, and Council representation on Committees.

21/22 September 1990

- Council held an extended meeting to discuss the 1989/90 Accounts. Clearly the current UK economic situation had not helped the Society. A series of decisions was made by Council to reduce expenditure and increase income. In the context of the latter, it was agreed that the basic subscription rate should be increased to £30 as from 1 December 1990.
- Council noted that the total value of concessionary membership fees in the 1989/90 financial year had been of the order of £65,000. Council agreed that at the present time it could not afford to be as generous with concessions as it had in the past and directed that the Finance and Staff Committee look at concessionary membership fees.
- The 1989/90 Accounts were approved for publication in the November 1990 issue of *RadCom*..
- Following advice from the new Auditors, they were

Continued on page 6

NEWS & REPORTS

Council Brief

continued from page 5

authorised to check the RSGB's VAT subscription policy.

- The viability of remaining at Lambda House was discussed, though no action was proposed. With regard to Lambda Investments, an earlier decision not to re-establish this company was reversed.
- The Packet Working Group was formed into a Committee of Council to be known as the DataComms Committee. Its first Chairman would be GM4AUP.
- RSGB attendance at the London Amateur Radio Show and the RSGB's 1991 National Convention were discussed at length.
- The composition and future of the F&S Committee was discussed, as were ideas for streamlining decision making at Council level. Reporting structures were also discussed.
- Council debated the format of the RSGB *Call Book* at length. The proposal to revise the format of the *Call Book* so that countries would be shown separately was not accepted by Council. The format of the 1991 *Call Book* would thus be the same as the 1990 *Call Book* with non-G entry prefixes offset by one space in order to make them easier to locate in the listings.
- Entries for the RSGB flag competition were discussed. A decision would be reached at a future meeting.
- Council agreed that the new Chief Morse Examiner would be Roy Clayton, G4SSH, as from 5 October. The new Deputy would be G4ZGP.
- Various aspects of Project YEAR were discussed and progress noted.
- The possibility of using Mercury in favour of BT as a means of saving money on telephone charges was to be investigated further.
- Other matters discussed included: Raynet procedures, qualifications for Council members, harmonisation of amateur radio exam syllabuses, quality assurance, awards for service to the RSGB.

Heard on GB3DA . . .

. . . . By a not so newly licensed G7. "I'm fed up with my amplifier. I can only get it to work when working through repeaters. It won't work at all on simplex! . . .".

GB2ER Celebrates Queen's Visit to Devizes

And Raynet helps keep everyone safe

On 8 August, the Queen visited Devizes to re-open the Kennet and Avon Canal, restored over many years by volunteers. The Devizes and District Amateur Radio Club and North Wilts Raynet have been involved with restoration work, including fund raising *[see also our cover photo of N.Wilts Raynet's fund raising efforts -Ed]*.

Raynet members Jane Cowley, G1NYP, (immediately to the left of the Queen) and her husband John, G1VTV (almost obscured by the Queen's hat) shown at Her Majesty's re-opening of the Kennet and Avon Canal.

Special Event Station GB2ER, run by the Devizes and District ARC, was operational during the royal visit. With the permission of British Waterways, it was located at the top of the famous Caen Hill flight of 29 locks. The operator for the day was Carole, G0KVY.

Meanwhile, Raynet was busy helping the Police, Red Cross and St John's Ambulance Brigade. The population of the town increased threefold for the visit but, despite this and the high temperatures, there were relatively few incidents: the bomb squad blew up a lamp post in the town *[the report from G4TIX does not enlarge on this intriguing piece of information, unfortunately -Ed]*, and on site one person collapsed with a heart attack and a lady suffered head abrasions. Clearly Raynet's presence as part of the emergency team helped to make the day a safe and successful one.

Article Reprint Service

Lost an old *RadCom* with that vital article or tip? We now have the solution. Articles from any issue of *Radio Communication* can be copied for **£1** per page if you can tell us the edition and page number. A research fee of **£5** will be charged if we have to find the item ourselves.

GB2RS on Top Band and Six

RSGB has recently obtained the go-ahead from the Radiocommunications Agency to make GB2RS test transmissions on lower sideband on the 160m band. The frequency will be 1997.5kHz, and it is expected that transmissions will be made, initially, on Wednesday evenings later this year.

The possibility also exists of transmitting GB2RS News bulletins on six metres. Anyone interested in providing this service, which would use FM with vertically polarised antennas, should contact the Chairman of the Membership Liaison Committee, Geoff Smith, G4AJJ, giving details of transmitter, antenna and your availability on Sundays.

Y2 in CEPT Licensing

Following the unification of Germany, UK amateurs may operate in the former East Germany without special licensing, under CEPT T/R 61-01. Although local amateurs will continue to use the prefix Y2 until further notice, visitors should use DL/, for UK Class A and equivalent, and DC/ for UK Class B and equivalent.

New CEPT members are Bulgaria, Romania, the Czechoslovakia, Poland and Hungary. At the time of writing, they had not yet implemented T/R 61-01.

Raynet Supplies Officer

Raynet's new Supplies Officer is Mrs Sue Brodie, G6YCP.

Her address is:- Top of the Hill, Hospital Road, Wicklewood, Nr Wymondham, Norfolk, NR18 9PR; tel 0953 607594.

- Following the death of GB2RS News Reader G8ML, there is a vacancy for someone to read the news bulletin on 80m SSB on Sunday mornings. Anyone who feels he/she has the time to devote to providing this service should contact Zone D Council Member Peter Chadwick, G3RZP, QTHR.

RSGB Books for Christmas

There is still time to buy an RSGB book as a Christmas present, or to drop hints in the direction of the XYL for your own present. Recent new titles include *RF Byrne's Unpublished Masterpieces* (humour), and *The Bright Sparks of Wireless* (anecdotal history). See the price list on pages 78/79, and the leaflet enclosed with last month's *RadCom*.

Give an RSGB Subscription

Several RSGB members have their first year's, or even every year's, subscription paid for by another member as a gift. Not a lot of people know that!

An RSGB sub makes a great present for someone overseas, or a person new to amateur radio, or even that friend who never quite gets round to filling in his application form. For details, ring our subs department on 0707 49805.

Stolen Equipment

An Icom IC-R1 receiver, serial number 890001213, was stolen from the premises of Characteristics, 44 Hilderthorpe Road, Bridlington, North Yorkshire, YO15 3BG on bank holiday Monday, 27 August. Anyone having knowledge of this receiver should contact G4NJP on (0262) 673635, or their nearest Police station.

The Radio Investigation Service Glasgow office have in their possession an HF amateur bands transceiver which is believed to have been stolen in the Central Scotland area. Anyone wishing to make a claim to this equipment should write to: The District Manager, Radio Investigation Service, PO Box 2500, Glasgow, G41 1QY. Please quote the make, serial and chassis numbers of the equipment when you write.

A Yaesu FT-270 RH (serial no: 5D051153) was stolen from a car in Beith, Ayrshire on 9 November. Anyone who knows of the whereabouts of this transceiver should contact GM8NVG on 0505 85533, or Strathclyde Police, Kilbirnie on 0505 682677.

On 28 August, a Yaesu FT-290R (serial no: 4M 400243), complete with mic and leatherette case, was stolen from a car in Reigate Surrey. Also a Realistic Pro 30 hand scanner no: 20 9131/ 44312, and a Datong Morse Tutor with the speed control knob broken off. Anyone with information should contact G1WWN QTHR, or Reigate (or your local) Police.

£500 Reward

On the first day of the Leicester Show, 26 October, from in front of the reception area of the Leicester Post House Hotel, a Black Ford Escort XR3i, was violently broken into. It was subsequently found extensively damaged with all the radio gear missing. This comprised: Yaesu FT-4700 s/n 8D 020970; two Yaesu FT-811 s/n 9I 090526; Mobira Cityman portable phone; Shinwa car-radio sized scanner (not generally available in the UK).

The owner, Chris Lorek, G4HCL, is offering a £500 reward for information leading to the conviction of *any* of the persons responsible and subsequent recovery of *any* of the stolen gear.

Information, please, to Beaumont Leys Police Station, Leicester; tel 0533 530066 x 3222; or any police station, or direct to G4HCL, PO Box 73, Eastleigh, Hants, SO5 5WG; tel 0703 262105, fax 0703 263429.

We are indebted to *Vital Spark*, the newsletter of the Hastings Electronics and Radio Club for the following:

Great Radio Hams Of The Past.

No.3. Mad Carew

There's a sagging disused rhombic to the north of Khatmandu
There's a Yagi up a pole below the town
And all that's left of a DXer who was know as Mad Carew
Is a wooden shack forever falling down.

It was in the mess one evening that the incident began
We were celebrating Fanshawe's RAE.
By the time it came to midnight we were blotto to a man
And someone said he'd try DXCC.

There was silence in the mess-room for a moment, maybe two
As hurriedly we downed our final tots
For the voice that made the statement was the voice of Mad Carew
A man we knew had only fifteen watts.

He was daring, he was reckless, he was loved by one and all
He led his small platoon through shot and shell
He did wheelies on his skateboard at the regimental ball
And the Colonel's daughter smiled on him as well.

There's a filthy little back-street so the native fellas tell
There's a stinking little junk shop on the right
Run by a one-eyed coolie by the name of Sid Patel
Who charged Carew two rupees for a kite.

He flew the kite next morning on three hundred feet of string
The antenna wire was hanging underneath
But as he'd brought no tools he did a very foolish thing
He tried to bare the feeder with his teeth.

There was a vivid flash of lightning and it travelled down the wire
The antenna lead was glowing cherry red
His dental plate exploded, and his jodphurs were on fire
And Mad Carew was very, very dead.

There's a tiny little graveyard to the west of Khatmandu
Where regimental heroes meet their God
There's a sobbing Colonel's daughter tends the grave of Mad Carew
And as she weeps she mutters "Silly sod".

Stan, G4ITM

RAE Courses

Clacton:

Due to insufficient numbers, the course at Green Lodge has been cancelled. However, if at least ten students can be assembled by the start of the Spring term (Jan 91) a new course will start. Details from the college or Jeff Harris, G3LWM, 21 Waltham Way, Frinton on Sea, Essex, CO13 9JE.

Correspondence Course

The Rapid Results College has an RAE course by post - ideal for the diabled or those far from a local college course. Details can be obtained by phoning 081 947 7272.

Coventry

Henley College is currently running a RAE course which has vacancies. The group meets at Alpha Block, Lyng Hall School, Blackberry Lane, Coventry, at 6pm on Thursdays.

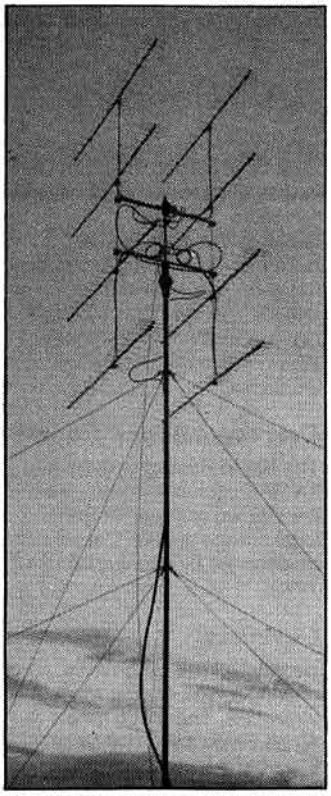
28MHz CB Conversions

At the time of writing, the RIS were still intending to cease issuing Authorities to possess unlicensable CB equipment for conversion to amateur bands at the end of 1990. At a recent meeting with the RSGB, RIS HQ staff explained that one unfortunate effect of this special dispensation for radio amateurs had been the creation of a market which actually *encouraged* the illegal importing of these radios - exactly the opposite effect to that which was intended. As soon as the Authority system ceases, the possession of unlicensable CB equipment for whatever reason will be illegal. Members are advised to apply as soon as possible for an Authority to convert any such gear they have in their possession. The address to write to is:- Radio Investigation Service, Room 102, Waterloo Bridge House, Waterloo Road, London, SE1 8UA.

VHF Communications

UKW Berichte, the publishers of *VHF Communications* magazine, is ceasing its English language edition from the end of this month. To the rescue of UK readers has come KM Publications, run by Mike Wooding, G6IQM, which has negotiated the UK publication rights. The only noticeable change will be an increase in the annual subscription to £12.00 (inc P&P) which is necessary to ensure the continued existence of the magazine.

PHOTOGRAPH: G8KQW



The 8 x 19 ele Tonna array used by G8KQW/P on 70cm.

VHF NFD 1990

VHF Contest Committee member, Andy Cook, G4PIQ, analyses the results

LAST YEAR'S VHF NFD saw poor conditions, but 1990 started out with a determination to be even worse, particularly on the east coast. However, this began to resolve itself on the Sunday, with some reasonable DX being worked. The weather, likewise, seemed to have a variable sense of humour. Some southern stations were in cloud throughout the contest, some suffered antenna pointing problems due to strong winds, some had rain dripping down their necks, some of the lucky ones had all of the above, and others simply had a reasonable amount of pleasant sunshine!

The VHFCC met for a weekend to carry out the bulk of the adjudication, and our thanks must go to Tony G4APA, Martin G4XUM, Jerry G4CJG and Shirley G0ESO for their most valuable help with this monumental task. Our job was not eased by the quality of paperwork supplied by some groups. Much was in excellent order, but there were the usual exceptions, and the culprits have lost points - if you have suffered a mystery loss of score, this may be why.

Groups should ensure they fill in the 427 band cover sheets thoroughly. Also real-time, hand-scrawled logs, complete with illegible alterations, coffee (and other) stains, and pencil entries do nothing to endear contesters to the adjudicators. A couple of real-time logs which we received were so bad that they had points docked from them, so beware! These may seem really trivial points, but be assured that at 8pm on a Sunday after a solid weekend of checking with a 350 mile drive ahead of you, being unable to find what section someone is in because it is not on the 427, doesn't exactly make your day! It only takes a few minutes to make sure everything is OK before sending the logs off, and it can easily save the loss of a significant portion of the efforts from a weekend of hard work!

Congratulations and certificates go to the winners and runners up in all sections/bands/countries. Special congratulations to the Northern Lights, who win the Surrey Trophy for the first time; to the Martlesham Radio Society who win the Restricted Section; to the Warrington Contest Group who yet again retain the Arthur Watts Trophy; to the Westmoreland VHF Group who take away the Scottish Trophy; to Hawick Station Group who win the Tartan Trophy; and to Martin Parry, BRS 52543, who again wins the SWL section.

70MHz

CONDITIONS WERE described generally as flat this year, with activity in the CW section significantly lower than in the phone section. The return to the format of two 70 MHz sections was, however, welcomed by the groups which did comment. There was one request to ditch the QTH exchange. However, from careful checking of the logs, there is no doubt it certainly sorts out the good CW operators from the rest. One leading station could well have been even better placed had 40% of the QSOs of one of the operators not been invalid due to QTH errors. Their saving grace was that the other operator was one of the best in the contest. The adjudicator felt however, that perhaps he should have been giving points for imagination for some locations which had obviously been patched together from the few characters copied correctly!

144MHz

CONDITIONS ON the Saturday were poor, but in the last few hours things improved considerably, with the top ten stations in the open section working distances of the order of 900km. The best DX on 2m, however, was worked in the low power section, between GM4AGG/P and F1MRV/P at 1070 km.

There were a number of isolated reports of poor signals, some of which may have been receiver problems. It is worth noting that some modern rigs are very poor with regard to broadband transmitter noise and synthesiser phase noise; some will not even meet the VHF contests code of practice of -90 dBc, even at spacings of several hundred kHz. If your group is receiving complaints of broadband noise it may be something needing look into. With the ever increasing size of antenna systems in use, it is not reasonable to plug your 'black box' rig and 'black box' amplifier together and expect the system to perform adequately under such stressful conditions without some careful attention to detail.

432MHz

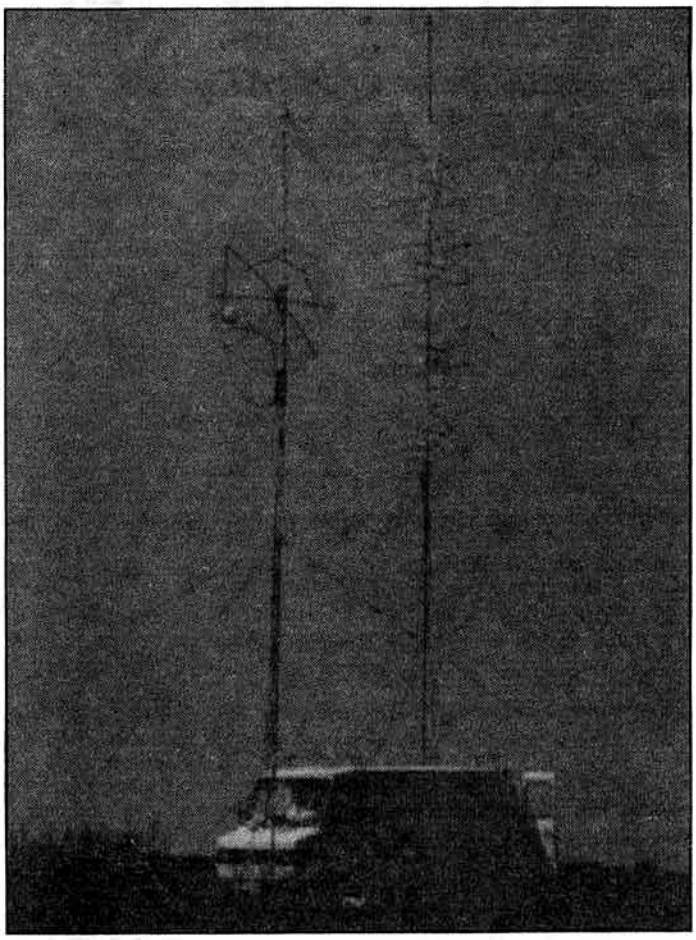
CONDITIONS FOLLOWED the same pattern as the other bands, but at least this made for no complaints about Syledis for a change! Again, the best DX was worked towards the end of the event, between G4GCM/P and OK1KIR/P at 1015 km.

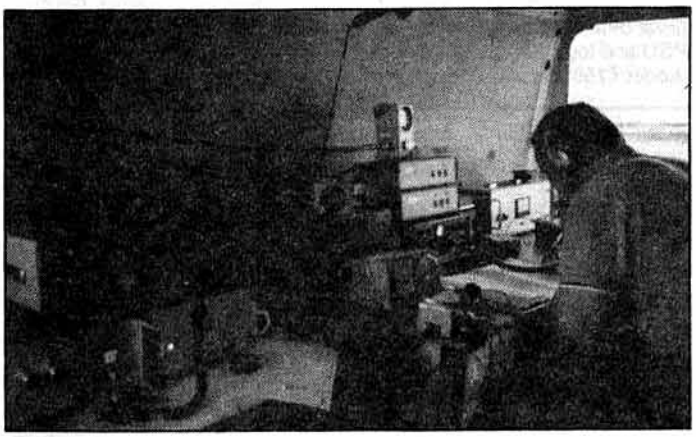
On the equipment front, it appears that the 2m multiple antenna array syndrome is obviously contagious, with at least three groups admitting to having this type of system on 70cm.

Also this band showed the highest equipment mortality rate. A very embarrassed adjudicator must admit to have been on the fourth generator, second rig and second amplifier before G4MRS/P got on seventy centimetres properly! GW8SJP/P report that they were so unhappy with their receiver that the '736 is now being used as a wheel chock for the Land-Rover!

PHOTOGRAPH: G4ZRS

Second place went to the Windmill Contest Group. Front, l to r: G4EGU; G4IFB; G8XIR; G0AFH; G4BUO; G4ZRS; Sue, XYL G4FAM; G0HSS; Stuart (The Cook); G3KZN; G6ALF. Top, l to r: G4FJW; G0FDZ; G0FKL; Sally, XYL G4IFB; G4FAM.





Winners: The Northern Lights Contest Group. Above: The 1.3GHz and 2.3GHz antenna system used by G4XUM/P. Below: G4XUM operating.

Microwaves

THESE BANDS also suffered from the poor conditions for the contest, and were in close competition with 70cms for the equipment disaster award. G3RXJ/P, sitting in cloud for most of the event, had both main and spare driver stages fail from flash-overs due to the humidity. The weather also took its toll in other ways, with, amongst others, G8VOI/P complaining that they couldn't comment on conditions because they couldn't keep the 3m dish pointing the same way for long enough to tell! Best DX on 23 was between G4XUM/P and ON7YK at 787 km, and on 13 between G4HGU/P and PE0MAR/P at 555 km.

The number of thanks for the shutdown period was exactly balanced by the number asking for its removal. Probably the best opportunity for DX on these bands was in the early hours of the morning when HB9s were being worked on 2 and 70. Activity on 70cm overnight is very low, and it should be possible for one operator to look after both 70 and 23, probably calling CQ on 70 and QSYing to 23 from there - it could certainly make the wee small hours more interesting and fruitful. There were also requests to incorporate 13cm into the low-power and restricted sections. How do you feel about this? Write and let us know.

OVERALL RESULTS - OPEN SECTION

	Group	Locator	70	144	432	SHF	Total
1	The Northern Lights	94RJ	1000	1000	938	941	3879
2	Windmill CG	01LD	893	698	611	1000	3202
3	Wulfrun CG	82JG	841	571	1000	679	3091
4	Ridgeway CG	91FN	510	434	632	829	2405
5	Ariel RG (Warwick)	91RU	479	295	871	733	2378
6	Victory CG	90JO	798	971	258	349	2376
7	Flight Refuelling ARS	80UU	771	369	700	521	2361
8	Leicester Poly. ARS	92NP	760	530	386	458	2134
9	Splinters CG	91GI	632	398	319	734	2083
10	Bracknell ARC	80ST	839	332	413	483	2067
11	Clifton ARS	01DH	698	380	448	480	2006
12	The Flowerpot Men	82JJ	647	457	574	306	1984
13	RS of Harrow	90XV	429	653	727		1809
14	South Manchester RC	93EH	597	443	407	323	1770
15	Reading & DARC	91IH	722	326	251	440	1739
16	Hornsea ARC	93PV	713	334	278	356	1681
17	Surrey Radio Contact Club	91XH	571	331	227	505	1634
18	Leicester RS & Rugby ATS	92MO	627	461	279	255	1622
19	Cousin Jacks CG	70PP	949	440	155		1544
20	Telford & DARS	82LQ	693	318	240	204	1455
21	Farnborough & DRS	91OF	570	286	404	112	1372
22	Exmoor RC & Appledore RC	81CC		115	555	636	1306
23	Verulam ARC	91LT	538	59	316	264	1177
24	11th Hour CG	91XG	558	233	176	177	1144
25	Thornton Cleveley	83LU	470	136	145	152	903
26	Crawley & Reigate	01OC		269	584		853
27	Mid-Sussex ARS	90WV		273	338	100	711
28	Watford CG	91PS		284	397		681
29	Yeovil ARC	80LV		392	224		616
30	South Devon RC	80FJ	413	157	44		614
31	Maidenhead & Dist ARC	91PN	501	81			582
32	Sears CG	01EN		222	270		492
33	Chesham & DARS	91PS		382	78		460
34	Doncaster ARS	93JK		119	76		195
35	Hawick Station Group	85PJ	61	69	46		176
36	Glenrothes & DARC	86JE		111	2		113

OVERALL RESULTS - RESTRICTED SECTION

	Group	Locator	70	144	432	SHF	Total
1	Martlesham RS	01QX	689	1000	1000	939	3628
2	Sheppy Exiles	94WC	964	663	622	1000	3249
3	Scunthorpe CG	94PH	676	528	403	911	2518
4	Spalding & DARS + 5 Bells Gp	02BV	444	318	634	711	2107
5	Plymouth RC	80AQ	1000	594			1594
6	Shefford & DARS	92VB	443	246	261	577	1527
7	Channel Island ARCG	89WG	137	942	300	142	1521
8	Ripon & DRS	94HG	178	316	190	276	960
9	Preston ARS	83RU	620	183	126		929
10	Weston Super Mare RS	81PH	520	89	319		928
11	Northern Heights Elect Soc.	93BS	342	303	271		916
12	Goole Radio & Elect Soc.	93PW	334	228	346		908
13	Hucknall Rolls-Royce ARC	93GC	369	211	262		842
14	Colchester RA	01IT		534	233	70	837
15	Mid-Cheshire ARS	83PF	374	211	219		804
16	NW of Ireland ARS	64LX	581	114			695
17	Queens Uni. Belfast RC	74BD	298	223	120		641
18	Burton on Trent & DRS	92BV	299	102	186		587
19	Grimsby ARS	93VJ		54	321		375
20	Mexborough & DARS	93JM	132	155	78		365
21	Melton Mowbray ARS	92MT		110	118		228
22	Nene Valley RC	92PG		86	84		170

OVERALL RESULTS - LOW-POWER SECTION

	Group	Locator	70	144	432	SHF	Total
1	Warrington CG	93AD	658	1000	1000	949	3607
2	Lichfield ARS & BBC	82JU	869	846	643	758	3116
3	Wirral & DARC	83JA	789	851	643	789	3072
4	Sutton & Cheam RS	93AC	654	659	788	616	2717
5	Basingstoke ARC	91KG	517	426	621	850	2414
6	Salisbury R&ES	81XA	342	401	476	1000	2219
7	South Birmingham RS	82XJ	608	404	452	731	2195
8	Salop ARS	82IP	595	451	349	470	1865
9	Guildford CG	91TF	499	207	384	556	1646
10	Bristol & Shirehampton ARC	81TK	413	289	541	386	1629
11	Westmoreland VHFG	84BT	1000	292	323		1615
12	Nunsfield House ARG	92GX	506	138	139	509	1292
13	Torbay ARS	80FM	701	377	136		1214
14	Bristol CG	81QJ	451	362	384		1197
15	Edgeware & DRS	91VR	571	178	195	222	1166
16	Kidderminster & DARS	82UK	476	219	433		1128
17	IOM ARS CG	74QD	686	92	208	57	1043
18	Dorking & DRS	91UE	547	209	142		898
19	Carrickfergus ARG	74BU	149	426	219	8	802
20	Braintree & DARS	01GU		183	302	285	770
21	W. of Scotland ARS & YAGIS	75UW	44	314	188	2	548
22	Wimbledon & Coulsdon ARS	91VG		270	165	66	501
23	Whythall RC	92BJ		195	145	146	486
24	Ellesmere Port & DARS	83JG		368	19		387
25	Dartmoor RC	70QO		148			148

OVERALL RESULTS - SWL SECTION

	Callsign	Locator	70	144	432	SHF	Total
1	BRS 52543	83LT	937	1000	622	0	2559
2	BRS 31976	01HO	1000	830	403	0	2233
3	BRS 28918	00HX	178	128	1000	0	1306
4	BRS 25429	93FX	0	174	634	0	808

Turn to page 61 for the individual band results

What does it cost to run a repeater?

by Geoff Dover, G4AFJ, Chairman, Repeater Management Group

The effort which goes into providing and maintaining a repeater service is too often taken for granted.

Out there somewhere is a group of people who have provided technical expertise, obtained equipment, found a site, sorted out the paperwork and a myriad of other problems to get your local repeater on the air.

After that, they have raised funds to pay the electricity bills, and arranged that the repeater is put back on the air when it goes wrong - usually on a dark, cold winter's night. These masochists are the committee members of the repeater group.

Once a group has agreement in principle from the RSGB, the construction of the repeater can be planned. A suitable receiver and transmitter will have to be bought and modified for repeater service.

The next piece of equipment needed is the control 'logic' which ensures that the repeater is activated only on receipt of a 1750Hz tone burst and generates the callsign, and 'K' or pips. This is not available commercially so has to be built by the group.

Next a mast, aerial/s and feeder have to be obtained - often two sets. Heavy duty aerials and extremely low loss feeder are required, rather than the usual 'amateur quality' gear.

In nearly all cases, another very important piece of equipment is needed -a 'duplexer'. This uses cavity resonators to prevent strong signals from the repeater's own transmitter overloading its receiver, causing it to lose sensitivity. If Rx and Tx share the same aerial then the duplexer will need more stages of filtering and will, therefore, be more expensive and more complicated to set up.

Next, someone will have to find a suitable site where the mast can be erected (planning permission may be needed) and also a place for the equipment. Alternatively, a commercial site can be shared - but often at considerable cost. The best sites may cost over £1000 per year, and in recent years the value of sites has gone up colossally because of the demands of cellular radio and local broadcasting. However, the RSGB has assisted repeater groups by negotiating very favourable site rentals with the IBA, BBC and Phillips, but even these can run into three figures.

It is then necessary to submit a detailed application to the Repeater Management Group (RMG) whose job is to ensure that the group is capable of responding to the technical challenge which repeater building represents. The RMG also ensures the most efficient use is made of available frequencies.

The proposal comprises the Radiocommunications Agency (RA) 'site clearance form', a coverage map, evidence of permission to use the site and the RMG's technical questionnaire. Every effort is made at the proposal stage to ensure that the group has enough technical expertise and local support to build and maintain the repeater.

The proposal forms are sent in monthly batches to the RA who pass them to the RIS, any other (Primary) band users (eg MoD), and the Frequency Planning Section where final agreement is given and the frequency is registered. All this can take a very long time, possibly up to two years, so the repeater group needs to be patient.

The licence is issued to the RSGB which holds and pays for all repeater licences. The RSGB also pays for public liability insurance for all repeaters. The group receives a 'franchise' to operate the repeater, rather in the way the IBA issues franchises to the regional TV or local radio companies.

A typical repeater may well have cost the group members a great deal of money. Eg: Rx, Tx, PSU and logic £400; aerials and feeder £150; mast £50; duplexer £400. It is assumed that equipment will need replacement every five years which means that £200 needs to be raised every year just to ensure continued service. Additionally, there are annual running costs. Eg:- Site fee £100; electricity £50 pa; misc costs including admin £50. This brings to £400 the total amount needed to be raised each year.

If the group has 50 members, this implies an annual charge of £8 per member, or little more than 15p a week. So, a repeater does cost something and, if you are not contributing, you are being subsidised by the group members.

Wouldn't it be far better if anyone who ever used a repeater subscribed to the local group. It only costs a few pence a day but think what it would cost if you had to pay for the equivalent PMR system - the licence fee alone would be several hundred pounds and you could only use the local repeater. Imagine the cost of a national system of commercial repeaters!

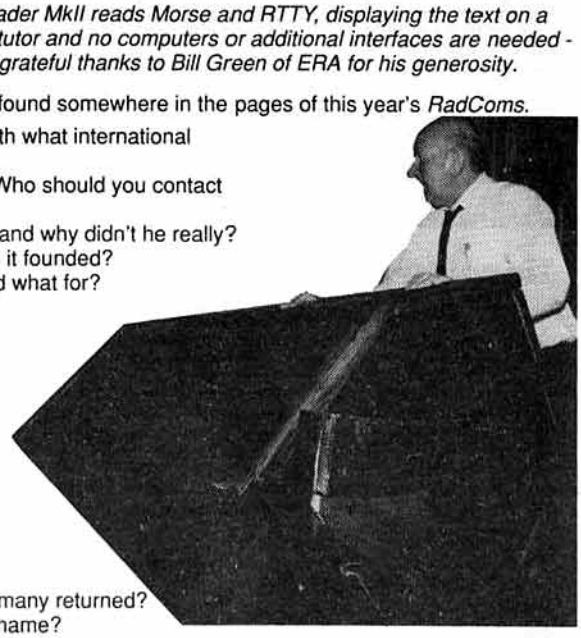
If you use a repeater and don't contribute to its upkeep, don't be surprised if it goes off when the few payers get fed up with subsidising your service. Go on - ask today who runs YOUR local repeater - and send him/her a cheque.

Win an ERA Microreader in this year's *RadCom* Christmas Quiz

Presented by Enterprise Radio Applications Ltd, the Microreader MkII reads Morse and RTTY, displaying the text on a built-in 16 char LCD screen. It can also be used as a Morse tutor and no computers or additional interfaces are needed - just plug into the rig's speaker socket and away it goes! Our grateful thanks to Bill Green of ERA for his generosity.

This year's quiz should be easy! All of the answers, except for the tie-breaker, can be found somewhere in the pages of this year's *RadComs*.

1) In what field would you find an organisation described as a 'competent body'? With what international legislation is it connected?
2) What number should you ring to order RSGB books or make an enquiry of HQ? Who should you contact about RSGB policy?
3) Which British amateur reportedly took part in EME tests during the lunar eclipse, and why didn't he really?
4) Our German sister society, DARC, was 40 years old this year. In which town was it founded?
5) Which RSGB member was awarded an MBE in the New Year's Honours List, and what for?
6) When was IMD? How many SESs worldwide were on the air for that event?
7) Which country was responsible for building DOVE?
8) When was International QRP Day? Who sponsors it?
9) How would you send a direct QSL to 7J1AB?
10) Who publishes the Radiant Catalogue?
11) What call sign did Terence Langdon use during his trip to the USSR?
12) What are the principle differences between LDF5-50 and LDF4-50?
13) What is ROPOCO? What makes it different from all the others?
14) Which two amateurs held the title YAOTY for 1989/90 and 1990/91?
15) What is the 6-figure locator for the North Pole 90 base camp on Sredniy Island?
16) Who is pictured opposite, what is he doing, and where? *[The name is easy but you may need some inspired guesswork for the rest].*
17) 16,554 of what were dropped on Western Europe just under 50 years ago? How many returned?
18) Who was the first amateur to operate from Turkey on 50MHz? What is his wife's name?
19) What is the address of the RSGB QSL Bureau? Which Sub-Manager handles cards for GX calls?
20) **The tie-breaker:** *RadCom* is sent by Royal Mail Presstream to all UK members (excluding GD, GU, and GJ). What was the total weight in kilograms of *RadComs* sent out by Presstream in March?



Answers should be addressed to: Christmas Quiz, RadCom, RSGB, Lambda House, Cranborne Road, POTTERS BAR, Herts, EN6 3JE, and must arrive before 6 January 1991. Good luck!

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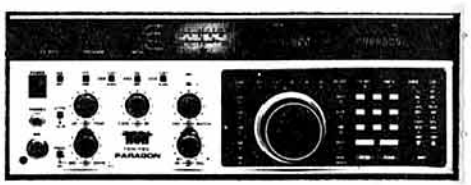

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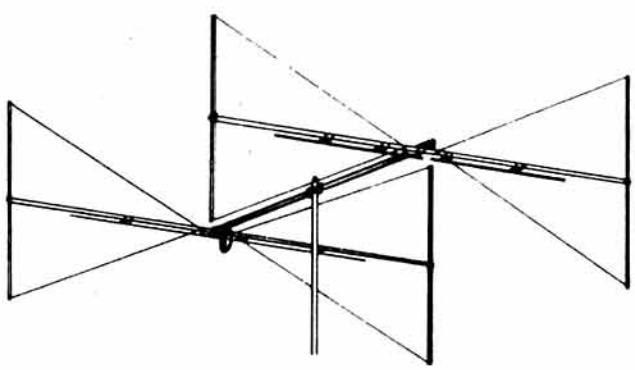

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MFJ 989 *3 KW A.T.U. cross needle peak reading meter and dummy load* ***£368. 17***
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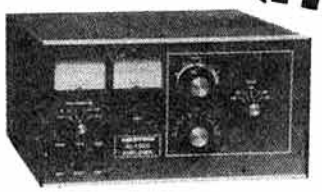

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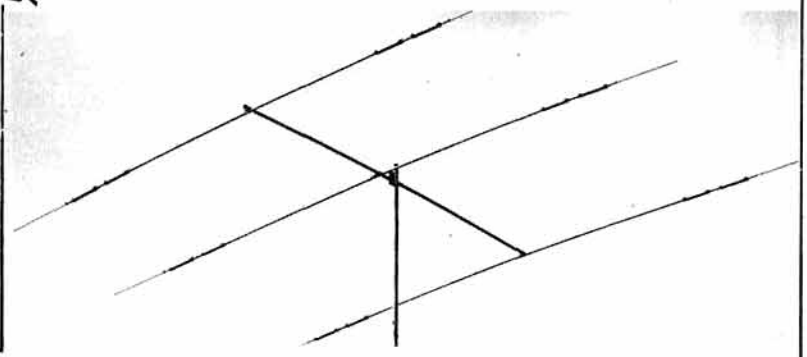

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A3SS 3 ele 10, 15, 20 meter beam £329.00
A4S 4 4 ele 10, 15, 20 M beam (stainless steel) £391.95
A50-6 6 ele 6 M beam £182.51
AP8 80/40/30/20/17/15/12/10 M vertical £164.76
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CHRISTMAS OPENING HOURS

HQ SHOWROOM

DEC 21/22 — 9.00am–1.00pm. DEC 24 — 9.00am–1.00pm. DEC 25/26 — CLOSED.
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FP-22	Internal 240V AC P.S.U.
DVS-2	Digital Message Storage Unit
XF455m	CW Filter 600Hz

£995 inc VAT

Noisy, crowded frequencies are about as productive as motorways in rush hour. Now, you can jump the queues and head for the wide, open spaces with the FT650 from Yaesu.
The FT650 packs substantial communications power in a streamlined, compact case. A flip out handle makes it the perfect portable, especially for those remote locations. The three frequency operation lets you win the battle of the bands on 6m, 10m, & 12m. The transceiver covers from 24 to 56MHz continuous on receive with a full 100W output.
An optional power supply and desk mic are available for base station operation.

The Best of The Best — the FT1000

Designed with no spared effort or expense for optimum performance and operability, the FT-1000 is the fruit of over 25,000 man-hours of intensive research and development by Yaesu's top design engineers. Instead of merely offering incremental improvements on existing designs or adding bells and whistles to an old model, the FT-1000 project involves a wholly new approach to the application of the latest digital and RF technologies to today's most demanding needs on the hf bands. Extensive surface-mount component technology allowed six microprocessors and five Direct Digital Synthesizers to be harmoniously integrated with a simple operator interface into a highly reliable full-featured transceiver optimized for serious hf applications.

BRIEF SPECIFICATIONS

- ★ General Coverage Receiver 100kHz-30MHz
- ★ Ham bands TX 160-10m
- ★ Modes CW, USB, LSB, AM, FM, RTTY and Packet
- ★ VFO steps 10Hz CW, SSB, RTTY, 100Hz, AM, FM, PKT
- ★ Auto antenna impedance range 16.7 to 150 ohms
- ★ Selectable receiver band widths 2.4kHz, 2kHz, 500Hz, 250Hz
- ★ Dual band receiver tuning and monitoring with balance control
- ★ Power output up to 200 watts P.E.P. 50W AM
- ★ Sensitivity preamp on SSB/CW 0.25 micro volts 10dB S/N
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G-250	BELL TYPE TWIST/SWITCH CONTROL	£78.00
G-400	BELL TYPE METER CONTROLLER	£149.00
G-400RC	BELL TYPE ROUND CONTROLLER	£179.00
G-600RC	BELL TYPE ROUND CONTROLLER	£235.00
T2X	BELL TYPE METER CONTROLLER	£499.00
G-800SDX	BELL TYPE 450 DEG VAR. SPD	£325.00
G-1000SDX	BELL TYPE 450 DEG VAR. SPEED	£368.00
G-2000RC	BELL TYPE ROUND CONTROLLER	£445.00
G-500A	ELEVATION METER CONTROLLER	£199.00
G-5400B	AZIMUTH/ELEV DUAL CONTROL	£375.00
G-5600B	AZIMUTH/ELEV DUAL CONTROL	£435.00
RC5-3	BELL TYPE PRESET	£275.00
RC5-1	BELL TYPE ROUND CONTROLLER	£219.00
RC5A-3	BELL TYPE VAR. SPEED AND PRESET	£425.00
RC5B-3	BELL TYPE VAR. SPEED AND PRESET	£675.00
ROTATOR HARDWARE		
AR200AB	ALIGNMENT BEARING AR200XL	£17.50
KS505	ROTARY BEARING 1½" MAST	£19.95
GS-065	ROTARY BEARING 2" MAST	£29.95
GC-038	LOWER MAST CLAMP G-400, 600 etc	£16.95
9523	CHANNEL MASTER BEARING	£19.95
CK46	ROTARY BEARING 1.5–2.5 MAST	£34.95
MC1	LOWER MAST CLAMP RC5 SERIES	£25.00
ROTATOR CONTROL CABLE		
RC5W	5 WAY G-400RC, 800, 1000SDX PER MTR	£0.48
RC6W	6 WAY G-250, 400, 600, RC KR500 PER MTR	£0.66
RC8W	8 WAY HAMIV, T2X 2000RC RC SERIES PER MTR	£0.72

CARRIAGE:
ROTATORS £7.50, ROTATOR HARDWARE £4.00 ROTATOR CABLE £3.50 UP TO OVER 20 MTS, OVER 20 MTS £5.00

SWR/PWR METERS

YS60

FS710V

FS710V	50-150MHz	15/150W	PEP	£107.80
FS300H	1.8-60MHz	20/200/1000W		£53.40
FS210	1.8-150MHz	20/200W	Auto SWR	£65.50
FS301M	2-30MHz	20/200W		£42.25
FS301MH	2-30MHz	200/2000W		£42.25
FS711H	2-30MHz	20/200W	Head/Display	£43.65
FS711V	50-150MHz	20/200W	Head/Display	£43.65
FS711U	430-440MHz	5/20W	Head/Display	£43.65
FS711C	26-30MHz	10/100W	Head/Display	£24.55
FS500V	50-150MHz	20/200W		£81.95
W720S	130-440MHz	20/200W	Head/Display	£52.75
SWR50B	3-5-150MHz			£36.75
FS20DL	3-150MHz	1/10W		£43.65
FS20D	3-150MHz	5/20W		£43.65
SWR3E	3.5-150MHz	20/200/1000W		£28.75
JD110	1.5-150MHz	10/100W		£16.50
T435	144/430MHz	20/200W		£65.00
YMIX	3.5-150MHz	Rel. Power/SWR Twin meter		£31.50
OSCAR-171B	3.5-150MHz	Rel. Power/SWR Twin meter		£26.85
SP425	140-524MHz	5/15/150W		£119.95
YS60	1.6-60MHz	20/200/2000W		£93.15
YS500	140-525MHz	4/20/200W		£81.65

Carriage on all power meters £4.00

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MORSE KEYS			p.p.
HK702	STRAIGHT KEY	£42.75	£1.75
HK703	STRAIGHT KEY	£49.69	£1.75
HK704	STRAIGHT KEY	£26.35	£1.75
HK705	STRAIGHT KEY	£26.25	£1.75
HK706	STRAIGHT KEY	£28.95	£1.75
HK707	STRAIGHT KEY	£25.49	£1.75
HK708	STRAIGHT KEY	£26.45	£1.75
HK710	STRAIGHT KEY	£41.75	£1.75
HK711	STRAIGHT KEY KNEE MOUNTING	£41.75	£1.75
BK100	MECHANICAL BUG	£41.45	£2.00
MK701	SINGLE LEVER PADDLE	£38.35	£1.75
MK702	SINGLE LEVER PADDLE	£41.50	£1.75
MK703	SQUEEZE KEY	£37.00	£1.75
MK704	SQUEEZE KEY	£24.99	£1.75
MK705	SQUEEZE KEY	£32.78	£1.75
MK706	SQUEEZE KEY	£35.00	£1.75
HK802	DELUXE BRASS KEY	£99.95	£2.50
HK803	DELUXE BRASS KEY	£89.95	£2.50
HK804	DELUXE BRASS KEY	£95.00	£2.50
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DEWSKEYSTD	STAR MASTER KEYER	£54.69	£2.50
DEWSKEY M	STAR MASTERKEY MEMORY	£94.99	£2.75
D70	MORSE TUTOR	£63.40	£2.50
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PK232/FAX	MULTIMODE DATA TERMINAL	£289.95	£3.50
PK232/MAIL	MULTIMODE DATA TERMINAL C/W Mail Drop	£319.95	£3.50

CREATE

ROTATORS

The RCS Series of rotators from Creative Design are built to meet the exacting standards required by both professional and amateur users. A range of methods is available designed to cater for medium to large shed antennas. All the rotators are manufactured with high quality components allowing continued and reliable operation.

RC5-1	£219.00
RC5A-3	£425.00
RC5B-3	£675.00
CK-46 Rotary bearing	£34.95

Carriage on:

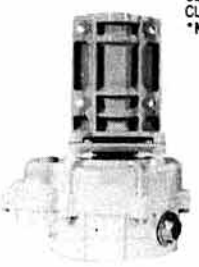
Rotators	£7.50
CK-46	£3.50

6M BEAMS

New from Creative Designs are a range of 6M beams, the CL6DX 6 element, CL6DXX 7 element and CL6DXZ 8 element.
All these antennas are the result of long and continued research to achieve the best possible performance whilst remaining both cost effective and extremely robust.

CL6DX	5 ele 13dB*	£115.00	P&P £8
CL6DXX	7 ele 14.3dB*	£168.99	P&P £14
CL6DXZ	8 ele 14.5dB*	£225.00	P&P £14

*Manufacturers figures



COMET & HOKUSHIN ANTENNAS

New from Hokuskin, an exciting range of high performance antennas, the WX1 has been a best seller for some time now, available are its bigger brothers the WX2 and WX4. Both are multi section 2m/70cm colinears and the mechanical construction the best we have seen yet. On the mobile front a new mini dual band mobile, the HS-727SS, very similar to the Comet CHL21J, and tests with our network analyser confirm its compatibility with our existing range of gutter and mag mounts. Also available a low profile hatchback mount and cable, the SS-B1, two new dual band antennas, the very slim VM-720SKR and the compact HS-727VMS. Both are suitable replacements for the 70N2M. For the HF enthusiasts a compact 10m HB9CV dual driven element antenna that is extremely light and very cleverly constructed.

WX2	WX4	HS-727SS	28HS-2HB
VHF/UHF Base	VHF/UHF Base	VHF/UHF Mobile	10m 2 ele HB9CV
144/432MHz	144/432MHz	144/432 mini	Dual driven element
6/8dB gain	7.8/10.8dB gain	1/4 5/8 wave	6dBi gain
200W max	200W max	100W max	500W PEP max
£75.00	£99.00	£16.95	£65.00

MOBILE ANTENNAS		
2QW	2m 1/2 wave	£4.95
2NE	2m 5/8 wave folding	£13.25
788	2m 7/8 wave	£15.00
78F	2m 7/8 wave folding	£21.50
88F	2m 8/8 wave	£24.10
258	70cm 2 x 5/8	£29.37
358	70cm 3 x 5/8	£33.73
268E	70cm 2 section colinear	£32.80
DUAL BAND MOBILE		
CHL21J	Mini dual band mobile	£14.95
CHL23J	Small dual band mobile	£16.90
CA2X4KG	2m 2 x 5/8 70cm 4 x 5/8	£39.95
CA2X4MB	2m 4.5dB 70cm 7.4dB	£37.75
HS-727SS	Dual band mini antenna NEW	£16.95
HS-727VMS	2m 1/2 70cm 2 x 5/8 NEW	£25.95
VM-720SKR	2m 1/2 70cm 2 x 5/8 NEW	£24.95

DUAL BAND BASE ANTENNAS		
WX1	2m/70cm colinear	£54.99
WX2	2m/70cm colinear	£75.00
WX4	2m/70cm colinear, high gain	£99.00
CA2X4WX	2m/70cm colinear	£79.00
CA2X4MAX	2m/70cm colinear, high gain	£99.95
CF416MN	Duplexer 1.3-500/400-540MHz	£25.50
HS790DN	Duplexer Mess 1.6-150/410-460MHz	£25.50
ANTENNA MOUNTS		
GCCA	Gutter mount and cable	£14.25
HDTMCA	S/S trunk mount and cable	£19.50
SOMM	Mag mount and cable	£12.75
TBR	S/S hatch back mount NEW	£11.25
RS17	Mini hatch back mount NEW	£12.50
RS16	Mini gutter mount NEW	£12.50
SS-B1	Mini back mount & cable NEW	£26.50
CK-3LX	Cable assembly for RS16, 17, TBR	£19.95

CARRIAGE BASE ANTENNA £7.50, MOBILE ANTENNAS £4.00, CABLES AND MOUNTS £3.50

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SPECTRUM ANALYSIS

HF

JOHN ALLAWAY G3FKM
10 Knightlow Road, Birmingham
B17 8QB

ANOTHER YEAR GONE! We have passed the peak of Cycle 22 but there is still going to be a lot of life on the HF bands for some time to come - and LF will become better and better. Very best wishes for the Christmas season anyway!

Peter Reed, G4BVH, tells me that he still gets requests, both direct and via the bureau, for QSOs he made when he was A4XVK on Masirah Is between 1976 and 1982. He still has plenty of cards left - if you need one apply to the address in *QTH Corner*.

DX NEWS

MEMBERS OF THE Royal Omani Amateur Radio Society will take part in UNESCO's project for the study of the Silk Roads - the maritime mobile route starting from Venice and ending at Osaka. The voyage - on the Omani yacht *Fulk Al Salamah* - will take more than 100 days beginning 23 October. There will be an amateur station on board using the callsign A43SR/MM which will be on all bands 3.5 - 28MHz. There is a special award for working it on two different modes or two bands. Send certified log details plus 10 IRCs or equivalent to the address in *QTH Corner*. The National Day Award is similarly available with the same requirements if you worked two A4/20 stations between 21 and 23 November. A92BE hopes to be on top band again this winter but he says that amateurs in **Bahrain** are still not allowed on 10MHz. *DXpress* says that the application by a group of Indians to visit **Bhutan** has been turned down. JE7RJZ/JT has been on 21MHz SSB and is expected to be in **Mongolia** for some time. There is now a Mongolian amateur radio society which has recently applied to become a member of IARU. According to the *Long Island DX Bulletin* four operators of the club station 7O8AA, using the equipment left behind by the recent DXpedition, keep a schedule with F2VX at 0900 on Saturdays and Sundays on 21.235MHz. It is believed that 9K2CS is alive and well and that the 7O1AA logs are also safe.

DX News Sheet says that W2QM, W2JB, and W2AGW will be on **St.Martin Is** from 4 to 12 December as FS/W2QM on all bands, mostly on CW.

Since 1 October, Canadian amateurs no longer have to follow a mandatory national band-plan but now are being asked to follow the one internationally-agreed within IARU and applicable in Region 2.

The application for DXCC status for Grosse Ile has been rejected unanimouly. FP8DX, on **St.Pierre Is** has now put up LF antennas and is sometimes on 7.006MHz from 0200. At 0300 he goes to 1.833MHz, and at 0400 to around 3.798MHz. G1SWW is communications manager for Halley, which is one of five full time bases maintained by the British Antarctic Survey. He says that all five allow amateur operation and have permanent callsigns. They are - VP8HAL (Halley); VP8FAR (Faraday); VP8SIG (Signey); VP8ROT (Rothera); and VP8SGB (Bird Is). Faraday and Halley hope to be on HF packet, RTTY, and AMTOR sometime in the next two years. Those who already have VP8 callsigns may use them at the bases of course.

LA7DFA will be on from **Jan Mayen** until next April mostly on the LF bands and 28MHz as JX7DFA. He likes CW, and frequencies to watch are 3.501, 7.004, 10.110, 14.101, 18.080, 21.101, 24.910, and 28.010MHz. According to *DX-NL*, the Federal Republic of Germany and the German Democratic Republic probably ceased to exist for DXCC purposes on 3 October. They should still count as separate countries between 17 September 1973 and that date. A new listing for Germany should appear for QSOs before and after that period.

If you hear an unusual prefix from **Wallis and Futuna Is** it will be FW1FM who in France is FE1GJO. He is there for three years and sometimes appears around 14.120 at 0630. AH3C will be on 7.009MHz this winter at his sunrise and sunset times from **Johnston Is**.

In a QSO with G0DYW, FT5XH said that FT4WB, on **Crozet Is**, is still off the air because of equipment problems. However, there will be another operator in 1991 - his name is Jean-Claude and he will be there for a year using the callsign FT4WC. FT5XH himself can often be found, together with FT5XA, near 14.200MHz at around 1100. XT2BX, in **Burkino Faso** is a YL - and joins the 'Family Hour' on 21.345MHz at 1800. 3C1EA in **Equatorial Guinea** is often on 21.040MHz from 2215 - a bit late for the UK in mid-winter perhaps. J5CVF is due to leave in the middle of this month from the other Guinea - **Guinea Bissau**. 9Q5TE will be in **Zaire** for a year. He keeps a sked on 21.315MHz at 1400 and, according to *DX News Sheet* also operates on weekday nights on 7.066MHz between 0430 and 0500 before moving to 14.190MHz at 0500. ZS9A in **Walvis Bay** seems to like 14.185, 21.335, and 28.610MHz and he has often been found using the latter on Sundays after 1400.

1990 28MHZ COUNTRIES TABLE

G0JZU	196	G0KDS	115
G4VVP	195 (SSB)	G0MXU	101
G4MUW	193 (SSB)	G2AKK	98 (CW)
G4DXW	168	G4SJG	81
G4ZYQ	133	G0CKP	79
GM4OBK	131	G0DUS/M	74
G4NXG/M	120	GM4ZIL	63

VERY LOW FREQUENCY WORK

There was an announcement in September *Radcom* concerning the possibility of permits being issued for experimental work at VLF on single frequencies - probably between 15 and 120kHz but also possibly even lower. This has produced a response from several members which shows that there is indeed interest in VLF work. An important point to note is that *it will be necessary to give details of the experiments that you would like to carry out.* If you really have an interesting project why not write to the Chairman of the Society's Licensing Advisory Committee, John Bazley, G3HCT (QTHR), enclosing a SASE please, and describe it . . . ?

UK DX CLUSTERS

George, G3LNS, is now the publicity officer of the newly formed UK Cluster Group and has sent me an interesting and up to date resumé of DX Packet Cluster activity in the UK. There are now four clusters - GB7DXC, Cheltenham (SysOp - John, G4PDQ); GB7DXI, Wokingham (SysOp - Ian, G4LJF); GB7WDX, Crediton (SysOp - John, G3HTA); and GB7YDX, Wetherby (SysOp - Steve, G3VMW).

The clusters are linked via the national packet network and DX info can quickly be passed to any users logged on to the system. So, with the combined effort of 20 or 30 users scanning the bands for DX when conditions are good, the action can be fast and furious! George has seen the success of DX clusters in the USA and believes that the network will grow very quickly - he knows of at

EIGHT BAND TABLE NUMBER 4

CALL	1.8	3.5	7.0	14	18	21	24	28	Total
G3KMA	135	250	313	324	174	323	145	313	1977
G3XTT	162	217	269	310	132	300	101	277	1768
G3GIQ	71	211	273	322	132	321	104	306	1740
G4LJF	42	215	258	304	27	286	5	255	1392
GM3PPE	69	165	178	238	151	233	122	209	1365
G3NOF	5	101	105	323	112	322	65	288	1321
G4OBK	124	156	203	279	29	252	11	227	1281
G3JJG	52	101	184	228	132	254	107	199	1257
A92BE	55	145	190	302	25	280	3	251	1251
G3TXF	65	164	204	282	4	264	1	238	1222
G3YMC	81	114	191	250	63	258	50	209	1216
G3JXN	30	71	133	209	88	215	52	237	1035
G0AEQ	2	88	118	243	55	196	6	182	890
G4NXG/M	1	33	60	208	49	225	68	209	853
Average	64	145	191	273	84	266	60	243	1326

Next deadline - scores to be received by G3GIQ by 8 January 1991 (Prepared by G3GIQ)

QTH CORNER

A4XVK	P.Reed, 20 Horton Rd, Brighton, BN1 7EA.
A71CD	Box 80074, Alwakra, Qatar
C9QL	YASME Foundation, Box 2025, Castro Valley, CA 94546
CY9CF	via FP5DX, P.O.Box 4204, F-97500 St. Pierre et Miquelon, via France
D68GA	via N6ZV, 1349 Winchester, Glendale, CA 91201
D68VA	K5VT, 5227 E.Osborn Rd, Phoeniz, AZ 85018.
GD4UOL	Flat 4, 60 Genesta Rd, Westcliffe on Sea, Essex, SS0 8DB
HI8A	Akito Nagi, PO Box 1163, San Domingo, Dominican Rep
HS0B, HS0M, HS0SM, HS0AC	All via NY2E, 819 Old Medford Av, Medford, NY 11763
JX7DFA	Romolalia 58, N-7029 Trondheim, Norway
TY1DX	IK6FHG, via Solferino 62, I-61100 Pescaro, Italy
VP8CEJ	M.P.A, Box 260, Port Stanley
ZK3KY	Box 3, Tokaimura 31911, Japan

least three more already planned for the UK. The DX Clusters 'Pavilion Software' written by Nick Newell, AK1A, has many features including beam headings from the user's QTH, sunset/sunrise times for all DXCC countries, WWV forecasts, a QSL Managers file and bulletin/message files, to name but a few.

G3LNS will be producing a leaflet shortly which will list all the features of DX Clusters and if any reader would like a copy he will be pleased to send one on receipt of a SAE at QTHR.

TOP BAND NEWSLETTER

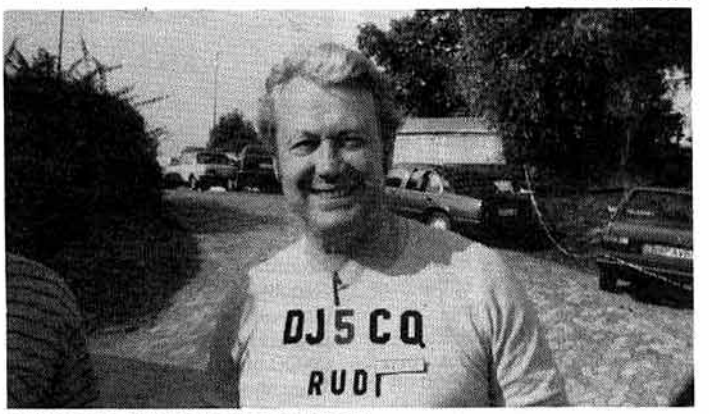
THIS WAS PRODUCED for many years by Stu Perry, W1BB/1, who at the time was undoubtedly world number one on 160m with his special shack and large vertical antenna sited near the Atlantic Ocean. Stu became ill and VE3DO took over. Now, in turn, it is being taken over by G3XTT and G3RBP (QTHR). The first issue was due in mid-November. For a trial copy send US$1.00 or equivalent to either of the new editors. It is quite something to have this specialist bulletin produced in the UK - so please support it !

NEW NCDXF BEACON

"THERE IS SOMETHING new on the NCDXF 14.1MHz beacon net" (writes Jack Troster, W6ISQ, in the *NCDXF Newsletter*). "Now almost everybody in the world who is anybody knows about the NCDXF beacon net on 14.1MHz - a frequency designated by international agreement through IARU as a 'beacon frequency'. The net has been in operation for almost 10 years and has been widely discussed and written about in amateur publications around the world. There are presently nine stations in it which broadcast a one minute message every 10 minutes, 24 hours a day.

Primarily the message consists of four nine-second dashes at power levels attenuated in sequence from 100W to 10W to 1W to 0.1W. You will be amazed at how many times you will hear the 1W and 0.1W signal from a beacon across the world. The stations on the air and their sequential times of transmission are: 0000 4U1UN/B, 0001 W6WX/B (Stanford, Cal), 0002 KH6O/B, 0003 JA2IGY/B, 0004 4X6TU/B, 0005 OH2B, 0006 CT3B, 0007 ZS2DN/B, 0008 LU4AA/B, 0900 (nothing), at 1000 back to 4U1UN etc every 10 minutes. The addition is a new capability at W6WX/B which was recently converted to a three-band beacon. After the W6WX/B one minute message on 14.1MHz it switches to 21.150MHz for the same one minute message beginning two seconds after the 14.1MHz message ends. At 0003 the beacon switches to 28.2MHz for the same message. If you can switch quickly enough you may hear the beginning of each transmission. This is a rather fantastic system and very interesting to monitor. The prototype three-bander was designed and built by NCDXF director W6QHS and master builder/designer N6EK. The NCDXF hopes that all nine beacons will be converted to the triband type within a few years. Other beacons may be added to the net later. Just think of the interesting information this new three-band system will provide to amateurs and researchers! The NCDXF would appreciate your evaluation of the three band beacon W6WX/B. Please send your comments to Al Lotze, W6RQ, 46 Cragmont Ave, San Francisco, CA 94116-1308, USA." These beacons *are* very interesting to monitor and it is quite surprising what low power signals can be copied - packet radio transmissions being made in the wrong place permitting. NCDXF is an organisation well worth supporting (it also funds many of the leading DXpeditions) and it is now able to accept membership fees - which start from US$25.00 - by Visa or Mastercard. I will be only too happy to send you a copy of the application form (SASE please).

PHOTOGRAPH: G3ZAY



DJ5CQ, alias VK9LM (Lord Howe Island)

BAND REPORTS

For a long time, I have wondered whether in fact the space devoted to this part of the column is justified. Because of the inevitable lead time, loggings have to be of stations heard or worked at least six weeks before you read them . . . I wonder what *you* think? Space in *Radcom* is restricted so should we 'cut' this part? Please let me know and I will act accordingly.

Information this month came from G2AKK, G2HKU, G3DYY, GM3GDX, G3's GVV, KSH, LPS, YRM, G4's DXW, EHQ, FRV, GW4KGR, G4's MUW, NXG/M, PDQ, VVP, ZYQ, G8KG, G0's DUS/M, DYW, G0KDS - and, of course, the packet cluster!

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

7MHz
0600 *HI8A, 6W1QB, 7X8CW*
1900 *JA4AO, TR8XX*
2200 *4S7WP*

10MHz
0600 *FG5ED, KL7U, ZL1-4, 9Y4KB*

14MHz
0700 FK8FS, FO0SSJ, FW1FM, *KH6/LA5HE*, YJ8AB, ZK1TW, ZK3TY
0800 *A35XK, FK8GJ, K8CRM/KH3*, T3ZZ, *V31BH, ZL7TZ*
1600 BV2/WE6C, *KC6MM*, S79JBM, *3C1EA*
1700 BY1QH, *BY5RA*, C9QL, 7J1ADJ/JD (M.Torishima)
1800 EP2HZ, HS1BV, VQ9CQ, ZL1GJ
1900 A61AD, *FK8FG*
2000 BZ1LB, VE8CB, YK1AN, *ZX8CW*
2100 FH8CB, JA, DF3DS/ST, VU, ZL
2200 J28NU, ST2YD, 5U7NU
2300 VP8CEG, 4S7EF, 5V7NU

18MHz
0700 *AH3C*, FK8FS, JA, LU, *VK2-VK5*
0900 *A35XK*
1800 *KH6CD*
1900 *PJ2AM*, ZL3DX
2100 *A45NZ/A*

21MHz
0800 BY5RY, *JT1BH*, JU1DX, *AA4NP/KH9*, KL7YL, V63BC, *3D2AG*
0900 NL7UT, YJ0AMD, 4K0ADS, 5W1HM
1000 BV2F, BY7KT, KH0/N6BUV, ZK3KY
1100 KD7P/NH2, VK9LA
1300 *HS0E*
1400 *V63BC*
1800 *FR5AI/J, KL7GU*, WH6ASW, 3B9FR, 7Z1AB
2000 FR5DX, HF0POL, *KH6FJ*, S92LB, *V2/G6QQ*, ZX8DX
2200 JA, TZ6VV, VK, W6-W7.

24MHz
0700 KH6BB, VK, ZL
1100 *FY5FA*, ZS8MI
1200 PJ6/KV4AD, YN/SM0DIG
1300 DU1KK, VK6, VS6CT
1400 FT4XG
1500 HI8RBI, HK5LEX, V47NXX, VQ9FM
1600 D44BC, VP2V, 9Q5PL
1700 NH6C
1800 FG4DM
1900 *HI8A*, KP2BT, *VP2VE*, 3D2CC

28MHz
0800 BY4SZ, KG6JJH, 7Q7JM, 8Q7JP
0900 BY5QW, HL5QY, KH6IRT, TR8GL, XU8DX
1000 AA4NP/KH9, KH0AC, KL7, P29DY, T5RR, TJ1MR, VK1-VK8, XX9KA, YJ8RN, ZL2BTO
1100 A71CD, FT5XH, ZS8MI, 7Q7KG
1200 FT4XG, VK6ADP, VK9XD, VS6CT, 5N30ZHM, 9Q5TE
1300 KB2IUZ/HZ, KG4DD, N3EMA/NH2, VP8BXX (S.Orkney), 9L1US
1400 FP/G3LMO, V47NXX, YK1AA
1500 SO1A, VE8CB, *VP5P*, VQ9FM, VS6VU, 9M2DM, 9V1YJ
1600 A47RS, FJ/K2IBW. ST2YD
1700 D68GA, JX9CAA, TY1DX, VU2ICC, Y90ANT, ZS9A
1800 D68VT, FO0IGS, FR5DX, KH6XT, P43TH, TG9GI, VP8CEJ, W6 W7, *ZD8BOB*, ZK3KY
1900 HK0TCA, J6LQC, NH6RZ, NL7PJ, ZX8DX

AWARDS

WORKED ROMANIAN MARTYR CITIES AWARD

For those who have worked (or heard) 10 different YO stations since 16 December 1989. The four 'martyr cities' must be included for the first class - Timisoara, Bucharest, Brasov, and Sibiu. For second class only three are needed and for third only two. Any modes. Send log extract, QSLs for the YOs, and 10 IRCs or US $5.00 to WRMC Award Manager YO3BDP, Georgian Ovidiu, PO Box 69-117, 76400 Bucharest.

PROPAGATION

SMITHY'S REPORT IS short this month. It says : "Early October saw a small increase in mean solar indices as compared with September although there can be little doubt that the underlying trend is now downward with the peak having been passed a year ago. For much of the time the

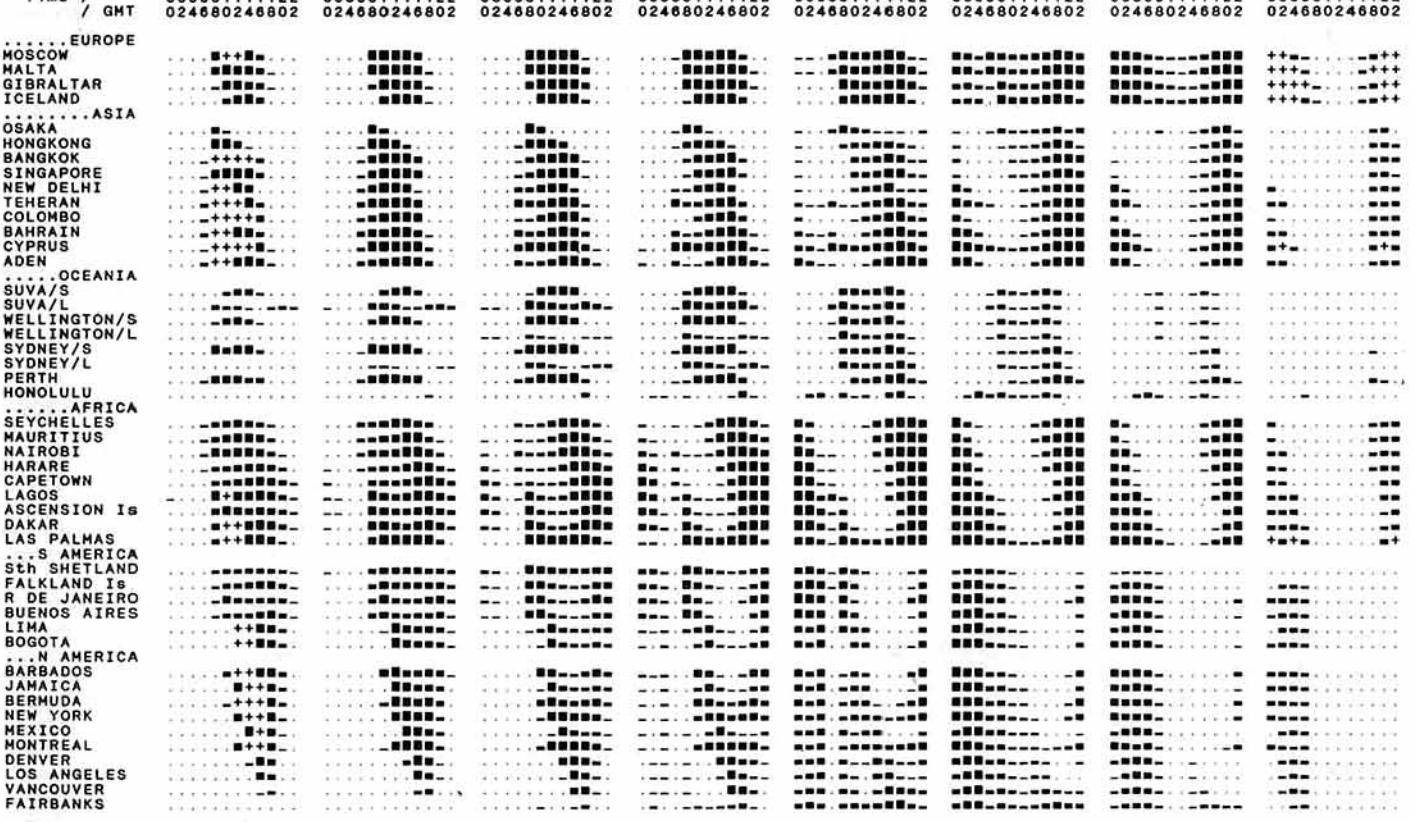
continued on page 20

HF F-LAYER PROPAGATION PREDICTIONS FOR DECEMBER 1990

The time is represented vertically at two-hour intervals 00(00)GMT for each band, ie 00=0000, 02=0200, 04=0400 etc. The probability of signals being heard is given on a 0 (indicated by a dot) to a 9 scale; the higher the number the greater the probability with 1 meaning 10 to 19 per cent of days, and so on. Additionally 50MHz F-layer and 1.8MHz openings are indicated by a plus (+) sign in the 28 and 3.5MHz columns.

Time / GMT	28MHz 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	....8++95...	....99997...	....999991..	...1998994..	11.587789821	763765567986	887532235888	++42....25++
MALTA	....798861..	....999982..	....999996..	....9889982.	11.487789972	773764458998	888632136898	+++3....3+++
GIBRALTAR	....288761..	....499882..	....799996..	....9989982.	98778972	563275557998	988753224799	++++2...25++
ICELAND	.....5896...	.....79981..	.....99993..	....299996..	....7888993.	454.86668984	888353346788	+++52...34++
** ASIA								
OSAKA	....62......	....84......	....96......	...1871.....	1..3753111.2	1..142234635	....2..13672	.........34.
HONGKONG	....9971....	...19983....	...28886....	...167772...	1...3556642.	2...12236872	13685	453
BANGKOK	...1++++4...	...279996...	...1588981..	....377893..	1....5568722	3....2236887	1......13687	454
SINGAPORE	...189995...	...279997...	...2588991..	....277893..	1....5568832	2....2236886	1......13685	452
NEW DELHI	...2++97....	...379981...	...447883...	...226786...	1....3568222	73....236777	72.....13687	4.........454
TEHERAN	...3+++94...	...588997...	...7668992..	...7447894..	311511468843	8642...136888	772....13678	44........445
COLOMBO	...2++++6...	...368998...	...2268993..	.....47895..	3....1468953	62....136888	5......13678	2.........445
BAHRAIN	...3++984...	...5779961..	...6458984..	...52368972.	4213..368964	873...136888	772....13678	44........445
CYPRUS	...1++++81..	...3999993..	...68889961.	1..887889931	541765578985	986532347999	8862...24788	5+3......5+5
ADEN	...3++8972..	...4678984..	...53469972.	2..411489952	7411..168997	883....36888	771.....3677	44........344
** OCEANIA								
SUVA/S	.....3662...	.....5784...	....17887...	....378882..	....665685..	...1532464..	...12..131..	....
SUVA/L	....4331.232	1...66522453	11..87655752	...18767783.	...4743576..	...3411253..	....2...21..	....
WELLINGTON/S	....26751...	....48873...	....78886...	....887881..	...1755683..	...1532463..	....2..131..	....
WELLINGTON/L	...........,	...........,	11..321..111	53211321	...17433551.	...1411252..	....2...2....	....
SYDNEY/S	....86883....	...198995...	...388898....	...2877892..	....5556861.	....2223672.	.......135..	.........2..
SYDNEY/L	...........,	....221...11	....5531.233	66531452	....6545574.	....3212561.	.......23..,	....
PERTH	...277755....	...378877....	...3588893..	...1277895..	5468942	2136873	13651	.........42.
HONOLULU	...........,	.........2..	.........4..	.11.1...161.	.34.412.561.	.263522253..	..352..131..	...2........
** AFRICA								
SEYCHELLES	...2567642..	...4568864..	...32368873.	2..1.1489962	74....168997	951....36889	73......3678	4.........345
MAURITIUS	...2578873..	...34679951.	1..212589841	31....389974	74.....68998	84.....36899	61......3688	3.........355
NAIROBI	...28788741.	...36679973.	2..533489963	52.411269986	9711...48999	983....15898	772.....3677	44........354
HARARE	...14567763.	1..245579852	41.322369985	74.3...48998	9811...16999	883.....4899	761.....1688	43........355
CAPETOWN	45678752	2...55568974	53.232237997	86.31..16999	9821....3799	984......589	761.....268	43........45
LAGOS	1...9+889852	21..97679974	63.184348998	86.362127999	99463...5899	88851...2699	7782.....488	445.......55
ASCENSION Is	68767642	11..87667864	53..84335897	761.72112899	99625....599	98862....379	7774.....58	445.......25
DAKAR	....6++89851	1...88768973	32..97336997	652.851.4899	996172..1699	88964....489	77761.....168	4453......35
LAS PALMAS	....5++9972.	....7999994.	99889972	22..98778995	775186556899	999663224799	888741..1478	+5+4......5+
** S. AMERICA								
Sth SHETLAND	34455431	1...56666553	32..87655566	552.87532356	6751642...24	355431.....1	12221.......	....
FALKLAND Is	25567741	47666663	21..77532366	542.8631.147	787174....16	688541.....3	36652.......	.332.........
R DE JANEIRO	27545541	48544673	21..77322486	542.851..278	987.72....58	98955.....26	77762......3	4443.........
BUENOS AIRES	24446741	56545562	11..78421255	432.872...47	877.75....16	789452.....3	57762......1	2443.........
LIMA	......++873.	1976651	13843344	212.35721.26	657.654....5	7894521....2	46762.......	.443.........
BOGOTA	......++873.	976651	1843353	1.2..3721146	647..54....16	8884321....4	66762......1	3443.........
** N. AMERICA								
BARBADOS	.....5++884.	7966761	8732574	212..761.277	757.253...48	988442....16	76762......4	4443.........
JAMAICA	......8++73.	......98664.	1853353	1.2..3731145	647.355...16	8884522....4	66762......1	4443.........
BERMUDA	.....2+++83.	.....398785.	6865673	1.2..7743575	646.3551.258	8884522...27	76662......4	4433.........
NEW YORK	......7++82.	......89883.	2887761	1.1..4775674	546.35542357	88845321..36	76662......3	4333.........
MEXICO	.......9+71.	.......9863.	185331	1.2.1.383113	446.5245...3	58855222...1	36762.......	.343.........
MONTREAL	......7++71.	.....189983.	3888861	1.1..5777773	546.35554567	8874522221236	76562.....14	4323.........
DENVER	.......286..	.......4971.	.......7873.	.11.1..77541	456.41165224	688452232..2	36762..1....	.343.........
LOS ANGELES	.........75..	.........861.	.......1862.	.11.1..28521	356.42.56212	478452133...	15762..1....	.243.........
VANCOUVER	.........13..	.........35..	.........671.	.11.1...873.	355.43.37653	478353134322	25652..12...	.243.........
FAIRBANKS	...........,	...........,	.....1..13..	.2..1212351.	464.45457842	577253235654	24552..13322	..23.........

Alternative method of showing predictions: see page 18, November *RadCom*. Comments to G4AQI, QTHR.



The provisional mean sunspot number for October 1990 issued by the Sunspot Data Centre, Brussels was 145.2. The maximum daily sunspot number was 227 on 15 October and the minimum was 77 on 31 October. The predicted smoothed sunspot numbers for December, January, and February were respectively: (classical method) 132, 130, 128; (SIDC adjusted values) 115, 113, 112.

1990 HF Table

Station	DXCC	28	21	14	7	3.5	1.8	Total
BRS25429	269	188	211	242	180	117	53	991
BRS8841	260	197	220	226	145	111	49	948
BRS24209	-	81	111	122	128	85	43	570
BRS1066	175	77	114	133	92	43	38	497
BRS52543	165	66	68	79	120	96	34	463
G1VDW	136	38	83	92	42	20	1	276
BRS32525	122	94	34	64	36	23	-	251
BRS20249	111	36	57	78	35	18	1	225
BRS40292	-	29	17	31	33	24	8	142
BRS92755	75	-	-	75	-	-	-	75

geomagnetic field was reasonably quiet and there were some excellent conditions on the higher bands. The improvement was particularly marked on 28MHz where there were good openings to the Far East and much of Oceania on a number of days.."

CONTESTS

ARRL 10 METER CONTEST

0000 8 December - 2400 9 December

No more than 36 hours of operation. Single-operator, mixed mode, phone only, CW only, and multi-operator single transmitter mixed-mode classes. Send RS/T plus serial number (from 001). W/VEs send state/province. Phone QSOs count two points, CW four, with Novice or Technician stations (/N or /T) ten. Multipliers are DXCC countries except W and VE plus the 50 US states and Canadian provinces. Logs to show date, time, mode, call, and exchange. Mark new multipliers and send dupe sheets if you make more than 500 QSOs. Post before 10 January to ARRL 10 Meter Contest, 225 Main St, Newington, Conn. 06111, USA. Official forms are available from ARRL at this address - send SAE and four IRCs.

INTERNATIONAL NAVAL CONTEST

1600 15 December to 1600 16 December.

3.5 to 28MHz. Organised by MARAC whose Contest Manager is PA2REH, P.O.Box 2025, 1780 BB Den Helder, Netherlands.

AGCW-QRP WINTER CONTEST

1500 5 January - 1500 6 January

3.5 to 28MHz. CW only. At least nine hours 'off' in up to two periods.

HAPPY NEW YEAR CONTEST

0900 - 1200 1 January

CW only. 3.510-3.560, 7.010-7.040, and 14.010-14.060MHz.

SASE for rules of either of the above please.

RESULTS

Results of the **1989 CQWWDX Contest (CW)** appeared in October *CQ Magazine*. Once again **G3FXB** was in the top listings - this time in the All-Band category where he came fifth in Europe. **GW4BLE** also shone with his large score which made him European ninth. UK scores are as follows : **Single-operator, all band: G3FXB** - 3,783,282, **GW4BLE** - 3,177,044, **G3XTT** - 2,843,998, **GD4UOL** - 797,875, **GM3YOR** - 666,976, G3ESF - 509,138, G4ZFE - 440,634, G4BKI - 416,405, **GI4BBV** 396,927. GW3JI - 395,808, G3GGS - 325,404, G4ZME - 73,482, G6NK - 45,500, GM4OBK - 39,762, G0/K5TU - 19,201. **28MHz G3TXF** - 542,572, **G4BUO** - 533,390, **G4CNY** - 512,584, **G3HCT** - 490,050, **GW5NF** - 361,771, G3NKS - 214,410, G3KHZ - 174,944, G4UZN - 123,585, **GM3CFS** - 85,002, GM8SQ - 8,680. **14MHz G4OKN** - 30,438. **7MHz G3IGW** - 169,074. **3.5MHz G4ARI** - 24,786. **1.8MHz GW3GWX** - 2,380. In the **Multi-operator single-transmitter section G3LNS** scored 4,587,840 points and G3SZA 2,352,114. Finally, in the **QRP section G4BUE** scored 928,440 and was world second in the **all band section** - G4JFN scored 142,990. On **21MHz G3VMY** scored 54252 **G3LHJ** 18,849. Quite an impressive list - and to be noted that Nigel, G3TXF, worked *121 countries and 37 zones* on 28MHz in the two days of the contest. Stations in bold type won certificates.

Almost as noteworthy - Grant Wilson, G4RFE, has received a winners certificate for his efforts on SSB on 28MHz in the 1989 contest - and he didn't even enter!

In the **1989 LZ DX Contest G3ESF** was top UK station with 46,124 points in the all-band class, followed by GM3CFS with 20,683, and G4CKN with 17,784. G0IDE on 7MHz was the only UK entrant with 2,844 points.

DEADLINES

THANKS, OF COURSE, go to the *Long Island DX Bulletin* (W2IYX), *RSGB DX News Sheet* (G4DYO), the *Ex-G Radio Club Bulletin* (WA8GTA), the *Lynx DX Group Bulletin* (EA2JGO), *DX'press* (PA3CXC), and *DXNL* (DL3RK).

Closing date for **February** issue is **24 December**.

VHF/UHF

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

THIS MONTH'S COLUMN is being compiled on the weekend when we change from BST to GMT. In a normal year, there would have been extensive tropospheric openings on 144MHz and above to report - but not in 1990, just a few minor ones. Another feature has been the absence of any major auroral events. To compensate for this disappointing state of affairs, 50MHz has blossomed into life with propagation to VK reported.

DXPEDITION RESULTS

DAVID JOHNSON, G4DHF (LCN), has sent a comprehensive account of the Five Bells Group's August VHF/UHF DXpedition to Iceland (IP03WS). These annual events require considerable planning and Keith Tatnall, G4ODA (LCN), again undertook this year-long task. Keith was the sole holder of the 50MHz permit and Kristjan Benediktsson, TF3KB, championed the cause with the licensing authorities since the band is not normally available to foreigners by reciprocal licensing.

The two other operators were Andy Cook, G4PIQ (ESX), and Dave Hilton-Jones, G4YTL (OFE). Chris Phillipson, G8IJC (LCN), was a non-operator and devoted his time to cooking for and looking after the others, enabling them to spend more time on the air. The transport of personnel and equipment is a story by itself, so I will confine the rest of this report to results on the various bands and modes.

50MHz

The station comprised an FT-736 transceiver and 5-ele Yagi 10ft AGL fed by LDF2-50 cable. Activity started on 4 August on MS, but reflections to Britain and the Continent at around 1500km were extremely poor. The only complete QSOs were with GMs at about 1000km.

There was a 10min Es opening to GI at 1440 on the 5th, followed by a major event from 1838, the first 40min of which favoured SM, OZ and northern DL. It then moved to ON, PA and central DL. The east coast Gs were worked from 2008 and 10min later the band opened up to all of G from IO80 to IO84. Best DX was FC1BUU (IN94) at 2400km, the last station worked was G3IMV, the event fading at 2133 after 160 QSOs.

The next Es event was on the morning of the 12th, coinciding with the peak of the Perseids shower. It was extensive bringing contacts with G, GI, GM, GW, DL, F, HB0, LA, LX, ON and PA stations. Best DX was HB0 at 2500km, the event lasted at least 4.5 hours and provided 180 QSOs.

The final Es opening was on the 14th, the first QSO being at 1155 in low activity. Only 55 contacts were made, many CQ calls going unanswered. At first, propagation favoured the Midlands and southern England but later moved to DL and PA, then briefly to LA and OZ.

144MHz

The 144MHz station comprised an FT-225RD with MuTek conversion, an FL3 AF filter, home built 3CX800 PA, four 16-ele. Tonna Yagis with SSB Products low noise masthead preamp and LDF4-50 cable. MS was the main mode and 133 contacts were completed between the 4th and 13th, mostly on CW but many on random SSB on the 12th and 13th.

They describe their EME operation as "spectacular and extremely enjoyable." Results exceeded their expectations and at moonrise they were able to copy their own echoes every day, frequently at S3. VE7BQH, KB8RQ and W5UN were tremendous signals and they completed with several four Yagi stations and even a two Yagi one. They would like to have devoted more time to the mode but were too committed on MS. Even so, they made 37 QSOs with 13 countries.

430MHz

The 430MHz equipment consisted of a TS-780 transceiver, home built 3CX800 PA, four 21-ele. Tonna Yagis with MGF1302 masthead preamp, a KR500 elevation rotator and LDF5-50 cable. They suspected there may have been some weak auroral activity for several days and in the early hours of the 14th there was a magnificent visual event overhead. Unfortunately there were no stations or beacons audible on UHF or VHF.

On EME they had reasonable success completing 10 contacts, but Faraday rotation was quite a problem; only once did they hear their own echoes, and then only very weakly. On the 20m VHF net, both SM2CEW and DL9KR confirmed that return signals had shown changed polarization for several days. Another problem

was an increase in VSWR due to the antenna changeover relay having virtually disintegrated!

On the outward and return journeys, G4DHF and G4ODA stopped off in the Faroe Islands (IP62OA). OY/G4ODA operated on 50MHz and on 31 July and 1 August had three Es contacts. On the way back, three OEs were worked on 18 August via Es, 18 assorted auroral and auroral-E QSOs were made on the evening of the 21st, and Scandinavians were worked via aurora on the 22nd. Best day was the 23rd when 38 contacts were completed by auroral modes between 1356 and 1727 from OH to F.

OY/G4DHF operated on 144MHz between 30 July and 1 August, the first two days producing MS and one tropo QSOs, the last bringing 11 auroral contacts with Scandinavians and GMs. On 21-23 August, all 92 QSOs were via aurora, 10 on SSB, the rest on CW.

The amateurs at the club station OY6FRA were extremely helpful, and David and Keith were very appreciative of the hospitality they were given. Special thanks go to Jon Dam, OY9JD, who loaned equipment for both bands and made local accommodation available.

As always, it is my pleasure, on behalf of readers and all those who worked them, to congratulate the group for putting on such a fine DXpedition and enabling many stations to work new countries and squares. These trips are entirely financed by group members and not sponsored at all. They are open to suggestions for next year but David thinks a major EME effort from OY is long overdue.

METEOR SCATTER

THERE ARE A COUPLE of major meteor streams in December, the first of which is the Geminids whose parent body is an object called 3200 Phaethon, according to the BMS's *Radiant Catalogue*. The Right Ascension is 112°, Declination +33°, orbit inclination 23.2° and period 1.49 years. The velocity at atmospheric encounter is 36.2km/S.

The radiant is above a mid-UK horizon between 1630, through midnight to 1230 and the reflection efficiencies are better than 50% as follows: NE/SW 2100-0200 and 0500-0930; E/W 0030-0400; NW/SE 1900-2300 and 0230-0730; N/S 1900-0100 and 0330-0900. This is a very reliable stream.

The maximum activity should be 12/13 December and in 1962-64, double maxima were recorded. The BMS data give a ZHR of 145 on the 12th and 105 on the 13th. The corresponding solar longitudes equate to an eight hour difference, so it will be interesting to hear if two peaks were detectable.

The second stream is the Ursids on the 22nd, RA 217°, DEC +76°, inclination 57°, period 13.5 years and velocity 33.4km/S. The parent body is comet Tuttle and this shower is available all day with a suggested ZHR of 15. It is very good for the E/W path with reflection efficiency never less than 69%, but poor for the N/S direction since the efficiency is never better than 39%. Best times for NE/SW are 0900-2400 and for NW/SE 1700-0800.

A couple of weeks later there is the Quadrantids stream, another all day one, RA/DEC 230/+48° degrees respectively, inclination 65.4°, period 5.3 years and velocity 43.1km/S. The peak of this one is quite sharp and, with a ZHR of about 100, completion can be quite swift.

The AD1C program, with the solar longitude corrected to the 1991 value of 282.660° at maximum, gives 1315 on 3 January as the peak time, but we need reliable observations to establish a bench mark for the future. The prime times for the usual directions are: NE/SW 1100-1800 and around 0600; E/W 1500-0300; NW/SE 2300-0600 and around 1130; N/S 0100-0700 and 1030-1630.

[See page 38 for a full explanation of this fascinating mode of communication - Ed]

MS CONTEST

STILL ON THE MS theme, David Hilton-Jones, G4YTL (OFE), has forwarded details of a contest devised by the Bavarian Contest Club. Called 'Geminides 1990', the idea is to generate more activity on random CW. The period is from 0000 on 11 December to 2400 on the 14th to coincide with the Geminids shower.

The rules include CW only, 1000 letters per minute, 2.5min periods; use 144.095-144.105MHz; exchange full callsigns and reports. Each complete QSO scores one point. There is a multiplier derived from prefixes defined according to WPX rules; e g DL5, DL8, DJ1, IK2, EA3, etc. Final score is QSOs times multiplier.

There are two categories - Single operator and Multi operator. The logs must contain operator's name, callsign and address, station details; date, time (UTC), callsign of stations worked, reports sent and received. Entries, postmarked no later than 31 December, should be sent to: Bavarian Contest Club, MS Contest, Kelheim-winzerstr 40, D-8420 Kelheim, Germany. Printed results will be sent to all participants and 'nice prizes' are mentioned for country winners.

50MHZ

PROPAGATION NOTES

In the commentary on his propagation report for September, Ray Cracknell, G2AHU (HWR), wrote: "After the highest activity so far during cycle 22 towards the end of August, conditions in September can only be described as disappointing. The August conditions tended to wipe out Sporadic-E and lead to a premature end to the summer season. Solar flux tended to remain relatively low in September and the expected good Es conditions, which are looked for in the first half of September, just did not materialize on 28 and 50MHz."

The report contains contributions from observers in Britain, Holland, Zimbabwe, South Africa, Greece and Japan. Z23JO reported conditions as "pretty awful" until the 27th, but the last few days were very good. On 1 October, Mal worked VS6WV and JR6WPT. ZS6LN copied 5B4CY and SV1SIX beacons on 24 days in the month, 9H1SIX on 11 days, CT0WW on seven days and FX4SIX on five days. GB3HGI was heard on the 21st.

SV1DH reported daily TEP on

LOCATOR SQUARES TABLE
STARTING DATE: 1-1-1979

Callsign	50MHz	144MHz	430MHz	1.3GHz	Total
GJ4ICD	426	263	119	59	867
G4IJE	366	338	5	2	711
G0JHC	329	48	-	-	377
G3IMV	319	446	125	51	941
G1KDF	309	184	104	39	636
G6HCV	309	233	-	-	542
G6HKM	266	224	112	48	650
G1DWQ	264	152	-	-	416
GW6VZW	238	143	6	-	387
G4TIF	222	204	111	-	537
G8PYP	199	120	34	-	353
G1SWH	196	165	60	6	427
GM0GEI	193	-	-	-	193
G0HVQ	173	71	-	-	244
GU7DHI	151	68	-	-	219
G4VXE	147	162	42	4	355
GM1XOG	145	-	-	-	145
G0EVT	142	213	57	-	412
G0DAZ	137	316	122	39	614
G4MUT	122	153	94	34	403
G4RGK	121	311	145	52	629
G4DEZ	116	249	62	54	481
G1SMD	115	106	-	-	221
G8LHT	113	185	93	14	405
G0NFH	113	78	18	9	218
GJ6TMM	109	151	52	-	312
G8XTJ	101	121	-	-	222
G1UGH	101	93	-	-	194
G1TCH	99	95	6	-	200
GM1BVT	92	23	-	-	115
G0LFF	83	153	-	-	236
G8ATK	74	144	94	52	364
G1LSB	73	176	144	-	393
G6MEN	67	54	27	3	151
G4XEN	66	301	115	6	488
G6MXL	52	97	48	20	217
GM4CXP	50	201	32	-	283
G6DER	43	183	114	82	422
GM1ZVJ	35	48	-	-	83
G1WPF	20	114	37	-	171
G1CEI	11	77	18	-	106
G4KUX	-	384	120	-	504
G0CUZ	-	350	73	-	423
G4PIQ	-	278	105	-	383
G4RRA	-	280	80	-	360
G4SSO	-	261	98	-	359
G4SWX	-	347	-	-	347
GM4YXI	-	340	-	-	340
G4DHF	-	331	-	-	331
G0GMB	-	187	99	-	286
G1GEY	-	170	92	22	284
G4YTL	-	269	-	-	269
G6STI	-	152	69	24	245
G3FPK	-	244	-	-	244
GW4VEQ	-	241	-	-	241
GW4FRX	-	232	-	-	232
G4DOL	-	219	-	-	219
G4XBF	-	172	-	-	172
G4TGK	-	137	-	-	137
GW4VVX	-	115	-	-	115
GM0GDL	-	88	23	-	111
G6UWO	-	41	44	18	103
G7CLY	-	100	2	-	102
GM0CLN	-	81	-	-	81
G6ODT	-	29	47	-	76
G0HDZ	-	64	-	-	64
GW7EVG	-	22	-	-	22

No satellite, repeater or packet radio QSOs. "Band of the month" 50MHz.

48MHz, openings to V5, ZD8 and ZS9 for 87% of the month, to ZS4/6 80% and to FR5 70%. In his 'special events' section, Costas mentions long path openings PY/JA at 0230 on the 23rd, 9H/JA at 2240 on the 25th and VK/ZD8 at 2300 on the 27th.

INFORMATION

Next some information from Ted Collins, G4UPS (DVN), from his September and October pages. EL2B is back home in the UK and it seems doubtful there will be any operation from Liberia again for some time due to the unstable political situation. OH2SX will be on from CT3 till mid-April 1991; QSL to his home call or via the bureau.

Jack Junk, LX1JX, is the VHF Manager for Luxembourg and says he and five other LX1s are QRV - DB, DK, DT, PD and SI. Up to 20 August, they had worked 47 countries and all continents between them. A beacon, LX0SIX (JN39AV) is planned, likely QRG 50.023MHz; further details later.

From India, VU2AID had a permit for the band from 10 June, due to expire at the end of October. His wife, VU2AIU, has been QRV and both hoped for an extension. The band was/is 50.07-50.13MHz and the equipment is either a TS-600 or FT-620 with 5-element Yagi. From Jamaica, when the band is quiet, 6Y5IC runs a beacon on 50.025MHz.

7Q7JA is another station QRV in Malawi and should be there for about a year. Yoshi is a JA operator whose address for direct QSLs is: Private Bag 28, Mana, Blantyre, Malawi. V51SW has a UK QSL manager - G1IOV, The Corner House, Church Road, Mortimer West End, READING, RG7 2HY. 3DA0BK is a new station on from Swaziland; QSL to PO Box 122, Eveni, Swaziland.

All 5B4 stations are reported to have access to the band now. G3KOX should be QRV from Turkey in the first week of December; Nick has had a written permit for some time.

ACTIVITY

Now to individual reports starting with Darrell Moody, G0HVQ (GLR), who heard 3X1SG on 8 October working into the UK, though his signals were very weak. The V51E keyer was heard on the 15th, 1545-1600, peaking to S3. He commented that the random SSB MS frequency of 50.350MHz is not being used, but that there is much activity around 50.110MHz, the inter-continental DX QRG. There is a proposal to change the MS QRG to 50.150MHz; what are your views on this? Darrell also mentioned that 50.200MHz is the centre of SSB activity within Europe and not 50.110MHz.

In the first three weeks of October, Neil Carr, G0JHC (LNH), heard southern G stations working into Africa quite regularly but didn't hear a ping in Preston. He reckons the ultimate challenge would be to work DXCC on the band from northern England! On 30 September, there was a three hours opening to OH and SM and at 1617 he worked ZS9A while there was Es to France. On 10 October he worked DJ2RE for the 'new' Germany; there were auroras to GM on the 11th and 15th and to GM and LA on the 20th, but the band opened up at last on the 22nd when the 9L1US beacon was audible for three hours; he worked 3X1SG (IK51) at 1432.

Bob Nixon, G1KDF (LNH), wrote after a long silence and is now up to 309 squares worked, but reported "nothing at all" for September and October. Terry Chaplin, G1UGH (SFK), heard 3X1SG from 1430 on 8 October in an otherwise quiet month.

On 27 September, G4UPS heard JA2BZY calling CQ at 0836, peaking S7 on CW. Ted contacted V51SW at 1742 on the 30th. On 10 October, there was strong in-band video from OK and HA at 1215 and at 1309 he worked OE6DGG followed by SM7CMV at 1705 and CT1LN at 1834. Next day brought a QSO with 9H1AW at 1137, with RST519 reports each way.

There was a brief Es opening to SM at 0938 on the 15th with SM7AED worked at 0938. Assorted African keyers and stations were copied in the afternoon until 1730. ZS6 keyers and stations were heard at lunch time on the 17th. At 1528 on the 20th Ted heard GM3WOJ aurorally at S6A but the event ended at 1550.

On the 21st at 1000, TU2EW was being copied at GJ4ICD but not at G4UPS, but he worked OZ1IEP (JO65) at 1550 and heard the OZ1IGY beacon. The early evening brought good signals from V5 and ZD8 with 3X1SG heard. Next day, Ted contacted ZS6WB at 1152, 3X1SG at 1437 and V51E at 1525. At times the V51, 9L1 and CT beacons were peaking at 230° azimuth.

Ela Martyr, G6HKM (ESX), worked OH1LEU (KP01), OH8AXN (KP23), OH6NRJ (KP32) and SM2DME (JO89) on 30 September; ZS6WB on the 15th and VK4BRG (QG48) on the morning of the 19th. She remarked that there was a VK opening last year on Friday, 13 October. In a minor aurora on the 20th she contacted GM0GEI (IO77). Derrick Dance, GM4CXP (BDS), wrote after a long absence and is QRV on the band but his air time has been limited to occasional weekends.

From Jersey, Geoff Brown, GJ4ICD, heard a weak JA4 and JA6 at 0900 on 29 September, plus some very weak Chinese TV. From 1222 there was an Es opening to OE and DL. Numerous ZS6 stations were copied from 1620 and the ZS5SIX beacon on 50.321MHz. Next day the band opened to OH and SM from 0925 for several hours. Geoff's best DX was on the 19th when he worked VK4BRG, who was S9+, at 0849.

70MHZ

I REGRET TO SAY THAT once again there was not one single report of any activity on 70MHz this month. There was the CW Contest on 21 October and it would be useful to know how many operators took part. Quite how this information can be gleaned seems a bit of a mystery since no adjudicator was mentioned in the rules in the August *RadCom*!

144MHZ

11 OCTOBER WAS QUITE A good day with some long distance tropo contacts made from the British Isles. EI6GF (WEX) worked well into the western part of Germany, while those in SE England worked into the eastern part and into OK.

Colin Morris, G0CUZ (WMD), caught this opening and worked OK1FFV/P (JN69), but heard nothing else on the 11th. On the 22nd, ". . . . on a very under-crowded band . . . ." he contacted SM5BUZ (JO78), SM6CMU (JO57), SM4GVR and SM4JSF (JO79), LA1ZE (JO28) and LA3NGA (JO49), his 350th square on the band. Those were the only stations he could find that evening, apart from SK4MPI (JP70NJ) copied for the first time at S2; it was S3 at 0500 on the 23rd.

G1UGH found Y25JI/P (JO51) for a new country and square at 1950 on 1 October, then worked Y22KI/P and OK1AXH (JO70) at 2032 for another new square. The following day Terry contacted Y46CI/P (JO51).

Mark Holloway, G4YRY (DOR), queried odd propagation on 29 September when he heard the German FAI beacon, DB0FAI (JN58IC) at 1030, had incomplete QSOs with Y91VL and an OK1 portable at the same time as there were Es propagated TV signals on Band 1. He said it didn't sound like tropo, but other reports suggest it was weak tropo.

He reported plenty of French activity when cold fronts have been passing through with high pressure to the east. A typical period was 1-3 October when stations in IN88 and IN95-97 were worked and the beacon FX4VHF (JN05) was heard. From 2000 on the 7th Mark contacted FC1SA (JN28), FC1ADT/P (JN15), F6FNL (JN03), FC1DDG (JN17) and F6BZI (JN16); from 2015 on the 9th, F6EML (JN18) and EA1TA (IN53), a QRP QSO with the EA using 10W and G4YRY just 2W; from 1550 on the 10th, EA1TA and EA1DKV (IN53).

G6HKM reported no great DX; Ela did find a few openings but lack of activity was the main problem. FD1JRX (JN25) was worked on 28 September and Y25JI/P on 1 October. The last QSO with an East German station was with Y46CI/P on the 2nd. She gave DK5UZ (JN49) his first UK QSO on the band. Her tally on the 11th included FC1OET (JN38); DK9WB, DD4VK, LX1RR and FC1GWT all in JN39; DC6HQ/P and DB3TH/P (JN48); DL8OAR, DD1UA and DH3IAD (JN49), DL4EAU/P (JO51) and OK1FFV/P.

GJ4ICD commenced TEP tests on 144.090MHz on 28 September. Geoff tried to get V51SW to cooperate but he didn't appear to be very interested. V51E worked into Monaco and Italy in September, but it must be appreciated that Jersey is about 600km further north than Monaco. Nevertheless, Geoff hopes he will work into southern Africa some day and the only way to achieve that will be by prolonged, regular tests at suitable times.

Mike Robertson, GM0BQM (DGL), mentioned the tropo opening to Poland on the night of 22 October which continued into the early morning of the 23rd. Stations only 30 miles north of his QTH were in on this, but Mike heard nothing. This seems to have been another example of selective ducting.

John Lincoln, GM0JOL (HLD), wrote on 20 September, a day after a storm caused quite a bit of damage to his antenna system. Two guys snapped in force-11 winds and he lost a few elements from his two 7-element Yagis. So he had to go back to a single 6-element at reduced height pending repairs.

A tale of woe from Gary Nicholas, GW7EVG (CWD), who blew up the PA stage of his IC-202 on 16 September while setting up the equipment for the WAB Contest. The transceiver was still being repaired when he wrote, so his scores remain unchanged. Anyway, he will have gathered that he didn't miss any great tropo opening.

From *2M Direct*, I note that G4PIQ worked F6IRF (JN35) at 1954 on 28 September, then FD1JRX (JN25) at 2120. Next

morning at 0952 Andy contacted HB9BLO/P (JN37) who was using 2.5W and an HB9CV antenna. At 1130, beacon OZ1IGY was heard at S2, DL0PR was very loud but there was no activity. At 1725 he had a CW QSO with OK1JKT/P (JO60).

Opportunities to operate G3FPK have been rather limited but I have often switched on at lunch time and put out CQ calls on SSB in various directions. Almost invariably the band had been devoid of activity, even though GB3ANG and EI2WRB have been reasonable signals.

Nobody has mentioned the CW Cumulative Contest which started on 5 September. The final session was on 11 November so it would be helpful to know how well supported this event was. One reason for contests is to generate activity but I get the feeling that some erstwhile enthusiasts are getting bored with them. Your comments, please. A reminder that the 144MHz Fixed Station, AFS event is on 2 December, 0900-1700; rules on page 62 in the August *RadCom*.

Stan Brown, G4LU (SPE), has been running regular skeds with G3AHX at Porthleven (CNL) for a couple of years. These are at 0830 clock time on Tuesdays and Fridays, almost every afternoon at 1515 and on Friday evenings at 1845. These are successful five times out of seven, usually on CW, sometimes on phone.

Irrespective of time of day, general conditions, weather and barometric pressure, signals have the same characteristics in that they exist for only a minute or so then disappear. They both run QRO stations and G3CSS in Hereford, using an indoor antenna, gets the same reception as Stan. However, G4VTS in Truro does not report any anomalies on Stan's signals.

Stan read the piece in the October column about noctilucent clouds but, for several reasons, I am sure this phenomenon is nothing to do with them. There is rising ground in Stan's direction from G3AHX, so I wonder if the mechanism could be reflections from aircraft?

The characteristic of these, as observed on GB3ANG from G3FPK, is of a weak, fluttery signal building up in strength as the flutter frequency gets lower. For a time, signals become steady and much enhanced then, as the geometry changes, the flutter sets in again, increasing in frequency as the signal drops back to its average level.

430MHZ

CONDITIONS AND ACTIVITY on this band must have hit an all-time low lately as the only report received this month is from G6HKM. Her best DX of the month was FD1JRX (JN25) though she didn't mention the date; I would guess it was 28 or 29 September?

Ela participated in the first session of the Cumulatives on 17 October but conditions were very poor and she made only 49 QSOs. There were further legs on 2 and 18 November and the last two are on 4 and 20 December, 2030-2300GMT.

THE MICROWAVES

G1KDF OPERATED IN THE UHF/SHF Contest on 7/8 October. On the 7th on 1.3GHz, Bob worked F6CTT/P (JO09) for a new square, and on 2.3GHz G0CDA/P (IO93) gave him his 6th square on that band. On 11 October, conditions were good on 1.3GHz and stations in SE England, including G3IMV and G3MEH, worked into the eastern part of Germany and to OK; QRBs in excess of 600km.

On 1.3GHz G6HKM found conditions quite good on 28 September resulting in QSOs with GU8IRF (IN89) and ON4ABJ and PA3DYS (JO21). In the first leg of the Cumulative Contest on 9 October Ela reported conditions as average; there were further sessions on the 25th and on 10 and 26 November, the last leg being on 12 December, 2030-2300. On 11 October, although conditions were good, activity was low; she contacted DC6HQ/P and DF6IY (JN48).

DEADLINES

THAT'S IT FOR ANOTHER month and may I take this opportunity to wish all readers a Very Happy Christmas. The deadline for the **February** issue is **27 December** but please allow for the Christmas post load. The **March** deadline is **24 January**; please note this in your nice, new 1991 diaries.

SWL

BOB TREACHER BRS 32525
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DXTV

ONCE AGAIN, MENTION of DXTV has prompted a number of licensed members to write. I shall concentrate this month on information received from G0MLE and W9WI (nice to know I'm read in Wisconsin!)

G0MLE agrees with GM1DSK that there is much to be gained from having a Band 1 TV when searching for Sporadic E. He relates that it's quite unusual not to find any Es on Band 1 through May, June and July, although on some days the duration of the propagation can be quite short and variable. His monitoring equipment was not at all expensive and should be within the pockets of most youngsters, and newcomers to the hobby with cash flow problems. He uses a D100 converter and an old portable VHF TV, a wideband antenna which only has a few dB of gain and a Labgear wideband preamp. He has never seen any F layer TV DX, but his log is full of European TV stations. One or two of the more commonly seen test cards are the VEIT test pattern from the USSR and TVE from Spain which seem to occur throughout most days in June.

One difficulty experienced by TV DXers is gaining positive confirmation of signals. There is a very good book, published in Germany, which has helped me identify signals. It is titled *TV-Bilkatalog Europe* (A catalogue of TV-pictures) and is written by Norbert Kaiser. The ISBN no is 3-922221-31-9. It is a useful reference book which shows test cards, clocks, idents and the introduction themes of news programmes.

British TV DXers might be interested in news of TV DXing in the States. W9WI wrote with much information. Foreign reception, except for Canada, Mexico and Cuba is extremely rare, although some dedicated and well-equipped viewers have received European stations from places as far west as Illinois. The stations W9WI can see use the same television system and channel allocations so multi-standard receivers are not necessary. Additionally, the transmitting stations affiliated to the five main national TV networks are independently owned, and frequently air local commercials, local newscasts and local station IDs, making identification of the exact location of a given transmitter fairly simple.

From the W9WI station about 200km northwest of Chicago, TV stations have been seen from 10 US States and 3 Canadian Provinces via Sporadic E, and from another 10 states plus Ontario via tropospheric propagation. His best Es DX is Calgary, Alberta at about 2,000km, while via tropo his best DX is Pittsburgh, Pennsylvania at about 1,000km.

An organisation, based in the States, of people interested in DXing the VHF-FM and VHF/UHF TV bands has six European members, although none is in the UK. It is the World-wide TV-FM DX Association at PO Box 514, Buffalo, New York 14205-0514. The annual sub outside the US is US$27.

Detail from the test card of Channel 1, Sweden.

1990 HF Table

Station	DXCC	28	21	14	7	3.5	1.8	Total
BRS25429	269	188	211	242	180	117	53	991
BRS8841	260	197	220	226	145	111	49	948
BRS24209	-	81	111	122	128	85	43	570
BRS1066	175	77	114	133	92	43	38	497
BRS52543	165	66	68	79	120	96	34	463
G1VDW	136	38	83	92	42	20	1	276
BRS32525	122	94	34	64	36	23	-	251
BRS20249	111	36	57	78	35	18	1	225
BRS40292	-	29	17	31	33	24	8	142
BRS92755	75	-	-	75	-	-	-	75

VHF NEWS

THE VHF BANDS HAVE been very poor. No tropo to speak of, no Es on 50MHz and the F2 season on that band had not started at the time of penning this column. I would, however, like to mention the helpful letter from G3UTS who provided most of the missing locators from stations heard by Mick Toms and I during this year's Perseids meteor shower.

HF NEWS

CONDITIONS ON HF have continued to improve. On most days, the West Coast of the States has been heard at very good strength in mid afternoon on 28MHz, and there has been some good propagation to Asia, the Far East and Australia. Although conditions have been good, there seems to have been a lack of exciting or unusual DX to speak of. Some of my regulars even report a month with no new countries. The WARC bands have provided some consolation with some interesting DX.

I do not mention 10MHz often in this page, so this month UH2E/UA9TZ, 4S7WP and 4U1ITU noted by Robert Small, BRS8841, helps to redress the balance. Robert also mentioned 18 and 24MHz. 6W1QJ found its way into Robert's log on 18, while CU2AR, DU1KK, SV0HS and UD7KWB were heard on 24MHz.

Reverting to our usual look at the five main bands, we find that 28, 21 and 14MHz have been in good shape. 14MHz tended to be at its best in the early morning and late in the evening. Some of the best DX mentioned by reporters included A35KB (Niua Fo-Ou Is), VE3PJH/C6A (Long Is), JW0GB, KP2AL, 4K4/EK0AK and XE1QF.

Moving to 21MHz, we find there has been plenty of DX on offer, too. Once again, the best, in my opinion, was AA4NP/AH9 (Brad Bradbury's 37th country on 21MHz), BV5OC, BY4BC, HL9EN, 7J1ADJ/JD1 (Minami Torishima), V44KAY, VK4MIA (Thursday Is), VP8BFH, 5R8JS (Barren Is), 5X0URA and 9X5SW.

28MHz has been very good, with the band staying open until 2130Z. The best DX noted included A61AD, FH5EJ, FP/G3LMD, FT5XA, TJ1MR, TL8WD, K1EFI/VP9, ZF1RY, ZF2NE/ZF8, ZX8DX (Sao Joao Is), 7Q7KG and 9J2AD.

With the two parts of Germany becoming united on 3 October, several listeners said they were hunting out DL and Y2 stations prior to this so they could send QSLs while the two countries counted as separate countries for DXCC purposes. Indeed, on 3 October, there were many Germans to be heard, so most people must by now have a logging of united Germany in the log. At the time of writing, no decision had been taken as to whether it will be an all-time new country or whether the old country, deleted in September 1973 will be resurrected.

I have left 7 and 3.5MHz to the end of this report. We will be seeing more DX on these bands in the next few months as the days get shorter. As an appetiser, these were the best on offer on those bands this time around. 7MHz: CM5AM, HR1RMG, VE5DX, VE6SV, YI1BGD and 9J2NO. 3.5MHz: FP5DX, JJ7PPV, HKONZI, JT1CO, PJ9EE and ZD9Z.

FINALE

LET US HOPE THAT, by the time that you read this, 50MHz will have provided some choice F2 DX, and that the CQWW contests will have been blessed with really good conditions enabling listeners to have found a few new countries. Whatever you have heard, drop me a line so that it can be included in this column. The deadline for next **February**'s column is Monday **10 December**. In closing, let me wish my readers 'Season Greetings' and my sincere thanks to everyone who has provided news for the SWL in the last year.

Do You Have a Query?

Who do you contact for an answer? In most cases there is no need to consult anyone, as 90% of the answers to your questions are to be found in the 130 page Information Directory which forms part of the 1990 *RSGB Call Book*

However, if you feel a letter is the only way to get a definitive answer, are you writing to the best person? To ensure an improved response, we suggest you contact one of the following:-

• General advice and details on local clubs, or don't know who to contact:-

Your RSGB Liaison Officer. See the *Call Book* , May *RadCom* page 59 or your membership card (if recently renewed).

• RSGB Policy Matters (Zonal Council member):-

Zone A (North of England):

Geoff Smith, G4AJJ, "Greenacres", Sawdon, Scarborough, North Yorks, YO13 9DY.

Zone B (Midlands):

John Allen, G3DOT, 4 Philip Avenue, Waltham, S.Humberside, DN37 0QD. Tel: 0472-825899.

Zone C (SE England and East Anglia):

John Greenwell, G3AEZ, "Eastfield", Henfold Lane, Beare Green, Dorking, Surrey, RH5 4RW. Tel: 0306-77236.

Zone D (SW England):

Peter Chadwick, G3RZP, "Three Oaks", Braydon, Swindon, Wilts, SN5 0AD. Home: 0666-860423.

Zone E (Wales):

John Case, GW4HWR, 2 Abbey Close, Tyrhiw Taffswell, Mid Glam, CF4 7RS. Tel: 0222-810368.

Zone F (Northern Ireland):

Terry Barnes, GI3USS, 95 Crawfordsburn Road, Bangor, Co Down BT19 1BJ. Home: 0247-473948.

Zone G (Scotland):

Ian Suart, GM4AUP, 37 Meldrum Mains, Glenmavis, Airdrie, Lanarkshire., ML6 0QG. Home: 0236-65937.

• Awards:

For contest award winners, please refer to the appropriate contest committee.

For other awards, enquiries and applications go to either:

HF Awards Manager - Steve Emlyn-Jones, GW4BKG, P O Box 20, Bridgend, Mid Glamorgan, CF35

IOTA (Islands on the Air) Awards Manager - Roger Balister, G3KMA, La Quinta, Mimbridge, Chobham, Woking, Surrey, GU24 8AR.

VHF and Microwave Awards Manager - Ian Cornes, G4OUT, 6 Haywood Heights, Little Haywood, Stafford, ST18 0UR

• Band Plans and operating practices:

See the Call-book or Feb 90 *RadCom* for latest bandplans. For policy, contact the appropriate spectrum committee chairmen:

HF - Martin Atherton, G3ZAY, 41 Enniskillen Road, Cambridge, CB4 1SQ

VHF - Peter Burden, G3UBX, 18 Langley Road, Merry Hill, Wolverhampton, WV3 7LH.

Microwave - Mike Dixon, G3PFR, Woodstock, Gazebank, Norley, Warrington, WA6 8LL.

• Beacons:

HF - Alan Taylor, G3DME, QTHR.

VHF - John Wilson, G3UUT, QTHR.

Microwave - Graham Murchie, G4FSG, QTHR.

• RSGB Contests:

First contact the contest adjudicator (see the contest rules). For policy, contact the respective Committee Chairman:

HF Contest Committee - Dave Lawley, G4BUO, QTHR.

VHF Contest Committee - Bryn Llewellyn, G4DEZ, 110 South Avenue, Southend-on-Sea, Essex, SS2 4HU. Home: 0702-460747.

Direction Finding Committee - Brian Bristow, G4KBB, QTHR.

• EMC:

Advice on solving breakthrough and other electromagnetic compatibility matters:

EMC Coordinator (see Dec 89 and June 90 *RadComs*)

Committee Chairman: Bob Peace, G8SOZ.

National helpline: 0537-593449.

• Exhibition & Rally Committee:

Organises trade shows at NEC, VHF Convention and Woburn Rally.

Chairman: Norman Miller, G3MVV, "Avon", Gardiners Lane, Crays Hill, Billericay, Essex, CM11 2XA.

• Intruder Watch:

Non-amateur service operation in exclusive amateur radio bands.

Acting Co-ordinator - Martin Atherton, G3ZAY, 41 Enniskillen Road, Cambridge, CB4 1SQ

• Licensing:

RSGB Policy - John Bazley, G3HCT, "Brooklands", Ullenhall, Solihull, Warwickshire, B95 5NW

Government policy/licence conditions and interpretations - Amateur Radio Section, Room 613, Radiocommunications Agency, Waterloo Bridge House, Waterloo Road, London, SE1 8UA. Tel: 071 215 2316.

Renewals and payments - Radio Amateur Licensing Unit, Post Office Counters Ltd, Chetwynd House, Chesterfield, Derbyshire, S49 1PF. Tel: 0246 217555/217699.

• Membership Liaison:

Committee Chairman - Geoff Smith, G4AJJ (see above).

• Morse Practice Transmissions (GB2CW):

Co-ordinator - Mike Thayne, G3GMS, 14 Tynedale Avenue, Monkseaton, Whitley Bar, Tyne & Wear, NE26 3BA. Home: 091 252 6138.

• Novice licence:

John Case, GW4HWR (see above).

• Packet Radio:

Mailboxes - Neil Lasher, G6HIU, 40 farm Road, Edgware., Middx, HA8 9LT

Nodes - Dave Hough, G4WRW, 1 Foxe Rd, Frampton, Cotterell, Bristol, BS17 2AE.

General enquiries - Ian Suart, GM4AUP, 37 Meldrum Mains, Glenmavis, Airdrie, Lanarkshire., ML6 0QG. Home: 0236 65937.

• Planning

Need for permission and how to apply - booklet free to members from Membership Services at RSGB HQ.

Planning application refused - RSGB Planning Panel, via RSGB HQ.

• Project YEAR:

Encouraging youngsters into amateur radio.

Co-ordinator - Hilary Claytonsmith, G4JKS, 115 Marshalswick Lane, St Albans, Herts, AL1 4UU. Tel: 0727 59318.

• Propagation Studies Committee:

Chairman - Geoff Grayer, G3NAQ, "Bagatelle, 3 Southend, Brightwalton, Newbury, Berks, RG16 0BE. Home: 0235-446511

• QSL Bureau:

Outgoing cards - RSGB, PO Box 1773, Potters Bar, Herts, EN6 3EP

Incoming cards - your QSL sub-manager (see p44 June *RadCom*)

• Raynet:

Group Information - Mike Barker, G8CAC.

Zonal Co-ordinator & Talk-through permits - Ian Jackson, G8RWH.

Emergency Planning & Vice Chairman - John Witts, G6BBW.

Press Officer - Ronald Cowan, GM4SRL.

Public Relations - Trevor Emery, G3KWU.

Chairman - Philip Howarth, G3YAC, 1 Clay Close Lane, Impington, Cambridge, CB4 4NE.

• Repeaters:

All repeater enquiries should be referred to the Repeater Zonal Co-ordinator in which the repeater is sited, as follows:-

North of England - Phil Coates, G0COA, Tel: 0924 848803.

Midlands - Alan Marwood, G8SSL, Tel: 0602 202562.

SE England and E Anglia - Mike Hastings, G8ASI, Tel: 0923 265734.

SW England - Fergus McGilp, G8URB.

Wales - Dave Brown, GW4NQJ, Tel: 0686 640814.

N Ireland - Dr David Hutchinson, GI4FUM, Tel: 0849 464672.

Scotland - Colin Dalziel, GM8LBC, Tel: 0698 281847.

Special Projects - Dave McQue, G4NJU, Tel: 0908 378277.

TV Repeaters - Graham Shirville, G3VZV, Tel: 0525 290343.

Chairman - Geoff Dover, G4AFJ, 31 Newbold Rd, Kirkby Mallory, Leics, LE9 7QG. Tel: 0455 823344.

• Spectrum abuse:

Amateur Radio Observation Service Co-ordinator - Geoff Griffiths, G3STG, 11 The Grove, Asfordby, Melton Mowbray, Leics, LE14 3UF.

• Technical queries:

Peter Chadwick, G3RZP, "Three Oaks", Braydon, Swindon, Wilts, SN5 0AD. Home: 0666-860423.

• Trophies:

Mrs Hilary Claytonsmith, G4JKS, 115 Marshalswick Lane, St Albans, Herts, AL1 4UU. Tel: 0727-59318.

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

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What will the NRD-525 do for you? In a space so limited as this page, I cannot possibly cover all the answers, so I will let a respected reviewer make some comments for you. Here's what Rainer Lichte, author of "Radio Receivers — chance or choice" said about it:-

Accuracy and stability
"The tuning accuracy and the matching display are impressive indeed. Still the more impressive is the receiver's frequency stability. Drift is virtually non-existent, it was measured at less than 5Hz/hour."

And about dynamic range:-
"ICP 3rd order (3rd order intercept point) was measured at +17dBm at 7MHz and + 14dBm at 25MHz. These are excellent values, and they are not the result of decreased sensitivity. The NRD-525 is amongst the most sensitive receivers I've measured so far.... Dynamic range was computed to 102dB, an equally outstanding value."

All very well you may say, but what does this technical jargon mean in real life? Let me quote Rainer Lichte again:-

"The signal quality under adverse conditions is remarkable, e.g. the 40 metre band here in Europe is fairly cluttered with high-power stations and most receivers just quit when you try to extract some intelligence from a weak radio amateur signal. The NRD-525 is unimpressed and functions in a truly professional manner."

In other words, there is virtually nothing you cannot resolve. If it cannot be received by the NRD-525, it cannot be received by anything. As a final quote from the review, let me give some conclusions:-

"The receiver is a joy to operate and a joy to listen to."

"The new NRD-525 very impressively manifests itself as the No. 1 receiver outside the commercial/military bracket."

"Performance-wise, the NRD-525 is way ahead of the competition because this receiver delivers outstanding results in all modes of operation."

When you try an NRD-525 for yourself, all that Rainer Lichte has said will be clearly true, but that's not the end of the story, because the NRD-525 has a range of options which will extend its use even further; to VHF/UHF with an internally fitted converter; to more demanding applications with a range of high performance IF filters; to almost anything you want it to do.

For more advice on this outstanding receiver, just send for details, or call in here at Matlock, or at any of our branches across the country. You will find us helpful, knowledgeable and competent, and when you buy from us you have the comforting thought that you have the backing of Europe's best service team should you require it. That's why JRC, Kenwood, AOR, Signal, Daiwa, and all the other well known names have chosen us to be their sole UK distributors. Others may sell the radios, but we do so much more. Try us and see.

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The NRD-525 is fitted with 12kHz, 6kHz and 2.4kHz filters as standard. Option filters are available for 300Hz, 500Hz, 1kHz and 1.8kHz bandwidths.

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TOPICS

PAT HAWKER G3VA

CAPACITIVE FILTERING & THE EMC DIRECTIVE

BACK IN THE 1930s, the ripple (smoothing) filters (**Fig 1**) in the PSUs of both transmitters and receivers generally consisted of a reservoir capacitor having a value of only about 4 or 8µF, an iron-cored smoothing choke (in receivers this was often the energising coil of a moving coil loudspeaker before improved permanent-magnet speakers were developed) and a further capacitor, again usually not more than about 8µF. Alternatively, for better regulation in transmitters, with a varying load, a choke input filter was used in which there was no reservoir capacitor in front of the choke (or special swinging choke).

Later, with improved electrolytic capacitors and the low-voltage, high currents of solid-state equipment, the filter is often just a single very high-value capacitor, although additional ripple-reduction may be provided by a voltage regulator. Unfortunately, as noted below, the use of a large capacitor means that power is drawn from the mains supply as a series of short-duration high value peaks of current: **Fig 2**. This has the unfortunate effect of distorting the wave-form of the AC supplies sometimes sufficiently to affect the operation of other equipment in the area.

A *TT* item last February (p31) noted the concern of the electricity industry at the large number of switch-mode PSUs (or indeed any other form of PSU using capacitive filtering) now in use, all taking short duration peaks of current and resulting in distorted AC wave-forms being supplied to all other users in the area.

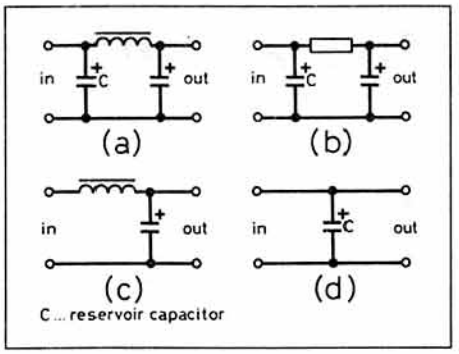

Fig 1. Basic PSU ripple filters. (a) As commonly used for many years for valve receivers/transmitters. The reservoir capacitor was usually not more than 4 to 8µF. (b) Lower cost filter with resistor replacing the LF smoothing choke introducing power loss and reduced DC voltage output. (c) Choke-input filter provides better DC regulation on varying loads but with lower peak output voltage. (d) Typical modern capacitive-only filter using very high-value electrolytic reservoir capacitor which, for 12V supplies, may be 10,000µF or more resulting in short-duration high-current peaks being drawn from mains supply.

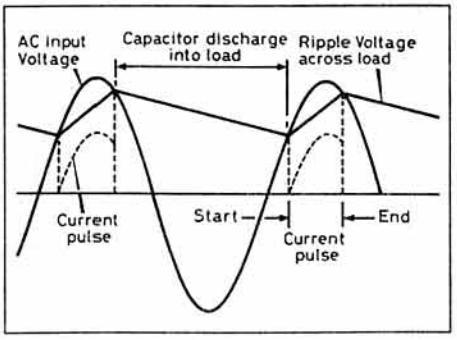

Fig 2. Approximate wave-forms with half-wave rectification and a capacitor-input ripple filter. Current is drawn from the mains supply only during the periods when the positive peaks of the 50Hz AC cycle exceeds the stored DC voltage in the reservoir capacitor. With full wave rectification there will be similar (but slightly less pronounced) input current pulses at 100Hz.

Sid Dunn, G0BIF has drawn attention to a long letter in *IEE News* (23 August 1990) from M Burchell of Saffron Walden, who points out that: "As a result of various changes being enacted in EEC legislation and international EMC standards, virtually all forms of capacitive smoothing in mains-derived power supplies is being outlawed in the next few years. This means a design change of varying magnitude will be required by nearly every piece of electronic or electrical equipment (including battery chargers) to reduce the 'peakiness' of the line current waveform to new lower limits.

"Ever since the introduction of the modern low-series-resistance aluminium electrolytic capacitor in the 1960s, with its ability to carry high levels of ripple current without overheating and premature failure, the capacitively smoothed power supply has supplanted the previously inductively smoothed power supply due to its low cost and efficiency.

"It has always been accepted that, because this form of rectification and smoothing creates non-sinusoidal current pulses in the supply line, with their attendant series of harmonic currents, some degree of voltage distortion is inevitable. A simple analysis shows that these currents occur at the odd harmonic frequencies and, in particular, the lower-frequency harmonic currents, which are in phase with the fundamental current, cause flattening of the voltage-waveform peaks. The third harmonic current, in fact, approached the magnitude of the fundamental current and is known to cause problems in three-phase installations of single-phase equipment, where the third-harmonic currents are in phase with each other in the neutral line and can create a neutral current which is larger than the line current."

M Burchall suggests that as a result of decisions taken recently in the international standardisation committees of the BSI and the IBC, this situation will be changed dramatically and that the final result of the changes is that the design of nearly every piece of 240V AC equipment in the UK using capacitive smoothing will have to be modified to meet the new EC Directive which comes into force January 1992. "For very low power equipment the requirement can be met with a small series inductor, but this becomes increasingly bulky and impractical, particularly in direct offline switched-mode power supplies, where there isn't sufficient room for such an inductor."

It is by no means clear from the letter in *IEE News* the extent to which amateur radio equipment will be affected (only home-built amateur equipment is outside the scope of the EC EMC Directive).

M Burchall notes that "one of the main culprits is the vast installed base of TV sets which cause considerable voltage distortion at all levels of the supply distribution system, particularly in the evenings". As noted before in *TT*, the EMC Directive will not be retrospective but applies to all products (other than home-built amateur radio equipment) marketed after January 1992, no matter when they were first put on the market. It does appear that IEC555-2 is being revised to apply more stringent limits to all equipment using capacitive filtering in both linear and direct offline switched-mode power supplies and battery chargers. It thus seems likely that it will require changes to new equipment designs and, as G0BIF points out, will become a matter of great interest and concern to RSGB members.

OFF-CENTRE-FED MULTI-BAND DIPOLES

THE ORIGINAL SINGLE-WIRE transmission line 'Windom' dipole, originally developed at Ohio State University (but named after Loren Windom, W8GZ, who described it in *QST* back in 1929) was, like a conventional centre-fed half-wave dipole, intended to be a single-band antenna, **Fig 3 (a)**. It was the late Jim MacIntosh, VS1AA (later GM3IAA), who found that a one-third-wave tapping point (ie one-sixth-wave from its centre point) can match well on several harmonically related bands. This tapping point gives a resistive feed impedance of roughly 300 ohms. The VS1AA was described in the *T&R Bulletin*, November 1936 although often described as a 'Windom' antenna: **Fig 3 (b).**

As Les Moxon, G6XN, has pointed out, any single-wire transmission line, even when correctly matched, radiates some RF energy which will affect the radiation patterns. This does not, however, imply that a Windom or VS1AA, if correctly set up, is not capable of giving excellent results.

The dislike of single-wire feeder radiation, with its increased possibility of RFI problems, led in the late 1940s to the use of 300 ohm balanced line as a non-radiating feeder to a VS1AA/Windom 'one-third' tapped element: **Fig 3 (c)**. This antenna was described in *QST* and the *Radio*

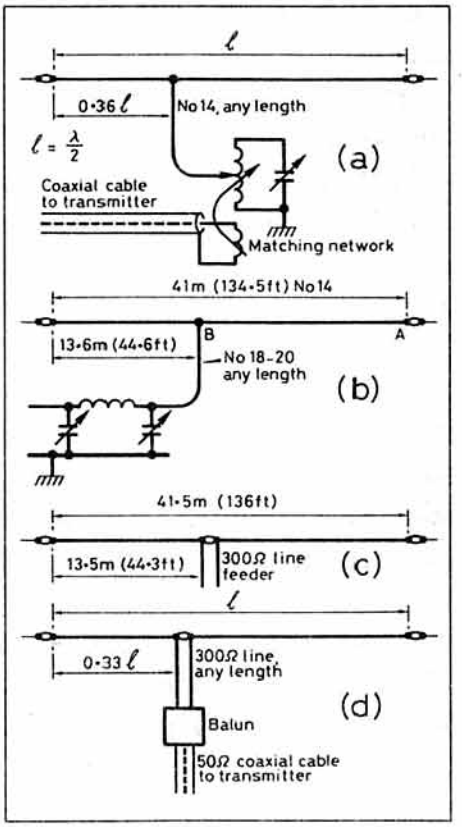

Fig 3 Basic off-centre-fed dipoles. (a) The original 'Windom' half-wave dipole as developed at Ohio State University over 60 years ago. (b) The multiband VS1AA introduced the concept of 'one-third' tap for multiband operation. (c) The twin-feeder (300 ohm) version became popular in the late 1940s. (d) Later still, a 6:1 balun was introduced to permit the use of 50 ohm coaxial feeder for direct connection to the transmitter.

Amateurs Handbook and was subsequently included in an early *TT* (July 1958 and all editions of *ART*). With a 136ft top, fed 44ft from one end, this could be used on 3.5, 7, 14 and 28MHz from an ATU providing balanced output. It could also be modified to include 21MHz by adding two shorted-quarter-wave stubs at 76ft and 38ft from the feed point. Later the use of a balun was introduced: **Fig 3 (d)**.

As noted by Tom Sorbie, GM3MXN, in *Sprat*, Autumn 1990, a modified form of the four-band off-centre-fed dipole was described by DJ2KT in QRV (December 1971) and has since become widely used, particularly in Germany, under the name 'FD4 Windom'. This substituted 75Ω or 50Ω coaxial cable for the balanced 300Ω line but with a 4:1 or 6:1 balun at the one third feedpoint. This means that it can be used on modern transceivers with 50Ω unbalanced sockets without an ATU on 3.5, 7, 14 and 28MHz. **Fig 4** shows the FD4 antenna used for QRP operating by GM3MXN, who is well satisfied with the results, and also his ferrite-rod balun based on a well-known G6XN design (see for example 'Balanced to unbalanced transformers' by Dr Ian White, G3SEK, *RadCom*, December 1989, pp39-42). GM3MXN simply used twin-coloured grey and black wire wound together six turns on a scrap ferrite rod. He finds that his FD4 provides also an acceptable match on 18 and 24MHz but for 10.1 and 21MHz he needs an ATU.

A year after the appearance of the FD4, F Spillner, DJ2KY (*QRV*, August 1972) showed how the multi-wire dipole technique enables the 21MHz band to be used without an ATU by adding two wires to the basic FD4, 4.5m and 2.52m long (*TT*, October 1972 and *ART*): **Fig 5**.

More recently, as described in an Appendix to a detailed discussion of Windom-type antennas 'The off-centre-fed dipole revisited: a broadband, multiband antenna' by Dr John Belrose, VE2CV, and Peter Bouliane, VE3KLO (*QST*, August 1990, pp28-32) - Hubert Scholle, DJ7SH and Rolf Steins, DL1BBC (*CQ-DL*, September 1983) have shown that a 'double Windom' based on the FD4 can be extended to cover all eight HF bands without an ATU, or, if the space is available, expanded to cover also 1.8MHz. **Fig 6 (a)** shows the eight-band design while **Fig 6 (b)** gives SWR measurements made by DJ7SH and DL1BBC indicating very low SWR on all bands except possibly 7MHz. However, the 7MHz figures are perfectly acceptable unless your solid-state rig starts cutting back power output at about 1.5:1 SWR. The longer nine-band version is shown in **Fig 7**.

LASER-PRINTER OZONE

THE JUNE TT ITEM on the potentially harmful effects of using xerographic copying machines or laser-printers, both of which produce a significant amount of ozone, in poorly ventilated areas or without adequate maintenance, has resulted in comments that confirm that toxic levels can build up in some circumstances.

Moreover, both Dennis Lisney, G3MNO, and Dirk Koopman, G1TLH, point out that safe threshold levels are likely to be exceeded before you notice the smell of ozone. G1TLH believes that since the level of ozone builds up gradually while the machine is in use, the user is most unlikely to detect it by smelling, except possibly when first opening the door and entering the room - the same problem applies also to the hydrogen-sulphide (H^2S) fumes from batteries. He mentions the laser printers and xerographic copying machines often use the same basic EHT-generating mechanisms so that comments applying to copiers apply equally to most laser printers.

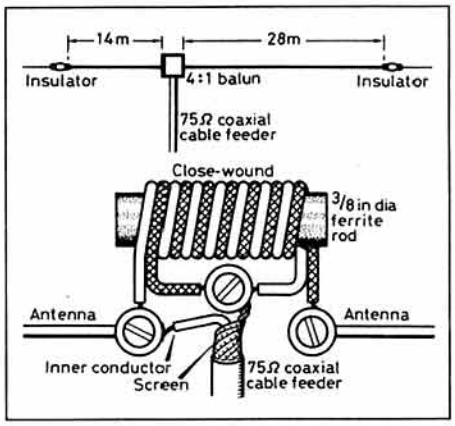

Fig 4. Since the 1970s, the four-band 'FD4 Windom' has been popular, particularly in Germany, with the balun up at the feed point. Shown also the simple 4:1 balun used by GM3MXN for low-power operation. The FD4 does not match on 21MHz (*Sprat*).

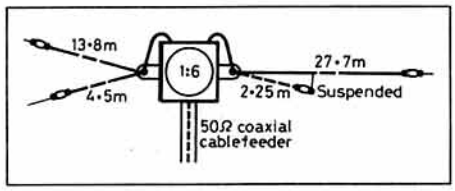

Fig 5. DJ2KY's five-band version of the FD4 introduced the concept of the double-Windom. Note 300 ohm line could be used without a balun.

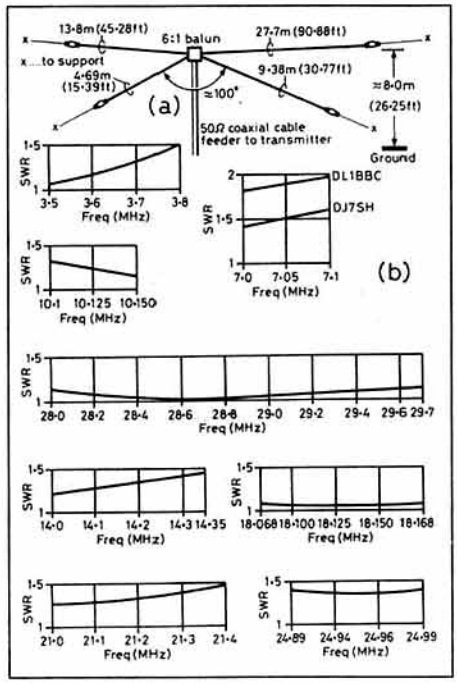

Fig 6. (a) The eight-band "double-Windom" with (b) SWR measurements made by DJ7SH and DL1BBC.

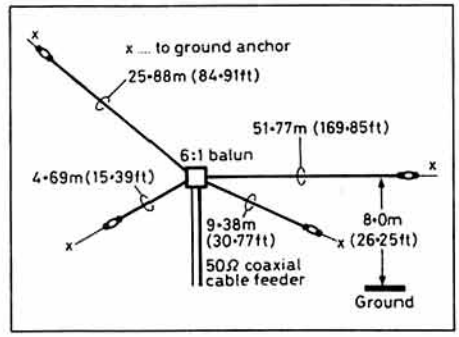

Fig 7. The extended nine-band version covering all bands from 1.8MHz to 28MHz.

G3MNO recalls that he was once concerned professionally in a lengthy investigation of the problems arising from the use of a copier in a small print room by a lady who liked to keep warm and never opened the large windows despite the room being over-provided with radiators (the problems arose during winter). A chemist taking her some documents to copy noted and queried the level of ozone with G3MNO who was then in charge of accommodation at a large research establishment. G3MNO sought out the environmental chemist with whom he proceeded to measure ozone levels in the room. The very first test showed levels above the safe threshold, subsequent tests showed that the levels built up over the working week and reached a maximum on the Friday evening. G3MNO felt it would be wrong simply to fit extractor fans and let the operator sit between the machine and the fan; he sought to overcome the problem at source. The makers (Rank Xerox) were most co-operative; his own office-machine people far less so; attempting to prove that their own tests failed to detect any ozone at all!

In the outcome, the lady operator (who had suffered respiratory problems although it could never be proved that the ozone was to blame) was moved to another job and replaced by a young man who shut off one radiator, always kept one small window open and used the small extractor fan that G3MNO had reluctantly fitted. All subsequent tests even when attempting to simulate the original conditions, failed to show any above threshold levels. He felt the problem had arisen because of (a) the operator keeping her room hot and dry with windows shut tight; and (b) possibly a small defect in the machine which had been cleared with routine maintenance. It was a matter of concern that although ozone is unstable, it appeared to build up over the week.

G3MNO believes that there is something of an *Achilles heel* in the environmental specification for copying machines since the assumption seems to be that normal open-window ventilation is provided by the building rules; but this cannot be enforced on the operator. Finally, in the course of looking into ozone problems, he found references to the fact that safe levels can even be exceeded in the open air in thunderstorm conditions. As noted in the June *TT* exposure for two hours to concentrations as low as 1.5 parts per million may result in coughs and excess production of sputum.

WINDING COILS ON PVC

LOADING COILS FOR USE in antennas requires a good deal of care if high efficiencies are to be achieved, particularly with short vertical antennas with top capacitive loading above a top loading coil. It is all too easy to lose more power in the coil than is gained by the loading. A four-page article "Loading coils for 160 metre antennas' by Charles J Michaels, W7XC (QST, April 1990) is based on his detailed study of loading coils and their placement in connection with 1.8MHz antennas up to about 60ft in height. He provides a lot of practical information on loading coil losses, skin effect, proximity effect, distributed capacitance and the effects of varying the coil length, diameter and wire size as well as consideration of materials suitable for use as coil formers of 2, 4 and 6 inch diameter.

He found that some readily available PVC tubing, tested by noting whether it heats up in a microwave oven (with the minimum load of a cup of water), remained no warmer than the air exhausting from the oven magnetron compartment and could be considered as satisfactory

low-cost formers. (Some PVC tubes have fillers that make them unsuitable). Without attempting to summarise the whole of W7XC's very detailed article, it seems worth quoting his novel method of winding a very light coil on PVC formers, as this could have application for other purposes including the winding of ATU coils etc.

W7XC writes: "I have a novel means of winding a tight coil on PVC. Drill the form at the winding-end points and install brass machine screws with brass nuts and lock washers. Put the screw heads inside the form. Secure the far end of the wire to a wall, fence or vice. Bend the near end of the wire around a screw on the coil form, in a tight U shape, over a brass flat washer. Do not cross the wire and leave a generous pigtail. Secure the U with another brass flat washer, lock washer and nut. Tuck the pigtail inside the form. Check for clearance between the flat washers and the first turn. If necessary, add an extra nut to be sure the flat washers will not short to the first turn. Keeping the wire tensioned, turn the form as you walk towards the anchored end. When the required number of turns are on the form, wrap the wire around the other screw just enough to keep it from slipping off. Cut the wire, leaving a generous pigtail.

"Place the wound form in the freezer for a couple of hours. The coefficient of expansion/contraction of the PVC exceeds that of copper, so the winding will be looser that in was at room temperature. Working quickly so as not to allow the PVC form to come up to ambient temperature, work the loose turns towards the loosely secured end of the coil, adjusting the space reasonably uniformly. The heat from your hands will warm the copper and help it expand. Do not try to finish this process in one pass. The PVC may warm up too much. Take up the slack at the end and again secure the wire to the screw with a partial turn around it. Put the coil back in the freezer for another couple of hours and then repeat the process, spacing the turns uniformly and taking up more slack. Bend the wire around the screw in a tight U-shaped loop over a brass washer, and secure it with another brass washer and nut. When the form comes up to room temperature, it will take a screwdriver to move the turns. They seem to squeeze so tightly I suspect they dent the PVC.

"Although the coil is tight, after extremes of temperature cycling (if installed on an antenna) the soft-drawn copper may no longer be as tight. (Do not use hard-drawn copper, its conductivity is only 95% that of the soft-drawn variety.) I suggest a coat of Q-Dope (an American registered trademark) to ensure preservation of the spacing. The Q Dope can be purchased or can be made by dissolving polystyrene shavings in carbon tetra-chloride. Be careful - "carbon tet" is a suspected carcinogen that affects the liver and kidneys when inhaled or absorbed through the skin!"

VHF PARASITICS AND OVERDRIVE CAN INJURE YOUR TUBES

IN THE SEPTEMBER *QST*, Richard L Measures, AG6K, presents Part 1 of a two-part article on 'Parasitics Revisited' warning of the damage that can be caused to high-cost RF power valves by VHF parasitic oscillations or by overdriving linear amplifiers. Parasitics, he warns, can "boil gold, destroy amplifier tubes and blow meter movements out of their cases." In Part 1, he describes and illustrates some of the damage inflicted on high-power amplifier valves.

Parasitic oscillation is not confined to home-built rigs; amateur linears and even professional broadcast transmitters are not immune. I note from an *IBA Newslink* a variant of Robert Burns' 'To a mouse', by Dave Walker who, until his retirement, was based at the IBA transmitter site at Durris, near Aberdeen. I can't vouch for the accuracy of the dialect:

Wee sleekit 4CX250
Oh what a panic's in they breastie
Don't go into self-osc sae hasty
Wi parasitics
I wad be laith tae hae tae 'neut' ye
Wi electrolytics

I would hesitate to use an electrolytic capacitor to neutralize a 4CX250 but one has to concede a degree of poetic licence!

TT has previously (August 1986, p571) noted AG6K's concern with the fact that even though the popular high-power zero-bias, grounded-grid amplifier has zero phase shift and theoretically provides an unconditionally stable amplifier not requiring neutralization, this does not mean that such amplifiers are always free of VHF parasitic oscillations which, if undetected, can shorten the life of high-cost RF power valves.

A detection problem exists in that HF amplifiers may operate, apparently reasonably well, for several years without the user becoming aware of the intermittent presence of VHF parasitic oscillations, although possibly noting occasional flash-over of the tank capacitor or the overheating of parasitic-suppressor resistors.

555 WINDOW-DETECTOR CONTROLS BATTERY CHARGER

A SIMPLE 'FOUR-COMPONENT' window detector, based on the ubiquitous 555 IC timer, to form a controller in conjunction with a low-cost charger for lead-acid batteries has been described by Phil Hine in *Electronics Australia* (September 1990). He uses it to switch the charger on when the load pulls the battery voltage down to about 12V, and off again when it rises to about 15V, although the limits are adjustable. In this case, the load comprises a couple of 60W automatically-controlled garden lights for which he uses a 4A car-battery charger with the controller, believing that it is better repeatedly to cycle a battery than to float it continuously.

Fig 8 (a) explains the action of the 555 detector with the circuit arrangement of the unit shown in **Fig 8 (b)**. He writes:

"A portion of the input voltage is compared to the reference voltage V_z across the zener diode. If V2, set by RV2, is less than half V_z, the 555 flipflop is set - resulting in a Hi output capable of sourcing 200mA (for the relay). This will be maintained until V1, set by RV1, exceeds V_z. V_z should be less than the upper voltage to be detected. I used a 5V zener diode as that was what I had available. RV1 and RV2 can be any value from 10K to 100K with ten-turn trimpots best for fine adjustment.

"I used the window detector to drive a 12V relay which in turn switches 240V mains to a cheap commercial 4A automotive battery charger as in Fig 7 (b). If the battery is next to the charger then the output of the charger will be well filtered by the battery, but in my case the battery is some distance away connected by about 0.25Ω of cable, hence the need for the 4700µF capacitor across the output of the charger. Without this filtering, the pulsing waveform out of the charger would set and reset the window detector at 100Hz. The 33V zener diode and the two fuses form a belt and braces approach to 240V safety, and are only for my peace of mind."

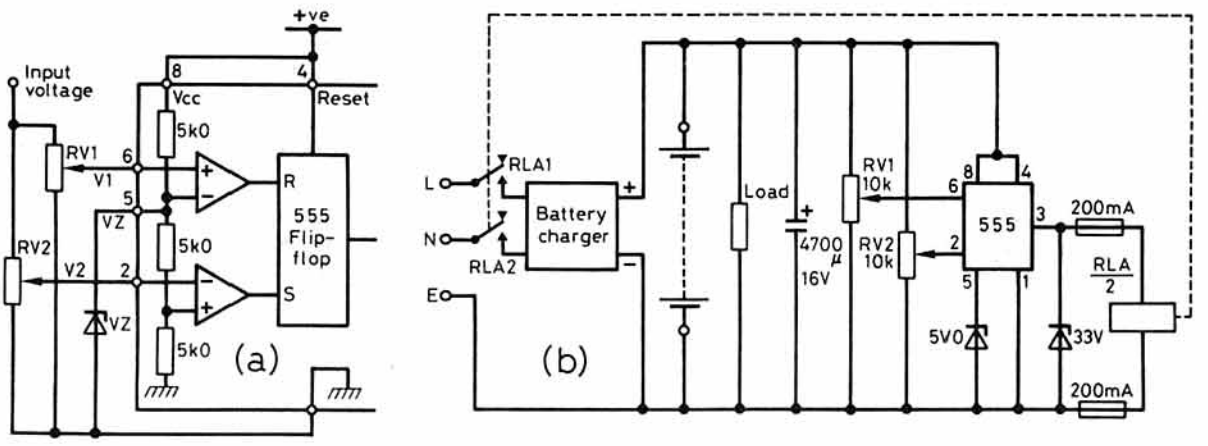

Fig 8. Battery charger controller using an adjustable 555 window-detector.

VHF parasitics result from resonances brought about by the unwanted but unavoidable reactances in leads, grid wires and components: **Fig 9** from *TT*, August 1986 shows (for a grounded-cathode amplifier) the difference between what we would like the amplifier to be and (b) the many stray inductances and capacitances that exist and can cause VHF parasitics.

One must not be too paranoiac about amplifier instabilities. Bill Orr, W6SAI, has pointed out (*TT*, December 1986, p854) that: "Generally speaking the cathode-driven amplifier is a docile beast when triode valves are used and shielding is adequate. Amplifier instability at the operating frequency can often be cured by careful attention to feedback paths external to the amplifier (proper by-passing of primary power leads) and by ensuring that the exciter and amplifier are operating at the same earth potential. An extra-short, heavy earth strap between exciter and amplifier will often cure an unstable amplifier . . . . Parasitics, when they occur, are usually mild and commonly above the self-neutralizing frequency of the valve . . . . A sure fire cure is to load the circuit at the parasitic frequency until the amplifier refuses to oscillate. The valve lead common to all parasitic circuits is the anode; this is where parasitic suppression should take place. A simple resistor-inductor circuit will do the job but winding too many turns around the resistor will cause it to overheat, too few and the parasitic will not be suppressed."

AG6K might disagree about the "mildness" of VHF parasitics, although he stresses that valve damage can be caused in other ways.

He writes: "If the gold plating on the grid wires of an amplifier valve is missing in places, a VHF parasitic was the most likely culprit. If a VHF parasitic has occurred, it's also common to find that some of the cathode coating has been dislodged. This leaves dark patches on the cathode surface. But if the grid's gold plating is completely intact, and the cathode coating has been damaged, a parasitic oscillation was *not* the reason for the failure. Instead the valve was destroyed by *cathode overdrive* . . . . A common misconception among radio amateurs is that it's okay to overdrive an oxide-cathode valve as long as the grid current is held to a safe level. I don't know how this idea got started but this notion is a thick slice of some very expensive bologna . . . . overdrive abuses a frangible oxide cathode"

AG6K notes that with a directly-heated filament-type cathode (eg 3-500z) the tungsten-dicarbide coating is bonded into the tungsten/thorium-oxide-alloy filament wire and cannot be dislodged by cathode overdrive (but can be wasted away by excessive filament voltage). However, in indirectly-heated valves, the cathode comprises a nickel cylinder coated with a mixture of barium-oxide and strontium-oxide. At the recommended drive level, the nickel-to-oxide bond is strong enough to keep the oxide coating in place. Overdriving pushes anode current beyond rated maximum and may be sufficient to dislodge the coating no matter what the grid current happens to be. He illustrates this with a *kaputt* 8873 valve (one of two from a Henry Radio 2K Ultra linear). Although the manual warns against exceeding 75 watts drive, it had been driven with over 95 watts - a $810 mistake!

He believes also that there is a common misconception that a valve will amplify linearly as long as its grid current is controlled by heavy loading. He writes: "Although heavy loading reduces grid current and usually improves linearity, *it does not linearize the amplifier if the valve is overdriven.* A valve cannot be made to operate linearly when it is severely overdriven

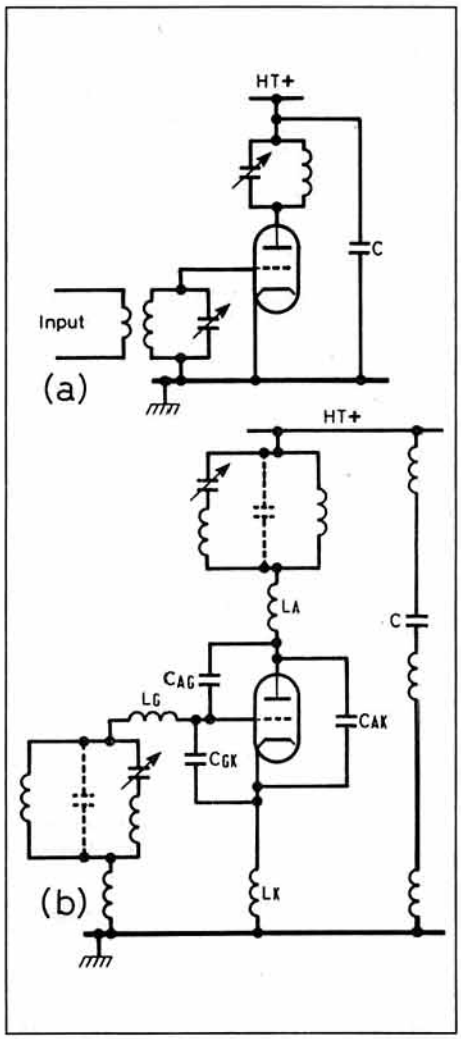

Fig 9. (a) Basic RF grounded-cathode amplifier which also forms a tuned-plate, tuned-grid oscillator unless the two tuned circuits are effectively isolated and not coupled inductively or capacitively so as to result in positive feedback. (b) The problem is made complex by the presence of stray capacitances at VHF resulting in VHF parasitic oscillation. This is how the circuit of (a) appears at very high frequencies.

because its cathode emission *saturates* - fails to increase with further increases in drive - causing flat-topping and on SSB causing *splatter.*"

On the question of valve damage resulting from VHF parasitics, he writes: "Excessive grid current is the principal reason for failure in valves subjected to intermittent VHF parasitic oscillation. Often, however, the large anode-current pulse, which is fed by the energy stored in the HT-supply filter capacitor(s), damages other components. The pulse can create a powerful magnetic field that can pull a 3-500z's hot, thoriated-tungsten filament wires off centre, sometimes causing a filament-to-grid short-circuit; it may also damage the current-metering circuit and zener cathode-bias diode . . . . The damage typically inflicted on ceramic-metal valves by VHF parasitic oscillation can be spectacular. Such valves have indirectly-heated oxide-coated cathodes, high gain and gold-plated grids (to reduce secondary emission) . . . . VHF energy is capable of heating the gold-plating while leaving (due to *skin effect*) the grid cage relatively cool . . . . the gold can be heated to evaporation and the resulting hot gold-cloud condenses into tiny droplets some of which may land on the cathode, poisoning it, and reducing cathode emission . . . ; Migrating gold can also find a new home inside the ceramic anode insulator and may cause flashover between the anode and adjacent grounded-grid ring."

These extracts from the four pages of Part 1 of AG6K's article show the need for care in using modern high-cost RF power valves (which can cost hundreds of pounds/dollars when bought new) in operating both factory-made and home-built high-power linear amplifiers.

HERE AND THERE

MIKE KING, G3MY MENTIONS that on 50MHz he uses a grounded-grid power amplifier developed over the past three years and now duplicated by a number of the local amateurs. This uses a single TV-line-output valve with adequate forced air cooling. Various types have been used with little difference in efficiency, and all the constructors have commented on the unequivocal stability. Power gain is 10 to 12dB depending on the anode voltage, physical design and layout. Efficiency usually proves to be around 50 to 55%. Valves used have included 6JB6, 6MJ6, 6KD6, 6LF6, 20LF6 (G3MY's preferred type), PL509 and PL519. All have given good results. An experimental version, so far only bench tested, using Laminar flow forced air cooling and 1200V on the anode of a 20LF6, gives some 140W PEP output without wilting.

Del Arthur, G0DLN notes that many amateurs struggle to receive CW through an SSB filter, since Narrow CW filters tend to be classed as expensive optional extras. This situation can be much improved by the use of an outboard audio filter which plugs in between rig and phones. He writes: "Most of these use a PP3 or similar battery which always seems to expire when needed. Spurred on by a recent *TT* item, I decided to knock up a passive filter as an experiment. In my junk box I found a small 1H toroid choke only about 3cm in diameter. When connected in series with an 0.15µF capacitor and the earpieces of a cheap pair of low-impedance headphones the results were quite remarkable. It provides a sharp resonance peak around 500Hz with higher and lower frequencies severely attenuated. The beauty of this arrangement is that the two small components can actually be fitted inside the earpiece cover, together with a miniature toggle switch, thus doing away with extra boxes and cables between rig and phones.

"There is some attenuation of the wanted signal but this is overcome by slightly turning up the volume control. In **Fig 10** the resistor R is to equalise the volume when switching the filter out, and its value needs to be slightly more than the DC resistance of the choke. More by luck than judgement I now have a KISS-type CW filter which is selective enough to wipe out some kinds of quite heavy QRM completely, as well as reducing some kinds of atmospheric static and receiver noise."

GODLN proved his point by sending along a tape cassette recording of the effect of switching the filter in and out under conditions of severe interference. Certainly, the filter improves reception of the wanted signal.

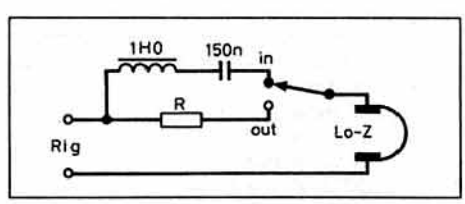

Fig 10. G0DLN fits a simple passive audio filter inside the cover of one earpiece of his low-impedance headphones to improve CW reception on a transceiver fitted with an SSB filter.

Bill Guest, G4IYB following up the *TT* item on Telegraphists Cramp/Glass Arm/Brass Arm/RSI/ Upper Limb Disorders etc (May 1990, pp28-29) has found in the 1921 edition of T E Herbert's *Telegraphy* (4th edition reprint, Addendum p995) an interesting note relating to the Vibroplex key and the then current thinking on telegraphist's cramp: "The Vibroplex: This device is in extensive use in America to prevent telegraphist's cramp by relieving the operator of the work of forming the separate dots .... (description of the operation of a Vibroplex `bug' key) .... It is contended that the device permits faster sending with less fatigue to the operator, and that the strain on the receiving operator may be reduced by taking the message on a typewriter. In this way it is claimed that higher output is secured and the possibility of telegraphist's cramp is reduced. Whether these claims can, any or all of them, be substantiated in practice remains to be determined, since the experiments in progress are not yet conclusive. It is, however, true that when the device was tried some twenty years ago (presumably about 1900) it was, at that time, condemned by most practical telegraphists in this country.

"Telegraphist's cramp is neither very rare nor is it extensive, and there is some reason to think that in many cases where it does occur the prime cause lies in bad teaching and the consequent development of unnatural, jerky methods of sending. The replacement by properly adjusted double-current (brass) keys for single-current type keys on all busy circuits should tend to reduce the risk of cramp, even where the art of rhythmical sending has either never been acquired or has been impaired due to some obscure physical condition of the operator."

This note certainly reflects the long-held belief of British professional telegraphists of the merits of the up-and-down straight brass key that lasted for at least half-a-century - and the anti-bug' feeling of the authorities. As someone who still uses a Post Office type double current key (and other straight keys), this is not an argument that I would want to enter into. But the modern electronic keyer, when correctly operated, does give extremely good morse with apparently little or no risk of incurring glass arm!

TT has referred from time to time to the difficulties and dangers (as well as the equipment involved) in clandestine radio operations during the second world war from enemy-occupied territory. But radio was only one of several forms of communication used by the Intelligence Services. Lt Col CJ Walters in *The Journal of the Royal Signals Institution* recalls that homing pigeons brought back to the UK useful information from the inhabitants of the occupied countries of Western Europe.

Birds were dropped from aircraft in cardboard containers with message holders, message pads, a little food for the bird, instructions in the local language on the type of information needed, and even a pencil. From April 1941 to September 1944 some 16,554 birds were dropped of which 1,722 or just over 10% returned. The high casualty rate is ascribed to enemy counter-measures which paralled those directed at radio agents, and included big rewards to anyone handing in a pigeon and the death penalty for any civilian caught with one. Other problems included the shortage of experienced, fully-trained pigeons and the seasonal bad weather. One suspects also that at least some of the missing 14,832 birds ended up as pigeon pie - at least nobody was tempted to try and eat a suitcase radio, although there is a story of one radio-agent who found himself in France without a radio but carrying the overnight suitcase of the conducting officer who had seen him off from the Tempsford aerodrome!

UHF CO-AXIAL CERAMIC RESONATORS

Leon Heller, G1HSM draws attention to an article in *Siemens Advance* which describes the use of their range of co-axial ceramic resonators between 300 and 1500MHz.

This notes that resonators of high-permittivity, temperature-stable ceramic are finding increasing application at frequencies up to 30GHz. For mobile radio there is an increasing demand for small resonators with good RF characteristics for use above 400MHz.

Co-axial ceramic resonators as now marketed by Siemens are claimed to be an attractively-priced solution for stabilising frequencies in voltage-controlled oscillators for small, portable mobile radios.

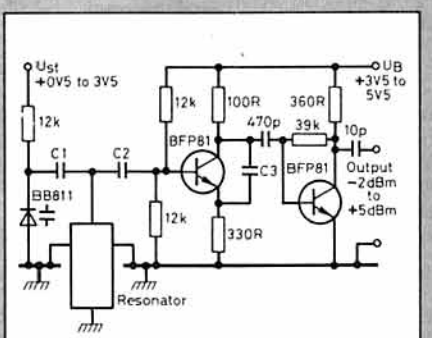

Fig 11. UHF voltage-controlled oscillator stabilised with a Siemens co-axial ceramic resonator.

Fig 11 shows a regenerative broad-band amplifier that begins to oscillate when an electronically tuneable resonator is connected to the input gate: "Because of the design and the influence of lead and stray capacitances, the oscillator frequency (fo) is some 10% lower than the resonance frequency (f) of the unloaded co-axial resonator. The oscillator output is buffered and amplified in the second transistor stage, which has an output impedance of about 50Ω. This circuit can be used for oscillator applications between 300 and 1500MHz. The required frequency is obtained by using an appropriate resonator and fitting suitable coupling capacitors C1, C2 and C3.

Such resonators can also be used for frequency stabilisation in IC oscillators. To achieve the optimum oscillator response, the resonator should be soldered to the PCB on both sides of the outer cylinder jacket and along its entire length. This results in good earthing as well as excellent mechanical strength. Further improvement can be achieved with the cylindrical form of resonator (which has an additional nickel barrier to produce good solderability even under difficult conditions) by recessing it in a slot on the board. Besides giving the shortest possible connection between the inner conductor and the circuit, this also reduces installation height.

Jim Glanville, G3TZG, noting my recent comment that I found opaque the Cyrillic alphabet of the Russian magazine *Radio* sent along a copy of his "Russian Morse for the Amateur and Commercial Operator" published in 1988 and still available price £3.50 post free. This is a short ten page duplicated-style booklet, but it does provide a useful guide to copying and transmitting to Russian Amateurs in the Cyrillic Morse alphabet after learning a few extra Morse symbols and becoming accustomed to the Latin equivalent of the 33 letters. G3TZG provides a guide to common phrases including, for example, abbreviations and phrases which occur in Russian CW satellite working and Russian marine operations, etc. His address is 3 Seneschal Road, Coventry. CV3 5LF if you are interested. But remember that not all operators in the various Soviet Republics use Russian as their mother tongue. Some now get a little touchy if you insist on using Russian abbreviations these days! All Russian amateurs have to understand International Morse and the standard abbreviations. But I have long found such abbreviations as SPB (spasibo - thanks) ZA (for) QSO and DSW (Do svidanya - goodbye) goes down well.

I still feel that in order to avoid introducing errors into *Technical Topics*, it is better to mix Imperial weights and measures with metric rather than to strive after pedantic consistency - hardly, I admit, a scientific approach, but personally I still think in feet and inches. A recent letter in *Nature* from Ernest L Asten, who runs a hardware store in San Francisco, notes that the USA alone obdurately clings to the old British patchwork of systems that are often not what they say they are. He points out that in a 100 year old house, 2 x 4 timber really was 2in by 4in; in a 50 year old house usually 1⅝ by 3⅝ in; and in a deflated modern house 1½ by 3½ inches!

"Half-inch" galvanised pipe isn't half an inch anywhere: the inside diameter is about ⅝ in and outside diameter about 13/16 in. Nails are measured in "pennies" with the symbol d as in £sd - so a 4d nail is 1½ in long. 6d is 2 in, 8d is 3 in so it should be perfectly obvious that a 3½ in nail will be, that's right, 16d. Concrete comes by the cubic yard, timber by the board foot, shingles by the square, yarn by the skein, but a sack of cement is always 94 pounds. "It's a Jim Dandy system and any country that would give it up for something as straightforward as metric has no sense of humour." ❑

Gerald Stancey, G3MCK provides a method of securing small batteries, such as the PP3, inside equipment that is much cheaper than buying battery holders: Fig 12. He writes "Cut a piece of PCB or paxolin about 2 ¾ by ⅞ inches and drill two 4BA clearance holes in it. Secure the battery to this strip by wrapping Sellotape round them. Bolt the combination inside the equipment".

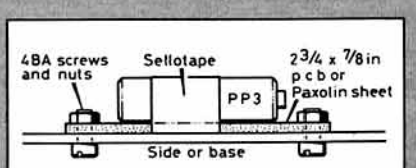

Fig 12. G3MCK's low-cost "battery holder"

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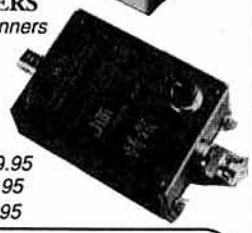

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An Introduction to Meteor Scatter Operation

Part 1 of a two part article by Nigel Wilson, BEng A.M.I.E.E., G4VVZ

INTRODUCTION

MANY AMATEURS active on the VHF bands may have heard of meteor scatter or MS operation, but most have never used the mode. This article explains some of the fundamentals of the mode, as well as considering the current ways we amateurs utilize it.

Meteor scatter is unlike any other mode of propagation known at VHF. Not only does it give long range communications (up to around 2000km) 365 days a year, but variations in performance are highly predictable. Other propagation modes offering communication over similar ranges, such as Es, tropo 'lifts' and aurora are all to some extent unpredictable. For example, you can never be sure whether there will be a tropo lift next week - it all depends on what happens to the weather! With MS we can accurately predict when good propagation is coming, as it follows well-established patterns which can be used when selecting the optimum time to try a contact.

Before we consider how to make use of MS, let us first examine how the mode works.

PROPAGATION MECHANISM

METEOR SCATTER propagation results from particles entering the earth's upper atmosphere. These particles, travelling at very high speed, collide with air molecules, thus becoming very hot and disintegrating as they fall towards earth. The resulting meteor 'trails' of ionization reflect radio signals for a short time, until they are dispersed by winds in the upper atmosphere. The trails occur at heights of about 100km above the earth, the same height as Es clouds and aurora. Hence the ranges obtainable by meteor scatter propagation are similar to those achieved by these other modes.

So far, meteor scatter looks an ideal mode for working lots of DX, but of course there is a snag. In the case of meteor scatter, the problem is that signals only come in short 'bursts'. These may be anything from less than a second to several minutes in length, but the longer bursts are much less frequent than the shorter ones. This may seem discouraging, but in practice QSOs are easily possible using procedures developed to take account of the special nature of meteor scatter signals. These QSO procedures are well documented in other articles [1,2], and the *Amateur Radio Operating Manual* contains perhaps the most comprehensive description [3]. The skill is in using the available propagation to full advantage, thus improving the chance of a complete QSO.

VARIATIONS OF METEOR REFLECTIONS

METEOR 'BURSTS' as I have already mentioned, are short periods of signal. The rate at which these bursts occur is dependent on many factors, the most important of which are frequency, time of day and time of year. A typical graph of the frequency dependence of meteor scatter systems is shown in **Fig 1**. It clearly shows that the lower the frequency, the better things are, although we amateurs are restricted to our choice of frequency band, ie. 50, 70, 144MHz etc. The difference between 144.010MHz and 145.990MHz is negligible. This leaves us with the other two variables - time of day and time of year - which we can select to give the maximum number of meteor signals or 'reflections' over a given path between two stations.

When determining the best time to make a QSO, it is important to distinguish between two types of meteor scatter activity. The first uses 'sporadic meteors'. These effectively form the background meteor rate, which is present all the time. In addition there are 'meteor showers' when the number of meteors entering the earth's atmosphere is greatly increased. Most amateur communications using meteor scatter take place during these showers.

SPORADIC METEORS

THE RATE AT WHICH sporadic meteor bursts occur has two cycles, both of which are regular and highly predictable. Firstly there is a daily cycle, often known as the diurnal cycle, which results from the earth's rotation around its axis. The variation in rates is depicted in **Fig 2**, and it will be seen that the optimum time for a QSO is in the early morning.

The reason for the diurnal cycle is quite simple. In the morning, the earth's rotation means that it will be sweeping up meteors from the space in front of it, so larger numbers of meteors enter the atmosphere. In the afternoon and evening, the opposite effect occurs and only meteors overtaking the earth will enter the atmosphere.

A yearly cycle of sporadic meteors arises due to the distribution of meteors around the sun. This cycle has a peak around June/July/August as can be seen from **Fig 3**.

A more complete explanation of this and many other aspects of sporadic meteor propagation can be found in many professional articles, reference 4 probably being the most comprehensive review of the subject published to date. Some useful introductions to the subject can also be found in amateur literature [1,5,6].

METEOR SHOWERS

METEOR SHOWERS occur at regular times each year. The best time for reflections during the shower is often referred to as the 'peak' of the shower. Predictions for the time that a shower peaks can be made from astronomical data and are often published in VHF-UHF columns. It is equally effective to find the time of last year's peak using QSO reports in the DUBUS magazine, and then to add 365.25 days (ie. a year and 6 hours later).

Shower meteors have the property that all the meteors from any particular shower are radiant from one point in the sky. This fact can be used to calculate the best times for a particular path, as explained in the following section, and tables of such predictions are available [8]. Alternatively computer programs [9] will calculate the

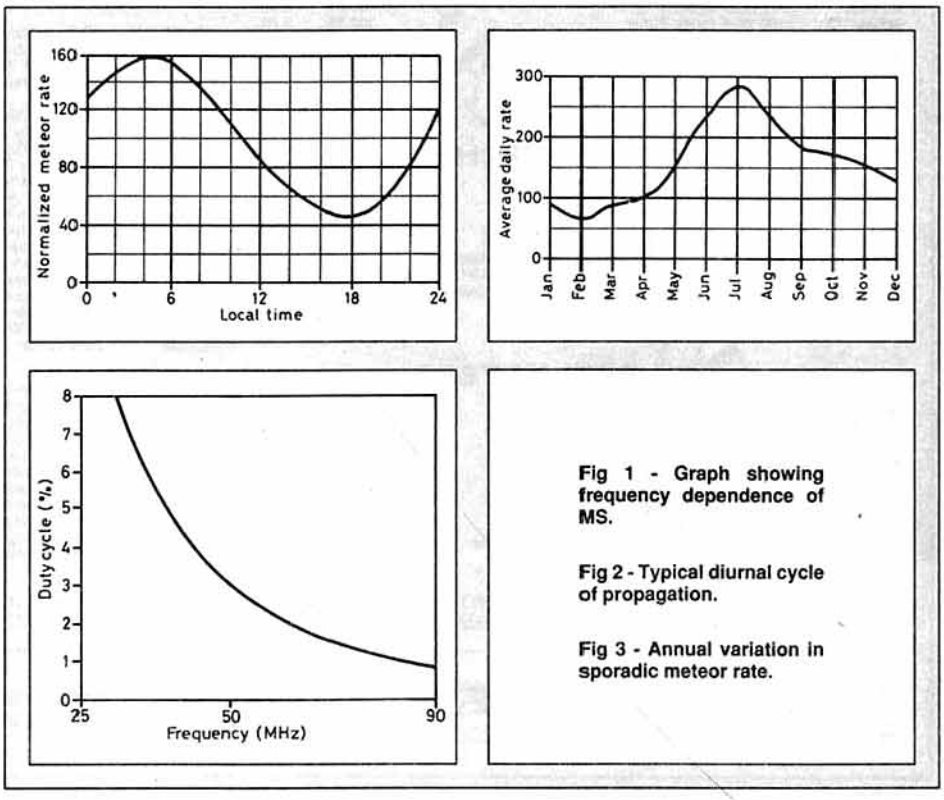

Fig 1 - Graph showing frequency dependence of MS.

Fig 2 - Typical diurnal cycle of propagation.

Fig 3 - Annual variation in sporadic meteor rate.

results for any given shower, giving optimum times for a particular day. However these predictions are based purely on geometry - they cannot say whether any meteors will be present!

Thus, the time for a QSO can only be selected to give the best *chance* of optimum propagation conditions. In practice, many other considerations such as TVI and working hours will also influence the decision!

BEAM HEADINGS AND HOT SPOTS

THE FINAL AREA to consider in this brief review of the propagation media is where to point your beam to get the best results. It may at first appear that you should simply beam directly at the station you wish to work, ie use the great circle bearing. In fact this is NOT the case: best results will always be achieved by beaming slightly to one side of the great circle path (GCP).

This offset is required because of the geometry of the propagation path. For a meteor trail to reflect a radio signal it must lie in a plane perpendicular to the plane of the path between the two stations. If we consider the GCP case (**Fig 4a**) we see that, for reflection to occur, the meteor would have to be travelling horizontally, ie parallel to the earth. Obviously meteors which are falling to earth very rarely travel in such a way! Thus by beaming to one side of the GCP (**Fig 4b**) the number of reflections observed will increase. This leads to the concept of 'hot spots' which are points in the sky where the maximum number of reflections can be observed.

For the system to work, both stations must beam to the same side of the GCP (**Fig 5**) and the choice of which side to beam is not just an arbitrary one. For sporadic meteors some general rules are presented in **table 1**. For showers, tables of data [8] contain optimum beam heading offsets for given paths.

Finally, for the purists out there, some may have noted that I referred to meteor scatter signals as 'reflections' throughout. This is only partly correct; the longest and strongest bursts are genuinely reflections, but the more frequent, shorter bursts are in fact scattered signals. The difference need not concern us any further, but I mention it before people start telling me that reflections aren't reflections . . . .

EQUIPMENT

IN THE PAST, very high-specification equipment for MS operation has been recommended, but this is not available to most amateurs. Equipment for CW is necessarily more complex, but for SSB operation an operator is unlikely to need much additional equipment to that already in the shack. The following are a few guide-lines to equipment requirements.

Transmitter: At 144MHz power levels below 80 - 100W (19 - 20dBW) cannot be recommended. MS propagation is such that the length and number of 'bursts' observed by a station is proportional to the power of the transmitter. Stations with low power are advised to concentrate their activity during 'showers' when longer, stronger signals are more frequent. Also there are often many more stations around looking for contacts at shower times - although competition for QSOs may be stronger as well!

Receiver: Almost any commercial transceiver will be good enough for MS operation to some degree, although not ideal. For 144MHz, a good low noise pre-amp at the mast head is recommended for improved results.

Antenna: For distances in the 1000-1500km region, a single long Yagi is sufficient (e.g. 17 element Tonna, 14 or 19 Element MET etc.). For longer distances, larger antennas are preferred but not necessarily essential.

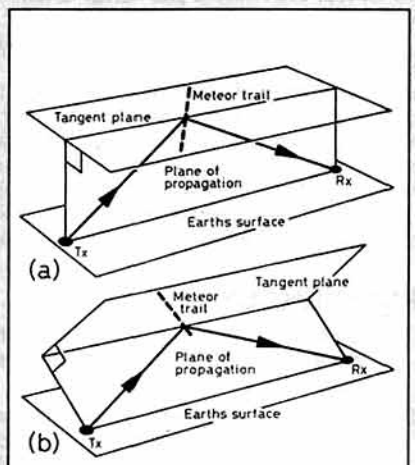

Fig 4a - Geometry of meteor-scatter propagation along the great circle path.
Fig 4b - Geometry of meteor-scatter propagation off the great circle path.

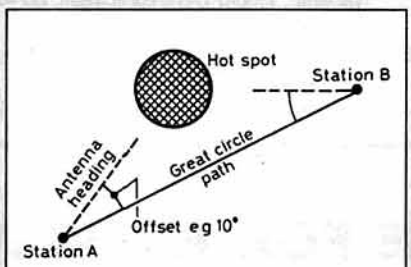

Fig 5 - Example beam headings for typical QSO, showing offset.

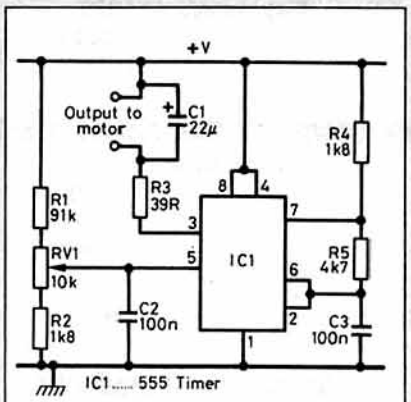

Fig 6 - Circuit of Cassette Recorder speed controller.
Note: The values of R1, R2 and R3 may need to be adjusted for a particular motor. Supply voltage can be up to 15V, also dependent on the type of motor used.
IC1 - 555 Timer.

Time	Direction of Path	Offset
00.00-12.00	East - West	North Side
12.00-00.00	East - West	South Side
06.00-18.00	North - South	East Side
18.00-06.00	North - South	West Side

Table 1 - Path offsets for Sporadic Meteor Operation

Frequency: Accurate measurement of frequency is required because you can't waste time finding the signal and tuning it in. In my experience, many modern rigs have very poor frequency calibration. DO NOT take the digital display on your rig as accurate. The accuracy should be checked using a frequency counter or by calibrating your rig against somebody who knows their precise frequency. In its simplest form this process can be done over the air. Also remember that some rigs drift quite significant amounts after switch-on, although often their digital displays do not show this.

Timing: It is important to get timings correct. However any watch with a second hand, calibrated against a suitable standard ('Speaking clock', radio time signal etc) will be acceptable. Alternatively a simple 'MS timer' circuit may also be built [10] which warns the operator at the start of each period.

Beam Headings: The MS operator cannot simply 'peak the beam' as on tropo. The antenna must be pointed at the intended DX station to a reasonable degree of accuracy. This accuracy depends on how sharp the antenna is. It is recommended that a compass be used to check the calibration of rotators, which should be within a few degrees. I have used an orienteering compass to good effect for this purpose for many years.

CW MS EQUIPMENT

FOR CW MS, SOME method of generating and decoding morse at very high speeds is needed. We shall consider each in turn. The speeds required are in the region of 1000 letters/minute (lpm), ie about 200 words/minute.

MS Keyers: Two approaches can be taken. The classical approach is to use a memory keyer. These can be purchased, but can be expensive. The reader should be aware that some commercial keyers, sold as MS keyers are not really suitable. The essential feature is that the memory can be continuously cycled at high speed without gaps.

Some keyers have to send the whole of their memory store rather than just the bit of CW you have programmed. This leads to breaks in transmission, effectively defeating the object of the exercise. Such keyers are usable but not ideal.

The alternative approach, and that adopted by myself, is to use computers to generate the Morse. This increases the flexibility of the station by the provision of several memories. I have used a number of systems. A proprietary Morse 'keyboard' provided very good results, but this product is no longer on the market. An excellent compact solution uses the PC1500A Sharp pocket computer [11a], and other published systems are available for the Commodore C64 [11b] and ATARI-ST [12]. I presently use a Dragon 64 computer with proprietary software from G4BMK.

The potential problem with computers is interference generated by the machine. Amstrad and BBC computers are particularly bad offenders in this. Screened boxes, aluminium foil, metallic sprays and judicious choice of operating frequencies can often alleviate the problem.

Another difficulty with CW MS, whatever the keyer in use, is the rig being unable to key at high enough speeds. You will just have to experiment but the most important thing is to be aware that there could be a problem. I have used an IC251e

for about 200 meteor scatter QSOs, though I know of one amateur who could not get a memory keyer to work with another IC251e.

Methods to overcome this [13] involve going inside your rig to reduce the keying time constants, or buying another rig! Another alternative is to send CW via audio into the mic input. This is very successful if done properly and has been used by the author using the PC1500A design [11].

Tape Recorders: These are used to record the received Morse and then to replay it at slower speeds. Old reel-to-reel tape recorders used to be popular and can give very good results, especially if they are capable of 15 and 1⅞ inches/second. More common today are cassette recorders with variable speed control. It is essential to get the right tape recorder. Recorders with mechanical speed control are very difficult to modify (as I have discovered to my cost!). Electronic speed control, such as that used on Philips tape recorders, allows a simple speed controller device such as that in **Fig 6** to be used. Another design for certain Philips machines is given by PA3DZL in the DUBUS magazine [14].

Some stations use an 'up-converter' [10] to aid the reading of the CW. This is a device that raises the low frequency of the slowed-down CW. At very high speeds (above about 1200 lpm) an up-converter is almost essential. Below this speed, decoding is possible just by slowing the Morse, especially if you favour a low CW pitch.

Another potential problem is RF breakthrough on audio play-back of the tape recorder, as received signals must be decoded during the following transmission period. This can often be alleviated, if not removed, by a liberal sprinkling of decoupling capacitors (0.01µF say) around the audio leads (eg in the headphone plug etc).

The concluding part of this article will look at some recent developments in meteor-scatter.

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. . . to be concluded

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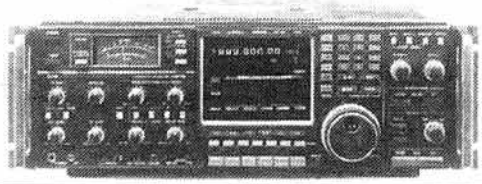

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Direct Digital Synthesis

What is It and How can I Use It?

by Dr P H Saul, G8EUX

'DIRECT DIGITAL SYNTHESIS' (DDS) has appeared several times recently in *RadCom*, both in *Technical Topics* [1] and in a review [2]. Direct Frequency Synthesis (DFS) and Numerically Controlled Oscillator (NCO) are synonymous terms. It is the latest feature offered in top-of-the-range rigs such as the Icom IC-781 and the new Yaesu FT-1000, which has, according to the advertisements, no less than five direct digital synthesisers. What then is this apparently new technique, and what is its relevance to amateur radio?

TERMINOLOGY

FIRST, SOME TERMINOLOGY explained. Direct synthesis (without the digital bit) simply means the production of an output frequency, either a transmitter output or a local oscillator for a receiver by the addition of several, sometimes many oscillators, usually by a combination of mixing, multiplying, re-mixing etc., with many stages of filtering. A truly analogue technique, and horrifically expensive to carry out really well. Examples were primarily limited to specialist, often military, synthesizers in the fifties. Outputs could be made very clean, especially in respect of close-to-carrier phase noise, but only by massive amounts of filtering, usually racks full of it! Of course, synthesizers of this type never made it into amateur production equipment.

A simpler version did go into quantity production, primarily, at least in numbers, in the early U.S. market C.B radios. This was the 'crystal bank' synthesizer, shown in **Fig 1**. This arrangement used two arrays of crystals, selected in appropriate combinations to give the required coverage and channel spacing. It worked very well over a restricted frequency range, could offer very low phase noise since crystal oscillators are inherently 'quiet', and could be made acceptably (for the time) compact, and low power. A familiar example on the UK market some 15 years ago was the very well known 'Liner 2'. This used crystal bank synthesis, with a front-panel tuned VXO on a further crystal oscillator for the conversion up and down from the effective 'tuneable IF' at 30MHz to the working frequency of 145MHz. The need for the VXO illustrates the weakness of this type of synthesizer; close channel spacing is essentially prohibited by the very large number of crystals which would be needed. Triple bank versions were described in the professional literature, but were not produced for amateur purposes. The other disadvantage of this class of synthesizer is the high cost of the crystals, but it remains an interesting technique capable of very high performance with reasonable design. The well-documented 'faults' of the Liner 2 were not connected with the synthesizer, but were due to overdrive of a later mixer stage.

Most of the earlier commercial amateur bands HF radios overcame the need for frequency stability by the use of a tuneable IF system and a carefully engineered VFO. Examples are in the KW range, the Yaesu/Sommerkamp FT-DX series and, in homebrew form, the G2DAF. This technique survived in solid state form, with among others, the FT101. However, in parallel with these came the early attempts at combining the best VFO characteristics with synthesis in order

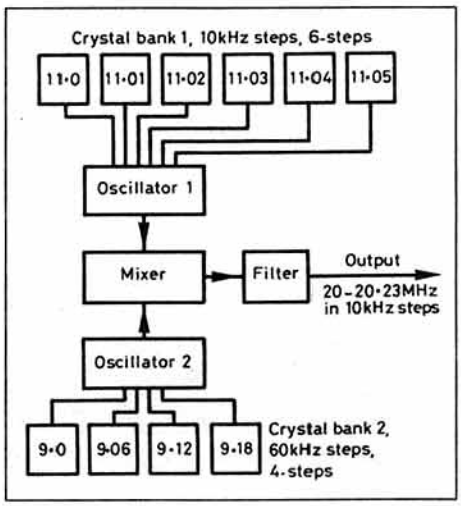

Fig 1: Simplified crystal bank synthesizer

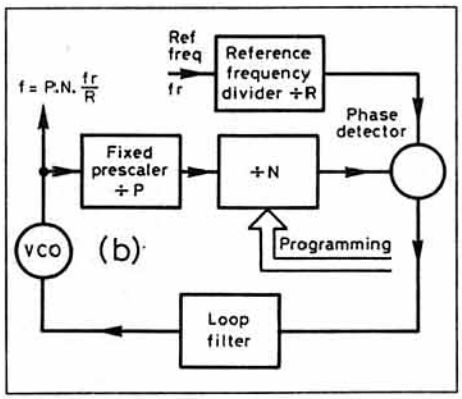

Fig 2a:Direct division

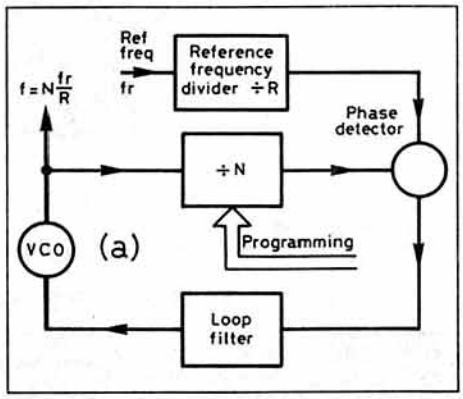

Fig 2b: Fixed prescaling

to build a single conversion receiver, with the objective of achieving exceptionally wide dynamic range. An example of this was G3PDM's classic phase-locked oscillator as used in his receiver [3], This was a true synthesizer, albeit analogue, based primarily on valves, with a VFO using a FET and two bipolar transistors which is still regarded as the standard to beat. The author was present at a demonstration of this receiver where a signal below 1 microvolt suffered no apparent degradation from a 10volt signal 50KHz away, an amazing 140+dB dynamic range made possible by the extremely low phase noise of this synthesizer, and of course the superb linearity of a beam-deflection mixer run with 100 volt push-pull local oscillator drive!

About this time (1969), the first truly digital (but not direct) synthesizers were beginning to appear, chiefly in military equipment; the outstanding example is the UK sourced 'Clansman' series of radios, still in service with UK forces.

BASIC SYNTHESIZER

A BASIC SINGLE LOOP digital synthesizer is shown in **fig 2**. Actually, this is very simplified. Fully programmable dividers of appropriate frequency range were not immediately available. Two solutions were proposed for this; the 'dual modulus' prescalers and a variant of the crystal mix scheme. The first of these uses the properties of a dual modulus, or in some cases even a triple modulus, counter to overcome the difficulty of producing a really high frequency fully programmable divider. The scheme is shown in **fig 3**. It consists of a VCO, usually in discrete component form, a dual modulus counter, a main counter, a reference oscillator and divider chain, a phase detector and a loop amplifier/filter. This type of synthesizer has been described many times, both in the professional and amateur fields. In some variants, it probably represents the current status of PLL frequency synthesis, especially for very wide frequency range applications such as TV receivers and satellite tuners.

The second method, that of crystal mixing, is probably the most widely used technique in amateur and PMR equipment, where wide operating frequency range is not needed. It offers advantages of simplicity and low component count, especially when the digital functions of the system can be contained in a single chip. The scheme is shown in **fig 4**. Unlike the dual modulus scheme, no prescaler is needed, but a high frequency mixer is necessary, usually with two crystals , one for mixing down and one for the reference.

Almost all the commercially available phase locked loop synthesizers use an external VCO, which must be designed by the equipment builder; not too difficult to a commercial concern, but no mean task for the amateur building a one-off. The problem is that the VCO is critical to achieving good performance from the synthesizer,

especially in respect of phase noise , and hence reciprocal mixing in a receiver. While the lock loop can take care of phase noise close to the carrier, a badly designed circuit or a badly laid out PCB can cause a synthesizer to 'feature' sidebands on the output spectrum at the comparison frequency and sometimes harmonics of it. The VCO dominates the noise away from the nominal frequency, ie outside the PLL bandwidth, which may be only a kHz or so, less in the case of very narrow frequency increments. Phase detector design is another critical area; the most recent PLL chips [5] offer two or more phase detectors to cover the far-from-lock and locked-in cases. All in all, PLL synthesizer design is a very demanding and essentially analogue task, as anyone who has built one and carefully examined the output on a spectrum analyser will testify. Nevertheless, truly excellent performance can be achieved, by the professional engineer in factory built equipment and by the very dedicated and well equipped amateur who does not cost his time into the project. It should be said that for any synthesizer work, a spectrum analyser, or at least a continuously tuneable receiver covering the frequency of interest and a harmonic or two, is essential.

LOCK-UP TIME

PHASE LOCKED LOOP synthesizers have one further disadvantage. The lock-up time is inherently related to the smallest frequency increment. For an FM only rig, with say 5KHz minimum frequency step, this is of no real consequence. For SSB, however, even 100Hz steps are disconcertingly large to most operators, and 10 Hz or better is preferred for the 'analogue feel'. Professional systems overcome this by complex, multiple loop synthesis, which can be both expensive, and when the filters are taken into account, bulky.

Amateur equipment practice has tended to take a more pragmatic route. Minimum step size in the synthesizer is usually 1KHz, while increments between are achieved with a separate control knob on older equipment, or by a digital analogue converter (DAC), operated by the last digit of the frequency set. The analogue voltage tunes a VXO in the rig, which may either be the conversion crystal in the synthesizer, or may be the reference crystal itself. Care must be taken to ensure that the pulling range is accurate or the '100Hz' steps will show a jump in one direction or the other at the 1KHz increments. Actually, many rigs do show this if observed carefully; the reason is that, until recently the DAC was a fairly simple affair consisting of a resistor array and switching transistors. More recently, real DACs have been used, but this is not a complete solution, since the VXO is unlikely to be linear to the required degree, so some step nonlinearity is inevitable. At least if the end points are not seriously wrong, this should not be a problem. Some rigs do tune in 10Hz steps, especially on HF; this is an extension of the technique to 100 steps instead of just 10. Again, there is the issue of the 1KHz crossover points; but with 10Hz steps this can be made less noticeable on a well designed and adjusted rig. This is the final point on PLL synthesis; properly designed, it works very well indeed, but who has not heard of 'synthesizer whine', or read reviews of otherwise excellent radio limited in performance by synthesizer noise causing reciprocal mixing? My own experience includes a rig which preferred not to go mobile; the synthesizer lock loop would go out of tune after a surprisingly repeatable mileage, only finally cured by the application of much wax to the VCO coil.

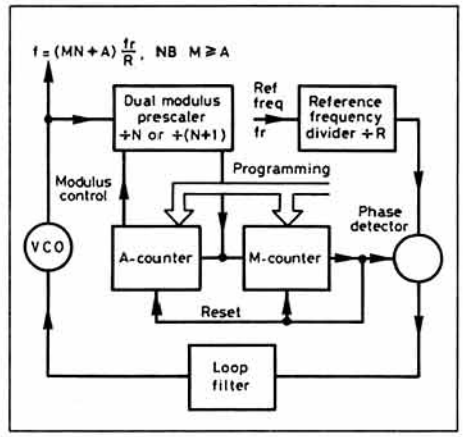

Fig 3: Dual Modulus prescaling

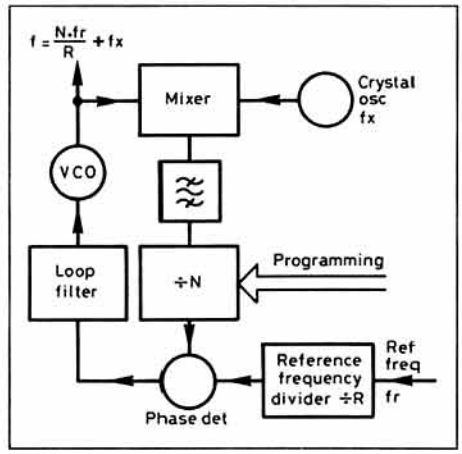

Fig 4: Mixing in the loop

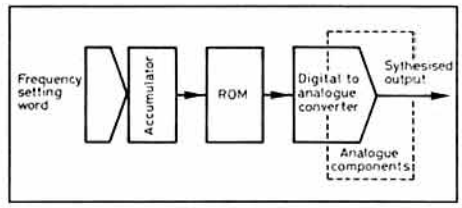

Fig 5: Direct frequency synthesizer

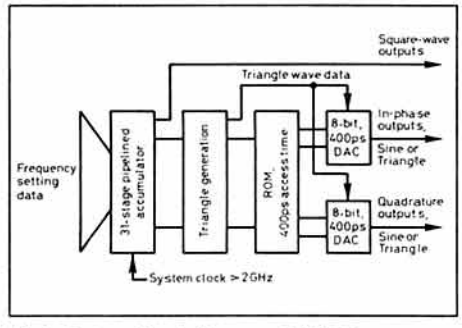

Fig 6: System block diagram of SP2002

A CURE-ALL?

WILL DIRECT DIGITAL synthesis cure all these ills? The answer is "no, not yet", but in the fairly near future this may turn into a qualified "yes". The basic direct digital synthesizer consists of an arrangement to generate the output frequency directly from the clock and the input data. The simplest conception is shown in **fig 5**. This consists of a digital accumulator, a ROM containing the pattern in digital form of a sinewave, and a digital to analogue converter. In general, the DAC will be followed by some filtering usually a low-pass filter somewhere just below half the clock frequency.

Dealing with the accumulator first, this is simply an adder with a store at each bit. It adds the input data word to that in the store. The input data word only changes when the required frequency is to be changed. In the simplest case the length of accumulator is the clock frequency divided by the channel spacing, although it is usually calculated the other way round, ie if a 5kHz channel spacing up to 150MHz is needed, a clock frequency of at least 300MHz will be required, due to the Nyguist sampling theorem, and 300MHz divided by 5KHz is 60,000. More conveniently, a 16 bit accumulator gives a 65,536 steps. If the step size is to be 5KHz, then a clock frequency to the accumulator of 65,536 x 5KHz is needed, i.e. 327.68MHz.

These numbers are the basic values chosen for the first commercially available VHF DDS, the Plessey SP2001. What the numbers mean is that by applying a binary number multiplied by 5KHz, ie the number to be applied is the 'channel number'. This makes programming particularly easy, especially as the device has a parallel input data format: DIP switches were used on the evaluation boards. The device produces any frequency in the range covered, ie 5KHz to over 100MHz in a single range, without any tuned circuits, although of course it does depend for stability on the clock source, which would normally be crystal controlled. Other frequency increments are available; any multiple of 5kHz by selection of input data, and others by choice of clock frequency, eg 6.25kHz requires a clock at 204.8MHz, with a two channel (2 x 3.125kHz) program word. Of course, frequency multiplication or mixing can be used to take the output to higher frequencies.

NEW DEVICE

RECENTLY, A NEW DEVICE (SP2002) has been announced [6]. This device, which is shown in block diagram form in **fig 6**, is more complex than the SP2001, since it has on chip DACs and facilities for square, triangle and sine outputs. Two DACs are needed because both phase and quadrature signals are available in true and complement form. The most significant bit (MSB) from the accumulator feeds the square wave output buffer direct. In parallel, the next 7 bits from the accumulator, which digitally represent a sawtooth waveform, feed a set of XOR gates, under control of the MSB, so that a triangle output is generated, in digital form, at this point in the circuit. Actually, two triangles in quadrature are generated. These can be digitally steered to the output DACs, or can be used to address a ROM containing data for sine and cosine waves; only 90 degrees is needed, since all four quadrants can be generated from one. Finally, if selected, the digital sine/cosine is fed to the DACs for conversion to analogue form.

This device was designed to operate at up to 500MHz output frequency, with 1Hz steps, so the full range is 1Hz to 500MHz, again in a single 'range' with no means of or requirement for tuning. The clock frequency is necessarily very high; the quadrature requirement adds a further factor 2, so nominal clock frequency is 2^31Hz, i.e. 2.147483648Ghz. This must be supplied with crystal controlled stability, although since phase noise is effectively divided down in the synthesizer, and the frequency is fixed, it can be generated by a simple multiplier from a crystal source. Output spectra are shown in **figs 7 and 8**. Fig 7 shows a clean output at exactly one quarter of the clock frequency. Noise floor is essentially generated by the spectrum analyser. Fig 8, however, is more representative of the general case; it shows a spectrum a 225MHz, a

frequency not integrally related to the clock frequency. Here the spurs have come up to a level about 50db below the carrier. This is the fundamental limitation of the DDS technique, and where most development work is going in the future. The limit comes from the finite word size and accuracy of the DAC, and incidentally the ROM, although this could have been made bigger fairly easily.

Fast DACs are difficult to make accurately, for two reasons. The first is technological; IC processes in general limit to a component matching accuracy of about 0.1%, ie 9 or 10 bits accuracy in a careful design. Other techniques, such as laser trimming of the resistors, can be used on some processes. However this tends to use older, slower processes, and especially requires large resistors for trimming, which slow the DAC settling time. The second problem is simply the requirements on fast settling; the DAC is required to get to the final value quickly, and this will in general happen with the smallest number of bits. An eight bit system was chosen to fit the process capabilities and the device requirements, but this leads to a limitation in the high level of spurious signals present. Basically, although some frequencies are very clean, in the worst case the spurious level is 6N dB below the carrier, where N is the number of effective DAC bits. For an 8 bit system, this give -48dB. Oversampling, ie running the clock at more than twice the output frequency gives some improvement, at 3dB per octave, by improvement of the DAC resolution, but only up to a limit of the DAC's accuracy. Typically this is about 9 bits or -54dB. In some applications, this may not be serious, since filtering can remove all but the close in spurs; phase locked translation loops into the microwave region also act as filters of relatively narrow band, while retaining the 1 Hz step capability.

In the amateur rigs available using DDS, the synthesizers operate at relatively low frequencies and are raised to the working frequency by PLL techniques; complicated, but still making the fine frequency increments available without compromise of PLL design. The devices used are probably CMOS types, with DAC accuracy around 12 bits. This gives spurious signals which should theoretically be -72dB referred to the carrier, which is adequate in most cases especially with some filtering from the PLL.

What of the homebrewer? Where does he get the devices? Does he want them anyway? All the devices mentioned by part number are commercially available; although the exact types in the Japanese equipment are not known to the author, US types of similar performance are also available. However, prices are likely to be high, at least for the next year or two. This is especially true for the VHF and UHF types, which are not really ideal anyway for single frequency (as opposed to 'hopping') radio receiver applications.

PRACTICAL DDS

A VERY USEFUL ARTICLE on a practical DDS appeared some years ago [7]. This showed how a synthesizer could be made using available TTL and a ROM. However, the output frequency was limited to 1MHz. Real DDS systems could be built by the amateur, and I intend to explore this for my own use. This is not intended to be a constructional article, so the comments made here are more in the nature of hints, without guarantee of success, but they outline a possible route to follow.

First, what do we need? An output up to say 10MHz would be useful for further conversion upwards in a mixer or PLL. Steps of 10Hz or

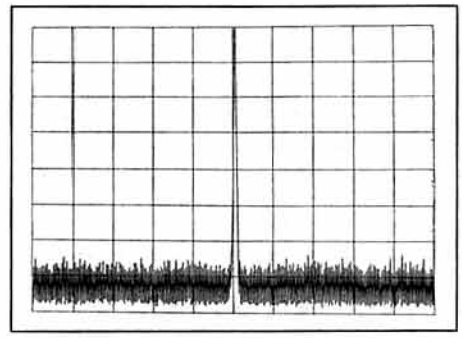

Fig 7: Output spectrum at 250MHz, with a 1GHz clock. 10MHz/div, X axis; 10dB/div, Y axis.

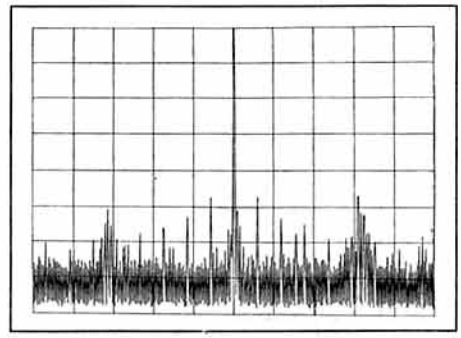

Fig 8: Output spectrum at 225MHz, with a 1GHz clock. 10MHz/div, X axis; 10dB/div, Y axis.

better are essential. This determines the clock frequency (>20MHz) and the accumulator size (21 bits). For convenience, the clock should therefore be 20.971520MHz. Standard TTL will work at this frequency although I would prefer HC CMOS.

A square wave would fit most applications in radio; there is no real need for a sinewave in local oscillators. However, the MSB output mentioned above has one problem; even higher spurs! Think of it as a one-bit DAC. Then -6NdB is not very good spurious suppression. The reason is that the square wave can give only increments in time, limited to the clock period in resolution. The sinewave also interpolates in amplitude, to the degree offered by the DAC accuracy, and so gives much better spurious control. However, if we are prepared to accept harmonics, which can be filtered out later if required, then a triangle is just as good in this respect as a sinewave. Since most commercial ROMs have access times of around 100ns, 10MHz is the limiting update rate, so a triangle has the further advantage of not needing the ROM at all. The DAC remains the major problem. Current low cost DACs are limited to 8 bits and settling times of over 1 microsecond.

A BETTER APPROACH

A MUCH BETTER APPROACH would be to use a current output DAC such as the SP9768 (8 bits, 5ns) or SP9770 (10bits, 12ns). These are ECL input devices, so will need interfaces to the CMOS accumulator and XOR gates; an ECL accumulator and XOR array should be considered. The latter device would give some 60db spurious suppression alone. Alternatively, it should be possible to add more bits using external discrete components, probably one further LSB and possibly two MSBs. Although temperature tracking of these components would not be good, the system would be operating in a fairly benign environment, so this is not critical. The DAC so produced would therefore be 12 or 13 bits accurate, the accuracy of the added bits coming from preset 10 turn potentiometers and some careful DC measurements. A full 4 digit DVM (or better) will be required for this operation. Of course, a better solution would be a fast 12 or more bit DAC; these are becoming available, but at a price.

Putting the system together should be fairly simple, using good VHF practice in order to avoid accidental cross talk onto the output lines. Power supplies need good decoupling for the same reason. A clock oscillator at this frequency should not pose problems. The only set up adjustment is the DAC if built up as above; ideally, DDS systems are set up free. Finally a check on a spectrum analyser will show how well it works.

CONCLUSION

IN CONCLUSION, DIRECT frequency synthesis is a promising technique for the future. There are certainly obstacles to overcome before it is generally used without a phase locked loop for filtering and conversion in HF radio applications, but it is already in use in amateur equipment. Eventually, we may see faster, more accurate DACs and new filtering techniques combine to produce a 100dB clean synthesized oscillator, with no set-up procedures at all and with extremely narrow channel spacing at low cost.

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2) Peter Hart 'ICOM IC-725 HF Transceiver' *RadCom* September 1989 pp 56 - 58
3) Peter Martin 'A receiver with noise immunity and Frequency Synthesis', *Radio Communication Handbook* (RSGB), fourth Edition pp 10.104 - 10.108.
(4) Plessey Semiconductors 'Frequency Dividers And Synthesizers IC Handbook', especially pp 304 - 306.
5) Plessey Semiconductors Data Sheet SP8853
6) Plessey Semiconductors Data Sheet SP2002
7) JHJ Dawson 'Direct Digital Frequency Synthesizer' Wireless World December 1981 pp 40 - 43.

CORRECTION

Avoiding Wind Vibration Damage to Aerials by A Bolton, GM3BMI.

In keying in the mathematics for Mr Bolton's article (Sept *RadCom*), the following errors crept into the Appendix:

Page 48, section 2: In 'Fatigue Stress', line 7, replace '1' with 'l'.

Page 48, section 3: In 'Natural frequencies', line 9, the '(4)' is a reference, not part of the equation.

Page 48, col 2, 3 lines from the bottom: After 'rotate', insert 'the upper with both ends pinned but free to rotate'.

Page 48, col 3, section 4, equation (6): Replace '1' with 'l'.

Page 49, col 1, 'c:natural frequency' should, of course have been in larger bold letters and not indented.

We hope that readers did not find that these errors detracted from the usefulness of the article.

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Equipment Review

The Heatherlite Explorer HF Linear Amplifier

by Peter Chadwick, G3RZP

THE FIRST THING TO BE SAID about the Explorer is that the name would be more reasonable if it was Heather-heavy! Weighing in at some 60lbs, it is no lightweight, take-on-a-Dxpedition-as-hand-baggage equipment. It does, however, have an HT transformer rated at 900 VA output continuously.

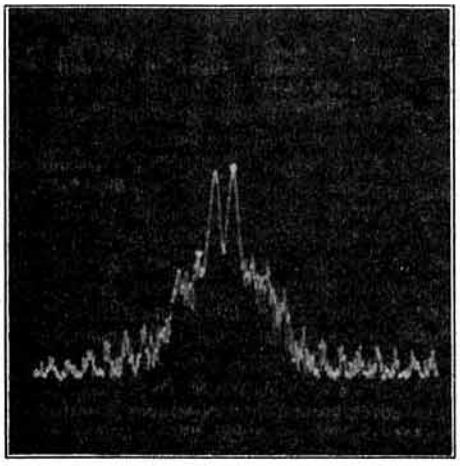
The amplifier covers the bands from 80 to 10 metres, including the WARC bands. It is rated at 1kW output, with about 100W of drive, and the review model was easily driven to full output with this level. The circuit is the well tried grounded grid type, using a pair of 3-500Z valves with a tuned input circuit and a standard pi-circuit output network.

Physically, the unit is in a two part metal case, with slow motion drives to the tuning and loading controls. Additionally, a potentiometer is provided for adjusting the level at which ALC is fed back to the exciter.

RESULTS

AS FAR AS RESULTS WERE concerned, 1kW was obtained on all bands with adequate intermodulation performance. The graph shows the spectrum, and no significant differences were measured on other bands. The noise in the two tone test was the result of problems with the reviewer's two tone source, and not the amplifier. Harmonics were not measurable with any accuracy; they appeared to be of the levels to be expected from a pi network, which is about -45dBPEP for the second harmonic. It is probable that a pi-L output network would offer some advantages in this respect, as well as offering a more controlled Q when working into a high SWR. Having said that, it is a fact that at these power levels, it is advisable to run with a fairly low SWR - say, under 2:1. Although very few EMC problems occur these days from HF transmitter harmonics, the use of a low pass filter is probably advisable.

In short, then, the Explorer did everything claimed for it, and is priced at a competitive level. It is also manufactured in the UK, so that in the event of any difficulties there are no problems of 'authorised dealers' or 'grey imports'.



Some points were a little irritating. The tuning and loading controls were a little smaller than I would have liked, and the transparent plastic pointers attached to the slow motion drives were almost invisible. However, the knobs themselves had large white pointers engraved upon them, which was confusing. This is a matter which Heatherlite has now overcome. This shows, of course, that the difficulty the amateur sometimes has in getting parts is mirrored in the professional field. The demand for control knobs for analogue controls, especially of any size, is rapidly disappearing. The other area which was felt to be lacking was the handbook, but the manufacturers have stated that this was under review, and would be updated.

> "The explorer did everything claimed for it, and is priced at a competitive level"

A competitive import claims to prolong the life of the 3-500 valves by using a step-start filament circuit, to avoid the inrush current. Whether or not or practical gains are attained by this extra complication is difficult to say without a lot of evidence. The easiest and most elegant way of achieving such a result would be to use a filament transformer with a high leakage reactance, and I understand that Heatherlite were looking into this.

SUMMARY

IF YOU ARE GOING TO buy an HF Linear amplifier, rather than build, then look at the Explorer. Bear in mind that the use of any linear may well make any EMC problems worse though, and don't blame the linear for being faulty if that happens! The Heatherlite Explorer is 15½" wide, 9½" high, and 17" deep overall; it costs £1250 inc VAT at the time of writing.

SWL

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

ALTERNATIVE XMAS QUIZ

As the quiz posed by G3XWK was such a success last year, we are running another which is also based on old prefixes. The idea this year is to tell us the month and year in which each of the listed countries disappeared from the DXCC List and which country took its place in the listings. Not particularly difficult, but one to get people rummaging through their reference libraries.

The list comprises 15 countries as follows: AC4, CN2, FF8, FQ8, I5, KR6, KS4, PK4, UN1, V0, VS9H, ZC5, ZC6, and 1M. Thirty points are on offer for the month and year of deletion, and the prefix of the country which took its place. We hope for a good entry and a few of the anecdotes and reminiscences which made last year's quiz so enjoyable to check.

GEOFF WATTS DX PUBLICATIONS

Geoff is BRS3129 and is best known world-wide for his sterling work in editing *DX News Sheet* which is edited today by G4DYO. He has been a member of the Society for 53 years, but in all the time I have been compiling this page, I cannot recall mentioning Geoff, or the DX publications which he has on offer. Any amateur or short wave listener will find any of them of immense use if they are interested in working or hearing DX.

There are four Guides. Firstly, there is the *DXNS CQ and ITU Zones List*. This gives details of all DXCC countries (and Antarctic stations) in each CQ Zone and in each ITU Zone, arranged by prefix, with a list of other and special prefixes used by that country. Secondly, there is the *DXNS USSR Oblast Guide*. This is 15 pages giving details of Oblasts in both numeric and prefix order. It includes seven maps showing all the Oblasts, Russian awards, R-150-S Countries List, Victory 40 station, deleted Oblasts and future Russian prefix blocks. There are also 250 USSR QSL bureaux addresses.

Thirdly, there is the well known *DXNS DXCC Countries Guide*. This really is a must. It has DXCC Countries listed alphabetically, present and past prefixes, detailed list of deleted countries. Details of IOTA reference numbers are also provided and there is a 6-band DXCC/IOTA check list. Lastly, there is the *DXNS Radio Amateur Prefix-Country-Zone List*. As the title suggests, this lists everything for each country arranged by prefix. Details include the normal prefix, special prefixes, ITU callsign block, DXCC status, CQ Zone and ITU Zone. The cost of all these publications is most reasonable. Each Guide detailed above cost £1.25 for a double-sided version or £1.50 for a single-sided version. They can be obtained by sending a large SASE to Geoff Watts, 62 Belmore Road, Norwich, NR2 0PU.

On a personal point, Geoff wrote about my wish to find out if anyone could better David Whitaker's, BRS25429, DXCC Country Score. David had 347. Geoff has heard 373 and has them all confirmed. He has missed out on French Indo-China (FI8) and Damao and Diu (CR8), otherwise he would have all the DXCC all time countries.

EUROPEAN 1992 COMMUNITY AWARD

Jan, ON6JG had forwarded details of this new Award, which is available to SWLs. It can be obtained from 1 January 1991. You will need to log 144 stations to claim the Award. It is available either for CW, SSB or Mixed. There are two ways to achieve the Award. You can either try to do it outside of the UBA Contests, in which case you have to log 144 different stations from the 12 Member Countries. At least six different stations must be logged from each of the 12 countries and, at most, 20 stations per country to complete the required 144.

During the UBA Contests (held in January and February) you still have to log 144 different stations, but at least two different stations must be logged from the 12 and, at most, 24 stations per country to achieve the required 144. If you try to do it this way, the application is free and it must accompany your contest log. If you hear OR5EEC, the Club Station of the European Community, it may be used to replace a maximum of 3 missing contacts.

The full rules can be obtained from ON5KL, PO Box 400, Oostende 1, Belgium. Usual Award rules apply and the cost - outside the UBA Contest - is 7 IRC's.

PHOTOGRAPH: BRS25429

Jim, VK9NS, with his son, G3HSR, at the HF Convention in September.

GX PREFIX

Colin Roberts RS93262 wrote to report on using the GX prefix to pass greetings. He could not beat Doug Waterfield's 3 June transmission, but on 8 June he used GX3TRF (the Maidstone ARS club station) to pass a message to W4GXT in Raleigh, North Carolina on 21MHz. The W4 was most interested in the GX prefix and he recorded the transmission and played it back to Colin. It was good to hear of the exploits of a listener who does not usually write to me. He has been an SWL for 8 months and is studying for the RAE and the Morse Test. He had recently been elected to carry out the QSL Manager duties for the Maidstone club.

Time	Call Sign	RS(T)/Serial Number Sent	Stn Wkd	Multplr	Pts
1234	DF1YQ	59002	G3VZT	DL	1
1234	LA9CQ	55010	G3VLX	LA	1
1235	PA3ELU	59012	G41UF	PA	1
1235	SM0DJZ	59002	GW4UZL	SM	1
1237	ON6JG	59032	G4TGK	ON	1
			Total	5	5
				5 x 5 =	25

Table 1

UNDERSTANDING CONTEST SCORING

Readers will recall that I asked for reasons why SWLs seem to be so shy of entering contests. I am still waiting for your letters but, in the meantime, Ron Smith, RS90926, has sent me a copy of his entry for the Cray Valley contest which occurred in September. This was his first contest, and he explained that he fails to understand the methods of scoring and this is why he does not enter.

This will be passed on to the two contest committees, but it may be helpful if I spend some time to try to explain. Each contest has its own scoring system, and I'm sure the organisers consider the rules on scoring are explained as simply as possible. I do not have the space here to explain the scoring system of all the contests in the calendar. Most of the HF Contests nowadays use the points x multipliers concept. This means that to compute your final score you will need to arrive at two figures - a points total and a multiplier total. Let us take the scoring system for the Society's Listener Contest as an example. One point is claimed for each station heard and another point may be claimed for each different country heard on each band. This means that you can log a 'G' on all five bands and claim 5 points. The final score is arrived at by adding up how many stations have been logged; say, 75 at 1 point each, and multiplying that figure by the total number of different countries heard; say 25 at 1 point each. The final score is therefore 75 x 25 = 1875. An actual contest log is shown in **Table 1** to illustrate what I mean.

Ron had several other queries. It is not necessary to verify the callsign of the station heard by using a Call Book, but listeners are expected to make every effort to log the correct callsign of the station heard. In contests taking place at the same time as a transmitting contest, listeners must log the RS(T) given by the station heard plus a serial number. If this information is not logged the station may not be claimed for points. Finally, it is not permissible to use computer aided decoding of Morse, rtty and sstv signals in contests.

ADRESSES

REG AKEHURST, BRS25209, has both the International and North American listings of the 1990 callbook. He has volunteered to provided addresses to anyone who needs them on receipt of an SASE or an IRC. His address is 75 Rochester Street, Chatham, Kent, ME4 6RU.

FINALE

News and views for inclusion in the **February** issue should be received here by Monday **10 December**.

DataComms

NEIL LASHER G6HIU
40 Farm Road, Edgware, Middlesex HA8 9LT
Telephone: 0836-379275

Well, Christmas is with us again; each year seems to get shorter, maybe I am getting older.

This is the time of year when we must all spare a thought for the amateur who has just joined the world of datacomms. Many stockings bring new gadgets including TNCs and computers. I am still waiting to meet the lady who wears the stockings that can hold an IBM 386 tower system.

For the seasoned user, remember we all started once upon a time. We all tried to send a command to the TNC whilst in converse mode and most people have at some time or other transmitted with the callsign 'NOCALL'.

For the new user to packet, or any other data mode around the festive season, welcome. Be patient, and if it does not work at the first attempt read the book again and again. If all else fails, do not be afraid to ask. Most problems are relatively simple but can be narrowed down to two main ones. They are: either the computer is not talking to the interface or the interface is not talking to the radio. If you can ascertain which it is you will save many hours of both reading and typing.

I have included a list of all mailboxes that are operational, with their system operators' (SysOps') callsigns and names so that you can find your local mailbox. If you need help with the mailbox you will find your local SysOp very willing.

To send the SysOp a message, type the following: *sp sysop*. You will be prompted with a message for a subject and then for your message which should end with either a Control Z or /EX on a separate line.

RSGB MAILBOX LIST

The following is a list of those mailboxes licensed under the Notice of Variation system. It shows the frequencies (bands) on which permission to operate has been granted, but does not guarantee that the station is operational on that frequency. Where a band is listed in brackets, a port has been licensed by the Radiocommunications Agency under the Site and Frequency Clearance system. Further information about these ports will appear in a future *RadCom*. Any queries about this list should go to the *Datacomms* column author, Neil Lasher, G6HIU, not to RSGB HQ.

MAILBOX	SYSOP	LOCATION	COUNTY	FREQUENCIES			
GB7ABC	GW3TMH	Kinmal Bay	Clwyd	50.650 1.3GHz	144.650	432.675	70.4875
GB7AEU	G4AEU	Southampton	Hants	50.650	144.650		
GB7AKE	G6AKE	Shrewsbury	Salop	50.650	144.650		
GB7AKJ	G3AKJ	Ilfracombe	Devon	50.650	144.650	1.3GHz	
GB7AOB	GM8AOB	Fort William	Inverness	50.650	144.650		
GB7AVM	G0DFP	Chinnor	Oxford	50.650	144.650	1.3GHz	(432MHZ)
GB7AWA	GM4AWA	Scone	Perth	50.650	144.650	(432MHZ)	
GB7BAD	G1EUP	Bulwell	Notts	70.4875	144.650	432.675	
GB7BBS	G1DIL	Highley	Salop	50.650	144.650	1.3GHz	(432MHZ)
GB7BEN	G6WZD	Bletchley	Bucks	50.650	144.650	70.4875	
GB7BEQ	G0BEQ	Swindon	Wilts	50.650	144.650	1.3GHz	
GB7BIL	G6LOH	Whittlebury	Beds	50.650	144.650	70.4875	432.675
GB7BIR	G7BGP	Sutton C'field	W.Midlands	50.650	144.650	1.3GHz	
GB7BLY	G8UVE	Burnley	Lancs	50.650	144.650	1.3GHz	
GB7BMX	G1YAA	Bilton	Northumbs	144.650	432.675	1.3GHz	50.650
GB7BNI	GI4XFN	Glencairn	Belfast	50.650	144.650	(14MHz)	(3.5MHz)
GB7BNM	G4WPT	Verwood	Dorset	50.650	144.650	1.3GHz	
GB7BPL	G4YVQ	Blackpool	Lancs	50.650	144.650	1.3GHz	
GB7BRK	G1AWD	Mortimer	Berks	50.650	144.650		
GB7BST	G0BST	Northwood	Middx	50.650	144.650	432.675	1.3GHz
GB7CDM	G4BVE	Northwich	Cheshire	50.650	144.650	1.3GHz	(432MHZ)
GB7CFB	G0CFB	Huntingfield	Suffolk	50.650	144.650	1.3GHz	
GB7CHS	G3WCS	Antrobus	Cheshire	50.650	144.650	1.3GHz	(432MHZ)
GB7CPG	G4KAW	Mount Ambrose	Cornwall	50.650	144.650	1.3GHz	
GB7CQV	GM0CQV	Cove	Aberdeen	50.650	144.650		
GB7CRG	G4WSD	Mobberley	Cheshire	144.650	432.675	1.3GHz	
GB7CYM	G1FTA	Copmanthorpe	Yorks	50.650	144.650	1.3GHz	
GB7DAD	G3MME	Matlock	Derbys	50.650 (432MHZ)	144.650	1.3GHz	(70MHz)
GB7DDX	G0DDX	Histon	Cambs	70.4875	144.650	1.3GHz	432.675
GB7DGK	G4DGK	West Drayton	Middx	144.650	1.3GHz	432.675	70.4875
GB7DNS	G7DNS	Clacton on Sea	Essex	50.650	144.650	70.4875	432.675
GB7DOI	GW1DOI	Treherbert	Mid Glam	50.650	144.650	1.3GHz	
GB7DQW	G0DQW	Sundorne Mead	Salop	50.650	1.3GHz	(432MHZ)	
GB7DXC	G4PDQ	Cheltenham	Gloucs	70.325	Note 3		
GB7DXI	G4LJF	Wokingham	Berks	70.325	Note 3		
GB7EDN	GM4GZW	Edinburgh	Central	144.650	50.650	(432MHZ)	
GB7ESX	G1NNB	Witham	Essex	144.650	70.4875	432.675	50.650
GB7EYM	G4HRM	E Ayrton	N Yorks	50.650	144.650	1.3GHz	
GB7FCI	G6FCI	Blackpool	Lancs	50.650	144.650	432.675	1.3GHz
GB7FLG	G0FLG	Whitwick	Leics	50.650	1.3GHz		
GB7FRI	GM0FRI	Oban	Argyll	50.650	144.650		
GB7FYS	G1FYS	Huddersfield	W Yorks	50.650	1.3GHz	144.650	432.675
GB7GBY	G4DXB	Grimsby	S Humbs	50.650	144.650	1.3GHz	
GB7GHU	G4GHU	Perivale	Middx	50.650	144.650	432.675	
GB7GLP	G6GLP	Newton Abbot	Devon	50.650	144.650	1.3GHz	
GB7GMX	G3VOM	Swinton	Gtr Manch	50.650	144.650		
GB7GRN	G4MQM	Harlaxton	Lincs	50.650	144.650	1.3GHz	
GB7GUN	G4GUN	Taunton	Somerset	50.650	144.650	1.3GHz	
GB7GUR	GU4YMV	Vale	Guernsey	50.650	144.650	(432MHZ)	(14MHz)

MAILBOX	SYSOP	LOCATION	COUNTY	FREQUENCIES			
				(70MHz)	(3.5MHz)		
GB7HAS	G6WKL	St Leonards	E Sussex	144.650	50.650	432.675	70.4875
GB7HEZ	GW8HEZ	Penarth	S Glam	50.560	144.650	1.3GHz	
GB7HHH	G3OUF	Hemel Hempst'd	Herts	50.650	144.650	1.3GHz	432.675
GB7HIU	G6HIU	Edgware	Middx	50.650	144.650	1.3GHz	432.675
GB7HJP	G6HJP	Milton	Hants	50.650	144.650	1.3GHz	
GB7HMI	GI3TLT	Kircubbin	N.Ireland	50.650	144.650	432.675	
GB7HQQ	GB2RS	Potters Bar	Herts	50.650	144.650	432.675	70.4875
				1.3GHz			
GB7HSN	G1HSN	Mottingham	London	144.650	432.675	70.4875	50.670
GB7HXA	G4UXV	Oxmoor	Cambs	50.650	144.650		
GB7ILO	G3ILO	Forest Green	Gloucs	50.650	144.650	1.3GHz	
GB7IMB	G8IMB	Bristol	Avon	50.650	144.650	(70MHz)	(432MHZ)
GB7IOT	GI0IOT	Kilfennan	Lond'derry	50.650	144.650		
GB7JED	GM4UPX	Jedburgh	Roxburgh	50	144	70.4875	432.675
				1.3GHz			
GB7JSC	GM1VBE	Bothwell	Lanarks	50.650	144.650	(432MHZ)	
GB7KCM	G4KCM	Southampton	Hants	50.650	144.650		
GB7KEV	G3KEV	Scarborough	N Yorks	50.650	144.650	1.3GHz	
GB7KHW	G6KHW	Dunton	Bedford	50.650	144.650		
GB7KJL	GOJNH	Edgeley Pk	Cheshire	50.650	144.650	1.3GHz	
GB7LDI	G3LDI	Norwich	Norfolk	50.650	144.650	(21MHz)	(3.5MHz)
				(14MHz)			
GB7LDS	G3WNR	Leeds	W Yorks	50.650	144.650	1.3GHz	432.675
GB7LED	G4XMH	Long Eaton	Notts	50.650	144.650	1.3GHz	(70MHz)
GB7LIV	G3ZFJ	Liverpool	Merseyside	144.650	70.4875	432.675	
GB7LNX	G4GOU	Horsington	Lincoln	50.650	144.650		
GB7LRG	G0CND	Stoney Stanton	Leics	50.650	144.650	1.3GHz	
GB7LRS	G6NGV	Willow Park	Leics	50.650	144.650	1.3GHz	
GB7MAC	GM4AUP	Glenmavis	Lanarks	50.650	144.650	(29MHz)	(3.5MHz)
				(432MHZ)			
GB7MAX	G1DKI	Perton	Staffs	50.650	144.650	432.675	1.3GHz
GB7MUM	G6HOQ	Brinsley	Notts	50.650	144.650	1.3GHz	
GB7MXM	G0JVU	Ipswich	Suffolk	144.650	432.675		
GB7NCL	G1RUY	Newcastle	Tyne/Wear	144.650	432.675	70.325	
GB7NEM	G8EIA	Linthorpe	Cleveland	50.650	144.650		
GB7NEW	G4XBA	Thatcham	Berks	50.650	144.650	1.3GHz	
GB7NNA	G1NNA	Witham	Essex	50.650	144.650	1.3GHz	70.4875
				432.675			
GB7NOS	GM0HBI	Golspie	Sutherland	50.650	144.650	1.3GHz	
GB7NRC	G4NRC	Melton Mowbray	Leics	50.650	144.650		
GB7NUN	G1KBB	Camp Hill	Warwicks	50.650	144.650		
GB7NWP	G1ULA	Swinton	Manchester	70.4875	144.650	432.675	
GB7OAR	G4OAR	Oxton	Merseyside	144.650	432.675	70.4875	1.3GHz
GB7OXF	G6MKK	Headington	Oxford	50.650	144.650	1.3GHz	
GB7PEN	G6BSK	Penrith	Cumbria	50.650	144.650	70.4875	432.675
				1.3GHz			
GB7PET	G4PYR	Peterborough	Northants	50.670	144.650	1.3GHz	
GB7PLX	G3PLX	Gosport	Hants	50.650	144.650	1.3GHz	(28MHz)
				(21MHz)	(14MHz)	(10.1MHz)	(7MHz)
				(3.5MHz)	Note 1		
GB7PLY	G7AUQ	Eggbuckland	Devon	144.650			
GB7PMB	G3UQH	Minsterley	Salop	50.650	144.650	1.3GHz	
GB7RMN	G4RMN	Norwich	Norfolk	50.650	144.650	1.3GHz	
GB7SAM	G3TJP	Clayton	Staffs	50.650	144.650	1.3GHz	70.4875
				(432MHZ)			
GB7SAN	GM3SAN	Glasgow	Central	50.650	144.650	(432MHZ)	
GB7SCA	G4SCA	Plympton	Devon	50.650	144.650	1.3GHz	
GB7SDN	G8VRI	Covingham	Wilts	50.650	144.650	1.3GHz	432.675
GB7SEK	G4IDX	Ashford	Kent	50.650	144.650		
GB7SIG	G3VXX	Blandford	Dorset	50.650	144.650	1.3GHz	
GB7SMT	G6ELD	Sale	Cheshire	50.650	1.3GHz	70.4875	432.675
GB7SNE	GM8SNE	Dalgety Bay	Fife	50.650	144.650		
GB7SPV	G4SPV	Stevenage	Herts	50.650	144.650	1.3GHz	(432MHZ)
GB7SRC	G3ZPB	Coulsdon	Surrey	50.670	1.3GHz		
GB7SSB	G0HWO	Reigate	Surrey	50.650	144.650	1.3GHz	
GB7SUF	GM4SUF	Edderton	Ross-shire	50.650	144.650	1.3GHz	
GB7SUT	G8AMD	Sutton C'field	W. Midlands	50.650	144.650	1.3GHz	
GB7TCM	G8ADH	Ryall	Worcs	50.650	144.650		
GB7TED	G14AHP	Belfast	N.Ireland	50.650	144.650	432.675	
GB7TLH	G1TLH	East Dereham	Norfolk	50.650	144.650	1.3GHz	432.675
				70.4875			
GB7TVM	G1HZI	Sandhoe	Northumbs	50.650	144.650		
GB7TXA	G4TXA	Hook	Hants	50.650	144.650		
GB7ULV	G4BDE	Croftlands	Cumbria	50.650	144.650	1.3GHz	432.675
				70.4875			
GB7UWS	G1UWS	Eltham	London	144.650	432.675	70.4875	
GB7VLS	G4VLS	Norwich	Norfolk	50.650	144.650		
GB7VMR	G3VMR	Maidenhead	Berks	50.67	144.650	432.675	
GB7VRB	G8VEH	Lancing	W Sussex	50.650	144.650	1.3GHz	
GB7WAM	G3SPX	East Ardsley	W Yorks	50.650	144.650	1.3GHz	
GB7WDX	G3HTA	Crediton	Devon	70.325	144.650	Note 3	
GB7WIR	G1LMI	Langley	Berks	50.650	144.650		
GB7WNM	G4RKN	Kings Lynn	Norfolk	144.650	50.650	432.675	70.4875
GB7WQM	GW1WQM	Burton	Dyfed	50.650	144.650	1.3GHz	
GB7WRG	G0COA	Flockton	W Yorks	50.650	1.3GHz	144.650	432.675
				70.4875			
GB7WRI	GI4WRI	Randalstown	Antrim	50.650	144.650		
GB7XJZ	G6XJZ	Chandlers Ford	Hants	50.650	144.650	(432MHZ)	
GB7YAX	G0EOJ	Almondbury	Yorks	50.650	1.3GHz		
GB7ZAA	G6ZAA	Canterbury	Kent	50.650	144.650		
GB7ZBA	G4ZBA	Old Catton	Norfolk	50.650	144.650		
GB7ZPU	G1ZPU	Sutton	Beds	50.670	144.650	1.3GHz	
GB7ZZZ	G1TDM	Burgess Hill	W Sussex	50.650	144.650	70.4875	432.675
				1.3GHz			

NOTES.
1) GB7PLX is an AMTOR HF mailbox connected to the UK packet network
2) '1.3GHz' refers to a forwarding port only. No user access is currently available on this band.
3) DX Packet Cluster.

EMC

HILARY CLAYTONSMITH, G4JKS
115 Marshalswick Lane, St Albans, Herts. AL1 4UU

ERO - EMC '90

It was heartening to see, whilst visiting this exhibition at the Barbican in October, just how the test houses had expanded to provide the full range of facilities which will be necessary and available to the electronics industry in the run up to 1992. Alongside the large well-established test houses such as Era Technology and Siemens Plessey Assessment Services, it was good to see others such as RN Electronics (probably better known to us for their pre-amplifiers and transverters) branching out to provide industry with susceptibility testing with fields of up to 30V/m in the range 20MHz to 1GHz, as well as conducted emission and initial radiated emission testing.

Having spoken to a large number of the exhibitors, the same message came over repeatedly: when is the electronics industry going to wake up and realise that midnight 31 December 1991 is not exactly centuries away? I envisage that when reality dawns there will be such a rush for the facilities offered by those providing the testing services that they will be faced with overload.

One product which will prove to be of great help to designers of electronic equipment, other than radio equipment, in the next year or two is a Distance Learning Package produced by Hatfield Polytechnic entitled 'Electromagnetic Compatibility'. The package aims to "provide companies with a more thorough understanding of the fundamental principles involved and their practical implications for compliance with the mandatory elements within the Directive". The course which comprises eight video cassettes, each with associated text, has for the most part been designed, and is presented by, two radio amateurs.

ACHIEVING COMPLIANCE WITH THE EMC DIRECTIVE

Third party testing (the use of test house facilities) is not the only route to compliance. In-house testing and the construction of a technical file are other options.

Manufacturers can self-certify their products providing they have been tested using facilities which conform to the requirements of the specifications.

The construction of a technical file is the responsibility of the manufacturer or importer. A document is drawn up on the product in question which contains a theoretical study and the test results achieved by the product. The results should show that the product meets the objectives of the Directive. The file is then sent to an approval organisation known as a 'competent body' who will, if satisfied, issue an EC Type Examination Certificate. At the end of the day, we will be able to tell if a particular product is compliant by looking for the *CE* mark affixed to the product. If products do not comply with the directive they will not be allowed to be marketed in Europe.

PLACED ON THE MARKET

Although the expression 'placed on the market' is not defined in the EMC Directive, it will probably be interpreted as meaning the first time a particular piece of equipment is supplied or offered for supply. Equipment which has been tested, and which meets the required standards when supplied by the manufacturers, will not have to be tested again by the retailer when re-sold further down the distribution chain. Nor will it have to be tested if sold second-hand.

Apparatus which enters the distribution chain before legislation comes into force will not have to comply with the legislation, even if re-sold after the implementation date. This is dependent on no significant alterations having been made to the system. If, however, there have been significant alterations, it is proposed that the legislation will provide for enforcement action against systems which are significantly altered after the implementation date, irrespective of when the original system first entered service. What constitutes significant alteration, however, is rather vague. Repair and maintenance will not constitute significant alteration but any alterations which alter the system's EMC characteristics are likely to.

EMC DIRECTIVE UPDATE

In October 1989 the DTI issued a consultative document which sought views on how the Directive should be implemented in the UK. The RSGB submitted a paper to the DTI outlining the Society's views on the specific areas which related to amateur radio (*RadCom* April 90).

In August this year a meeting was held at the Radiocommunications Agency to discuss this paper. Since the RSGB's submission in February, further meetings have taken place at the European Commission in Brussels and it was agreed that the Commission will publish an explanatory document to clear up which goods are covered by the EMC Directive. It is still too early to give definitive answers to many of the questions related to the Amateur Radio Service but further clarification will be given as the draft Wireless Telegraphy Acts are developed and circulated for discussion. The final WT Acts must, however, be implemented by July 1991.

Some 15,000 copies of the consultative document were sent out to industry; several hundred were returned. Although it was generally agreed that there was a need for an EMC Directive to improve the EMC environment, there was some concern expressed over certain areas, ie the scope of the Directive. There was also concern that standards would not be available soon enough for manufacturers to ensure compliance. Industry was worried that there would not be enough test facilities in the UK.

A meeting of officials from member states was held to discuss concerns and progress being made in implementing the Directive. The Commission agreed to consider seriously the possibility of introducing a further Directive to amend the transitional provisions in the present text. This is in order to phase in the implementation, and to provide more opportunity to adapt existing products and new designs to the EMC requirements.

Q R P

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QRP CLASSICS

QRP CLASSICS (the best QRP Projects from *QST* and the *ARRL Handbook*) is a newly published book from the American Radio Relay League (ARRL) edited by Bob Schetgen, KU7G. The book is a collection of projects previously published by the ARRL over the last couple 15 years. It covers the building of transmitters, receivers, transceivers and accessories. There are chapters on portable antennas, power supplies and a large chapter on design hints.

I managed to obtain a copy of *QRP CLASSICS* shortly after its publication in the USA. My first impression was that it was like meeting a group of old friends. There are articles by Doug DeMaw, W1FB, Wes Hayward, W7ZOI, Zack Lau, KH6CP, Ed Wetherhold, W3NQN, Roy Lewallen, W7EL, Ade Weiss, W0RSP, and a host of other contributors even including a short item by Ha-Jo Brandt, DJ1ZB. These people are the household names of QRP technical writing. It is not surprising that the majority of the articles are by Doug DeMaw, W1FB, who has built a fine reputation for simple and lucid articles for the radio constructor in the pages of QST. *[W1FB is also a frequent source of Technical Topics items - Ed]*

Many of the articles are old friends too, having been previously published by the ARRL, although I did find a fair number of them were new to me. It is very useful to find under one cover many articles which are around the shack somewhere in copies of *QST*, the *ARRL Handbook* and issues of *Hints and Kinks*. Not only will it save time in searching through my dubious cataloguing system ("what system?" my wife would say) but they are carefully arranged and indexed within the pages of *QRP CLASSICS*.

The book begins with a couple of introductory articles on the 'lore' of QRP operation and some hints on construction practice. The receiver section includes old favourites fully documented and ready to build with several articles on receiver design application. The receivers include the Neophyte, the Band Imagining Receiver for 10 and 18MHz and W1FB's fine 'build as you go' series on 'His Eminence - The Receiver'. I especially enjoyed a W1FB article on a very simple SSB Superhet for 3.5MHz which I had not seen before. The transmitter section has a fine balance from the simplest crystal and VXO controlled transmitter boards to four concluding articles on VFO design.

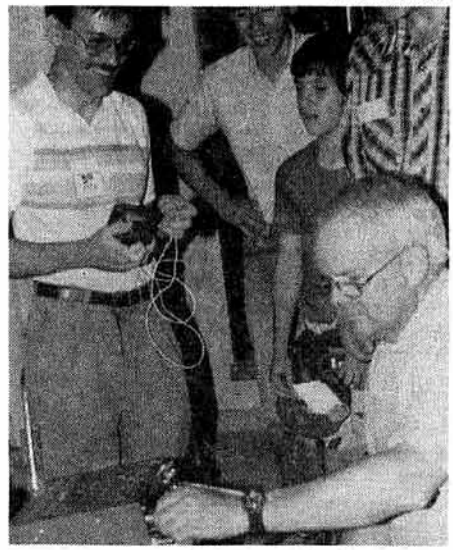
The transceiver section is perhaps a little disappointing since it contains fewer complete designs which include the sound, but now rather dated, MAVTI-40 Transceiver. It also includes a rather dated, but buildable, transceiver for 50MHz. I was impressed by a new, to me, article by W7ZOI, on a carefully designed QRP SSB/CW transceiver for 14MHz. The chapter does contain some good modification details for popular QRP transceivers like the Heath HW8 and HW9 and the Ten Tec Argonaut and Argosy. The Antenna section is, in some ways, rather odd in the choice of articles. It does seem to be based upon assumption that QRP operators require portable or restricted space antennas. Even assuming that to be the basis of the choice, I believe I have seen other, more appropriate, articles published by the ARRL. A better source of antenna ideas for the wire antenna fan or beginner can be found in the *W1FB Antenna Notebook* also published by the ARRL. *[available from RSGB Sales at £6.79 to members - see pages 78/79 - Ed]*

The chapter on accessories is a well compiled section with some of the real classics from *QST*. The definitive writing of Ed Wetherhold, W3NQN, on passive audio filters can be found alongside the original articles on the Super SCAF switched capacitor filters. There are good examples of the commonest accessories like SWR Meters, Power Meters, ATUs and other metering aids. Rather displaced in this section is the very useful article by W7ZOI on the design of crystal filters. The chapter on power supplies is exactly that - although it does contain a couple of items on alternative energy sources.

The final chapter on Design Hints has some very useful articles on transmitter power amplifier design, broadband and narrow-band amplifiers, a delightfully simple section on electronic switching of circuits and a few other small design tips. I enjoyed the W1FB article on electronic switching: another one I had not seen before I obtained this book.

QRP CLASSICS is entirely what the title suggests: some of the best writing on building QRP equipment to have appeared in recent years. I have been dipping into my copy since it arrived and I am sure that I will turn to it many times for its wealth of ideas and circuits. The writing is clear and simple enough to be of use to the beginner and the more seasoned constructor alike. I believe that it will become a QRP classic. The book will be more than useful to any amateur radio constructor, interested in QRP or not. I hope, like other ARRL publications, it soon becomes a standard book in the RSGB Mail Order list.

PHOTOGRAPH: G3RJV



The station at the QRP Hospitality Suite at the Dayton Hamvention 1990. To the left (standing) is 'Randy' Rand, AA2U, who currently heads the G QRP Club Countries Worked score.

JOIN IN THE QRP ACTIVITY

IN THE DECEMBER issue of *Radio Communication*, I usually include a mention of the G QRP Club Winter Sports and this year is no exception. This annual event probably attracts more QRP stations on to the bands that any other low power activity event. It is just that: an activity event. The Winter Sports are designed to be non-competitive and friendly. It is a simple idea. During the period from Boxing Day (December 26) to New Years Day (January 1) inclusive, QRP stations attempt to work as many other QRP stations can be found.

It is a CW event and stations running 5 watts RF output (or 10W DC input) or less, are encouraged to call 'CQ QRP' on the International QRP Frequencies of 3560, 7030, 10106, 14060, 21060kHz. There is no contest style exchange although stations usually exchange their power levels and other information about their station and, if members of the G QRP Club, their club number. There are no fixed times and frequencies but it is common for stations to use the highest frequency band open for reliable communication at the time of operating.

There are a couple of exceptions to this simple principle. This year 3560kHz is being left open for trans-continental two way QRP contacts between 0600 and 0800GMT, use 3570 for local working. Those wishing a competitive edge may apply for the G4DQP Trophy. This trophy is awarded to the station thought to have made the best overall contribution to the event. Angus Taylor, G8PG, welcomes any logs of the event. Please send them to him (Mr. A D Taylor, G8PG, 37 Pickerill Road, Greasby, Merseyside, L49 3ND) with station and antenna details before the end of January 1991. This annual event does really bring out QRP operators world-wide. The results each year are an amazing affirmation of the principle of power management of the HF bands. It is also a fine chance for those who have not tried low power operation to turn down the power to 5 watts or less and see what can be done.

Another winter QRP activity event is the OK/G QRP WEEKEND to be held on 9 and 10 February 1991. This is a joint venture by the G QRP Club. The idea for UK operators is to work as many Czech QRP stations as possible. This event has recommended frequencies and times.

3560	0400-0700 and 2000-2400GMT
7030	0500-0700 and 1700-1900GMT
10106	0600-1000 and 1400-1800GMT
14060	0800-1700GMT
21060	1100-1300GMT

Use the best band open at the time with 1100-1300GMT advised for 18 and 24MHz skeds. Logs may be sent to G8PG: Address as above.

DID YOU KNOW THAT

THE ARRL WILL endorse a DXCC Award for QRP with a confirmed claim using powers under 5W.

Currently the G QRP Club Countries Table is headed by 'Randy' Rand, AA2U, with 225 countries on CW and 226 countries on SSB, all worked with under 5W RF. The W8UR 500mW Beacon on 21285KHz can provide a good indication of the prevailing conditions on 15 metres.

Satellites

ARTHUR GEE G2UK
21 Romany Road, Oulton Broad, Suffolk
NR32 3PJ

AMATEUR OR PROFESSIONAL

THE 'ROBOT OLYMPIA' recently held in Glasgow, was particularly interesting because, according to one of the media reports on it, the exhibits were almost half by professionals and half by amateurs. It appears that the amateurs, both individuals and groups, devote their spare time and cash to developing robots and some of their exhibits apparently came up to, or even exceeded, the sophistication and craftsmanship of exhibits from professional technical establishments.

The development of amateur radio satellites has almost exactly paralleled this. Thirty years or so ago, when the concept of an amateur radio satellite was progressing from vague ideas to the actual construction of a workable project, it was very much an 'amateur' endeavour. Readers who have read *25 Years of Amateur Radio Satellites* (published by AMSAT-UK and available from RSGB Sales at £4.10 to members) will agree that this was indeed the case. As time went on, the purely amateur effort started to become more professional, particularly when technical colleges and schools began to get interested. The classical example in this country, of course, is the Spacecraft Department of the University of Surrey. Under the enthusiasm and guidance of RSGB member Dr Martin Sweeting, G3YJO, time has seen the establishment of a satellite orientated department which not only builds satellites but carries out research and development projects in the forefront of space communication science. It is good to see that Martin's professionalism has been recognised by his being recently granted Professorial status.

PROBLEMS

WHILST IT IS GOOD to see one's interest progress from the primitiveness of early amateur efforts to sophisticated technical professionalism, such progress does raise its problems. Amateur radio activity is rigidly prescribed by official regulations, one closely guarded requirement being that only amateur radio activities be carried out within its frequency allocations.

Some of the more professional activities on the amateur satellite service bands are of doubtful amateur interest, for instance, the Pakistani BADR-1 satellite launched in July last. There are those, too, who consider that when DOVE starts its proposed voice transmissions, these will not be of truly amateur content, though in fairness we should wait until it does 'speak' before making judgement. One thing we must not forget in the face of the more sophisticated satellite activities, such as store-and-forward systems and packet radio, is that whilst these are very worthy activities and most useful in developing new techniques for amateur radio, they must not take precedence over more simple types of amateur satellite activity which will appeal to those wanting to get into amateur satellites for the first time. In this respect, it is very disappointing that the transponder which was proposed for the forthcoming UoSAT satellite has had to be abandoned as it did not apparently fit in to the more sophisticated plans for that spacecraft.

ROCKETS

IT IS OF INTEREST to recall that the early history of space rocketry ran along similar lines to that of the amateur radio satellite scene. Right back to the days when the name of William Congreve was known all over Europe for his 'War Rocket' project in the eighteenth century, it was a group of young men at Trinity College, Cambridge, who joined together to further William's ideas. It was said of Congreve that "he took to inventing rockets for the more effective destruction of mankind". Shades of 'things to come'!

The only rockets in use in those days were for celebration occasions. Those who manufactured them were classed as 'toymakers'. Congreve decided to make a serious study of the possibilities of these for use as weapons and he bought from them the largest sky-rocket he could whilst paying for them out of his own pocket - a classical requirement of amateur status! Congreve was followed by Konstantin Ziolkovsky, who wrote the first really scientific literature on rockets and their possible use for space travel. He was an obscure Russian schoolmaster and his writings appeared in a Russian magazine called *Science Survey* in 1903. He introduced the idea of reaction motors for space travel vehicles and he realised that a spacecraft would need some means of re-using the air it contained when it left the earth and he suggested green plants might be used to absorb the carbon dioxide produced and release oxygen. In 1911 he wrote a series of articles on space travel in the Russian magazine *Aviation Reports*. The Russians have a fair claim that they were the first seriously to consider space travel.

However, about the same time, an American, Dr Robert Goddard, was studying the idea of space travel, whilst Ziolkovsky's work was gaining public recognition. At this time too, a group of Russian students formed a Space Travel Society. It did not last long, but in 1929 two other groups were formed; one in Leningrad and the other in Moscow. In 1932, Ziolkovsky celebrated his 75th birthday which was marked by public acclaim. By the time he died in 1935, rocketry was well on the way to becoming a respected professional science.

In America, Dr Goddard had pushed forward with his theories and in 1919 he produced a paper in which he said that theoretically it should be possible to build a rocket powerful enough to go up to the moon. He became a physics teacher at Clark University, USA, but he continued his interest in rocketry, spending much of his small salary on his experiments. Unlike Ziolkovsky, who work was mostly theoretical, Goddard carried his space travel interests into the laboratory and undertook practical work towards his aims.

In 1914 he patented a design for a nozzle and combustion chamber in which a smokeless powder burned with an exhaust velocity exceeding six thousand feet per second in static bench tests in his laboratory. It was he, too, who developed the idea of step-rockets, each one adding to the velocity of the others, as still used today.

ROCKET SOCIETIES

DURING WORLD WAR 1, Goddard's work was officially recognised, and in 1918 he moved to a workshop at the Mount Wilson Observatory at Pasadena, California. He was later to experience much criticism from 'professionals' who thought his ideas too 'impractical', but he overrode this with his usual tenacity. In 1921 he wrote an article for the *Scientific American* in which he answered much of the criticism, and this seemed to stimulate public interest in his work. So much so that active Rocket Societies began to appear.

A book written by an unknown German student named Herman Oberth, stimulated the formation of these societies. Herman Oberth eventually became one of Germany's greatest rocket pioneers. This first book of his probably stimulated interest in space travel and rockets more than any other of his activities. He was intended by his parents to become a doctor and he did start a medical course at the University of Munich, but he gave it up and took a course in astronomy and mathematics. World War 1 interrupted this as he was called up for military service, following which he became a school teacher. During his spare time, he continued his researches into space travel. In the spring of 1922, he read one of Dr. Goddard's papers entitled 'A Method of Reaching Extreme Altitudes'. After many difficulties, his work was accepted, early rejection by the professionals being the greatest obstacle he had to fight. He was instrumental in starting a society called the Verein Für Raumschiffahrt - Society for Space Travel, widely known in Germany as the VIR. Its objects were to hold meetings where members could discuss their ideas; to publish a regular magazine and to help those interested in space travel with "their groping efforts in this new field". This was the world's first active organisation of space travel enthusiasts. Their productiveness and success was such as to attract the attention of the Nazi party which was gaining strength daily and only those organisations who allied themselves with it were able to survive the years leading to World War II.

Space [*no pun intended*] prevents me from continuing this story with accounts of how the American Rocket Society and the British Interplanetary Society carried on with similar activities, but I have said enough to leave no doubt whatsoever that the place of the amateur, even in these days of very high technology, does play a most important part in furthering technical development. If it had not been for the part these amateurs had played in developing rocketry and those who developed satellites later, maybe we should not be enjoying amateur radio satellites today.

MICROWAVES

Unfortunately, there is no Microwaves column, as Mike Dixon was unable to supply copy this month.

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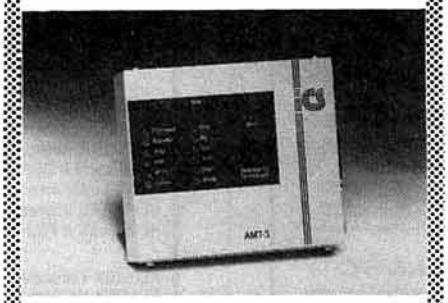

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continued from page 9

70 MHz LOW POWER SECTION

	Callsign (/P)	Points CW	Points SSB	Total QSO	Loc	Pwr	Ant
1	GM3FDW	779	791	128	84BT	25	7LP
2	GW3WAS	481	883	191	82JU	25	8Y
3	GW3UVR	524	715	173	83JA	15	6Y
4	G3LHJ	533	568	123	80FN	25	4Y
5	GD0IOM	548	529	108	74QD	25	5Y
6	G0CDA	295	738	155	93AD	25	8Y
7	G4ADM	449	578	164	93AC	20	5Y
8	G4EYD	377	577	171	82XJ	25	6Y
9	GW4AZV	442	492	132	82IP	10	5Y
10	G4IUZ	422	475	141	91VR	25	5Q
11	G7DOR	415	444	119	91UE	25	5Y
12	G3ZOI	422	390	125	91KG	10	6Y
13	G3EEO	395	400	125	92GX	10	4Y
14	G3PJX	405	379	113	91TF	25	8Y
15	G4GXP	352	396	130	82UK	10	4Y
16	G4WUB	315	393	106	81QJ	10	4Y
17	G4AHG	418	230	105	81TK	15	6Y
18	G4RLF	212	325	84	81XA	4	4Y
19	GI0JLG		234	18	74BU	20	6Y
20	GM0MVZ		69	5	75UW	25	5Y

70 MHz RESTRICTED SECTION

	Callsign (/P)	Points CW	Points SSB	Total QSO	Loc	Pwr	Ant
1	G3ULN	742	1065	171	80AQ	160	4Y
2	G4BVY	667	1075	174	94WC	160	7Y
3	G4MRS	493	752	135	01QX	160	8Y
4	G3VIP	642	579	123	94PH	30	6Y
5	G4OOT	541	579	138	83RU	100	5Y
6	GI4ONL	506	544	67	64LX	30	6Y
7	G4WSM	418	522	126	81PH	15	4Y
8	G4DSP	369	433	115	02BV	160	8Y
9	G3WRJ	384	416	121	92VB	25	6Y
10	G4CAX	153	522	121	83PF	50	4Y
11	G4JSM	223	443	114	93GC	80	4Y
12	G3TQA	220	398	83	93BS	50	4Y
13	G0FRX	157	447	74	93PW	10	7Y
14	G4PGJ	230	310	97	92BV	2	5Y
15	GI4MXW	145	393	47	74BD	15	4Y
16	G1WCY	201	120	50	94HG	10	2Y
17	GJ7DGJ	7	240	28	89WG	20	LP
18	G4ANP	65	173	46	93JM	10	4Y

70 MHz OPEN SECTION

	Callsign (/P)	Points CW	Points SSB	Total QSO	Loc	Pwr	Ant
1	G4UJS	630	991	169	94RJ	160	8Y
2	G4ADV	596	942	142	70PP	50	2 x 7Y
3	G3GRS	648	799	164	01LD	70	6Y
4	GW3XBY	441	922	191	82JG	100	6Y
5	G4DDN	519	841	166	80ST	150	6Y
6	G0ERS	321	972	154	90JO	150	12Y
7	G3PFM	547	702	169	80UU	160	2 x 12Y
8	G3ORY	471	761	189	92NP	160	2 x 3Y
9	G3WGV	473	697	178	91IH	100	8Y + 7Y
10	G4IGY	495	660	135	93PV	100	10Y
11	G3JKY	488	643	156	01DH	120	5Y
12	GW3UKV	453	670	163	82LQ	50	8Y
13	GW4KFK	445	603	149	82JJ	10	5Y
14	G4CIZ	387	638	155	91GI	80	2 x 5Y
15	G3HYH	316	701	165	92MO	100	9Y
16	G3FVA	405	563	153	93EH	30	2 x 5Y
17	G4FUU	355	570	132	91XH	25	6Y
18	G1FRS	421	503	131	91OF	35	3Y
19	G3NAT	412	493	129	91XG	100	5Y
20	G3LXP	343	529	144	91LT	50	8Y
21	G5RP	362	464	143	91FN	80	8Y
22	G3TWG	363	449	131	91PN	30	4Y
23	G0FEH	195	582	150	91RU	10	4Y
24	G4BFH	381	381	91	83LU	15	5Y
25	G3UFB		695	97	90XV	70	2 x 4Y
26	G7FDC		669	65	80FJ	25	6Y
27	GM6VAQ		99	11	85PJ	10	4Y

70 MHz SWL SECTION

	Callsign	Points CW	Points SSB	Total QSO	Loc	Ant
1	BRS 31976		287	39	01HO	3Y
2	BRS 52543		269	35	90XV	HB9CV
3	BRS 28198		51	7	00HX	TA31JR

144 MHz LOW POWER SECTION

	Callsign (/P)	Score	QSOs	Loc	Pwr	Ant
1	G3CKR	4305	486	93AD	20	15Y
2	GW4MGR	3665	463	83JA	25	16Y
3	GW2BBC	3641	472	82JU	25	14Y
3	G4FKA	2839	382	93AC	25	16Y
4	GW3NSY	1942	251	82IP	25	17Y
5	G3TCR	1836	251	91KG	25	17Y
6	GI0LIX	1834	150	74BU	25	13Y
7	G1OHM	1738	249	82XJ	25	17Y
8	G3FKF	1727	235	81XA	25	14Y
9	G3NJA	1624	176	80FM	25	17Y
10	GW3CSA	1586	255	83JG	25	17Y
11	G4WAW	1557	241	81QJ	25	17Y
12	GM4AGG	1350	116	75UW	25	8/8
13	GM0ANT	1256	127	84BT	22	8QY
14	G7AHG	1242	169	81TK	25	14P
15	G4FUR	1164	172	91VG	25	8/8
16	G4CTU	942	148	82UK	10	13Y
17	G3CZU	901	155	91UE	25	13Y
18	G5RS	890	162	91TF	25	17Y
19	G1WAC	838	137	92BN	25	17Y
20	G6BRH	788	95	01GU	10	13Y
21	G3ASR	767	105	91VR	25	13Y
22	G1RCD	638	68	70QO	25	17Y
23	G0NHR	592	77	92GX	10	8Y
24	GD4IOM	396	46	74QD	10	17Y

144 MHz RESTRICTED SECTION

	Callsign (/P)	Score	QSOs	Loc	Pwr	Ant
1	G4MRS	7366	536	01QX	400	18Y
2	GJ1TJP	6937	605	89WG	380	16Y
3	G4ZAP	4601	427	94WC	400	19Y
4	G3PRC	4122	390	80AQ	100	17Y
5	G0EGX	3703	331	01IT	180	9Y
6	G4ERG	3664	374	94PH	400	16Y
7	G1DSP	2339	246	02BV	400	16Y
8	G4SJM	2331	235	94HG	400	18Y
9	G2SU	2099	275	93BS	150	14Y
10	G3FJE	1704	211	92VB	70	17Y
11	G0GLE	1579	183	93PW	45	17Y
12	GI8FQB	1550	127	74BD	200	16Y
13	G0JJN	1467	212	93GC	300	CQDX
14	G3ZTT	1461	220	83PF	300	17Y
15	G3KUE	1269	150	83RU	100	8Y
16	G4BTS	1078	128	93JM	15	19Y
17	G4FOX	810	165	92MT	100	16Y
18	GI3CFH	794	60	64LX	100	17Y
19	G3NFC	707	108	92BV	10	7Y
20	G8WSM	618	80	81PH	20	7Y
21	G4NWZ	595	91	92PG	25	14P
22	G3CNZ	375	47	93VJ	10	3Y

G7CCX Disqualified, Rule10, General Rule 3.

144 MHz OPEN SECTION

	Callsign (/P)	Score	QSOs	Loc	Pwr	Ant
1	G4APA	10643	766	94RJ	400	4x17Y+4x9Y
2	G8LNC	10334	815	90JO	400	4 x 19Y
3	G0FBB	7431	614	01LD	250	4 x 9Y
4	G3EFX	6949	608	90XV	400	4x14Y+3x17Y
5	GW0KZP	6073	581	82JG	350	2 x 17Y
6	G3SDC	5644	561	92NP	400	4 x 14Y
7	G4APD	4904	511	92MO	400	4x17Y+4x9Y
8	GW0JIM	4867	502	82JJ	400	4 x 9Y
9	G8SMR	4710	444	93EH	200	2 x 17Y
10	G4VRL	4679	405	70PP	300	4 x 10Y
11	G3PIA	4614	519	91FN	400	2 x 17Y
12	G3WOI	4232	448	91GI	400	2 x 17Y
13	G3CMH	4175	435	80LV	220	2 x 13Y
14	G3MDG	4065	449	91PS	400	2 x 9Y
15	G4RFC	4047	413	01DH	400	2 x 19Y
16	G4RFR	3928	433	80UU	400	2 x 19Y
17	G4EKT	3560	378	93PV	250	2 X 19Y
18	G6BRA	3534	371	80ST	80	2 x 17Y
19	G4DDY	3524	391	91XH	150	2 x 16Y
20	G4CCC	3474	442	91IH	200	9Y + 17Y
21	GW3ZME	3388	412	82LQ	300	2 x 13Y
22	G2LO	3137	412	91RU	400	4 x 9Y + 2 x 8Y
23	G0FRS	3048	370	91OF	100	2 x 16Y
24	G0KEG	3018	362	91PS	350	18Y
25	G1ZMS	2910	338	90WV	200	16Y
26	G3WSC	2860	269	01OC	100	9Y
27	G6CTU	2476	319	91XG	400	4 x 17Y
28	G4RSE	2359	307	01EN	100	19Y
29	G4SSD	1672	200	80FJ	200	2 x 12Y
30	G4ATH	1452	186	83LU	300	2 x 9Y
31	G0ITW	1263	158	93JK	160	2 x13Y
32	G2FKO	1220	156	81CC	100	13Y
33	G3WKX	858	149	91PN	100	13Y
34	GM4GRC	796	111	86JE	180	14Y
35	GM1JKJ	737	61	85PJ	100	2 x 14Y
36	G4VER	630	96	91LT	50	14Y

144 MHz SWL SECTION

	Callsign	Score	QSOs	Loc	Ant
1	BRS 25429	771	93	93FX	8Y
2	BRS 28198	353	46	00HX	10Y
3	BRS 52543	288	43	83LT	12ZL
4	BRS 31976	286	41	01HO	9Y

432 MHz LOW POWER SECTION

	Callsign (/P)	Score	QSOs	Loc	Pwr	Ant
1	G8XVJ	1382	199	93AD	10	21Y
2	G0BWV	1089	179	93AC	25	21Y
3	GW0MGR	889	137	83JA	25	21Y
4	GW6BBC	888	126	82JU	25	88Y
5	G0JSR	858	123	91KG	25	21Y
6	G3TAD	748	116	81TK	10	88Y
7	G4LDR	658	89	81XA	25	17Y
8	G8OHM	625	107	82XJ	17	24Y
9	G6KRC	598	100	82UK	25	19Y
10	G6GS	531	90	91TF	25	21Y
11	G4GCT	530	82	81QJ	15	21Y
12	GW3SRT	482	77	82IP	10	18P
13	GM4RCD	447	38	84BT	25	21Y
14	G4JXG	418	63	01GU	25	19Y
15	GI0GDP	303	27	74BU	25	15Y
16	GD0MAN	288	29	74QD	10	21Y
17	G4RMD	270	51	91VR	10	21Y
18	GM0GAS	260	23	75UW	20	19Y
19	G6HC	228	44	91VG	25	24Y
20	G0EYO	201	49	92BJ	8	17Y
21	G7DKP	196	46	91UE	10	23Y
22	G3ZBI	192	55	92GX	10	21Y
23	G3HFG	188	24	80FN	10	24Y
24	G1RCD	152	18	70WO	25	88Y
25	GW0IEQ	26	20	83JG	25	7/8 VERT

432 MHz RESTRICTED SECTION

	Callsign (/P)	Score	QSOs	Loc	Pwr	Ant
1	G4MRS	2174	193	01QX	250	21Y
2	G8ZHP	1378	172	02BV	400	21Y
3	G8TFI	1353	133	94WC	400	19Y
4	G0JRB	876	91	94PH	250	21Y
5	G8HSG	752	88	93PW	100	48Y
6	G0IIO	697	101	93VJ	100	17Y
7	GJ6TMM	653	74	89WG	70	24Y
8	G4EMW	589	89	93BS	150	21Y
9	G0LBW	569	108	93GC	25	88Y
10	G4LOO	568	91	92VB	100	21Y
11	G1CWO	506	78	01IT	80	21Y
12	G8ZTT	477	84	83PF	50	17Y
13	G8WSM	452	82	81PH	12	13Y
14	G0MTV	412	67	94HG	80	88Y
15	G7BOT	405	71	92BV	20	SLOT
16	G4DBU	275	53	83RU	50	12Y
17	GI3LLQ	260	21	74BD	10	23Y
18	G7FOX	256	66	92MT	10	21Y
19	G0EAE	183	40	92PG	10	88Y
20	G6FUM	170	44	93JM	10	48Y

G7EUC Disqualified, Rule10, General rules 3, 13.

432 MHz OPEN SECTION

	Callsign (/P)	Score	QSOs	Loc	Pwr	Ant
1	GW8KQW	3296	311	82JG	400	240EL
2	G4GCM	3090	244	94RJ	400	12 x 21Y
3	G4HRY	2870	309	91RU	350	6 x 21Y + 32EL
4	G4JNZ	2395	237	90XV	300	3 x 21Y
5	G0FRR	2306	227	80UU	400	2 x 20QLY
6	G3SEK	2082	239	91FN	350	2 x 21Y
7	G4FAM	2013	184	01LD	400	2 x 21Y
8	G5LK	1926	182	01OC	400	21Y
9	GW8SJP	1892	219	82JJ	400	4 x 19Y
10	G4JKN	1829	185	81CC	400	4 x 28Y
11	G0HUZ	1476	187	01DH	200	2 x 18Y
12	G4BRA	1362	175	80ST	400	2 x 21Y
13	G7AYI	1273	194	92NP	400	4 x 14Y
14	G3UHF	1340	185	93EH	150	8 x 21Y
15	G6FRS	1333	186	91OF	120	4 x 21Y
16	G0KVA	1309	179	91PS	200	2 x 23Y
17	G1DVU	1115	117	90WV	25	4 x 19Y
18	G4UHF	1051	150	91GI	200	2 x 21Y
19	G3VER	1042	165	91LT	75	2 x 18Y
20	G3LRS	920	162	92MO	220	4 x 21Y + 48Y
21	G3PWN	916	114	93PV	150	4 x 21Y
22	G6RSE	891	124	01EN	100	2 x 21Y
23	G0CCC	827	137	91IH	100	2 x 17Y + 21Y
24	G4JBH	737	121	80LV	100	21Y
25	G0LNC	852	123	90JO	100	4 x 17Y
26	GW6ZME	791	129	82LQ	250	4 x 17Y
27	G3ZPB	747	118	91XH	150	4 x 15Y
28	G8MNY	579	122	91XG	400	27QLY
29	G0JWX	512	53	70PP	25	88Y
30	G6GMW	478	61	83LU	60	4 x 19Y
31	G8JJR	460	76	93JK	30	2 x 21Y
32	G1MDG	278	78	91PS	12	2 x 19Y
33	GM1AQV	153	13	85PJ	25	2 x 19Y
34	G0CDB	144	18	80FJ	10	12Y
35	GM4GRC	4	2	86JE	35	COLIN

432 MHz SWL SECTION

	Callsign	Score	QSOs	Loc	Ant
1	BRS 52543	235	34	83LT	19Y
2	BRS 31976	195	31	01HO	19Y
3	BRS 25249	41	9	93FX	8Y (2m)
4	BRS 28198	30	8	00HX	48Y

1.3 GHz LOW-POWER SECTION

	Callsign (/P)	Score	QSOs	Loc	Pwr	Ant
1	G8OPR	487	69	81XA	25	2m Dish
2	G4WDL	462	70	93AD	18	55Y
3	G8FMH	414	69	91KG	25	55Y
4	GW0JSB	384	53	83JA	25	55Y
5	GW1YFG	369	53	82JU	15	45QLY
6	G3OHM	356	66	82XJ	20	55Y
7	G0GZQ	300	50	93AC	10	55Y
8	G3IGQ	271	63	91TF	25	79QLY
9	G8KGC	248	45	92GX	15	23Y
10	GW4LU	229	36	82IP	10	38QLY
11	G0CFM	188	49	81TK	20	9 Helical
12	G8ZHF	139	25	01GU	3	55Y
13	G3SJE	108	24	91VR		
14	G0ICJ	71	17	92BJ	1	52Y
15	G8WIM	32	18	91VG	4	54Y
16	GD6ICR	28	4	74QD	1.2	55Y
17	GI4TAJ	4	2	74BU	1.5	15/15
18	GM0GCG	1	1	75UW	6	18 Helical

1.3 GHz RESTRICTED SECTION

	Callsign (/P)	Score	QSOs	Loc	Pwr	Ant
1	G4NXO	688	66	94WC	150	55Y
2	G4MRS	646	72	01QX	50	55Y
3	G4CCH	627	60	94PH	100	47QLY
4	G4SIV	489	63	02BV	150	1.2m Dish
5	G4TXG	397	63	92VB	25	55Y
6	G4DEZ	190	26	94HG	10	55Y
7	GJ8PCY	98	15	89WG	7	1.2m Dish
8	G6SPS	48	17	01IT	15	23Y

1.3 / 2.3 GHz OPEN SECTION

		Points			23 cm		13 cm	
	Callsign (/P)	23	13	Loc	Pwr	Ant	Pwr	Ant
1	G8XIR/P	849	94	01LD	200	1.4m Dish	0.5	1.4m Dish
2	G4XUM/P	740	147	94RJ	300	16 x 23Y	50	2m Dish
3	G3NNG/P	676	106	91FN	140	8 x 23Y	40	1.8m Dish
4	G3UAX/P	553	139	91GI	150	2m Dish	12	1.2m Dish
5	G3YKI/P	540	151	91RU	350	2.4m Dish	15	1.4m Dish
6	GW8IFT/P	524	116	82JG	150	2m Dish	15	1.4m Dish
7	G4HGU/P	499	101	81CC	200	3m Dish	50	1.8m Dish
8	G3YGF/P	448	43	80UU	200	4 x 49Y	40	20Y
9	G8TB/P	447	29	91XH	30	2m Dish	3	2m Dish
10	G0FCT/P	404	51	80ST	120	2m / 55Y	6	1.2m Dish
11	G3BSN/P	385	68	01DH	100	4 x 23Y	30	Dish
12	G4OQR/P	384	48	92NP	40	1.8m Dish	1	1.2m Dish
13	G3ULT/P	372	43	91IH	200	88Y	50	
14	G6EKT/P	336		93PV	75	48 QLY		
15	G8VOI/P	302	27	90JO	30	3m Dish	3	3m Dish
16	G3ZDM/P	289	16	93EH	80	8 x 23Y	4	1.2m Dish
17	GW8KHS/P	289		82JJ	40	8 x 23Y		
18	G8VER/P	249		91LT	10	2 x 54Y		
19	G4JDI/P	240		92MO	25	2m Dish		
20	GW0CZD/P	191	1	82LQ	20	1.4m Dish	0.3	1m Dish
21	G4AVV/P	167		91XG	85	65QLY		
22	G8KBH/P	143		83LU	20	2 x 23Y		
23	G4FRS/P	106		91OF	100	2 x 15/15		
24	G3RXJ/P	94		90WV	100	2 x 22QLY		

RULES

COMMONWEALTH CONTEST 1991 - RULES

(This contest counts towards the UK HF Contests Championship).

1. General: The Commonwealth Contest is intended to promote contacts between stations in the British Commonwealth and Mandated Territories.

2 Eligible entrants: British Isles - Class A licence holders, who must be members of RSGB. **Overseas -** Licensed Radio Amateurs within the British Commonwealth or British Mandated Territories. Single-operator entries only will be accepted and entrants may not receive any assistance whatsoever during the contest, including the use of spotting nets or other assistance in finding new bonuses. Entries will not be accepted from Headquarters stations, nor from stations using GB or other special event callsigns or operating maritime or aeronautical mobile.

3. When: 1200GMT Saturday 9 March 1991 to 1200GMT Sunday 10 March 1991.

4. Sections: **(a)** Multi-band

(b) Single-band

Single-band entrants should claim points for contacts made on one band only, but are requested to submit details of QSOs made on other bands, for adjudication purposes. Multi-band entries will not be eligible for single-band awards.

5. Frequencies/Mode: CW only in the 3.5, 7, 14, 21 & 28MHz bands. Entrants should operate in the lower 30kHz of each band, except when contacting Novice stations operating above 21030 and 28030kHz. Crossband contacts will not count for points or bonuses.

6. Contest Exchange: RST and serial number, commencing with 001.

7. Scoring: Contacts may be made for points with any station using a British Commonwealth prefix (see accompanying list) except those within the entrants own call area. Note that for this contest, the entire UK counts as ONE call area, and therefore UK stations may not work each other for points. Each completed contact scores 5 points, with a bonus of 20 points for each of the first three contacts with each Commonwealth Call Area, on each band.

8. 'Headquarters' Stations: A number of Commonwealth Society HQ stations (although not eligible as entrants) are expected to be active during the contest and will send 'HQ' after their serial number to identify themselves. Every HQ station counts as an additional call area (and therefore attracts the 20-point bonus) and entrants may contact their own HQ station for points and bonuses.

9. Logs: Separate logs are required for each band. Entries should be typed or written in ink on one side only of standard (A4) size paper or pre-printed log sheets, and should contain 40 QSOs per page. Columns to be headed: Time GMT; callsign of station worked; RST and serial number sent; RST and serial number received; bonus points; points claimed. Computer-generated logs are welcomed provided they are formatted as above.

Duplicate contacts must be clearly marked and not claimed for points. Each unmarked duplicate contact found for which points have been claimed will result in the deduction of 55 points. Entries containing more than 5 such duplicates will be liable to disqualification.

Each entry must be accompanied by a cover sheet (HFC2 or equivalent) indicating the section entered and the scores claimed on each band (also don't forget details of equipment, and your correspondence address!). Entrants making more than 80 QSOs are requested to include a check-list of the callsigns appearing in the log, sorted into alphabetical order and with either the serial number sent or the time of contact beside the callsign.

10. Declaration: Each entry must be accompanied by the following declaration, signed and dated: "I declare that this station was operated strictly in accordance with the rules and spirit of the contest, and I agree that the decision of the Council of the RSGB will be final in all cases of dispute." UK entrants must further state "I have no objection to the information from my log being entered into a computer for the sole purpose of the contest adjudication." (Data Protection Act).

11. Address for logs: RSGB HF Contests Committee, PO Box 73, Lichfield, Staffs, WS13 6UJ, ENGLAND.

12. Closing Date for Logs: Logs should be posted to ARRIVE before 8th April 1991. Overseas entrants are advised to forward their logs by Air Mail, as late entries may be treated as checklogs.

13. Awards:

(a) Multi-band - The Senior Rose Bowl will be awarded to the overall leader, and the runner-up will be awarded the Junior Rose Bowl. The Col. Thomas Rose Bowl will be awarded to the highest-placed UK station. Certificates of Merit will be awarded to the third-placed entrant overall, and to the leading station in each Call Area.

(b) Single-band - Certificates of Merit will be awarded to the leading Overseas and UK entrants on each band.

RECEIVING CONTEST

Rules as for the transmitting contest except where specified below.

2. Eligible entrants: ***British Isles*** - RSGB members only. ***Overseas*** - all SWLs in the British Commonwealth or Mandated Territories.

Holders of transmitting licences for frequencies only above 30MHz may enter the receiving section.

7 Scoring: To count for points, stations heard must be outside the entrant's Call Area, and in Contest QSO. CQ or TEST calls, non-contest contacts and stations within the entrants call area may not be claimed for points. Scoring and bonuses as for transmitting contest.

11 Logs: Columns to be headed: time GMT; callsign of station heard; report/serial number sent by that station; callsign of station being worked; bonus points; points claimed.

NOTE. In the column headed "station being worked" the same callsign may only appear once in every three contacts. If both stations in contact are heard, they may both be logged separately as 'Station Heard'.

Each entry should be accompanied by the following declaration, signed and dated: "I declare that the station was operated strictly in accordance with the rules and spirit of the contest and I agree that the decision of the Council of the RSGB shall be final in all cases of dispute. I do not hold a transmitting licence for frequencies below 30MHz." UK entrants must further state "I have no objection to the information from my log being entered into a computer for the sole purpose of the contest adjudication." (Data Protection Act).

13. Awards: The overall winner will be awarded the Receiving Rose Bowl. Certificates of Merit will be awarded to the overall runner-up and to the leading entrant in each continent.

COMMONWEALTH CONTEST 1991 CALL AREAS

The following call areas are recognised for the purpose of scoring in the Commonwealth Contest 1991:

A2	Botswana
A3	Kingdom of Tonga
AP	Pakistan
C2	Nauru
C5	Gambia
C6	Bahamas
G,GB,GD,GI,	United Kingdom
GJ,GM,GU,GW	(all one area)
H4	Solomon Is.
J3	Grenada
J6	St. Lucia
J7	Dominica
J8	St. Vincent
P2	Papua New Guinea
S7	Seychelles
T2	Tuvalu
T30	W. Kiribati
T31	C. Kiribati
T32	E. Kiribati
V2	Antigua, Barbuda
V3	Belize
V8	Brunei
VE1	Maritime Provinces
VE1	Sable Is.
VE1	St Paul Is.
VE2	Quebec
VE3	Ontario
VE4	Manitoba
VE5	Saskatchewan
VE6	Alberta
VE7	British Columbia
VE8	North West Territories
VK1	Australian Capital Territory
VK2	New South Wales
VK3	Victoria
VK4	Queensland
VK5	South Australia
VK6	Western Australia
VK7	Tasmania
VK8	Northern Territories
VK9L	Lord Howe Is.
VK9M	Mellish Reef
VK9N	Norfolk Is.
VK9X	Christmas Is.
VK9Y	Cocos (Keeling) Is.
VK9Z	Willis Is.
VK0	Heard Is.
VK0	Macquarie Is.
VK0	Antarctica
VO1	Newfoundland
VO2	Labrador
VP2E	Anguilla
VP2K	St. Kitts, Nevis
VP2M	Montserrat
VP2V	British Virgin Is.
VP5	Turks & Caicos
VP8	Falkland Is.
VP8	S. Georgia
VP8	S. Sandwich Is.
VP8	S. Shetland Is.
VP8	Antarctica
VP9	Bermuda
VQ9	Chagos
VR6	Pitcairn Is.
VS6	Hong Kong
VY1	Yukon
VU	India
VU7	Laccadives
VU7	Andaman & Nicobar Is.
YJ	Vanuatu
Z2	Zimbabwe
ZB2	Gibraltar
ZC4	Cyprus (Sovereign Bases)
ZD7	St. Helena
ZD8	Ascension Is.
ZD9	Tristan da Cunha, Gough Is
ZF	Cayman Is.
ZK1	Cook Is.
ZK1	Manihiki
ZK2	Niue
ZK2	Tokelau
ZL0	New Zealand
ZL1	New Zealand
ZL2	New Zealand
ZL3	New Zealand
ZL4	New Zealand
ZL5	Antarctica
ZL7	Chatham Is.
ZL8	Kermadec Is.
ZL9	Auckland & Campbell Is.
3B8	Mauritius
3B9	Rodriguez Is.
3D2	Fiji
3D6	Swaziland
4S	Sri Lanka
5B4	Cyprus
5H	Tanzania
5N	Nigeria
5W	Western Samoa
5X	Uganda
5Z	Kenya
6Y	Jamaica
7P	Lesotho
7Q	Malawi
8P	Barbados
8Q	Maldives
8R	Guyana
9G	Ghana
9H	Malta
9J	Zambia
9L	Sierra Leone
9M2	W. Malaysia
9M6/9M8	E. Malaysia
9V	Singapore
9Y	Trinidad & Tobago
GB5CC	RSGB HQ Station + Various other Commonwealth HQ Stations.

FIRST 1.8MHZ CONTEST 1991

1. When: 2100GMT Saturday 9 Feb to 0100GMT Sunday 10 Feb 1991.

2. Sections: Single-operator entries only.

(a) British Isles. All entrants must be members of RSGB.

(b) Overseas including EI.

3. Band and Mode: 1820 - 1870kHz, CW only.

4. Exchange: RST + Serial Number starting at 001. British Isles stations also send their County Code as printed in the May 1990 issue of *Radio Communication* and other current RSGB publications.

5. Scoring:

(a) British Isles - Three points for each completed contact, with a bonus of five points for the first contact with each British Isles County, and for the first contact with each country outside the British Isles.

(b) Overseas - Three points for each completed contact with a station in the British Isles excluding Eire, with a bonus of five points for the first contact with each British Isles County.

6. Logs: Please use RSGB HF Log sheets or A4 paper with 40 QSOs per page. Columns to be headed: Time GMT; callsign of station worked; RST/serial number sent; RST/serial number received; County Code received; bonus; points claimed. Computer-generated logs are welcomed if formatted as above.

Duplicate contacts must be marked and not claimed for points - unmarked duplicates will be penalized.

UK entrants must include a summary sheet (Form HFC2 or equivalent) with the usual signed declaration and must further state "I consent to information from my log being entered into a computer for adjudication purposes." (Data Protection Act).

7. Address for logs: RSGB HF Contests Committee c/o G4BUO, "Carramore", Coldharbour Road, Penshurst, TONBRIDGE TN11 8EX, Kent, ENGLAND.

8. Date for Entries: All entries must be postmarked not later than fifteen days after the end of the contest.

9. Awards:

(a) The Somerset Trophy will be awarded to the leading station in the British Isles. Certificates of Merit will be awarded to the second and third placed entrants.

The Maitland Trophy will be awarded to the Scottish entrant with the highest aggregate number of points in this contest combined with the Second 1.8MHz Contest 1990.

(b) Certificates of Merit will be awarded to the leading three entrants in the Overseas section.

RECEIVING SECTION

The rules for the Transmitting Section apply except as modified below.

Eligible entrants:

(a) British Isles - RSGB members only

(b) Overseas - all SWLs

Holders of transmitting licences for frequencies ONLY ABOVE 30MHz may enter the receiving section. *Holders of UK Class B licences are particularly encouraged to enter.*

Logs: Columns to be headed: time GMT; callsign of station heard; report/serial number/County Code sent by that station; callsign of station being worked; bonus; points claimed. NOTE- In the column headed "station being worked" the same callsign may only appear once in every three contacts unless the station heard is a new bonus.

Declaration: The declaration must include the following:- "*I do not hold a transmitting licence for frequencies below 30MHz.*"

Awards: Certificates of merit will be awarded to the leading entrants in each section. Additional certificates may be awarded at the discretion of the HF Contests Committee dependant upon the number of entries.

GENERAL RULES FOR RSGB VHF/UHF/SHF CONTESTS 1991

The rules governing all RSGB VHF/UHF/SHF Contests held in 1990 will include the following general rules, supplemented by individual rules for each contest. Please read the rules carefully before the event.

Queries on VHF contests may be made to Bryn Llewellyn, G4DEZ, 110 South Avenue, Southend-on-Sea, Essex, SS2 4HV. Telephone: 0702 460747.

The individual contest rules contain most of the detailed information on the sections, scoring systems and methods of tabulation. Unless otherwise stated in the individual contest rules, all of the general rules apply in every contest.

Please note that all points claimed for a contact will be lost by both stations if either station logs callsigns incorrectly, including any suffix. The receiving station will also lose all claimed points for a contact where other information is logged incorrectly. Ten times the claimed score will be lost for unmarked duplicate contacts.

The committee intends to make station inspections in events other than VHF NFD during 1990.

1. Entries

All entries must be sent to the contest adjudicator at the address shown in the individual contest rules. Entries sent to other addresses will be treated as check logs. All entries become the property of the RSGB and cannot be returned. Recorded delivery and registered post should not be used, as receipt of your entry may be delayed.

2. Last posting date

All entries must be postmarked not later than 16 days after the end of the contest or last cumulative activity period, or as specified in rules for the specific contest as published in *Radio Communication*.

3. Cover sheets

All entries must be accompanied by a correctly completed current RSGB VHF/UHF contest cover sheet (Form 427-86 or later) for each band used, including full details of antennas and final amplifier devices. In multiband events entrants must also complete a multiband sheet (Form 4422). In contests using a county/country multiplier scheme a multiplier check list must also be included.

4. Operators

All operators must be RSGB members.

5. Single-Operator fixed stations

Single operator fixed stations are those operated by the licensee in person from his/her normal place of residence, with no assistance with operating or log keeping during the contest.

6. Fixed stations

To be eligible to enter a fixed station section the station must be located at the Main Station Address shown on the licence validation document.

7. Locations

In multiband events all stations forming one entry must operate from one site, defined as a circle of 1km radius. All equipment for /P stations must be installed on site during the 24 hours before the contest or during the contest itself. There must be no operation from the site on the bands involved in the contest in the week prior to the contest, UNLESS prior authorisation has been agreed with Chairman of VHFCC, (this is for people on holiday or bona-fide expedition groups).

Entrants may not change the location of their stations during the contest.

8. Valid contacts

No points will be lost if a non-competing station contacted by an entrant is unable to supply an IARU Locator, or serial number, but the receiving operator must obtain and record enough information to be able to calculate the claimed distance score. Contacts with stations whose callsigns appear on the cover sheet will not count for points.

Only one scoring contact may be made with a given station on each band in use during the contest, ie any callsign regardless of suffix or prefix may only be worked for points once. Any non-scoring contacts must be clearly marked in the log. Unmarked duplicate contacts will be penalised at the rate of 10 times the claimed score for that contact.

In cumulative contests one contact may be made with a given station (as defined above) during each activity period. The adjudicator may normalise the scores in each session (see rule 10), however whether normalisation will be used or not depends on the rules for the individual contest as published in *Radio Communication*, and each entrant's best three (or as many as requested in the rules for the individual contest, as published in *Radio Communication*) scores will be combined to determine the overall placing. Entrants should submit logs for every session for which they are active.

9. Radial ring scoring

Contacts made between stations separated by the distances shown in the table will score as indicated.

km	Points
0-50	1
51-100	3
101-150	5
151-200	7
201-250	9
251-300	11

and pro rata. For computer scoring purposes a conversion factor of 111.2km/degree must be used. In 50MHz contests all contacts over 650km score 25 points.

10. Final Tabulation of multiband and cumulative contests

The final tabulation showing the overall results will be formed by taking the sum of the normalised scores on each band or from the three best sessions in cumulative contests,or as decided by the rules of the individual contest as published in *Radio Communication*. The normalised score will be calculated by dividing each station's points score by that of the band/session leader and multiplying by 1,000. ie

Normalised score for each band/session =

Score achieved x 1,000 divided by Band/session leader score

11. Awards

There will be an award to the highest scoring station in each section. An award will also be made to the runner-up in each section. Certificates of merit may be awarded at the adjudicator's discretion. Placement certificates will be awarded if the cover sheet of the contest entered is annotated 'Placement certificate required' and a large (A5, minimum) stamped addressed envelope is enclosed.

12. Crossband contacts

Crossband contacts do not count for points.

13. Log keeping

The logs for contest entries must be made out on current RSGB VHF/UHF log sheets or, if computer listings are to be submitted, these must be cut to A4 size, RSGB log format, line spaced to contain 25 contacts per sheet, and be correctly collated (not Z-fold). Each sheet must be headed with the entrants callsign, IARU locator, contest title, and sheet number. The total points claimed on each sheet must be included at the foot of the sheet. Logs must be tabulated as follows:

(i) Date/time (GMT)

(ii) Callsign of station worked

iii) My report on his/her signal and serial number

(iv) His/her report on my signal and serial number

(v) IARU Locator received

(vi) QTH or county received (when required) or comments

(vii) Points claimed

The contest exchange must consist of both callsigns, RS or RST report followed by serial number, and IARU locator. Where QTH information must be exchanged it must be given as a point identifiable on an Ordnance Survey route planning map or equivalent (scale 1:625,000) or as a distance and direction not greater than 25km from such a point. Any complaints received or made about signals must be recorded in the comments column.

14. County/country multipliers

a) In contests using a county/country multiplier scheme the contest exchange will include the full county name on phone or the code letters shown in May *RadCom*, page 76, on CW. The county must be shown on each log sheet.

b) Each new county or country worked is a multiplier and must be clearly identified in the log. Note that this includes your own county and country, and that a contact with a station in another G prefix area can count for both a county and country multiplier. Where more than one station is worked in a particular Scottish region, additional multipliers can be claimed for each contact, up to a maximum of three multipliers per region.

c) The score obtained under rule 9 is multiplied by the total number of multipliers worked to provide the claimed score.

d) A separate multiplier check list must be included showing as a minimum the counties and countries worked in alphabetical order together with the callsign and a serial number of the first claimed contact for each multiplier. If other contacts are to be considered as alternative multipliers should the first contact be invalid for any reason, then please include callsigns and serial numbers for subsequent contacts with each county or country.

15. Serial numbers

Serial numbers start from 001 on each band and advance by one for each contact. In cumulative contests serial numbers increment from 001 for each activity period.

16. The DTI(RA) licence limits must be strictly adhered to.

In an RSGB contest (sponsored or controlled by VHFCC) where the contest power limit is lower than the DTI(RA) licence limit then this limit, (as described in the rules for the contest in question) must also be strictly adhered to.

If upon inspection a station is found to be running *illegal* power, or above the contest power limit, the station will be *disqualified*, and *all* operators of that station during the contest in question will be liable to a *ban* on entering *all* VHFCC sponsored or controlled contests for a period of up to *two* years.

17. The same antenna system must be used on transmit and receive.

18. Stations using telephony in the recognised CW sub-bands are liable to disqualification. Entrants must observe the provisions of the IARU/RSGB band plans. Bands other than those included in the contest cannot be used simultaneously by a separate station for setting up contacts or talkback.

19. Stations which persistently radiate poor-quality signals, or otherwise contravene the code of practice for VHF/UHF contest operation (see below), are liable to disqualification or loss of points. Gross errors in logging will result in disqualification.

20. Contacts made via a repeater, man-made satellite, or moonbounce will not count for points.

21. Proof of contact may be required.

22. Entrants must permit inspection of their stations by members of the VHF Contest Committee, or its representatives, and give site access information if requested to do so. The inspector must be permitted to remain for as long as desired, and to return to the site at any time during the contest. Contestants must demonstrate to the inspector's satisfaction that they are obeying the rules of the contest.

23. The ruling of the Council of the RSGB shall be final in all cases of dispute.

24. Site registration may be required at the VHFCC's discretion.

25. Foreign amateurs are allowed to enter RSGB contests but will be placed in a separate section, thus allowing them to compare their entries with those of UK entrants. Winners and runner-up certificates will be issued as appropriate.

GENERAL RULES FOR RSGB LISTENERS VHF/UHF CONTESTS 1991

1. The 1991 general rules for VHF/UHF contests will apply except where modified by these rules.

2. Listeners contests are open to all non-licensed members of the RSGB. Only the entrant may operate the receiving station.

3. Logs must show in columns: (a) date/time (GMT), (b) callsign of station heard, (c) my report on his/her signals, (d) report and serial number sent by station heard, (e) callsign of station being worked, (f) IARU locator given by station heard, (g) QTH given by station heard (if appropriate), (h) points claimed.

On 144MHz the callsign in column (e) may only occur once in every ten contacts logged. CQ and test calls do not count for points and should not be logged. If both sides of a QSO can be heard, both can be claimed for points.

The Hansen Trophy will be awarded to the entrant with the highest aggregate score in all the SWL contests between 4 March and 3 September 1991. The aggregate score will be calculated in accordance with general rule 10.

CODE OF PRACTICE OF VHF/UHF CONTEST OPERATION

1. Obtain permission from the landowner or agent before using the site, and check that this permission includes right of access. Portable stations should observe the Country Code.

2. Take all possible steps to ensure that a site is not going to be used by some other group or club. Check with the club and last year's results table to see if any group used the site last year. If it is going to be used by another group, come to an amicable agreement before the event. Groups are advised to select possible alternative sites.

3. All transmitters generate unwanted signals; it is the level of these signals that matters. In operation from a good site, levels of spurious radiation which may be acceptable from a home station may well be found to be excessive by nearby stations (25 miles away or more).

4. Similarly, all receivers are prone to have spurious responses or to generate spurious signals in the presence of one or more strong signals, even if the incoming signals are of good quality. Such spurious responses may mislead an operator into believing that the incoming signal is at fault, when in fact the fault lies in his own receiver.

5. If at all possible, critically test both receiver and transmitter for these undesirable characteristics, preferably by air test with a near neighbour before the contest. In the case of transmitters, aim to keep all in-amateur band spurious radiation, including noise modulation, to a level of -90dB relative to the wanted signal. Similarly, every effort should be made to ensure that the receiver has an adequate dynamic range.

6. Above all, be gentlemanly at all times. Be helpful and inform stations apparently radiating unwanted signals at troublesome levels - having first checked your own receiver! Try the effect of turning the antenna or inserting attenuators in the feedline; if the level of the spurious signal changes relative to the wanted signal then non-linear effects are occurring in the receiver. Some recent synthesised equipment has excessive local oscillator phase noise, which will manifest itself as an apparent splatter on strong signals, even if there is no overloading of the receiver front end. Preamplifiers should always be switched out to avoid overload problems when checking transmissions. If you receive a complaint, perform tests to check for receiver overload, and try reducing drive levels and switching out linear amplifiers to determine a cure. Monitor your own signal 'off air' if

possible. Remember that many 'linears' may not be linear at high power levels under field conditions with poorly regulated power supplies. The effects of overdriving will be more severe if speech processing is used, so pay particular attention to drive level adjustment.

If asked to close down by a Government Official or the site owner, do so at once without objectionable behaviour.

RESULTS

50MHZ TROPHY CONTEST RESULTS 1990

The contest was poorly supported this year; activity was down and for most stations the only DX was FC1JG. Comments were "no activity", "deep QSB" and "too early in the year". Congratulations to the winners and runners-up; certificates will be awarded to G4KUX and G0KPW for multi-op., and G4BLX and G6HKM for single op. Subject to Council approval, the Telford Trophy will go to the Northern Lights Contest Group.

EQUIPMENT IN USE:

G4KUX - FT726R, ant 2X6 or 2X5, 5W PEP.

G4BLX - TS830 + TVTR + QQVO640A, ant 5e Yagi, 20W PEP.

MULTI OPERATOR

Pos	Call	Pts	QSOs
1	G4KUX	140976	235 *
2	G0KPW	38900	143 *
3	G6KEZ	18690	92
4	G4RFR	16705	84
5	G1TOS	7069	37
6	G3YSX	3210	63
7	G0AJQ	2460	35

SWL

1	BRS25429	15084	68 *

SINGLE OPERATOR

1	G4BLX	30840	134 *
2	G6HKM	15225	105 *
3	G1DOX	14689	83
4	G8APZ	14510	108
5	G1KDF	9486	51
6	G3NEO	9362	69
7	G3KXR	6420	61
8	G1DWQ	6168	65
9	G8ZQB	6090	49
10	G8JXV	4506	62
11	G0HVQ	2340	35
12	G3RDQ	2040	25
13	G0LAM	1510	51
14	G4DDL	1296	38

Check logs gratefully received from G1NUS, G3BPM and G0FDX/P
* Certificate. G8XVJ.

COUNTY ROUND-UP 1990 RESULTS

This year saw improved participation in both sections, although once again the SSB entry did not reflect the level of activity. About twice as many more stations were active than in the CW section. Scoring in the latter was very tight - most of the leaders employed similar tactics and a number found themselves running out of stations to work in the last half-hour. In many cases more time could usefully have been spent in chasing multipliers on 80m, but by 1030 it was, of course, far too late!

All those who passed any comment professed to have enjoyed the event, the wife of one entrant being "glad of the chance of getting on with her gardening unhindered".

G3LET

CW SECTION

Posn	Callsign	QSOs	Mults	Score
1	G5LP*	107	65	20865
2	G3KHZ*	100	61	18300
3	GM4OBK	105	57	17955
4	G3JJG	97	60	17460
5	G4ARI	98	57	16758
6	G4KGK	97	57	16587
7	G3GLL	98	56	16464
8	G3MA	94	56	15792
9	G3MPB	91	57	15561
10	G3OXC	96	54	15552
11	G4OGB	85	56	14280
12	G4IQM	85	50	12750
13	G4ECI	81	48	11664
14	G0IDE	77	50	11550
15	G5MY	75	49	11025
16	G3HKO	78	47	10998
17	G3BPM	71	46	9798
18	GW3JI	68	44	8976
19	G4XPE	62	44	8184
20	G3DPX	62	41	7626
21	G4ECI	54	39	6318
22	GM3IZD	63	31	5859
23	G0CGV	56	30	5040
24	G3SB/P	43	31	3999
25	G4PTE	41	29	3567
26	G9KJV	40	29	3480
27	G4ZME	33	21	2079
28	G3EAO	22	17	1122

SSB SECTION

Posn	Callsign	QSOs	Mults	Score
1	G3NLY	149	87	38889
2	G5LP	167	64	31185
3	G4ARI	122	72	26352
4	G3MA	114	65	22230
5	G4MET	118	56	19824
6	G4IQM	93	53	14787
7	GM0ALS	94	51	14382
8	G3BPM	67	43	8643
9	GM3IZD	59	41	7257
10	G0NBI	49	35	5145
11	G4XPE	25	23	1725
12	G4PTE	14	12	504

Checklog received with thanks from G2FWX
* - Certificate Winner

ROPOCO 2 CONTEST 1990 RESULTS

It was good to see (following recent trends) that the number of logs received was up this year. Everyone enjoyed themselves once again trying to make sense of the strange postcodes, although there seemed to be less corruption of the originals than in previous years.

G3TBK in first place was running an FT102 to a half-wave inverted-vee with the apex at 57' and the ends at 30'. G5LP used an FT101ZD and a half-wave dipole at 20'!! G4ARI used a TS930S and a dipole at 40'. He had the highest-scoring completely accurate log, and so wins the G3XTJ Memorial Trophy and Miniature.

The G5MY Trophy, being presented for the first time this year, is awarded to the station having the highest aggregate score in the two ROPOCO contests, David Cree, G3TBK.

G4JKS

Place	Call	Points	Place	Call	Points
1	G3TBK*	664	25	G3KNU	408
2	G5LP*	644	26	G3HKO	406
3	G4ARI*§¶	630	27	G4EBK¶	400
4	G3RZP	618	28	G3JSR	398
5	G4OBK	588	29	G2HLU	388
6	G4RFR¶	580	29	G4KLQ	388
7	G3GLL¶	570	31	G4BKI¶	360
8	G3JKS	568	31	G0CGV¶	360
9	G3SYA	564	33	G0GKH	354
10	G3VYI	552	34	G3MCX¶	350
11	G3OLU	548	35	G3BPM	348
12	G4OGB	544	36	G4HZF	338
13	G3WGV¶	530	37	G0CGB¶	310
14	G3NKS	528	38	G4ZYN	288
15	G3JJG	526	39	G4PTE	266
15	G3OWO	526	40	G3CQR	246
17	G3OXC	514	40	G0NND	246
18	G4KGK¶	480	42	GM3UM	228
19	G3JJZ¶	470	43	G0ATR	226
20	G3IGU	448	44	G3WRR¶	210
21	G4XPE¶	440	45	GW4KVJ	188
22	G4HTD¶	430	46	G3GMS¶	180
23	G5MY	428	47	GM4WLN	148
23	G3HZL	428			

§ Trophy winner
* Certificate
¶ Accurate log

Check logs received with thanks from G5WW, G4IZB & G0IVZ.

DIRECTION FINDING

RESULTS OF TORBAY D/F QUALIFYING EVENT

The assembly for the first Torquay D/F qualifying event took place at "Windy Corner" under a cloudless sky. High spirits and good natured banter gave way to competitive concentration at the start. All teams left the start promptly to search the Torbay area for two hidden stations.

Station B, G4ELZ, was favoured by most to be investigated first. It was located on the edge of Dartmoor, 24km from the start, at Shipley Bridge and sported a very fine radiating earth-staked vertical at the top of the hill near the Tor which most found. The operator, however, was about 300m of aerial wire removed from it, hidden in Rhododendron bushes, the bane of DF hunters.

Station A, G4XWP, hidden only 2km from the start in Clennon Valley, kept his competitors busy during the afternoon with far less aerial but more onerous terrain. Difficult access proved to be only the first of several obstacles. A multiple-earth-staked aerial and steep valley sides kept DF hunters well away so that many extra transmissions were used to tempt them in.

Later, a splendid tea was served at STC social club where Brian Bristow received congratulations for his fine performance. A final thanks to all concerned in running the event and to the camera crew, Peter and Murray, for producing a video of the days activities.

	Name	Club	Time at TX 'A'	Time At TX 'B'
1.	B.Bristow	Mid Thames	14.52	15.46
2.	D.Newman	Northampton	14.53	15.50
3.	B.Pechey	Mid Thames	14.51	16.12
4.	P.Lisle	Mid Thames	15.04	16.19
5.	A.Collett	Colchester	15.04	16.29
6.	G.Whenham	Coventry	15.30	-
7.	C.Wells	S.Manchester	15.31	-
8.	R.Gray	Mid Thames	15.34	-
9.	A.Simmons	Mid Thames	15.39	-
10.	R.Brocks	Chelmsford	15.39.30	-
11.	T.Gage	Mid Thames	15.40	-
12.	G.Nicholls	Banbury	15.44	-

D.Newman and R Gray qualify for the National Final to be organised by the South Manchester Radio Club on 30 September.

ERRATUM

1ST 28MHZ CUMULATIVES 1990

The winner of the SSB section of the above event was G4WEY and not G3WEY as reported in September *Radio Communication.*

CONTESTS CALENDAR

RSGB HF CONTESTS

5 Jan	7MHz LF Cumulative (Oct 90)
6 Jan	3.5MHz LF Cumulative (Oct 90)
7 Jan	1.8MHz LF Cumulative (Oct 90)
12 Jan	3.5MHz LF Cumulative
13 Jan	7MHz LF Cumulative
13 Jan	Affiliated Societies (Nov 90)
15 Jan	1.8MHz LF Cumulative
19 Jan	7MHz LF Cumulative
20 Jan	3.5MHz LF Cumulative
23 Jan	1.8MHz LF Cumulative
26 Jan	3.5MHz LF Cumulative
27 Jan	7MHz LF Cumulative
31 Jan	1.8MHz LF Cumulative
2 Feb	7MHz LF Cumulative
3 Feb	3.5MHz LF Cumulative
8 Feb	1.8MHz LF Cumulative
9/10 Feb	1st 1.8MHz Contest (Nov 90)
23-24 Feb	7MHz CW Contest (Sep 90)
9-10 Mar	Commonwealth Contest (Nov 90)

RSGB VHF CONTESTS

2 Dec	144MHz AFS/Fixed/SWL (Aug 90)
4 Dec	432MHz Cumulatives (Aug 90)
20 Jan	144MHz CW Single Op Fixed /All other
27 Jan	70MHz Cumulatives
3 Feb	432MHz Fixed/AFS/SWL
10 Feb	70MHz Cumulatives
24 Feb	70MHz Cumulatives
2/3 Mar	144/432MHz
10 Mar	70MHz Cumulatives
24 Mar	70MHz Cumulatives
31 Mar	70MHz Fixed/SWL
7 Apr	50MHz Trophy Fixed/Single/Multi
14 Apr	1st 1296MHz Fixed/SWL
4/5 May	432MHz to 24GHz
18/19 May	144MHz and SWL Single/All Others
2 Jun	1.3GHz Trophy
2 Jun	2.3GHz Trophy
22 Jun	432MHz FM Fixed and Open
22 Jun	432MHz CW Single/Multi Op
23 Jun	432MHz Trophy/SWL
6/7 Jul	VHF Field Day
27 Jul	144MHz Low Power/SWL
28 Jul	432MHz Low Power/SWL
25 Aug	432MHz Fixed/SWL
4 Sep	144MHz CW Cumulatives
7 Sep	144MHz CW Cumulatives
7/8 Sep	144MHz Trophy/SWL
20 Sep	144MHz CW Cumulatives
22 Sep	50MHz CW
29 Sep	70MHz Trophy/SWL
5/6 Oct	432MHz-24GHz SWL and IARU
8 Oct	1.3 & 2.3GHz Cumulatives
16 Oct	432MHz Cumulatives
20 Oct	70MHz CW
23 Oct	144MHz CW Cumulatives
24 Oct	1.3 & 2.3GHz Cumulatives
27 Oct	2nd 1296MHz Fixed/SWL
1 Nov	432MHz Cumulatives
3 Nov	144MHz RSGB CW
2/3 Nov	144MHz CW Marconi/RSGB 24 Hour
8 Nov	144MHz CW Cumulatives
9 Nov	1.3 & 2.3GHz Cumulatives
17 Nov	432MHz Cumulatives
25 Nov	1.3 & 2.3GHz Cumulatives
1 Dec	144MHz AFS & Fixed & SWL
3 Dec	432MHz Cumulatives
10 Dec	1.3 & 2.3GHz Cumulatives
18 Dec	432MHz Cumulatives
28-31Dec	144 and 432MHz Fixed Station

There are four new contests this year; 432 and 1296MHz short length fixed and SWL, and Christmas Holiday 2m and 70cm fixed station contests. We still need more SWLs to enter, the currrent leaders can be beaten! There will be an SWL section in every VHF contest even if not mentioned in rules Dates of publication of rules in *RadCom* are shown in parentheses

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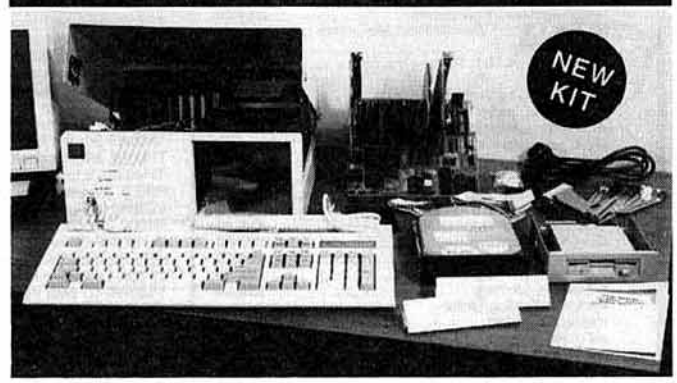

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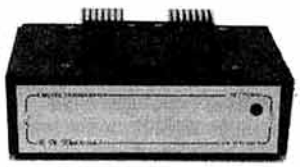

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Bank 6	VHF marine	156-163MHz	25kHz step	NFM
Bank 7	VHF amateur	144-146MHz	12.5kHz step	NFM
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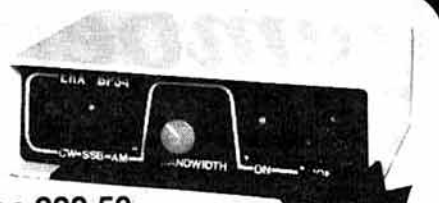

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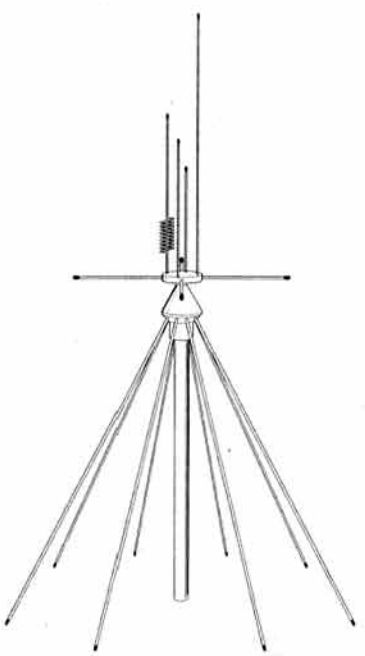

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Most discones only have horizontal elements and this is the reason that they are *not* ideal for use with a scanner. Most of the transmissions that you are likely to receive on your scanner are transmitted from vertically polarised antennas. The Sky Scan V1300 discone has both vertical and horizontal elements for *maximum reception.* The V1300 is constructed from best quality stainless steel and aluminium and comes complete with mounting pole. Designed and built for use with scanners.

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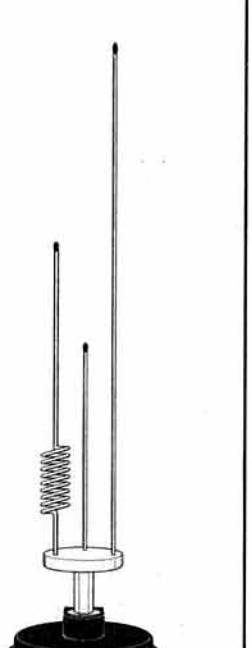

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FOR SALE

● 1 2m h/h. Trio TR2600E, with PB26 nicad, ST2 PSU/chrgr, base stand, spkr/mic, soft cases x2, extra unused wall chrgr, dual-band 5W max linepass pwr meter, BNC fitting. All exc.cond: £235. G0KPH QTHR. (Leamington Spa) 0926 429719 after 5pm.

● 10-12GHZ Handic LNB, 1.5m spun alumin dish and mount, new: £200. Connexions CX2450R remote control block down rcvr, VGC: £50. Racal 9917 freq counter, 9442 STD oscillator, VGC: £100. Racal 9901 universal timer counter, VGC: £65. Marconi TF995A/5 sig.gen: £60. KW77 rcvr, wkg but needs attn: £45. GR1363 56-500MHz oscillator and admittance bridge for ant measurements: £15. W15U: £15. Gould 05250B 15MHz scope: £35. High band GE Mastr 35W+ tcvr: £20. Heathkit freestanding 32ft galvanised tower, HT1G, dismantled: £100. This will carry a 2in mast 15ft above tower. All ono. Buyers inspect and collect. Dave. (Frome) 0373 830439.

● 132FT long wire possible! QTH, small 3 bed semi, long gdn, urban setting. Fertile soil, rotavator, garage, sea! G3DGT not QTHR. (Portchester) 083483 369.

● 200W dry UHF load: £25. AT150 ATU: £190ono. IC28H 144MHz tcvr: £200. Pye TP105 60W boradband VHF transmitter: £25. 24/28VDC petrol generator: £50. Heathkit DX100U: £18. Vibroplex bug key: £7.50. HP331A distortion analyser: £35. MM432 tvtr: £15. G4OKM QTHR. (Wokingham) 0734 789187.

● 6M tvtr 144/50 25W PEP with 7dB attenuator: £150. Altron 40ft mast with cage: £150. Kenpro KR400 rotator: £75. 14ele 2m yagi: £25. 5ele 6m yagi: £25. 2m masthead preamp with controller: £50. G1VOQ QTHR. (Daventry) 0327 62126 or 0831 412148.

● 70CM linear amp. 10W in, 50W out: £80. PA for 2/70 FM ports. I/p adjustable, 20W o/p, RF switched: £45 (Bridgend) 0656 665225.

● ALINCO 2m 45W FM tcvr with selectable scan steps and 14mem channels, mint cond: £220. G4KOU QTHR. (Worthing) 0903 62129.

● ALINCO DJ100E 2m h/h, remote mic, telescopic whip, chrgr: £110. Nearly new BBC Master 512 coprocessor and latest s/ware. Runs IBM on Beeb: £90. Commodore Plus 4 OK on packet: £30. G7DWX QTHR. (Loughborough) 0509 235165.

● ALINCO DJ100E h/h c/w pack, chrgr, r/duck ant. 2.5W, 11mths old. Owner going mobile: £150. John, G4VPU QTHR. (Whitley Bay) 091-252 2304.

● ALTRON AT32 2 section mast/head unit. Top section bent but replaceable. Sensible offers: £150. Paul G4XHF. (Crawley) 0293 515201.

● AMSTRAD PPC512DD computer, 1yr old, comes c/w manuals, s/ware, case, PSU etc: £325ono. Also Regency HX850E scanner, new batt fitted recently, chrgr: £90ono. Keith G1YRX. (Barnet, Herts) 081-441 1224.

● AN exceptional opportunity to purchase v.large 2 bed flat incl comprehensive radio station. 3ele beam, verts, trapped dipole, TS940S, linear, ATUs: £110,000 or will split. Exc.wkg relationship with neighbours. G0GKT QTHR. 0425 619232.

● ANALYTICAL laboratory balance by Sartorius. Single pan electro mechanical model no 2452: £180ono or swap 2m h/h. Buyer collects. G3RFN. (Leyland, Lancs) 0772 421885.

● ANT hygain 3ele tribander full size TH3 balun good cond. Kenpro rotator KR400 round controller: £250pr. (Manchester) 061-723 3461.

● AOR2002 rcvr, scanner 12V lead, 240V lead, box and manual. Little used, owner going up market: £275ovno. (W.Yorks) 0274 880927 eve.

● AR88 in wkg order, no spkr. Photocopy of manual. No reasonable offer refused. Buyer collects. G1JQH QTHR. (Sheerness) 0795 876091.

● AR88D: £45. VGC, manual, spkr, phones, complete set spare valves plus Viceroy MK3A free. GC with 6146Bs and spare valves. (Liverpool) 051-531 7088.

● ATLAS 180 c/w console pwr pack. Exc.cond 100W SSB/CW: £300. G3GMN QTHR. (Gloucester) 0452 301365.

● ATLAS 215X with 2948H PSU. Would split: £290ono. G3VKP QTHR. (Cambridge) 0223 842978.

● BARGAIN. Trio TR9000 2m all-mode tcvr plus MM144/100S unused 100W 2m linear amp. Both units in unmarked cond: £450. (Nottingham) 0602 204083.

● BBC Master 128 with Cumana dual DSDD drives and plinth, barcode reader, Viewstore, Viewplot and other s/ware. Plus ref manuals. All for: £450. Epson FX85 printer: £150. All in exc.cond with orig.packing. G0NJQ. (Cookham) 06285 20320.

● BELCOM LS102 10m multimode 15W, proper VFO. Dig readout: £150ono. G4PWD. (Rugeley, Staffs) 0889 578981.

● BELCOM VHF/FM monitor 2m scanning rcvr model AMR104H: £150. G6DJE QTHR. 081-459 8274.

● BJ200 26-520MHz AM/FM pocket scanner: £50. Vince. (London) 081-531 0716 after 6pm.

● BNOS LPM144 3-180 linear & preamp: £225. MM 23cm tvtr 144MHz IF: £125. 5V/30A PSU: £20. G6MXL QTHR. (Poole, Dorset) 0202 665284.

● BOGNOR. 4 bed det hse, private estate, close sea. Ideal DX. Plot 150x20ft: £160k. Offers invited. G2CIL (Felpham, Bognor Regis) 0243 829508.

● BRAND new Icom IC2SE 2m h/h, comes c/w nicad and chrgr. Retailed at £275. Will sell for £220ono. Sean G0NRW. (New Mills, Stockport) 0663 65982.

● BUSH TV 10in screen, 1959. Collectors item. Beautiful cond. Back missing: £80. 021-777 1638.

● BUTTERNUT HF5V 20-15-12-10m 2ele compact beam. VGC: £160. G4MH compact 2ele beam, VGC: £50. Western DX33 3ele triband beam, never used and boxed: £280. Buyers to pay carr please. GM4GTU QTHR. (Aberdeen) 0224 743039.

● COLLECTORS books. Techniques of Radio Design, Zepler 1945. RSGB Handbook, 1941. ARRL Handbook, 1954. Sound Reproduction, Briggs 1950. Second Thoughts on Radio Theory, Cathode Ray 1955. Bound vols 1&2 of Practical Electronics c/w Blueprints: Offers. Brian. (Newport, Gwent) 0633 614376.

● COLLECTORS items. Varley cellular HF choke: £4. RI dual antistatic HF choke: £4. RI LF choke: £3. Lissen inter valve transformer: £5. Vidor batt/mains portable valve rcvr model 396A: £6. RF unit No.24: £3. G3OEG. (Staines) 0784 454757.

● COLLINS 390A rcvr, 32-band, VGC: £375. Racal 117E exc.cond sensitive E235 Racal 17L table model, fitted LF cvtr type RA137A. Both rcvrs VGC with orig manuals: Offers. (Southall, Middx) 081-571 5759.

● COLLINS 455kHz mechanical filters, one type 455ZI p/n 526-9095-00. One type F455J-08 p/n 522-9090-002: Offers. G3DYY QTHR. (nr.Huntingdon) 0487 841558.

● COLLINS KWM2A RE 516F2 312B5 136B2 noise blanker cables, manuals, valves. VGC: £800. G3WNI QTHR. (Devon) 0823 680778.

● COMMODORE 64, ICS AMT2 TNC. ICS s/ware cartridge AMT2 RTTY/CW PSU, RS232 i/face to match, c/w leads, inst books. Ready to go: £125ono. Philips 80 green monitor: £60. JEP deluxe filter suitable for the Spectrum c/w insts: £15. (Benfleet) 0268 753685.

● COMMODORE 64. 2, 1 for spares only, 2 green monitors, 2 disk drives 1541, cassette recorder, joystick, manuals, books, repair manual. S/ware, Superscript, Superbase, Easyscript, Forth, Flightsim, Practicalc: £200. PC items keyboard: £15. CGA colour monitor: £35. White screen monitor 12V with mains PSU + Hercules card: £50. Full-size organ keyboard, Rhodium wires: £35. G3OGK QTHR. (Andover) 0264 781752.

● CRO unit: £15. Spare tubes: £7ea. 807: £1ea. General chemistry book: £10. LEO 6WPM cassette: £2.50. Buyer collects. (Barking) 081-594 8675.

● DAIWA h/d PSU 30A: £85. Shure 444D mic: £45. Altron 44ft tower: £350. G4SGV QTHR. (Redditch) 0527 545304.

● DRAE SSTV tcvr: £150. FT101ZD, TS180S service manuals: £7ea. Operating insts telereader: £3. All items post extra. GM4HKW QTHR. (Kirriemuir) 0575 73455.

● DRAKE 7 line stn. TR7A tcvr, all extras fitted, NB7 and AUX7 boards, RV7 synth. VFO with mem facility, h/d PS7 and astatic desk mic. Also R7 rcvr, all 5 filters with extras. Superb rcvr in mint cond. No splits on above: £1400. Drake L7E 1kW o/p HF linear matching above stn, mint: £900. Trio SM220 stn monitorscope with pan display: £100. 4-1000A HF linear 1.5kW o/p. Prof built. Split PSU, RF deck. V.heavy: £700ono. 2 prof HF linears, solid state. Wideband 100mW for 1kW o/p cont duty, complete. Free standing units. Peter, G4HSB QTHR. 0642 816608 eve.

● DRAKE PS7 PSU with fan: £165 incl carr. AUX7: £25. TR7/R7 filters, 6kHz, 0.3kHz: £25ea. (Shrewsbury) 0743 884858.

● DRAKE R4A RX, VGC, manual: £120. NDI 2m FM tcvr, 5/25W o/p, c/w m/mount and manual: £120. Hallicrafters HT32B TX. Collectors item, 3.5-30MHz, SSB/AM/CW: £75. Radiospares 500W isolation transformer. 2 separate secondary windings to cover 120V or 240V in 5V taps: £20. 12ele 144MHz yagi ant: £10. G3AVL QTHR. (Wirral) 051-327 7149.

● DTR3 80m CW tcvr: £95. TU2 Mk2 ant tuning unit: £35. PSU13 regulated PSU: £25. Zepp 80m ZA-3.5 ant: £35. 40m ZA.7R ant: £45. KW Super morse key, custom-built: £45. Maplin noise ratio morse oscillator: £15. Buyer collects. G1HPJ. (Stevenage) 0438 354857.

● EDDYSTONE 770U 150-500MHz rcvr: £55. Philips PM3400 sampling scope 200ps risetime: £45. Pye Cambridge on 4m AM: £30. All wkg, all ono. G4LUN QTHR. (New Milton) 0425 611084.

● EDDYSTONE S640 manual partly stipped for rebuild: £10. Wavemeter Class-D: £8. Phones DLR1: £3. WW2 American radar multirange testmeter 856G: £10. Marconi TF1041C VTVM: £10. Clockwork Master contactor Type 2: £8. Stabilised PSU 500V 500mA. G3BGF QTHR. (Bristol) 0272 843321 anytime.

● ENGINEERS lathe, length between centres 20in, swing radius 4.5in: £250. G7AZB QTHR. (Minster-on-Sea) 0795 872319.

● EPSON LQ2500 24-pin dot matrix A3 printer with dual bin sheet feeder: £500. Vince. (London) 081-531 0716 after 6pm.

● FRG7 exc.cond hardly used, boxed with inst book: £100 for quick sale. G6NYQ. (Orpington) 0689 39386.

● FRG7 rcvr fitted CW filter. GWO with manual: £90. (Blackfen, Sidcup, Kent) 081-859 7630 after 6pm.

● FRG7700 rcvr, as new: £230 incl del with 30 miles. G6UYY QTHR. (Dartford, Kent) 0322 76327.

● FRG8800 c/w FRV8800 and FRT7700. Exc.cond. Silent key sale: £500ono. G4UXE QTHR. (Evesham) 0386 831508.

● FT101 Mk1 160-10m, New o/p valves. A bit low pwr on 10m: £200. FT290 Mk1, good cond: £200. MFJ941D ant tuner. Almost new: £75. Would consider pt/exch for gen.cov rcvr of approx value £200. G0KWG QTHR. (Halifax) 0422 344284.

● FT101B, mint, boxed, CW filter, fan, mic, manual plus pwr meter: £280. QTHR. (Sidcup) 081-309 1295.

● FT101ZD Mk3, fan, mic, manual. As new: £425. FRG7 RX 500kHz 30MHz unmodified: £100. VHF scanning RX covers 70-87.9MHz 140-175MHz: £30. 5A PSU: £10. Reg, G4GEL QTHR. (Potters Bar) 0707 51351.

● FT102 mint cond, boxed. SSB narrow filter and AM/FM board fitted. FV102DM ext VFO. YO901 monitorscope with bandscope fitted. All wkg with FT102: £1000. Will not split. AMT2 1/2hr use. Only fair offer considered. Henry Radio 1KD-5 1200kW linear. Very good cond: £550. Datatech phone modem, new. Cost £220: Offers. (Brighton) 0273 417120 day 0273 418713 eve.

● FT102 tcvr AM/FM 200W PEP: £550. FC102 ATU: £75. SP102P spkr/phone patch: £50. TR9500 70cm all-mode tcvr: £275. Matching mains PSU PS20: £40. SP120 spkr: £15. Daiwa CN630 144/70cm swr/pwr meter: £50 (Coventry) 0203 460405.

● FT200 80-10 with PSU plus Europa B 2m tvtr, 50W+ VGC: £230. G1LCI QTHR. (Maidenhead) 0628 22352.

● FT200 HF tcvr with PSU/spkr, mic and h/book: £185. G0KYG QTHR. (Fakenham) 0328 863283.

● FT200/FP200 80-10m HF rig, exc.cond, spare PA valves: £200. Prefer buyer collects. G4GTX QTHR. (Sunderland) 091-528 4435 after 6pm.

● FT201 5-band 240V/12V tcvr with Homebrew FM, spare PAs and driver, c/w Europa 2m tvtr, Shure 401 mic, Datong RF clipper and Homebrew second VFO: £295ono. Would consider exch for VHF/UHF multimode rig. FT75 5-band xtal VXO mobile tcvr: £75ono. All GWO c/w manuals and can be demonstrated. Reason for sale, bought new TS140S. G4LBH QTHR. (Luton) 0582 415846.

● FT290R Mk1 spkr/mic plus Superod 7/8 whip for rig. 7/8 & 5/8 mobile whips, spare nicads, boxed, VGC: £250. Buyer collects. G4VIW QTHR. (Upminster) 04024 45199 after 6pm.

● FT290R Mk1, good cond boxed with manual, 30W linear, PSU, nicads, chrgr, helical, c/case, mic, strap: £280. No offers. G0MSC. (St.Helens) 074488 3547.

● FT290R Mutek F/E, carrying case, chrgr etc. Toyo TA30 linear, Jaybeam 8ele crossed yagi: £250. Will split. G1IXK QTHR. (Chepstow) 0594 530056.

● FT307 Sommerkamp (same as Yaesu FT107), all extras fitted. Matching VFO FV307 and spkr SP107: £600. HF linear amp 1x 3-500z 1kW i/p: £300. Trio TR2300 c/w nicads and mods: £105. President Adams 10m SSB with 100W amp and DTI approval: £110. 10m FM and 40W amp: £60. Charlie G0DZI. (St.Helens) 0744 51814.

● FT709 70cm h/h: £140. AR2001 25-550 scanning rcvr: £175. Sinclair Z88 laptop computer: £155. G3UYK QTHR. (Winchester) 0962 867819.

● FT727R case YH2 headset, PA3 12V car adaptor, chrgr: £285. Era Microreader + morse tutor: £65. Kenwood HMC2 headset/Vox for TH25/45 (offers): SMC32 spkr/mic for TH25/45E: £20. Sinclair Cambridge calc: £5. All plus carr. G8ESK QTHR.

● FT727R dual-band h/h 5W, nicad, chrgr: £325. Tektronix 545A scope, no EHT, manual, 2x plugins: £35. Avo valvetester, slight fault: £15. G7DDD QTHR. (Solihull) 021-744 1536.

● FT736R Yaesu. 144 and 430MHz plus 50 and 1.2GHz modules. Iambic keyer module, ext spkr c/w audio filters, desktop mic, w/shop manual. Cost £2274. Sell: £1300. Versatower P60 with electric winch and auto brake winch, head and bearing. 5ele 6m tonna, 4x 23ele 1.2GHz tonnas and 4100 cable, Cenpro CR400 rotator: £500 the lot. Himound key HK802: £50. Eddystone 770R rcvr: £50. G6FIO QTHR. (Solihull) 021-745 3354.

● FT767GX c/w 2m module. Updated local unit fitted by SMC: £975ono. I might even be prepared to haggle. Buyer inspects and collects or carr.extra. G4MYA QTHR. (St.Helens) 0744 22647.

● FT780: £230. 7.6MHz shift, v.little used. GI6FHD QTHR. (Portadown) 0762 350759 after 6pm.

● FT9600 Raycom MkV, mods HF to 960MHz: £420. PA100 for FT77S or possibly suit FT707 or FT1, complete PA stage heat sink and fan. Ready to bolt on & connect up: £100. 13in B/W monitor 14x13.5x15in: £15. FT75 with mobile, 12V PSU, mains PSU, VFO for 20/80m, 15 switch ED VFO positions, 3 for each band, some xtals twin tube o/p stage transistor up to driver: £150. Standard C8800 mobile rig, VHF synth TX/RX 5k/25k shifts mem: £125. G3BDK QTHR. (Towcester) 0327 52309.

● G3NGX wishes to sell Nagard scope. Valves, spare tube, WO. Built like battleship: Offers. Harry. (Reading area) 0491 872919.

● HEATHKIT HF rig SB400, SB303 100W with manuals: £250. G0ASD QTHR. (Stourbridge) 0384 372961.

● HEATHKIT SW7800 gen.cov HF rcvr, 150kHz-30MHz. SSB/LSB CW/AM dble conversion Superhet, dig readout. Connections: phones/tape o/p/50ohm ant PL259/ground post. Built in 1989. One owner, as new cond c/w PSU, manual, cir.diag. Exc HF rcvr. Cost £300: £175ono. Dave Gosling G0NEZ, 31 Semphill, Hemel Hempstead, Herts, HP3 9PF. 0442 45832 anytime.

● HENRY Radio 2002A 144MHz valve linear amp, 1200W o/p. As new, v.little use. Buyer must collect. Any trial. Offers around: £950. G6NWF not QTHR. (Birmingham) 021-471 3243.

● HEWLETT Packard HP28C advanced prog scientific calc: £75. Vince. (London) 081-531 0716 after 6pm.

● HF vert c/w radials: £45. FT77/707 m/mounting frame: £12. WH Smith computer recorder: £15. Spectrum mini printer: £10. Full size G5RV: £10. Howes brand new boxed as received 20m TX built: £17.50. KW Match: £15. Heath swr unit type HK2141 coverage 50/175MHz: £20. AEC twin meter swr/pwr unit 100W: £10. AEC single ditto 10/100W: £7.50. Post at cost. G3OAZ QTHR. (Basingstoke) 0256 465126.

● HOKUSHIN HS-HF5 trap vert ant with HF-5R radial kit: £50. Dewsbury Supa-Tuta: £44. HQ1 4-band mini-beam: £55. Dee-Comm 8ele yagi, unused: £15. Eddystone 840C HF rcvr: £85. All items in VGC and GWO. G0NVM. (Witham, Essex) 0376 84649.

● IC2E plus 2x BP8: £125. IC471E incl PSU: £525. FT707, FP707: £350. IC3210 dual-band mobile: £375. Yaesu FT965 (FT9600) scanner: £375. FT790: £175. Azimuth-elevation rotator, new, unused: £250 incl control box. VHF linear 4CX250B needs transformer: £150. 40ft 2 section tower H/D plus rotator cage, ready for collection: £300. Large collection RadCom, PW etc: Offers. HF/VHF sig.gen: £40. 3x 88ele Jaybeam yagis: £90. 4-way pwr splitter: £40 new. Fluke dig meter: £90. Akai AMV11 stereo pwr amp: £80. Kenwood ATU: £60. TS120V needs some work: £175. (Biggin Hill) 0959 76589.

● ICOM 720A with PS20, many extras: £550. Yaesu FT708 with ext mic 12V PS: £100. (Ealing) 081-567 8771.

● ICOM HP2 phones: £20. Search 9 2m FM RX: £30. 071-263 2983.

● ICOM IC04E 70cm h/h tcvr. VGC: £155. ICR7000, v.little use, boxed: £700. Heathkit free-standing 30ft tower, galvanised. VGC: £150. Colin, G4ERO QTHR. (Ely, Cambs) 0353 665869.

● ICOM IC251E, Mutek F/E plus desk mic. VGC: £470. Nag 144XL linear, new valve. VGC: £225. Yaesu FT690 MkII, matching linear plus desk mic and h/book plus 3ele beam: £350. Hilomast 30ft plus compressor, h/duty rotator. G8IQO QTHR. (Eastbourne) 0323 763123.

● ICOM IC32E dual-band h/h with chrgr and spkr/mic: £225. Also dual-band ants CHL21J: £10. HS727VM: £17. G4RSR. (Poole) 0202 687248.

● ICOM IC471E multimode with 19ele tonna cross ant: £450. Icom IC271E multimode: £400. Both rigs in mint cond with orig.boxes. Also Realistic PRO2009 base scanner: £70. Buyer collects. Ken Harvey G0DGV. (Walsall) 0922 493994.

● ICOM IC475H 70cm all-mode basestn, 75W, 500Hz CW narrow filter, high stability xtal unit: £890. Icom IC900E 70cm/10m multi-band mobile with 100W 10m linear: £600. All as new with orig.packing. All ono. Bruce, G4WVX not QTHR. (Bucks) 0628 664415 anytime.

● ICOM IC4E c/w 2 BP3 nicad packs and spkr/mic: £120. 80tr 5.25in disk drive, suit BBC: £50. (Barton, Hants) 0425 615143.

● ICOM IC720A tcvr 160-10m incl WARC bands, FL36 250Hz CW filter, AM/SSB filters fitted, c/w PS15 PSU, HM17 hand mic, SM2 table mic and w/ shop manual. Just serviced at Icom. Details incl: £550. Icom PS55 PSU for IC725, 735 etc. 13.8V/ 20A: £100. Daiwa variable regulated PSU 0-15 at 12A max: £50. Standard C500 dual-band 2m/70cm h/h tcvr with nicads: £195. Philips d/beam scope 10MHz. Needs attn: £20. Amstrad s/ware on plug-in ROM for CPC6128 for use as comms package, Honeyterm, Viewdata etc: £10. G3XNE. (Bude, Cornwall) 0288 354564.

● ICOM IC735 plus PSU, hardly used, as new: £900. Must go. Phil G0JXR. (Hoddesdon) 0992 468522.

● ICOM IC735, as new, hardly used on TX: £625ono. Matching PSU, PS55: £75. Both for: £650. Martin, G4XUM QTHR. (Nantwich) 0270 626351.

● ICOM IC735, CW filter, int keyer, VGC: £800. Fluke model 27 h/duty prof dig multimeter (yellow) rigid case, hardly used: £200. Martin, G4FUI QTHR. (Penrith, Cumbria) 0768 66728.

● ICOM IC740 and matching PSU, boxed, 2 mics, exc.cond: £550. G1LCI QTHR. (Maidenhead) 0628 22352.

● ICOM IC900E c/w UX49E 70cm module, UX29E 2m module, UT29 tone and squelch: £650ono. G0HRM. (Rugby) 0788 560384.

● INSTAGRAPHIC bubble etch kit with 35 boards, 5ltrs ferric choride, transfers, trays and board racks: £75. Seagate ST225 20HB hard disk drive, unused: £40. Poet 2+2 boss/secretary phone system, new with insts, BT charge £500+: £150. Mark G6HSM. (Canterbury) 0227 750471 eve-w/e.

● JRC model JST100 HF tcvr, 10-160m, twin VFOs, Vox, processor, passband tuning, mems, SSB/CW/RTTY. H/book, boxed, exc.cond (see buyers guide to Amateur Radio): £575. Ten-Tec Argosy II, dig tcvr, with matching PSU, mic, h/book, mint cond, boxed: £450. R2000 gen.cov RX, h/ book, boxed, mint, save £270 on new list price: £325. Lowe ASV1515, VHF 2m monitor RX: £25. AR900 scanner with chrgr, mint cond: £140. Buyers collect or split carr. G0MHQ. (Cambs) 0733 230088.

● KENPRO 144 h/h touchtone LCDR out CW chrgr, box, insts, mint: £175. Navico AMR1000S c/ w inst. Racal DC filter fitted. No ignition sprogs: £220. G6RJG. (Workington) 0900 61822.

● KENWOOD 2k liner TL911, mint cond: £500ono or exch HF tcvr. (Medway) 0634 713478.

● KENWOOD TH415E 70cm portable with chrgr + 2x PB2 nicads + case. Unused: £195. G6KGU QTHR. (Rye, Sussex) 0580 830558.

● KENWOOD TR9130 5W/25W 2m multimode with m/mount: £300. Desk mic MC60A: £45. Rotator Alinco EMR400 with 5ele 2m yagi: £40. All above in good order and with v.little use. Peter G8TIO. New address. (Croydon) 081-655 3993.

● KENWOOD TS120S and VFO120: £400. Yaesu FC700 ATU: £85. Yaesu FT290 all-mode tcvr, nicads etc: £200. Will exch for 6m equip WHY for any of above equip. G4YRR QTHR. (Stoke-on-Trent) 0782 395017.

● KENWOOD TS140S HF tcvr: £600. Drae 24A PSU: £100. PK232 data controller: £160. All above in mint cond and comes with orig.packing. Also Homebrew Z-Match with d/load and swr/pwr meter: £40. G0LFX. (Uckfield) 0825 762756.

● KENWOOD TS530S, exc.cond: £525. Yaesu FL2100Z linear, only 12hrs in log since £250 spent on service incl replacement of both PA valves by SMC: £575. SEM Transmatch ATU 160-10 incl Ezitune: £80. All prices carr paid. G4ODV QTHR. 0209 820193 after 7th Dec.

● KENWOOD TS530S: £550ono. Yaesu FRG7 rcvr: £115ono. Phones TH55: £10. Uniden 2030 mic 027: Offers. Eurosonic PSU PP136 6A0A: £15. Academy swr meter: £7. Joymatch ATU: £10. 2m cvtr 28-144MHz: Offers. Silent key sale, equip not used since 1983. Not QTHR. (Richmond, N.Yorks) 0748 2998.

● KENWOOD TS830S 9-band MC50 mic, Kenwood VFO240, Kenwood AT230. All items pristine cond, orig.boxes and manual: £1000. May consider split. Brian, G0BLO QTHR. (London) 071-515 5517.

● KENWOOD TS830S tcvr plus AT230 ATU, SP230 spkr, MC50 mic, stand. All boxed, exc.cond. Only a few hrs use, a bargain at: £800. Arthur G0JVH. (Cheltenham) 0242 675632.

● KENWOOD TS830S, 270Hz CW filter fitted, mic, manual, exc.cond, boxed: £650. Kenwood VFO240 remote VFO: £70. KB1 Kenwood deluxe tuning knob: £7. Matched pair new Amperex 6146B tubes: £15. New Westinghouse 12BY7A tube: £10. George G6VS QTHR. (Liverpool) 051-733 6415.

● KENWOOD TS950S digital: £2800. Reluctant sale due to mortgage. (nr.Manchester) 0942 891605 after 6pm.

● KENWOOD TS950SD full spec, as new, orig.packing plus manual: £2500ono. G4RUQ QTHR. (Chesterfield) 0246 236756 after 4pm.

● KW2000B with PSU and mobile PSU. H/books etc: £165. Buyer collects. (Manchester) 061-724 6961.

● LATTICED mast 35ft telescopic wall mounted (allweld): £150. Jaybeam tribander 3ele: £175. Icom 2m 251E with Mutek F/E, superb contest rig (won RSGB fixed): £450. BNOS 2m linear 180W: £150. Packet type TNC (Tiny 2) with Commodore 64 s/ware: £100. G0BUK. (nr.Uckfield, E.Sussex) 082581 3356.

● LINEAR amp HF 1.5-30MHz. Redifon 6139 1.5kW QRO cont rating, c/w manuals. V.high quality: £550ono. Allan GW0GGW. (Bangor) 0248 600766.

● MAINS trouble? Advance constant voltage transformer, i/p 190-260 o/p 240, RMS 150W: £80. G3FNJ QTHR. (Harrow) 081-866 4680.

● MM 144MHz AM RX: £10. MM 5W AM 144MHz TX: £10. Acorn Prestel adaptor: £20. Homebrew RTTY unit for BBC Micro, incl s/ware: £20. Ray Wright, G3WZR QTHR. (Guildford) 0483 575870.

● MOSLEY TA32 BRAM plus AR40 rotator. Good cond, coax and cable: £65. Prefer buyer collect. (Christchurch) 0202 485569.

● MOSSLEY TA33 HF tribander: £100 VGC. Kenpro 400 rotator: £95. Kenpro 500 elevator: £95. 2x 10XYs 2m by Jaybeam: £30ea. 2x 12XYs 70cm by Jaybeam: £30ea. Incl of harness for circular polla' 2 phasing coupler 70cm/2m incl of N-type connectors: £12ea. 6m 4ele folded dipole. New: £30. (Norwich) 0603 409857.

● NRD515 rcvr, exc.cond c/w matching spkr, h/ book and boxed: £450. 96ch mem unit NDH518: £95. Marconi valve voltmeter TF2604: £15. Advance freq.counter/timer TC12: £25. Both with h/ book. Morris. (Bolton) 0204 40629.

● POLYSKOP 1250MHz sweeper & display type-N connectors, WO: £40. You collect or del.extra. G8AOJ. (Seaton, Devon) 0297 23020.

● PROPERTY of silent key. TS930S: £1000. Henry 2KD classic linear amp: £1200. TS440S with auto ATU, unused: £900. FT780 70cm multimode, as new: £290. FT690 50MHz multimode: £210. FT230R 25W FM mobile: £200. Icom IC271 25W 2m multimode basestn: £400. 20A/13.5V DC PSU: £75. 4CX1000A and VHF base: £75. 4CX250M: £5 used. 4CX250 bases VHF: £5ea. B5F bases: £3ea. 4CX300A: £10. Bases: £10. GW3NWS QTHR. (Newport, Gwent) 0633 880146.

● RADIO shack with house attached. Purpose-built sound-proofed shack in loft of semi-det house in secluded position. 3 beds with fitted wardrobes, bathroom with shower. Kitchen plumbed for washing machine and dishwasher. Downstairs cloakroom, hall with phone point, 2 other points in bedroom and shack. Living/dining room 18x18ft. Warm air heating, dble glazing throughout. Landscaped walled gdns. Telescopic mast 66ft from shack. Separate grge: £65,000. George G0ICR. (Worcester) 0905 25131.

● REEL-to-reel 1/4in tape recorder, Akai X1800SD, 7in spool 4tr, 4sp 15-17/8ips incl 8tr cartridge recording facility port. Mint cond, little used. No offers: £150. Also 2m Alinco FM radio: £75. Will deliver within 50 miles. (Royston, Herts) 0763 262443.

● ROBOT 450C slow scan cvtr: £400. Incl SCI mode fitted. JVC video camera GX59E: £100. Full details. Chris, G4MXB QTHR. (St.Austell) 0726 850576.

● SELINA 215 8-band Russian rcvr, batt/mains. As new: £25. LR2 2m vert ant, Jaybeam. Never been used: £40. Sony ICF2001D synth rcvr, air/FM/AM FM/CW SSB/AM 150kHz 30MHz 116-136MHz 76-108MHz, 32 prog mem, batt/mains: £250. Brian G7GGC. (Calne) 0249 816334 after 6pm or w/e collection only.

● SHORT wave rcvr. Tandy model DX300 10-30MHz cont. Dig display. Exc.cond. Good starter RX: £80. Dave G3ZOI. (Reading) 0734 332777.

● SILENT key sale. Racal RA121 SSB adaptor: £15. BC221: £12. McElroy bug key SER 6060: £21. 6cu ft boxed valves: £25. 15 used boom mic headsets: £12. HF trapped vert: £20. 2m Slim Jim: £3. Antique Gaumont variometer: £10. Heavy duty morse key: £7. Boxed Harley signalling lamp: £9. Various cables, amps, phones: £5. Ferranti batt valve port: £5. The lot for: £95. Buyer collects. (Brackley) 0280 701321.

● SONY Camcorder V8AFE, case, tapes, batts etc: £350ono. Sony RM100V editor: £60. All as new. G3KNJ QTHR. (Watford) 0923 244069.

● STANDARD C500 dual-band h/h with s/case: £215. Also Tandata 1616 Prestel terminal colour with Autodial etc. Boxed: £120. (Worthing) 0903 830434.

● STANDARD C5800E 2m multimode 25W o/p m/ mount, boxed, new cond: £265ono. Malcolm G0HOG. (Ruislip) 0895 676919.

● STANDARD C78 UHF FM port tcvr with CPB78 FM linear/preamp. Both with manuals, nicads, chrgr, soft carrying case, rubberduck, all leads: £130. Get onto 10m. MM 10m tvtr 2m IF: £75. Dragon 32 computer, dustcover, joysticks, all leads, PSU, Tandy cassette recorder. Both boxed, manuals, games, editor/assembler: Offers. Lots of Pye equip. Phone for details. All VGC. (Leeds) 0532 741365.

● STAR NX15 wide carr printer for sale. IBM or compatible. Draught or NLQ, tractor or friction feed. Cables and manual: £185. FDK750XX, needs attn: £90 sold as seen. FDK430X expander + all bits: £120. Or both for: £200. Tono 100W 2m: £90. (Chester) 0244 674998.

● STRUMECH Versatower P60 tiltover mast with head unit emotator h/d rotator 1102MXX control unit. VGC, ready for collection: £400. KW1000 linear, exc.cond: £350. Drake MN2000, mint: £300. Dual 2-30V 10A metered PSU: £35. G4GIK QTHR. (Solihull) 06755 2186.

● SUPERB Kenwood Trio HF station consisting main rig fitted CW xtal filter, remote VFO, linear amp, PSU. All units mint, boxed, literature. Offers around: £850. Send for photo and full details. Also incl 80m QRP rig. G4MWN. 0664 64678.

● SX200 scanning monitor rcvr 26-88MHz, 108-180MHz, 380-514MHz, 16 prog channels, FM/AM, priority scan. Early model: £150 plus post. G4YNZ QTHR. (St.Austell) 0726 73647.

● TANDY TRS80 computer system. TRS80 level 2 computer, B/W monitor, expansion i/face 48k. 2x mini-disk drives TRSDOS, 4 pen graphic printer, manuals, cables. As new: £200ono. No split. Revcone ant 30-500MHz: £25 new. Jaybeam LR1/ 2m colinear, new: £30. AOR AR800E scanner: £100. Kenwood TM231E 3mths old: £230ono. Nikon F401F autofocus 35mm camera, 30-70 zoom lens + dedicated speedlight flash + Sigma 70-200mm AF zoom. As new: £375ono. G8VJF QTHR. (St. Neots, Cambs) 0480 213595.

● TEN-TEC Argonaut 515 with matching audio and notch filter. Pristine cond: £275. G4MLI. (Tintagel, Cornwall) 0840 770344 after 6pm.

● TEN-TEC Century 22 tcvr incl calibrator keyer and QRP PSU: £150. Amstrad 1640 computer twin drive, mono display: £150. SEM QRM Eliminator MkII: £35. Bob not QTHR. (Worthing) 0903 31466.

● TEN-TEC Century 22 tcvr, good cond c/w cir.breaker: £250. Kent iambic key, as new: £25. Yaesu FRG7, good cond, fitted quality SSB filter and xtal BFO c/w freq.counter: £130. G0KMC QTHR. 0296 29342 eve-w/e.

● TEN-TEC Corsair Mk2 with PSU and CW filter: £895. Navada ATU: £95. G4VWB QTHR. (Derby) 0332 551945.

● TEST gear scope HM203 20MHz, VGC: £120. Sig.gen Marconi TF995/A FM/AM: £35. Boonton UHF GDO 300-1000MHz: £25. Pwr meter Lodestar PM330: £30. VVM Marconi TF1041C: £10. General Radio UHF oscillator: £30. Inductance bridge 1uH up: £10. HB QRP TX, 80/40/30/20 CW: £15. Isolating transformer 200VA: £10. Mains valve radio 3-band wooden cabinet: £8. Knome 35mm enlarger c/w 50mm El-Nikkor lens, unused: £40. HV/LV transformers, chokes. Test gear revalved, orig.manuals. Callers only. G3ZYL (Hertford) 0992 582307.

● TONO Theta 5000E sender decoder CW/RTTY/ ASCII/AMTOR terminal with built-in 4in monitor and keyboard. Cond as new: £320. Micropro daisy wheel printer as used with above. Cond as new: £120. G4OWM QTHR. (Sutton) 081-647 8399.

● TOWER 30ft lattice work, 2 sections h/d: £50ono. G1VHC. (Dunstable) 0582 667490 after 6pm.

● TOWER fixed lattice, c/w base and head sections, integral steps, 30ft: £100. G4NVV QTHR. (Bristol) 0272 842925.

● TRIO 7010 2m SSB tcvr plus Homebrew VFO: £60. Mizuho 2m SSB QRP h/h: £45. Tonna 9ele 2m port, hardly used: £25. 7ele 2m ZL special: £5. 2x 12V/3A PSUs: £5ea. Expmr Pye 2m amp, broken: Free with tcvr. G1PWE. (Northwich) 0606 882826.

● TRIO 9000 2m multimode, mic, mobile headset, car brkt, manual. Tone not wkg hence: £250ono. Trio TH21E h/h, case, spare heavy duty nicad, chrgr, DC/DC cvtr, manual: £150ono. Paul G4ZMO QTHR. (High Wycombe) 0494 32602.

● TRIO 9130 multimode 5/25W, B09 base unit, MC60A basestation mic, m/mount: £500. Warwick, G6SKM QTHR. (Wigan) 0942 879568.

● TRIO 9500 UHF multimode mobile tcvr with mobile brkt. V. little use and in superb cond throughout: £300ono. G4HBD QTHR. 0202 767583.

● TRIO HF T/R T599S R599S fitted 2m module S599 spkr, little used: £275ono. TS700 2m base + Vox: £175ono. TR2400 h/h 2m c/w nicads, chrgr. Slight fault in display: £50ono. All in orig.packing. G4EVC QTHR. (Leeds) 0532 662037.

● TRIO TH21E handy tcvr 2m: £110. Trio TH41E handy tcvr 430MHz plus PB21H nicad pack and E82 ext batt case: £120. Will sell the pair for: £200. PacComm TNC320 plus leads HF and VHF dual port model. Mint cond with dumb terminal unit: £150. Spectrm 128k computer: £85. Bob, G0LHD QTHR.

● TRIO TS120V 10-80m 10W tcvr: £275. Several Yuasa 38Ah sealed 12V accumulators, new and unused: £40ea. Gervald, G0GNF QTHR. (Leamington Spa) 0926 613669.

● TRIO TS780 2m/70cm all-mode tcvr, mic, manual, mint: £675ono. Yaesu FT727R dual-band handie FNB4A, case, NC15 quick chrgr, YH2 headset, MMB21 m/brkt, MH12 LS/mic, PA3 car adaptor, slow chrgr: £340ono. MML432/100 70cm linear: £175. SSB Electronics MV4325/01 v.low noise M/H preamp, sequencer: £85. Blaupunkt Toronto stereo car radio/cassette, LW/MW/FM/ SW, Dolby, metal, 4x8W o/p, immac: £250. Dual-band ant 8ele 4m & 6ele 6m, dual gamma feeds: £80. Helford tcvr kit, most major items, G4CLF, cabinet, chassis, caps, orig.article, all parts new: £75. Ideal HF band project. G3ZTZ QTHR. (Camberley) 0276 25430.

● TS440S 2mths old narrow CW/SSB filters, auto ATU Daiwa 30A PSU, Shure 526T mic. Cost new £1500. Bargain: £1200. This radio is still under 10mths warranty. Almost new GDO: £20. (Bristol) 0272 642867.

● TS440S, fitted auto ATU, scanning mic, 3mths old, all in pristine cond, plus orig.packing. Cost £1282. Will sell for: £1000. Due to redundancy. GW1WRV QTHR. (Merthyr Tydfil) 0685 74061.

● TS530S immac, mic, Navada ATU: £600. FT290R, m/mount, mic, nicads, headset: £220. IC2E, mic, nicads, batt case: £120. Also have Heathkit tcvrs complete but not tested, HW16: £20. HW101: £30. G0BWW QTHR. (Seascale, Cumbria) 09467 28726.

● TS700S, VFO700S, SP70, MC50, service manual, spares: £450. MFJ949D ATU: £100. All boxed, immac 50m 8-way cable, brand new: £20. Belcom 2m valve linear 90W: £100. QQV0640A linear part built: £20. G4JBH QTHR. (Yeovil) 0935 28341.

● TS830S, SP230, VFO240: £650. HF linear 2x 4CX250 80-10m: £200. ATU SPC Transmatch, 1kW: £70. Nato 2000 10m CW/SSB/FM: £90. AC200 PU 7/5A supply: £45. 10m 230V linear amp: £35. 10m KLB110 linear amp 12V: £50. Desk mic, Sadelta XL30 preamp: £25. RN type c/w key: £20. Siltronix swr meter 2kW: £15. Philmore swr meter 100W: £10. Valves 4CX250B: £2.5ea. Coax RG8U per 30ft: £2.50. Shack Clearance. QTHR. (Stubbington, Hants) 0329 661198.

● TWO ex-Army telescopic port masts, exc.cond c/ w accs sets. Used twice field-day rally. Price £27.30, offered at: £20 or: £37 the pair. Also will purchaser 1989 of Minolta Plus Zoom contact me, as another bit turned up. John. (S.London) 081-857 8096.

● VIDEO monitors. 10in screen: £5ea. 19in screen: £7ea. URM70 coax 500yds, new: £50. Colour TV on stand: £25. 80 core multicore cable, new: £1m. 4CX250B: £2ea. EMI2001 camera equip: v.cheap. Vintage radio, TV: cheap. 100 old valves: £10. 1000 assorted caps: £10. Ex-BBC sound effects unit: £25 (v.unusual!). Ex-IBA TV transmitter, details: POA. Assorted junk, fill your car boot for: £10-20. 1/3RD tonne ex-computer PCBs, millions of ICs: Offers. Will split. 1in aluminium spools for video/audio tape. Also useful as shack cable tidy: £2ea. Hardware, nuts, bolts, brkts wtc. PYO: £1/lb. Loads of boxes of 1920s, 1930s etc old radio parts. Good for vintage enthusiast. Come and rummage. Call for appt. (Birmingham) 021-472 3688.

● WESTERN DX penetrator 3ele triband beam in orig.packing. 7ft 4in by 61/2in dia. Buyer arranges collection: £125. G3LCW QTHR. (Deal) 0304 364197.

● WODEN tmsfmr 1000/1250: £10. Choke 250mA: £2. B&O dynamic cardoid mic: £8. B&B mic type 402/C: £3. Newnes Radio & TV Servicing Vols 1-6 pre 1953-57: £12. Ferranti 3in meters 300mA, 50mA, 15mA: £3ea. Gambrell Honeycombe coils 1500, 1250: £1ea. G8DX QTHR. (Bath) 0225 833196.

● WOULD anyone like a free copy of my Spectrum logbook program? Send blank disk or tape with £2 post. (West Kilbride) 0294 823199.

● WRAASE SSTV/FAX SC1 decoder with keyboard: Offers invited. Timestep weather sat 137MHz rcvr with scanner: £100. G4LQD QTHR. (Weybridge) 0932 854393.

● WS No.19 MkII by RCA. English/Russian: Offers invited. G4MRR QTHR. 0462 674234.

● YAESU 290R Mk2 multimode tcvr with nicads and 25W amp: £300. Also tvtr for same, brand new 80-10m: £250. Azden PCS6000 2m FM with Aircraft, as new: £225. G3YQE. (Brentwood) 0277 823434.

● YAESU FRG7700 gen.cov rcvr. Orig.box and manual, VGC with 2m/10m cvtr: £225. Carl, G6NLC QTHR. (Poole) 0202 730617.

● YAESU FT101ZD Mk1, immac cond with manual and spare set of PA valves: £395. Also Trio TS120V with mains PSU and service manual, beautiful cond, ideal QRP or portable rig: £295. Dave, G3LSL not QTHR. (Andover) 0264 88579 after 7pm.

● YAESU FT101ZD, fan, FM board, fist mic, manual. 1st class rig in exc.cond: £440. Prefer buyer to test and collect. FT209R 2m keypad h/h, chrgr, case etc. Manual + packing, as new: £160. GW4UWD QTHR. (Tywyn) Fax 0654 711905. Tel: 0654 710548.

● YAESU FT102 HF tcvr. Immac cond c/w Kenwood ATU and dummy load: £650ono. Incl mainland post. G0CKF QTHR. 0983 760139.

● YAESU FT107 HF tcvr, FP107 PSU, Yaesu desk mic: £550. Carr by arrangement. G3WHK QTHR. (Morden) 081-330 5795.

● YAESU FT211RH 2m 45W. Extended cov RX, good cond, boxed etc: £260. Jim G4WXZ.

● YAESU FT211RH, brand new, orig.pack: £200. FRG7 RX, as new: £150? Yaesu FC901 ATU: £120. DS2 scope: £99? D43 scope: £99? D53 storage scope: £200? HRO RX g/c coils: £75? Heath linear exciter PSU SB200/104A/604. As seen: £199? Counter 150MHz: £40. Icom PS20 20A/240V i/p, brand new, orig.pack: £150? Buyers collect. (Milton Keynes) 0908 313379.

● YAESU FT221RD 2m multimode basestn, orig. owner, no mods, incl packing and manual. Immac: £325 + carr. Pye L470 UHF RX/TX basestn ex comm, will tune 70cm 5W TX swr meter etc. Tested: £18.50. Both items plus carr. G4DWM QTHR. (Swarland) 0670 787223.

● YAESU FT290R Mk1, Mutek, nicads, chrgr, box, manual, VGC: £225. Tokyo Hypower HL30V 30W linear: £25. Together: £240. G0CZB. (Hitchin) 0462 434552.

● YAESU FT290R2 with 25W linear. First: £300 secures. Andy. (Aylesbury) 0296 89780 eve.

● YAESU FT707 HF TX/RX IARU 80-10. VGC: £350. Matching FC700 ATU: £75. 30A/13V regulated PSU Grelco prof. Good cond, a hernia job, buyer collect: £125. Datong ASP7, good cond RF speech processor: £70. CN520 x-needle swr meter: £30. Or as complete stn sale: £600. Purchase to collect/view/operate. G0NGC. (Ealing, W3) 081-992 7581.

● YAESU FT726R 6m module: £150. BNOS 6m 50W linear: £100. Tonna 6m 5ele beam: £30. Technical s/ware TX3 TX TIFI i/face for Spectrum: £35. Buyer collects. G0MOU. (Littlehampton) 0903 723718.

● YAESU FT726R multimode base tcvr, 2m with mic. Like new: £485. 6m module: £200. HF module: £160. Sat unit: £150. Or £950 full system. FDK750E and expander 430, 2m and 70cm multimode: £350. Datong filter FL3: £60. K.Greenough, G8BEQ QTHR. (Glossop) 0457 855468.

● YAESU FT736R fitted with 50MHz and keyer modules. Mint cond, boxed: £1075. Can deliver reasonable distance. Norman GM0ELL. (Glasgow) 041-339 4552 eve.

● YAESU FT757GX, good cond: £550ono. G4TFT QTHR. (Keighley) 0535 46312.

● YAESU FT767GX with 2m/6m. Mint, boxed, 3mths old: £1600. Toshiba T1200 IBM compatible laptop computer with 4 s/ware progs. Built-in 20Mb hard disk, Epson LX850 printer. Total orig.cost £3000. Will accept: £1500. Both as new cond. Trio TR7200G 2m FM mobile 1W/10W. Perfect W/O, VGC for: £90. GM0MOP QTHR. (Falkirk) 0324 32594 eve.

● YAESU FT77 and FP700 PSU, CW narrow filter, FM board, boxed: £450. No split. Ivan, G0BON QTHR. (nr.Staines) 0784 482832.

● YAESU FT790R with Tokyo 20W linear. Ex.cond: £285. Yaesu FR50TS, FL50TS, FV50TS, HF10-

80m. Incl all accs. VGC: £150. G4HGM not QTHR. (Leamington Spa) 0926 881164.

● YAESU FT811 70cm h/h, 2x batt cases, s/case: £175. Standard C58 2m multimode port/mobile, s/case and m/mount brkt, nicads, chrgr: £220. Icom IC25E 25W 2m mobile, mems, scanning, boxed. VGC: £165. Stephen Hobbs, G7EXZ QTHR. (Gillingham, Dorset) 074785 639.

● YAESU FT980 HF tcvr mint cond, mic, manuals, boxes: £1050. Or pt/exch Icom IC740/5. Must be mint. Pref FM without PSU. GW4RLP QTHR. (Caernarfon) 0286 5264.

● YAESU FTONE full commercial spec 1.6-30MHz TX/RX. Ideal marine and amateur tcvr. Like new: £950. Sony PRO80 HF/VHF scanner 150kHz-108MHz, 118-225MHz, 40mem on HF/VHF. SSB/AM/FM/WBFM. As new, boxed with accs: £220. GM0BVF QTHR. (nr. Lockerbie) 05763 494.

WANTED

● £10 offered for loan of service manual to copy of Samwell & Hutton type 115 (PO type IC) spectrum analyser. G3ZZP QTHR. (Kingston-upon-Hull) 0482 851275.

● 1154/55 restoration, rcvr D/F plug type 209 ref 10H/433. J-switch sockets type 40 10H/8531, type 63 10H/11051, type 135 10H/319. Makers label for R1155A. Radar indicator with 2 CRTs, 6in and 2in. Switch unit 207 or 289. G4EZM QTHR. (Blackpool) 0253 47176.

● 80M TRX, 20W plus, Homebrew, age, appearance, size immaterial. Must work. G4MYX QTHR. (Tadcaster, Yorks) 0937 832061.

● A-Z info on fax systems. Cir.diag for modem. Prog for display on IBM computer. Source of info. G3HNP QTHR. (Gt. Yarmouth) 0493 393560.

● AEA CP1 RTTY/AMTOR/CW utility for Commodore C64. G3RFE QTHR. (Barrow-in-Furness) 0229 821227.

● AP1086 Issue One 1938/1952 (RAF radio stores ref nos). Also any Air publications relating to radio, radar equip. Exc.prices offered. Would purchase postwar to current magnetrons, klystrons, T/R cells, TWTs, photo-multipliers, most CV types of EEV, Ferranti, Varian M-OV, RCA valves. Have you any of these tucked away? Gee rcvr Type R1355 ref 10D/13032, control panel Type 3 ref 5U/1269, loading units types 2 or 51 ref 10B/13239, 10B/16025, W-plugs large 6-pin Type 201. Many thanks. M.Gee, 17 Foxley Cl, Mountford Est, Hackney, London, E8 2JN. 071-254 9083 or 071-790 2846 anytime.

● ARRL h'books 1955-1965. Also accs for Advance sig.gen model B4B, TP1D dummy aerial pad. PL5B RF feeder, PL18B AF lead. G3JSP QTHR. (Nottingham) 0602 604563.

● B2 spy set rcvr and PSU to go with wkg transmitter. Any cond considered. G0FSP QTHR. (Hemel Hempsetead) 0442 66787.

● BORROW for copying, manual, circuit etc for Telequipment scope DM64 and for Racal freq. meter 9059. John G4LPY. (Paignton) 0803 556243.

● CIRCUIT and coil pack assembly for restoration project of Ekco car radio, model CR61/B made 1948. G4IAD QTHR. (Bolton) 0942 817556.

● DENCO plug-in coils for TRF construction particularly green range but any other types or makes OK. Pete, G4LQZ QTHR. (Carterton, Oxon) 0993 845270.

● FILM equip 35-16mm cameras, lens. Bell & Howell (gun) aircraft cameras not G45 Bolex commercial 16-9.5mm equip, G0LJS. (Melksham, Bath) 0225 706795.

● FILTERS to help on NFD! YK88CI or YG455C for use on Kenwood TS930. G3TKF QTHR. (Bath) 0225 420442.

● FOR novice, first SSB HF tcvr, finance limited. FT70F/G would be ideal. G3AJT QTHR. (Romsey, Hants) 512557.

● FT101 Mk2 accs req'd, eg FV101, G3LLL RF clipper, matching ext spkr etc. Cash waiting. Tim, G0GSL QTHR.

● FT290, cond ext unimportant but must work OK for works van. G1VPE. (Chesterfield) 0246 452169 after 6pm.

● ICOM IC202 preferably working and fully xtalled. Alex, G0HWL QTHR. (Farnborough HPH) 0252 520227.

● IF i/p transformer for Heathkit Mohican rcvr model GC-1U Mk2, or unit for spares. G4SWH QTHR. (Letchworth) 0462 685238.

● KANTRONICS KAM TNC. Cash or exch deal with BBC Micro. BBC Micro for sale. Many h/ware extras. Ron G8WXP.

● KW Ezee Match ATU. G4KBY QTHR. (London, SE20) 081-778 9422.

● MAINS transformer type 295089 or 301050070 for Solartron scope CD1014.3. G3OHA QTHR. (Cheltenham) 0242 602168.

● MANUAL or info for Eddystone 830/7. Phil G0JXR. (Hoddesdon) 0992 468522.

● MARCONI wavemeters TF1026/1&5. Also one wooden box for same. Stolle through rotator, any cond. LT23 23cm tvtr. G3VVB. 0726 842368.

● MODERN Motor Cycles, Caxton Press 1945 era. Auto Mobile Electrical Maintenance, A.Judge 1945 era. Modern Electrial Equipment for Auto Mobiles, A.Judge, Caxton. Any Lucas, Wipac, Wico, BTH, Miller publication. G4EGB QTHR. (Scarborough) 0723 362537.

● OAP requires morse key, straight long arm (GPO dble contact) WHY. Glenn Grayland not QTHR. (Cirencester) 0285 657668.

● OPERATORS manual Trio TR60 comm rcvr. (Bridgwater) 0278 426991.

● Racal desktop cabinet BA45520 for use with RA1770 rcvr series. Also h/book for MA1105. Bargraph and MA1107 auto search unit. Morris. (Bolton) 0204 40629.

● SONY Videocorder AV3620CE manual or info wanted. Old video tapes containing TV progs, anything considered WHY. G0EVJ QTHR. (Lichfield) 0543 251915.

● STRUMECH Versatower P12 type ground post. Cut-off at ground level possibly acceptable but prefer complete. Also interested in any spare parts for P60 tower. Also want cheap 2m rig for local use, looks not important but must work OK. GW4UZL. (Haverfordwest) 0348 881346.

● T1154 with matching R1155. Leads, plugs, J-switch, ammeter, AC PSUs etc. Price to incl delivery to G4CCW QTH. Must be unmodified and preferably in wkg cond. Heres hoping. Derek Sheen. (Selsdon, S.Croydon) 081-651 1410.

● TRANSFORMER H/D 2kV. Wide spaced variable cap 300pF, H/D switch for linear PI network. Oil filled cap 40MFD, 4kV. G3TMA QTHR. 0775 87464.

● VALVE enthusiast wants valve transmitter. Any cond, age, make or Homebrew, to accompany AR88D. Will collect. Stuart, G0NQG not QTHR. (Bristol) 0272 712672.

● VSWR/pwr meter to cover 144MHz band. Eric G7IQE. 061-427 1027 eve.

● WEARITE type P Superhet coils in any usable cond. Project awaits completion. Brook, G7HJA QTHR. (N.London) 081-882 4110.

● WILL pay good price for Ferranti AF5 or AF5C AF transformer. Bernard Litherland, G4IMT QTHR. (Chippenham) 0225 891254 anytime.

● YAESU 6m unit for FT726R. Must be perfect. Please ring with your price. G4XEN QTHR. (Wellingborough) 0933 677573.

● YAESU DC200 mobile PSU for FTQ00. Must be GWO with leads. Steve G3OAG. 061-881 1850 9am-6pm.

● YAESU FRG7700, buy or borrow manual for this rcvr. Your price paid. G5MN QTHR. (Hull) 0482 77832.

● YAESU SP102 spkr. John, G1LUF QTHR. (Bloxwich) 0922 475377.

EXCHANGE

● KW Ten-Tec Century 22 CW only 5-band tcvr with own PSU. Will swap for best 2m multimode offered. Also Ham Intl Jumbo converted 10m by Spectrum with authority from DTI. Exc results worldwide. Will exch for BBC computer. Both items must be in good cond. Note: Jumbo can only be sold to licenced operator. GW0AGA QTHR. (Barry) 0446 736260.

● WIRELESS station A5100-10mcs in transit case with aerials, ATU and handset. Separate TX and RX with all connecting cables. Will exch for 1155 with PSU, RA117 or WHY. Buyer inspects and collects. G4XPU. (Bolton) 0204 595151.

● YAESU FT690R Mk2 hardly used, mint, boxed and FT290R Mk1 c/w carrying case, chrgr, for FT726R 2/6m boards GM1-2VJ. (S.Queensferry) 031-331 3360.

HELPLINES HELPL

FRENCH SCHOOL RADIO CLUB

Mr Annakin, G4KDV, received a letter from a French Technical School after making contact with their radio club. They are interested in exchanges between British and French pupils both on technology and cultural ideas by means of radio and letters. The age of the students is between 15 and 22. Contact should be made in the first instance to Mme Hanryon, 1 Place Lech Walesa, Lycee Professionnel, 89100 Sens, France.

VHF COMMUNICATIONS REQUIRED

Kevin Roche, G8GOS, is looking for copies of the *VHF Communications* magazine which are no longer available from the publisher. The dates he requires are 3.77, 3.78 and 4.79. He would be grateful of the originals or photocopies and will reimburse any costs incurred. His telephone number is 0420 83091.

MULLARD IF STRIPS WANTED

Graeme Refell, G0EEA, asks if anyone can provide a source to obtain Mullard pre-tuned IF strips used in the *RadCom* topband portable DF receiver. Any assistance would be appreciated by G0EEA tel: Gloucester 307315.

WELLINGTON BOMBER QUERY

Walter Williams, RS21008 is trying to locate the position of the R1082-T1083 set up in a Mk.1A Wellington Bomber prior to 1940. Perhaps there are some airframe electricians who can recall or still have notes on the general airframe electrics for the Wimpy - particularly the bomb-bay. Also, on a nostalgic note, he is trying to locate an ex-RAF ground station receiver type R1084 (Stores ref: 10A/8301). Please contact him at Hatchways Farm, Burrows Cross, Gomshall, Surrey, GU5 9QF.

RACAL UNIT

David Till, RS92758, requires information on the Racal Unit MA282, which enables the use of Panoramic Adaptor RA66 with 117E rcvr. Details are needed of the 2-3MHz amp filter on the MA282 unit, marked L4-L7 on the circuit diagram. Anyone using the RA66 or can help please contact David on 0983 864227.

ARGOSY 525 RECEIVER UPDATE

Bernard Greenall, G7CBX, would be grateful for information to enable him to upgrade his Argosy 525 transceiver, and is trying to locate a digital readout or noise blanker, model 223, or microphone Reed switch model 215. Any information to 0736 753676.

WRINKLE PAINT??

For people renovating old radios or making new projects Mr Parsonage, RS84999, has found that Osborne & Butler Ltd, Hartlebury Trading Estate, Hartlebury, Nr Kidderminster, Worcs, DY10 4JB import the original 'Illinois Bronze" black wrinkle paint from the USA. It works out at £7-£8 per 12oz tin and is also available in grey and khaki.

RADCOM 'WALKS' FROM MUSEUM

"It's rather strange, but if a friend borrows a couple of pounds he always remembers to pay you back, but if he borrows a book or magazine - then you'll generally have to remind him", writes Douglas Byrne, G3KPO, Hon-Curator of the Wireless Museum on the Isle of Wight. The one he is missing is January 1985 *RadCom*. If anyone can help please contact him on 0983 67665.

G AMATEURS PLEASE NOTE

Hal Fryer, VE7ALJ, has sent a plea for G amateurs requesting help from *Helplines* to please include addresses as many hams in Canada would like to assist from their vast junk boxes, but cannot get in touch with the person concerned. *(On this point a note sent to HQ for forwarding would always reach the enquirer).*

Helplines is designed to help put people in touch with each other. If you have a problem, it's more likely there's someone out there who has the solution; if you are looking for an old colleague or amateur friend, there could be a reader who has some news of their whereabouts; if you have solved a particular problem, write and tell the rest of us. 'Helplines' is there to help you and to give you the opportunity of helping others. Write to us marking your envelope 'Helplines' and we'll do what we can to get the message out.

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CLUB NEWS

DEADLINE - Items for inclusion in the February 1991 issue must be sent to HQ marked "Club News - DIARY", to be received by 21 December latest. If news is received by the published deadline, it will appear in the listing. It is your responsibility to ensure that items are sent DIRECT to HQ in good time. News items should be sent in writing, preferably typed or written legibly, and be signed by the club secretary or the person responsible for publicity.

NOTE: This is primarily a service for clubs affiliated to the RSGB, to whom priority will be given.

AVON

▶Bristol RSGB group - 17, Christmas party. Details 0272 513573.
▶South Bristol ARC - 5, judging for Terry Dunsford trophy; 12, HF contest evening; 19, Christmas party; 26, 2 metre activity evening; Jan 2, photographic equipment evening; 9, HF activity evening; 16, 1991 Bristol Rally planning. Details Whitchurch 832222 on a Wednesday evening.
▶Weston-Super-Mare - 17, annual exhibition of "home brew" items and pre-Christmas social evening; Jan 7, Annual General Meeting. Details 0934 514429.

BEDFORDSHIRE

▶Dunstable Downs RC - 14, Christmas TV show; 21, Club party (members only). Details G1NWZ, 54 Dovehouse Hill, Luton.

BERKSHIRE

▶Bracknell ARC - 5, Christmas meal at Old Rose, Wokingham, 7.30pm for 8pm; 12, talk "Amateur TV"; Jan 9, Annual General Meeting; 13, "Tune and Blow-up?" - hands-on experience of how to handle valve amps effectively.
▶Maidenhead & District ARC - 6, Christmas social; 18, Christmas quiz; Jan 4, new equipment evening; 16, talk "Operating from East Germany". Details 0628 25952.
▶Reading & DARC - 13, Annual General Meeting, with Cheese and Wine; 27, Christmas informal drinks party. Details 0734 874870.

BUCKINGHAMSHIRE

▶Aylesbury Vale RS - 5, G6NB construction contest; 19, informal pub meeting; Jan 9, New Year meal. Details 0280 817496 or 0908 560026.
▶Milton Keynes & DARS - meets every 2nd Monday of the month at the North Bucks Youth Sports Hall, Haversham Road, Wolverton. Doors open 7.30pm. Details Tony Burt, G6WXM.

CHESHIRE

▶Chester & District RS - 4, committee meeting; 11, construction contest; 18, pre-Christmas social; Jan 8, Annual General Meeting.
▶Widnes & Runcorn ARC - meets twice monthly on Tuesday evenings at the Scout Hut, Halton Castle, Runcorn. Details Dave Glover, G1VJP, tel: 0925 225445.

CLWYD

▶Delyn Radio Club - 4, talk and demonstration "Amateur TV"; 18, mince pie night; Jan 15, talk "The Work of the British Legion". Details 0244 819618.
▶Rhyl & DARC - ***NEW SECRETARY*** Mr. Edward Shipton, GW0DSJ, 34 Argoed, Off Chester Avenue, Kinmel Bay, Rhyl, LL18 5AY. Tel: 0745 336939. 10, Christmas dinner; Jan 7, annual junk sale. Details 0745 336939.

CORNWALL

▶Cornish RAC - 6, CRAC main meeting at Perranwell Village Hall; 10, CRAC computer club at Treleigh Church Hall; 11, radio constructors workshop at Perranwell VH.

CUMBRIA

▶Eden Valley RS - 27, BBC club. Details Culgaith 260.

DERBYSHIRE

▶Derby & DARS - 5, junk sale; 12, constructors contest; 19, Christmas party; Jan 2, junk sale. Details 0773 852475.

DEVON

▶Axe Vale ARC - 7, Christmas Dinner. Details G0GHH.
▶Exeter ARS - 10, talk and demonstration "Op-Amps"; Jan 14, any questions night. Details 0392 78710.

DORSET

▶South Dorset RS - 4, talk "PCB Design using CAD"; 14, Christmas Dinner; 16, SDRS DF hunt.

DYFED

▶Llanelli (Coleshill) ARS - meets every Monday at 7pm at Coleshill Day Centre. RAE course now running. Details 0554 820207.

ESSEX

▶Chelmsford ARS - 4, talk by Bob Boddy of Arrows Electronics; Jan 1, film show. Details 0245 260831.
▶Colchester ARS - 6, radio films and videos; 20, Christmas Buffet and bring and buy. Details 0206 851189.
▶Vange ARS - 6, junk sale; 13, Christmas cheese & wine night. Details 0268 524453.

GLOUCESTERSHIRE

▶Gloucester ARS - 5, talk "Radio in the Congo"; 12, Christmas social.

GREATER LONDON

▶Acton Brentford & Chiswick ARC - 18, talk "Surface Mount Construction"; Jan 15, Annual General Meeting.
▶Coulsdon ATS - 10, Annual General Meeting. Details 081-684 0610.
▶Cray Valley RS - 6, talk "Photography"; 20, Christmas social in The Jolly Fenman, Blackfen. Details 081-850-1386.
▶Crystal Palace & DRC - 15, Christmas social evening; Jan 19, talk "Test Equipment and Filters". Details G3FZL, QTHR.
▶Edgware & DARS - 2, RSGB 144MHz Affiliated Societies Team Contest; 13, junk sale; Jan 10, Annual General Meeting. Details 081-205 1023.
▶Silverthorn RC - 7, surplus equipment auction; 14, UHF activity evening; 21, Christmas party. Details G0LXA, QTHR.
▶Sutton & Cheam RS - 2, 144MHz fixed and AFS contest; 20, Christmas get-together. Details G0BVW, QTHR.
▶Wimbledon & DARS - ***NEW SECRETARY*** Chris Frost, G0KEB, 61 Selbourne Avenue, Tolworth, Surrey, KT6 7NR, tel: 081-397 0427. 14, Christmas social; Jan 11, New Year Resolutions. Details G0KEB.

GREATER MANCHESTER

▶Eccles & DARS - 4, demonstration "Repairing Christmas tree lights". Details 061-773 7899.
▶South Manchester RC - 7, contest round-up; 14, talk "Mobile and Cellular Radio"; 21, talk "History of the Knob" and Club Party.
▶Stockport RS - 12, Annual General Meeting; 19, Christmas party. Details 061-439 3831.

GWYNEDD

▶Holyhead & DARS - meets 1st and 3rd Friday each month at the Forresters Arms, Kingsland Road, Kingsland, Holyhead, at 7.30pm. Details R. Richards, Secretary, 5 Queens Park Court, Holyhead, LL65 1RB.

HAMPSHIRE

▶Basingstoke ARC - 27, DF foxhunt.
▶Horndean & DARC - 6, talk "Weather and Propagation", Jan 3, talk "High Tech Test Equipment". Details 0705 472846.
▶Itchen Valley RC - 14, Club Christmas Party. Details 0703 736784.
▶Three Counties ARC 5, quiz night. Details 0428 723415.

HEREFORD & WORCESTER

▶Bromsgrove & DARC - 14, Christmas party. Details 0527 33173.
▶Bromsgrove ARS - 11, social evening; Jan 8, night on the air. Details 0527 503024.
▶Kidderminster & DARS - meets alternate Tuesdays at The Queen's Head, Wolverley, Nr Kidderminster, at 8pm. 11, social evening.

HERTFORDSHIRE

▶Cheshunt & DARC - 12, Christmas social evening. Details 0992 464795.
▶Verulam ARC - 18, Annual General Meeting. Details G0BZS or G3PMF.
▶Welwyn-Hatfield ARC - 17, Christmas Social. Details 0707 324958.

HUMBERSIDE

▶Goole R&ES - 7, discussion: 1990 programme; 14, Christmas Dinner; 21, quiz night; 28, Christmas video night; Jan 4, talk "Airshows"; 11, ATV Repeater Progress Report. Details Goole 769968.

KENT

▶Bromley & DARS - 18, Christmas party, Jan 15, AGM.
▶East Kent RS - 6, talk "Home Construction"; 13, Christmas Dinner at the Miramar Hotel, Herne Bay. Details 452678.
▶Maidstone YMCA ARS - 7, social evening. Details 0622 676776.
▶Medway AR & TS - 4, talk "Raynet - What is it all About" (provisional), 18, Christmas social. Details G8VJU, QTHR.
▶South East Kent (YMCA) ARC - 12, visit by RSGB RLO (provisional); 19, Christmas social; Jan 9, discussion "The Novice Training Course".
▶West Kent ARS - 3, Christmas Social with the Seven Oaks RC at Seven Oaks.

LANCASHIRE

▶Bury RS - 11, Annual General Meeting.
▶Fylde ARS - 13, supper and social evening. Details G7CUL, QTHR.
▶Preston ARS - 13, Christmas party.
▶Thornton Cleveleys ARS - 3, talk "HMS Inskip"; 15, Annual Dinner at Brabyn's Hotel; 17, Christmas social evening. Details G4BFH, QTHR.
▶Wigan & DARC - 20, Christmas Social; Jan 3, general discussion and review of 1990. Details 0942 47416.

LEICESTERSHIRE

▶Leicester RS - 3, HF and VHF NFD slides and video; 10, committee meeting, HF/VHF activity night; 17, mince pie social evening.

LOTHIANS

▶Lothian Radio Society - 12, talk "Packet Radio"; Jan 9, mini talks.

MERSEYSIDE

▶Wirral ARS - 5, talk "Old Time Radio".

NORFOLK

▶Fakenham ARC - 4, talk "Amateur Television"; 18, Christmas meeting; 24, Christmas Eve net on 145.375MHz, start 11.30pm, club callsign GX4LSF.
▶Norfolk ARC - 5, talk "FETs and MOSFETs Made Easy"; 12, Christmas party; Jan 2, talk "The New Technology"; 6, 80m AFS, 9, talk "NICAM". Details 0362 850591.

NOTTINGHAMSHIRE

▶ARC of Nottingham - 6, Forum followed by activity; 13, Christmas social evening; 20, fun packed Christmas video show. Details 0602 733740.

POWYS

▶South Powys ARC - meets first Tuesday each month, RAFA Club, Brecon. Jan, demonstration "TS940". Details 0874 84266

SHROPSHIRE

▶Salop ARS - 6, talk "DXTV"; 20, Christmas party; Jan 3, talk and slides on the art of collecting "Sheepskins". Details 0743 790457.
▶Telford & DARS - 12, Annual Dinner, The Malthouse, Ironbridge at 8 pm; 19, Telford Rally Group AGM; 26, Club Net 144.6MHz & 1910MHz at 8 pm; Jan 2, informal; 9, G7BWQ Video "1990 in Retrospect".

SOMERSET

▶Mid Somerset ARC - 14, Club party; 28, open evening - HF radio. Operating. Details 0749 345975.
▶Yeovil ARC - 13, talk "The VK/G Propagation Phenomenon"; 20, mince pies and on the air; 27, on the air. Details G0NMM, QTHR.

SOUTH GLAMORGAN

▶Cardiff RSGB Group - 10, Annual Dinner; Jan 14, talk "Delta Loop Antennas and DX". ***CHANGE OF VENUE*** As from the January 1991 meeting the Group will meet at Whitchurch Community Centre, Old Church Road, Whitchurch, Cardiff. Details 0446 773212.

STAFFORDSHIRE

▶Stafford & DARS - 11, night on the air; 18, talk "Propagation via Sporadic E".

SUFFOLK

▶Ipswich RC - 12, quiz. Details 0473 42072.

SURREY

▶Dorking & DARS - 12, construction contest - Ashcombe School.

TAYSIDE

▶Dundee ARC - 4, construction evening and talk "Building the White Rose Receiver"; 11, talk "Field Day Experiences"; Jan 8, construction evening and talk "Building the White Rose Receiver". Details GM4FSB, QTHR.

WARWICKSHIRE

▶Mid Warwickshire ARS - 11, Christmas pies and wine at the Clubroom, 25, open your presents (sked on 145.350 at 8pm?); Jan 8, HF night at Warwick School (provisional). Details Kenilworth 513073.
▶Rugby ATS - 4, East Midlands Repeater Group video; 15, RATS Christmas dinner; 18, Christmas quiz; Jan 8, free bring and buy, visitors (and "junk"!) welcome.
▶Stratford-Upon-Avon RS - 10, chaired discussion; Jan 14, Region 1 and WARC 92.

WEST GLAMORGAN

▶BSC Port Talbot ARS - ***NEW SECRETARY*** G.W. Evans, GW3WWN, 18 Mount Pleasant, Tonna, Neath, West Glamorgan, SA11 3HX. 13, Annual Dinner. Details 0639 630880.
▶Swansea ARS - 6, Annual General Meeting and buffet; 20, Christmas quiz. Details 0639 815437.

WEST MIDLANDS

▶Barr Beacon RC - meets at 112 Walsall Road, Aldridge, Walsall, WS9 0JW on the first Monday and third Wednesday of each month (Bank holidays excepted). Details G0NOL, tel: Walsall 36162.
▶Midland ARS - 4, Christmas party. Details 021 443 5157

▶Solihull ARS - 20, Christmas social.
▶Stourbridge - 3, night on the air; 17, Forensic scientist, or quiz; Jan 7, night on the air.
▶Wolverhampton ARS - 11, night on the air; 18, Christmas quiz. Challengers invited (teams of 3).

WEST SUSSEX
▶Chichester & DARC - 18, Christmas social with presentation of the Marcuse Trophy.

WEST YORKSHIRE
▶Halifax & DARS - 18, Christmas social - free pie & peas for members; Jan 15, talk "Vintage Domestic Radio and Audio". Details Halifax 202306.
▶Keighley ARS - 20, Christmas buffet. Details Bradford 496222.
▶Northern Heights AR & ES - 19, social evening; Jan 2, 1991 videos. Details 0274 673116.
▶Spen Valley ARS - 6, Christmas social evening; 20, project evening - soldering and simple construction. Details 0274 875038.
▶Todmorden & DARS - 3, talk by Rev. G.Dobbs, G3RJV; 17, fun and games evening; Jan 7, talk "Antenna Design". Details Halifax 882038.
▶Wakefield & DRS - 4, call my bluff; 11, D. Pearson, G3ZOM, Jandek rep.

MOBILE RALLIES

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

9 DECEMBER
▶Leeds & DARS Christmas Rally, Civic Hall, Dawsons Corner, Pudsey. (Junction of the Leeds Outer Ring Road and Bradford Road A647). From 10.45am. Talk-in on S22. Catering facilities; ample car parking; admission by programme only (50p). Details 0532 585801.
▶Verulam Christmas Rally - Hatfield Polytechnic. 11am - 5pm. Details from Steve, tel: 0923 249456.

20 JANUARY 1991
▶Oldham ARC Rally - Queen Elizabeth Hall, Civic Centre, Oldham. Details from Kathy, G4ZEP, tel: 061 624 7354.

27 JANUARY 1991
▶University of Lancaster ARS & Central Lancs ARC. The Lancastrian Rally - Lancaster University. Details from Sue Griffin, G10HH, tel: 0524 64239 or Mike Sherlock, G4ZYN, tel: 0257 452287.

3 FEBRUARY 1991
▶South Essex ARS Mobile Rally - The Paddocks, Canvey Island, Essex. Trade stands; bring & buy; boot sale etc. Inexpensive refreshments available; free car parking. Talk-in on S22 by G4RSE. Details Dave Speechley, G4UVJ, tel: 0268 697978.
▶Rainham Radio Rally - Parkwood Community Centre, Deanwood Drive, Rainham, Gillingham, Kent. Traders; bring & buy; refreshments, etc; Talk-in by GB4RRR. Details 0634 362154.

24 FEBRUARY 1991
▶4th Taw & Torridge Rally - BAAC Halls, Bideford, North Devon. Doors open 10.30 a.m. (10.00 for disabled visitors). Trade stands, bring & buy; refreshments; bar; car parking. Details John G0GFK, tel: 0237 476402 or Keith, G0AYM, tel: 0805 23776.

3 MARCH 1991
▶Welsh Mobile Rally - Barry Leisure Centre, off Holton Road, Barry. Details from Ceri, GW0JCB, tel: 0446 721304.

17 MARCH 1991
▶Wythall RC 6th Annual Radio Rally - Wythall Park, Silver Street, Wythall, Worcestershire. Details Chris Pettitt, G0EYO, tel: 021 430 7267.

24 MARCH 1991
▶Cunningham & DARC Magnum Rally - Magnum Leisure Centre, Irvine, Ayrshire. Details from Bob Low, GM0ECU, tel: 0294 72233 or 0563 35738 (home).
▶Pontefract & DARS Components Fair, Carleton Community Centre, Carleton, Pontefract. Details 0977 615549.

31 MARCH 1991
▶Centre of England Easter Amateur Radio Rally - Motorcycle Museum, Bickenhill, nr NEC Birmingham. Details from Frank Martin, G4UMF, tel: 0952 598173.

7 APRIL 1991
▶Launceston 5th AR Rally - Launceston College. Details from Maggie, tel: 040921-219 or Rodney & Joy, tel: 0566-775167.
▶White Rose Rally - Leeds University. Details G4DXA, PO Box 73, Leeds LS1 5AR.

14 APRIL 1991
▶Trafford Rally "The Great Northern Rally" - G-Mex, The Greater Manchester Exhibition and Events Centre, City Centre, Manchester. Details from Graham Oldfield, G1IJK, tel: 061 748 9804.

21 APRIL 1991
▶Swansea ARS Rally - Swansea Leisure Centre (on the Swansea-Mumbles coast road, A4067). Details from Roger Williams, GW4HSH, tel: 0792-404422.

28 APRIL 1991
▶Bury RS Annual Rally - Castle Leisure Centre, Bolton Street, Bury. Details from Lawrence Jones, G4KLT, tel: 061 762 9308.

6 MAY 1991
▶Mid Cheshire ARS Rally - Civic Hall, Winsford. Details from David, G4XUV, tel: 0606 77787.

12 MAY 1991
▶Drayton Manor Mobile Radio Rally - Drayton Manor Park, Nr Tamworth. Details from Norman, G8BHE, tel: 021 422 9787 or Peter, G6DRN, tel: 021 443 1189.
▶Yeovil ARC " The QRP Convention" - Preston Centre, Monks Dale, Yeovil. Details from Mr. David Bailey, G0NMM, QTHR as G1MNM.

26 MAY 1991
▶Plymouth Radio & Electronics Fair - Plymouth Radio Club Plymstock School, Church Road, Plymouth, Devon. Details from Jan Fisher, G0IVZ, tel: 0752 340946 evenings/weekends, 0752 262826 (daytime).

9 JUNE 1991
▶22nd Elvaston Castle Mobile Radio Rally - Elvaston Castle Country Park, near Derby. Details from John, G4PZY, tel 0332 767994 - Trade enquiries to Peter, G3WFU, tel 0332 700265 (evenings).
▶Royal Naval ARS Annual Mobile Rally - HMS Mercury, Nr Petersfield, Hants. Details from Cliff Harper, G4UJR, tel: 0703 557469.
▶Southend & DRS Annual Rally and Boot Fayre - Rocheway Centre, Rochford, Southend-on-Sea, Essex. Details from Steve, G1XGP, tel: 0702 712595.

30 JUNE 1991
▶Longleat Amateur Radio Rally. Longleat House, near Warminster, Wiltshire. More details from Shaun, G8VPG, tel: 0225 873098.

7 JULY 1991
▶York Radio Rally - Tattersall Building at York Racecourse. Details from Dave Moreland, G7FGA, tel: 0904 790079.

14 JULY 1991
▶Sussex AR and Computer Fair - Brighton Racecourse. Details from Ron Bray, G8VEH, QTHR, tel: 0903 763978 or 0273 415654 (office hours).

28 JULY 1991
▶Rugby Amateur Radio Car Boot Sale - venue to be advised. Details from either Kevin, G8TWH, tel: 0203 441590 or Peter, G0JEW, tel: 0455 552449.

14 SEPTEMBER 1991
▶Wight Wireless Rally - Wireless Museum, Arreton Manor, Nr Newport, IOW. Details from Douglas, G3KPO, tel: 0983 67665.

15 SEPTEMBER 1991
▶Bristol Radio Rally - Brunel's Great Train Shed, Temple Meads Station, Bristol. Details from David Farr, G4WUB, tel: 0272 839855.

22 SEPTEMBER 1991
▶Centre of England Autumn Amateur Radio Rally will be held at the British Motorcycle Museum, Bickenhill nr The NEC, Jct 6 M42. Details from Frank Martin, G4UMF, tel: 0952 598173.

29 SEPTEMBER 1991
▶Harlow AR&E Mobile Rally - Harlow Sports Centre. Details from - weekdays: Alf, G7FNY on 0279 418392; evenings & weekends: Mike, G7BNF on 0279 722569.

13 OCTOBER 1991
▶Hornsea Rally (ELHOEX Electronic Hobbies Exhibition) - The Floral Hall, Hornsea, East Yorkshire. Details from Jeff, G4IGY, tel: 0964 533331.

OTHER EVENTS

8 DECEMBER
▶RSGB Annual General Meeting - Tyndall Theatre, H.H. Wills Physics Laboratory, Tyndall Avenue, Bristol, Avon BS8 1TL at 2pm.

17 MARCH 1991
▶Norbreck Amateur Radio, Electronics & Computing Exhibition - Norbreck Castle Exhibition Centre, Blackpool. Details from Peter Denton, G6CGF, tel: 051 630 5790.

24 MARCH 1991
▶VHF Convention - Sandown Park. Details, G3FZL, QTHR.

27/28 APRIL 1991
▶RSGB National Convention - NEC Birmingham. Details from Norman Miller, G3MVV., QTHR.

GB CALLS

The list below shows all special event stations licensed for operation during this month and up to 18 February. It was taken from the HQ computer on 9 November. These callsigns are valid for use from the date given but the period of operation may vary from 1-28 days.

11 NOVEMBER		
GB0GW	Gower Wales	GW0KPD
15 NOVEMBER		
GB2STC	South Tynside College	G3IPD
16 NOVEMBER		
GB2PNF	Poulner New Forest	G3SOF
17 NOVEMBER		
GB1KBS	Kettering Boys School	G1AZD
GB2NAW	National Astronomy Week	G3WVO
GB8CW	Cultural Station 'W'	GM4TYQ
20 NOVEMBER		
GB2CIN	Children in Need	G3YZR
22 NOVEMBER		
GB0CIN	Children in Need (BBC Pebble)	G0NXA
GB2CWR	Coventry Warwickshire Radio	G4AEH
GB4FRB	Forth Railway Bridge	GM0LLJ
23 NOVEMBER		
GB2CHN	Children in Need	G0BBE
GB2OSH	Old Swinford Hospital	G4IEB
GB2WRA	Wordsley Radio Amateurs	G0AOW
GB4KID	Children in Need	G0EVU
GB7STD	St Dunstan's	G3SEJ
24 NOVEMBER		
GB5ACF	Audley's Close Fayre	G7APY
25 NOVEMBER		
GB2MSC	Mercat Shopping Centre	GM0MMN
26 NOVEMBER		
GB2VGG	Original Club Callsign	G4IVJ
30 NOVEMBER		
GB2CJC	Captain James Cook	G4GGP
1 DECEMBER		
GB6AQ	Tops CW Club	G3AWR
6 DECEMBER		
GB1WYR	West Yorkshire Radio	G8WYR
7 DECEMBER		
GB4OKH	40 Years Kirkley Hall College	G0AMT
GB5SG	Season's Greetings	G0NAT
8 DECEMBER		
GB1DOE	Duke of Edinburgh	G1ECA
9 DECEMBER		
GB0GW	Gower Wales	GW0KPD
10 DECEMBER		
GB2PYM	Paisley YMCA	GM0NAF
14 DECEMBER		
GB4RN	Royal Navy	G3LIK
20 DECEMBER		
GB4FRB	Forth Railway Bridge	GM0LLJ
29 DECEMBER		
GB8CA	Cultural Station 'A'	GM0HRT
6 JANUARY		
GB0GW	Gower Wales	GW0KPD
3 FEBURARY		
GB0GW	Gower Wales	GW0KPD
18 FEBRUARY		
GB2HGB	Hazel Grove Brownies	G3MBQ

9H1JK	**Mr RJ Waddington**	May 1990
G0AAI	**Mr RL Frame**	01.09.90
G0DET	**Mr JEG Allen**	
G0GPJ	**Mr JF Bristow**	15.07.90
G0HZH	**Mr EJ Johnston**	Sept 90
G0IGG	**Mr ER Baister**	
G1KLQ	**Mr R Penfold**	29.09.90
G1WSB	**Mr VAL Bukavs**	31.03.90
G2BM	**Mr GR Foster**	05.07.89
G2CIX	**Mr AS Davey**	11.09.90
G2CPS	**Mr FG Marshall**	30.09.90
G2DJX	**Mr GR Martin**	
G3CPM	**Mr DG Ingram**	09.09.90
G3DYN	**Mr AC Bradbrook**	01.05.90
G3EJO	**Mr W Bates**	23.10.90
G3FFC	**Mr A Cave**	19.10.90
G3IFL	**Mr JHP Pridmore**	05.07.90
G3MC	**Mr RAM Crust**	04.10.90
G3SZB	**Mr GW Burmingham**	14.09.90
G3VTM	**Mr E Ridgeway**	24.09.90
G3WHI	**Mr JH Dawson**	15.10.90
G4EZI	**Mr RR Hughes**	22.08.90
G4HIS	**Mr E Williams**	16.09.90
G4ZTV	**Mr WM Foster**	16.03.90
G7CXW	**Mr S Mattinson**	28.09.90
G7GYL	**Miss PJ Goddard**	28.10.90
G8ML	**Mr LW Lewis**	10.09.90
G8SQT	**Mr WHJ Price**	26.09.90
GM0EBE	**Mr D Robertson**	13.09.90
GM1SRK	**Mr J Robertson**	09.08.90
GM4GSJ	**Mr KB Lanyon**	May 1990
GM4GWL	**Mr CWE Kerr**	
GW4IGR	**Mr JA Griffiths**	21.09.90
GW4UYY	**Mr C Fox**	14.09.90
GW7DVN	**Mr ME Towns-Gore**	29.09.90
RS30512	**Mrs F Rowe**	
RS52602	**Mrs D Jones**	
RS91788	**Mr NW Adcock**	Sept 90
RS9271	**Mr HA Bodigian**	03.10.90

Mr FD Cawley, G2GM

Don Cawley was a typical 'old timer' and homebrew enthusiast. Although I knew he was a member of FOC - it was only by chance I discovered that he had helped to train young men who later became radio operators in HM Forces.
His homebrew station was donated to the Isle of Wight Radio Museum and the remainder was auctioned at the Binstead IW RC. The proceeds of which were donated to the Tennyson Memorial Ambulance of Freshwater, IOW.
I would, on behalf of Don's family like to take this opportunity of thanking the Binstead club for its efforts in this. *Ron G3RJK*

Ron Perks, G4CP

Ron had been licensed for around fifty years, and was an ardent DXer. CW was Ron's great interest and he had been a very active member of FOC for over forty years; being FOC President in 1979. He performed many jobs over the years and the club will miss his tireless work and organisation.
He was a member of the Cannock Chase Club and with G3ABG, had several wins in National Field Day contests. He latterly joined the Lichfield ARS.
Ron was top of the DXCC Honour Roll in the UK and was an ardent supporter of CW contests where he consistently made top positions.
Our deepest sympathy to his wife, Dot, and daughters, Jane and Pam on their great loss. *G3KDB*

the last...

CELL SHOCK

On reading G3TRK's letter in *The Last Word* November 1990, I was shocked how much some suppliers charged for 3V lithium batteries such as the CR2032 from his handheld transceiver. So, for the benefit of any member replacing such a cell I decided to put pen to paper. These 3V batteries can be purchased from any Tandy store at what seems a very reasonable price of £1.79, and they stock a large range of similar batteries for the same price.

I hope this will help some fellow members save both time and money.

David Murray G7HME.

A LITTLE LIGHT MORSE

Almost any tape or cassette recorder/player will drive a 6V cycle headlamp bulb from the earphone socket. That is how I practiced visual morse for my AFCA Communicator's ticket.

I assume that a receiver headphone socket would also drive the bulb though I haven't tried it.

My feeling is that the on-off would be simpler to read than the long-short mark and space on a CTR. Maybe one of our amateur members, who wastes his radio time by working as a psychologist during the day, will confirm this.

A word of warning though, start with the volume control at low and gradually increase it to the light level required, unless you have an infinite supply of bulbs.

This system will work at up to about 14WPM. Over that speed the filament is still glowing when the next dot or dash hits it and re-boosts it.

Alan Gordon G3XOI

A REPORT IS A REPORT

In answer to the comments in November's SWL Column concerning the use of a Telereader to read morse. What bigotry! A report is a report, and however it is arrived at, if it proves the fact of reception with useful data that is all that is required. I have been licensed for ten years and spent my time during WW2 as a Wireless Operator and later I did the same job in Korea.

Throughout that period, and now, I have used a straight key, and if my morse is good enough to be read by a Telereader then I would feel flattered. After all a Telereader or any other kind of computer aided print-out cannot pick out the sense from someone's faulty operating.

In the past I have had printed copies sent to me with reception reports of my RTTY transmissions. Maybe those who sent them should be able to read Murray Code?

I am 70 years old, and I don't know how old the G3 or Bob Treacher are, but my advice to them is "Grow Up" and encourage others, not put them down. If someone is interested enough, and technically minded enough to use a piece of modern equipment to record your transmission, accept it and answer it. We now have unmanned terminals on packet links. It never will be my forté, but good luck to those who do find an interest in this mode of communication. But of course signal reports of these transmissions are no good, they must be recorded via a computer!!

Harold Bennett G4LPV

FIFTY-FIVES

When I first moved to DL in 1975, the greeting *55* was used continuously on the repeaters. It was also heard as: "sixty-four, plus and minus nine old man!". Then, after an article (I'm pretty sure it was in *CQ-DL*) it stopped, practically overnight!

There are two versions of the following story. This is the version that I prefer.

"It seems that a certain Herr Hitler decided that everyone should greet his fellows with the form 'Heil Hitler'. As fishermen and boy scouts were included it was inevitable that the radio amateur was not exempt; there was one concession for the radio amateur he was allowed to abbreviate the greeting in CW to just *HH* (.... ....). But the radio amateur is not a political animal, and he wasn't going to be told what to do, but he was certainly going to be shopped if he didn't do it! So he found a solution. He added a single dot to each H, making it *55* instead. The monitoring operators didn't have time to listen to everything, and they were either too young and inexperienced to be sure what they had heard, or they were old stagers who shared in the secret".

Whatever the real story, or the real reason for it dying, I can truthfully say I haven't heard *55* for years.

Peter Bendall GW3NBU/DJ0JR

BE FAIR

I would strongly endorse the view put forward by Chris Randall, G4RBR, in the November issue of *RadCom*. If we are serious about encouraging youngsters to come into amateur radio (and the hobby will die if we aren't) we should not only give the novices access to some of the amateur bands but give them access *on equal terms*. We should limit the power used in those parts of the bands to what they may use. (For this reason your footnote to his letter rather misses the point). Just as in polite society it is considered rude to talk in a foreign language to one friend in the presence of another who doesn't understand it, so we should consider it good manners, when operating CW in a band used by novices, to keep our own speed down to some 8WPM so that any novice listener could hope to follow the conversation.

Phil Mayer G0KKL

ERRATUM

Reference 'Harmsworth's Wireless Encyclopedia' letter in November *RadCom*. Inadvertently we printed the wrong date. This should have read '1923/24' not '1933/34. We apologise for any confusion this may have caused.

CQ CONTEST

I have searched my better self to be tolerant towards HF contests. I have smiled sweetly and given away points without flinching. I have even asked one of the many contestants who have dumped themselves on my frequency kindly to move therefrom with such politeness that they have wept tears of repentance. But when it comes to CQWW this annual farce of free publicity for a magazine, where every contesting lunatic in the world blocks every HF band for 48 hours, I stiffen the sinews, cry "God for Harry . . . ." etc.

But I was determined to have at least one normal QSO - and I did: He lived two miles down the road with a report of 5-9+20! The other QSO was with a US station on a clear frequency, but a seemingly deaf contestant leapt upon it and then, when asked to QSY, moved 1kHz away and we gave up in the ensuing QRM. There is no amateur who cannot tell a similar story of bad operating, bully-boy tactics or simple rudeness during HF contests.

Of course, I acknowledge the RSGB has manfully espoused frequency limits, 24hr only, not-all-band rules to please the likes of me and impose some discipline, and generally things are much better than a few years ago. But *CQ* has no such tender conscience - and why should it with such a free annual boost to its profits? Perhaps the *Radio Times* or the *Sun* (truly fictional logs allowable for this one) should follow suit.

Jeremy Boot G4NJH

NEWCOMER'S THANKS

Being tired of television night after night, I became a short wave listener and sent signal reports and received QSL cards from many parts of the world. I wrote to a radio ham for an explanation of a long range experiment and we became pen friends. My new friend suggested that I went to night school to study for the RAE and he was so persuasive that I took his advice and, after much hard work, I was proud to receive the much prized certificate, followed by the licence on the 24 July 1990.

I am now very active on the air and would like to express my thanks and appreciation to the many hams who have been so welcoming and helpful. Three in particular have been exceptionally helpful even for radio hams, above the normal call of duty as it were, namely - Ernest Cooper G3GTH, Don Powell G0FHI, and Len Jackson G6MYH, who has spent a great deal of his time taking me though the transition period from the RAE to the practising radio ham.

I am now studying morse at night school and very much appreciate the RSGB morse over the air from Geoff, G4ODC.

John Purcell G7HLS/RS92810

AMATEURISH

How refreshing it was to see recently the words of a newly licensed amateur on the packet network! I refer to Tom, G1LZK, who in his bulletin *'Now is the future'* reminded us of the old proverb "Oh! would some power the giftie gi'e us, to see ourselves as others see us".

He raised the point of amateurs vs professionals. I would like to extend his comments by looking at four little words. In my book:

'Amateur' refers to activities carried out without payment,

'Commercial' implies that some form of payment is involved,

'Professional' implies that a job is carried out properly in a committed, thorough and workmanlike manner,

'Amateurish' implies that a job is carried out in a slipshod, incomplete or incompetent manner,

That is, the opposite of 'amateur' is 'commercial', not 'professional'; the opposite of 'professional' is 'amateurish', not 'amateur'.

We have all come across radio 'amateurs' who do things in a most 'professional' way. On the other hand, there are many individuals who profess to do their work in a 'commercial' environment, yet are indescribably 'amateurish'.

I take the liberty of repeating Tom's comments verbatim: they are a breath of fresh air:

"Is it not time that all the backbiting stopped and also a stop put to all those who attempt to impose their will on those who are enjoying the hobby? Why don't we examine our attitude towards others and put right just those little things in our attitude that could be upsetting others. There is a quote that says, Come on 'folks' let us all pull together in harmony and continue our hobby in a pleasant manner for life is just too short to be other than pleasant. Let us all be equal and enjoy the world of amateur radio. We *are* all equal, none of us are better than others. 73 and enjoy amateur radio in the many forms available to us".

Welcome to the ranks Tom. We need more like you.

Ian Wade G3NRW. (Still a 'novice amateur' after 31 years . . . . and a 'commercial' . . . . and hopefully not too 'amateurish' in either . . . !)

'QUEUE' CODE

The desire to work special event stations is one of the enjoyable pastimes of many amateur operators. How rewarding it can be to be picked out from the general chaos of operators shouting their heads off when the operator calls "CQ, QRZ.." etc! Some SES operators, having heard the chaos abounding from the simultaneously transmitted callsigns, immediately set about creating order by sorting out calls by calling for certain groups, eg G6s, G4s, G0s, G3s etc and compiling a manageable list. Intending callers then know where they 'stand' and 'sit' back to await their turn to complete a QSO. If a caller has not been included on the list then he/she tries again, if and when another call list is being created.

My callsign identifies a generation of operators who should be patient by now but a queue arrangement offers a more civilised approach; even shopping in the town's main post office has become civilised by the introduction of queue barriers.

My thanks to those operators who devote their leisure time to running special event stations.

Ken Darby G3MLD

Please note that the views expressed in 'Last Word' are not necessarily those of the RSGB.

We reserve the right to edit letters and regret that we can no longer acknowledge them individually but will pass them on to the relevant department.

...word

RSGB-MAIL-ORDER PRICE LIST

ANTENNA BOOKS

		NON-MEMBERS	MEMBERS
All About Vertical Antennas	(RPI)	£7.82	£6.65
Antenna Compendium Volume 1	(ARRL)	£12.30	£10.45
Antenna Compendium Volume 2	(ARRL)	£12.30	£10.45
Antenna Book	(ARRL)	£13.88	£11.80
Antenna Notebook, W1FB	(ARRL)	£7.99	£6.79
Beam Antenna Handbook	(RPI)	£8.70	£7.40
All About Cubical Quad Antennas	(RPI)	£7.17	£6.09
HF Antennas for All Locations	**(RSGB)**	**£7.91**	**£6.72**
Novice Antenna Notebook	(ARRL)	£8.20	£7.00
Practical Wire Antennas	**(RSGB)**	**£8.26**	**£7.02**
Radio Amateur's Antenna Handbook	(RPI)	£8.17	£6.94
Simple Low Cost Wire Antennas	(RPI)	£8.70	£7.40
Transmission Line Transformers	(ARRL)	£13.92	£11.83
Yagi Antenna Design	(ARRL)	£11.88	£10.10

AWARDS BOOKS

Amateur Radio Awards Book (3rd Ed)	**(RSGB)**	**£10.32**	**£8.77**

BEGINNERS AND NOVICES

DIY Radio (pilot issue)	**(RSGB)**	**£2.23**	**£1.90**
DIY Radio (2nd pilot issue)	**(RSGB)**	**£2.23**	**£1.90**
First Steps in Radio	(ARRL)	£6.17	£5.24
Novice Licence Proposal by the RSGB	**(RSGB)**	**£7.17**	**£6.09**
Novice Instructor's Manual	**(RSGB)**	**£7.30**	**£6.21**
Tune in the World Kit	(ARRL)	£12.69	£10.79
Tune in the World Book	(ARRL)	£10.80	£9.20

CALL BOOKS

Callbook - RSGB 1990	**(RSGB)**	**£10.12**	**£8.60**

CLOTHING (MEMBERS ONLY)

RSGB Tee Shirt - Large	**£5.29**
RSGB Tee Shirt - Medium	**£5.29**
RSGB Tee Shirt - Extra Large	**£5.29**
RSGB Tie - Blue	**£4.64**
RSGB Tie - Coffee	**£4.64**
RSGB Tie - Green	**£4.64**
RSGB Tie - Maroon	**£4.64**

EMC BOOKS (BREAKTHROUGH)

Interference Handbook	(RPI)	£8.52	£7.24
Radio Frequency Interference	(ARRL)	£5.57	£4.75

EMC FILTERS

Ferrite Ring Toroid (pack of 2)	£4.99	£4.24
Filter 1 - Braid Breaker	£8.93	£7.59
Filter 2 - High Pass for FM Broadcast Band 2	£8.93	£7.59
Filter 3 - High Pass for UHF TV	£8.93	£7.59
Filter 4 - Notch Tuned to 145MHz	£10.11	£8.59
Filter 5 - Notch Tuned to 435MHz	£10.11	£8.59
Filter 6 - Notch Tuned to 50MHz	£10.11	£8.59
Filter 7 - Notch Tuned to 70MHz	£10.11	£8.59
Filter 8 - Six Section for UHF TV	£20.76	£17.65
Filter 10 - Notch Tuned to 28MHz	£10.11	£8.59
Filter 15 - Notch Tuned to 21MHz	£10.11	£8.59
Filter 20 - Notch Tuned to 14MHz	£10.11	£8.59
RSGB Filter Kit	£51.17	£43.49

GENERAL - TECHNICAL BOOKS

Buyers Guide to Amateur Radio	**(RSGB)**	**£7.38**	**£6.27**
Hints and Kinks for the Radio Amateur	(ARRL)	£5.75	£4.88
Radio Communication Handbook Vols.1+2	(PB)	£13.99	£11.89
Solid State Design for the Radio Amateur	(ARRL)	£10.70	£9.10
25 Fun to Build Projects for Learning Electronics	(TAB)	£10.38	£8.33

HISTORY BOOKS

The Bright Sparks of Wireless *NEW*	**(RSGB)**	**£10.85**	**£9.22**
History of QRP in USA 1924-1960	(MB)	£10.05	£8.54
The Dawn of Amateur Radio	(G3FNJ)	£12.69	£10.79
2MT Writtle - The Birth of British Broadcasting		£16.41	£13.95

HUMOUR

R F Byrne's Unpublished Masterpieces *NEW*	**(RSGB)**	**£4.09**	**£3.48**

LICENCE EXAMINATION BOOKS

Advanced Class Licence Manual	(ARRL)	£6.56	£5.58
Extra Class Licence Manual	(ARRL)	£6.70	£5.70
FCC Rule Book,	(ARRL)	£7.63	£6.49
How to Pass the RAE	**(RSGB)**	**£7.19**	**£6.11**
Radio Amateurs Examination Manual	**(RSGB)**	**£7.19**	**£6.11**
Technicial/Gen. Class Llc. Man.	(ARRL)	£6.56	£5.58

LOG BOOKS AND LOG SHEETS

Log Book - Transmitting	**(RSGB)**	**£2.82**	**£2.40**
Log Book - Mobile	**(RSGB)**	**£1.53**	**£1.30**
Log Book - Receiving	**(RSGB)**	**£3.02**	**£2.57**
Log Sheets - HF Contest (100 sheets)	**(RSGB)**	**£4.04**	**£3.43**
Log Sheets- VHF Contest (100 sheets)	**(RSGB)**	**£4.04**	**£3.43**

MORSE CODE BOOKS AND PRODUCTS

Morse instruction tape, 5 - 10wpm (2 cassettes)	(ARRL)	£10.68	£9.08
Morse instruction tape, 10 - 15wpm (2 cassettes)	(ARRL)	£10.68	£9.08
Morse instruction tape, 15 - 22wpm (2 cassettes)	(ARRL)	£10.68	£9.08
Morse Code the Essential Language	(ARRL)	£6.17	£5.24
Morse Code for Radio Amateurs	**(RSGB)**	**£3.38**	**£2.87**
Morse instruction cassette to 5wpm	(ARRL)	£5.21	£4.43

NOVICE KITS

Novice Kit - Audio Amplifier	£11.59	£9.85

MAPS/CHARTS/LISTS/ATLASES

List - Countries/Awards	**(RSGB)**	**£1.35**	**£1.15**
Great Circle DX Map (card for desk)	**(RSGB)**	**£1.35**	**£1.15**
Great Circle DX Map (wall)	**(RSGB)**	**£3.38**	**£2.87**
Locator Map of Europe (card for desk)	**(RSGB)**	**£1.37**	**£1.16**
Locator Map of Europe (wall)	**(RSGB)**	**£2.55**	**£2.17**
Locator Map of Western Europe (wall)	**(RSGB)**	**£2.09**	**£1.78**
Maidenhead Locator World Atlas	(ARRL)	£4.70	£4.00
World Prefix Map in full colour (wall)	**(RSGB)**	**£3.55**	**£3.02**
Radio Amateur Map of North America	(ARCI)	£3.75	£3.19
List - Beacon - Region 1	**(RSGB)**	**£1.37**	**£1.16**
List - Beacon - UK	**(RSGB)**	**£1.37**	**£1.16**
List - Repeater - UK	**(RSGB)**	**£1.37**	**£1.16**
World Atlas	(RACI)	£4.84	£4.11

MICROWAVE BOOKS

Microwave Handbook Vol.1	**(RSGB)**	**£23.46**	**£19.94**

MICROWAVE COMPONENTS SERVICE

Semiconductor MD4901 for JVL Mixer		£10.99	£9.34
Semiconductor DC1501E for JVL Mixer		£14.56	12.38
PCB - UHF Source (RC 10/1981)		£7.25	£6.16
Regulator PCB (RC 10/1981)		£2.68	£2.28
Doppler Module - 24GHz - GDHM32		£74.23	£63.10
Waveguide - Copper WG20 (price/foot)		£7.31	£6.21
Capacitor - Coffin 1000PF (10/pack)		£1.25	£1.06
Termination - CBT40/40W/50 OHM		£22.46	£19.09
Prescaler UPB581C 2.6GHz divide by 2		£8.19	£6.96
Prescaler UPB582C 2.6GHz divide by 4		£8.19	£6.96
PCB Cuclad 233 0.005" 2 x 1 inch block		£1.16	£0.99
PCB - 1152MHz Source (RC 0287)		£4.04	£3.43
Trimmer - TZ03Z2R3ER110	(PEDOKA)	£1.16	£0.99
PCB Culad 233 0.031" 2 x 1 inch block		£1.64	£1.39
Amplifier Board - G4DDK - 1152MHz		£4.28	£3.64
PCB G4DDK 004		£7.25	£6.16
Amplifier - Broadband MSA0504		£6.64	£5.64
PCB - G3WDG/001 - 10GHz Source		£26.53	£22.55
Capacitor ATC100PF (2/pac) - for DDK004		£2.29	£1.95

OPERATING BOOKS AND AIDS

ARRL Operating Manual	(ARRL)	£13.82	£11.75
Amateur Radio Operating Manual (3rd Ed)	**(RSGB)**	**£7.63**	**£6.49**
Better Short-wave Reception	(RPI)	£7.20	£6.15
Complete Dxer	(IDIOM)	£8.64	£7.34

continued on next column

Members visiting HQ are advised to telephone first to confirm availability of goods (0707) 49855

RSGB-MAIL-ORDER PRICE LIST

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ARRL DXCC Countries List	(ARRL)	£1.58	£1.34
DX Edge (HF propagation aid)	(XANTEK)	£21.23	£18.05
Low Band DXing	(ARRL)	£9.35	£7.95
Meteor Scatter Data Sheets	**(RSGB)**	**£2.52**	**£2.14**
Operating an Amateur Radio Station	(ARRL)	£2.82	£2.40
International FM Guide	(B&P)	£4.40	£3.75

QRP (LOW POWER) BOOKS

G-QRP Club Circuit Handbook	**(RSGB)**	**£7.29**	**£6.20**
Joy of QRP	(MWB)	£11.52	£9.79
QRP Notebook	(ARRL)	£6.57	£5.58

BOOKS ON SPECIAL MODES

The ATV Compendium	(BATC)	£5.95	£4.46
Amateur Television Handbook	(BATC)	£2.51	£2.13
Am. Packet Rad. Link Layer Prot.	(ARRL)	£8.09	£6.88
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