Radio Communication

The Journal of the Radio Society of Great Britain

August 1991

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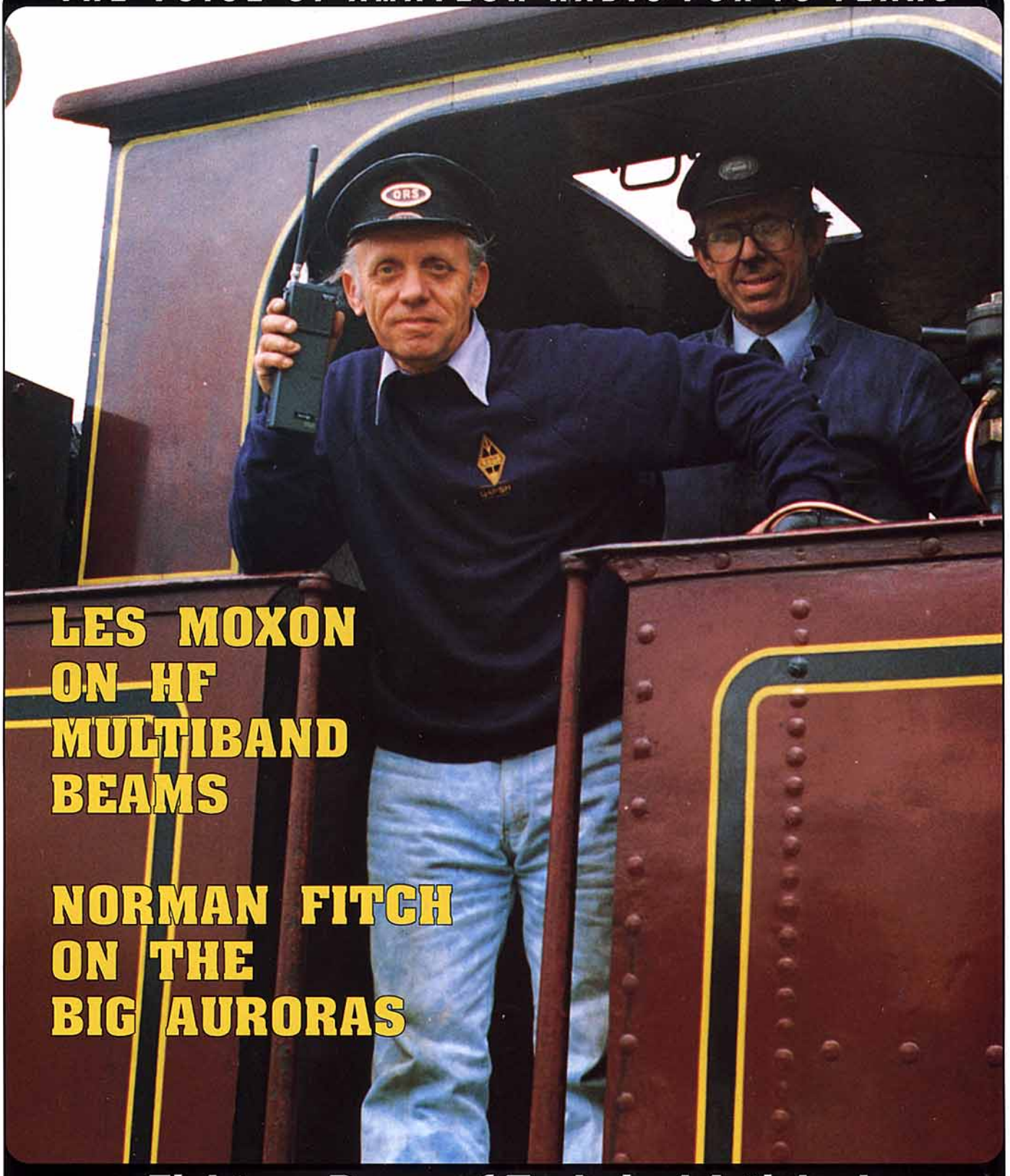
THE VOICE OF AMATEUR RADIO FOR 78 YEARS



LES MOXON ON HF MULTIBAND BEAMS

NORMAN FITCH ON THE BIG AURORAS

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KENWOOD

TS-450S All mode, all band HF Transceiver with General Coverage Receive

The introduction of this beautifully compact new HF transceiver from Kenwood gives you competition class reception from 500kHz to 30Mhz and 100W transmit capability on all nine HF amateur bands. The TS-690S boasts the same power output and full complement of performance and convenience features, but adds 6 metres with 50W output power and separate antenna connector.

Built upon the success and reliability of the TS-440 series, we show here some of the innovations of the TS-450S. A full colour, eight page brochure with details and pictures is available on request; but if you can, drop in on your local Lowe Centre and 'test drive' one for an hour or so. We think you'll be impressed.

TS-450S Features

✦ Direct Digital Synthesis (DDS) gives 1Hz tuning steps with extremely low phase noise and no tuning 'glitches'. ✦ New 'fine' tuning function changes tuning rate from normal 10kHz per revolution to 1kHz per revolution for ultra-fine tuning in demanding modes such as RTTY, CW or Packet. (All of course still in 1Hz steps). ✦ New 'Primary' function for enabling only those front panel controls you actually need for mobile operation. ✦ Full range of filter options, with total flexibility for the operator and clear indication of filter status. ✦ 'Cloning' facility in two station use where all operating data can be transferred to another transceiver (TS-850S, TS-450S or TS-690S) down a serial data cable. ✦ Direct frequency entry from keypad plus twin VFOs plus 100 multi-function scan memories. ✦ Kenwood's advanced intercept point (AIP) feature gives dynamic range of 108dB and 3rd order intercept of 30dB. Simply put, the receiver is outstanding. ✦ CW pitch selectable by operator for personal preference and CW 'reverse' function as in the TS-850S to switch incoming signal to opposite filter passband to remove adjacent interfering signals. ✦ IF shift to allow user to slide the IF passband around signal without re-tuning the receiver. ✦ Kenwood uncompromising quality and attention to detail in every aspect of this exciting new mid-price addition to the range.

TS-450S £1,150

TS-690S £1,325

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Managing Editor
Mike Dennison, G3XDV

Assistant Editor
Marcia Brimson

Production Editor
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Derek Cole

Editorial Secretary
Erica Fry

Typist
Belinda Gannon

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

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

Tel: (Editorial *only*): 0707 59260
Fax: (Editorial *only*): 0707 49503
E-mail (Telecom Gold) 87:CQQ083

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

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Radio Communication

The Big Auroras: Extra *Propagation* and *VHF/UHF News* pages.

* **PLUS even more pages of technical items.**
* **PLUS our new regular full colour section.**

NEWS AND REPORTS

TECHNICAL FEATURES

COVER PICTURE:
Terry Owen, G4PSH, on the footplate of a Metropolitan Railway E Class 0-4T built in 1898. Terry operated GB4QRS in June from the Buckinghamshire Railway Centre at Quainton Rd Railway Station. See page 7.

REGULAR ARTICLES

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:
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Correspondence to honorary officers 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

Council Nominations

WE HAVE NOW REACHED the end of a fairly traumatic financial year. In the earlier part of the year it seemed likely that we might have an even bigger deficit than that incurred up to last June. However, tough decisions were taken and in all probability the Society should approach a break-even situation for the year.

Now must be the time to start addressing some of the opportunities to improve the service provided to members. I have started to find out how best to do this by sending out a simple survey form with the membership renewals. This survey, of course, will continue throughout the year as members renew across that time span, and if action is taken early as a result of the initial answers, progress can be assessed from 1991 renewal replies. The first few hundred replies have been surprisingly consistent across all questions. The most popular perceived problem facing the Society would appear to be apathy, followed by finance.

The financial position is being very carefully monitored and I want to address the other problem by trying to communicate more effectively with our membership. It is clear to me from my meeting with RLOs that not enough information about Council, committee and HQ activities is getting through to the membership. I sense a feeling of frustration amongst members and RLOs that they feel powerless to influence the decisions of Council and thus the direction of the Society. This inevitably leads first to frustration, then to apathy and indifference. This year's Council elections provide an excellent opportunity to change that scenario. Almost half of the seats on Council are up for election and Council is starting the election ball rolling a month earlier this year, which should give more time for potential candidates to be proposed. However, I think it would be sensible for me to point out that being on Council is no sinecure.

It is demanding, stressful, time-consuming and expensive, requiring a wide range of skills not usually found in one person. This is why suitable candidates in the past have often been those who have retired early from demanding and responsible jobs.

The Society has been consolidating its financial position during the last half year and I now expect to go on the offensive during the next year. I will need the enthusiastic support of a Council prepared to get out amongst the members and RLOs and fight for our Society. I believe passionately in the future of the Society and expect a similar dedication from future Council members. So start searching and cajoling now. Details of how to nominate a Council Member can be found on page 6.

Filling the role of RLO for your county is a good way of gaining experience and getting known, as a preliminary step to putting up for Council in future years. We are short of RLOs now - so please think about this, too.

Philip Smith,
General Manager

Snoopy steps in to improve astronaut safety

G3ZCZ/W3 Wins NASA Award

RSGB MEMBER Joe Kasser, G3ZCZ/W3, has been presented with the coveted Astronaut's Silver Snoopy Award for outstanding support given to the US Space Shuttle programme in his capacity as an employee of Lorel Aerosys at the Goddard Space Flight Centre, Greenbelt, Maryland.

The citation, signed by Astronaut Mary Cleave, commends Joe's "contributions to the design upgrade of the Shuttle Payload Interface Facility (SPIF) providing expanded capabilities with minimal impact on current mission support and also providing significant cost savings."

It goes on to say: "You have carried out your responsibilities in an exemplary manner, demonstrating pride in your work and performance", and concludes "we who fly in the spacecraft take extreme pleasure in presenting you with the Astronaut's Silver Snoopy Award." The Award itself is a silver pin in the form of Snoopy in space suit and helmet.

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Snoopy, the precocious puppy from the popular Peanuts cartoon strip, was selected by NASA to help increase aerospace workers' awareness of flight crews and their missions in order to improve safety and quality performance. The character's creator Charles Schulz, an avid supporter of the US space programme, enthusiastically welcomed the idea.

Proving the maxim "If you want something done, ask a busy man", Joe is best known to radio amateurs as the author of the LAN-LINK software and Editor of the award-winning AMSAT Newsletter and the AMSAT Journal. He is also the author of two books on microcomputing and amateur radio, and numerous magazine articles. Last May, *RadCom* published an abridged version of his article about amateur radio on the soviet Mir space station.

Special Subs Rates

THE NORMAL RSGB subscription is £30. However, for a number of categories of people there are reductions available. These are likely to be attractive to those just coming into amateur radio, particularly Novice course students. With the few exceptions noted below, these membership categories attract all of the direct benefits of RSGB membership, including receiving *Radio Communication*, use of the outgoing QSL Bureau, minimum 15% discount on books and newsletters, access to advice on EMC, planning, and technical matters, preferential rate equipment insurance, use of members' advertisement service and so on.

For the retired:

£25.00 Corporate (Senior Citizen): Over state pensionable age. We will, of course, need proof of your age and this should accompany the application.

For the young:

£19.20 Corporate (Student): For those in full-time education between 18 and 25 years old. Proof of age and student status required.

£12.75 Associate: For the under-18s. Associate members do not vote.

£11.95 Corporate (Family): For those living at the same address as an existing member of the Society. Family Members do not receive *RadCom*.

Why not help the RSGB help you by trying to recruit another member this month? Ring the Subscriptions Dept on 0707 49805 for a form.

QSL Bureau News

THE JULY *RadCom* item regarding Ted Allen, G3DRN, taking over the sub-managership of the 'G3A series' was a little ambiguous. Ted is in fact Sub-Manager for the G3AAA - G3DZZ series.

Young Amateur Deadline

THE LAST CHANCE to nominate the 1991 Young Amateur of the Year is **31 July**. Full information, including a nomination form, went out with the May edition of *RadCom*. Additional forms are available from The Secretary at RSGB HQ.

Important Notice for RSGB Credit Card Holders

MEMBERS WILL have seen press reports that the Bank of England called in the liquidators to the Bank of Credit and Commerce International on 5 July. BCCI is a multi-national and this decision affected many thousands of companies world-wide.

BCCI administered the RSGB Credit Card which, we regret to say, cannot not now be used. However, we now have an agreement with Bank of Scotland to issue a new RSGB credit card. Members will be mailed with details of the card in September and will be offered the oportunity to apply. All the usual vetting procedures will apply and, once the applications are approved, holders of the existing RSGB Credit Card will be given the option to transfer any outstanding balance to their new card, up to their agreed credit limit.

BCCI also handled all of the credit card transactions (not just the RSGB card) made at RSGB HQ. We apologise for any inconvenience this may have caused members whilst alternative arrangements were made.

Full details and a written quotation available from: Bank of Scotland Card Services, Pitreavie Business Park, Dunfermline, Fife KY99 4BS.

Council Elections 1991/92

THE COUNCIL is the governing body of the Society and is responsible, on behalf of the Society's members, for the conduct of all the Society's business.

Much of this work is delegated to a number of sub committees who deal with the various aspects of amateur radio and the financial affairs of the Society. However, the overall supervision of these committees and the Headquarters staff and functions, lies with Council.

Council meetings are held every two months in London and election to Council presupposes a commitment to attend. In addition, Council members are expected to deal with individual members' problems and generally represent the Society and its policies through attendance at various functions and liaison meetings.

Because of the size and complexity of the Society's activities, it is hoped that members with substantial management experience, together with a proven track record of involvement in amateur radio, will feel able to put themselves forward for election and participate in progressing the work of the Society.

Qualifications for Election

(A) A candidate must have been a Corporate Member of the Society for at least three years at the time of nomination.

(B) A candidate must submit:
- (i) Written consent to accept office if elected.
- (ii) If appropriate, a signed statement that he or she is over 70 years of age or will become so during the term of office if elected.
- (iii) A declaration of any commercial interest in amateur radio.

Nomination Procedure

(A) Each candidate must be nominated by at least ten current corporate members and in the case of Zonal candidates all nominators and the candidate must reside in the Zone concerned.

(B) Nominators may nominate one candidate only.

(C) Nominations may be made on either of the supplied forms or a plain sheet of paper. Nominators should state their address in full and sign the nomination.

Additional Information

(A) Candidates:

To assist the membership in voting, candidates may find it helpful to supply a *brief* statement covering their experience and qualifications in support of their candidature, with particular reference to their involvement in amateur radio. Bona fide statements will receive the minimum of editing consistent with good style and factual accuracy; however, statements exceeding 200 words will be cut to that number. A recently taken black-and-white head and shoulders photograph may also be submitted.

(B) Nominators:

Nominators may wish to supply details of how long they have known a particular candidate and supply information in support of their nominee.

All the initial indications suggest that there will be at least three Ordinary vacancies on Council in 1992. In addition, it seems likely that there will be Zonal vacancies for Zone A (Northern England), Zone C (South East England), Zone D (South West England) and Zone F (Northern Ireland). A list of Council members who retire at the end of 1991 will be published in the September issue of *RadCom*, but those who wish to seek nomination may write to HQ now for forms which will assist with their nomination. Please address your request to '1992 Council Elections', Radio Society of Great Britain, Lambda House, Cranborne Road, Potters Bar EN6 3JE.

WAB

THE COMMITTEE of the Worked All Britain Group has agreed that the Royal National Lifeboat Institution will be the next recipient of WAB's fund raising activities. See page 45 for more details of this award scheme with a difference.

G0OIQ has written to mention a WAB net on 14.270, 21.318 and 28.655MHz most mornings. Main controllers are SM5GA and IK8DUL.

REPORT OF THE CITY AND GUILDS OF LONDON INSTITUTE ON THE JUNE 1991 NOVICE RAE

(reproduced by authority of the Institute)

OVERALL RESULTS (UK CANDIDATES)

Exam Date	No of candidates completing exam	Candidates qualifying for NRAE certificate Number	%
June 1991	185	153	82.7

REPORT ON MULTIPLE-CHOICE QUESTION PAPER PAPER NO.773-1-01

Syllabus Topic or Objective	No of Items	Comments on Performance of Candidates
Receivers and Receiving Techniques	4	Items on receivers were well answered with the exception of one which tested the understanding of the method of receiving a modulated morse signal. 56% of candidates thought it necessary to use a beat frequency oscillator.
Components, Applications and Units	2	36% of the candidates answered incorrectly a question on the resistor colour code, but an item on battery polarity was very well answered.
Measurements	4	Although 60% of candidates chose the correct multimeter range to measure a low AC voltage, the remaining candidates chose a DC meter. In another item requiring candidates to identify a voltmeter in a circuit, 54% of candidates gave the wrong answer. Items on the precautions for accurate meter measurement and on converting frequency to wavelength were very well answered.
Propagation and Antennas	5	Some candidates did not know the polarisation of a ground plane antenna. Other items in this section were well answered.
Transmitters and Transmitting Techniques	10	Most candidates had a good understanding of transmitters, interference and EMC topics. There were many candidates, however, who did not appreciate that frequency modulated telephony was less prone to causing television interference than the amplitude modulated telephony modes.
Operating Techniques	6	All items on operating techniques were well answered. Candidates had a good command of the phonetic alphabet and abbreviations commonly used in amateur radio contacts.
Station Layout	4	Quite well answered, but some candidates did not appreciate the reason for using a screened microphone cable.
Construction	0	Items on construction are not included in the written paper.
Safety	2	Both items on safety were generally well answered. However, 32 of the candidates had the wires for Line and Neutral crossed in a mains lead; the colours used for mains cables needs emphasising in the interest of candidate safety.
Licensing Conditions	8	All items on licensing conditions were well answered. Many candidates thought that they should notify the RSGB rather than the Secretary of State of any change in their Main Station Adddress.
General Comments		The results for the Novice Radio Amateurs Examination were very encouraging, particularly as this was the first examination of its kind and there had been little guidance to candidates and instructors of the standard required. Of the candidates who attended the examination, 82.7% of them were successful. Areas of the syllabus to which attention might be given are detailed above. All associated with the success of the first examination are to be thanked and congratulated.

● THE FIRST Novices have passed the NRAE, and some have passed the RSGB 5WPM Morse Test. The Radiocommunications Agency will be presenting licences to some of the first Novices at a special ceremony on 25 July (full story next month).

Following the difficulty some candidates had in finding examination centres prepared to offer the Novice RAE, the RSGB made representations to City and Guilds. C&G have replied that they are prepared to extend the deadline for registration by a week, and "are conducting an urgent exercise seeking the cooperation of a wide variety of centres in being prepared to accept entries from young persons."

Planning Advisory Committee and Panel

Please help us to redress a shortage

THE SOCIETY maintains a panel of volunteers who offer their services to members experiencing difficulties with local planning authorities regarding aerials and masts. Unfortunately, the number of difficult cases seems set to outweigh the level of support available, and the Committee is quite desperate to entice more volunteers into this vital service.

Qualifications which can prove of immense value are possessed by Planners, Surveyors, Architects, Solicitors and, indeed, anyone with considerable experience in submitting or processing Town & Country Planning applications.

Volunteers are co-opted onto the Planning Panel, and thus become corresponding members of the Planning Advisory Committee. They receive all of its papers, and are invited to attend meetings whenever an item of special interest is on the agenda. The Committee meets three or four times a year, in London. Their own areas of operation can be tailored according to their own wishes, of course; currently there is a particular need for reinforcements in the Midlands and Scotland.

Please give this plea serious consideration, and if you feel that you can assist in any way, contact the Planning Advisory Committee Chairman, H Fenton, G8GG, at 5 Cromer Road, St Annes, Lytham St Annes, Lancashire, FY8 3HD.

144MHz DF

THE ARDF Committee wishes to establish a two metre DF competition, organised in a similar way to the long-established Top Band competition.

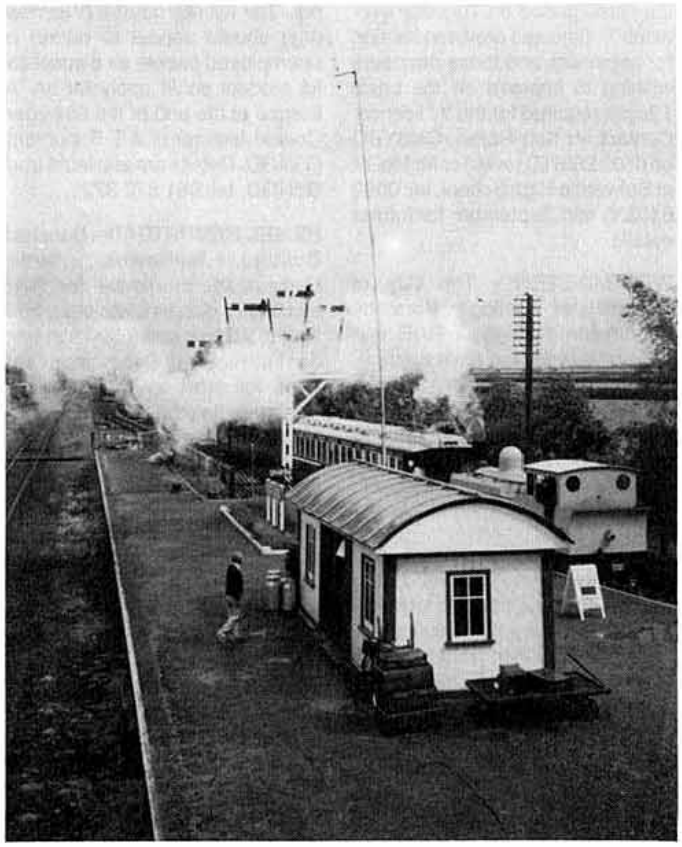
To this end, the committee is compiling a list of clubs already running such events - perhaps as a result of the May *RadCom* article. Would Secretaries please write to the HF DF Contest Manager, Trevor Gage, G1MPJ, at Lowfield House, Bolter End lane, Lane End, High Wycombe, Bucks, HP14 3NB, or telephone 0494 881842.

GB4QRS – The Slow Train?

GB4QRS OPERATED from Quainton Road Railway Station at the Buckinghamshire Railway Centre Museum, in June. Operation is on the 3.5, 14, 21, 28 and 144MHz bands, CW, SSB and FM. The museum is 5km NW of Aylesbury and is signposted from the A41. It features both full size and miniature trains which are in steam Sundays and Wednesdays throughout the summer.

Despite poor band conditions, the team (G4PSH, G0MMI and G1WAG) made nearly 150 contacts on HF and VHF. The RSGB video and much amateur radio promotional material was on display to visitors vying with the other main attraction, three locomotives in steam.

RadCom's Assistant Editor Marcia Brimson visited GB4QRS and was put on the microphone in time to exchange a greetings message with RSGB Council Member Angus Mckenzie, G3OSS.



Stolen

FROM THE premises of Dressler Communications Ltd in East London,

Kenwood TH-75

Kenpro KT-22

AOR AR1000

Kenwood TH-77 S/N 21104497

Standard C500 (E160006)

Icom IC-W2E (9510021680)

IC-2SET (835006918)

IC-24ET (822003803)

IC-2SE (785013965)

IC-4GE (712001298)

Information to Harvey Lexton on 081 558 0854.

Apparently stolen in the post between Essex and Navico Ltd, AMR1000S S/N EJ000079S. Any information via *RadCom* office at RSGB HQ.

● IN THE list of 50MHz GB2RS readers given in April *RadCom*, G2HDR was wrongly included. Apologies to him and to anyone who has tried to find his 50MHz transmissions.

144MHz Bandplan

Your comments invited

THE VHF Committee is considering making one of the following alterations to the 144MHz band plan to accommodate the growth of packet radio. The new designations for packet radio will be for frequencies that may be used for unattended operation. Comments and further suggestions are invited.

In making designations the VHF Committee will consider occupancy as recorded in the VHF register (see p5 of the December 1990 issue of *Radio Communication*).

1. The frequencies 144.6375 and 144.6625MHz be used for AFSK packet radio.
2. One of the FM Simplex channels S11-S23 be designated for AFSK packet radio.
3. The spot frequency 144.475MHz be designated for AFSK packet radio.

The VHF Committee is also seeking suggestions for a suitable frequency for FAX operation on 50MHz.

The Committee currently has a vacancy for a corresponding member with experience of repeaters and associated matters. The ideal candidate would already be a member of the Repeater Management Group. There is also a vacancy for a corresponding member with experience of packet radio and associated matters. The ideal candidate would already be a member of the Data Communications Committee.

All mail should be addressed to the chairman of the VHF Committee: Peter Burden, G3UBX, 2 Links Road, Penn, Wolverhampton, WV4 5RF (Packet radio messages may be sent via GB7MAX).

Beware Strangers Bearing Gifts!

A MEMBER recently received a letter from Nigeria offering to deposit $15.5 million in his bank account, 30% of which was his to keep. Too good to be true?

The snag is that you have to provide four pieces of headed notepaper, two blank pro-forma invoices, full details of your bank account and your telephone, telex and fax numbers. And the letter goes on to say that "all of the aforementioned documents will of course be signed and stamped by you." With all those goodies in the Nigerian's possession, it doesn't take a genious to work out in which direction the money would *really* flow.

This is an apparently common fraud and, assuming our member's address was obtained from the *Call Book* (which is not certain), it is one which amateurs should watch out for.

● OUR NEW *Datacomms* columnist is Richard 'Rick' Sterry, G4BLT, of Wakefield. His first contribution will appear next month.

RAE and Morse Courses

Chingford - Adult Education Centre, Nevin Drive, Chingford, London E4 will start a **Morse** course on 15 September and then every Monday evening 7.30 - 9.30pm. For details contact T Langley, G4PSY, tel: 0992 715168.

Stevenage - classes for the **RAE** will be run in the Ground Floor Lecture Room No 1, 'D' Block, Ridgemond Training Enterprise, Ridgemond Park, starting 2 September for 32 weeks. Further details from P Daly, G0GTE, tel: 0438 724991.

WOMBOURNE - Ounsdale High School, Ounsdale Road. **RAE** classes will be held on Mondays 7.15-9.15pm. First class 16 September. Enrol now. Details from Roger Price on Wolverhampton 895198.

HAVERING - College of Further and Higher Education will run a **RAE** Examination preparation class starting on Monday 9 September and a **Morse** Examination class starting on Thursday 12 September. For more information write to Stuart Woosnam, G0NKP, or Chris Potarzycki, G0NJR at Havering College of F & HE, Quarles Campus, Tring Gardens, Harold Hill, Romford, Essex RM3 9ES, tel: 04023 81460 Extn 7131.

BURNHAM - Adult Education Centre, Opendale Road, Burnham, Slough will run **RAE** and **Morse** classes. Details of dates and copy of the prospectus can be obtained from the Education Centre, tel: 0628 665513 or from Roy Smith, G0IWU, tel: 0628 667136.

BRIGHTON - classes for the **RAE** and **Morse** will be run at Brighton College of Technology, Pelham Street, Brighton. Two evening classes will be available: Tuesdays from 6-9 pm covers the theory necessary to pass the City & Guilds RAE. Wednesdays from 6-9pm for Morse and practical project building. Further details on tel: 0273 667788, ext 605 or 730.

FIFE - The Glenrothes & DARC is planning to run a course to prepare candidates for the RAE to be held in May 1992. The course will be 7 - 9pm Monday evenings beginning late September. A second course in **Morse** Code will be run during the same period on Tuesday evenings 7 - 9pm and provides training for beginners and those amateurs wishing to improve on the basic 12wpm required for the 'A' licence. Contact Mr Ken Horne, GM3YBQ on 0592 265789 (eves) or Mr McGill at Balwearie High School, tel: 0592 640335 mid September for further details.

WESTMINSTER - The City of Westminster College (formerly Paddington College) - **RAE** and **Morse** classes start early September. Contact Ann James, Science & Technology Dept, The City of Westminster College, 25 Paddington Green, London W2 1NB, tel: 071-723 8826 for enrolment details etc.

RHONDDA College, Llwynypia, Tonypandy, Rhondda. **RAE** course will start September. Enrolment during the first week in September. Further information from Mr John Howells, GW4BUZ, tel: 0443 432187 (W) or 0443 432542.

SOUTH LONDON College, Knights Hill, West Norwood, London SE27 0TX. **RAE** course starts mid-September. For details contact J W Hobbs, G3JQN, ECE Department, South London College, tel: 081-670 4488.

CAMBRIDGE - Chesterton Community College, Gilbert Road, Cambridge CB4 3NY. **RAE** class starts 24 September. Enrolment evenings are Tuesday 10 September and Wednesday 11 September, 7-9pm. Course tutor is Martin Mann, G4FFO, telephone 0223 860150.

MANCHESTER - North Trafford College, Talbot Road Centre, Stretford, Manchester M32 0XH. Enrolment dates for **RAE** and **Morse** classes are 2, 3 and 4 September The courses take place as follows: Theory - Monday pm or Wednesday am; Morse Code - Tuesday pm or Wednesday pm; Amateur TV - Wednesday am; Advanced Morse Code - Monday pm. The full day course (Wednesday) should appeal to retired or unemployed people as a successful student could apply for an 'A' licence at the end of the first year. Course lecturer is J T Beaumont, G3NGD. Details are available from G3NGD, tel: 061 872 3731.

HEMEL HEMPSTEAD - Dacorum College, Marlowes, Hemel Hempstead. Enrolment for **RAE** and **Morse** classes takes place from 2pm to 3.30pm and 6.30pm to 8pm on Tuesday 10 September. The class will meet on Thursday evenings starting on 26 September. Further details available from the College on 0442 63771.

KINGSTON UPON THAMES - Kingston College of Further Education. Enrolment for **RAE** course takes place 9/10 September. KCFE is also a centre for the City and Guilds 765 exam (RAE) as well as the 773 exam (**Novice RAE**) and welcomes external candidates. However it cannot offer the September 773 exam. For further information contact G7DGW, Electrical Engineering Department, Kingston College of Further Education, Kingston Hall Road, Kingston-upon-Thames, Surrey KT1 2AQ, tel: 081 546 2151, ext 2066.

TELEGRAPH RADIO CLUB, Telegraph Road, Longriggend, Nr Airdrie ML6 7RS meets every Tuesday evening at 7.45pm. **RAE** course and **Morse**. Visitors welcome. For more details contact GM4LDU.

TELFORD: A ten week 12WPM **Morse** course starts at Wellington College of Arts and Technology, Heybridge Road, Wellington, Telford, Shropshire. It will be run by John Christopher, G0ISI, on Thursdays 7 - 9 pm. Cost is £22 and enrolment is on 9-10 September at the college.

FAREHAM: Morse course Starting 23 September at Neville Lovett Community Centre. Monday evenings, 7 - 9 pm. Enquiries to the Centre Office (0329) 823471, or the tutor A S Chester, G3CCB, on (0329) 288139.

Christian Amateurs' Conference

The annual conference of the World Association of Christian Radio Amateurs and Listeners will take place 13 - 15 September at the Elim Bible College Conference Centre, Nantwich. The inclusive cost of the weekend to members and guests is £44 each. Contact Geoff Peterson, G4EZU, 124 Darnley Rd, Gravesend, Kent, DA11 0SN; tel 0474 533686

G8KW Trophy

A MAGNIFICENT silver cup, the KW Trophy, has been presented to the RSGB by Rowley Shears, G8KW. The trophy will be awarded each year to the leading UK single operator station in the CQ WW CW Contest.

Rowley Shears is perhaps best known for his company KW Electronics which, in the 60s, manufactured some of the first British purpose-built amateur radio rigs. These had stirring names like Vanguard, Valiant and Viceroy, the latter being a very early SSB transmitter. Still popular on the second-hand market is the KW2000 series of SSB transceivers, which were amongst the very few commercial SSB transceivers available before the Japanese became involved.

Less well known is the fact that G8KW was responsible for getting permission for West German amateurs to go back on the air after WWII. He made the first legal post-war amateur transmission from Germany to announce the event. Not surprisingly, he became Honorary Member No:1 of the German national society, the DARC.

An RSGB member for an incredible 56 years, Rowley has missed only one copy of *RadCom*, then called the *T & R Bulletin*, when it went astray between the UK and his forces address in the Middle East.

Asked why he wanted to donate the trophy, Rowley Shears replied he wanted to give something back to the RSGB and a cup would keep the KW name going.

Latest Callsigns

THE LATEST callsigns issued by the Post Office Radio Amateur Licensing Unit on Wednesday, 10 July, were in the G0 Papa Kilo and G7 Juliet Romeo series.

South Midlands Co

Southampton (0703) 255111 **Leeds** (0532) 350606 **Chesterfield** (

NEW

A QUART IN A PINT POT?

Never I hear you say, well **YAESU's** engineers have done it again with the **NEW** Dualband **FT5200**

- ★ Dualband 2m and 70cms
- ★ 50/5W on 2m and 35/5W on 70cms
- ★ Crossband full duplex operation
- ★ Reversed-mask dual LCD display
- ★ Built-in antenna Diplexer
- ★ Trunk Mount Cable Option 3m or 6m

NEW

FT-990 HF TRANSCEIVER

- ★ Amateur Bands 160-10m
- ★ General Coverage Receiver
- ★ 100W Output (25W AM Carrier)
- ★ 50 Memories
- ★ Built in iambic memory keyer

Based on the remarkable performance and easy operation of the FT-1000, Yaesu's new FT-990, combines the basic technical features of that top-of-the-line model with several recent advances resulting in a spectacular performer at a very reasonable price.

Utilising Direct Digital Synthesisers (DDS) and the extremely quiet receiver circuitry of its big brother, the FT-990 delivers silky smooth tuning, pure local signals and clear reception of even the weakest stations.

So if you're looking for top performance in an HF transceiver, try out the FT-990.

You might just fall in love!

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FT-26 & FT-76

2m & 70cms

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Leeds *(0532) 350606*
SMC Northern.
Nowell Lane Ind. Est.
Nowell Lane,
Leeds LS9 6JE.
9am.-5.30pm. Mon-Fri
9am.-1pm Sat

Chesterfield *(0246) 453340*
SMC Midlands,
102 High Street,
New Whittington
Chesterfield.
9.30am.-5.30pm
Tues-Sat

Birmingham *021-327 1497*
SMC Birmingham.
504 Alum Rock Road,
Alum Rock,
Birmingham B8 3HX.
9am.-5.00pm. Tues-Fri
9am.-4pm Sat.

Axminster *(0297) 34918*
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1 Western Parade.
West Street,
Axminster,
Devon EX13 5NY.
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PS120 Mk2	3-15v Variable	9A/12A max.	£69.95
PS304	1-15v Variable	24A/30A max.	£129.95
RS40X	1-15v Variable	32A/40A max.	£189.00

COAX SWITCHES

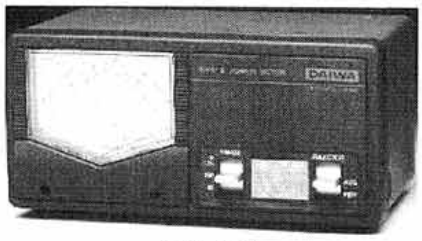
CS201	2 Way SO239	DC-600MHz	1kW	£13.95
CS201G2	2 Way N	DC-2GHz	1kW	£27.50

SWR METERS

CN101	1.8-150MHz	15/150/1500W	£59.95
CN103N	150-525MHz	20/200W N	£69.95

LINEAR AMPLIFIER

LA2080H	2m 1.5-5W in	30-80W out	£159.95



CN 101

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TRANSCEIVERS

HT106	6m Transceiver 10W P.E.P. SSB/cw	£305.50	C
HT120	20m Transceiver 10W P.E.P.SSB/cw	£305.50	C
HT180	80m Transceiver 10W P.E.P.SSB/cw	£305.50	C
HP100S	Power Supply for HT series	£99.00	B
HC100	A.T.U. 80-10M 5 band 200W P.E.P.	£109.00	B
HCF100	CW Narrow filter HT series	£39.85	A
HNB100	Noise Blanker HT series	£19.95	A
HBK100	Mobile Bracket HT series	£10.20	A

TUNERS

HC400L	160-10m 350W P.E.P.	£203.00	C
HC2000	160-10m 2kW P.E.P.	£365.00	D

LINEARS

HL2K	160-10m HF Linear 2kW		£1450.00	E
HL1K	160-10m HF Linear 1kW		£899.00	D
SAGRA-600	2m	25w drive 600w output	£815.00	E
HL100B/10	10m	10W in 100W output P.E.P.	£182.00	C
HL100B/20	20m	10W in 100W output P.E.P.	£182.00	C
HL100B/80	80m	10W in 100W output P.E.P.	£182.00	C
HL66V	6m	10W in 50-60W output	£131.75	C
HL166V	6m	3/10W in 80/160W output	£255.00	C
HL37V	2m	3W in 32W output	£90.95	B
HL62V	2m	10W in 60W output	£137.95	C
HL110V	2m	2/10W in 100W output	£220.00	C
HL180V	2m	3/10/25W in 170W output	£299.00	C
HL36U	70cm	6/10W in 25/30W output	£138.00	B
HL63U	70cm	10/25W in 50W output	£220.00	C
HL130U	70cm	3/10/25W in 120W output	£397.00	C

TRANSVERTERS

HX240	2m to HF 80, 40, 20, 15 & 10m 2.5W/10W in 30-40W P.E.P. output	£254.50	B
HX640	6m to HF as above	£254.50	B

COMET PRODUCTS

BALUNS

CBL-30	1:1	1.7-30MHz. 1kW P.E.P.	£18.95	A
CBL-2000	1:1	0.5-60MHz. 2kW P.E.P.	£25.50	A

HANDHELD ANTENNAS

CH72S	2m/70cm BNC 0dB/3.2dB 2m/70cm	£12.25	A

MOBILE ANTENNAS

CA2x4MB	2m/70cm 4.5dB/7.5dB 2m/70cm	£38.50	C
CA2x4KG	2m/70cm 6.0dB/8.4dB 2m70cm	£40.75	C

DUPLEXERS

CF-30S	50/144 Duplexer UHF conn.	£25.00	B
CF416MN	144/430 Duplexer UHF/N conn.	£26.00	B
CFX-514	50/144/430 Triplexer UHF conn.	£36.75	B
CFX4310	144/430/1200 Triplexer UHF/N conn.	£36.75	B

MOUNTS

TBR	Adjustable trunk mount.	£11.50	B
RS17	Mini trunk mount.	£12.75	A
RS16	Mini Gutter mount	£12.75	B
CK-3LX	Mini Cable Assy for RS16/RS17	£16.25	B

MINI MOBILE ANTENNAS

CHL21J	2m/70cm 0dB/2.15dB 2m/70cm	£14.75	B
CHL23J	2m/70cm 2.15dB/3.8dB 2m/70cm	£17.35	B

BASE ANTENNAS

CA350DB	6m/10m 2.15dB/6.5dB	£139.00	D
CA2x4WX	2m/70cm 6.5dB/9.0dB	£80.72	C
CA2x4MAX	2m/70cm 8.5dB/11.9dB	£102.12	C

FILTERS

CF-30MR	HF Cut off 32MHz 1kW P.E.P.	£38.75	B
CF-50MR	6m Cut off 54MHz 1kW P.E.P.	£38.75	B
CF-30H	HF Cut off 32MHz 2kW P.E.P.	£80.75	A
CF-30S	HF Cut off 32MHz 150W cw	£19.35	A
CF-50S	6M Cut off 57MHz 150W cw	£20.35	A
CF-BPF2	2m Band Pass 150W cw	£31.65	A

METERS SWR/PWR

CM-420	2m/70cm 15-50W Mini	£36.75	B
CD-120	1.8-200MHz 15/60/200W	£76.60	B
CD-160H	1.6-60MHz 20/200/2000W	£90.85	B
CD-270D	140-525MHz 15/60/200W	£79.65	B

COAX SWITCHES

CSW-20	2 way DC-1000MHz SO239	£26.50	A
CSW-20N	2 way DC-1500MHz N	£45.95	B

ACCESSORIES

CEP-M2	Earphone 3.5mm jack	£1.28	A
CES-M2	Mini Clip on Speaker 3.5mm jack	£5.62	A
CHM-M4	Mini mic + PTT 2.5mm jack	£9.15	A

PRICES FOR POSTAGE ON ALL THE ABOVE ITEMS ARE CODED AS FOLLOWS:

A = £1.75 **D = £10.00**
B = £4.00 **E = £15.00**
C = £6.00

STRUMECH VERSATOWER

STANDARD 13M20 SERIES

13M20P25	25FT POST MOUNT	£468.83
13M20P40	40FT POST MOUNT	£660.35
13M20P60	60FT POST MOUNT	£777.85
13M20FB25	25FT FIXED BASE MOUNT	£324.30
13M20FB40	40FT FIXED BASE MOUNT	£442.33
13M20FB60	60FT FIXED BASE MOUNT	£609.83
13M20BP25	25FT BASE PLATE MOUNT	£553.43
13M20BP40	40FT BASE PLATE MOUNT	£767.28
13M20BP60	60FT BASE PLATE MOUNT	£863.63
13M20M25	25FT MOBILE TOWER	£2226.63
13M20M40	40FT MOBILE TOWER	£2439.30
13M20M60	60FT MOBILE TOWER	£2613.20

HEAVY DUTY 16M20 SERIES

16M20P40	40FT POST MOUNT	£820.15
16M20P60	60FT POST MOUNT	£930.60
16M20P80	80FT POST MOUNT	£1457.00
16M20FB40	40FT FIXED BASE MOUNT	£658.00
16M20FB60	60FT FIXED BASE MOUNT	£780.20
16M20FB80	80FT FIXED BASE MOUNT	£1245.50
16M20BP40	40FT BASE PLATE MOUNT	£869.50
16M20BP60	60FT BASE PLATE MOUNT	£972.90
16M20BP80	80FT BASE PLATE MOUNT	£1563.93
16M20M40	40FT MOBILE TOWER	£2909.30
16M20M60	60FT MOBILE TOWER	£3031.50
16M20M80	80FT MOBILE TOWER	£3760.00

MIDITOWER SERIES

P30	30FT POST MOUNT	£500.55
BP30	30FT BASE PLATE MOUNT	£528.75
PB30	30FT FIXED BASE MOUNT	£429.09

36FT VERSIONS OF ABOVE.
1 EXTRA SECTION ADD £45.83

All towers except mobiles are available from stock 13M20 and 16M20 series all supplied with auto brake winches. All are supplied with H2R head unit drilled to take GS-065 bearing. Holding down bolts for BP and FB towers are available at £29.38 per set extra.

Alternative winches and head units are available at extra cost.
Delivery is by quotation dependent upon distance.

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- *Free Finance on selected items, subject to status. Details available on request.*
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- *Same day despatch wherever possible.*

LOWE ELECTRONICS LTD

OPEN DAY INVITATION - Saturday Sept 7th

Once again, the annual Lowe Electronics Open Day will soon be upon us; on Saturday September 7th to be exact. As those that have come to them in the past know, it is a bumper occasion when our friends and customers from near and far converge on Matlock to see what makes the company tick, to have a good day out and give us the opportunity to meet you in person.

You will find all the latest gear from the stables of Kenwood and others, much of which will be wired up for you to try out; which is what you would expect from the sole appointed UK distributor. But there is much more. We will have Short Wave Magazine here to talk with you; there will be the hugely popular free car boot sale where you have the opportunity to sell off all that stuff lying in the corner of the shack; you can collar the workshop staff on technical queries; there will be steam engines and ... much more!

We always look forward to this day and very much hope you will be able to make it. We usually have special offers on the day and, God willing, the weather will be better than it is today as we write this. It had better be!

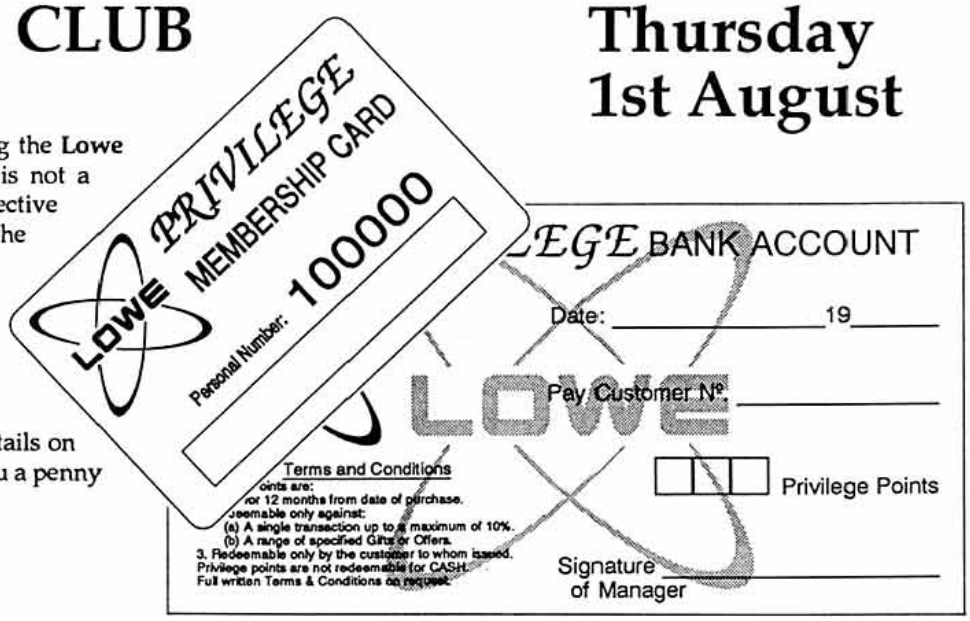
PRIVILEGE CLUB

Thursday 1st August

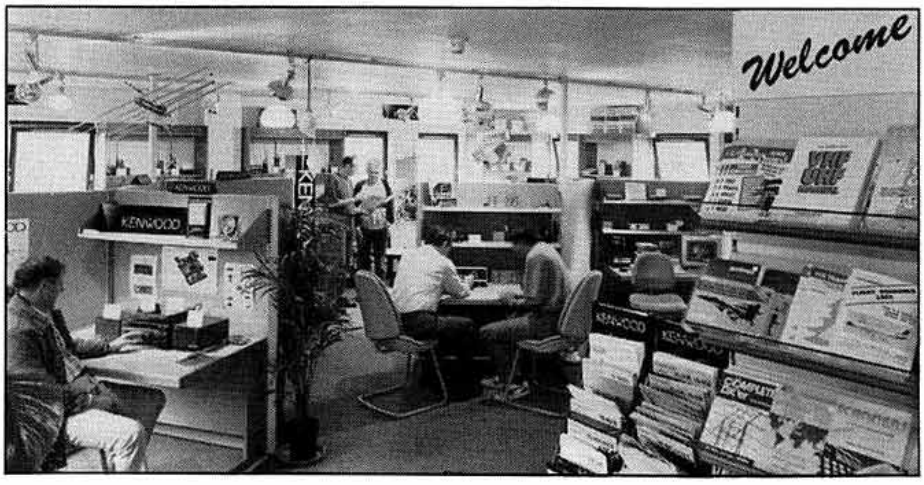
On 1st August, we are launching the **Lowe Electronics Privilege Club**. It is not a credit scheme but a simple and effective way for us to be able to reward the loyalty of our customers.

The question is: "Can you afford NOT to be a member of the Lowe Privilege Club?"!

Phone, Fax or write to us for details on joining the club. It won't cost you a penny and it will save you many.



REVOLUTION IN MATLOCK SHOWROOM!



Well ... almost. We have completely rebuilt the showroom at Matlock which now offers the most comprehensive and comfortable surroundings for looking at and trying out the equipment. With nicely private operating positions, with aerials galore to use, this is undoubtedly the finest place in the UK to come and try out the last word in amateur radio. Open six days a week, every week. Do call in soon and see it for yourself.

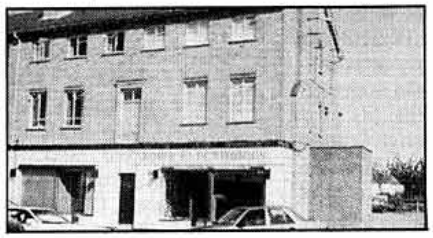
HEAD OFFICE & MAIL ORDER: Chesterfield Road, Matlock, Derbyshire DE4 5LE

Buy locally - Trust technically
Look to Lowe

Lowe Electronics has nine centres across the country. Each one is managed by an enthusiastic licenced radio amateur and supported by a fully equipped workshop and team of knowledgeable RF engineers at Matlock. When buying sophisticated electronic equipment, there is no greater reassurance than being able to deal locally with a company you can trust technically.

This month we are highlighting our centres at Bournemouth & Cumbernauld.

BOURNEMOUTH



Our Bournemouth Centre has been open for 7 years and for that time has been managed by Colin G3XAS who is a keen HF mobile operator. It carries a very broad range of products for licenced radio amateurs, short wave listeners and airband enthusiasts.

It has an immaculate showroom where the service is the same whether you come for a PL-259 or a TS-950SD. A range of rigs for HF/VHF/UHF is ready and waiting for you to come and try out and specific equipment can be made ready for demonstration with minimal notice.

The location is particularly well-sited for VHF/UHF demonstrations and there is plenty of road parking without the dreaded yellow lines! The coffee is brewed on the premises, it's good and it's free.

If you have not visited the Centre before, give Colin a call and he will be pleased to give you directions and a warm welcome when you arrive.

Lowe Electronics Ltd,
27 Gillam Rd, Northbourne, Bournemouth BH10 6BW
Tel: 0202 577760 Fax: 0202 593882
Managed by Colin G3XAS
(Closed on Mondays at present)

CUMBERNAULD

The new Lowe Centre at Cumbernauld has only been open for a few weeks. We looked for a new location that was easy to find and where our customers could park without any problems.

We have found a marvellous site in the main foyer of Cumbernauld Airport, which is signposted directly from the A80. Quite apart from the superb noise-free site and excellent 'take off' in all senses, there is a fully licenced bar and restaurant just up the stairs from our showroom where you can have a cup of coffee while you read the brochures and the family watch the aeroplanes just outside the windows.

We have the full range of amateur radio equipment, receivers, scanners, books and airband radios plus a complete range of accessories for pilots and aircraft enthusiasts. To make it complete, we are also open 7 days a week. Sim Weir, our centre manager, will be only too pleased to welcome all his visitors both old and new and show them round.

Lowe Electronics Ltd,
Cumbernauld Airport Foyer, Cumbernauld.
Tel: 0236 721004 Fax: 0236 738322
Managed by Sim GM3SAN

BARRY (S WALES)
Lowe Electronics Ltd
251 Holton Road, Barry
S Glamorgan CF6 6HT
Tel: 0446 721304
Fax: 0446 735662
Managed by Ceri GW0JCB

BRISTOL
Lowe Electronics Ltd
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Bristol BS2 0XW
Tel: 0272 771770
Fax: 0272 772500
Managed by Tony G4CYE

CAMBRIDGE
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Cambridge CB4 1NL
Tel: 0223 311230
Fax: 0223 315099
Managed by Tony G4NBS

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Lowe Electronics Ltd
56 North Road
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Tel: 0325 486121
Fax: 0325 381485
Managed by Hank G3ASM
(Closed on Mondays at present)

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6 Cherwell Close, Langley
Slough, Berks SL3 8XB
Tel: 0753 545255
Fax: 0753 545277
Managed by Tom G6PZZ

LONDON (MIDDLESEX)
Lowe Electronics Ltd
223/225 Field End Road
Eastcote, Middlesex HA5 1QZ
Tel: 081-429 3256
Fax: 081 868 2676
Managed by Fred G4RJS

Telephone: 0629 580800 (4 lines) Fax: 0629 580020

HF NEWS

JOHN ALLAWAY G3FKM
10 Knightlow Road, Birmingham
B17 8QB

MORE HIGH scores from those who specialise in contacts with Australia - GW3NNF claims that he has worked 1,457 different ones and says that his brother, G3EDM, has contacted 2,125. GW3NNF is also proud of his achievement in contacting 1,614 different Californian stations to date . . . .

Congratulations to G3COJ and G3VOF who have recently become members of the DXCC Honour Roll. At the moment this requires confirmed QSOs with 313 countries on the list.

The *Amateur Radio Operation Standard* formulated by the Japanese Amateur Radio League (JARL) impresses me. Most of us are already familiar with the Paul Seager *Amateur's Code* (see *RSGB Call Book*, p81) but in today's world this one is pretty good too. It goes:

(1) Not to disgrace the reputation of any indivual or organisation by openly disclosing facts against their wishes.
(2) Not to impair human rights of other people by the use of slandering or insulting words.
(3) Not to infringe on the privacy of other people.
(4) Not to express assertions or opinions in connection with politics, religions, elections, or any other issue in dispute.
(5) Not to disturb social order.
(6) Not to use indecent or obscene expressions which may offend and/or harm other people.

Full marks to JARL . . . . and they have one on packet procedures too [see July *RadCom*, p71 for UK packet guidelines - *Ed*].

GEOFF WATTS DX PUBLICATIONS

THERE ARE four of these which are compiled and published by Geoff Watts, 62 Belmore Rd, Norwich, NR7 0PU. The first is *The DXNS CQ & ITU Zones Guide*. This is 15 pages of information about DXCC countries and Antarctic stations in each CQ and ITU zone. The *DXNS USSR Oblast Guide* (also 15 pages) lists amongst other things all oblasts in numerical and prefix order, it also has information on USSR contests and awards, an R-150-R list, and details of 250 USSR QSL bureaux. The *DXNS DXCC Countries Guide* (14 pages) lists all DXCC countries - current and deleted - as well as the IOTA numbers of the islands on the DXCC list. Finally, the *DXNS Radio Amateur Prefix-Country-Zone List* (15 pages), - this gives full details of each country with current and obsolete prefixes used within the past ten years. Each publication comes in a single or double sided version and they costs £1.25 and £1.50 respectively.

DXPEDITIONS

RECEIVED AFTER last month's early deadline was a report of the recent expedition by G3SXW (H44SX), G3TXF (H44XF), and GW3WVG (H44VG) to the Solomon Is. They seem to have done a fantastic job making in all 23,387 QSOs - *and all on CW*. They covered all bands (including the new ones) 3.5 to 28MHz and 55 per cent of their contacts were with Europe. They had a 4-element triband beam at 80ft - loaned by H44KA.

A group of six Spanish amateurs, with the help of 3C1EA, is hoping to visit **Annobon Is** between 4 and 18 August. Seven members of the West Island ARC of Montreal are planning a visit to **St Paul Is** from 1 to 7 August. Their callsign will be CY9CWI. LA4LN and LA1SP were due to be in the **Faroe Is** from 2 to 5 August and they will use their own callsigns with the OY/ prefix. Prior to this they will have been in Iceland. Likely frequencies to be used will be 1.835MHz and 10kHz up from the low end of the CW bands, plus 3.685, 7.085, 14.185, 21.285, 28.485MHz for SSB and 14.085, 21.085, and 28.085MHz for RTTY. Packet will be used on 14.099, 21.099, and 28.099MHz.

A group of members of the Baden Powell DX Foundation was due to be in **Andorra** in July and August. Their callsign is C30EJA and they intend to be on all the HF bands on CW and SSB.

BV2A is said to be planning a visit to **Pratas Is** which is located in the China Sea about 60 miles south west of Taiwan. It is believed that these islands are part of the Spratley group, Chinese territory, currently occupied by Taiwanese forces and that they might count as a separate DXCC country.

Finally - some advance warning of a return to the **Isle of Man** by G4UOL during the latter part of November. More on this one later.

DX NEWS

IT HAS BEEN decided by a unanimous vote of the DXCC Awards Committee that **Penguin Is** will count for DXCC credit under Point 3(a) of the Countries List Criteria. QSLs may be submitted for credit but not before 1 September and this will then bring the total number of current DXCC countries to 323.

FT4WC on **Crozet Is** is now said to be found near 14.010MHz from 1100 particularly at weekends. T5RR, in **Somalia** is around 14.190MHz after 1900.

F2JD was due to leave France for **Togo** in mid-June and he should be there until the end of the year. 5V7DP - who is already there - is to be found almost daily on 21.335MHz at 1730. Pat, formerly FR5FD, is currently in the **Central African Republic** using the callsign TL8FD.

Activity in **Mozambique** consists of five stations (according to *DXpress*). Silvano, C9RTC, is very active near 14.186MHz daily at 1800 and after 2230 on 7.042MHz. C9DTM is the callsign of the Radio Club of Mozambique and has been used only a few times for special activities.

HF0POL, in the **S.Shetland Is** keeps a schedule with QSL manager SP3HLM at 1600 on 28.320MHz and takes callers when he has finished.

If you hear RJ0J, RJ2S, RJ1J, RJ3K, RJ4X, or RJ5R and others with similar callsigns they are celebrating the 80th anniversary of Mirzo Tursoon-Zadeh, a famous Tadzhikistan poet. They will operate from all five Oblasts in the republic and (according to the *Long Island DX Bulletin* all the operators of RJ0J are members of his family. 4K4/UA0KBZ is on **Wrangel Is** which counts for the IOTA award.

DX-NL reports that LA1YL, LA4NM, LA5NM, and LA6EDA are part of a Norwegian telecoms team working in **Baghdad**. They will try to get licences. G0KKV reports the presence of a 'Desert Storm' net which meets at 2000 on 14.262MHz on Thursdays and Fridays, and at 1400 on Saturdays. 9K2YA is involved in the net.

RSGB DX News Sheet reports HV0HH as being located at a Pontifican Basilica near **Ancona**. It has been under Vatican administration since 1929 and IK6FHG and IK6LBT - who have operated the station several times this year - believe that it might count for DXCC as it is about 125 miles from the Vatican.

From **W.Kiribati**, T30A (formerly T30BC) is believed to be very active on 14.226MHz after 1000. VR6TC on **Pitcairn Is** keeps a schedule with DL8FL on 14.140MHz at 0730 on Sundays. Sometimes they are joined by VR6BX, and VR6KY.

AWARDS

WORKED ALL SWEDEN AWARD

For verified contacts since 1 January 1988 with Swedish laens (counties). Separate diplomas for HF, 144MHz, 432MHz, 1296MHz, and satellite contacts. For HF QSOs on *all* bands 1.8 to 28MHz are valid. Requirements are - Class 3 - all laens on two different bands. Class 2 all laens on three different bands, and Class 1 all laens on four different bands. If you get all laens on five bands you receive a plaque. Send a detailed list of QSLs (certified by a national society awards manager) to WASA Diploma Manager, SSA, Ostmarksgatan 43, S-123 42 Farsta, Sweden. The fee is Swedish Krona 30 or equivalent.

SRAL 70 YEARS AWARD

1991 is the 70th anniversary of the Finnish national society and this celebrates the fact. European stations need 70 points - QSOs with OH stations count for two, with OG and OI stations four, and with club stations double these amounts. All bands and modes with endorsements for CW, SSB, and RTTY, and also for single band. Send log book extracts and 10 IRCs or US $4.00 to Jukka Kovanen, OH3GZ, Varuskunta Rak. 47 AS 11, SF-11310 Riihimaki 31, Finland.

DLD AWARD

Issued by the DARC for confirmed contacts (or reports) with/from German District Location Codes (DOKs). There are different classes - DLD 100, DLD 200, DLD 300, DLD 500 (with badge), DLD 600, DLD 700, DLD 800, DLD 900, and DLD 1000 (with badge of honour). Listener awards are called DLD-SWL-100 etc. Single band only and endorsements can be made for single mode. A 'DOK List' is available from DARC, DLD-Diplome, Postfach 1155, D-3507 Baunatal 1, Germany, (DM 5.00) - please send a self-addressed label as well. This serves as the application form. I can supply

continued on page 16

RSGB HF Convention '91

28/29 SEPTEMBER 1991

Penguin Hotel, Daventry, Northants

Saturday 28 September BOOK IN ADVANCE
1200, 1330, 1500 hrs. Visits to BT Radio Station, Rugby* 1930 hrs DX Dinner, Speaker John Forward, G3HTA, tickets £18**

Sunday 29 September ADMISSION £4, doors open 9.30am

- **Full lecture programme**
- **Young Amateur of the Year**
- **RSGB bookstand**
- **Clubs**
- **Trophy presentation**
- **Packet cluster**
- **Software demonstrations**
- **Raffle**
- ***. . . and much, much more!***

**Booking for BT Radio Station visits and general information to :* ***Dinner tickets (cheques payable to RC Whelan) to:*

Bob Whelan, G3PJT, 36 Green End, Comberton, Cambridge, CB3 7DY, tel: 0223 263137

Hotel bookings direct to Penguin Hotel, tel: 0327 77333, quoting HF Convention.

PCB SERVICE FOR *RADCOM* PROJECTS

G3BIK BATTERY OPERATED AF OSCILLATOR AND WAVEFORM GENERATOR

September 1990

BOARD DESCRIPTON	CODE	PRICE
PCB	93990	£4.70
Full kit including box		£25.85

G4WIM 50/70MHz TRANSCEIVER

May/June/July 1990

BOARD DESCRIPTON	CODE	PRICE
Complete set of boards	567WIM90	£67.56

MORSEMAN

BOARD DESCRIPTON	CODE	PRICE
PCB		£17.45

BRS54049 DUAL CONVERSION MULTIMODE RECEIVE IF/AF STRIP

May/June 1985

BOARD DESCRIPTON	CODE	PRICE
PCB	643585	£17.25

G4PMK SIMPLE SPECTRUM ANALYSER

November 1989

BOARD DESCRIPTON	CODE	PRICE
RF Board	118946	£6.11
Video/sweep board	118947a	£4.88
Marker generator/PSU	118947b	£4.49
Complete set of 3 boards	1189SSA	£14.68

G3TXQ TRANSCEIVER

February/March 1989

BOARD DESCRIPTION	CODE	PRICE
Main IF/Audio	028945	£11.75
VFO	028946	£5.55
Driver/Preamp	028947	£6.75
Low pass filter	028948a	£7.65
Band-pass filter	028948b	£4.70
Control board	038942a	£5.30
Regulator board	038942b	£2.35
Complete set of 7 boards	0289TXQ	£27.61

All prices include VAT, postage and packing

Please note these PCBs are not available from RSGB HQ, but direct from Badger Boards, 1180 Aldridge Road, Great Barr, Birmingham, B44 8PE. Tel: 021-366 6047

HF NEWS

continued from page 14

photocopies of detailed rules on request (SASE please).The callsigns of new award holders are published regularly in *CQ DL*.

CONTESTS

EUROPEAN DX CONTEST

1200 10 August - 2400 11 August (CW)

1200 14 September - 2400 15 September (SSB)

1200 9 November - 2400 10 November (RTTY)

3.5 to 28MHz. Single-operator all bands, multi-operator single transmitter, multi-operator multi-transmitter, and listener sections. No contest QSOs should be made in the segments 3.550 - 3.800 and 14.075 - 14.350 MHz (CW) or 3.650 - 3.700 and 14.300 - 14.350 MHz (SSB). Single operators may only operate for 30h and the six hours rest may be in not more than three periods, each clearly marked in the log. Europeans work non-Europeans and exchange RS/T and serial QSO number (from 001). The multiplier for Europeans is the total number of non-European DXCC countries worked on each band added together.

The multiplier on 3.5MHz should be multiplied by four, on 7MHz by three and on 14/21/28MHz by two. Additional points can be gained by 'QTC traffic' and I strongly suggest that if you intend to enter seriously it would be a good idea to send me an SASE for a photocopy of the rules. Logs go to the WAEDC Contest Committee, PO Box 1328 D-8950 Kaufbeuren, Germany, to arrive by 15 September, October, or December respectively. Log stationery is available from that address also (send envelope or address label and postage).

In the **1990 WAEDC CW Contest**, **G3SXW** was sixth European with 549,461 points followed by G3FXB with 513,676, and G4BUO with 471,900. **G3MXJ** scored 440,603, G0MFO 73,216, G3ESF 60,690, **GM3CFS**, and G0AOL 551. In the SSB section **G4PKP** scored 108,392, **GM3BCL** 69,509, and G0/SP3GHK 620. In the RTTY section the only UK entry was **GW0ANA** with 14,625points. BRS27239 scored 23,870 points.

Results of the **1990 CQ WW WPX Contest (CW section)** have appeared in *CQ Magazine*. In the single-operator all band section **GB8FX** came ninth in the world listing with 2,994,498 points, and on 7MHz **GB0DX** was also world ninth with 881,832 points. **GJ0LYP** came 14th in the multi-operator single transmitter section. Other UK scores are as follows: (all band) **GM4OBK** 1,666,005, **GB6MX** 1,478,598, GW0WPX 1,111,548, G3ESF 316,250, **GW6TM** 216,240, and GM4HQF 33,184 points. On 28MHz, **G4CNY** scored 73,749, and on 7MHz **GB0DX** 881,832, and G4ZOB 159,080.

SEANET WORLDWIDE DX CONTEST

0001 17 August - 2359 18 August (SSB)

1.8 to 28MHz (no WARC bands). Single operator single and multi-band and multi-operator multi band sections. QSOs with stations in DU, HS, YB, 9M2, 9M6, 9M8, 9V, and V85 count 20 points on 1.8MHz, 10 points on 3.5 and 7MHz and four points on 14, 21, and 28MHz. Contacts in other Seanet countries count half these points.

SEANET countries consist of: A4, A5, A6, A7, A9, AP, BV, BY, DU, EP, HL, HS, JA, JD1, JY, KH2, P29, S79, V85, VK1-9, VQ9, VS6, VU, XU, XV/3W, XW, XX9, YB, ZK, ZL, 3B6, 3B7, 3B8, 3B9, 4S7, 4X, 8Q, 9K2, 9M2, 9M6, 9M8, 9N1, and 9V. Multipliers are three for each country worked within this list. Exchange RS and serial number from 001. Send logs to arrive at SEANET Contest Manager 1991, Eshee Razak, 9M2FK, PO Box 13, 10700 Penang, Malaysia, no later than 31 October 1991.

AGCW STRAIGHT KEY PARTIES HTP 80 / HTP 40

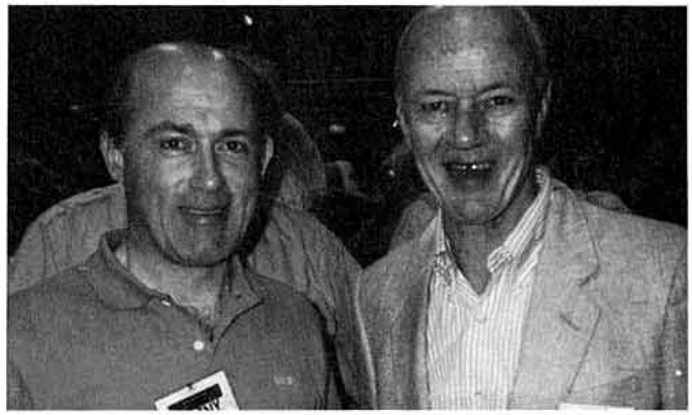
1300-1600 1 September

CW only, using straight keys. HTP 80 3.510 - 3.560 kHz and HTP 40 7.010 - 7.040kHz. Three classes (A) maximum input/output 10/5W, (B) input/output 100/50W, and (C) input/output 300/150W. Send serial number consiting of number, class, name, and age (ladies are excused - send "XX" !). SASE for copies of rules.

THANKS

THANKS GO TO the *Lynx DX Group Bulletin* (EA2KL), *DX'press* (PA3DZN), the *Heard Island DX Bulletin* (VK9NS), *DX-NL* (DL3RK), the *Ex-G Radio Club Bulletin* (WA8TGA), the *Long Island DX Bulletin* (W2IYX), and the *RSGB DX News Sheet* (G4DYO).

To be included in the **September** column please send everything to reach me no later than **25 July**.



Pictured at the Dayton Hamvention 1991: Stuart Jesson, G4CNY, (l), and Ken Miller, K6IR.

1991 28MHz COUNTRIES TABLE

G0DOO	179		G4YNG	72	
G0JZA	158	(SSB)	G4NXG/M	60	
G4DXW	152		GM0GEI	55	
G0KDS	143		G0DUS/M	54	
G0AEV	137		G2FQR	46	
G4MUW	125	(SSB)	G4XAH	43	(RTTY)
LA0GC	113		G2AKK	31	(CW)
GM4CHX	81				

QTH CORNER

C30EAJ	BP 1713, F-87025 Limoges, France.
C9RTC	IK4QIZ, Box 65, I-47100 Forli, Italy.
D2ACA	LZ2DF, Minchi I Petkoff, k Kukuvishky 15, 5600 Troyan, Bulgaria.
H44SX	Roger Western, 7 Field Close, Chessington, Surrey, KT9 2QD.
H44VG	Ian Pritchard, Homelea, Manor Rd, Abersychan, Pontypool, Gwent, NP4 7DY.
H44XF	Nigel Cawthornem Falcons, St George's Avenue, Weybridge, Surrey, KT13 0BS.
OH2A/OJ0	OH2AP Jarveenpaan Radioamatoorit Box 90, SF-04401 Jarveenpaa, Finland.
OH2AU/OJ0	OH2BVM, A.Lehtiranta, Nummittie, SF-05200 Rajamaki, Finland.
4J1FS	OH2BU, Pilvijari, SF-02400 Kirkkonummi, Finland.

BAND REPORTS

Not many satisfied customers this month - most have difficulty deciding which has been worse - conditions on the HF bands or the weather !

Some regulars will have again missed the deadline through no fault of their own - and once again, my apologies. *Radcom* has a new production schedule which makes deadlines a few days earlier (and also results in the earlier appearance of the magazine).

Those who got through this month included G2HKU, G3s GVV, KSH and LPS, G4DXW, GW4KGR, G4MUW, and G4NXG/M. Thanks to all. CW stations are listed in italics.

7MHz

2100	*A22GH, OH2AP/OJ0, TL8FD*
2200	*PY1RO, UL8GB, YC0UNC, 9M2AX*
2300	*HB9APJ/CT3, PJ8MM, VK6VZ, ZD8LII, 4K1AFM, 4S7RO, 6W1QB*

14MHz

0600	A35KB, FK8FS, *FO5FO*, V63/KB6CC, *VK9NS*
0700	KH6JEB/KH7, *PJ2/PA0VDV*, 4J1FS
0800	SU1ER
1000	V73AK, VQ9AY, 9V1XQ
1500	VK5TT, 6C1RJ, 9M8LL
1600	BV2BE, V51DF, YI1BGD
1700	D2ACA, VS6WV
1800	S2/WZ6C
1900	ST0DX, *TA3D*, T5RR, V51JM, 7Q7RM
2000	S92LB, TU2XB, ZS10JUN
2100	A61AC, VK4MZ, VQ9RS, 9U5BZP
2200	HV0VC, 9K2YA
2300	FH6CB, *4S7WP*

21MHz

0800	D2ACA
0900	SV2ASP/A
1100	FO5CS
1200	YI0EP
1300	HL0K, S79KMB, ZS9A, 9M8ZZ
1600	H5AW, TZ6VV, VQ9AY, 7Q7JA, 9W6WPX, 9X5NN
1700	BV2CK, 5Z9FEA
1800	KH6IDW, U9U/PA0JTL, VP8CGD, ZD7CRC, 5U7NU, 9L1JK
1900	D2ACA, ST0DX, SU1ER, *3A2LF*, 5H3GM
2000	S79KMB
2100	9U5BZP

Propagation NEWS

Compiled from reports supplied by G3FKM, G3FPK and the Propagation Studies Committee

HF

THIS TIME, G8KG's report is more than usually interesting. He says "The impact of events on the sun and in the earth's magnetic field and the ionosphere during late May and the first weeks of June are well illustrated by comparing two figures. The average of the daily Boulder geomagnetic A indices for the first 27 days of 1991 was 7 and the highest daily value was 15. For the 27 days ending on 17th June the average was 36, the highest daily value was 151 and the index was below 15 on only three days.

"During this period, in which the 27-day average solar flux also climbed back above the 200sfu mark, a series of major solar flares gave rise to the whole array of terrestial consequences - fade outs, noise storms, magnetic storms, abnormally low MUFs and sometimes abnormally high ones for the time of year - east coast W's on 28MHz in mid-afternoon with strong west coast stations on 21MHz at the same time. On occasions, a notable example being around 0900 on 15 June, it seems that the ionosphere had disappeared leaving only ground wave signals on all HF bands - in fact a classical Dellinger fade out due to very high absorption in the ionosphere during a major flare and with the higher HF bands recovering first.

"The events on the sun received more publicity than usual because of warnings of possible damage to computers and space vehicles. There are many ways of 'measuring' the impact of such events and this one was certainly one of the most significant in Cycle 22, though in terms of mean A indices it fell somewhat short of the major event of March 1989. One cannot help wondering what more may be in store. As mentioned in January, the peak in the geomagnetic cycle usually occurs somewhere in the seventh to tenth years of a solar cycle - in our case somewhere in late 1992 to 1996 if the present cycle conforms. Largely unaffected by the turmoil, the Sporadic-E season made its annual appearance and could hardly have been kinder to participants in NFD."

VHF

GEOMAGNETIC ACTIVITY is usually observed to peak some 12 to 18 months after sunspot maximum, and the exceptional solar activity in late-May until mid-June exemplifies this. Regular listeners to the Sunday *GB2RS* News Broadcasts will have heard brief resumes of the major events, but this expanded report gives a more detailed account.

A very readable history of this period has been received from *Solar Terrestrial Dispatch* of Stirling, Alberta, Canada, in the form of its 'Solar Terrestrial Review for 31 May to 20 June' which is reproduced with grateful thanks.

"A magnificent barrage of very powerful solar flares is the highlight of this STFR report. The first signs of significant activity were observed on 1 June. An optically uncorrelated class X12+ X-ray event was observed at 1520UTC on 1 June. This event was accompanied by a large spray off the northeast limb. Over the next several days, Region 6659 rotated into view at a north solar latitude of 31°, in the vicinity of old Region 6619.

"On 4 June, Region 6659 unleashed another powerful class X12+/3B X-ray flare which saturated the GOES satellite sensors and was associated with strong radio bursts. This event had a very high integrated X-ray flux, estimated at 3.53 joules/m^2.

"The delay of several days between these powerful solar flares is evidence of a magnetic 'store and release' mechanism where magnetic energy is stored until it surpasses a trigger threshold, after which it suddenly and explosively releases it all. This method of energy build-up and release was observed throughout the transit of Region 6659 across the solar disk.

"On 6 June, a massive solar flare ripped out of Region 6659, which again saturated the GOES sensors at a greater level than X12. This flare was optically rated a 4B event (very large in area and brilliant). This ▶

HF F-LAYER PROPAGATION PREDICTIONS FOR AUGUST 1991

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	.....1..	.....121.	...22322353.	..1455546763	535666556897	875433334689	753111.11368	42.....35
MALTA	.....1..	....1111121.	...233433641	2.1566656874	755766667898	998643344789	886311112478	++3.....4+
GIBRALTAR	.....	.....1..	....1111132.	1..143333652	522676666897	987754444799	997422112478	++42.....4+
ICELAND	.....	.....	.....11.	.....11.1331	2..234334775	744654445678	776422112356	454.....23
** ASIA								
OSAKA	.....	.....	...122112.1.	...132123231	....2...2564	362	.....13.	.....
HONGKONG	.....1...	...1111122..	...122224531	22225752	2.....3686	475	142	.....2.
BANGKOK	...1111.12..	...12222342.	...123335751	1...12225874	4.....3688	3.....477	.1.....155	22
SINGAPORE	...1111112..	...22222342.	..1123335752	2...12225884	4.....3688	3.....478	.1.....156	23
NEW DELHI	...111111...	...22222321.	..1223335531	211112225763	62.....3688	61.....478	3.....157	24
TEHERAN	...12221231.	..1333334531	1.3433346763	425211235886	864.....3689	851.....478	62.....156	3.....24
COLOMBO	...12221231.	..1233334531	1.1224346763	421112235886	73.....3689	71.....478	4.....156	24
BAHRAIN	...22232331.	..1333445541	213433446875	535211225887	964.....3689	851.....478	72.....157	4.....24
CYPRUS	...22232342.	..1444545642	313766667875	646766667898	987533346799	98521.113589	862.....267	53.....35
ADEN	...233444421	1.1444556753	534423347887	756311135899	985.....2699	962.....478	74.....157	4.....24
** OCEANIA								
SUVA/S	.....	.....1..	....11.1132.	...22111353.	..152...263.	...3.....31.	...1.....1..	.....
SUVA/L	21.1.....52	32131.....74	32262.....74	124731...172	..362....44.	...3.....31.	...1.....1..	.....
WELLINGTON/S	.....	.....	...11111..2.	..132111..41	..252...1261	..13.....33.	.....11.	.....
WELLINGTON/L	1..1.....12	32.2.....33	44251.....65	44472.....75	12562....363	..23.....33.	...1.....11.	.....
SYDNEY/S	.....	...11111....	..1433221..1	..15422221.2	...42...2434	...1.....362	.....14.	.....
SYDNEY/L	1	1...1.....12	31.23.....45	321441....66	1.153....165	...2.....262	.....3.	.....
PERTH	...1222.....	..133331....	1.2354331...	3112422221..	51..2...244.	3.....473	155	22
HONOLULU	.....	.....	.....1..121.	...11111231.	..232...23..	..23.....	...1.....	.....
** AFRICA								
SEYCHELLES	...233444321	1.1444556553	534423457887	755211235899	984.....2699	961.....478	73.....157	4.....24
MAURITIUS	...334545532	1.1445556754	514424447887	836312225899	975.....2699	962.....478	74.....157	4.....24
NAIROBI	1..334555632	311444567865	744533357988	976411125899	9971....2689	884.....478	762.....157	43.....24
HARARE	2..234566743	411445667865	754633457998	987611225899	9983....2689	9961.....478	773.....157	54.....24
CAPETOWN	...243566751	...455667874	1..764447997	41.742225899	85162...2689	8853.....378	7741.....157	45.....24
LAGOS	21.143566753	421354567875	863653336998	986741.15899	99861...2689	8973.....378	7741.....157	452.....24
ASCENSION Is	1...33345641	32..54446873	752.64335897	984253113899	99852....689	8873.....378	7751.....47	442.....4
DAKAR	1...33454641	32.254455873	652564323897	8857521.1799	99862....489	9973.....168	7751.....47	542.....4
LAS PALMAS	....2122232.	1..143443652	421466666885	753677667898	997765445799	998532112479	88631....158	++3.....25
** S. AMERICA								
Sth SHETLAND	.....45564.	1566871	2446884	1....2224887	621.1...1678	8752.....357	6751.....124	342.....
FALKLAND Is	1....1354641	21...3466763	6421.3446786	874312224688	99852...1468	9973.....147	7851.....14	552.....2
R DE JANEIRO	1....2343541	21...4454663	6421144336B6	875323211488	99862....169	9873.....38	7751.....16	442.....4
BUENOS AIRES	2343441	21.1.4454663	5414.4443586	874613222378	99862.....58	9974.....26	7751.....4	442.....
LIMA	121221	1...11232342	42.132332245	752442221127	89663.....6	7974.....3	5751.....	252.....
BOGOTA	.....111.121	1....2221232	31.123232235	641343221126	88653.....5	7974.....2	5751.....	252.....
** N. AMERICA								
BARBADOS	1111221	1...12222342	42.133322255	65234321.147	98663.....17	8974.....4	6751.....2	452.....
JAMAICA	.....11.	1111222	21..12221234	53112221..16	87443.....4	6874.....1	3751.....	.42.....
BERMUDA	.....11.	1111132	2....2221245	52.12221.136	87442.....16	7874.....3	5751.....1	242.....
NEW YORK	.....	121	2....1111134	41...1111136	76331.....15	6864.....2	3641.....	.42.....
MEXICO	.....1.	111	1.....111122	31..1.111.12	55332.....	3764.....	.541.....	.22.....
MONTREAL	.....	11	1....1111134	41...1111135	75321.....15	6863.....2	3641.....	.32.....
DENVER	.....	.....	1.....12	2.....11.12	4322.....1	2563.....	.341.....	.....
LOS ANGELES	.....	.....	1111	1.....12111	2322.....1...	.463.....	.141.....	.....
VANCOUVER	.....	.....	.....	1.....1..1	22231....1...	.253.....	..31.....	.....
FAIRBANKS	.....	.....	.....	...1111.11.1	..242...121.	..23.....	...1.....	.....

The provisional mean sunspot number for June 1991 issued by the Sunspot Data Centre, Brussels was 170.7. The maximum daily sunspot number was 251 on 9 June and the minimum was 113 on 20 June. The predicted smoothed sunspot numbers for August, September and October, were respectively: (classical method) 127, 125, 122; (SIDC adjusted values) 124, 123, 122.

event had major Type III, IV and V sweeps with an Importance 2 Type II sweep.

"These large solar flares produced copious quantities of high-energy solar protons which engulfed the Earth. Protons at geosynchronous altitudes passed event thresholds at 1300UTC on 31 May and would not return back below threshold values for a stable period of time until 19 June, almost three weeks later. The peak proton flux of 1,400pfu (particle flux units) was observed at greater than 10MeV (Mega-electron volts) on 15 June at 1950UTC.

"The intensity of the solar flaring as was observed from Region 6659 is only rarely seen. Great Flares (as they are called) have saturated the GOES sensors before (eg, during the flare storm period of March 1989). However, never before in this solar cycle have the GOES X-ray sensors been saturated so many times in such a short period of time. Even the region which spawned the large flares in 1989 could not match the stability and power unleashed by Region 6659.

"Region 6659 rotated beyond the west limb and out of view on 16/17 June. By that time, it was showing signs of decay and penumbral fragmentation, but was still able to produce another major M-class flare before it finally departed from view. *[This region was not expected to return in a configuration capable of producing powerful major flares, although occasional M-class flaring will have been a possibility. It was due to return back into view on 1 July. - G3FPK]*

"A severe magnetic storm was observed on 5 June. The activity began on 4 June at approximately 1600UTC. Minor storming was observed until near 0600UTC on 5 June, when major to severe geomagnetic storming began to be observed over all latitudes. This event produced planetary magnetic A-indices higher than anything observed since the very severe geomagnetic storm of March 1989. The planetary A-index for 5 June was 150 (compared to 246 for 13 March 1989). K-indices between six and nine were consistently observed throughout the UT day of 5 June. Minor to major geomagnetic storming was the dominant feature over the last two weeks. Minor to severe storming occurred from 4 to 7 June, 9 to 13 June, and the last minor geomagnetic storm was observed on 17 June. Conditions since then have been generally unsettled to active.

"A major auroral storm accompanied the severe geomagnetic storm of 5 June. Auroral activity was observed as far south as Kansas, New Mexico, California and other low latitude states in the USA. Many confirmed sightings of auroras were also received from Australia. There has even been an unconfirmed report of visible auroral activity from Mexico. Repeated observations of auroral activity were observed throughout the previous two-week period.

"Region 6659 was expected to produce several powerful auroral storms. However, the unfortunate timing of the interplanetary shock waves prevented significant widespread auroral observations over the USA., Australia and New Zealand. Weather conditions over Europe were not favourable for viewing auroral activity during most of the intensive storm periods.

"The most intense periods of auroral and geomagnetic activity occurred during daylight hours over North America after the 5 June event. By the time evening twilight had ended for observers in North America, the most intense phase of the storming had ended and auroral activity died down. For these reasons, significant auroral displays over the USA and Australia were not possible after the 5 June event, even though a high probability existed.

"Strong HF radio impacts were observed as Region 6659 crossed the solar disk. Aside from frequent SIDs (sudden ionospheric disturbances) and SWFs (short-wave fadeouts) generated by the powerful X-ray flares from this region, significant PCA (polar cap absorption) blacked out radio paths over the polar and some high latitude regions. Persistent absorption from proton activity severely disrupted communications from, through, or near the polar regions.

"There were a few brief periods (between proton waves) where absorption levels abated long enough to permit sporadic and unstable communications from the polar regions. However, these conditions did not last long, for as soon as Region 6659 spawned another powerful flare, the Earth was quickly engulfed in another stream of protons which ionized the polar ionosphere sufficiently to absorb most radio signals. Improvements began to be observed after Region 6659 rotated behind the west limb of the Sun. Between 18 and 20 June, significant ionospheric recovery took place.

"VHF backscatter communications were possible and were observed on 5 June, in conjunction with the severe geomagnetic storm. Repeated observations of auroral backscatter were observed with each period of major geomagnetic storming, although conditions were never as favourable as was observed during the 5 June event.

"This period of major flare and significant geophysical activity was one of the most significant periods since the March 1989 activity. Although it is almost impossible to tell, there will continue to be a threat for similar unexpected outbursts of activity over the next year or two.

"There will also continue to be a threat of severe geomagnetic storms and impressive auroral displays for several more years. Based on previous solar cycles and activity models, the next three to four years (until 1994 or 1995) will be statistically significant years for experiencing possible major to severe geomagnetic activity and global auroral storms."

While those conclusions will disappoint HF operators, they will gladden the hearts of most of the VHF fraternity, although moonbounce enthusiasts will not appreciate disturbed activity periods. For a fuller account of how this exceptional period affected the VHF bands, see the *VHF/UHF News* column.

VHF/UHF NEWS

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

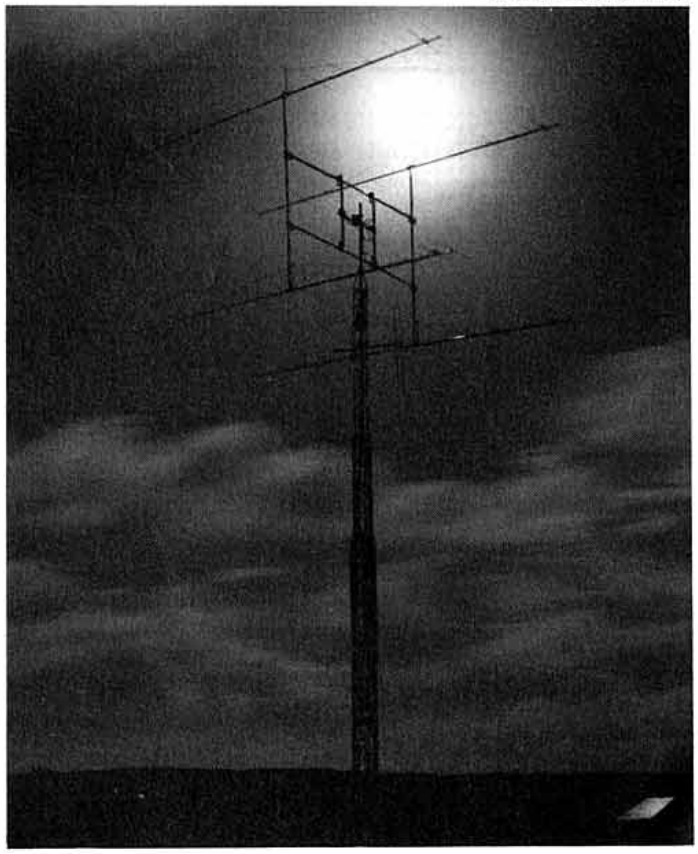
THE LACK OF any significant Sporadic-E propagation on 144MHz in June was more than made up for by the exceptional auroral activity. This was triggered off by violent solar flares, and a detailed history of these geomagnetic and geophysical events will be found in this month's expanded *Propagation News* feature. There is the welcome news that some Yugoslav amateurs now have access to the 50MHz band.

Those who have expressed disappointment that *VHF/UHF News* has been limited to two pages so far this year will be delighted that the Editor has allocated extra space this month to accommodate all your reports. So let's get down to business.

BAND PLANNING

ONE OF THE terms of reference of the VHF Committee, as laid

PHOTOGRAPH: MALCOLM BRADBURY



The Aurora Borealis (Northern Lights) as seen from Dunrossness in Shetland.

down in the *Green Book*, is to be responsible for band planning in the 30-1,000MHz part of the spectrum. As new techniques gain in popularity, their devotees seek modifications to the existing plans to accommodate their experiments.

By the end of this year, there could be a significant number of packet radio operators with 9600 baud capability and the VHF Committee has had to consider recommending a frequency in the 144MHz band for them. Irrespective of this, the 144.625, 144.650 and 144.675MHz frequencies are often very cluttered, so more packet radio frequencies would appear desirable.

The proposals made during our 8 June meeting were:-

(1) To allocate an existing S-channel in the FM part of the band, or
(2) To allocate 144.475MHz, for 9600 baud.
(3) To adopt 12.5kHz spacing in the 144.625-144.675MHz sub-band to provide two extra frequencies for general packet operation.

Chairman Peter Burden, G3UBX, wrote: "The 12.5kHz splits are wildly unpopular, most are unhappy about taking a simplex channel and the most popular choice is 144.475MHz. Since I have only, so far, contacted packet radio operators, this is hardly surprising."

Proposal 2 is not in accordance with either the UK or IARU band plans and is in the SSB section of the band. Bearing in mind that some 9600 baud signals will be pretty wide, this choice would be bound to upset those who use that part of the band for WAB nets, SSB meteor scatter schedules and general SSB QSOs.

For what they are worth, my views are that, with the undeniable, and considerable, decline in general FM voice traffic compared to that a few years ago, surely allocating one channel in the exclusive FM part of the band to 9600 baud packet is not asking too much? If commercial operators can use 9600 baud at 12.5kHz spacing, then surely we should be able to use 12.5kHz at lower baud rates?

At the moment, 9600 Baud seems mostly confined to the satellite experimenters. However, it would be irresponsible of the VHF Committee not to have considered this inevitable development; if we fail to plan ahead, chaos will prevail.

So, we invite your constructive comments and/or alternative suggestions so that we can discuss the matter again during our meeting on 14 September. Please send them to me for airing in *VHF/UHF News* and I will forward your letters to the Chairman.

BEACON NEWS

JOHN WILSON, G3UUT, the RSGB VHF Beacon Coordinator, has confirmed that the licence for the Shetland beacons, GB3LER, on 50.064 and 432.965MHz has now been issued. However, considerable funds are required by their proposer and keeper, Andy Steven, GM4IPK, to assemble the installations. Please send donations to him at QTHR.

The Cornish beacons, GB3CTC, have had their licence amended; the new callsign will be GB3MCB and the 4m one has had its new frequency of 70.025MHz approved in accordance with the current band plan.

John has produced a document, *Guidelines for Personal Beacons*. At present, the RA only allows these on 70MHz. The recommended frequency is 70.030MHz but until the Cornish beacon QSYs from 70.030MHz, probably in the autumn, it is suggested that any personal beacons operate on 70.035MHz. Send an SASE to John for a copy of these guidelines; he is QTHR.

DXPEDITIONS

ANDY COOK, G4PIQ (ESX), has sent further information about the Five Bells Group's proposed operation from the Faroes, mentioned last month. The dates are 4-15 August depending upon travelling and setting up times. The party comprises G4s DHF, ODA, PIQ and XUM and G8IJC; callsigns will be OY/own call.

The frequencies are as stated last month except for 6m on which they will use 50.128MHz. Equipment will comprise: 50MHz 20W and 4-ele Yagi; 144MHz 3CX800 PA and four 16-ele Yagis; 430MHz 3CX800 PA and four 21-ele Yagis. Operation on all modes is planned concentrating on EME, although Sun noise will be a problem for a good part of the time since New Moon is on the 10th. No advance skeds will be taken but they will be QRV on the 14.345MHz VHF net every day.

In the June issue of Mark Turner's, G4PCS, *2M Direct* newsletter, there is mention of two other August DXpeditions. Pierre Pasteur, HB9QQ, will be operating from the Principality of Liechtenstein (HB0) 10-13, and IK0BZY will be on from Corsica (TK) 7-25. Presumably both will be available on meteor scatter?

METEOR SCATTER

THERE ARE TWELVE meteor streams whose radiant appears to come from the constellation Perseus. The most important is known simply as the Perseids, which should peak on 12 August, when the radiant is 46° Right Ascension and +58° Declination. The IMO's *1991 Meteor Shower Calendar* gives a ZHR (Zenithal Hourly Rate) of 95.

This is a reliable stream and, since the radiant never sets as far as the UK is concerned, is available all day. Reflections are usually quite good over several days before the peak. My MSD1 program suggests that reflection efficiences for the usual, four directions exceed 50% as follows: NE/SW 0800-1800; E/W 1000-0130; NW/SE 1800-0400; N/S 0800-1330 and 2200-0400, all times UTC.

REPEATERS

THE MALVERN HILLS repeaters GB3MH (R1) and GB3MS (RB0) ". . . . have been switched off for an indefinite period", to quote from a *GB2RS* item broadcast on 23 June. Further information can be obtained from Mick Trollope, G4FAT, of the Mid-Severn Valley RG, who is QTHR.

The Central Scotland FM Group has sent its Summer 91 edition of *FM News*. It includes news of the commissioning of VHF relay GB3DG (R7) near Wigtown (DGL). There is an article on CTCSS (Continuously Tone Coded Squelch System), a low-AF signalling system which is apparently necessary when linking repeaters. The vandalizing of GB3PA (R1) is reported, but the date of this occurrence was not mentioned.

MOONBOUNCE

THE JUNE ISSUE of *2M Direct* reports that EME conditions in May were not too bad. On 144MHz Peter Atkins, G4DOL (IO80SP), who runs a 4CX250B amplifier and four 5-ele Yagis, is a new reporter although he is a frequent contributor to *VHF/UHF News*. His first-ever signal heard off the Moon was - guess who? - W5UN, worked from 2119 on 19 May. KB8RQ was heard on the 24th.

Graham Peyman, G0KON (IO80WQ), another Dorset operator, is now QRV on the mode with 150W and a single 16-ele Yagi; he has completed with KB8RQ and W5UN. Mark Holloway, G4YRY (IO90CR), yet another Dorset resident, completed with K2GAL, W5UN, KB8RQ and I2FAK in May and with N5BLZ at 1530 on 9 June.

Ian McCabe, G0FYD (LNH), appreciates these EME notes and asks that optimum times for horizon listening off the Moon be published. 3/4 August is a day sked weekend when the Moon's declination is +17.6° at the start and +24.3° at midnight on the 4th.

The WA1JXN Moon program for a London QTH gives moonrise as about 2200 on the 2nd at an azimuth of about 64°. Moonset is around 1315 on the 3rd at about 300°. The Moon rises again around 2230 on the 3rd, azimuth 57°, with moonset about 1430 on the 4th at 306°, and another moonrise is at about 2300 at 51°.

For about 75min after moonrise and before moonset the elevation will be below 12.5°. Moonrise provides a short Asian window and moonset a brief North American one, the higher elevations being European. The following weekend will be New Moon, so rather noisy, while the Moon will be in the south during the 17/18 and 24/25 weekends.

The regulars, G0GMS, G4PIQ, G4SWX and GM4YXI, were quite active in May on 144MHz with a few new 'initials' worked between them, such as AF9Y, DK0OG, IS0/DL5MAE (JN40), I1KTC (JN45), IW5BBH (JN53), OK2VMD, PA0JMV, PA3DZL and W7HAH. G4PIQ (JO01MU) and G4SWX (JO02PB) worked each other at 2130 on the 15th - new initials for Andy and John!

On 432MHz, Dave Dibley (IO91ON), was QRV on 19 May from 1952. He completed random QSOs with N4GJV and DF3RU, lost HG1YA due to severe libration fading, but completed with DL9KR at 2058 (579/569 reports) in perfect conditions.

Dave Cox, G8OPR (HPH), has worked another three initials with his 250W to bring his score to nine. These were SM0PYP on 9 June, KU4F on the 15th and OE5JFL on the 16th. He has heard DL9EBL and DL9KR with his two 21-ele Yagis, masthead preamp and FT-790.

DUBUS Magazine issue 2/1991 includes an excellent article entitled 'High Gain Yagis for 432MHz' by Rainer Bertelsmeier, DJ9BV. He deals with his own 'BV' and 'OPT70' series of long Yagis with reference to the computer-tweaked DL6WU models. This 14-page treatise is copiously illustrated with plots, tables and sketches covering designs with up to 36 directors on a 13-wavelength boom - gain 18.75dBd - and is essential reading for any-

one contemplating EME experiments on the band.

50MHZ

THE GOOD NEWS this month is that all Class A licensees in Yugoslavia were granted access to the band on 14 June. The power limit is only 10dBW ERP for those living in built-up areas, but 20dBW for those in rural places. CW, SSB, RTTY and packet radio are the permitted modes and the band is 50.0 to 51.9MHz.

INFORMATION

The following items are taken from the *6M Information* notes for June by Ted Collins, G4UPS (DVN). ZB2IB's new QSL address is PO Box 211, Gibraltar; Wilfred has moved from the *Call Book* QTH. The QSL route for IY4AJ (JN54), who was QRV on 2 June, is via IK4BWC.

Peter Wippel, who many have worked as OE6WHG, is now OE4WHG having moved a few kilometres to another area; new locator is JN87BB. QSLs for the May 4J1FS operation should go to OH2BU who is Jari Jussila, Pilvijarvi, SF-02400 Kirkkonummi, Finland. They worked 39 Gs and one GJ; other countries worked were DL, F, LA, OH, ON, OY, OZ, PA, SM and YU, the total number of contacts being 122.

The only active station in Saudi Arabia was HZ1AB but access to the band is currently denied. W2USA/MM (LL57) has been active from the Gulf though. Clive Penna, GM3POI, is now permanently resident in the Orkney Islands and can be reached at North Windbreck, Deerness, Mainland, Orkney Islands, KM17 2QL.

Dave Court, G3SDL, has moved to Scandinavia and is now OZ3SDL at Ege Bakken 18, DK-3520 Farum, Denmark. Bill Sterling, GM4DGT, has moved to 58 Tippet Knowes Park, Winchburg, W Lothian, Scotland EH52 6UP. Adrian McGonigle, ex-ZC4MK, is now back in the UK as G0KOM, and 7Q7JA has left Malawi; QSLs for 7Q7JA should now go to JL1IHE.

G4UPS has resigned as Secretary of the UK Six Metre Group for personal reasons. He put in a tremendous effort to build up the membership as everyone appreciates. The Acting Secretary is Chris Gare, G3WOS.

Geoff Brown, GJ4ICD, reported that I0DUD and I0CUT made 260 QSOs from The Vatican station, HV3SJ, on June 16, 175 of them with the UK. The ARRL has confirmed that 5N0 is not valid on 50MHz for DXCC and the RSGB will not accept it either. FC1MKY has confirmed that no 50MHz operation will be allowed from The Principality of Monaco (3A).

ES ACTIVITY

Although Es propagation on 144MHz from the British Isles was almost a non-event in June, on 50MHz things were very lively. In summary, day/UTC/prefixes as follows: 1, 1340-2300 CT, DL, I, OE, OH, SM, YO and 9H. 2, 1050-1615 CT, EA, I and ZB. 6, 0715-0930 CT and EA beacons; 1740 CU3/K6EDX (HM68); 1745 VO1NE heard and VO1ZA beacon till 1810. 7, 1045 9H. The UKSMG contest was on the 8/9 weekend and is reported later.

10, morning 9H. 12, morning CU3/K6EDX keyer; 1415 OZ; 1530 ZB0T. 13, 1620-1710 I. 15, 1300 9H; 1650-2224 CN8, EA6, I, and 9H beacon. 16, 0740-2400 a massive opening to CU3, DL, EJ, F, GI, GM, HV, I, IS0, IT9, LA, OE, OH, ON, OZ, SM, YO and YU with the OH1SIX and SV1SIX beacons heard up to midnight in Gloucester. 17, morning F, I, ZB, and CT0WW and EA3VHF beacons; 2155 OE4WHG.

18, 1700-1900 CN8, CT, ZB. 19, 0725-0735 CU3 keyer; 1600-1745 CT and ZB. 20, 0720-2010 DL, F, I, OZ, SM and YU, and 5B4CY beacon heard at 1320. 21, 0925-1930 DL, I, LA, OE, OH, PA and YU. 22, morning CU3, SM3, and EA3VHF beacon; 1250-1940 F, I, IS0, IT9, SV1, ZB and 9H. 23 morning, selective activity to CT, I, IS0, YU and 9H and SK6SIX beacon heard at 1125. 24, 1924-2120 OZ, SM with CU3 at the end. 25, from 0625 YU and I4; OZ later.

AURORAS

Auroral activity occurred on 31 May, 1530-1630; 5 June, 1530-1915, a huge event with the K-index at 9 bringing all available countries and with some auroral-E QSOs to OH around 1700. Pete Weller, GM3XOQ (SLD), reported that beacon LA7SIX (JP99LO) on 50.051MHz was copied via auroral-E from 2100 and this mode persisted for much of the 6th. 10, 1400-1850, with a K-index of 6, providing British Isles, PA and SM contacts.

The BBC news warned of a massive magnetic storm and aurora on the 12th but auroral signals were confined to 1745-1820 with the K-index at 5. The 13th was better with beacons GB3NGI and GB3RMK S9A at 1225, the first phase ending by 1300. Round 2 started about 1730 fading by 1900, but most QSOs were inter-G. From 2220 on the 23rd there was auroral-E propagation to LA, OH, OY and SM till 2350.

OTHER MODES

In the middle of the Es on 16 June, from 1443, G4UPS heard ZS6WB, 7Q7RM, A22BW, other ZS6s and ZS9A for about 15min. On the 20th, 1615-1740, 7Q7JA, Z23JO, A22BW, 9J2HN, ZS6AXT and other ZS6s were heard/worked.

GJ4ICD, worked 4X4IF on 2 June. On the 6th at 1720 Geoff contacted CU3/K6EDX, then D44BC and heard LU and PY at S3. The exceptional conditions on the 16th brought 40 countries. LU1DMA was copied at 1800 on the 18th.

70MHZ

MALCOLM HAMILTON, GM3TAL (FFE), was alerted to an Es opening on 2 June by G3UKV and worked ZB0W (IM76HE) at 1505 on SSB. On the 13th he found an aurora and worked GW4HBK and Gs 3LVP, 3NKS, 4SEU, 4VOZ, 4WND and 4YTL, mostly on SSB, the event fading by 1925.

He is dismayed at the lack of regular 70MHz coverage in *VHF/UHF News*. Realizing this is due to the very low activity, he suggests that a regular day and hour be re-instituted to try to concentrate some activity. He suggests 10.00pm daily on 70.205MHz SSB. He is willing to arrange skeds, particularly with newcomers to the band. He is QTHR.

Malcolm is also concerned that 70MHz is not included in the Squares Table. My reasons for excluding it are that: (i) There are only about 50 possible squares to work, whereas all the other bands are open-ended. (ii) There seems minimal interest in DX-ing on 70MHz, most operators using it either for packet radio or local FM QSOs. (iii) I think four bands are enough. Let me know if you really do want 70MHz included in this table, perhaps alternating the entries with another band, if so, which one?

Eddie Ashburner, G0EHV (TWR), refers to 70MHz as the 'Cinderella band' echoing GM3TAL's sentiments about low activity. He found conditions in the WAB Contest on 9 June terrible and he only worked four stations, best DX being G4SEU. He did work ZB0W on the 15th, though.

144MHZ

AFTER MONTHS OF complaining about poor conditions, the intense solar activity in June triggered off some exceptional auroras. Not surprisingly, my local postman was kept very busy delivering all your letters.

Es propagation in June was rather a sick joke as far as the British Isles were concerned. The only opening reported was a late evening one on the 17th to Bulgaria from 2144 and lasting 10min. Lee Adams, G4RKV (KNT), worked LZ1s KDP and KRB (KN12) and Paul Pasquet, G4RRA (SRY), heard some LZs.

John Nelson, GW4FRX (PWS), uses a scanning receiver with various VOR beacons programmed in its memories. Around 1100 on the 20th he copied BNA on 114.3MHz. It wasn't on his list so he checked with RAF Shawbury. They said it was Banak in the far north of Norway (KQ20LE), a QRB of 2404km from Crew Green. Not bad for a wideband discone antenna.

There was some good tropo on 31 May/1 June but I missed it as I was editing the July *VHF/UHF News*. On the 31st, things got going around 1740. G0EHV's best DX was OK1AXH (JO70). G0FYD worked DL and Y2 in the JO40, 50 and 60 columns of squares, plus SP6GZZ (JO81) on the 1st.

Others who worked into DL, OK, OZ and Y in these openings included G0KON, Nick Peckett G4KUX (DHM), G4RGK, G4YTL, Arlen Pardoe GM0HUO (FFE) and Keith Kerr, GM4YXI (GRN). John Regnault's, G4SWX (SFK), best DX were SP3NNE (JO81) at 0655 on 1 June and I2FAK (JN45) at 0830 on the 2nd. G4YRY reported propagation to northern Spain on the 11th and heard Italians briefly on the 22nd.

AURORAS

Scottish stations reported auroral activity on 25, 26, 30 and 31 May. GM4YXI worked LA/PA3BIY in the rare JP41 square at 1610 on the 25th and again 24 hours later. G4KUX also worked the JP41 square on the 25th and 26th. On the 31st Nick heard UV1AS (KO59) at 1540 with a couple of OH1s worked.

Coming to June, more activity was reported on 2 and 4, but the first major event was on the 5th when G4SWX heard LAs and OZs at 0640. A telephone call at 1330 from Colin Smith, GM0CLN (LTH), alerted me to the start of the aurora which went on till about 2020.

As observed from G3FPK, at the very beginning, GM3POI was a terrific signal at QTE 5°. GM0EWX (Isle of Lewis) was worked at 1416 at 0°, Calum's

azimuth being 50°. From then on the optimum QTE rotated clockwise with 50-80° bringing signals from SP, RB5, HG, I, OK, YU.

From G4SWX's impressive list in *2M Direct* I pick out SP5EFO (KO02), UC2CBZ (KO34), OH5LK (KP30), ES5RE (KO38), OH2AV and OH2TI (KP20), UV1AS and UA1AFA (2071km) in KO59 and YU7AU (KN04). John worked many DL, HG, OK, Y and YU stations, plus assorted F, HB9, I and other locals. G4PCS/P (JO02ID) turned in a very similar performance.

From Blackpool, G0FYD found optimum QTEs for the OKs and SPs 80-90° and for the Is and YUs 100-110°. Ian's best DX was HG0HO (KN07) at 1830km. G4PIQ made 190 QSOs ending up with 74 DLs, 19 HGs, 15 YUs, 23 OKs and assorted ES, HB9, I, OE, SP and UB5 contacts. Andy's QTEs were up to 80° for the HGs and YUs, all at 0° elevation.

G4YRY was QRV from 1518 till 2306 and Mark worked 16 countries in his 80 QSOs which brought 13 new squares. His 'furthests' were; east RB5PA (KO21), southeast YU7AU and south FD6AYJ (JN25). Most numerous were the DLs, but he managed 14 YUs and 10 HGs. Ela Martyr, G6HKM (ESX), spent most of the time on 50MHz but came on 144MHz to work some 'locals.'

GM0CLN's log covers over three pages and Colin has highlighted QSOs with OK1FFD (JO60), SP6CIK (JO80), HB9RCJ (JN47), OH2TI, OK2BTI (JN99), HB9IFG (JN37), OK1HAG and OK2HRO (JN79) and SP6GZZ (JO81). Mervyn Rodgers, GM0GDL (TYS), whose new QTH is in IO86MP, worked 38 stations in 70min, best DX being FC1LJA (JO10) and SP4LVG (KO13).

Doug Smillie, GM4DJS (SCD), sent in his usual detailed scientific account of the event as covered in the *Propagation News* section. He heard the first signals at 1405 with fadeout at 1820, with a second phase in the late evening. Of his 35 CW QSOs, best DX were OY6FRA (IP62), SP5EFO, SP2HHX, FD1DQ (JN18) and F6DW (JN19).

GW4FRX didn't get on till 1921 when his first CQ call was answered by HG8CE, followed by various HB9, YU, OK and OE stations. John later worked I2FAK and I1KTC, the last one worked at 2012 being F8ZW (JN38). On playing back his tape recording of the event, he thinks an IT9 may have been calling him. Tony Jones, GW4VEQ (GDD), filled up four log pages which showed 18 countries worked between 1523 and 2000 and 2255-2354, including LX2WA (JN39) at 1905.

There were brief auroras on 8 and 9 June but the next major affair was on the 10th. John Eden, GM0EXN, telephoned me from Dunnet Head at 1410 and I switched on to hear LA6HL at 1420. This one went on till about 1930 and, while not as intense as the event on the 5th, there was some nice DX on offer including OH2AP/OJ0 (JP90), SM1NVW (JO96), UC2CBZ, RB5PA, SPs, SMs and the usual locals.

GM4DJS made 54 QSOs on CW, best DX being SP7DCS (JO91), OK3LQ (JN88), F1FH (IN97) and LA6HR (JO28). GM0CLN found the optimum QTE 70-80° which brought him a further 58 QSOs. Best DX were SP7DCS, OKs in JO60 and JO70, LX2PA (GW4VEQ reckoned LX2WA; who is right?), HB9s and F2GL (JN17).

Colin reported another, less intense aurora on the 11th, 1600-1750, mainly locals and DLs but also SP5EFO again. GM4DJS heard the first signals at 1500 and made 16 contacts, best DX being DK4TG (JO31). On the 12th, 1637-1830, there was another event starting with Scandinavians, then DL, OK and SP with a second phase later. There were two events on the 13th, 1205-1359 and 1710-1832, mostly DL, ON and PAs.

Steve Burrows, G7BXB (HFD) was one of the few to work EJ4VNX (IO43WX) in the 13 June aurora at 1245, QTE 30°. He runs an FT-767GX at 100W to a single 17-ele Tonna Yagi at 11m AGL, the QTH being 100m ASL. There was a small 'Scottish' event on the 17th, 1618-2010.

Steve Read, G0AEV (WLT), wrote about his auroral operation on 5 and 10 June on 28MHz. On the 10th there was simultaneous F-layer propagation to ZS at 1730, Es to OE at 1630 mixed with British Isles and DL auroral activity till 1910. So, if we get bored with VHF, we should try on 28MHz!

LOCATOR SQUARES TABLE
Starting date: 1-1-1979

Callsign	50MHz	144MHz	430MHz	1.3GHz	Total
G3IMV	319	446	125	51	941
GJ4ICD	470	264	119	59	912
G4IJE	415	338	5	2	760
G6HKM	303	225	112	48	688
G1KDF	309	184	104	39	636
G4RGK	121	311	145	52	629
G4TIF	231	204	111	-	546
G6HCV	309	233	-	-	542
G4XEN	66	301	115	6	488
G4DEZ	116	249	62	54	481
G1SWH	201	166	62	9	438
G0CUZ	-	354	73	-	427
G4MUT	142	155	94	34	425
G0OFE	264	152	-	-	416
G0EVT	142	213	57	-	412
GW6VZW	259	143	6	-	408
G8LHT	113	185	93	14	405
G4PIQ	-	289	108	-	397
G1LSB	73	176	144	-	393
G0JHC	338	48	-	-	386
G4RRA	-	292	80	-	372
G8PYP	214	120	35	-	369
G4SSO	-	267	99	-	366
G8ATK	74	144	94	52	364
G6YIN	125	153	72	-	350
G4SWX	-	347	-	-	347
GM4YXI	-	340	-	-	340
G4DHF	-	331	-	-	331
G0FYD	134	177	6	-	317
GJ6TMM	109	151	52	-	312
G0GMB	-	198	103	-	301
G1GEY	-	170	92	22	284
GM4CXP	50	201	32	-	283
G1SMD	171	112	-	-	283
G0HVQ	200	71	-	-	271
G4YTL	-	269	-	-	269
GU7DHI	194	73	-	-	267
G0EHV	-	173	80	-	253
G3FPK	-	244	-	-	244
GW4VEQ	-	241	-	-	241
G0NFH	124	81	22	11	238
G8XTJ	111	121	-	-	232
GW4FRX	-	232	-	-	232
GM0GEI	224	-	-	-	224
G4DOL	-	219	-	-	219
G6MXL	52	97	48	20	217
G1UGH	115	96	-	-	211
GW4VVX	81	120	-	-	201
G1TCH	99	95	6	-	200
G4XBF	-	172	-	-	172
G1WPF	20	114	37	-	171
G6MEN	67	54	27	3	151
GM1XOG	145	-	-	-	145
G4TGK	-	139	-	-	139
GM0CLN	-	116	-	-	116
GM1BVT	92	23	-	-	115
G1CEI	11	77	18	-	106
G7CLY	-	100	2	-	102
G7BXB	18	66	5	-	89
GM1ZVJ	35	48	-	-	83
GM0CLN	-	81	-	-	81
G6ODT	-	29	47	-	76
GM0GDL	-	55	-	-	55
GW7EVG	-	22	-	-	22

No satellite, repeater or packet radio QSOs.

430MHZ

ACTIVITY IMPROVED during the last week in May when there was tropo propgation into the JO50 and 60 column of squares. G0EHV worked OK1AXH in JO70 and finds his new Westflex feeder a help. G6HKM's additional table points all came from the contest on 22/23 June but Ela found conditions, like the weather, poor and activity low.

Andy Smith, G7FWE (CHS), took advantage of a very selective duct on the evening of 30 May. It appeared to stretch from southern Ireland, through NW and NE England, to Denmark onto southern Sweden. Using 10W and a 44-ele Multibeam, he worked OZ9IT. Beacon SK6UHF (JO67) was S3 for much of the evening.

G8OPR found some good tropo on 1 June which brought Dave QSOs with OK1AXH, OK1DFM/P (JO60) and FF1LPW (IN95). On his way home on 10 June, he heard the aurora on 144MHz on his mobile rig. As he had not got any 144MHz antennas at home, he went onto 432MHz and called CQ on SSB for ages to no avail. He went down to the CW end, called CQ and worked G1GEY. I can only remark: "Shame on all you A licensees!"

The only comment on 1.3GHz came from G6HKM who wrote: "The Trophy contest on 2 June was a disaster as far as I was concerned. Hours of CQ calls gave me just two QSOs, the other ten contacts were by hunting around. Apart from frustration, I did get some points for the tables."

DEADLINES

PLEASE SEND your reports for the **October** issue by **Thursday 29 August** and for the **November** edition by **Thursday 26 September**; those are *the very latest dates.*

Novice NEWS

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

AT DENBY DALE rally I met Simon and his dad. Simon and his brother sat the first NRAE exam and they are waiting for the results. Quietly confident, was my impression from Simon, though, he said, brother Daniel had found some questions harder to understand. Not surprising as Daniel is nine, while Simon is twelve.

Simon has already passed the RAE exam and as he must wait until he is 14 to get his amateur ticket, he is also entering the hobby by the Novice route. He hopes to start a Novice net on 70cm in the Manchester area, and is looking for future members.

He took leaflets and posters to spread the word at his school, and has promised me a progress report. I'll pass it on. Any more offers?

CALLING ALL CLUBS

THERE MUST be at least one member of each amateur radio club who reads this column, so this is for you. By the time this is printed there will be licensed Novices, some young, some older and more experienced in life. All would be grateful for a warm welcome into the hobby and the opportunity to meet other local amateurs in person. Radio clubs can help the Novice and themselves at the same time.

Some clubs meet in pubs and similar places. This does pose some problems which fortunately can be overcome. Instructors can help here. They have probably had some contact with the parents of their younger students, and can reassure them that their children are in good hands. Perhaps parents may also like to go along. They would make new friends - and may even become interested enough themselves to follow the excellent example set by their 'harmonics'!

If a kind and sympathetic member became responsible for Novices, making them welcome and introducing them to others, perhaps in a very short time those same Novices could take over the role and become 'club assets', as membership grows. Obviously, the cost of membership must be considered; Novice membership at a reduced fee, and perhaps free to those still at school?

It goes without saying, of course, that *everyone* makes them welcome. It may well be that these new members have something to offer in other areas in life and isn't the hobby about friendship?

CALLING ALL NOVICES

YOUR FIRST radio contacts will probably be fairly local ones. Some will be with people you have already met, possibly during your training or through mutual friends in your new-found hobby. Now you have the opportunity to meet many more. You will meet new friends on the air, and will fall into the inevitable trap of building a face to fit the voice! Everyone knows that this is impossible, but everyone does it! There is a way however, to correct those imagined faces.

In your area there will probably be an amateur radio club, and many of those local contacts will be members - your Instructor will probably have connections for a start. If not, he (she?) will know who to approach. There, you will meet some of the disembodied voices and, of course, it works two ways. In their turn they will discover what you look like and get to know you better. I often wonder how others picture me from my voice. I bet they are completely wrong! I have never been disappointed although often surprised.

As mentioned previously, the meeting place for these clubs is sometimes in pubs. Older Novices, of course have no problems, but for those still under sixteen there are some problems. I have just checked with the landlord of our meeting-place to get a legal ruling. We meet in the dining room, where there is a bar hatch which is not opened during our stay (mainly for our benefit to keep out the sounds from the main bar). Children of any age can go, accompanied, into the eating area, where they can have a soft drink brought to them. This should apply to any public house.

Ideally, of course, if one or both of your parents could be there too, they would feel more reassured. Even if they could only go the first time, so that they saw you safely handed over, and made arrangements for your collection, they would perhaps give their permission for future occasions.

If you go, then do mix in with the members present, I am sure they will make you welcome. You will also get the chance to hear the knowledgeable people who come to talk to members, and the members themselves will be able to teach you more about the hobby.

THAT FIRST QSO

THE FIRST Novice callsigns will be heard very soon, perhaps calling CQ. How will they be received? Do you remember your own first call with an obviously new callsign? The amateur answering you knew it was a recent issue, but not that it was brand new, never before used. By the nature of their training, Novices will have had some experience of QSOing, but they knew who was at the other end then. Not any more.

Novices have come into the hobby with high hopes and boundless enthusiasm. First impressions are important. Let *all* amateurs make sure that those first impressions are good ones and treat the newcomers, of whatever age, in the way we ourselves would like to be treated.

Now a word for the Novices themselves: 'My first QSO' could be the title of your contribution to this column (though any letter from you, on any subject would be welcome!) I promise to answer all letters, and look forward to the first *novice* contribution.

ANOTHER RECORD?

GUY MITCHELL'S parents were using tapes to study for their Novice Class licences in Buckingham, Iowa, USA, and their son was of course, all ears. He passed the 5WPM test at four years old! The written exam took longer. He passed that at five! I hope his parents passed too.

Our record stands at eight for the 12WPM test of course. Any advance?

By contrast, Senator Barry Goldwater was well in his 70s when he gained his novice class licence. It would be tactless to ask for the record on that one - so I won't!

HELP LINE

NOW, THERE IS specific help for Novice members of the G-QRP Club. A Novice Services Manager has been appointed, who will write his first column for the Summer issue of their magazine, *Sprat*.

David Gosling, G0NEZ, will give operational help to all future Club Novices. Antenna advice, technical back up, or on any other problem. With the expertise of the Club behind him, no problem should be too great! From one new columnist to another, I wish you success David.

[The RSGB, of course, is able to put all of its members, including Novices, in touch with a wide range of experts. See *Do You Have a Query?*, page 11, April 91 *RadCom* - Ed].

RURAL NOVICES

GWYNEDD ISSUE their own newsletter for Novices, and a copy of the April issue has reached me from Dewi, GW0ABL. In a covering letter he makes two comments: The first is the difficulty, in rural areas, of distances between

Cubs visit the permanent special event station GB2RN on HMS Belfast.

Instructor and Novices, with the winter prospect of travelling narrow country roads, probably twisting and unlit. One Instructor is more than 20 miles from his possible students. A 40 mile round trip calls for a lot of dedication on someone's part. The second point is that none of the prospective Novices in that area is in the age group widely expected to be most interested, with one 19 year-old and the rest 30 to 60+.

Of our nine local students, four are of school age and five are adult. How does this compare in other areas? I am sure that the people who worked so hard to get the whole thing started would be pleased to know.

GB1MIR

THE JUNO PROJECT has been reported in detail elsewhere, and Helen Sharman is safely back on terra firma. One school, Walthamstow Hall School, asked the Sevenoaks and District Amateur Radio Society to set up a station there, so that the girls could listen to Helen's transmissions from space. A JUNO callsign was offered but time did not allow this. With their Special Event callsign they hoped to talk to the Canterbury school that Helen was scheduled to contact.

In fact, this was not to be, as technical problems on the spacecraft reduced Helen's transmissions and the Canterbury school was not heard.

However there is a happy ending, as a dozen of the girls spoke to two local lady amateurs and interest soared. The outcome was that six of the girls decided that they would like to form a radio society at the school. With SADARS' help perhaps there will be new recruits to the hobby there!

Like many others, I heard Helen as she passed overhead. Everyone has agreed that she was very efficient, clear and concise. No repetitions or hesitations. The question asked could be guessed from her reply. Top marks to her. Less than top marks to the amateurs I heard a little later on 80 metres: "Pity that the first Briton in space had to be a second class operator . . . .". Unfortunately, I was not tuned to transmit and there were no callsigns given, or somebody would have had to explain!

WORLD SCOUT JAMBOREE

THIS IS an event which takes place every four years, and this year is held in Korea. Over 20,000 young people from more than 100 countries will be there, nearly 1,400 from the UK. Each one has had to raise over £1650 for the experience of a lifetime, leading to lifelong friendships and a deeper insight into different ways of life.

Martin Brown (right) of T H Brown Ltd, was the main sponsor of the equipment used to create the school radio station at Tetney Primary School, Grimsby. Head Teacher Paul Hewitt, G0NUE supervises the pupils.

You may not be there, but there is a chance to "hear all about it" Read on . . . .

The World Scout Jamboree Station, 6K17WJ, will be on the air in August between the 6th and 16th from Korea. Any Novices (or anyone else who is interested for that matter!) may like to listen for it.

If you have no equipment of your own capable of receiving the station, perhaps you can twist your Instructor's arm enough for him to have his in listening mode. Possibly a little time could be given to this on your training evening. It would be even more exciting if you could send one of your QSL cards and get one back!

There is a Scout Net each Saturday morning on 3.740 MHz. It starts at 0900 BST. If: a) you are interested, and b) you can find a friendly amateur to let you listen, you could have all the latest radio scouting news at your fingertips. Scouts and ex-scouts could find this very interesting and informative.

REPEATER USE

REPEATERS ARE primarily intended for mobile use, but there are many occasions (particularly on the 433MHz band available to Novices) when a mobile station calls and gets no answer. A fixed station could well be the only one listening. Novices will probably use repeaters on occasion, so a look at correct procedures is perhaps timely.

All set? You are tuned to the repeater output frequency and have the repeater-shift set on your rig as all repeaters transmit (talk) on one frequency, and receive (listen) on a different one to prevent congestion on one frequency. All repeaters need a toneburst of 1750Hz for a half second or so (with practice you can whistle this note) and then a few words of audio to wake them up. Your callsign followed by "listening through GB3xx" should be enough. It saves on electricity bills if everything is turned off when not in use.

If there is no reply, wait a few seconds before trying again. If you do get an answer you are all set to go ahead, but read on as there are dos and don'ts and things to remember.

There is a 'timeout' period on many repeaters. Talk too long and it will close down and leave you talking to yourself, so keep your transmissions reasonably short. When someone stops transmitting, the repeater will give a 'K' in morse or a bleep before it is ready for a further transmission from the other station. This procedure must be repeated each time a different speaker takes over.

That, very basically, is how to make a one-to-one contact, but of course there is more. Remember that mobile stations may be wanting to use it - it may be their only means of contacting the amateur they are going to meet or looking for directions in an unknown area. There are many possible reasons.

The second or so before the 'K' gives the chance to break in, but again there is a right way to do it. In that brief period, there is just time to give a callsign, with perhaps "Break please" added. If there are a few of you in the conversation, it is even more important to give mobiles a chance - and much easier to forget them!

Don't break into an interesting conversation unless you have something to offer on the subject. Just listening can be very instructive! If a breaking station doesn't give a callsign, ignore him - he may not have one.

These are only general guidelines. Practice may not make perfect but your technique will be acceptable, and listening helps you to decide what is correct and courteous. A few amateurs forget the rules. An even smaller number break them. Please don't follow this minority and develop bad habits. Remember, repeaters are *heard* by a large and varied audience. Give them a *good* impression of amateur radio.

One more point. Repeaters are set up locally by groups of amateurs for the benefit of all, and they do have bills to pay. Equipment, maintenance, licence, insurance, electricity bills, site rent. You can't contribute to all repeater groups, obviously, but a very fair solution is that if everyone supported the repeaters that they commonly use, *all* groups would thrive for the benefit of *all* amateurs.

SWL NEWS

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

IT WAS WITH deep regret that I learnt of the passing of Brad Bradbury, BRS1066, one of the column's most ardent contributors, in early June. He was, of course, one of the Society's dedicated QSL Bureau sub-managers, but he was also a very fine reader of CW who entered and won many, many contests, including BERU. He had over 300 countries heard and his most recent aim was to hear and get confirmed all USSR Oblasts. From memory he had only one Oblast to hear to boast a full set, a feat which cannot be bettered by a British listener at this time.

We never met, but his useful monthly contributions to my column will, indeed, be sadly missed.

BUILDING QRM!

AT THE TIME of writing, the QTH is in something of a mess. We have the builders in converting the loft which will house the new shack and I have been forced to go temporarily QRT. The shack is under dust covers, as are many of your letters. The column relies entirely on contributions this month, and you have certainly provided a fine amount of material. Please keep it up!

ACTIVITY BONUS

TACKLING THE HF spectrum first, I shall provide a slightly more in-depth account this month. The month in question had actually been very poor with much auroral activity which had knocked the bands sideways for over a week of the period. My reporters considered that the best conditions had been in the early morning and during the night. Recent DX-peditions to H44, 4J1, PY0S, 1A0 and 5Y had helped to fill in a few blanks and keep the bands 'ticking over'. Indeed the G's who operated from H44 appear to have done a marvellous job, judging from reports. Activity this month starts at 7MHz where some North American and African stations had been noted along with the 4J1 expedition. PY0SK, CE0ZIS and VP8CEM had also been reported.

14MHz had been acceptable in terms of providing some interest, but most of the activity here was noted by Robert Small, BRS8841 using CW. Some of the more choice DX included: ZK1RBH, H44SX, D2ACA. Others mentioned were KG4AR, TI9JJP, TJ1GG, V29PI and 7X5ST/3V8.

Most reporters felt that 21MHz had been the better band this time around. Robert Small also noted CW from SY/DJ6SI, 1A0KM and 4J1FS. From an enormous list I have picked this handful as the best DX on offer - A25/KF7E, CE9GEW (South Shetland), FO5CS, FS/JH4ADK, HS0E, V73AX, NU2L/VE2 (Sept Iles). I have undoubtedly omitted some other choice DX, but what is good DX varies from listener to listener.

28MHz, as we heard into the summer months, had begun to deteriorate. On some days my reporters heard no DX whatever. Listeners would probably have logged some interesting short skip stations by the time they read this to have improved their European countries scores.

We can also dwell a little longer on what had been heard on the WARC bands. 30MHz had provided CO6CG, OA4ZV and ZP5XDW. 17MHz accounted for A22AA, CP6XK, FM5WD, PY0FF, K1EFJ/VP9 and 9Y4KB, while 12MHz had given Robert Small six new ones in the shape of YL2PQ, VP2MLD, FS/JL1RVC, H44VG, 5N0HBK and LU8EWD. As I tend to devote little space to the WARC bands, it would be interesting to know what your country scores are. Write and let me know and I shall provide the best scores so that other listeners have some targets to aim at.

VHF HAPPENINGS

FIRST, THANKS TO G4FUF for advising me that the station he had worked was, as I thought, a DU. The information has been passed on to Mick Toms, who was most grateful for the information. Now on to what had been happening. There had been some Sporadic E events, but no really extensive openings at the time of writing. This was probably accounted for by the disturbed nature of the bands caused by the many Auroras which had been noted. I am advised that Auroral conditions had been noted on 5 June, and on four consecutive days from 9-13 June. No doubt G3FPK's column will provide readers with more detail, but Mick Toms, BRS31976 heard EI8DQ, F6HRP and GJ4ICD for three new countries on 50MHz taking his tally in an extremely short period of time to 37. On 144MHz his best DX via Aurora was OK2PZW. Mick noted that during the Aurora on 5 June all the signals heard were south of the '3' line of squares, with no GM, GI and LA's heard.

Turning to Sporadic E, Mick had caught a number of selective openings on 50MHz. He logged YO2IS on 6 May, CN8ST and EA3DZG on 14 May and two LU's around 1940 on the same day. He also boasts 4J1FS on both CW and SSB - heard around 1800 on 27 May. An extremely tasty catch indeed. (Your scribe is very envious!) Elsewhere he had logged the usual CT's, a goodly number of Italians, several OH's, and a clutch of 9H's including 9H4CM on Gozo. He had also heard ZB0X on 70MHz.

David Whitaker, BRS25429 had even caught some tropo on 144MHz. He mentioned many stations in Germany including several in JO6Z, a couple of OZ's in JO55 and 65, GW3KJW in IO72 (surprisingly, a new square), and OK1AXH in JO70 who was apparently 5x9+ at 2300z. The duct seems to have been quite narrow and David could hear no stations south of Yorkshire working the DX. He had also been collecting new countries on 50MHz, logging EA6/DF5JJ. He mentioned a useful Es opening to Scandinavia on 25 May when he logged stations in JO57, 59, 65, 67, 99 and in JP40, 70 and 81. Conditions in the UK Six Metre Group Contest on 8/9 June were so poor that David went to watch the golf at Fulford!

DX TV

G0MLE PROVIDED his first report of the Sporadic E season on the DXTV bands (Band 1). He started seeing DX pictures on 9 May with pictures from Italy. Since then he had logged pictures from Norway and Spain. Hopefully, I shall receive more detailed information and some pictures as the season progresses.

FINALE

NEXT MONTH SHOULD see the column return with its usual wide scope of listener activities. The deadline is Tuesday, 13 August. Please continue to support the column

G6NUO wrote, following mention in the January *SWL News* of WAB squares which had never been activated, with reference to SM40 - Smalls Lighthouse. He had a QSO with this square in September 1985, when it was activated by GW1FER/A, who was a lighthouse keeper doing duty 'one month on, one month off'. There were plans to automate the lighthouse, so SM40 is probably even rarer now. Readers will see from the photograph (given to G6NUO to confirm the QSO with GW1FER/A) that access is only via the helipad.

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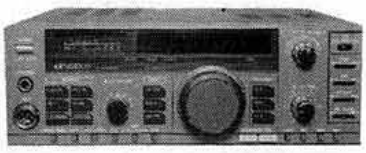

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- **HS-51, Headset.** Headset with VOX function that allows you hands-free operation.
- **Carrying Cases.**

Carrying Case	Battery Packs, Battery Case
LC-53	BP-81
LC-55	BP-81, BP-83 or BP-86
LC-56	BP-84 or BP-85

- **MB-30, Mounting Bracket.** Mounts the IC-2SE in a vehicle or on a wall.
- **OPC-235, Mini DC Power Cable.** For use with a 13.8 V DC power supply

Datapost: Despatch on same day whenever possible.
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THE COMPACT HANDHELD WITH A SPLIT PERSONALITY

5 Watt Output Power.
Utilizing a specially designed ultra-small highly efficient power module, the IC-2SE delivers a full 5 W* of output power. Bring those distant repeaters into range.
* At 13.8V DC

48 Memory Channels.
The IC-2SE has 48 fully-programmable memory channels and one call channel. Each memory and call channel stores an operating frequency and other information required for repeater operations.

Convenient Repeater Functions.
The IC-2SE is equipped with programmable offset frequencies for accessing repeaters. All memory channels and a call channel store repeater information for your convenience. The IC-2SE includes a newly designed 1750 Hz tone call transmit function. A 1750 Hz tone call transmits when the PTT switch is pushed twice quickly.

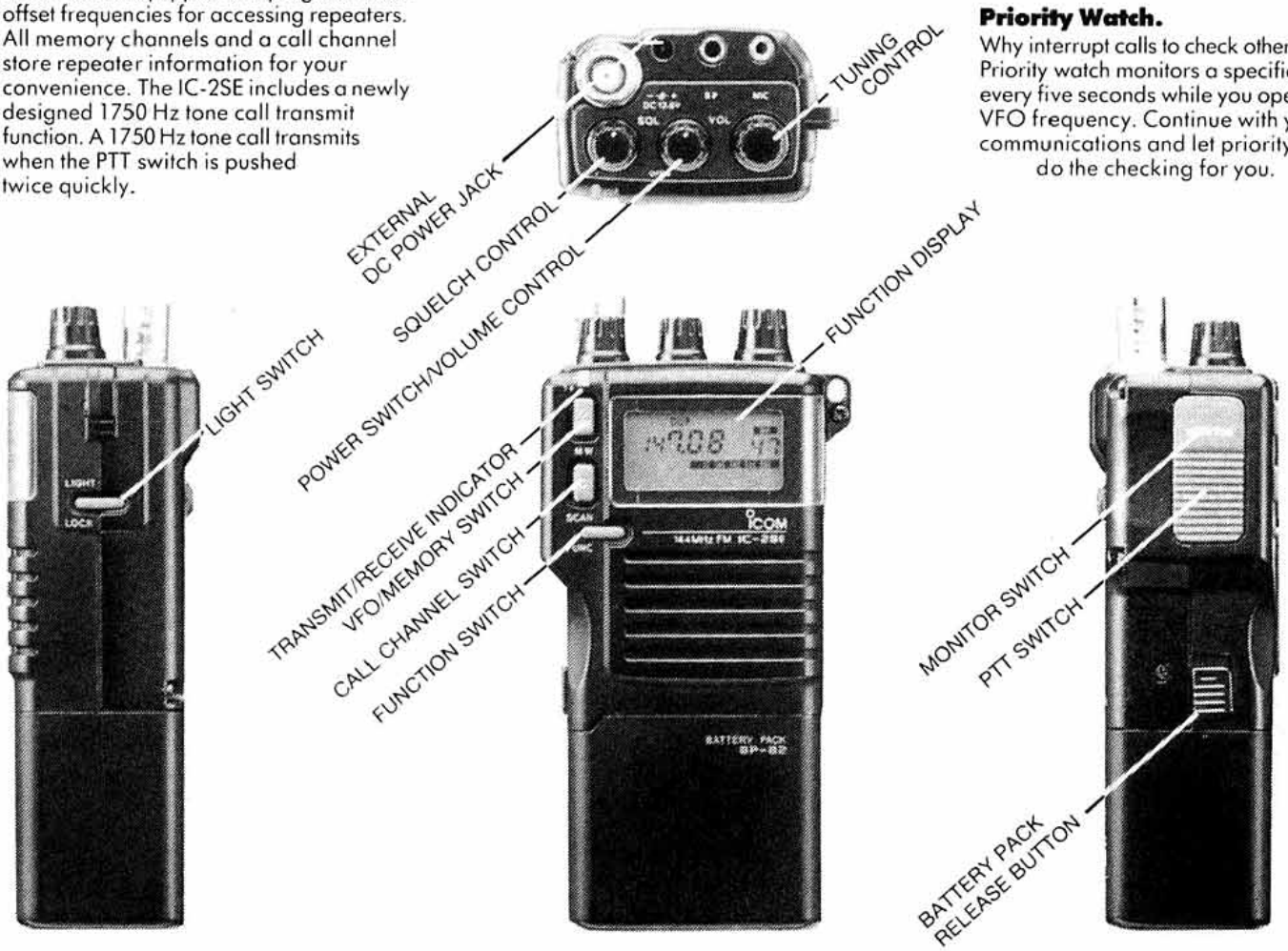
Power Saver for longer operating time.
The power saver ensures lower current flow during standby conditions. Operating times are much longer than with older, more conventional transceivers.

Built-in Clock with timer functions.
The IC-2SE is equipped with an advanced 24-hour system clock with timer function. The transceiver automatically turns on when real time matches a pre-programmed time. This is perfect for scheduling QSO's. Auto power-off timers and other settings can be made in clock mode.

Convenient Scan Functions.
The IC-2SE is equipped with VFO and memory scan.
- **VFO Scan.** VFO Scan repeatedly scans all VFO frequencies. In addition, unnecessary frequencies can be skipped.
- **Memory Scan.** Memory scan repeatedly scans memory channels.

Auto Power Off Timer Function.
If you ever forget to turn the IC-2SE off, don't worry. It will turn itself off. Power-off time can be selected or deactivated using multi-function mode. Preserve battery pack power for the times when you need it most.

Priority Watch.
Why interrupt calls to check other stations? Priority watch monitors a specified station every five seconds while you operate on a VFO frequency. Continue with your communications and let priority watch do the checking for you.



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TOPICS

PAT HAWKER G3VA

COLINEAR ANTENNAS FOR VHF/UHF MOBILE OPERATION

WHAT APPEARS TO BE A realistic use of the moment method (program not specified) to investigate the performance to be expected from a colinear monopole anna (CMPA) as a 900MHz mobile radiotelephone antenna, or as a dual-band antenna permitting also the reception of Band II (85 - 108MHz) FM broadcasting, is presented in *Electronic Letters* (6 June 1991, pp1103-4) by H Nakano *et al* of Hosei University, Tokyo.

This indicates how the gain of a conventional quarter-wave mobile antenna above an infinite ground plane (in practice a vehicle roof) having a gain of around 1dB can be improved by using two linear wire sections (L_F 0.23λ and L_S 0.5λ) connected by a coil with a diameter of 1/16thλ , a pitch angle of P1 7° and a coil wire length of 0.5λ : **Fig 1**. All dimensions are for a λ equivalent to 900MHz. At this frequency, **Fig 1(a)** shows the calculated current distribution along the antenna. The wire radii of both antenna sections and the coil is taken as 1mm.

The Japanese authors write: "It is found that the current amplitude and phase on the first element are close to those on the second element. Because the contributions of both the antenna elements in the far field add constructively, the radiation pattern becomes narrower than that in the conventional monopole antenna, as shown in **Fig 2(b)**. The gain is increased by 3.3dB compared with a conventional monopole antenna. The input impedance is calculated to be 69 - j32Ω."

The Japanese also discuss a double-band version of the CMPA with a further section connected to the top of the 900MHz colinear antenna via a (900MHz) trap coil, with the length of the third section arranged to resonate the antenna in the FM broadcast band (input impedance at 85MHz 21 - j4Ω).

Consideration is also given to the use of a CMPA with four quarter-wave ground wires (radials) rather than an infinite ground plane: "The absolute gain at 900MHz is calculated to be 3.6dB which is significantly higher than a value of 1.4dB obtained by a quarter-wave monopole antenna with ground wires."

LOOSE PINS AND OVER-HOT 3-500Z VALVES

THE HIGH-POWER (AND COSTLY) 3-500Z power triodes used in a number of amateur radio linear amplifiers can occasionally develop loose pin sleeves on their filament pins. According to Bill Orr, W6SAI, (*Radio FUNdamentals, CQ*, May 1991), this problem seems to arise only in amateur practice and not in the many 3-500Z valves used in professional communications and broadcast equipment.

He goes into the causes of loose pins in great detail, but essentially it is a reflection of the problem that is basic to glass-to-metal seals, accentuated by the high filament current (14.5A) and high dissipation of the 3-500Z in linear service. The filament leads are of tungsten which has approximately, but not identical, temperature expansion to that of glass. Whereas metal expands linearly, glass

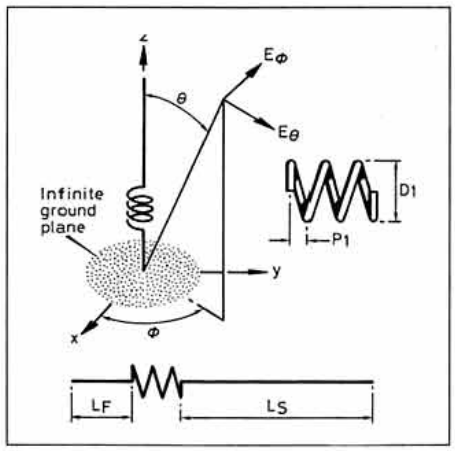


Fig 1: Configuration of the 900MHz colinear monopole antenna (CMPA) with loading coil (180° phase change) analysed by H Nakano *et al* in the IEE's *Electronics Letters*.

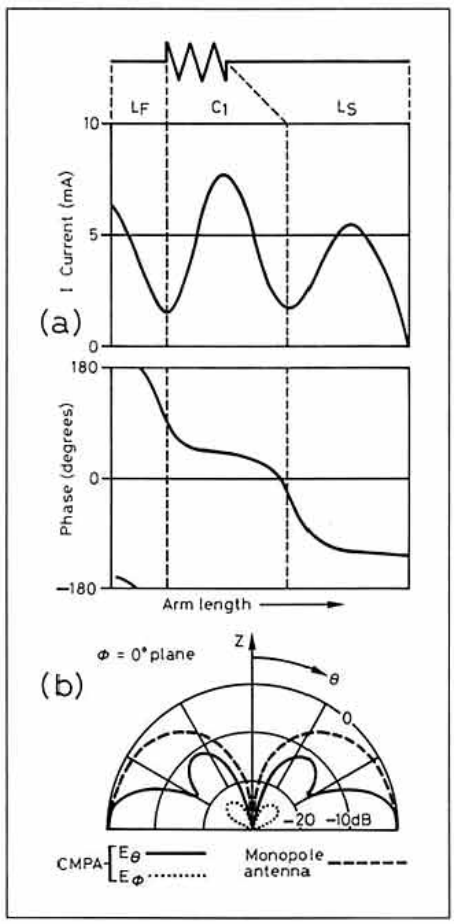


Fig 2: Current distribution and vertical radiation pattern of the 900MHz CMPA. (a) Current distribution. (b) Radiation pattern.

does not: **Fig 3**. W6SAI points out that the useful life of a seal is longest when the seal is heated and cooled slowly. For the 3-500Z, maximum temperature rating of the filament seals is 200°C (the thoriated-tungsten filament operates at temperatures in the range 1800 to 2200K (1527 to 1927°C)). To hold the seals within 200°C, cooling air *must* be applied to them.

W6SAI suggests that for amateur service, the 5V filament of the 3-500Z should be run at about 4.9V: "This enhances filament life and also permits the filament seals to run cooler than if the filament is run at or above the nominal voltage." Second, he notes that electrical connection to the filament pins should have minimum contact resistance: "Any voltage drop across the contacts represents an 'I^2R' loss, which shows up as additional heating at the filament pins". Thirdly, sufficient cooling air must be passed across the filament pins to hold pin and seal temperature below 200°C (this can be checked by means of temperature-sensitive paint or decals applied to the base of the tube directly at the filament seals). All three requirements can be met by carefully measuring (and regulating) the filament voltage, using the proper valve socket, and by applying adequate cooling.

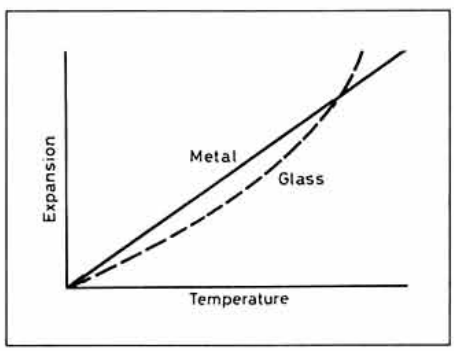


Fig 3: Typical example of how glass and metal expand, showing how differential will increase rapidly when the temperature of a glass seal exceeds the recommended value.

W6SAI notes that extended operation in a DX contest with heavy speech processing can make an otherwise adequate air flow suddenly become insufficient. Pin problems usually occur with only one of a pair of valves, indicating that one of the sockets is receiving insufficient cooling air. A special Eimac SK-410 Air System socket is recommended but is expensive. Ceramic sockets can be used successfully provided extra air to that required for the SK-410 is passed through the socket holes.

In his article, W6SAI provides information on temperature runaway conditions, proper cooling for the 3-500Z, techniques that have been used to resolder base pins and how to reduce the chances of the problem re-occurring. He considers that equipment reviewers should check out the air system of amplifiers, or run the equipment under tough operating conditions to check seal heating, using temperature-sensitive paint or decals. He finds that loose pin problems occur in isolated cases among many brands of amplifier, with no particular factory-built amplifiers having a consistent history of socket/base overheating.

W6SAI provides a check list intended for amateurs who have experienced pin problems, but which also makes good sense for general use with high-power linears:

- Do I run my filament voltage at or slightly below the nominal value?
- Do I operate for long periods with a lot of speech compression?

- Do I carefully retune my amplifier for proper loading when I change bands or frequencies within a (wide) band?
- Do I take care not to overdrive my amplifier valves?
- Do I regularly oil my blower or fan and clean the air passages of the amplifier?
- Do I examine the socket pins at intervals for signs of overheating?
- Finally, do I know the characteristics and air-flow capability of my cooling fan or blower? Is it big enough to do the job?

CAPACITIVE BOTTOM-LOADING OF ANTENNAS

THAT REDOUBTABLE TROIKA OF retired engineers - Arch Doty, K8CFU, John Frey, W3ESU, and Harry Mills, K4HU - did much a few years ago to revive the interest of broadcast antenna engineers, as well as amateurs, in the use of elevated radials and counterpoises rather than extensive and costly buried radials and earth systems (by making thousands of measurements rather than using computer software). They have more recently turned their attention to the use of capacitive bottom loading in order to tune approximately-quarter-wave vertical elements to resonance over a quite wide frequency band, without changing the dimensions of the element, by varying the capacitance of the bottom loading. They have constructed many test antennas at 450MHz and also tried out the system at 144 and 28MHz using quarter-wave folded monopole elements (see *TT*, July 1987); at 450MHz constructed from printed circuit board.

They presented a paper on this subject at the Radio Club of America Technical Symposium in November 1987 of which some parts were published in the July 1990 issue of *Mobile Radio Technology* under the title 'Capacitive bottom-loading tunes mobile antennas'. This emphasised that the technique eliminated the need to change element length for different frequencies or vehicles. K8CFU has sent some selected pages from this article from which the following notes are derived.

"Loading vertical antennas to reduce their physical height is not a new idea. Verticals often are loaded inductively, as with 'top-loading coils' and 'base-loading coils' and capacitively with 'top hats'. The idea of capacitive bottom-loading, although mentioned by K Henny *Principles of Radio*, p462 (John Wiley, 1938) as early as 1938, apparently has not been tested or applied extensively. The authors conducted a series of tests to better define and quantify the capacitive bottom-loading effect. The emphasis in these tests was to determine what range of frequencies could be attained with a fixed height of vertical element by varying the value of the capacitive bottom-loading.

"In deriving the test programme, it was considered that the capacitive bottom-loading effect may be described as follows: As the frequency of operation is raised, an antenna of fixed length looks at its base feedpoint as an increasing resistance in series with a decreasing capacitance. The resulting inductive reactance at the feedpoint must be tuned out, which necessitates the use of capacitive reactance, which is provided by a capacitor . . . . In the tests, a sufficiently accurate impedance bridge was not available, so VSWR data were taken instead. The data and subsequent tests show:

(1) The resonant frequency of a quarter-wavelength vertical antenna used with a counterpoise varies as the size of the ground system (or plate in the design tested) under the counterpoise (in the 450MHz unit this comprises a circular 'wheel' with many wire spokes), the larger the ground system, the lower the resonant frequency.

(2) The resonant frequency of a vertical antenna used with a counterpoise varies with the distance between the counterpoise and the ground. The greater the distance, the higher the resonant frequency.

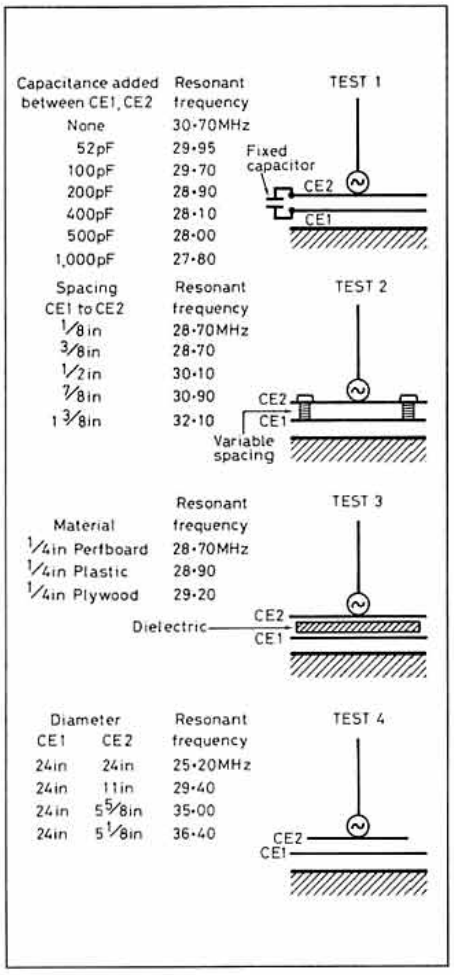


Fig 4: The 28MHz version of the capacitive bottom-loaded antenna showing how its resonant frequency can be changed by bottom-loading without varying the length of the vertical element. The arrangement resulting from Test 4, varying the diameter of CE2, provided an antenna tunable from 25.2 to 36.4MHz.

"In other words, the capacitance between counterpoise and ground acts to capacitively bottom-load the vertical element. In these tests, capacitance was added between the feedpoint and the ground system to supply the required capacitive reactance. By varying the value of this reactance, the frequency at which the base impedance of the antenna is purely resistive, ie its resonant frequency, was varied."

Extensive tests of vertical antennas using this principle have been made on amateur bands from 3.5MHz to 450MHz, including fixed as well as mobile applications. K8CFU has also made some 800MHz versions for use with his (American) cellular telephone: "Each of the antennas boost simple construction because they have fixed, rather than adjustable, whips."

Some test results of various methods of 'tuning' 28MHz antennas are shown in **Fig 4**. It is stated that the 28MHz antenna (presumably the Test 4 version) was tested extensively and found to be tunable from 25.9 to 31.5MHz without changing the height of the vertical element: "On-the-air performance on the amateur 10-metre band was excellent."

EARTHS, COUNTERPOISES AND RADIALS

THE ITEM "LOW RESISTANCE EARTHING" (*TT*, April) outlined the American military "surface-wire-ground" (SWG) system using a series of short, cruciform-shaped stakes as a means of providing a lower DC earth resistance than the traditional 6ft earth rod. It also referred briefly to the important difference between DC earth resistance (important where the system is used as a *protective earth*) and the RF return-current efficiency when the earth is used to provide the missing half of a monopole or Marconi-type antenna, where RF loss resistance can dramatically reduce radiation efficiency.

As emphasised on many occasions in *TT*, there is growing evidence that elevated radials or even a single quarter-wave counterpoise (which may be physically shortened by inductance loading etc) tend to provide better radiation efficiency (ie lower RF ohmic loss) than all but the most elaborate buried earths, which for broadcast applications may consist of 120 or even 150 buried wires in addition to earth stakes.

The detailed measurements some years ago by Arch Doty, K8CFU, and his friends provided a very strong case for using elevated wire(s) and this has since been further strengthened by NEC-software computer studies reported in *TT*.

As a result of the April item, Allan Taylor, G3JMO, has commented in some detail on the question of 'earths' used as an integral part of vertical monopole antennas. He writes: "Although the SWG system apparently bettered the results of earthing by a 6ft rod in terms of DC resistance compared with 6ft rods, I am very suspicious of its use as part of an antenna system based on my own experiences with the vertical antennas used consistently for over 30 years.

"To judge from results of earthing experiments in my own locality (Redcar, Cleveland), I do not think a series of 10in ground rods would achieve very much, in fact any length of rod is nearly useless in ground which will not carry earth currents - and that goes for most of it. The short-ground-rod philosophy appears to be based on the assumption that earth currents travel near the surface which gets the rain (but dries out easily) whereas formerly it was considered that any ground rod less than three-feet long was of very little use. This can suggest only that the subject of earthing is still uncertain, at least in respect of RF ohmic losses.

"It is well recognized that if a vertical radiator of about a quarter-wavelength is to radiate effectively then its efficiency depends upon the earth creating the antenna's 'mirror image' of the quarter-wave element. Provided that the 'return' earth currents flow back to the feeder, then the antenna radiates, but in practice low earth-conductivity means that such current does not flow readily and the antenna radiates poorly with low efficiency. Indeed, in some circumstances the earth forms virtually a dummy load on the end of the feedline, absorbing most of the transmitter output, particularly where the antenna element is mismatched or mistuned.

"There is thus often a large difference in radiation efficiency between a vertical antenna tuned against ground and one tuned with a counterpoise or radial, either as a 'ground-plane-antenna (GPA)' elevated above ground, or with radial(s) at about ground level. I suspect that the improved results of the American SWG system, if they relate to antenna earth rather than protective earths, may be due more to the counterpoise effect of the circular ring of cables than to the actual short earth rods. Indeed, if the 10in rods are as inefficient at linking the wire to the ground as I suspect they are, the wire may well be acting more as a counterpoise than as a 'true' earth. The improved (ie lower) DC resistance compared to 6ft spikes reported by the Americans may, from the figures quoted, still be far too high in areas of poor earth conductivity, to form an efficient antenna 'mirror image' earth.

"In my experience, most antennas work far better isolated from true earth even by a foot or so, rather than being connected directly to earth as part of the antenna system. If a 'true earth' cannot equal or excel the efficiency of a simple counterpoise, which can be isolated from ground and tuned as part of the antenna system, why bother to use ground in the first place?

"However, this does not include the coaxial feeder; by burying the cable a few inches underground, this will kill off the outer-braid common-mode current and may reduce the pick-up of local electrical interference close to the house (recognising that vertical elements are in any case prone to pick-up more interference than horizontal elements)."

G3JMO discusses other possibilities including the use of balun impedance matching transformers with the feeder earthed at both ends but this is a rather different question to that of SWG earths. He does however point out that the cruciform rods used for SWG look familiar, as he uses MetPosts from a garden centre as guy anchors and finds them very effective in holding the guys of his 30ft vertical; but being painted he would *not* recommend them as short earth rods!

L E Newnham, G6NZ, points out that much information on earths, and the configuration of earth rods (but for protective rather than RF earthing systems) can be found in such books as: *Earth Resistances* by Dr G E Tagg (Newnes, pp258) and *Earth Conduction Effects in Transmission Systems* by Erling D Sunde (Dover Publications, New York, pp370 (rather more mathematical)). I tried to find these in some professional libraries but without success.

MORE ON SAFE SOLDERING

THE JUNE *TT* ITEM ON 'Safe Soldering', highlighting the potential problem of 'woodworker's asthma' from breathing in flux fumes resulted in a useful follow-up from Roger Blackwell, G4PMK. He writes:

"Some years ago, when microprocessors first came on the scene, I began making a number of memory boards for my home-brew machine, each of which had nearly 3000 soldered joints. It soon became apparent that I was reacting badly to the fumes of the flux from the solder. The project, indeed any soldering at all, was not really practicable, even with a fan blowing the fumes away.

"Fortunately, I talked to my GP, who was also an electronics enthusiast. He prescribed an inhaler used for asthma sufferers (Intal, diSodium Cromoglycate) which helped a great deal.

"A further positive step was to change to a solder using a different flux - Multicore Xersin. This is available from such suppliers as Farnell. Using this solder, I experienced no problems at all.

"I would therefore suggest that anyone who experiences problems when soldering should consider the use of this type of cored solder, or, if their reaction is severe, talk to their GP."

Roy Hill, GM0IJF, is more careful than he used to be to avoid inhaling fumes. He reports: "Recently I made myself a fume extractor using an old vacuum cleaner - a spherical 'Hovercraft' machine. I kept the felt dust filter and replaced the bag with an active charcoal filter intended for kitchen hoods. A cardboard cone taped to the suction pipe helps to take the fumes away from a suitable area.

"Briefly: (1) The charcoal may not be altogether suitable for solder fumes, but I can't smell what gets through. (2) The normal dust bag could be filled with active charcoal. (3) The machine is noisy, but is needed only intermittently. A foot-operated switch would be useful. (4) Instead of trying to absorb fumes, they could be vented through a window or under the floor boards, although this is not possible with my type of machine. Clearly, there could be many possible variants, based

TWO-TONE TESTING WITH OLD OSCILLOSCOPES

DEL ARTHUR, G0DLN, IS A FIRM believer in the value of two-tone testing for anyone involved in the construction of SSB transmitters and linear amplifiers. He considers such checks should always be carried out before equipment is put on the air. He writes: "Not only does such testing demonstrate the linearity but also enables an amateur to know the maximum PEP that can be run safely before flat-topping occurs. A mildly non-linear flat-topped signal may sound perfectly OK to a listener but could be resulting in RFI somewhere else. A bent cross-over curve may gain 'BBC quality' reports from the station you are working but try telling that to the unfortunate amateur using a nearby channel suffering severe interference from your splatter!

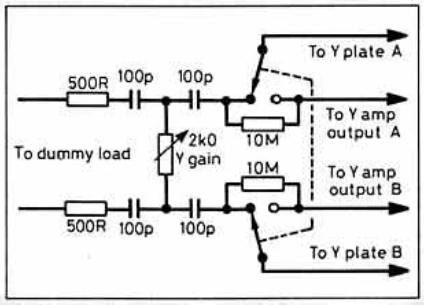


Fig 5: G0DLN's method of feeding RF directly to the Y-plates of an oscilloscope of restricted HF performance for two-tone testing at 14MHz and above.

"Thousands of amateurs have an oscilloscope available but a considerable proportion of these are ancient or have insufficient bandwidth to do a good job on HF. Although for two-tone testing, only a slow sweep rate is required from the time-base, the problem usually lies in the Y amplifier which was not designed to handle higher HF signals. My ancient Cossor single-beam oscilloscope will just struggle up to about 14MHz but is completely defeated on higher bands.

"With valve-type 'scopes, the problem is easily overcome by connecting the test signal directly to the Y plates, by-passing the Y amplifier. A simple RC network is required and the plates can be disconnected from the Y amplifier for two-tone testing with a double-pole change-over switch (unless this is done the signal will tend to disappear into the Y amplifier causing loss of amplitude on the screen). In **Fig 5** the two high value resistors keep the DC voltage from the Y amplifier on the plates so that the Y-shift control is still operational. Without this voltage it may prove difficult to focus properly. The 500Ω resistors preserve the SWR between rig and dummy load which would otherwise be disturbed due to the low reactance of the capacitors at HF when the gain control potentiometer is set low.

"All component values are nominal but the capacitors should not be of much higher value than shown or hum will appear on the trace. About 5% of the total test power will be dissipated in the network so components should be rated accordingly. A 'sniff' of RF is taken from the dummy load via a very small-value capacitor to the external synch terminal (or hard wire it to the appropriate point in the synch amplifier if you can find it).

"With the component values of Fig 62 I can obtain a usable amplitude of trace with as little as three watts into a 50Ω load; with the gain control set to low gain I can punch in 400W for short periods. Since modifying my old Cossor 'scope in this way, I now enjoy a clear, sharp display vastly better than was possible when using the original Y amplifier. But don't forget that even small 'scopes will bite your fingers if provoked. Take care."

on the type of machine and the particular circumstances."

MININEC - A DOUBLE-EDGED SWORD?

IN RECENT YEARS, there have been many *TT* items on the uses and abuses of computer-modelling of antenna impedances and radiation patterns derived from software based on simplified versions of the Numerical Electromagnetic Code (NEC), using the 'method of moments' developed in the late 1960s and later translated into software. Let me stress that there can be no doubt that NEC and the less powerful MININEC have given antenna designers probably the most important new tool developed in the past 20 years.

Yet, equally, there can, as G3SEK stressed in *TT*, July 1990, be great need for amateurs to be extremely careful in ensuring that, in using the NEC variants, they possess sufficient knowledge of antenna fundamentals and practice to avoid being seriously misled by their computers.

Dick Rollema, PA0SE, draws attention to 'MININEC - The Other Edge of the Sword' by Roy Lewallen, W7EL, (*QST*, February 1991, pp18-22) which is editorially sub-titled 'MININEC antenna-modelling software is powerful and popular. But you need to know about its limitations to use it effectively. Here's the lowdown.' This referred to one amateur whose computer told him that a 3.5MHz dipole erected 0.110ft above poor ground would give him a gain of 45dB!

As W7EL warns: "One of the edges (of the MININEC program) is its ability to help us answer questions about antennas; its other edge is its limitations which, should we fail to recognize and carefully avoid them, can lead us to conclusions that are embarrassingly and profoundly wrong."

As Ian White, G3SEK (the European agent for MN, the enhanced MININEC program written by Brian Beezley, K6STI), very fairly puts it: "I would like all antenna users to have a *realistic* appreciation of both the power and the limitations of antenna software. This field is developing very fast; yet whatever wonders the future may bring, the most important ingredient in successful mathematical modelling will always be the end-user's understanding of how *real* antennas behave!"

KISS 70W POWER AMPLIFIER USING VHF BIPOLAR TRANSISTORS

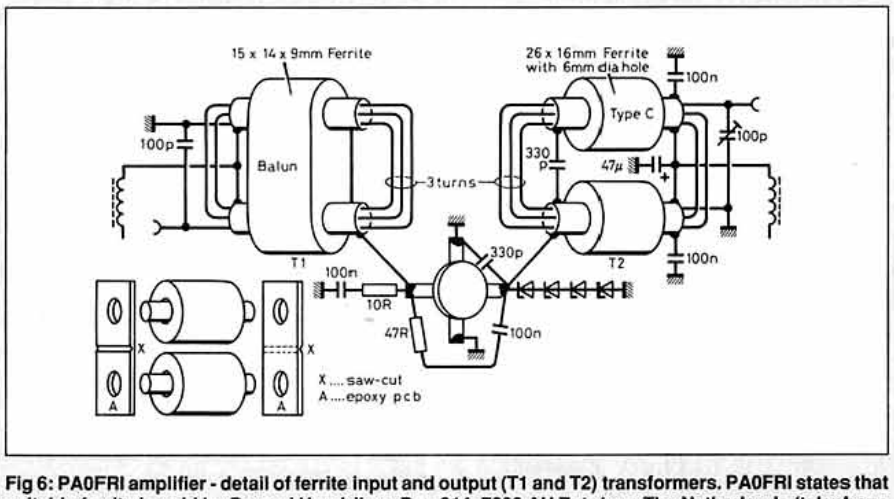


Fig 6: PA0FRI amplifier - detail of ferrite input and output (T1 and T2) transformers. PA0FRI states that suitable ferrite is sold by Barend Hendrikse, Box 314, 7200 AH Zutphen, The Netherlands (telephone Holland 05756-1066).

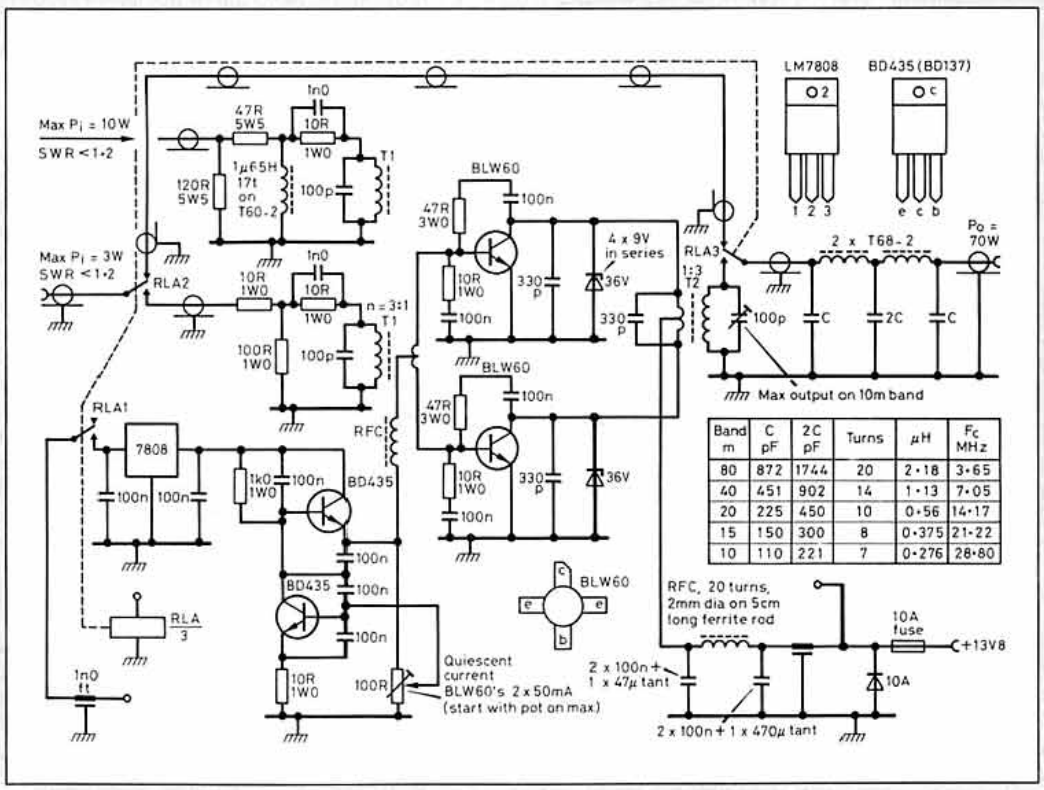
FRITS GEERLIGS, PA0FRI, has sent me annotated diagrams (**Figs 6 and 7**) of a KISS 70W HF power amplifier using two VHF bipolar power transistors (Mullard/Philips BLW60). He writes:

"It is possible to build this KISS amplifier successfully with the brief information shown on the diagrams. (I would not recommend this for constructors not experienced in sorting out the problems that can arise with high-gain bipolar transistor amplifiers - *G3VA*). Several Dutch amateurs are currently on the air with this design.

"No PCB need be made. Copper clad epoxy (CCE) is used upside down. The copper side forms the 'ground' and cut-out pieces of CCE are glued to the copper as stand-offs/soldering pads etc. The epoxy side is bolted to a heat sink.

"The amplifier performs well with a two-tone test and on-air reports are excellent when using an FT-7 as the driver. I expect the BLW transistors could be replaced by similar VHF-types with similar results."

The above notes plus the annotated diagrams represent the only information available to me. The gain at HF of a VHF bipolar transistor can be very high so that the amplifier must be perfectly stable. PA0FRI's address is: F H V Geerligs, Beverdam 89, 4874 KT Etten-Leur, The Netherlands.



Band m	C pF	2C pF	Turns	µH	Fc MHz
80	872	1744	20	2·18	3·65
40	451	902	14	1·13	7·05
20	225	450	10	0·56	14·17
15	150	300	8	0·375	21·22
10	110	221	7	0·276	28·80

Fig 7: PA0FRI's KISS 70-watt power amplifier using two BLW60 VHF bipolar transistors.

W7EL summarises his long *QST* article as follows: "All modelling tools, no matter how elaborate, powerful and expensive, have limitations. Absolutely none of these can be used sensibly unless you're constantly conscious of their limitations. MININEC is no exception. You must always be alert for answers that don't seem quite right. Are the impedance and gain values *reasonable*? If the antenna is symmetrical, is the pattern symmetrical about the axis you intended to specify? Do the currents change abruptly from one segment to another? Do the results seem too good to be true? *If so, they probably are!*

"We owe MININEC's authors a great debt of gratitude for the pioneering work they have done. They've put fast, accurate antenna analysis within the reach of thousands of amateurs. The programs they have created are very useful for analyzing a variety of antenna designs. Wielded properly, MININEC can be a powerful tool - a weapon against a decades-long void in knowledge about antenna design." His long and detailed article provides an excellent guide that should help MININEC users to avoid the other edge of the sword. But for the amateur-radio antenna erected among all the clutter and metalwork and unexpected resonances of the average urban or residential area, the proof of the pudding still depends on how the real antenna works out in practice.

NEW INDUCTION LIGHT BULBS AND THEIR RFI POTENTIAL

W A BOOTHMAN, G3SWP, and Bill Dykes, G1UKE, have each sent me an article by Tony Sachs, the first from *Electrical Review* (19 April/2 May), the other from the 31 May/13 June issue. Both articles relate to the future marketing in the UK of new, high-efficiency 'induction' or 'electrodeless' light bulbs, developed by Philips as the QL lamp, by GE-Thorn (unnamed) and by Sylvania (IWCF - Induction Wave Compact Fluorescent lamp). These lamps differ to some extent in construction and characteristics but all are energised not directly from 50/60Hz AC mains but from RF energy. They are expected to cost much more than conventional incandescent lamp bulbs (I have seen estimated prices up to about £15 each, at least initially) but they should have an active lifetime of over 60,000 hours (and more at reduced efficiency) and efficiencies (lumens/watt) up to about 65%, equivalent to that of a compact fluorescent tube.

The *New Scientist* suggests that the cost-effectiveness of such lamps (based on purchase price/energy consumption comparisons with conventional bulbs) only emerges when the light is used for thousands of hours per annum (continuous 24-hour use represents roughly 8000 hours/annum) seldom if ever required in a domestic situation. Nevertheless, it seems likely that they will be heavily promoted for both commercial and domestic use on account of their considerable energy-saving ('green') characteristics.

To understand why amateurs are already viewing their introduction over the next few years with some trepidation, it is necessary to appreciate that these lamps have no filament but are excited by induction at a radio frequency which in Europe may be 2.65MHz. The RF causes mercury vapour molecules to strike fluorescent powder on the inside of the bulb; **Fig 8** from one of the *Electrical Review* articles gives an idea of the construction of the Philips QL lamp. An external unit provides the RF power, presumably from a relatively crude form of transmitter-type generator.

To quote from the second ER article: "Another reason for the arrival of the commercial induction lamp is that agreement is close on operating frequencies. The international body which regulates RF allocations has already had one vote to approve RF lamp operation at 2.65MHz. A second vote is needed before this approval can be formalised, probably next year. US suppliers are (already) allowed to use higher frequencies but, says Philips, these are less efficient and will require tighter controls to stay within the allocated band.

"Peter Lees, Sylvania's European marketing manager for fluorescent lamps, believes that there will have to be world-wide standardisation of frequencies and emission levels to minimise radio frequency interference (RFI) before the induction lamp can really take off."

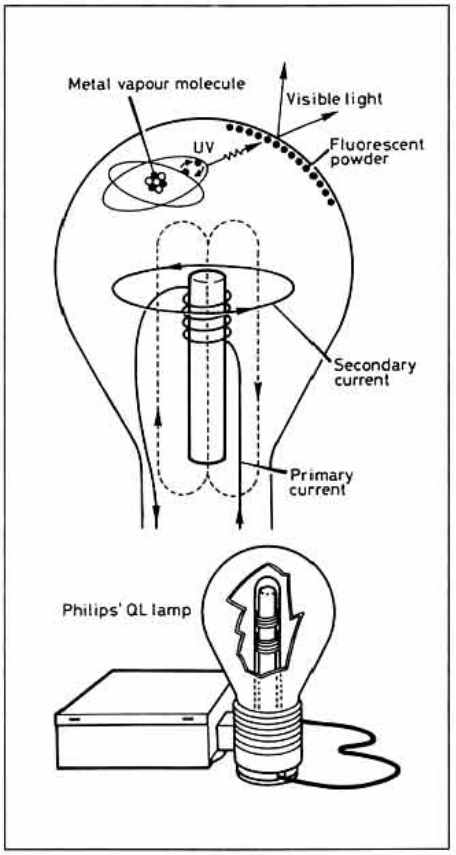


Fig 8: The new Philips QL induction lamp (filamentless) energised by RF. As depicted in *Electrical Review*.

The American frequencies appear to be the existing ISM bands around 6, 13 and 27MHz with 13.56MHz used for this application. One does not have to be a pessimistic soothsayer to recognise that widespread use of such lamps could significantly affect the reception of weak signals on HF and even VHF due to harmonics, spurii and drifting signals! As G3SWP comments: "Yet more QRM?".

VALVE DATA AND THE DAH50

FIRST, I WOULD LIKE TO acknowledge the safe receipt through Parcelforce of a Flintstones Freezers carton full of post-war Mullard, Brimar, GEC, RCA, Osram, Sylvania valve and valve-application data. There was no indication of the identity of the sender, only an illegible postmark. The parcel has significantly augmented my collection of valve information, thanks!

I can also report that the appeal for information on the interesting Philips DAH50 low-voltage valve with a space-charge grid (*TT*, May, p32) brought a most informative reply from Gerhard Stroessner, DJ2VN, who actually has one in his collection. Enclosed with his letter were articles from German war-time and post-war periodicals (these have been forwarded to Dr Tom Going), some specific to the DAH50, others dealing with space-charge-grid valves in general, including German military types RV2.4T3 and RV2.4P45).

The earliest of these, from the German DASD journal *CQ* (No 3/4. 1941) 'DAH50 - Eine neue Roehre fuer tragbare Geraete' (DAH50 - a new valve for portable radios), was of particular interest as I had previously not been aware that DASD (the pre-war German national amateur radio society) continued publishing its journal in wartime - although I frequently listened (with envy) to German wartime amateur activity (and band-edge beacons) on 3.5, 7, 14 and 28MHz, with German pre-war call prefixes D3 and D4. The *CQ* article had been photocopied by Rudi Staritz, DL3CS, who has written extensively on German Abwehr clandestine radio sets.

DJ2VN writes: "I obtained my DAH50 from a friend in 1942 when he was serving in an air force signals company stationed in Czechoslovakia. He bought the valve from a Prague radio store, although at the time I could not find this valve on sale in Germany. Shortly after the end of the war, about 1948, a local valve-dealer offered for sale a large number of DAH50 valves but quickly sold out. Having only the one DAH50 I have not been tempted to experiment with it. "To my knowledge, space-charge-valves were primarily used for applications other than radio communication or broadcast reception. In the military field, such valves were used in mine detectors and also in lightweight detectors for telephone-line reconnais-sance (military designation: 'Kleiner Drahtlauschempfaenger') as well as line-detecting devices. Small, lightweight audio-amplifiers together with a large searching coil were used to pinpoint buried telephone lines and power cables, with a strong AF test signal applied to the line.

"To date I have no knowledge of any application of space-charge-valves in radio communications or even in clandestine radio. Nor does there appear to have been any industrial use of the DAH50 with only constructional articles for portable receivers."

Apart from the *CQ* 1941 article introducing the DAH-50, an article in *Funkschau* (February 1942) covered valves and circuits for very low anode voltages; *Funk-Technik* (No 13, 1949) provided circuits for space-charge-valves, particularly the military types: *Funkschau*, January 1949 presented some thoughts about space-charge valves.

RADCOM CONSTRUCTION FEATURE

A Miniature 80 Metre SSB Transceiver

Concluding an article by Mike Grierson G3TSO

THE OUTPUT FROM THE power amplifier contains the required signal and considerable harmonic products. Before it can be connected to an antenna it must be adequately filtered. The low pass filter is fairly conventional using a 5-pole Chebychev design. Detailed calculations and tables are contained in the *ARRL Handbook* for anyone unfamiliar with them [see our *Bookcase* pages for price -Ed]. The filter uses Amidon toroidal cores and polystyrene 160V close tolerance capacitors. If the correct values are adhered to, there should be no alignment necessary. A small current transformer T6 using a 43-grade ferrite core is used to measure forward and reflected power for front panel metering.

The SWR bridge is balanced by adjusting C28 with a 50Ω dummy load connected to the output. The reflected power reading is adjusted for a null which should coincide with zero reflected power indicated on the meter. Numerous articles have appeared on the construction of SWR bridges and if in doubt refer to the *ARRL Handbook*.

CONSTRUCTION

THE COMPLETE TRANSCEIVER is constructed on a single PCB measuring 6.5 by 4in (**Figs 9 and 10**). The board is double sided with a continuous groundplane on the upper surface. The board can be mounted directly to suitable aluminium sideplates to which a front and rear panel are mounted.

The PA transistors are mounted on the rear panel which should be at least 16SWG aluminium. A small heatsink can be cut to fit directly over the transistors. The tuning capacitor is a three gang 15pF VHF tuner capacitor with all sections in parallel. These capacitors usually have a built in 4:1 drive, and the addition of a miniature 10:1 epicyclic drive available from Maplin produces a very neat 40:1 reduction unit. No screening is employed in the transceiver other than the double sided PCB and cans fitted over the bandpass filter coils and the RF choke L2.

TESTING AND ALIGNMENT

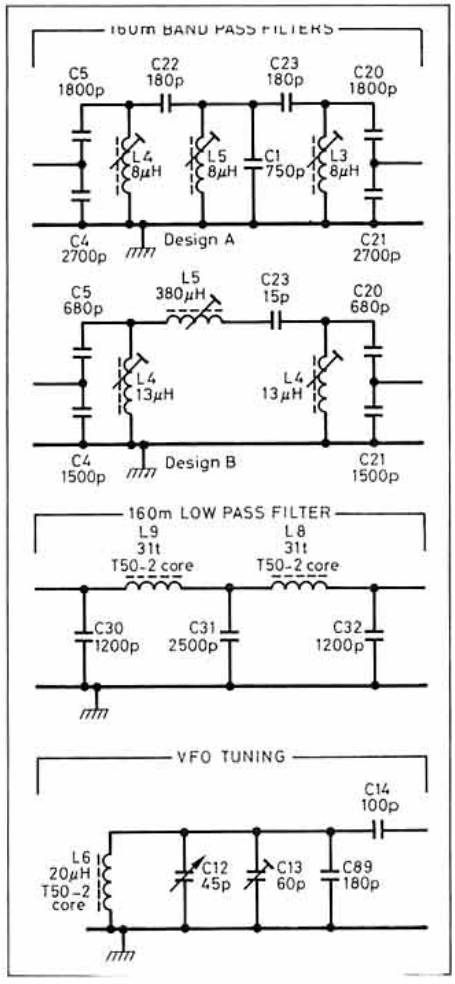
ALIGNMENT OF THE 'SIMPLE' transceiver is fairly easy and comprises the following operations:

a. **VFO Alignment.** The VFO will normally oscillate first time and it is just a matter of setting it to the correct frequency. This can be done with either a frequency meter or a receiver capable of finding the oscillator and covering the desired frequency range. Be careful if connecting any measuring device directly to the NE602 as it is very easy to damage the IC if DC appears on the wrong pins.

b. **Band Pass filter Alignment.** The bandpass filter is best aligned with a signal generator initially. It should be aligned in the centre of the band and then widened to produce a flat response across the band. Final alignment can be completed using the transmitter and adjusting for a constant output level across the band. Special attention should be made to the image signal on transmit and the bandpass filter should be adjusted to minimise the unwanted signal.

c. **Carrier Oscillator.** The CIO uses a ceramic resonator which will oscillate very close to 455kHz. Adjustment of either the parallel or series capacitance will allow the resonator to be pulled to the desired carrier frequency, ideally 453.5kHz, for LSB operation.

With the oscillators and the bandpass filter correctly aligned, the receiver can be tested. With only two controls, tune and AF gain, operation couldn't be simpler. An easy way to check the operation of the switching diodes is to measure the voltage across them, when they are ON the voltage across the diodes will be approximately 0.6V; when they are OFF it will be about 5V.



Once the receiver is working correctly, the transmitter alignment should also be complete. There is very little left to do other than to select transmit, talk into the microphone and observe RF come out. The gain of the SL610 can be adjusted using RV4, whilst RV5 and RV6 calibrate the power meter. Testing of the transmitter can best be accomplished using an audio oscillator to produce a constant signal source into the mic input. This can also aid antenna tuning.

No SWR protection has been included in the design, and care should be taken when adjusting the antenna. The output devices are very rugged, but it has been noted that under certain load conditions the PA can take off (oscillate). Adjustment of the antenna effects an immediate cure.

CONCLUSION

I HAVE OUTLINED THE operation of a simple 80 metre receiver and a simple companion transmitter. I have also shown how, with the addition of a diode switching system, the two may be turned into a single band transceiver. For QRP operation, the final PA stage which produces 10W PEP output from two inexpensive CB transistors may be omitted, leaving the driver stage as a QRP PA in its own right giving an output of 2W. The addition of an audio oscillator, keying circuit and active audio filter would permit CW operation.

Inspiration for the design must be credited to G4ENA who pioneered a miniature 160m mobile transceiver making me aware of the possibilities of the SL6700 device.

The performance from the receiver is very good indeed and is far superior to any of the direct conversion receivers that I have heard. The transmitter sounds excellent and attracts reports that would credit a more sophisticated design, the inexpensive ceramic filter producing an almost ideal audio response.

The use of purpose-made devices has its limitations and perhaps the least favourable aspect of the design is the AGC performance of the Rx. If the time constant is set to the optimum, the recovery time of the receiver under transceiver operation is too slow. Reducing the time constant speeds recovery time, but results in very fast AGC action with the 'S' meter resembling the output meter on a Tx. Nevertheless it is a minor penalty.

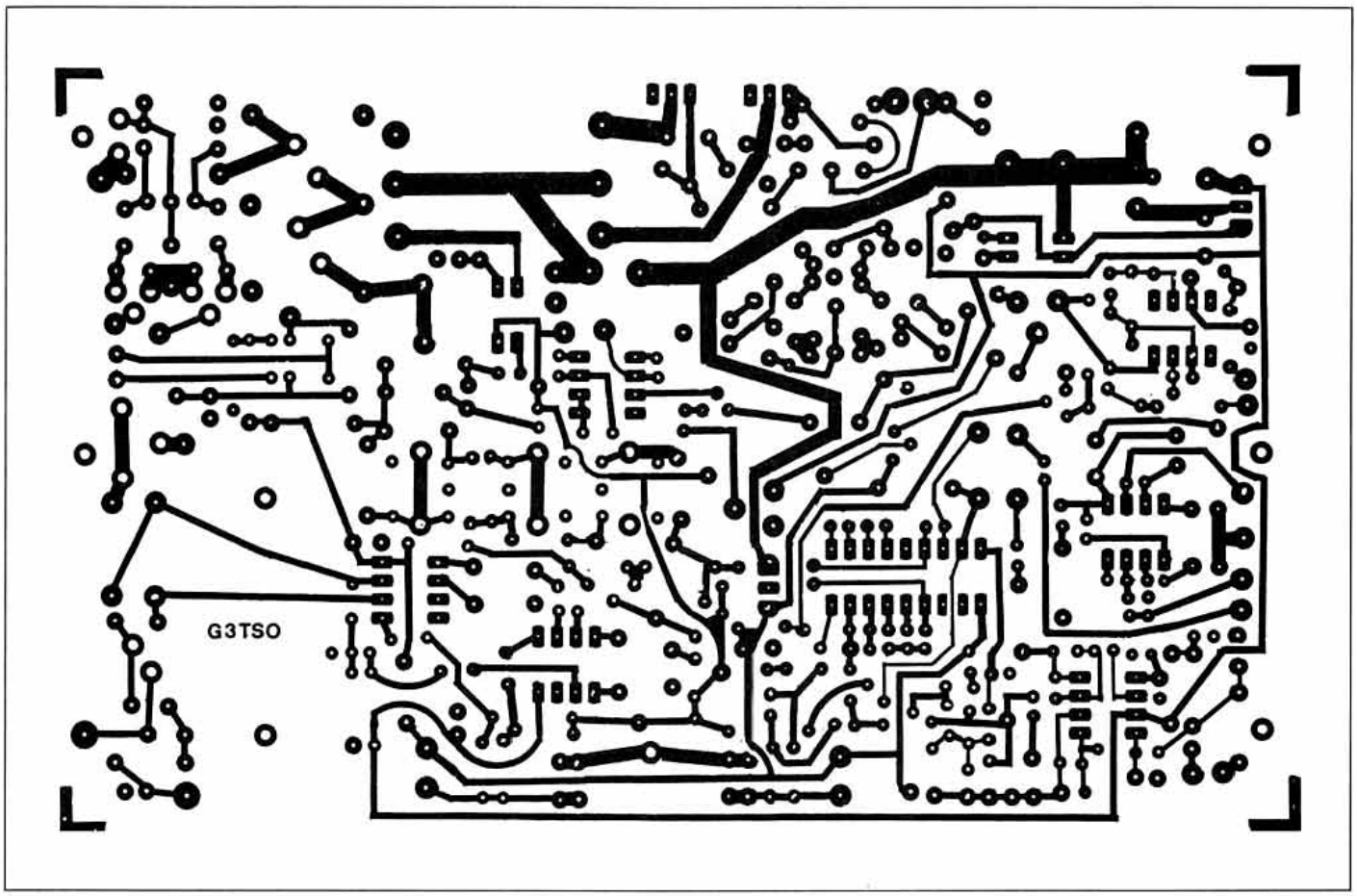


Fig 9: Track side of the printed circuit board (actual size). The other side is a continuous groundplane.

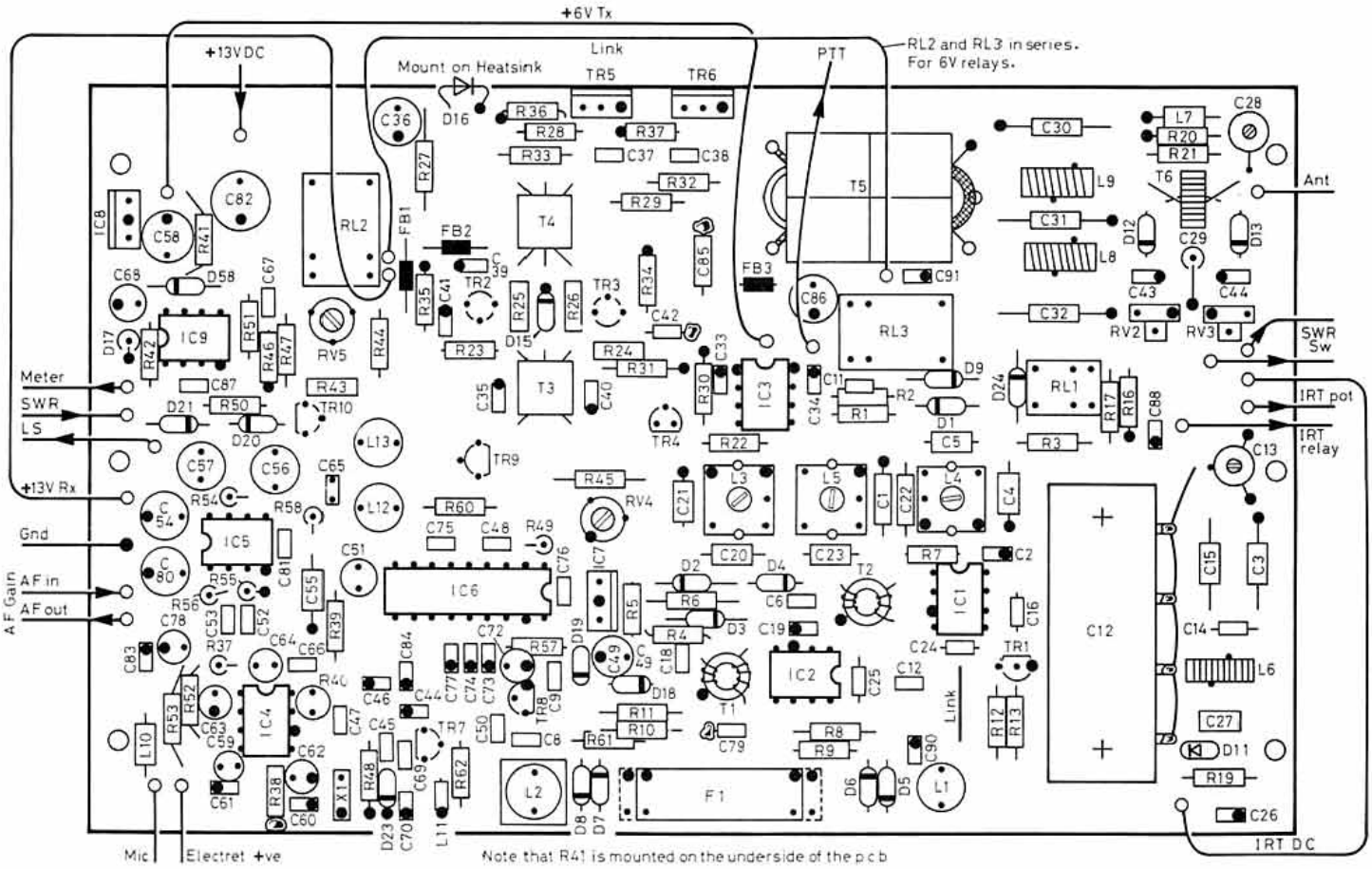


Fig 10: Component overlay (actual size) viewed from the groundplane side of the PCB.

COMPONENTS LIST

Item	Quantity	Reference	Part
1	1	SP1	SPEAKER 2" 8ohm
2	1	J1 Ant Skt	SO239
3	1	MIC SKT 4pin	
4	2	IC1,IC2	NE602
5	17	C2,C7,C8,C34,C35,C39,C40 C44,C50,C52,C65,C74,C77 C84,C85,C90,C91	100n Monolithic or disc ceramic
6	2	C30,C32	560p polystyrene
7	2	C4,C21	1000p polystyrene
8	9	D1,D2,D3,D4,D5,D6,D7,D8,D9	BA244 low cap diodes
9	7	R2,R1,R3,R4,R5,R6,R7	470 .25W
10	2	C5,C20	390p polystyrene
11	20	C6,C9,C10,C11,C18,C24, C25,C26,C33,C37,C38,C41 C42,C43,C44,C48,C66,C75,C79,C88	10n monolithic or disc ceramic
12	3	R8,R9,R10	22K .25W
13	4	L1,L2,L12,L13 Toko	10mH (187LY103)
14	1	R11	6K8 .25W
# 15	1	C12 (3 gang 15pF)	45p VHF Tuning Cap
16	4	C16,C17,C47,C87	100p Ceramic plate
17	2	R12,R57	560 .25W
18	7	C19,C53,C60,C61,C67,C73 C76disc ceramic	1n Monolithic or
19	3	L3,L4,L5 (KANK3334R)	5u5 TOKO
20	2	T1,T2 (Siemens Core)	1:7 2t:14t 26swg B6429037X830 ELECTROVALUE
21	1	RV1 "IRT" Tune	5K LIN Pot
22	2	R14,R15	2K7 .25W
23	3	R17,R16,R55	10K .25W
24	1	R18	1K .25W
25	3	R19,R13,R48	47K .25W
26	1	C27	8p2 Ceramic plate
27	1	D11 Varicap diode	BB109
28	1	L6 Amidon Core	35t 26swg T50-2 VFO Coil 38t 26swg T50-7
* 29	1	C13 Trimmer Cap 5mm	1.8 -6p
30	2	C23,C22	47p polystyrene
31	1	C1	270p polystyrene
32	2	Q1,Q7	2N3819
33	1	F1 MURATA CFJ455K 2.4KHz	FILTER (BONEX) Alt CFS455J 3KHz
34	1	RL1 SPDT	RELAY OUC
35	1	D10	IRT LED
36	8	D24,D14,D18,D19,D20,D21,D22,D23	1N914,1N4148
37	1	SW1a,b IRT ON/OFF	SW DPDT
38	1	SW2 SWR FWD/REV	SW SPDT
39	1	C28 Ceramic	Trimmer 12.5p 5mm
40	1	C29	220p Polystyrene
41	1	R20	1K8 .25W
42	2	L7,L11 axial RFC	1mH
43	2	D12,D13	OA47
44	1	C31	1200p polystyrene
45	1	IC3	SL610, SL1610
46	2	R22,R62	100R .25W
47	2	R32 R33	100R .5W
48	2	R23,R24	10R .25W
49	2	R25,R26	1K5 .25W
50	1	R27 Wire Wound	68R 3W
51	1	R21	68R .25W
52	2	R28,R29	1R8 .25W
53	3	C36,C57,C80	100uF 16V aluminium
54	2	RV2,RV3 Vertical Preset	22K
55	2	R30,R52	47R .25W
56	2	R31,R49	220R .25W
57	2	D15,D16	1N4001 to 1N4007
58	2	RV4,RV5 Preset pots	4K7
59	4	R39,R40,R45,R61	4K7 .25W
60	3	FB1,FB2,FB3	3t FX1115
61	1	Q4 Plastic 2N3866	ZTX327
62	2	R36,R37	22R .25W
63	1	T5 4 FAIRITE tubes	1:2 1/2t+1/2t:2t coax braid: hook up wire 26-4300006301
64	2	RL3,RL2 12V or (6V in series)	RELAY SPDT TRK1403 "JANDEK" or YX94C MAPLIN
65	1	T3 (26-43002402)balun	3:1 6t:2t 26swg
66	1	T4 (26-43002402)balun	2:1 2t+2t:1t+1t 26swg
67	2	Q2,Q3	BFY51
68	2	R35,R34	4R7 .25W
69	2	Q5,.Q6 PA Transistor	2SC1969 (or similar)
70	4	C86,C51,C72,C78	10uF 16V tantalum
71	2	L8,L9 Amidon T50-2	21t 22swg
72	1	T6 FT50-43 Ferrite	9t+9t Bifilar 26swg SWR Bridge 1t secondary 22swg
73	1	C45	15p ceramic plate
74	3	C46,C69,C70	470p ceramic plate
75	1	IC4 VOGAD	SL6270
76	4	R34,R43,R47,R60	2K2 .25W
77	1	R58	1R5 .25W
78	3	C59,C62,C64	2U2 16V Tantalum
79	1	R38	27K .25W
80	1	D17	9V1 Zenner
81	2	R41,R53	470R .25W
82	1	M1 "S-Meter" CIRKIT	200UA
83	1	C68	25uF 16V Tantalum
84	1	R42	8K2 .25W
85	1	R44	820R .25W
86	4	R46,R50,R51,R59	1M .25W
87	1	IC6	SL6700
88	2	IC7,IC8	LM7806
89	4	C63,C49,C54,C58	47uF 16V Tantalum
90	1	Q9	BC237
91	1	Q10	BC327
92	1	Q8	BC182
93	1	C55	220n Polyester
94	1	C56	220uF 16V Aluminium
95	1	IC5	TBA820M
96	2	C81,C83	220P ceramic disc
97	1	R54	56R .25W
* 98	1	C14	100P polystyrene or SM
99	1	R56	33R .25W
100	1	C82	470uF 16V Aluminium
101	1	L10 axial RFC	100uH
102	1	C71 nominally 60pF	S.O.T. ceramic plate
103	1	X1 Ceramic Resonator	455kHz
104	1	VR6 AF Gain On/Off	20K Pot + DPST switch
105	1	IC9	CA3130 8 pin dil
* 106	2	C89 (2 Caps in parallel)	68p Silver Mica
107	1	Toko 10mm screening can to fit over L2	
* 108	2	C3,C15,	560p Poly or S.M.

* Note 1: To minimise drift, C3, C14 and C15 can be changed from polystyrene to silver mica. C13 modified to 1.8 - 6pf Ceramic trimmer.

\# Note 2: C12 can be any 45pf variable. Jackson 804 series (ELECTROVALUE) 80450 (50pF) or (100pF) for 160m. Use 6:1 epycyclic plus MAPLIN 10:1 drive type HB42V gives 60:1 reduction and fits the space.

KITS AND PCBS

COMPONENT KITS including the PCB, but excluding the case, are available from G3TSO, QTHR at £100 inc P&P. PCBs individually £13 + £1 P&P.

JAB Kits, excluding the capacitor and case are £87, tel: 021 353 9326.

Badger Boards supply the PCBs at a price of £10 + VAT, tel: 021 353 9326.

HJ Morgan Smith can supply the case for approx £14 inc VAT & p&p, tel: 0494 532 421

NOTES

A SMALL ERROR HAS OCCURRED on the PCB layout in the vicinity of IC5 pin 3. C53 should go from pin 3 to ground. This can easily be arranged without having to modify the PCB. Locate C53 in the isolated pad below pin 2 and connect it under the PCB to pin 3. The other end of C53 can be soldered directly to the ground plane. (Issue 4 PCBs available from the author are modified).

The layout drawing shows interconnection of RL2 and RL3 in series, 2 x 6V units were used in the prototype. connect in parallel if 12V units are used.

C71 and C89 are located under the PCB.

If IC5 is unstable, raising the value of R56 (33Ω) to a maximum of 120Ω will reduce the gain.

Capacitors C3, C14 and C15 can be either polystyrene or Silver Mica, the latter have proved more stable with the toroidal VFO coil. A T50-7 core (White) available from Mainline Electronics is more thermally stable than the T50-2 (red) core.

A DXpedition on Our Doorstep

To celebrate Samuel Morse's anniverary, the RSGB obtained permission for several clubs to use the unique callsign M0RSE (see page 5, May *RadCom*). Tim Kirby, G4VXE, tells the story of one of them.

FOR MANY OF us, the chances to operate with a really rare callsign are few and far between. The 200th anniversary of the birth of the "father of communication", Samuel Morse, provided such an opportunity.

Like many others I was intrigued by a message, on the local packet DX Cluster, from the editor of the RSGB's *DX News Sheet*, Bren, G4DYO. It explained that M0RSE had being allocated to celebrate Morse's birthday and that anyone interested in using the call should contact him asap.

I quickly phoned Bren to check that it wasn't a late April fool trick and was told that the man to speak to was David Evans, G3OUF at RSGB HQ. This definitely sounds like fun, I thought, and left some messages for Derek, G3NKS, and John, G4PDQ, suggesting that we apply for the use of the callsign - they were enthusiastic and John agreed to contact David Evans.

By the next day, M0RSE had been allocated to us for 24 hours on 15 April. It was in the form of a variation to John's licence, so we would use his station. The licence stated that it would be "inappropriate" to use the call on SSB so it was to be a CW only operation. That suited us!

Over the next few days we planned our campaign. We decided to keep the callsign on the air for the full 24 hours. John and I booked the day off work. Derek was not so lucky, he could only join us for the afternoon/evening sessions.

New technology

IN RECENT months most of us have been bringing our contest/DXpedition techniques into the nineties using computers to ease the pain of logging and, in some cases, to assist with the sending of CW. We decided to try the computerised approach; the G3WGV LOG v3.00 program seemed like the best bet.

Using the LOG software and a simple interface it's possible to type the callsign into the computer which will then log the QSO whilst sending 'W1AW 599 BK', or whatever. Since all of us feel more confident using paddles and keyers than typing we planned to parallel up a keyer with the computer in case of emergency and to allow us to break out of the 'rubber-stamp' mould if required.

On the Sunday before the operation was due to start, the team met at John's to help prepare his station. Derek and I wondered what we had let ourselves into when each of us received a message on our packet mailboxes telling us to bring wellies! Surely John's shack can't be waterlogged ?

On arrival chez 'PDQ all became clear. Our mission was to install some new radials for the top band antennas - the last ones having suffered from 'gardeners spade'!

We had agreed that John and I would operate for the first 12 hours of the day, sleeping when we could and Derek would join us just after 1 o'clock.

Pile-ups

AT 0001 WE tuned the rig to 14.020MHz, turned the beam to the States and started to call CQ. Immediately we were answered and as the pile-up gained momentum it was necessary to operate split frequency to stand any chance of keeping a sensible QSO rate going. We operated in 2-hour stints with some fantastic pile-ups on 14MHz in the small hours.

The day before, we had compiled a band schedule in an attempt to cover all the bands between 1.8 and 28MHz at appropriate times. We published the schedule on the DX Cluster so that UK stations would know when to catch us. WB3AVN publicised our operation on the US Cluster network. We tried to emphasize that the schedule was a guide only and that we would vary it depending on conditions. Nevertheless we received complaints that we had not been on 80m when we said we would be - I had had to QSY 10 minutes early due to poor activity.

PHOTOGRAPH: G3XKD

One of the M0RSE stations which celebrated the 200th anniverary of Samuel Morse: Tim Kirby, G4VXE (right) and John Clayton, G4PDQ.

Pirate?

JUST AFTER 1300 Derek appeared and seemed pleased with our progress. Despite a couple of slow hours we had already made 700 QSOs. Derek set to on 28MHz and got a good pile-up going. Many people asked what country we were in; most people wanted to know 'QSL VIA?'and one person enquired 'PSE UR OBLAST?' Some people obviously thought that we were a pirate operation judging by some of the comments and mysterious calls we received. I was most amused to read the headline in the following week's GB2RS news script, "Special event station M0RSE is not a pirate . . . .".

It was pleasant to be able to announce where we were operating on the DXCluster and contact many of the cluster users on each band. It was also enjoyable to tempt some very well known phone-only operators onto CW to work the call.

By early evening we had some fierce pileups going again - the computer screen often showing 160 to 200 QSOs/hr. We also decided to activate the call on 144MHz CW. Here the QSO rate was less intensive - we managed to work 3 stations in an hour.

Just after 2300, Derek and I decided it was time to return home - in my case so that I could try and work M0RSE on a few bands before it was time to close down.

The final QSO total was 1675 - very pleasing indeed. We certainly enjoyed being at the sharp-end of the pile-up for once. This was perhaps the closest that any of us had come to activating a really rare callsign on the bands and all without taking out a second mortgage! It seemed a suitable celebration of Samuel Morse and of the mode of communication that he pioneered. We hope he would have approved!

Thanks go to the RSGB, and David Evans in particular, for arranging for the callsign to be available. Thanks also to John and Pauline for making us feel so welcome over the 24 hours or so that we took over their house.

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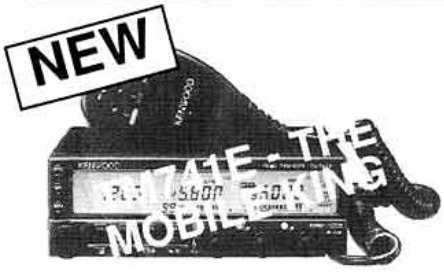

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IDEAS FROM ABROAD

Eurotek

TRANSLATED AND EDITED BY ERWIN DAVID, G4LQI

VHF NOISE BRIDGES built by **William Oorschot, PA0WFO**, are based on an HF admittance bridge researched, designed and built by **Dick Rollema, PA0SE**. These were described in his column in '*Electron*' (NL) of March and July 1988. PA0WFO recently provided an update.

HF ANTENNA BRIDGES capable of measuring complex impedances, such as those from General Radio Inc(**Fig 1**), have been around for many years, but they are too expensive for amateurs. R T Hart, W5QJR, changed that with his publication 'The Antenna Noise Bridge' (*QST* 12/67). He showed that the station receiver makes an excellent frequency-selective null indicator if the input to the bridge is wide-band noise, eg from a zener diode with an amplifier.

Noise generators comprising a zener diode and three-transistor amplifier are now almost standard; one is shown on the left in **Fig 2**.

Bridges for complex impedances (R *and* L or C) come in two basic types: *series* bridges, which yield readings in the familiar R±jX form, and *parallel* or *admittance* bridges, expressing the complex impedance as R in parallell with ±jX. (user-friendly computer programs help to convert between series and parallel expressions - G4LQI). For a wide frequency range, eg 1.8 - 30MHz, a series bridge would accurately cover a wider reactance range on the lower bands, as a parallel bridge would towards 30MHz. For that reason, the professional use a series *and* a parallel bridge. If one wants to stretch into VHF, the parallel bridge is preferred and shown at the right side of Fig 2.

R1 - R2, the fixed arms of this bridge, dissipate most of the noise power applied to the bridge, especially when low impedances are being measured; the loose coupling in T1 further reduces the bridge output. The alternative is a transformer of which the centre-tapped secondary replaces R1 - R2, but several authors report that the best transformers they could make caused symmetry errors on the higher frequencies; I decided to stick with R1 - R2, as described by G3MYT in *RadCom* 1/78. With the noise generator shown and a modern receiver, sensitivity proved adequate. In fact, a receiver input attenuator is required to avoid masking of the null by intermodulation products.

COMPONENTS AND CONSTRUCTION

THE NOISE OUTPUT of zener diodes, even of the same type, varies widely. It pays to select, at the highest frequency to be used, from a goodly number having zener voltages between, say, 2.5 and 6.5V. The reverse break-down of the base-emitter junction of many transistors falls within that range; these are suitable. The amplifier transistors must have good gain at the highest frequency used, eg 2N2222 for HF, BFY90 for VHF and as a zener. Wiring should follow VHF practice. The noise generator must be well shielded to prevent its output reaching the receiver other than through the bridge.

R1 - R2 are matched ¼W composition. C1 is silver mica. T1 is non-critical; it has a small core (eg Amidon FT37-67 - G4LQI) with thin wire; the primary is close-wound on one side of the core and the secondary on the opposite side to minimize capacity accross it; the secondary leads are soldered directly to the Rx connector. C2 is an air variable; its max-min capacity ratio should be as great as possible; semi-circular plates with the shaft through their centre make for an easy-to-mark capacity-linear scale. R3 is a best-quality linear carbon type, preferably without metal housing to minimize capacity; for VHF, PA0WFO suggests a ceramic-substrate preset type if you can attach a shaft to it.

Bridge wiring should be symmetrical, short and thick to reduce self-inductance, especially the connections C1 - R3, C2 - Zx, and from these parts to 'common' (part of the PCB-material shield box).

CALIBRATION

THE DIAL OF R3 is calibrated in ohms with a digital multimeter connected to the Zx socket; make calibration marks at 10Ω intervals. To calibrate C2, terminate Zx with a 100Ω ¼W carbon resistor in a coax plug, connect an AM or SSB receiver tuned near the LF end of the desired range and adjust R3 and C2 for a null. If all is well, R3 now reads 100Ω. The C2 position found, which ought to occur near mid-scale, is marked 0pF.

Tune the receiver to the top end of the frequency range and check that the null occurs at the same C2 setting. If not, move the T1 connections along the resistor leads at B and/or C until the null is restored to the 0pF position previously found.

To mark the rest of the C2 dial, disconnect the R2 - T1 lead from C2 and connect a capacity meter to the Zx socket. Mark the C2 dial every 10pF up and down from 0pF; reconnect the R2 - T1 lead.

INTERPRETING THE READINGS

IF AT FREQUENCY f_o, with an unknown impedance connected as Zx, the bridge balances with R3=70Ω and C2 at the 0 mark, Zx=70Ω purely resistive; if balancing at R3=70Ω and C2 20pF below the 0 mark, Zx=70Ω in parallel with 20pF; if balancing at R3=70Ω and C2 20pF above 0, Zx=70Ω in parallel with an inductance which has, at f_o, a reactance equal (but of opposite sign) to 20pF.

MAKING IT WORK ON VHF

TO GET THE PA0SE HF bridge to work on 50MHz, PA0WFO had to capacity-compensate R1 - R2 as was shown in the R-only bridge in the *RSGB VHF/UHF Manual*, 4th ed., p11.19.

With 2pF in parallel with R1, a 1-6pF trimmer in parallel with R2 could be adjusted to make the calibration of C2 hold beyond 70MHz. He also built a bridge with a physically much smaller C2 of 50pF max, a 40pF max trimmer adjusted to 25pF for C1 and fewer turns on T1. It worked well to over 200MHz!

Fig 1: Commercial antenna bridge by General Radio.

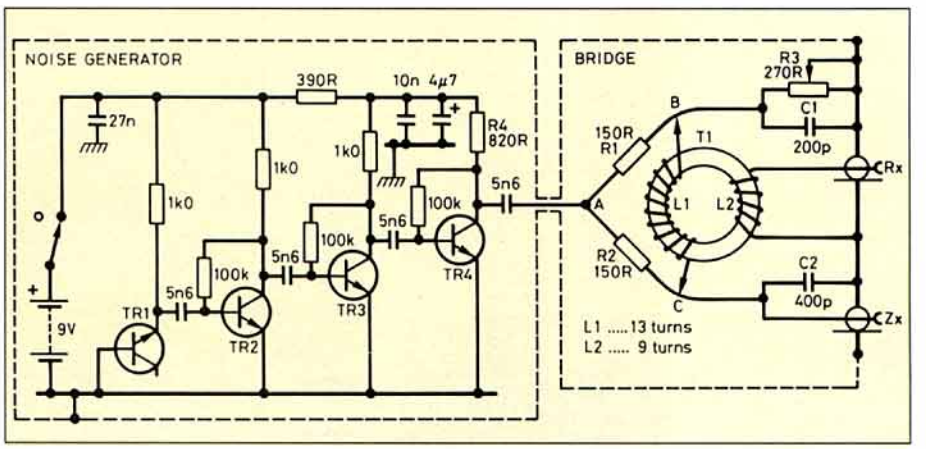

Fig 2: PA0SE's HF noise bridge; capacity compensation of R1 - R2 made it work on VHF

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RADCOM CONSTRUCTION FEATURE

First Steps in Home Construction

Part 4 of a series of articles by John Case, GW4HWR

REMOVE THE OUTER covering from 50mm of the mains lead. A very light cut with a modelling knife around the outer is helpful but it must not cut through to the inner conductor insulation. Bending the cable at the cut will usually break the outer insulation and allow it to be removed. Inspect the three inner leads, if there are any nicks in the insulation at the point where the leads emerge from the outer, cut them off and start again. **A damaged inner must not be used.**

Reduce the length of the green/yellow lead to 30mm and then strip off 10mm of insulation from each of the three leads. Solder the bare ends, cut to about 5mm and again inspect to make sure there is no damage or stray strands of wire. Pass the wire of the green/yellow lead through the eye of one of the earth tags and solder. An excellent joint is imperative as it is this connection that earths the core of the transformer, and together with the double bobbins for primary and secondary, provides mains isolation. Next, connect the brown inner (live or 'line') to the left-hand lower tag of the switch, as viewed from the back of the panel, and the blue (neutral) to the right-hand lower tag.

Two pieces of mains grade PVC wire connect the output of the switch to the primary of the transformer as follows. Cut off 10 in from the other end of the mains cable, strip off the outer covering and remove 10mm of insulation from each lead. Solder (tin) and reduce to 5mm. Pass the wire of the green/yellow lead through the eye of the other earth tag and solder. The other end of this lead is to be connected to the Green terminal on the panel, so adjust the lead length so that it will lie in the bottom corner of the angle between the front panel and the base. Cut and solder.

Solder the brown lead to the top left-hand tag of the mains switch and the blue to the top right-hand tag. Twist the leads together, then arrange them along the bottom left-hand side of the box so that they will lie between the heatsink and the box side (see Fig 4 published last month). Adjust the length of the leads so that they comfortably reach the transformer primary terminals at the top of the bobbin. Again, strip off 10mm, tin and reduce to 5mm. Solder to the primary tags. Now examine all of the above connections very critically. There must be no stray ends of conductor, each joint should be covered in solder and the surface should be shiny. Once more, check for any cuts in the insulation of the leads. **At this stage, get your work checked by a competent engineer or home constructor.**

PART 4: CONNECTING UP THE TRANSFORMER

This part involves the mains input connection and must be carried out very carefully. Get help if you are not familiar with making mains connections. In any case, follow these instructions precisely and get someone experienced to check your work before connecting to the mains.

When the work is given the 'all clear', wire up the secondary of the transformer as follows. Connect one side of the secondary (bottom tags) to the fuse carrier. The other side of the fuse carrier to one of the bridge rectifier tags marked ~. Connect the remaining transformer secondary tag to the other rectifier tag marked ~. Do not use wires coloured Red, Brown, Blue, Black or Green for the above connections. It is good practice to twist the leads from the transformer to the bridge rectifier.

Next, use red wire to connect the '+' terminal of the rectifier to the positive of the reservoir capacitor (C1) and black wire to connect the '-' terminal of the rectifier to the negative of C1.

Finally, pass the free end of the mains lead through the hole in the back panel, fold the cord grip grommet around the cable where it emerges from the box, so that the thinner end of the grommet is towards the box. Grip the grommet tightly with a pair of long-nosed pliers and press it into the hole. It is a bit fiddly but it is most important to prevent any strain being placed on the mains connections to the switch. Ensure that the mains cable lies along the bottom left-hand side of the base so as to avoid the heatsink.

COLOUR CODING OF COMPONENTS

0 - Black	5 - Green
1 - Brown	6 - Blue
2 - Red	7 - Violet
3 - Orange	8 - Grey
4 - Yellow	9 - White

Table 1.

TESTING

FIT A 2-AMP SURGE-TYPE FUSE in the fuse carrier. These can be identified by a small spring inside the glass envelope. An ordinary 2A fuse (quick blow) will not do because it will be blown by a combination of the reservoir capacitor charging current and the load current at switch-on; not every time but sooner or later! Connect a 13A plug and fit a 1A mains fuse in the plug.

To test, connect a DC voltmeter across the reservoir capacitor, put the ON/OFF switch to the ON position and switch on at the mains socket. The meter should read 26-27V. **Do not touch the box, the circuit or the meter until after switching off.**

If no voltage is indicated, switch-off the mains and re-check all connections, especially those to the bridge rectifier. Also, check the continuity of both fuses.

This completes the first stage of construction. Next month's article will deal with the voltage control circuitry but first it is worth looking at the components involved.

RESISTORS

RESISTORS R1 - R6 ARE QUARTER-WATT carbon film type. These are probably the most common type in general use. They are about 2mm in diameter and 8mm long. When the wires are bent close to the body, the resistor will fit into the 10mm spaced holes in the PCB. This spacing is used for all resistors except R8. The resistance value is indicated by colour coded bands. A little trouble taken in learning this code will save a great deal of time in later projects.

The numerical value allocated to each colour is invariable and is shown in **Table 1**.

The colours are used on a number of different types of components to indicate either values or type numbers. For resistors, three, four or five bands on a neutral background are almost always used (**Fig 8**). When 3 or 4 bands are used there should be a bigger gap between the bands and one of the wire ends. With this gap to the right, the bands are read from left to right. The first and second bands give the first and second digits of the resistor value. The third band (called the multiplier), can best be thought of as indicating the number of zeros after the second digit.

For example, first band - brown = 1; second band - black = 0; third band - green = 5.

continued on page 43

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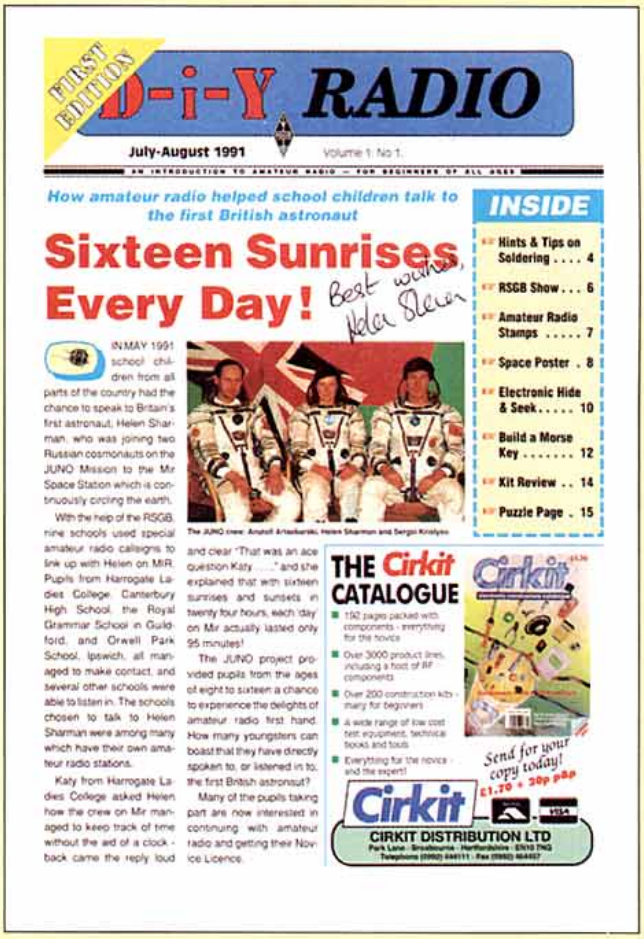
FIRST EDITION

D-i-Y RADIO

July-August 1991 Volume 1 No 1

AN INTRODUCTION TO AMATEUR RADIO — FOR BEGINNERS OF ALL AGES

How amateur radio helped school children talk to the first British astronaut

Sixteen Sunrises Every Day!

Best wishes Helen Sharman

IN MAY 1991 school children from all parts of the country had the chance to speak to Britain's first astronaut, Helen Sharman, who was joining two Russian cosmonauts on the JUNO Mission to the Mir Space Station which is continuously circling the earth.

With the help of the RSGB, nine schools used special amateur radio callsigns to link up with Helen on MIR. Pupils from Harrogate Ladies College, Canterbury High School, the Royal Grammar School in Guildford, and Orwell Park School, Ipswich, all managed to make contact, and several other schools were able to listen in. The schools chosen to talk to Helen Sharman were among many which have their own amateur radio stations.

Katy from Harrogate Ladies College asked Helen how the crew on Mir managed to keep track of time without the aid of a clock - back came the reply loud and clear 'That was an ace question Katy ....' and she explained that with sixteen sunrises and sunsets in twenty four hours, each 'day' on Mir actually lasted only 95 minutes!

The JUNO project provided pupils from the ages of eight to sixteen a chance to experience the delights of amateur radio first hand. How many youngsters can boast that they have directly spoken to, or listened in to, the first British astronaut?

Many of the pupils taking part are now interested in continuing with amateur radio and getting their Novice Licence.

The JUNO crew: Anatoli Artsebarski, Helen Sharman and Sergei Krikalev

INSIDE

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First Steps in Home Construction

continued from page 41

Therefore, the value is 1000000W or 1MW. Watch out for brown, green, black which is 1, 5 and no zeros = 15W. If two resistors, coded as above, are mixed with others, it is very easy, especially for those constructors who are familiar with the code, to mistake one for the other, usually with catastrophic results in the circuit.

The third band may also be either gold or silver. This indicates that the value is less than 10Ω. If it is gold; divide the figures given on the first and second bands by 10, and if it is silver, divide by 100. For example, green, blue, gold works out as 56 divided by 10 = 5.6Ω, and green, blue, silver is 56 divided by 100 = 0.56Ω.

The fourth band is usually either silver or gold and indicates the tolerance or the amount that the actual value of the resistor *may* differ from the marked value. Silver = 10% and gold = 5%. Sometimes red (2%) or brown (1%) may be used. A resistor with four bands, yellow, violet, orange and silver would have a value of 47,000Ω and a tolerance of 10%, which means that the value could be up to 4,700Ω more or less than the 47K indicated. In many cases this doesn't matter, but when it is important the tolerance is usually specified in the component list.

If there is a fifth band, it will be either black or pink. It indicates a first quality, high stability component. With five bands, the bigger gap at one end, mentioned earlier, may not be apparent, but as the value cannot commence with black - 0 or pink - no value, these bands must be on the right when reading the code. Practice reading the colours until it becomes just like reading the value in words.

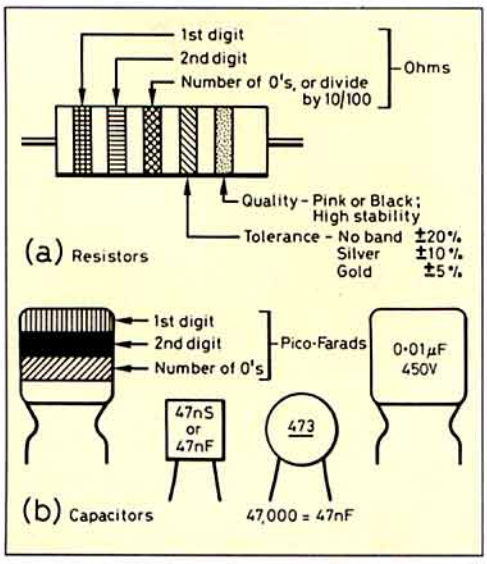


Fig 8: Resistor and capacitor colour coding

TESTING

IT IS GOOD PRACTICE, whenever possible, to test components before they are incorporated into a circuit. Resistors are easy. Take each of the eight resistors of the project, decode each value in turn, then measure the value using the Ohms range of the test meter. Note that the resistance scale of most meters is reversed when compared to the other ranges, ie 0Ω is on the right of the scale.

It is not common, but not impossible, that the wrong colours have been printed on the resistor. Quite often the wrong values have been supplied! Sometimes it is difficult to distinguish between some colours; brown and orange are often confused. Testing will sort out all of these problems and will also avoid the possibility of incorrectly reading the code, eg 15Ω for 1.0MΩ.

CHOOSING A TEST-METER

THERE ARE MANY MULTI-RANGE meters to choose from and the following notes should help in making that choice. A beginner's instrument should be of the analogue (needle) rather than digital type. Although digital meters are much more accurate than the others, there are a number of serious disadvantages unless a very expensive one is available.

They are rather slow to settle to a steady reading and consequently are unable to follow voltages that are varying at a moderately slow rate. For instance, a square wave voltage at 2Hz will appear as a steady rise and fall in voltage on an analogue meter but a digital meter will display a meaningless sequence of figures.

Prices range from £6.00 to well over £100 so the first factor determining choice could well be one of 'cash flow'. Most instruments will offer a variety of ranges including: DC Volts, AC Volts, DC Current and Resistance. Only the higher priced ones are likely to have AC Current, but the need to measure this is rather rare. The important factor to look for is the sensitivity. This is normally quoted in Ohms per Volt. A low-priced meter will probably have a sensitivity of 2000 Ohms/V which is rather low by today's standards. The disadvantage being that when voltage is being measured, a relatively high current is drawn and, if the circuit under test has high resistance, the voltage drop will cause a false reading to be displayed. A meter having a sensitivity of at least 20,000Ω/V is recommended and a lower figure of about £15.00 can be expected.

Cirkit list a number of low-priced instruments in their catalogue (see their advertisement elsewhere in *RadCom*), and examination of the specifications of various types is recommended to enable comparisons to be made. One model, the HM-102BZ, has some very useful ranges, a sensitivity of 20,000Ω/V and retails at about £15.00 including VAT. In my opinion, the only disadvantage of this model is that the maximum DC current that can be measured is 500mA. This is fairly general with meters at this price.

The next in the range, HC-2020S, has DC current up to 10A and resistance up to 20MΩ. It also incorporates a transistor quality tester and continuity tester and retails at around £20.00.

Some form of meter is a 'must' and even the lowest priced ones can be invaluable provided that the limitations are appreciated. Also, it is important to remember that the cheaper instruments are unlikely to have any overload protection and will be ruined by misuse such as applying voltage when the meter is switched to measure current.

CAPACITORS

THESE ARE TESTED for short circuits or leaks, but some indication of capacitance is normally obtained for values over 1nF. Use the highest resistance range and watch the pointer as connection to the capacitor is made. The needle should flick towards the zero end of the scale (the amount of movement being proportional to the capacity) and then fall back to infinity, (the extreme left-hand side) indicating that there is capacity and no leak. If electrolytic or tantalum types are tested the meter must be connected so that the capacitors are correctly polarised.

It is important to realise that when an analogue meter is switched to measure resistance, the polarity of the voltage between the terminals is opposite to the marking of those terminals, ie the positive terminal (normally coloured red) is actually connected to the negative terminal of the built-in battery. Therefore, the negative lead of the meter must be connected to the positive terminal of the capacitor under test.

Because of the higher capacity, the needle will flick almost to the 0Ω position and fall back rather slowly. It may not reach the left-hand end of the scale as there is always some leakage with electrolytic capacitors but a value in excess of 500K is usually acceptable.

Capacitor values are marked in a variety of ways (**Fig 8**). Remember that: 1,000,000 pico-farads (pF) = 1 micro-farad (µF) and 1,000pF = 1 nano-farad (nF). Therefore, 1,000nF = 1µF. The value may be marked directly in pF, nF or µF or it may be in code. Two methods are commonly in use:-

a) Colour code, horizontal stripes which are read from top to bottom in the same way as resistors, giving the value in pF. Note that if adjacent bands have the same colour, a band of double width will result, eg, 330nF = 330,000pF would be orange, orange, yellow, but in actual fact will have a wide orange band with a thin yellow one below.
b) A three-digit number, the first two giving the first two digits of the value and the third, the number of zeros, eg, 103 indicates a value of 10,000pF, or 473 = 47,000pF = 4.7nF.

. . . to be continued

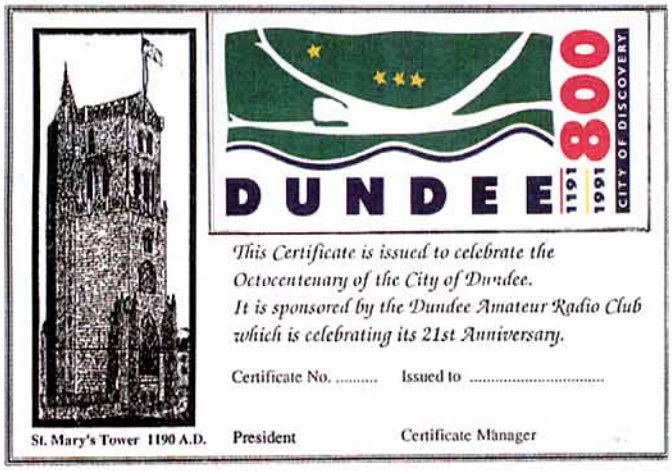
Next month: some advice on diodes and transistors, and putting the Power Supply components on the PCB.

In addition to the awards sponsored by the RSGB, many UK clubs and organisations produce attractive certificates which are awarded to those contacting club members or club HQ stations. Here are brief details of just some of them.

Parchment Farm

THE BANGOR and District Amateur Radio Society has re-designed and re-launched the **Northern Ireland Amateur Award (WAGI)** which is based on working stations in each of the six counties - Antrim, Londonderry, Tyrone, Armagh, Down and Fermanagh. Belfast is split between Antrim and Down. Full details can be obtained from: GI4BBV, 11 Drumawhey Rd, Newtownards, Co Down, Northern Ireland, BT23 3RS.

THE **NATIONAL Trust for Scotland Diamond Jubilee Award** is issued by the Scottish Tourist Board (Radio Amateur) Expedition Group for contact GB60NTS and four other stations operating from National trust properties during 1991. Twelve National Trust stations will be on the air 31 Aug / 1 Sep 1991. More information on this and other awards from the STB(RA)EG c/o GM3MTH, QTHR, enclosing $1 or two second class stamps.



THE HASTINGS Electronics and Radio Club have a **1066 Award** for contacts with club members. On HF, European stations need eight points and the rest of the world need six; on VHF/UHF those within 1000km of Hastings need eight points and those further away need six.

Each club member worked counts one point, club calls G6HH and G1HHH count two as do special event stations sponsored by HERC.

The award is available to SWLs as well. Claims, accompanied by $3, £1.50 or 8 IRCs should go to Mrs Gail Stevens, G0GRK, 33 Langham Rd, Hastings, TN34 2JE.

THE 800th ANNIVERSARY of the granting of the Royal Charter to the City of Dundee is commemmorated by an award sponsored by the Dundee ARC. The **Dundee 800 Certificate** involves contacts with club members and details can be obtained from W S Hall, GM2AOL, 21 Seabourne Gardens, Monifieth Road, Broughty Ferry, Dundee, DD5 2RT.

COLCHESTER RADIO Amateurs are running the **Camulodunum Award** from June to August 1991. Details can be obtained by sending a SASE to G4TZM, 37 Remercie Rd, Mistley, Essex, CO11 1NF.

THE **G/PX AWARD** for contacting different G prefixes, is run by the Sutton Coldfield RS. Details: G4WQW, QTHR.

THE **SHERWOOD FOREST Award**, for contacts with club members and amateurs in Nottinghamshire, is run by the Mansfield ARS. A club activity period is from 5 to 7 April. Details G W Lowe, G0NRA, 25 Manor House Court, Kirkby in Ashfield, Nottinghamshire, NG17 8LH.

THE **AVONCROFT AWARD** is sponsored by the Bromsgrove and Dist ARC with the Avoncroft Museum of Buildings in Worcester. Points are gained by working club members and other amateurs in Worcestershire. Details from John Harvey, G4IVJ, QTHR.

DETAILS OF THE **Royal Naval Amateur Radio Society London (HMS Belfast) Group Award** are available from Owen Selby, G0MEH, 82 Gaynesford, Basildon, Essex, SS16 5SG. The Group also mention their VHF net on Mondays on 145.350MHz.

WORKED ALL BRITAIN is an award with a difference - it raises money for amateur radio related charities. Last year, £5000 was presented to the Guide Dogs for the Blind Association who agreed to use the five dogs purchased for radio hobbyists.

The WAB group was founded in 1969 by the late John Morris, G3ABG, to further greater amateur radio interest in Britain. The award scheme is based on the geographical and administrative division of Great Britain and Northern Ireland. Full details and checklists of all the areas and counties for all the WAB awards are contained in the *WAB book*.

Further details of the book and awards are available from: Brian Morris, G4KSQ, 22 Burdell Avenue, Sandhills Estate, Headington, Oxford OX3 8ED.

The Amateur Radio Awards Book **(3rd edition), published by the RSGB, is priced at £9.25 for members.**

Full details of RSGB awards can be found in the *RSGB Call Book* available to members at £6.95.

See *Bookcase* pages for details.

PHOTOGRAPH: G4TZH

Eastbourne District Scout Amateur Radio Group Secretary Geoff (G4YJW) and Janice, a member of the Radio Scouting Fellowship 'tied the knot' last Easter, supported by members of the EDSARG. With initials of 'G' and 'J' there could be only one place for the honeymoon and there was a warm welcome at the Jersey Amateur Radio Society. Pictured are (l to r): Chris (G7INJ); Steve (G8NFZ); the Best Man, Tony (G3ZQB); Bride's son, Andrew (RS93564); Bob (G8TUU); Groom, Geoff (G4YJW); Jonathon (G6TDW), Bride, Janice (G4JZC); Pat (G8TNH); Dave (G7FCV); Dick (G4KAR); and Bride's son, Graham (RS93563).

RADCOM EQUIPMENT REVIEW

G4ZPY Keys Reviewed

THE G4ZPY STRAIGHT KEY KIT

by Tony Smith, G4FAI

By coincidence, two mini-reviews of ZPY keys dropped on the *RadCom* editorial desk recently from quite different highly respected sources. G4FAI is a past-chairman of the European CW Association and Consultant Editor of *Morsum Magnificat*, the magazine for morse enthusiasts. K4TWJ writes regularly for *CQ* Magazine in the USA.

DESCRIPTION

This kit comes with all parts individually and well packed to avoid damage in transit. The pre-assembled key lever is 6in x 0.5in square satin-finished brass, pivoted between two self-lubricating bush-type bearings in a yoke of 1in cube brass.

There is one adjustable contact only, with a fine screw thread of 40tpi. The front stop is of fixed height; the makers claim that an adjustable stop is unnecessary as the key is precision made. Hidden within the stop is 'The New G4ZPY Discreet Spring Tensioner', with a knurled adjuster nut on top of the lever. The key knob is black plastic with a clear plastic skirt.

The key is mounted on a 7in x 4in x 1in mahogany base (light or dark optional) and there is a sheet of 2mm stove enamelled steel fixed underneath, covered with green baize. The sheet provides extra weight to give the assembled key a total weight of approximately 2lb. The kit can be obtained with or without a base. In the latter case, the constructor needs to be capable of producing a well finished, accurately drilled, weighted base similar to the maker's own. Anything less will not really do justice to the appearance of the fine brass work it will carry.

ASSEMBLY

The makers claim that the key can be assembled in 15 minutes. It took me half an hour, but that included some time scrabbling around in my tool box to find a suitable spanner to tighten the two main fixing nuts.

The instructions are extremely simple. In summary, they are: 1) Fix the key assembly and other parts to the base. 2) Solder wires between the terminal blocks and the appropriate key contacts. 3) Screw the steel weighting plate to the base and stick on the self-adhesive baize.

All necessary holes are pre-drilled and I

experienced no difficulties in assembly. The tools needed are a screwdriver, a .25W spanner, a soldering iron, and a trimmer knife or scissors. The front stop and the pivot yoke are secured by nuts recessed in the base. Tightening these nuts with wide-nosed pliers would probably do the job but a proper spanner would be best. The front stop is square-shaped so care is needed in fitting this to prevent it turning and leaving a score mark on the polished base; the same applies to the two square-shaped terminal blocks.

By taking care, however, as is necessary in all self-assembly products, this kit becomes a very smart looking key. Adjustment of gap and tension is smooth and positive and it was easy to find the right tension to suit me straight away without having to make several adjustments over a period before getting it right.

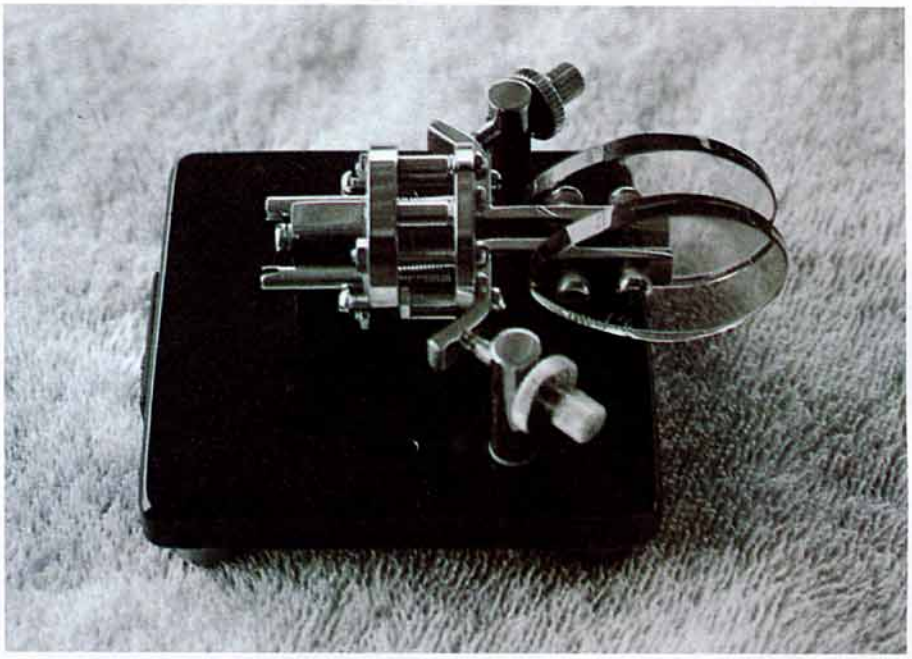
The 'Discreet Spring Tensioner' is an interesting novelty. It only does what other tensioners do, but the whole assembly is completely concealed within the front stop giving the key a slightly unusual, but distinctly clean-cut, appearance. The adjustable contact and its anvil are made of brass. One instinctively looks for contacts of a harder-wearing metal but, if provided, that could take away the attractiveness of the kit's low price. Conceivably, the contact and anvil could be replaced if long term wear occurs, so perhaps this is more of a discussion point than a disadvantage.

PERFORMANCE AND CONCLUSION

The key made its debut in my shack during the European CW Association's 1990 Straight Key Day. Although I had not used it before, I was immediately comfortable with it. It performed smoothly and well. It was light in use, needing little spring tension and was distinctly non-tiring. Apart from the pleasure of participating in SKD, I had the pleasure of using a nice key for the occasion.

Anyone wanting a good looking solid brass key, at a reasonable price, should certainly include this one on their short list before making a final choice. Being near the bottom of the maker's price range is certainly no criterion for judgement in this particular case!

Price, with base, £32.95; without base, £23.00; ready built, £36.00. P&P (UK) £4.00.



The G4ZPY VHS twin paddle, "handles like silk".

THE G4ZPY VHS TWIN PADDLE

by Dave Ingram, K4TWJ

After using keys and paddles of all types and highlighting many of them in my *World of Ideas* column (*CQ* Magazine, USA), I recently acquired a genuine masterpiece in CW instruments: G4ZPY's 'VHS Twin' iambic paddle. The key proved so delightful that I could not resist writing its mini-review for *RadCom* and sharing views of this modern classic with my European friends. Those statements may seem extraordinary, but the G4ZPY 'VHS Twin' is an extraordinary key. I love it!

The G4ZPY 'VHS Twin' is first class in every respect. Its main/upper parts are brass polished to the lustre of fine gold. They are set on a glazed black steel base, and complimented with beautiful transparent finger-pieces. Silver screws and nuts hold the upper assembly together, serve as separate dot/dash tension adjustments, and add '6dB' in sheer glamour. The paddle's base is fitted with non-skid feet that hold to a desk like glue. A three conductor mini jack is mounted on the front for easy hookup or quick removal for showing without dangling wires: a clever touch indeed.

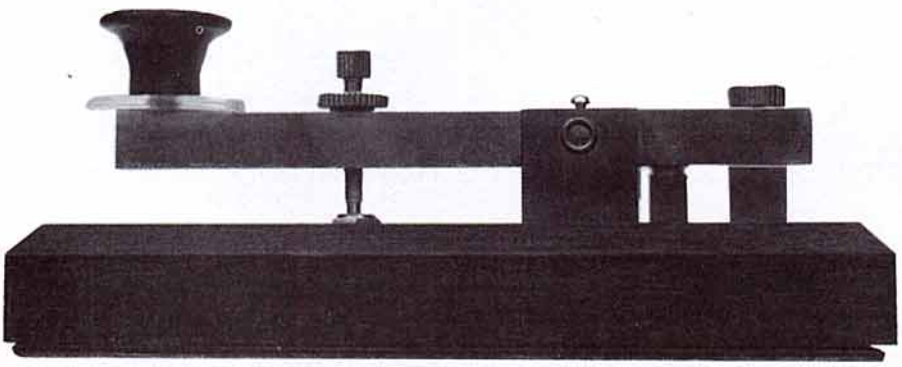
Close inspection of the 'VHS Twin' reveals it is thoughtfully designed for hearty use and high speed CW operation. Its split rear disc (one nearest the fingerpieces) is equipped with thick non-flexible arms, and their moulded silver contacts mate perfectly with silver contacts in fine-threaded adjustment screws. The screws' locknuts are also fitted with small fibre washers for set-and-forget dot/dash travel adjustment. This combination results in a paddle with very positive action and absolutely no backlash or 'loose play' during use. Unlike some paddles, the arm/fingerpiece sections do not 'wobble out of place' when bumped from an unusual angle. Nice.... very nice!

How does G4ZPY's 'VHS Twin' perform on the air, you ask? Marvellously! Its action is incredibly smooth, and electronic keyer/paddle combos make even the shakiest fist sound like a pro. Just tap the appropriate dot/dash fingerpieces, and the set-up sends perfect Morse. In fact, G4ZPY's paddle handles so well I can turn it sideways on my desk and alternate sending between my right and left hand! Working CW has never been so much fun! Whew! If this gem does not rekindle your enthusiasm for and enjoyment of CW, check your pulse!

The VHS designation in G4ZPY's key represents Very High Speed, so I naturally gave it a test run to evaluate its top speed. I accomplished this by first using my (previous) best paddle with an electronic keyer and increased speed until my mistakes in sending were obvious. I then replaced my paddle with G4ZPY's 'VHS Twin' and compared results. In each test, I could increase sending speed quite significantly when using the 'VHS Twin'.

There are many paddles on the market today, but I am sincerely convinced the 'VHS Twin' stands alone in appearance, quality, and performance. I would not be surprised if it increases in value during future times, and have no reservations recommending it to CW devotees. Gordon makes these keys by hand and since he is very meticulous, there may be a waiting period. Rest assured, however, the key is worth the wait. £70.95 P&P £4 (UK).

For more details, SASE to G4ZPY Paddle Keys International, 41 Mill Dam Lane, Burscough, Ormskirk, Lancs L40 7TG. Telephone: 0704-894299.



The G4ZPY straight key, "good looking and a reasonable price".

RADCOM CONSTRUCTION FEATURE

All-Band Beam Antennas

by Les Moxon, G6XN, B.Sc, C.Eng, MIEE

SMALL BEAM ANTENNAS

THE NEED FOR BEAMS capable of operating on four, five or even six bands, instead of the usual three, is becoming urgent as more of us seek refuge on the new (WARC) bands from QRM on the old ones. The new bands are narrow and as they fill up beams will become of special importance for those of us here in the UK. This is because most of our DX is to the west whereas QRM comes mainly from, or is caused to, stations in the east, being therefore in large measure preventable.

Unfortunately, this creates a major problem which cannot be resolved by beams designed on conventional lines. Traps have losses which, together with other design problems, escalate rapidly as the number of bands increases. Stacked beams suffer from interaction between elements which can lead to even worse problems, and log-periodic antennas are beyond the reach of most of us because of size, weight, cost and visual impact, as well as being inefficient in terms of gain for a given boom-length.

Continuous tuning of beam elements by means of servo-controlled capacitors has been suggested by the author [1]. However, this awaits new engineering developments and is unlikely to appeal to those looking for a simple answer compatible with the sort of constraints under which most of us have to operate. This would appear to leave as the only choice the use of loops or dipoles fed with open-wire lines operating in a resonant mode.

Open-wire lines tend to be viewed with disfavour, but objections seem to be based in part on misconceptions [2] and tend also to be waived in the case of the G5RV antenna to which the proposals herein bear some resemblance. It is of interest also to note that a typical open-wire line operating at an SWR of 20 has less loss than matched coaxial line of the same length, and important advantages follow from the fact that each element is required to have its own feeder so that all tuning can be carried out in the shack.

This affords a way of escape from bandwidth and other constraints with which conventional beams are afflicted. Also, because the beam is reversible, it is often possible to use simple and inexpensive methods of beam rotation.

Essential features are the use of feeders capable of operating efficiently at high values of SWR in conjunction with elements designed to radiate efficiently over the desired range of frequencies. The choice is restricted by the need to ensure that, at low frequencies, losses are negligible compared with the radiation resistance and, at the higher frequencies, energy is not wasted in the form of unwanted modes of radiation.

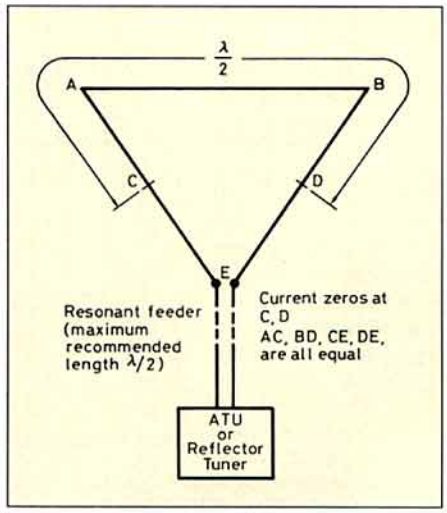


Fig 1: Original version of the Small Delta Loop. The distinctive feature is placement of the nulls in the centre of the sides in the case of the lowest frequency band (the 'main design frequency' or MDF) so that all radiation comes from the top. Reflector and driven elements are identical, tops being spaced about 11ft for 14MHz and the bottom corners brought in towards each other. The position of the zeros is not critical.

The superiority in these respects of the small delta loop (SDL) element **(Fig 1)** is convincingly demonstrated by **Figs 2 and 3**. Further advantages of the SDL array include a wide choice of methods of construction, some of which result in effective heights considerably in excess of the mast height; alternatively SDL arrays can be recommended to those looking for an 'invisible' antenna though, in a few cases, dipoles or some other shape of loop may be more suitable. Such exceptions and the use of 300Ω feeder are discussed later but in the meantime it should be noted that arrays based on the SDL in its simplest form as illustrated by Fig 1 are essentially compromises in which, at some cost in terms of operating convenience, complications have been removed from the antenna and transferred to the shack where they are easier to deal with.

Because of relatively large values of radiation resistance (R) there are few problems at the high frequencies. However, at the frequency assumed for the purpose of Fig 1, hereafter referred to as the main design frequency or 'MDF', the value of R (already low) is roughly halved by the transition at the bottom corner of the loop from a relatively high self impedance to the 600Ω of the line.

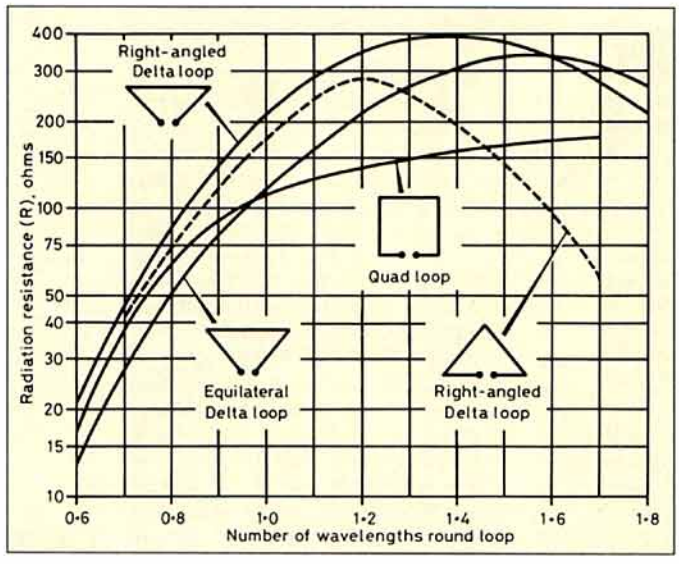


Fig 2: Variation of R with Loop size. R is radiation resistance as perceived at top centre, and size is measured in wavelengths of circumference. Values are approximate based on method described in Ref [1], p9.

Any major change of operating frequency makes it necessary to retune, and tuning components will be subjected to somewhat larger currents and voltages. Despite this, it has been found possible, using short feeders, to work at frequencies well below the MDF.

For example a 21MHz loop will work efficiently at 18MHz, and improved versions described below can even be pressed into service on 14MHz subject to a slight loss (about 2dB) and the imposition of greater demands on the operator, such as the need for more frequent retuning in the

event of QSY. At even lower frequencies, superdirective operation [3], which can be broadband, is possible for reception, switching to a vertical monopole mode for transmission.

EVOLUTION OF THE SDL ARRAY

THE FIRST VERSION OF the SDL array, based on Fig 1, has progressed through several stages of development which remain as useful options, leading up to 'impedance-transforming' systems which improve bandwidth, extend the frequency range, and ease constraints in respect of feeder length and type. Though originally conceived as an further improved version of the author's 'improved VK2ABQ', the present proposal also exploits features of the G5RV antenna together with favourable multiband properties of apex-fed delta loops.

In the case of the VK2ABQ, end portions of elements are bent inwards and act as capacitive end-loading for the centres thereby enabling them to radiate efficiently in spite of short length. At the MDF, the top halves of the sides of the SDL perform exactly the same function but, because they are bent towards the centre, radiation from them would be subtracted from the total. This would reduce the radiation resistance to an inconveniently low value were it not cancelled by that from the lower half of the sides.

In effect, one can regard the top side of the delta as a short end-fed dipole with capacitive loading. There is high impedance at the feedpoint which requires the use of high impedance feeder. This, apart from lower losses, avoids extremes of mismatch resulting from transitions between low and high Z_o in 'worst case' situations which are bound to arise in attempting to cover a wide range of frequencies. It remains important to keep the SWR as low as possible, and guidelines provided by Figs 1 and 2 are supplemented by **Table 1** which includes a set of dimensions in current use.

It should be appreciated that a front-to-side ratio of 5dB compares favourably with a figure of 6dB for dipoles assuming a typical radiation angle of 30°, but there is also a small power loss amounting to about 0.6dB. The optimum placement of nulls is affected by a number of design details but is not critical. At 14MHz, a spacing of about 11ft between the top of the loops of a 2-element array ensures maximum gain whilst keeping R as high as possible, but the lower corners should be brought in towards each other to improve coupling. At the higher frequencies, the spacing should be reduced as a result of radiation taking place from the whole of each loop instead of only the top. **Fig 4** illustrates the close resemblance of the SDL in plan view to the 'improved VK2ABQ' and helps to explain deep endwise nulls usually observed at the MDF.

Loops as shown in Fig 1 require the addition of about 0.15λ of 600Ω line to bring them to resonance. As these stubs are fairly short, the halving of R noted above has little effect on performance provided feeders are matched into them. A problem was that half-wave extensions initially used to allow matching at ground level to much longer lengths of 600Ω line resulted in a loss of 1dB and the SWR bandwidth was halved to a mere 100kHz. This was overcome by using relays for switching stubs as shown in **Fig 5**. This resulted in acceptable performance but, because of high RF voltage at the relays, operation at frequencies below the MDF was ruled out.

An alternative to the stubs is to tune the loops to resonance at the MDF with series inductance at the lower corners. This results in the impedance being stepped up instead of down, but also increases the SWR at 18 and 21MHz due to large reactances being concentrated near points of maximum current. To prevent this becoming a problem in some instances, eg with smaller loop sizes, the inductances may be replaced by helical loading of the lower halves of the sides.

Bandwidth can be improved by using tubing elements formed into delta loops by end-feeding each element with thin wires. Several beams of this type have been constructed for use on one, two, or three bands and this implies the feasibility of converting most small Yagi arrays into SDL systems giving four or five band operation and improved performance. Any traps should be short-circuited, and to avoid problems with guy ropes the feed wires (18 to 21SWG) could be taken upwards to a lightweight T-shaped 15ft mast extension and from there dropped down as open wire lines at least as far as the boom. An element length of about 24ft is suggested but not critical.

The impedance-transforming loop (ITL) **Fig 6** is seen as an important step forward which, as recorded elsewhere [4,5], came about by accident as a result of seeking an explanation for some odd behaviour of a loaded folded dipole. Two-element arrays based on loops of a similar type were in use as the main antenna at G6XN for over four years. The main advantages being the ability to use long feeders without reduction of bandwidth and the achievement of efficient operation at frequencies well below the MDF by dragging the current zeros up into the loops away from the bottom corners. This reduces the mismatch and increases R, allowing 14 and 21MHz arrays to operate down to 10 and 14MHz respectively with estimated losses of less than 2dB, subject to use of short feeders or the provision of matching close to the antenna.

At the MDF, each loop consists of a stacked pair of l/2 dipoles. This adds up to an electri-

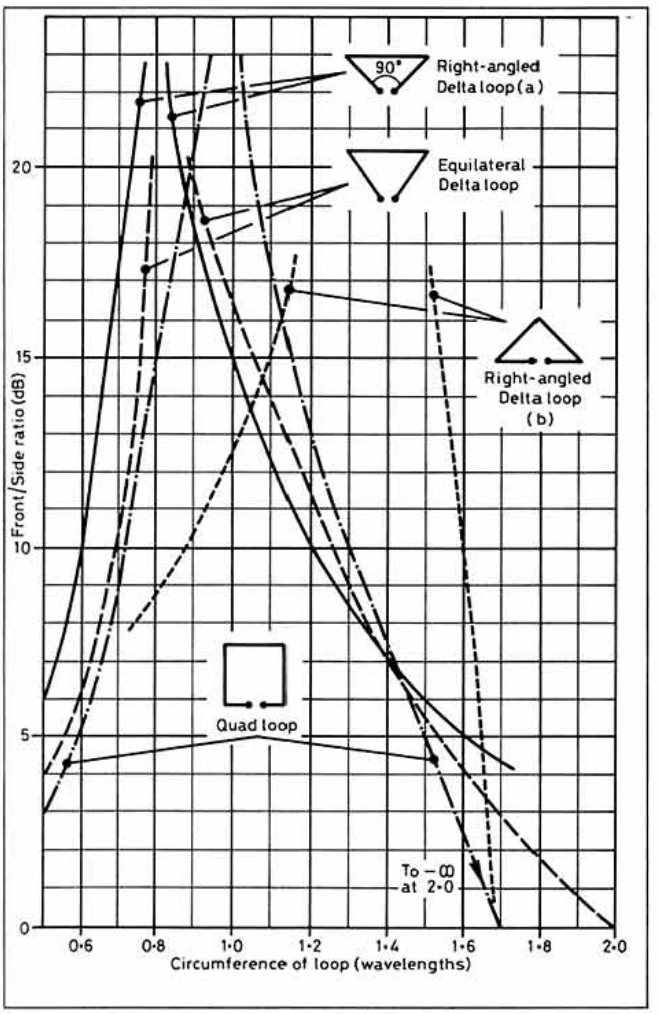


Fig 3: Variation of front:side ratio with loop size.

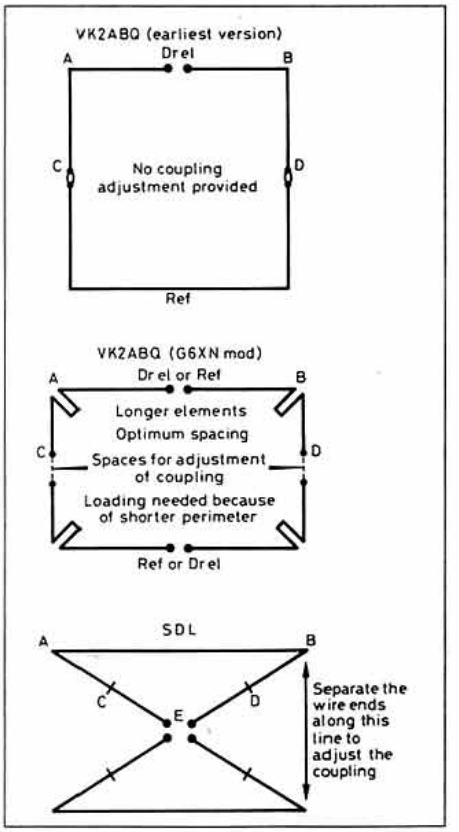


Fig 4: Plan views illustrating relationship between the VK2ABQ and SDL antennas. Lettering indicates corresponding points.

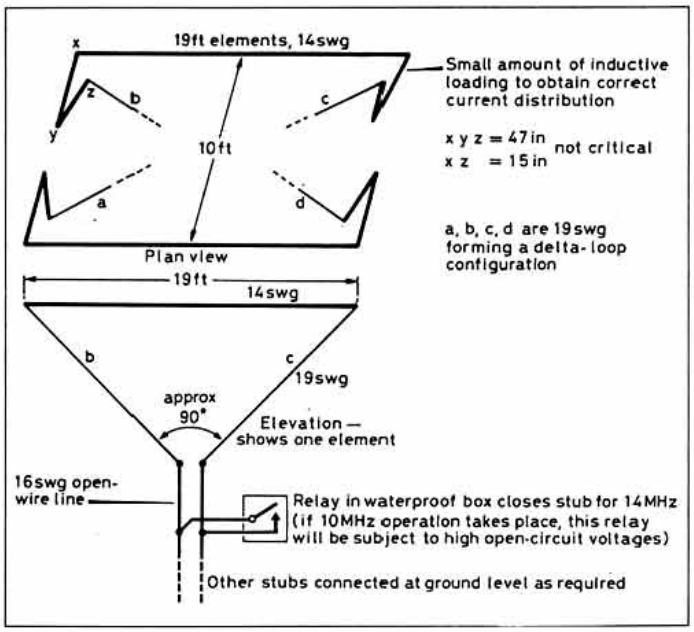
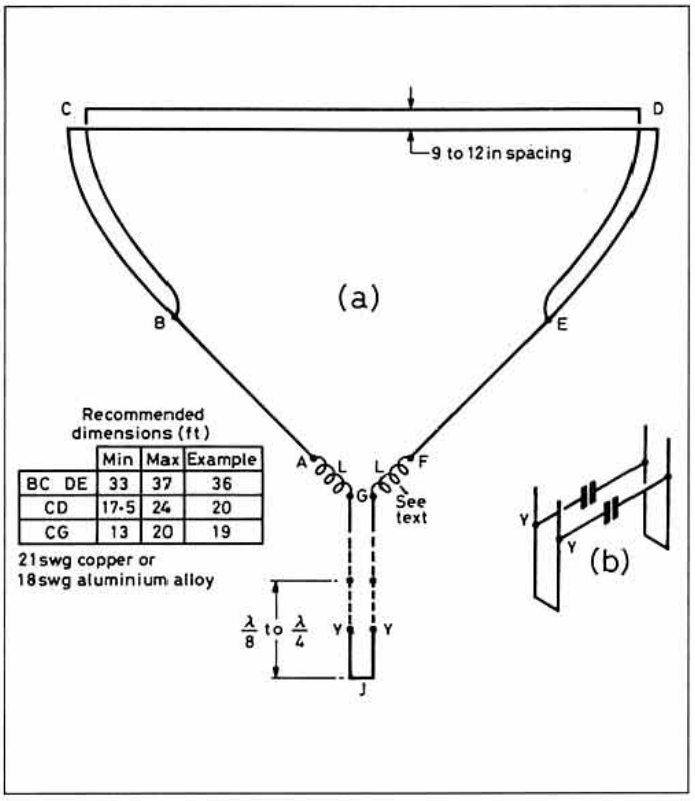


Fig 5: Early example of an SDL array using relays to switch in matching stubs at the MDF in order to permit the use of long feeders. Loading inductances at bottom corner as in Fig 6 avoid the need for relays (except possibly at ground level for 18 or 21MHz, see text).



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

Fig 6: Example of ITL Principle applied to the Claw antenna. Inset shows basic circuit for adjustment of coupling but see text for alternatives.

cal full-wavelength as in the case of a quad but physically much smaller because of inductive loading of the lower dipole.

The upper dipole uses two wires in parallel to achieve a low value of characteristic impedance Z_1, a higher value Z_2 being applicable to the lower dipole. This results in transformation of R to a higher value $(Z_1/Z_2)^2R$ at the bottom corner of the loop for presentation to the feeder.

In this case, because the unloaded dipole does most of the radiating, efficiency and bandwidth are not adversely affected by the loading. The current in the lower dipole is reduced in the ratio $\sqrt{(Z_1/Z_2)}$ which further helps to ensure negligible losses.

Table 2 compares a number of options, using figures calculated with the help of the Smith Chart from Fig 2, assuming values of 500 and 1000Ω for Z_1 and Z_2 respectively. Though suitable only as a rough guide they are in line with practical experience covering a large number of different constructions and demonstrate several interesting possibilities.

THE MINICLAW

FIG 7 SHOWS A SMALLER version of the Claw antenna designed for an MDF of 21MHz. Apart from the obvious attraction of smaller size, goals included better directivity on 28MHz and the reduction of losses on 18MHz by means of loading stubs at A and C, and the use of a heavier wire gauge for the lower dipole ABC.

The stubs have the effect of dragging the current zeros further up into the loop at lower frequencies whereas, at the MDF, being located at the zeros they leave the current distribution unchanged.

Following storm damage to the Claw the smaller antenna was pressed into service on 14MHz at a few minutes' notice, though apart from an earlier version fed with 600Ω line it had not previously been tried on this band. Used instead of the Claw for daily contacts with VK over a period of several months it was found to be only slightly worse, half the difference (4dB) being attributable to lower height. Coupling between elements needed no correction and front:back ratios were typically in excess of 20dB.

SINGLE-WIRE ELEMENTS

IT HAS TO BE CONCEDED that some readers will be deterred by the relative complexity of the ITL or, like the author, will be unable to arrange easy access for repairs. To ease the situation as a temporary measure the two wires of Fig 6 were replaced by single lengths of 20SWG enamelled copper, retaining the loading inductances and thereby some of the impedance transformation. This resulted in the loss of 10MHz and an increase of SWR to 5 or 6 on 14, 18 and 21MHz, but apart from some reductions in bandwidth there appeared to be no other adverse effects on performance despite the use of very long feeders (about 160ft). With short feeders (less than λ/2) beams using elements conforming strictly to Fig 1 were judged to be satisfactory in terms of gain though adjustments were more critical.

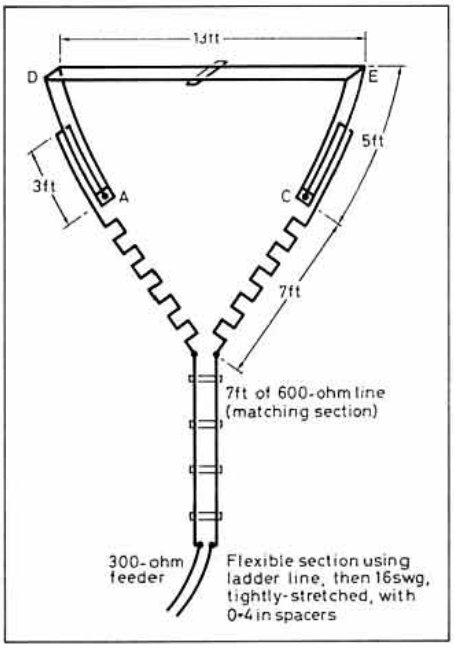


Fig 7: A smaller version of the Claw antenna.

CONSTRUCTION

1) Rotatable Beams

The usual form of Delta Loop uses horizontal wires held up by alloy side-arms and is unsuitable for multiband use due to the problem of insulation at the bottom corners and 'wrong way' impedance transformation in the loop. In the preferred arrangement, known from its appearance as the 'Claw', horizontal wires are supported by fibreglass spider arms (eg fishing rod blanks) angled upwards and outwards from the top of the mast, the angles being adjusted to ensure that wires are kept under tension since flexing can lead very quickly to breakage. Tips of rods should be cut back to about 0.25in diameter and lower ends extended if necessary.

The author was fortunate in having some 1in diameter fibreglass tube but other materials can be used if wires are kept well clear of metalwork or poor insulators such as wet bamboo.

To avoid RF excitation of the supporting structure at 28MHz, metalwork should not extend more than 5ft beyond the mast. Alloy or plastic sockets to hold the rods are attached to the mast with the help of short lengths of angle held in place with exhaust clamps. Points about 6ft along the arms are guyed back to a 5ft mast extension, and the ends of a boom of about the same length

aligned with the beam heading. Alloy tube of 3/4in diameter is suitable for both items.

The 'boom' also supports the feeders together with the bottom corners of the loops, a spacing of about 3 or 4ft (not critical) being suitable though it may be varied for adjustment of coupling. The angle between adjacent arms is set with the help of spacing rods about 2ft out from the mast. Cord ties are used between points near the ends of the rods to set the spacing to about 0.15λ at the MDF. As the construction is unusual it may be encouraging to record the survival of the single-wire elements in one of the areas worst hit by the storms of January 1990. Breakages have occurred in the case of ITL elements and it is essential for both wires to be kept under tension.

Fixed Arrays

These can be erected in several ways:

(a) Hung between spreaders

(b) Suspended in or from trees, spider arms or self-supporting tubing elements being attached to branches or trunks, a suitable length of tubing element for an MDF of 14MHz being 24ft. The sides of the loops are formed by wires dropped down from the ends of the tubing to a point which, in many cases, can be within easy reach of the ground for the attachment of matching devices and feeders. In one case good DX performance was obtained on 7, 10 and 14MHz using 34ft elements at 40ft, the lower corners being at 6ft, and this could obviously be scaled for higher frequencies. Note that losses in trees can be large with very small elements and good results are unlikely below the MDF or with very close spacings. To illustrate this, a 14MHz SDL beam at 30ft with 9ft spacing was judged to be 'as good as in the clear' from daily SSB contacts with VK using another station as yardstick but after increasing the height to 40ft there was no improvement. This was eventually traced to a reduction in spacing to 6ft and would be consistent with an initial loss of about 1dB.

(c) 'Spiders Web' Arrays.

If suitable supports are available 'invisible beams' can be constructed using thin wires held up by nylon fishing line; though not yet tried, experience with other aerials supported in this way has been very encouraging. The line is very slippery and if sharp edges are avoided, can be pushed up over branches which thereafter serve as pulleys, although it is safer to run it through insulators.

The line is very elastic and can accommodate a lot of tree movement, about 8% of stretch being available.

(d) Inverted-V construction wire elements suspended from a light boom attached to a mast extension have been used successfully for both fixed and rotary beams. The corners were held up by fishing lines attached to trees or short posts at a suitable distance or, for rotary beams, spreaders attached to 'yard arms'. This is a useful alternative to the Claw assuming an apex angle in excess of 120°, or some restriction of frequency range. The use of short spreaders or, in the case of cords, shared supports greatly assists construction but tends to result in overcoupling between elements at the MDF and lower frequencies unless spacing between lower corners is increased.

ADJUSTMENTS IN THE SHACK

THESE CONSIST OF THE tuning and matching of the driven element, tuning of the reflector, and in some cases adjustment of coupling between elements. Since both elements have to be tuned, a 2-element array requires two feeders. The beam is reversible, and since only about 120° of rotation is needed it is often acceptable to dispense with the beam rotator.

Time-honoured methods are available for tuning and matching but, in the present instance, leave much to be desired. After years of 'hit and miss', an easier method has emerged. Since this applies to tuned feeders in general it will be described in a separate article, but in essence it consists of inserting between the operating position and the point of entry of feeders into the shack whatever length of 300Ω line is needed for establishing resonance, **Fig 8**. This allows all further operations such as fine tuning, matching, nulling and beam reversal to be carried out at a point adjacent to the transmitter, ie at low impedance, subject to insertion of the correct plug or (possibly) switching at the point of entry. It is only here that account must be taken of the possibility of rather large RF voltages. In some cases, series capacitance or other measures may be needed at this point for dealing with inconvenient line lengths.

In the case of beams, special benefits accrue from the above method since fine-tuning of the two elements can be ganged, and coupling may be increased or decreased by lapping together high current portions of the 300Ω lines which are adjacent to the operator. These methods are suitable for in-shack use with any value of external feeder impedance from 300Ω upwards.

Fine tuning requires variation of line lengths by the switching of small increments, or short additional extensions tuned by series capacitance. An ATU may be used, but with the correct balun it is not needed with valve output stages.

ALTERNATIVES TO THE SDL

THE NECESSITY FOR AN antenna to conform to its environment may dictate its shape or, for example, the availability of suitably-spaced trees might suggest a preference for centre-fed dipole elements. The common factor in all cases being the need for feeders capable of operating efficiently at high values of SWR. **Table 2** summarises important properties of most types of element suitable for small multiband beams.

Delta loops with the apex upwards and fed in the middle of the horizontal side are often easier to erect but, though sometimes used for monoband arrays, they are less suitable for multibanding. Despite this, rough estimates included in Figs 2 and 3, in conjunction with Table 2, suggest that useful coverage of up to one octave is marginally feasible. Such elements should be suitable for the construction, say, of an 'invisible' array formed by hanging thin wires down from the booms of TV and FM receiving aerials [10]. The quad, though likewise restricted, has the merit of being the easiest to fit into a narrow space.

Centre-fed dipoles with a length of about 5/8λ at the lowest frequency may be preferred if suitable supports are available, a spacing of about 10ft between centres being required for 14MHz. The ends are brought into close proximity to improve coupling and to maintain performance at higher frequencies.

Advantages of this type of element include improved bandwidth at 14MHz and, at 25-28MHz, extra gains of 2-3dB. However, due to the narrow beam-width, area coverage is restricted. Half-wave dipoles (including the VK2ABQ with short resonant feeders) can also be used.

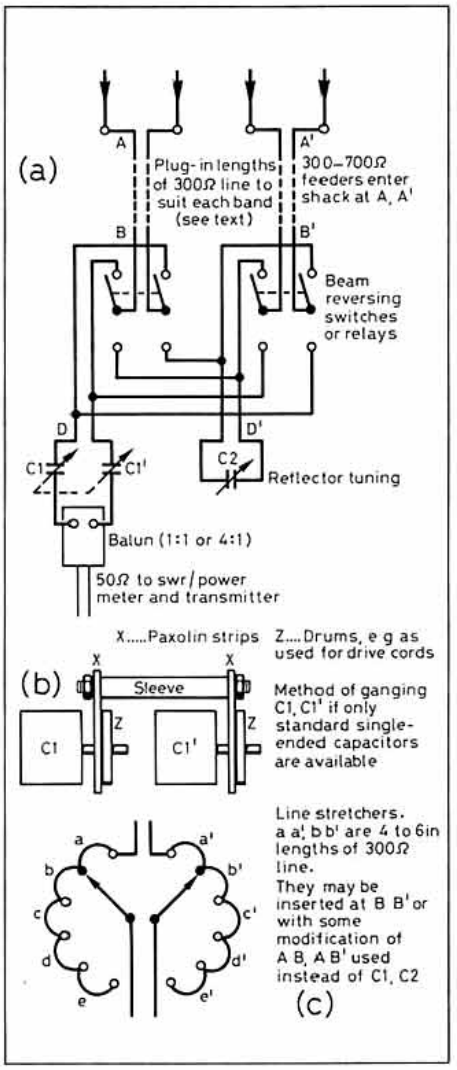


Fig 8: Tuning and matching.

To some extent the proposals herein have been anticipated by the DJ4VM quad [6]. This also uses resonant feeders and provides operation over an even wider range of frequencies, with up to 4dB extra gain at the highest frequencies and negligible endwise radiation. Disadvantages are a reduction of effective height compared with some forms of SDL construction, plus the larger size and high windage of quad antennas in general; its advantages may have also to be weighed against those conferred by use of the ITL principle. It is important to emphasize that *except* as just stated, and despite claims to the contrary, the quad does *not* provide appreciable extra gain [7,8].

Table 1
Comparison of characteristics of alternative elements.
With recommended spacings the values of R for a beam are comparable with these for a single element.

Type of Element (see Fig 9)	Circumference of Loops (wavelengths at 14MHz)	Span (ft)	Radiation resistance (R) in ohms at stated frequencies (MHz)				Front/side ratio (dB)		Possible height gain relative to support
			14	18	25	28.5	14MHz	28MHz	
120° Claw	0.8	19	50	130	320	344	20	7.6	15
90° Claw	0.7	20.4	46	140	370	400	18	7.1	9
Quad	0.72 (This is the critical size for coverage of 14-28MHz)	12.6	45	96	145	160	8.5 (but as near 21MHz)	7	
Modified VK2ABQ		20	50			270	12	9	
λ/2 Dipole		33	73			187	infinity, but typically only 6dB for a 30° radiation angle		
5/8λ Dipole		42	135			135			
Folded Dipole	0.67	22	54			450	(See addendum)		
90° Delta Loop (type B)	0.75 or 0.8	20.5 21	54 74	160 256	240 192	160 108	8 9	18 9	7ft approx

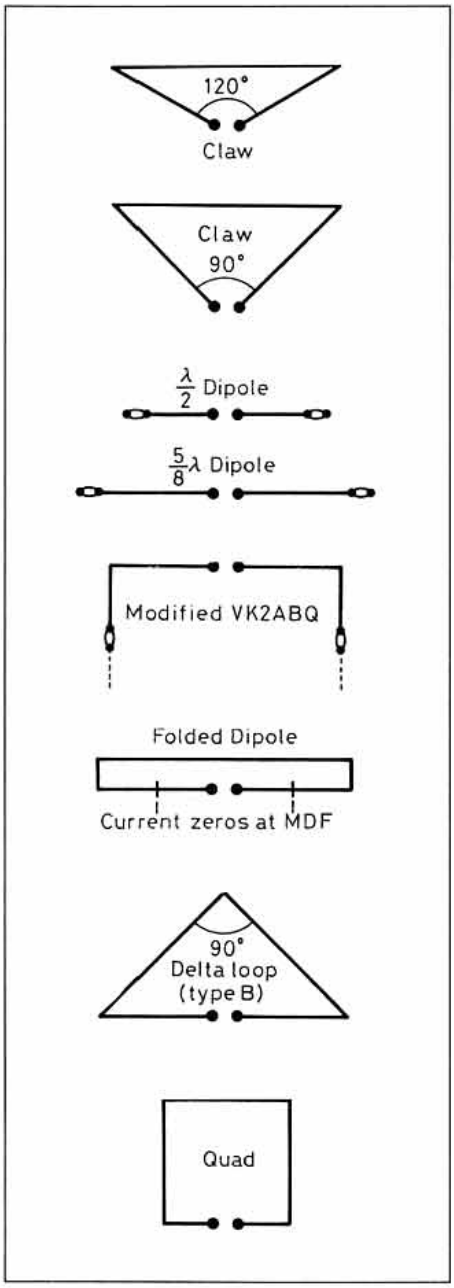


Fig 9: Elements used in Table 1.

THREE-ELEMENT BEAMS

A THREE-ELEMENT VERSION of the ITL array was constructed for 14-28MHz. A triband coaxial feed being devised for the centre element with resonant lines for the outer ones. This was very successful as an educational exercise, DX performance being virtually identical with 3-elements or any one of the three possible pairs. Except for an advantage of 1dB in the case of 3-elements at 28MHz, the main difference was extreme difficulty in optimising the performance when all three elements were in use, due to having too many variables. In practice the gain of Yagis with more than 2 elements tends to be closely related to boom length so that to obtain extra gain, one is forced into methods of construction which jettison the height gains listed in Table 1.

CONCLUSIONS AND RECOMMENDATIONS

IT WILL BE EVIDENT THAT a large range of options is available, with every installation probably a special case so that the aim here has been to present guidelines rather than blueprints. SDL arrays are well suited to an evolutionary approach, likely to appeal in particular to beginners and others looking for simple solutions to antenna problems, but they also afford scope for experimenters, particularly those faced with constraints imposed by the environment or by regulations.

Table 2
Estimated values of SWR for various options.

Type of Element	Band (MHz)	SWR in Main Feeder 600Ω line	300Ω line stub	300Ω line no stub
Equilateral loop as Fig (1), single wire, no loading, 56ft circumference i.e. 0.8λ at 14MHz. Stub (i.e. matching section) length 11ft	14	16	8	20
	18	4	8	2
	21	4.2	8	6
	25	6	3.7	12
	28.5	4.4	3.3	8
As above but ITL with loading at bottom corner	14	1.8		
	18	8		
	21	8		
	25	6		
	28.5	4		
As above but distributed loading	14	2.5	1.25	
	18	4.5	8	
	21	4	8	
	25	2.5	3	
	28.5	1.8	1.1	
Miniclaw, ITL Circumference 0.8λ at 21MHz (0.55λ at 14MHz) Stub length 7ft approx except for figures in brackets (11ft)	14	25	16(11)	50
	18	7	2(7)	8
	21	2.5	4	1.25
	2.5	.4	3	2.5
	28.5	3	3.5	6

Notes: Figures based on values from Fig 2 and Table 1, supplemented by rough estimates, 500 and 1000 ohms respectively, for Z_{01} and Z_{02}; in view of the complex shape, bends and assorted stubs accurate estimates are not possible but Z_0 (measured) was found (coincidentally) to be reasonably close to the 'single thin wire' value of 1000Ω for a helically-loaded lower dipole; leading coils yield a higher equivalent value of Z_{02}.

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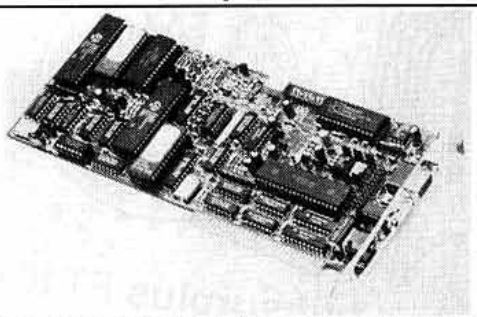

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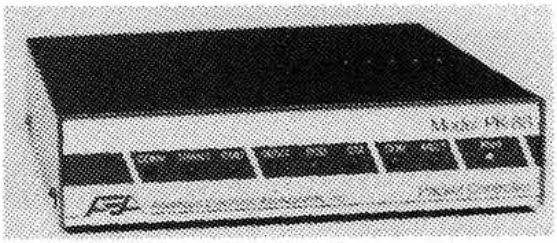

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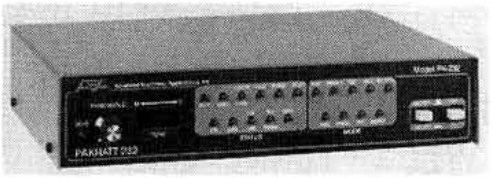

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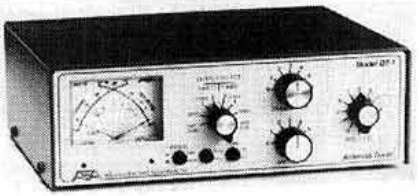
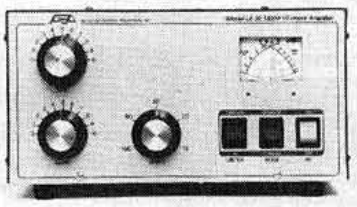


Exceptional value from AEA. The ET-1 covers 1.8 to 30 MHz with up to 300 watts power. It has a built in power/ SWR meter and switched outputs for balanced and unbalanced loads. **The new QT-1 includes a dummy load, peak/averge wattmeter and a meter light.**

ET-1: £129.95. Post and packing £6.00

QT-1: £159.95. Post and Packing £6.00

LA-30 HF Linear Amplifier



Designed to provide reliable, stable high power, AEA's LA-30 class AB2 linear amplifier is rated at 1200 watts PEP input, ready to handle the UK legal limit with plenty to spare. The LA-30 is a self contained tabletop unit equipped with a pressurised plenum cooling system to ensure optimum operation for extended periods of continuous use. A QSK option is available for CW and Amtor.

LA-30: £969.95. Post and Packing £10.00

All prices include VAT at 17.5%

Free catalogue on request. Prices and specifications subject to change.

Callers by appointment. Office hours: 09.00 to 12.30 and 13.30 to 17.30

ICS Electronics Ltd. Unit V, Rudford Industrial Estate, Arundel, West Sussex BN18 0BD
Telephone: 0903 731101 Facsimile: 0903 731105

RAYNET

Raynet

RONALD M COWAN, GM4SRL
516 Clarkston Road, Netherlee, Glasgow
G44 3RT

RAYNET HELPS ROMANIA

IN MARCH AND APRIL of this year, a party of Raynet members went to Romania to help the Yorkshire Dales Romania Fund with communications for a relief exercise based at eight different sites in the Mehedinti area of the country. The team had just ten days to get together and plan its trip down to the smallest detail.

The task was to link together a central stores and seven different projects which would all be ongoing at the same time, as well as providing a link with the UK. After the initial approaches, there was a lot of discussion about who would go out to Romania, what equipment should be taken, and which vehicles would be most suitable for the purpose. Eventually nine Raynet members, from various parts of Britain, agreed to make the journey and the real planning started. Graham, G4KDU, Brian, G1PZN, and Drew, a non licensed member, all from Todmorden, travelled on two buses together with Eddy, G0EWO, from Basingstoke. Paul, G6FMP, and Vince, G4SAF, travelled together in Paul's car and Dave, GW0KWY, joined Don, G6FHM, from Shrewsbury and his wife, Norma, a non licensed member.

There were about 120 volunteer workers in the group, from all age groups and all walks of life. There were nurses, nannies, plumbers, builders, electricians, cleaners, students and general workers, all ready to turn their hand to whatever needed to be done. The project leader was Andy Ives, who was accompanied by his wife and two young daughters.

The party sailed from Ramsgate and spent the crossing getting to know each other. While on board, some decided to have a decent meal, as they did not know when they would have the chance again, perhaps a decision that the others wished that they had taken too! On landing at Dunkirk, the convoy, started the long continental section of the journey to Romania. It passed through a small corner of France, then into Belgium, Germany, Austria and thence into Czechoslovakia for a much needed sleep in a bed! The queue at the Czech border crossing was horrific, owing to local demonstrations that day, and Customs men were said to be working to rule. Although most border crossings were not too bad, the *Carnet*, listing all the equipment for Raynet and the film crew, caused a few headaches trying to understand official bureaucracy in a foreign language.

After a meal in the hostel, the volunteers started the next leg of their journey across Austria (over the mountains in heavy snow and rain) through Hungary before the final border crossing into Romania. Usually a wait of 24 hours is not uncommon, but the driver of a vehicle in another convoy said that relief vehicles could go straight to the front of the long queue. This was done, but with some difficulty as the road was only one single lane in each direction, and there was a lot of traffic going in the opposite direction. It is amazing, however, the authority Raynet tabards appear to have in such situations! Eventually official help, in the form of a policeman, arrived and moved other vehicles out of the way, into ditches where necessary, and got the convoy to the checkpoint. This was by far the worst border crossing, the guards expecting a bribe of at least a packet of cigarettes before they would look at anything.

The final trek in Romania had started, and by now it was night and all were very tired, but knew that there was still a long way to go. Immediately the change in conditions became apparent, the roads being in a poor state of repair with lots of pot-holes and many cobbled streets. The houses looked impoverished and everything had a 'run down' appearance. In one large town, the roads appeared more like farm tracks, with muddy unmade surfaces. In another place one of the vehicles touched overhead wires under a bridge, and only became free after much careful manoeuvring.

The hotel was found with the help of a local policeman (another packet of cigarettes away!) and the group's first meal was two loaves and some tins of what they hoped was meat, washed down with whisky and lemonade. After that it was bed, for a well-earned rest after a journey which had lasted for just under four days. The buses, truck and van were left at the local police station under armed guard as the group had been warned that it was unwise to leave anything unattended. In spite of bribes, the vehicles were broken into, and after this all were parked beside the hotel and an all-night vigil was kept.

Raynet took over the thirteenth floor of the hotel where a communications room was established. HF and VHF antennas were erected on the roof, (it was the highest building in the town) and the work started in earnest.

The projects were as follows:-

1. Turnu Severin Hospital, where a computer system was installed, general maintenance was undertaken, along with cleaning, helping nursing staff and installing a night-call system.
2. An orphanage for 0 to 3 years, where an adventure playground was built and general work carried out.
3. Pre-school orphanage, where an adventure playground was built and new carpets were laid. When the furniture was moved to do this, rat droppings were found.
4. Home for recuperable and retarded children where an empty building was transformed into kitchens, a canteen, storerooms and showers and toilets installed. A lot of the equipment had been brought from a school which had been closed in Britain. There was much plumbing, wiring, tiling and decorating done at this site.
5. An orphanage at Patulele where previous aid had been received but which did not have running water, only a bucket and a well, with the toilets being holes in the ground. Eventually, after a lot of effort, a water tank was installed in the roof space and electricity was also brought on site. A sewing project was set up to help the women of the village.
6. Baia de Arma Hospital where the buildings were in a poor state of repair, with raw sewage in pools in the grounds and little general equipment. A lot still requires to be done here, although building repairs, plumbing and wiring were installed, as were proper toilets.
7. Isverna, a village which was very poor, even by Romanian standards. A medical centre was set up two miles from the village itself, and farmers were given help regarding the use of land and chemicals and medical advice for their animals. More facilities were provided for children, and an adventure playground was built, VHF communications between here and Raynet control at the hotel were impossible, and information was passed via the HF link with the UK.

Radio conditions back to the UK were not always good, but sterling work by Chas, G3XTL, and others meant that messages to and from Romania were dealt with efficiently. These included births, deaths, reservations, cancelled flights, requests for drugs, and engineering advice. Unfortunately the AMTOR link proved to be very difficult to set up and this idea had to be abandoned.

As well as passing radio messages, the Raynet teams joined with the others in digging ditches, doing wiring, setting up computers, tiling, painting, etc, as well as providing transport for people, equipment and lunches.

Two days before the party was due to return home, the axle of one of the buses broke, causing a major problem. A local blacksmith did a wonderful job repairing the damage, and spare parts were manufactured in an engineering works dating back to the 1940s. all this was completed in one and a half days and the convoy left on time for the trip home. This proved to be eventful too, when a piece of metal pierced the petrol tank of one of the buses. Raynet helped here, directing traffic, and going for thirty newly baked loaves and five kilos of cheese (total cost £5.00!).

Norma Sunderland, summing up her adventure, says that she is sure everyone felt a great contribution had been made towards helping the Romanian people, who need to know that other nations care about them. They love their country, but do not seem to know how to put it right after years of unfair, corrupt government. Many relief teams from other countries are working together to help build a new nation. Although it appeared at times that people took advantage of the helpers, maybe we do not understand what it is like to be deprived. A Romanian explained that they don't take things for the sake of it, only because they do not have anything themselves. Norma is sure that the lives of the children in the orphanages and the patients in the hospitals will have permanent benefit from the work which was, and still is, being done.

A further Raynet project in Romania is planned for later this year, and details can be obtained from G6FHM, Zone Rep 9, QTHR.

QRP

GEORGE DOBBS G3RJV
St. Aidan's Vicarage, 498 Manchester Road, Rochdale OL11 3HE

PERHAPS AMATEUR RADIO is an example of the Global Village concept of the world: we make and maintain friends throughout the world. This year I was back in Dayton, Ohio, attending the Hamvention and meeting old friends from the QRP ARCI, the American QRP organisation. A happy event, these people have become family! During the visit, I picked up further news on two of the items from my last *QRP* Column.

I mentioned the new edition of the *HW8 Handbook*, a revised book of modifications for the HW7, HW8 and HW9 transceivers, sold in kit form by Heath. I had heard rumours, but visiting their stand I was able to confirm that Heath are to produce no more amateur radio kits. They will continue to hold spares but the HW9 production is now at an end.

It is sad to lose a manufacturer from our hobby but especially sad in this case, because Heath provided so many of us with our first taste of QRP with their HW series of transceivers. It was building an HW7 at the beginning of the 1970's that brought me into QRP operation and construction. Over the years we have built, criticised but loved the 'HotWater' series.

If you do find one of this range of transceivers second-hand, and they often sell at modest prices, they provide a good way into operating QRP on the HF bands. Even the simple, and relatively crude, HW7 with a few modifications can become the basis of a viable QRP station. As a reminder, I have a few copies of the *HW8 Handbook*, with modifications for all the HW series available for £5 (G QRP Club members) or £6 (Cheques to 'G QRP Club'). Requests to be sent, with an address sticker, to the address at the top of this column.

I also mentioned that Doug DeMaw, W1FB, is producing a new edition of his QRP Notebook. One of the highlights of my trip to America this year was driving, with G0BPS, to North Michigan to meet Doug DeMaw. I have admired his work for many years: his work as Technical Editor of *QST* brought many people into amateur radio home construction. Highly buildable circuits, written up in a lucid and entertaining style, provided many of us with a good reason to subscribe to *QST*. Since his retirement to the farmstead in Michigan, we have enjoyed a series of books: *QRP Notebook*, *Antenna Notebook*, *W1FB Design Notebook* and *First Steps in Radio*: all good books for the novice and experienced radio amateur alike and all available from RSGB Sales [see pages 78/79 - Ed]. A good collection of his *QST* articles forms the basis of another ARRL publication, *QRP Classics*, and *Solid State Design for the Radio Amateur*, written in conjunction with Wes Hayward, W7ZOI, remains a classic amongst radio constructors.

I also managed to get a close look at the Ten Tec Argonaut II, the new transceiver promised for so long by Ten Tec Incorporated. It certainly looks very nice and their new variable bandwidth crystal filter should be interesting to try under European band conditions. The American pricing suggests that it will cost something in excess of £1,000 in the UK. Ten Tec have promised to lend me one for review, so I hope to give a full user report in a future issue of *RadCom*.

THIRD ANNUAL NORTHERN QRP CONVENTION

FOLLOWING THE SUCCESS of the previous two years, the Northern QRP Convention will take place again on Saturday October 19 1991 at St Aidan's Hall, Manchester Road, Rochdale in Lancashire. It will be from 10am to 5pm and the admission charge is £1. The convention will follow the popular format of previous years, with the accent on meeting, sharing and learning, rather than trading. Although the sale of used equipment, junk and components filled an entire room last year. There will be a full programme of lectures, a circuit archive with photocopier, technical and antenna advice, displays by kit manufacturers and plenty of homemade equipment on show and in use.

The largest single space will be the social area, where food, drink and talk are available all day. Another significant influx of overseas QRPers is expected from Europe and the USA. It is not the event to attend if you wish to buy a brand new rig on credit but it is the event if you want to soak up the excitement of people who enjoy their hobby. It is a real amateur radio occasion. For those with a discerning palate, Mr Salaway's famous meat pies with mushy peas, will be available at lunch-time. Further details can be had for an SAE to my address.

An HF QRP Station need not be large or expensive. Ronnie Marshall, GM4JJG, an active Scottish QRP operator uses an HW8 with a few ancillary items and a simple wire antenna to form a compact complete station.

EUROPE FOR QRP WEEKEND 1991

FOLLOWING THE previous successful joint ventures between the G QRP Club and the OK QRP Club, the two organisations invite all radio amateurs to join them in the Europe For QRP Weekend this autumn.

Rules

1 **Dates and times:** 1600UTC 27 September 1991 to 2359UTC 29 September 1991

2 **Mode and frequencies:** CW only on 3560, 7030, 14060, 21060, and 28060kHz, all + 10kHz.

3 **Power:**. Not to exceed 5W RF output. Stations unable to measure output take half their DC input (eg 10W i/p = 5W o/p).

4 **Stations eligible:** Any licenced radio amateur.

5 **Contest exchanges:** Call CQ EU QRP when seeking contacts.

6 **Contest exchanges:** For a contact to be valid RST, power output, and name of operator must be exchanged and logged.

7 **Scoring:** Contacts with own country do not score. European stations score 1 point for each European contact and 3 points for each contact outside Europe. Stations in USSR Asiatic Republics score 1 point for each contact with another USSR Asiatic Republic and 3 points for all other contacts. Stations outside the above areas score 3 points for each contact with Europe or a USSR Asiatic Republic. The final score is the sum of the points scored on each band used.

8 **Logs:** Separate log sheets must be used for each band, showing for each contact Date, Time, Call, plus RST, Name, and Power received and sent. A summary sheet must be provided showing call, name and address, claimed score for each band, total claimed score, and brief details of equipment used.

9 **Submission of logs**: Logs must be submitted to P Doudera, OK1CZ, U1 BATERIE 1, 16200 Praha 6, Czechoslovakia, by 30 October 1991.

10 **Awards:** Merit certificates will be awarded to the four leading stations from each continent.

11 **The judges decision is final** in the case of dispute.

G QRP CLUB
37 Pickerill Road
Greasby
Merseyside
L49 3ND
England

OK QRP Club
U1 baterie 1,
Praha 6
Czechoslovakia

EMC

MEGAN SMITH, G0MEG
EMC Committee Secretary

SOME OF THE EMC COMMITTEE went to the RSGB Convention in Birmingham over the weekend 27/28 April. Apart from the obvious benefits, like getting some of Sam Morse's 200th Anniversary cake, it gave us an opportunity to see what sort of EMC problems were around.

One or two new themes are starting to appear, connected to the ever-growing number of recruits to the satellite TV fraternity. Regretfully a small number of the people installing the systems are rather unfamiliar with the technology. The occasional EMC problem is turning up where amateur radio transmissions have been picked up on poorly installed satellite TV equipment, particularly where distribution systems are involved. More on this in a future issue, but I understand that a satellite TV 'user group' is being formed, along the lines of PC user groups. The user group has already gained the support of a number of the programme providers and other people in the Industry, and it is hoped that the newsletter will include 'do-it-yourself' items and technical articles. Pressure from such a group should be able to keep the installers 'on their toes'.

Another growth area is that of the amateur complaining about emissions from nearby computers. HF emissions from the Amstrad PC1512 and 1640 were dealt with at some length in the last column. One of the EMC Committee is working on the reduction of VHF emissions from these machines and the Sinclair Spectrum, which appears to be a popular item for producing spurious emissions. The results will be published when they are available.

Fortunately for most of us, another problem which was aired at Birmingham is comparatively rare! An SWL who lives very close to the BBC transmitter at Daventry receives World Service on just about eveything electrical in the house - including the toaster! Although ferrite rings and filters can eliminate some of this, the field strengths are likely to be such that even under the new EC regulations the problem would still occur.

The Convention also gave some of the 'far-flung' EMC Coordinators the chance to find out what the rest of us look like (perhaps they wish they hadn't!). Many of you will be aware of the EMC committee structure, but here it is again just as a reminder:- Chairman: Bob Peace, G8SOZ; Committee members: G3JWI, G3ZCV, G1OSC, G3GVM, G0MEG (Secretary); plus Corresponding members and Co-ordinators.

If you have an EMC problem after making your own checks that your station is in order, the Co-ordinators are the people to approach first - there should be one in your area. The full list appears in Table 1 and the new 1991/92 *RSGB Call Book*. Note that because of the time the *Call Book* goes to press the National EMC Hot-Line answering machine is already in operation on 0537 593449, and not "later in 1991" as published. The coordinators will try to help and, if appropriate, will escalate the problem to the main Committee. The corresponding members are normally experts in a particular field and are consulted when necessary.

SO WHAT IS EMC?

HANDS UP ALL THOSE HAPPY people who have just picked up pass slips from their doormats for the RAE and Novice tests! Congratulations and welcome to the hobby! I am sure that you could all tell us the textbook definition of EMC - electro-magnetic compatiblity. However, what does it really mean? Old hands and experts can skip the next paragraph as it is intended for newcomers to radio.

Just about everything electrical in your house could generate radio waves or could be affected by radio waves. EMC is all about making sure that radio waves produced by one piece of equipment do not cause unwanted effects in other equipment.

For example, thermostats in central heating systems or fridges, electric motors in vacuum cleaners or electric drills and electronics in home computers may produce emissions of radio frequency interference (RFI).

Any nearby receiver picks up both the RFI and the wanted signal and cannot distinguish between them if they are both on the same frequency. Well-designed equipment produces very low levels of RFI and most household equipment in the UK, apart from computers, has to meet certain standards which limit the level of RFI which it can produce. The strength of these unwanted radio signals is usually measured in microvolts per metre and the limits are designed so that the RFI is normally too weak to be heard or seen on broadcast radio or TV reception. When receiving weak amateur signals however, you may still hear a 'click' when the central heating switches on, or a 'buzz' from a motor or computer. This is an example of a lack of EMC; you are suffering from interference.

Two other jargon words often used in connection with EMC are 'immunity' and 'breakthrough'. These are important near a radio transmitter where field strengths are measured in volts per metre rather than microvolts per metre. For example, if you discover that every time you transmit on your 2m or 70cm hand-held in the kitchen, the washing machine starts its spin cycle, then the washing machine is not sufficiently 'immune' to radio frequency fields. It should have been designed to do the washing and not to receive radio frequencies!

Telephones are another example. If a person using a telephone hears a 'Donald Duck' voice from a nearby amateur radio SSB transmission, this is called 'breakthrough'. This is clearly the fault of the telephone as it lacks immunity. An ordinary (not cordless) telephone should not receive any radio signals.

Broadcast radios and TVs should be able to receive the radio or TV broadcasts which they are designed to receive, without breakthrough from amateur transmissions. The amateur transmissions are on different frequencies and broadcast radios and TVs are not designed to receive them. If amateur transmissions do break through, due to poor immunity of a radio or TV set, this can normally be solved by adding filters at the receiver to improve its immunity.

Do not overlook the possibility of a transmitter fault however. If an amateur transmitter were to produce an unwanted signal which was actually on the same frequency as a radio or TV broadcast, then this would be described as interference and would have to be solved at the transmitter as nothing could be done to the radio of TV receiver to get rid of it.

Unfortunately, high immunity and low emissions are not always the top priority with

R.Adam	GM4ILS	Elgin	0343 545842
R.M.Allsopp	G1YFT	Leicester	0533 833714
A.Armstrong	G0FBW	Peterlee	0915 864500
L.K.Ayre	G3DPR	New Milton	0425 615676
C.Barnes	GW4BZD	Bangor	0248 361195
C.G.Barry	GW3BUT	Cardiff	0222 628430
Rev.S.Bennie	GM4PTQ	Stornoway	0851 3609
G.Brooks	GM4NHX	Caithness	0847 83570
N.Carr	G0JHC	Preston	0772 742710
C.Corderoy	GI4CZW	Enniskillen	0365 34500
P.Daly	G0GTE	Stevenage	0438 724991
M.Goodfellow	G4KUQ	Bristol	0272 716093
G.Halse	G3GRV	Hemel Hempstead	0442 214972
R.P.Harrison	G4UJS	Nantwich	0270 627620
K.Hendry	G0BBN	S.Benfleet	0268 755350
D.A.Hopkins	G0MXI	Hull	0482 210763
J.Lawrence	GW3JGA	Prestatyn	0745 63255
A.D.Maish	G4ADM	Worcester Park	0813 372123
Mrs.S.Morley	G0MCV	Leicester	0533 374999
D.Morris	GM3YEW	Perth	0738 85533
S.O'Sullivan	G8VPG	Bristol	0225 873098
L.J.Parry	G8AMK	Bracknell	0344 423704
D.W.Smith	G3LIS	Ormskirk	0695 77960
R.P.Smith	G3SVW	Sale	0619 693999
R.Sykes	G3NFV	Leatherhead	0372 372587
K.N.Watkins	G3AIK	Martock(SOM.)	0935 825266
S.M.Wood	G4OWI	Newark	0636 72625

Table 1: EMC Co-Ordinators

electrical equipment manufacturers and this causes some EMC problems. The new European Commission EMC Directive will require equipment to meet standards for emissions and immunity which should go some way towards helping this situation. However, an amateur radio station is capable of producing high field strengths, depending on the antenna etc and no amount of standards will make up for a badly laid-out shack or a poorly-located antenna. The old advice is probably the best here - make sure you solve any EMC problems which you may have with your own transmitter and TV etc and you are less likely to have problems with your neighbours' equipment. It also makes a convincing demonstration if you can show that your own radio, TV etc is free of breakthrough.

BITS AND PIECES

Baby Alarms: It has been brought to our attention that there are problems with cordless baby alarms which operate on the frequency 49.86MHz. One member found his 50MHz transmissions coming through on the baby alarm. His operating hours are now somewhat limited. However, as he says, "babies grow up".

Passive infra-red sensors: Very little can be done when a problem arises with one of these devices. The installer of the alarm should be called in and be made aware that it is not performing satisfactorily and should be replaced. If any readers have experience of models which have proved to have a reasonable level of immunity, the EMC Committee would like to hear from you.

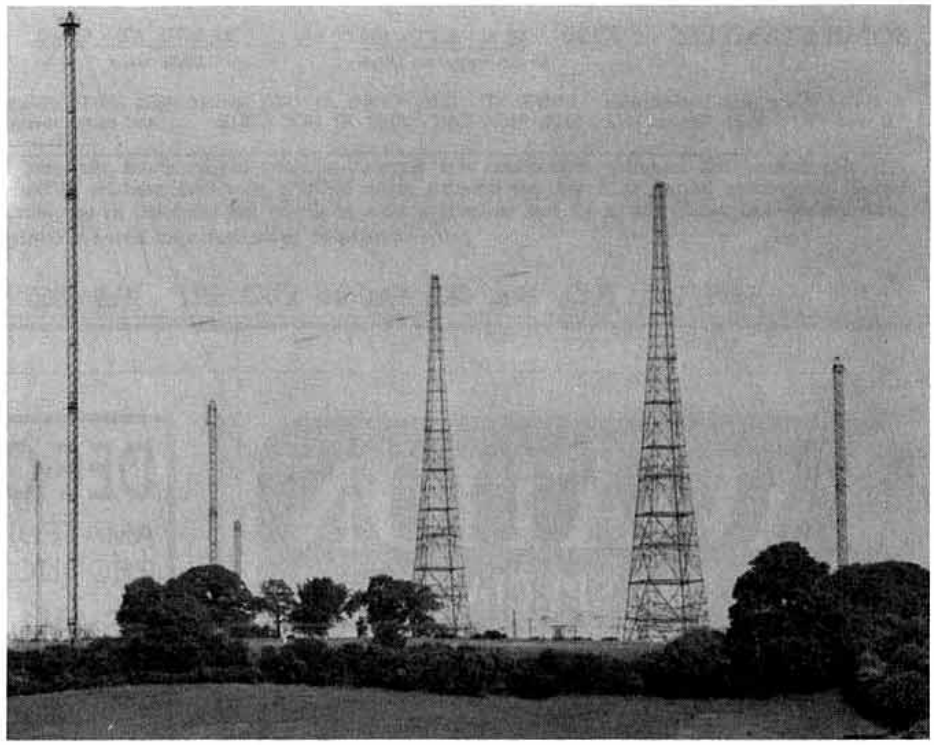
CASE HISTORY

A MEMBER recently sent me the following account of his experiences with an Atari 1040 STF computer.

"The problem with the machine was not with the computer itself but with the SM125 monochrome monitor. With the normal 'Desktop' displayed it generated considerable RFI on bands from 21MHz through to 144MHz and maybe beyond. Even though the antennas were located some distance from the monitor the interference level on 2m was distressingly high, in excess of a good S9+ signal over much of the band.

With the monitor switched off, the interference level from the computer was very low on 2m and nothing was heard on the other bands. The computer is well screened with a galvanised steel box inside the plastic case. There is even internal filtering of the leads leaving the screened case.

The monitor was opened and by the usual 'reverse engineering approach' it was discovered that the video circuits went through some parallelled open collector TTL inverters on the main PCB to the tube base where a PCB contained the emitter driven video transistor plus Rs and Cs. The lead feeding this consisted of three unscreened wires (video, power and earth) about 7in long. The video and earth wires were replaced with miniature 50 ohm coax. The power wire was threaded through a ferrite bead several times at the tube end and the same done for the separate 120V supply lead to the tube PCB.



An SWL living close to BBC Daventry receives World Service on his toaster!

The result was a reduction in the interference to a level where only the odd low level sprog was detectable on 2m and nothing was detectable on the lower bands.

This may also apply to the SM124, which is also a monochrome monitor for the ATARI ST range. Incidentally, these monitors are specials as the field rate is 71.25 Hz with excellent video bandwidth, which has not been compromised by this modification."

Comments - In the SM125, as with many other types, the video output transistor or transistors are on the tube base, and the drive to the output transistor's emitter is at a relatively low level and low impedance. Therefore, the use of screened cable for the drive signal may not cause significant loss of resolution. If the video output stage were on the main PCB, the video drive to the CRT would be very sensitive to any additional capacitive load, so the use of screened cable in such monitors could result in excessive loss of resolution.

More information on spread-spectrum techniques, once only used by the military, but now practised by radio amateurs in the US, can be found in the ARRL Handbook in the section dedicated to special modulation techniques.

LAWNS OR CLANS

HOT ON THE HEELS of LAWNS (Local Area Wireless Networks) in the States, the UK Government has given a provisional go-ahead for the development of radio-based local area networks which could form the basis of a European standard. Companies are now free to develop and test Cordless LANS (CLANS!!) linking PC's, based on spread spectrum technology using frequencies between 2.412 and 2.438 GHz, although these LANS are still not legal to use in the UK.

The DTI is being pressed by suppliers and potential users to consider promoting a standard. Under consideration is a maximum power level of 250mW and the concept that the eventual legal CLANS will not need licences. One manufacturer was barred from installing its CLAN in the UK last year as the frequencies used were almost identical to those allocated to cellphone operation.

OVER TO YOU

THE EMC COMMITTEE IS collecting together information about cars and RF immunity, so if you find your windscreen wipers come on every time you transmit, or any other similar happenings please let us know via the address at the top of the column. Some of the larger motor manufacturers are already taking EMC very seriously, but the response is not the same throughout the industry.

Another area of investigation is the immunity of burglar alarm systems, and any info on that will also be gratefully received.

DID YOU HEAR?

.... THE ONE ABOUT THE EMC Committee member who went to investigate a case of breakthrough to a TV which had re-occurred after a successful cure with a braid-breaker filter and found the filter sitting on the window-sill? Apparently, when asked why, the neighbour said she took it off "to see if that ***** amateur next door was still causing interference"!

THIS MONTH'S EMC was written by EMC Committee Secretary Megan Smith, G0MEG. Please send any correspondence to the Chairman, Bob Peace, G8SOZ, c/o Radio Communication, RSGB, Lambda House, Cranborne Road, Potters Bar, Herts. EN6 3JE.

PC KITS and PC Bits

SOME EXAMPLES of Kits:- **10 MHz XT - 199.00** Single floppy, No Display | **12 MHz AT - 550.00** 20Mb, MGA | **25MHz 486 - 2185.00** 40Mb, VGA Colour

A few of of our bits:- Motherboards - 10MHZ XT - 35.00, 12MHz AT 75.00, 16MHz 386SX 259.00, 25MHz 386 - 481.00. XT Case - 40.00, Baby Tower 55.00, 150 watt PSU - 33.00, 200watt PSU - 50.00, MGA Card - 20.00, XT HDC - 35.00, ...and many, many other items.

Kits also include full assembly instructions and diagnostics, many configurations available. Full range of Barebone Systems and Add-Ons at equally competitive prices. So if you are thinking about building your own machine to find out what really makes a PC tick or to save some money and would like a kit that really is a kit - or if you are interested in our Barebone Systems or high quality add-ons- for a brochure, price lists, spec lists etc. contact:-

3TH Ltd, P.O. Box 482, Oxford OX2 9RP Tel 0865 791452 Fax 0865 794267

JAVIATION

VHF/UHF SPECIALISTS

With equipment from all the leading manufacturers such as AOR, Fairmate, Icom, Yupiteru, Sony, Signal, Uniden & others we probably offer one of the widest range of scanning receivers available and can therefore offer unbiased advice on the merits and, often, de-merits of the various sets available.

Whilst our principal expertise lies within the aviation field we welcome a "chat" regarding any aspect of the listening hobby.

CALL 0274-732146

AOR AR2500

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CONTEST NEWS

All rules should be read in conjunction with the General Rules published in December 1990 (VHF/UHF/Microwave) and January 1991 (HF)

HF RULES

LOW FREQUENCY SSB CONTEST 1992 RULES

1 The General Rules for RSGB Contests, published in the January 1992 issue of *Radio Communication* will apply to UK participants. Overseas entrants should calculate their multipliers on the number of different county codes received from UK stations.

2 Eligible entrants: Overseas (including EI) - all licensed amateurs. British Isles - Class A licence holders, who must be members of RSGB. Single- and Multi-operator entries will be accepted in all transmitting sections.

3 When: 1500GMT Saturday 1 February to 0900GMT Sunday 2 February 1992.

4 Sections: (a) British Isles, **(b)** Europe, **(c)** North America, **(d)** South America, **(e)** Africa, **(f)** Asia, **(g)** Oceania.

5 Frequency/Mode: British Isles stations must transmit within the limits 3600 - 3790kHz and 7040 - 7100kHz SSB only.

6 Contest Exchange: RST and serial number, commencing with 001. UK stations must also send their County Code as printed in the January 1992 edition of *Radio Communication* and other current RSGB publications. No points will be lost if the full information cannot be obtained from a non-competing station, but any contest exchange sent by that station should be logged.

7.1 Scoring:

(a) British Isles stations. Each completed contact with a station in section (b) will count 5 points, in sections (c), (d), (e) and (f) fifteen points and in section (g), thirty points. British Isles stations may not work each other for points.

(b) Stations in Europe (including EI) score five points for each completed contact with a British Isles station.

(c), (d), (e) and (f) Stations in the Americas, Africa and Asia score fifteen points for each completed contact with a British Isles station.

(g) Stations in Oceania score thirty points for each completed contact with a British Isles station.

7.2 Multipliers:

(a) British Isles stations - One for each country worked. The ARRL Countries List will apply, with the exception that USA call areas 1 - 0 (irrespective of prefix), VO1, VO2, and VE, VK, ZL and JA call areas will all count as separate multipliers.

(b - g) Overseas stations - One for each different British Isles County Code received.

8 Logs: Logs 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; County Code received (if applicable), multiplier (if new); 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 ELEVEN times the points claimed. 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 power used, as well as the usual details of equipment and aerials. Also don't forget the operator's name and address!) and a list of the multipliers worked.

Entrants making more than 80 QSOs are requested to include a check-list of the callsigns appearing in the log, sorted into alphabetical order and with either the serial number sent or the time of contact beside the callsign.

9 Declaration: Each entry must be accompanied by the following declaration, signed and dated: "I declare that this station was operated strictly in accordance with the rules and spirit of the contest, and I agree that the decision of the Council of the RSGB will be final in all cases of dispute." 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).

10 Address for logs: RSGB HF Contests Committee, c/o S V Knowles, G3UFY, 77 Bensham Manor Road, Thornton Heath, Surrey, CR7 7AF, ENGLAND.

11 Closing Date for logs: British Isles entrants, 24 February 1992; Overseas entrants, 23 March 1992.

12 Awards:

Single-operator:- The 1989 HF Contests Committee Trophy to the leading British Isles station. Certificates of merit to the second and third-placed British Isles stations, and to the leading entrants in each overseas section.

Multi-operator:- Certificates of merit to the leading groups in each section.

RECEIVING CONTEST

Rules as for the transmitting sections except where specified below.

2 Eligible entrants:
(a) British Isles - RSGB members only
(b) Overseas - all SWLs

Holders of transmitting licences for frequencies ONLY ABOVE 30MHz may enter the receiving section and UK Class B licence-holders are particularly encouraged to have a go! Single-operator entries only are accepted for the Receiving Contest.

7 Scoring: British Isles SWLs log only overseas stations in contact with British Isles stations participating in the contest. Overseas SWLs log only participating British Isles stations in contact with overseas stations. Scoring and multipliers as for the transmitting section.

8 Logs: Columns to be headed: Time GMT; callsign of station heard; report and serial number sent by that station; County Code sent by that station (if applicable); callsign of station being worked; multiplier (if new); points claimed.

NOTE. In the column headed "station being worked" the same callsign may only appear once in every three contacts except when the logged station counts as a new multiplier.

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

12 Awards: Certificates of merit to the leading entrants in each section.

SECOND 28MHZ CUMULATIVES 1991

1 Entrants: Single-operator, UK stations only. If desired, entrants may operate from a 'portable' location, but this must be the same for all sessions.

2 Dates & Times (GMT):
Session 1: Sunday 15 September CW 1900-2000, SSB 2030-2130
Session 2: Monday 23 September SSB 1900-2000, CW 2030-2130
Session 3: Tuesday 1 October CW 1900-2000, SSB 2030-2130
Session 4: Wednesday 9 October SSB 1900-2000, CW 2030-2130
Session 5: Thursday 17 October CW 1900-2000, SSB 2030-2130

3 Frequencies: CW 28.0 - 28.1MHz, SSB 28.5 - 28.6MHz

4 Sections: (a) CW, (b) SSB, (c) Combined.

5 Exchange: RS(T), serial number beginning with 001 on each evening (running continuously through both modes if appropriate) and County Code as published in *Radio Communication* or the *RSGB Call Book*. The same station may be contacted for points once on each mode on the same evening. Each day is treated as a separate event.

6 Scoring: Three points for each completed contact, plus a bonus of ten points for each new county and each new country (outside the UK) worked. Where a county or country is worked on both CW and SSB on the same evening, the bonus may be claimed twice. Entrants for the CW and/or SSB sections should submit logs for the **three** best *sessions* out of the five on that mode, and for the Combined section should submit logs for the **three** best *evenings* out of the five. A contestant may enter any or all sections as desired. Entrants' logs for sessions other than those constituting the entry would be most welcome as checklogs.

7 Entries: Entries must be postmarked not later than Monday 4 November 1991, and sent to HF Contests Committee at the address printed in the general rules.

8 Awards: Certificates of merit will be awarded to the entrant in each section with the highest checked score. Further awards may be made at the discretion of the HF Contests Committee if the entry for any section exceeds 20.

HF RESULTS

1.8MHZ SSB CONTEST 1991

Conditions for this event were not the best. Only the leading four stations made any serious inroads into the DX and the highest total of countries worked was just nine. Even so, there was a fair amount of activity at home, with Devon being the most-worked county. It was very good to see a total of 31 G0 calls appearing in the logs - but what happened to all your entries? The poor response in the Overseas section is understandable because of conditions, but, more disappointingly, not a single log was submitted for the Receiving section!

Log accuracy was very good, despite the fact that computers were used at only two of the sites. The one station not credited with the number of points claimed was actually rescored upwards after having made an error in adding up the multipliers. Congratulations to the team at G4CBQ for their winning margin of very nearly 50%.

Many favourable comments were made by competitors about the style of the contest. We shall have to hope that better propagation will entice more people to put pen to paper next year.

G4BKI

UK TRANSMITTING

Posn		Callsign	QSOs	Mults	Score
1	*	G4CBQ +	139	55	22935
2	*	G3SJJ +	105	48	15120
3	*	G4PKP	100	48	14400
4		G4RFR +	102	44	13464
5		G0BFJ	86	41	10578
6		G3FFH	82	41	10086
7		G4MID	77	40	9240
8		G4NVA	75	40	9000
9		G3BPM	72	41	8856
10		G8CA	69	37	7659
11		G4DBN	62	39	7254
12		G3UNM	54	29	4698
13		G0KAQ	45	26	3510
14		G3GMM	37	26	2886
15		G0OCE +	37	24	2664
16		G3NKS	32	22	2112
17		G3TKR	28	22	1848
18		GM3UM	24	20	1440
19		G3EIZ	23	19	1311
20		G3ZRZ	22	16	1056

OVERSEAS TRANSMITTING

1	*	EI9FK	90	43	11610

* Certificate Winner
\+ Multi-operator Station

LF SSB CONTEST 1991

Gremlins struck repeatedly at the publicity for this contest, with the result that the rules were not published until only a month before the event. Even so, it was surprising to receive only 11 UK Logs. Conditions were favourable and multipliers were there in plenty for those well-equipped for both bands.

In the UK Transmitting Section, G3NAS took second place overall, and the 1989 HF Contests Committee Trophy for the leading single-operator entry, thanks largely to his persistence on 80m, losing out by the narrowest of margins to G3VHB who produced an equally outstanding performance on 40m to top the listings. Veteran SWL David Whitaker took the honours in a disappointingly supported SWL section. Regrettably, no entries were received from the Americas or Australasia in the Overseas section.

The log from G3VHB was a joy to check, but in fairness it must be said that the standard of all the G logs was good. None had the adjudicator reaching for his crystal ball, and only one unmarked duplicate was found.

A number of overseas logs needed to be rescored; the changes to the multiplier scheme have evidently not yet been published in a number of countries. The publicity for next year's event is already on its way overseas, and the HFCC look forward to an increase in activity and entries in all sections in 1992. *G4IQM*

Leading Stations - Equipment:

G3NAS: TS940S + TL922, 40m rotary dipole, 80m loop, 2 half-wave 80m slopers.

G3VHB TS940S + TL922, 2-ele 40m yagi at 97ft, 80m Delta Loop at 97ft.

Non-EU Multipliers Worked:

G3VHB: 80m UA9, VE1,3, W1,2,4,8
40m BY, CE, CN, CO, EA8, EA9, FM, HC, HK, HL,JA1-9, JY, KP4, OA, PY, S7, TG, UA9, UH, UJ, UL, VE1-3,6, VO1, VP2M, VU, W1-5,8-0, XE, YB, YV, ZL1, ZP.

G3NAS: 80m UA9, UH, VE1-3, VO1, VS6, W1-5,8, ZL1,2
40m 4X, 9M2, A9, AP, CO, EA8, FM, HC, HI, HK, JA1,2,5-7,9, OA, PY, UA9, UH, UJ, UL, VE1-3,6, VO1, VK7, VU, W3-5,8, XE, YB, YV, ZL2,4.

UK Transmitting

Posn	Callsign	QSOs	Pts 80m	Mults	QSOs	Pts 40m	Mults	Score	
1	G3VHB	42	350	21	383	3354	81	377808	@*
2	G3NAS	90	855	36	334	2690	69	372225	+*
3	G0JSM	80	590	28	305	2287	60	253176	@
4	G4RFR	64	595	26	274	1785	48	176120	@
5	G5LP	20	99	9	208	1170	34	54567	*
6	G3NKC	19	105	11	125	819	34	41580	*
7	G3FNM	20	120	11	146	836	28	37284	
8	G4PKP	3	15	3	149	960	34	36075	
9	G3FFH	4	20	3	120	760	28	24180	
10	G3YCH	-	-	-	32	150	17	2550	
11	G3TKR	-	-	-	18	150	11	1650	

UK Receiving

1	RS25249	-	-	-	122	663	35	23205	*$
2	RS28198	6	55	5	59	409	27	14848	
3	RS20249	8	40	5	43	276	19	7584	

Overseas Transmitting

Posn	Callsign	Score	
1	UH8EA	47520	*
2	UL7JV	18270	
3	UB4IWL	17200	*
4	RB4MV	14147	
5	LA9CQ	14070	
6	UZ9CYP	7560	@*
7	PA0KHS	6402	
8	UA9CUA	5928	
9	CT1EEB	5220	
10	SM5ARR	3480	
11	SP5MNT	3450	
12	YU7LS	1712	
13	FE6DRP	1600	
14	LZ3YY	1520	
15	F6EPO	1395	
16	PA0KDM	1260	
17	UC2OG	1190	
18	RA3AOS	1162	
19	= Y23HE	1050	
19	= RA4PO	1050	
19	= RW3WC	1050	

Posn	Callsign	Score
22	FD1NBX	1001
23	LA2AD	720
24	YU7SF	649
25	LA3WBA	570
26 =	SP3RAV	550
26 =	YU7KM	550
28 =	EA4DDE	405
28 =	SM4BTF	405
30	UC2ABO	352

Overseas Receiving

1	UA1-113-630	17750	*
2	UA3-117-651	3600	
3	UA0-103-611	2310	*

\+ 1989 HF Contests Committee Cup
* Certificate of Merit
@ Multi-operator
$ QSOs deducted (General Rule 3)

Checklogs received with thanks from: EA5AEN, UB4XWK, UV3DRU, UZ1OWZ and UZ9MXU

HF CONTESTS CALENDAR - 1991

Aug 3/4	YO DX (CW/SSB)
Aug 10/11	WAE CW
Aug 17/18	SEANET (SSB)
Aug 25	ROPOCO-2 (Jul 91)
Sep 1	LZ DX (CW)
Sep 7/8	SSB FIELD DAY (inc IARU Region 1) (Jun 91)
Sep 7/8	JARL All Asia SSB (Jun 91)
Sep 14/15	WAE SSB
Sep 15	28MHz Cumulatives (Aug 91)
Sep 21/22	CQ WW RTTY
Sep 23	28MHz Cumulatives
Oct 1	28MHz Cumulatives
Oct 5/6	VK/ZL SSB
Oct 5/6	Ibero-American SSB
Oct 9	28MHz Cumulatives
Oct 12/13	VK/ZL CW
Oct 13	21/28MHz Phone
Oct 17	28MHz Cumulatives
Oct 19/20	Wkd all Y2 CW/SSB
Oct 20	21MHz CW (Jun 91)
Oct 26/27	CQ WW SSB

RSGB VHF CONTESTS CALENDAR - 1991

25 Aug	432MHz Fixed/SWL (Mar 91)
4 Sep	144MHz CW Cumulatives (Mar 91)
7 Sep	144MHz CW Cumulatives
7/8 Sep	144MHz Trophy/SWL (Mar 91)
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

A full list of 1991 RSGB VHF Contests appears on page 65, December 1990 *RadCom*. Dates of publication of rules in *RadCom* are shown in brackets.

ROPOCO-1 CONTEST 1991

ROPOCO-1 attracted 55 entries, two check logs and the usual host of garbled postcodes. Entrants are reminded that it is their ability to copy CW that is being tested, not their knowledge of the UK Postcode system. Those who 'corrected' codes received will find that points have been deducted from their score.

The excellent number of logs submitted meant that most contacts could be fully checked. Logs were good, although the usual transcription problems of distinguishing between 'O' and '0', 'I' and '1' etc were evident and many points were lost due to such errors. Thanks to all who used and supplied a callsign checklist. Some of those who didn't will be wishing they had, since five logs contained unmarked duplicates. One of these had *two*! Good dupe-checking is important . . . . had G3TBK spotted G3YLC's reappearance he would have been placed first!

Some contestants included both an HF Summary Sheet and a Band Cover Sheet (as used for NFD) - only the former is required - and two entrants did not include any summary sheet at all. The proper documentation does assist greatly in the checking process.

Conditions during the contest were reported as good to fair, although quite a few stations suffered from a high noise level. Those in the north found the going heaviest, although the duration and timing were welcomed by most. G5LP sums it up by saying "Still the best - long live ROPOCO!".

Subject to the usual ratification, G3JJZ will be awarded the Verulam Silver Jubilee Trophy for the highest-scoring error-free log and Certificates of Merit go to G3RTE, G5LP and G3JJG. CU in August?

G4IQM

Posn		Callsign	Score	
1		G3RTE	766	+
2		G5LP	726	+
3		G3JJG	724	+
4		G3NKS	696	
5		G4BUO	686	
6		G3WGV	684	
7		G3TBK	670	@
8		G3VYI	666	
9		G0IVZ	664	
10		G3RZP	658	
11	=	G3SQX	650	
11	=	G3KHZ	650	
13		G4ARI	638	
14		G4OGB	604	
15		G3IGU	598	
16		G3GLL	590	
17		G3OXC	576	
18		GM3YOR	572	
19		G3LIK	552	
20		G3BLX	548	
21		G3OLU	546	
22		G3JJZ	540	*
23		G3JYP	524	
24		G3JKS	520	*
25	=	G4CZB	516	
25	=	G4BLI	516	
27		G2HLU	510	*
28	=	G4KGK	506	
28	=	G3HKO	506	
30		G3JTG	486	
31	=	G5MY	484	
31	=	G3MA	484	
33		G3SND	478	
34		G3BPM	456	
35		GW3SB	452	
36		G3AWR	438	
37		GM4SID	430	
38		G3YMC	400	*
39		G3DPX	392	
40	=	G0IDE	390	*
40	=	GM3OSS	390	
42		G3JSR	386	
43		G0LZL	378	
44		G3GMS	348	
45		G3IZD	336	@
46		G4XPE	334	
47		G4BKI	322	@
48		G3YLC	312	@
49		G4ECI	304	@
50	=	G4ZME	282	
50	=	G3COR	282	
52		G4RLS	280	
53		G3KKJ	226	
54		GW4KVJ	186	
55		GM3UM	158	

Checklogs received with thanks from G2AFV & G3EAO.

\+ Certificate Winner
* Error-free log
@ Log contained unmarked duplicate QSO(s)

LF CUMULATIVE CONTESTS 1991 - RESULTS

The HFCC expresses its thanks to all those who made the not inconsiderable effort to enter these contests and to send in checklogs, and congratulates the leading entrants. An encouraging number of newcomers took part. Two overseas stations in particular contributed exceptionally to the event *and* sent in comprehensive checklogs - although not eligible entrants, their scores are nevertheless shown in the listings.

Quite a number of overseas contacts were made, the majority with Europe but with the occasional USA station surfacing here and there. The French Contest, coinciding with the fourth weekend, spiced things up considerably. More than 800 calls appear in the logs: entries and checklogs account for 53, and a further 17 were well-known contesters making brief visits. After deducting the overseas contingent, more than half the remainder appear regularly in RSGB contest logs. Indeed, a number of non-entering participants were active in all the sessions on all three bands. It doesn't matter if you can't make all the evenings (one operator made his 404 points in just 128 minutes on the air) - why not put in an entry and see your callsign in print!

Once again, thanks to all those who included comments with their logs - they are always very welcome, although usually too numerous to print. Suggestions for changes and improvements in the contest format (eg replacing the RST element of the exchange with the County Code, to add more interest) are always considered by the Committee, so keep them coming in! Those who support these contests seem thoroughly to enjoy them, so let's hope for another good entry next year.

G3MXJ

1.8MHZ

Posn	Callsign	7/1	15/1	23/1	31/1	8/2	Score
1	G3TBK+	-	168	171	-	192	531
2 =	G3JJG	158	-	159	ck	177	494
2 =	G3YAJ	-	-	153	164	177	494
4	G0IVZ	-	-	147	153	174	474
5	G3SWH	149	ck	ck	152	168	469
6	G0JNZ	-	-	132	147	186	465
7 =	G4ARI	ck	ck	149	147	165	461
7 =	G4OGB	153	-	ck	146	162	461
9	G3ZGC/P	162	135	-	157	ck	454
10	G3OXC	ck	ck	141	144	156	441
11	G0IDE*	123	ck	129	147	ck	399
12 =	G3BPM	138	ck	129	ck	129	396
13 =	G4ENA (D)	108	ck	-	126	162	396
14	G2HLU	119	ck	132	135	-	386
15	G3LIK	ck	ck	126	110	149	385
16	G3YLC	128	126	-	120	-	374
17	G3GLL	131	123	117	ck	ck	371
18	GW3SB	ck	ck	126	131	102	359
19	G3AWR (S)	98	ck	ck	141	108	347
20	GM3UM	ck	92	ck	119	131	342
21	G3GMS	ck	ck	102	120	89	311
22	GW4HBK	83	ck	99	97	ck	279
23	G3OLU	120	62	-	83	-	265
24	GM4SID	135	117	-	-	-	252
25	G3JSR	92	-	71	83	-	246
26	G3GMM	62	-	87	93	-	242
27	GW4KVJ	ck	-	66	83	90	239
28	G4BUO	-	-	-	105	125	230
29	G4JSN	63	ck	ck	72	69	204
30	G3LET*	-	-	147	-	-	147
	EI4VEJ(G3HZL)	-	-	120	139	144	403
	LA1IE	-	66	75	-	91	232

Checklogs received with thanks from G3EAO, LA8NC.

3.5MHZ

Posn	Callsign	7/1	15/1	23/1	31/1	8/2	Score
1	G3TBK+	243	262	248	-	-	753
2	G5LP	228	260	238	-	ck	726
3	G3SQX	ck	245	227	216	-	688
4	G3OXC	207	231	246	ck	ck	684
5	G3JJG*	-	237	234	210	-	681
6	G4ARI	213	246	221	ck	ck	680
7	G3LET	252	-	-	240	186	678
8	G0IVZ	ck	249	226	201	ck	676
9	G4OGB	209	213	215	ck	ck	637
10	G4KGK	213	215	192	ck	-	620
11	G3YAJ	195	216	205	-	-	616
12	G3GLL	210	-	219	ck	177	606
13	G3SWH	198	218	184	ck	-	600
14	G0JNZ	199	-	197	201	-	597
15	G2HLU	ck	209	192	195	ck	596
16	G4LZB	186	206	-	198	-	590
17	GM4SID	189	189	193	ck	-	571
18	G3LIK	-	162	203	191	-	556
19	G3YLC	168	183	190	-	-	541
20	GM3UM	177	176	171	ck	ck	524
21	G3OLU (D)	157	198	165	-	-	520
22	G0IDE	168	147	186	ck	ck	501
23	G3WKL	177	ck	172	149	-	498
24	G3GMS	161	147	174	-	-	482
25	G4BLI	-	-	174	154	153	481
26	G3JSR (D)	171	-	187	122	-	480
27	GW3SB	-	173	150	148	-	471
28	G4XPE	150	-	174	ck	138	462
29	G3AWR (S)	ck	152	159	150	ck	461
30	G3BPM	162	ck	164	ck	132	458
31	G3ZGC/M*	129	114	150	ck	ck	393
32	G4AXD	-	-	107	138	132	377
33	G4JSN	108	125	125	ck	ck	358
34	GM4WLN	116	120	ck	108	ck	344
35	GM0JKF	ck	90	ck	93	94	277
36	G3GMM	81	-	121	-	63	265
37	G4EBK	95	-	-	-	165	260
38	GW4KVJ	60	84	-	96	-	240
39	G3EAO (D)	-	-	72	99	54	225
40	G4BUO	-	84	90	-	-	174
	LA1IE	98	81	102	ck	-	281

Checklog received with thanks from G3WPK

7MHZ

Posn	Callsign	7/1	15/1	23/1	31/1	8/2	Score
1	G5LP+	215	233	ck	231	ck	679
2	G0IVZ (D)	210	168	ck	240	-	618
3	G3OXC	197	201	ck	216	ck	614
4	G0JNZ	201	207	-	182	-	590
5	G3SWH*	174	186	ck	216	-	576
6	G4LZB	162	192	-	203	-	557
7	G3TBK (D)	-	-	189	221	146	556
8	G3LIK	-	147	177	231	-	542
9	G4OGB	192	ck	156	194	ck	542
10	G2HLU	171	185	ck	180	ck	536
11	G4KGK	180	-	158	189	ck	527
12	G4ARI	162	-	161	198	ck	521
13	GW3WWN	162	185	-	165	ck	512
14	GM4SID	180	174	153	-	-	507
15	G3JSR	179	-	-	183	144	506
16	G3ZGC	ck	168	ck	195	135	498
17	G3YAJ*	153	-	159	180	-	492
18	G0IDE	144	174	ck	168	ck	486
19	G0OAA	161	168	ck	153	-	482
20 =	G3OLU (D)	-	108	147	207	-	462
20 =	GM3UM*	141	159	ck	162	ck	462
22	G4XPE	143	ck	ck	147	143	433
23	GW3SB*	153	-	135	135	-	423
24	G3AWR (S)	125	ck	129	153	ck	407
25	G3BPM (D)	110	148	ck	147	ck	405
26	G3WKL (D)	117	155	-	125	-	397
27	G0IEI	112	97	-	-	99	308
28	GM4WLN	96	99	-	108	-	303
29	G4ZYF	ck	ck	90	93	110	293
30	G4JSN	89	95	93	ck	ck	277
31	G0OGN	-	-	87	97	90	274
32	G3YLC	134	-	-	-	123	257
33	G3GMS	126	119	-	-	-	245
34	G3EAO	-	-	51	79	87	217
35	GW4KVJ	88	ck	-	35	87	210
36	G3LET*	-	-	-	-	87	87
37	G3GMM*	-	-	75	-	-	75
	LA1IE	ck	81	65	68	-	214
	EI4VIJ	-	-	-	195	-	195

Checklogs received with thanks from G3RWL, G3SQX, G3WPK and OK1DMS.

3-BAND COMBINED COMPETITION

Posn	Callsign	Score
1	G3TBK+	1840
2	G0IVZ	1768
3	G3OXC	1739
4	G4ARI	1662
5	G0JNZ	1652
6	G3SWH	1645
7	G4OGB	1640
8	G3YAJ	1602
9	G2HLU	1518
10	G3LIK	1496
11	G0IDE	1386
12	G3ZGC	1345
13	GM4SID	1330
14	GM3UM	1328
15	G3BPM	1259
16	GW3SB	1253
17	G3OLU	1247
18	G3JSR	1232
19	G3AWR	1215
20	G3YLC	1172
21	G3GMS	1038
22	G3LET	912
23	G4JSN	839
24	GW4KVJ	689
25	G3GMM	582
	LA1IE	727

\+: Certificate of Merit
*: Error-free entry
(D): Unmarked Duplicate(s) found
(S): Arithmetic Error/Claimed for too many evenings
ck: Checklog submitted (thanks)

DIRECTION FINDING

RESULTS OF COLCHESTER/CHELMSFORD D/F EVENT

Sunday 12 May saw the second qualifying event of the year.

The start was at Danbury in the south-eastern corner of map 167, Chelmsford & Harlow. Good signals were received from both transmitters with no competitors requiring approximate bearings.

Station A, G3WMM/P, was 20km to the north in woodland adjacent to a dis-used sand pit to the north of Braintree. A fair run in and dummy aerials provided on-site difficulties, while an exceptionally strong signal persuaded many into seeking a closer site. Old maps and new roads also played their part.

Station B, G3WHR/P, was only 8km to the west, in undergrowth adjacent to the railway line in the middle of Chelmsford. Town sites are always difficult to pin down and this was no exception. A deliberately attenuated signal gave nothing away whilst local geography ensured that any competitor who over-estimated the range either heard nothing at all or at best got a reciprocal bearing at 1400.

Five teams found both stations by 1600, with a further nine completing the course by 1630. Five teams failed to find both stations.

Congratulations to local lad and winner Phil Cunningham, and to George Whenham, both of whom qualify for the National Final.

RESULT

POS	NAME	CLUB	TIME AT TX 'A'	TIME AT TX 'B'
1	P Cunningham	Colchester	14.51	15.31
2	G Whenham	Coventry	14.52	15.32
3	P Lisle	Mid Thames	14.53	15.33
4	A Collet	Chelmsford	14.56	15.35
5	D Newman	Northampton	14.53	15.48
6	P Larbelestier	Colchester	16.05	14.42
7	B Pechey	Mid Thames	15.25	16.14
8	P Clark	Torbay	15.24	16.15
9	C Wells	Mid Thames	15.24	16.16
10	T Gage	Mid Thames	16.20	15.23
11	B Gray	Mid Thames	16.21	15.24
12	B Bristow	Mid Thames	16.22	15.06
13	G foster	Mid Thames	16.22.30	15.37
14	A Mead	Chelmsford	16.28	14.40
15	G Nicholls	Banbury	15.25	-
16	P Tyler	Mid Thames	15.57	-
17	C Merry	Dartford Heath	16.05	-
18	J Hall	Ripon	16.07	-

One competitor failed to find either transmitter.

SALISBURY QUALIFYING EVENT

Date: 18 August

Map: 195 (Bournemouth & Purbeck)

Assembly: 1300 for start at 1320 **BST**

Location: Matchams Viewpoint, 2 miles SW of Ringwood (no access from A338), NGR 134021.

Competitors requiring **tea** should notify Bert Newman, tel: 0722 743837 no later than 11 August.

BRISTOL '91

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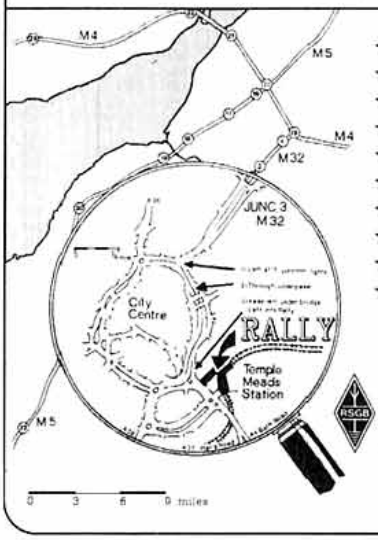
Sunday 15th. September 1991 at the Brunel Centre



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- ★ Packet Radio demo.

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Admission £1.00
(OAP's 50p)
Under 14's free

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Northern College of Education— Dundee

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RSGB Forum
Etc

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Admission £2.00
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Martin Hobson — GM8KPH — RLO Tayside & Fife
Tel: 0796 2140 or 0796 3408 (working hours)

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Warning: Members are advised to ensure that the equipment they intend to purchase is not subject to a current hire purchase agreement. The 'purchase' of goods legally owned by a finance company could result in the 'purchaser' losing both the goods and the cash paid.

FOR SALE

ATV eqpt for 70cm EDL 432 linear 2C39A PA + 2 spares: £75. PC Electronics ATV Tx 10W o/p: £60. MM ATV convtr: £25. MM 2m auto switch preamp: £25. W1SI WA01 professional monitoring Rx: £800. 18in b&w monitor steel cabinet: £15. HROM full set of coils: £140. All above in gwo. G4AKG QTHR (Sth Croydon) 081 651 5147.

BABY due, hence reluctant sale Sperry/Mitsubishi IBM at compatible, 40MB hard disk 1.2MB 5.25 floppy 2MB RAM SER/PAR, EGA monitor: £550. BBCB datacorder Hires/RGB monitor, s/ware, manual: £150. Pye PF8 UHF/FM h/held nicads xtalled RB10: £55. Several uncrystalled: £45 ea. Starphones UHF/FM h/held RB10 leather case nicads: £45. Several unxtalled: £15 each. Buyer collects, pays carr. G7DNU (Southend) 0702 205058.

BBC B computer C/W 80T disk drive and ROMS: £150. Trio TS700G 2m m/mode base, C/W LS, Vox and keyer: £250. RTTY TU: £20 or free with either of the above. Two Tait T196 UHF 25W mobiles: £25 each. Two VHF FM Pye Olympics: £15 each. Two new pace Linnet modems: £40 each. Any demo of the above. All prices are ono. Martin G4VKR (Flitwick) 0525 716547.

BBC Master 128 micro, Microvitec 1451 medium res RGB monitor, twin double-sided 40/80 switchable 5.25in disk drives, with PSU, Acorn teletext adaptor. All for £495ovno. Ken G1UWI QTHR (Harpenden) 0582 761393.

BIG signal equipment, HF linear, 3CX3000 tube, built to prof standard, vacuum variable tuning etc, 19in rack with 4.5kV, 1A PSU (legal limit easily): £500. TET 4-ele tri-bander on 60ft trailer mounted tower, with head unit, rotator and 100ft control cable and co-ax: £950. Due to weight and size, buyer collects or carr at cost. GM3ZSP QTHR (Cupar) 0334 53336.

COMPLETE Drake station. TR7 (upgraded to TR7A) with all filters, aux switch modules, NB7 board, PS7, RV7, MS7, SP75, MN2700, L7 linear and PSU, desk mic, all handbks, wkshop manual and extender boards. Mint cond with boxes if required: £2900ovno. Sorry no splits. Prefer purchaser to inspect, test and collect. Anticipated move to smaller QTH necessitates sale. G3RLN QTHR (Tewkesbury) 0684 296769.

COMPUTER Ericsson PCXT, 640K, 2x360K, floppies, 2 serial, 2 parallel, Hercules amber monitor, manuals, MSDOS 3.3 software: £225. New stabilised PSU, 48V DC, 32A continuous, overload and overvoltage protection, circuit: £95. Buyers collect. G3OGP QTHR (Billingshurst) 0403 822275.

CUSHCRAFT R5 vertical, new: £200. SX200 scanner: £130. TA32: £25. AM/FM signal generator: £35. HF 400W linear, 3 x 6KD6: £130. G3TSO (Cirencester) 0285 750532.

DRAKE TR7 with WARC bands, FA-7 fan, 1.8kHz and 500Hz filters, 7077 desk mic, PS7 power supply, MS7, spkr, RV7 remote VFO, full service schematic manual: £950ovno. Tom GM3EDZ not QTHR (Glasgow) 041-882 5753. Only just moved, please only genuine interested buyers.

BBC MASTER 128 with pair disk drives, console, manuals, books, programmes etc, mint cond: £220. G0HRR (Harlow) 0279 426647.

BBC Model B 1.2os Issue 7 Watford 1.43 DDFS 40/80 Track DD/DS drive microvitec colour monitor Pace Nightingale modem Viglen cartridge socket plus spare cartridges. Cables books and software: £400ono. Pete G0BYI QTHR 0543 676628 (after 6.30pm).

FT101ZD all bands, very clean: £350. FTV901R tnsvtr 2m & 70cm modules: £180. FC902 ATU: £100. Tono MR150W 2m linear: £75. BNOS LPM432-10-50 linear: £50. Tono Theeta 777 RTTY/Amtor inc s/ware for BBC/Master: £100. Elevation' rotator KR500: £45. Weltz SP300 station meter: £30. Altron 60ft tower floor/wall fixings, NO planning permission reqd for this tower: £375. (Swansea) 0792 298304.

FT980 with CW options fitted, mic, h/book, works manual, first class tcvr: £875. FT480R 2m m/mode, mic and desk mount (not used mobile): £270. FRG7 rcvr, unmodified with nicad pack: £110. Microwave Modules 432/28s tnsvtr: £95. SEM twin paddle key: £12. Airtech T100 dual beam transistorised indicator: £35. Control unit for HAM-2 rotator: £20. Smith Corona professional dot matrix printer D100: £75. Firmware specs for Amstrad CPC series, Cat Nos 968, 158A and 157: £15. All items in vg condition. G3FYS QTHR (Ringwood) 0425 479226.

G3AAG closing down /A station and sells little used equipment in ex cond. Ten Tec Paragon tcvr with power supply, 500cps and 1.8KHz filters, h/book, approx 60 hrs use, as new: £1350 (Save £875). Heil HM5 desk mic: £45. Azden PCS2000 2m FM tcvr, as new, remote cable for boot mounting, brckt, mic, DTMF keybd, h/book: £140. RCA/Microwave modules, ASCII keybd with MM100K ASCII to Morse cnvtr: £90. Microlog 6800 terminal/computer with Sanyo 9in monitor. RTTY/AMTOR/PACKET, all manuals and application board No. 2 (cost £1470) accept: £470. AEA model TI-1 bargraph tuning indicator 175/425/850cps: £30. Drake R-4C Rx, with Sherwood CF-600/6 filter and PS-4, S/N17173, completely overhauled by Drake, as new: £290. Ferrograph Series 7 reel to reel tape recorder, vgc: £200. Above equipment in storage London. Write Mrs E. Kemp, 52 Edwin Road, Twickenham, Middsx TW2 6SU.

HAM II rotator complete with 'CDE' transmit/receive direction control/brake release CW cable, vgc: £120. G400 rotator with SU 4000 direction control unit, as new: £75. V200A sensitive valve voltmeter 0.01V to 1000V with probe: £35. (Lincoln) 0522 750316.

ICOM 781, seven months old, only 15 hrs use, save £1000. Still under guarantee: £3600ono. (Jersey) 0534 24119.

ICOM C12GE 23cm FM h/held xcvr, remote spkr/mic, 4 NiCad packs, charger, r/duck, mint, bxd: £275ono. G4BLT (Wakefield) 0924 255515.

KENPRO KR5400 AZ/EL rotator and dual control unit: £220. Rotator control cable 8 core RC8W 30m: £15. Welz SP220 Peak/RMS Power/SWR twin meter: £50. Hi-Mound HK704 straight key: £12. Alphacom Printer type 42 with type 1842(RS232) interface: £25. All items new and boxed. G3FYS QTHR (Ringwood) 0425 479226.

HEATHKIT SB230 Lin Ampf with two spare 8873 four delay voltage tubes just been serviced by KW. Offers. G2DRT 0494 814240.

KENWOOD TL922 linear 1.5kW, as new: £925. TS140S filter: £675. Altron tilt-over tower: £250 PS3OXM Daiwa power supply: £100. 2kW rated Tentac 229 ATU: £150. All buyer collects or arrange carr, regret no offers. All above less than one year old. Rick, G3YEC (Colchester) 071-872 6210 (W), 0206 210710 (H).

KENWOOD Trio TS430S, mint, bxd, handbk, orig owner. FM430, 270Hz, 1.8kHz, 6kHz xtal filters. PS-430 power supply, mint. Matching spkr. DC cable. Amtor modification by Lowe Electronics: £650. Silent Key sale. TS930S. Internal AT-930 auto antenna tuner. SSB filter, gd cond, gwo, h/book: £899. Datong FL3 with Datong power supply: £85. Datong Woodpecker blanker: £45. 144MHz cnvtr: £15. G3HSW QTHR (Wylam) 0661 853676.

KENWOOD TS-790E all mode triband tcvr, 2m and 70cm, little used and mint cond: £1050. Matching PS31 power supply: £120. (Woking) 04867 4732.

KENWOOD TS140S HF tcvr and general coverage Rx, 110W PEP SSB AM FM: £675. G0LFF QTHR (Burgess Hill) 0444 48423.

KENWOOD TS440s C/W auto ATU + 1.8Khz filter, MC425 mic, manual, 18 mths old, little used, mint cond, as new, one careful owner: £900. FT101ZD MkIII with FM (FT227), all bands, fan, 2 mics, wkshop man, spare valves, ex cond, air test or inspection welcome: £400. GM3NVU QTHR (Falkirk) 0324 813349.

KENWOOD TS830S incl both 500Hz CW filters, plus remote VFO230 and mic, vgc: £800ono. GW3VOL (Cardiff) 892020 (eves).

KENWOOD TS850S + auto ATU, unused, in box, duplicated gift!: £1250, or P/X 757GX or similar plus cash. Full warranty and receipt ex Lowe, no time wasters. Wanted telescopic tower. GW3XCR (Swansea) 0792 816088.

KENWOOD TS930S plus internal ATU and 500Hz filters as new cond, 30 months old: £1100. Yaesu FL2100Z all bands amplifier, mint cond: £485. Both items carr extra, orig packing, one careful owner. G3RCU (Christchurch) 0202 475048 (after 6pm).

KW107 ATU with dummy load, vgc: £75. Racal RA17L clean gwo: £175. Eddystone 750 500kc/s to 31Mc/s original, no mods: £45. BC221: £10. All with manuals, ono. (Wirksworth) 0629 823934.

PNEUMATIC mast 30ft with built-on stand, as new: £200. 40ft heavy duty Clarke mast with legs and full kit: £275. For the serious microwave man ex-military satellite comms trailer, fitted large micro adjustable tripod 4ft microwave Andrews dish side tent 2in ball hitch for car towing, mint: £1000ono. Microwave B70 military tcvr complete: £250. A14 tcvr military: £250. (Redditch) 052 789 2282.

QRT sale TS140S: £650. AT230: £120. MC85 mic: £60. FDK750X: £120. BNOS power supply 24A: £95. Realistic 2001 scanner: £50. MM linear: £50. Telescopic mast 32ft rotator keys, all bxd, as new, plus lots more. Offers for complete shack or separate buyer inspects/collects. Paul G0EOS (Birmingham) 021 747 7616.

KENWOOD/TRIO TL922 2kW linear, absolutely perfect, hardly used: £975, you collect. G3UML QTHR (NW London) 081-202 7071.

QRT sale. Trio TW4000A 2/70 tcvr, little used, ex cond: £395. Technodrive 2-channel digiprop radio control Rx/Tx, new: £15. Yaesu FF-501 HF low-pass filter: £10. Yaesu FP757 switching PSU: £45. Hansen FS-711H 1.8-30MHz mobile PWR/SWR meter: £15. Hansen FS-7 144-430MHz PWR/SWR meter: £15. Weltz CH-20A coax switch DC-900MHz: £10. Carr extra all items. G4UEN QTHR (Southampton) 0703 433837.

RACAL RA17 x 2 gen coverage Rx, ex cond: £145 each or ono. G1POJ (Bristol) 0272 744157.

RADCOM back issues. 1975 to 1983 inclusive (bound): £10 each. 1984, 1986, 1989 (unbound): £8 each. Transit exclukded. G4ULI (Peterborough) 0733 380658.

SCOPE Philips 0-15MHz, dual trace leads probe manual, ex cond: £95ono. AVO9 batts leads: £55ono, ex cond. IBM compat 286-12 40MBHD 1.2MBFD data tape streamer EGA colour, ex cond: £475ono. Printers DMP1: £40. HR5: £25ono. Computer LSI Z80/8088 10MBHD 720KFD mono manuals DOS 2.1 CPM86-80: £145ono. Good cond. (Coventry) 0203 450476.

STABILIZED PSU 48V DC 32A with overvoltage and overcurrent protection: £95. Sectional 42ft mast guys/stakes/halyard/top/bottom fixings, all in canvas bag: £89. Buyer collects. G3SWC (Horsham) 0403 822444 (eves).

SWAN PSU readvertised Model 5A 16-18amp pair 2N3055's built-in spkr, ex cond, used to run FT707: £65. Boots PT1000 ptble typewriter, bxd, as new, 18 mnth warranty outstanding, save £18 on new price: £42. John (London SE) 081-857 8096.

TL922: £650. Dressler D200S 400W 2m PA new 4CX350: £450. MM432 100W 70cm PA : £175. MM432/28 tnsvtr: £65. PSU for 4CX250's fully screened all supplies :£50. PSU 28V 15A regulated: £50. 2m tnsvtr with SRA1H mixer, modular construction, ODBM 28MHz input 80W 144MHz output: £80. 30MHz LPF 1kW: £10. Bird 400MHz LPF: £10. Many high power components. G3XBY not QTHR (Solihull) 021 744 8675.

TRIO TS430S with CW and FM filters incl PS430 PSU: £750. Icom IC505 6m ptble tcvr with ni-cad batteries: £350. Heathkit HW8 QRP tcvr with sealed lead/acid bttry and chrgr: £100. SX-200 scanner Rx: £90. BBC B (Issue 7) with dual 80/40 disk drive, ATPL sideways and Sanyo RGB monitor: £290. Microwave modules ATV conv: £15. Airmec HF signal gen: £20. Bound RadComs 1973-80: £50. Encapsulated power supply 240V input dual 15V @ 200mA o/p: £15. Casiotone 201 four-octave organ - offers? Temperature controlled soldering iron: £5. 3.5 octave organ keyboard - offers? Ex GPO multimeter: £15. Loads of eqpt, cases, components, wire coax, magazines, PE PW BBC computing, valves, chips. (Sae with requirements - I need the money!.) (Dartford) 0322 277401.

WESTERN 3-ele antenna slightly damaged: £50. Yaesu FT DX401 tcvr: £250. Buyer collects and inspects. RTTY teletype unit (GPO) - offers invited. (Chorley) 0257 279798.

WATFORD, Herts, semi detached house in gd decorative order, comprising 3 bedrooms, 18.5ft x 12ft lounge, dining room, kitchen, bathroom, sep toilet, 100ft gdn, 30ft mast on tabernacle, close to schools and bus routes: £79,750oiro. No chain. (Watford) 0908 502957.

WELZ ATU and PSWR, unused: £95 pair. Hygain antenna TH2 Mk 3, new, in orig packing: £150. G3NJP QTHR (Truro) 0872 501487.

YAESU FRG9600 with HF conversion fitted. 100kHz to 950MHz HF VHF UHF, all mode, PSU and mobile mount: £425ono. (Tonbridge) 0732 366704.

YAESU FT400C SSB tcvr, 10 chnnl 100W 1.6 to 18MHz, MPT type approval FP400C AC power supply, dipole antenna with balun + 50m coax. All new in orig packing: £500. G3NFV QTHR (Leatherhead) 0372 372587.

YAESU FT767 21m 10W m/mode module, ex audio reports: £110. Datong Morse Tutor: £30. (Bristol) 0272 427668 (between 7pm and 8.30pm please).

YAESU FTV901R 2m/6m/70cm tcvr: £320ono. Icom 505 50MHz tcvr 3/10W output scan split VFO etc: £350ono. 2m microwave modules pre/linear 10W drive 100W out: £90. Butternut HF6VX 6-band vertical ant plus 160m coil: £150. 6m module wanted for Yaesu FT726R 432MHz linear preamp m/m 10W input 50W output: £75. No time wasters please. (Brighton) 0273 462696.

YAGI MM3 tribander, 40ft winch up and tilt with rotator cage Yaesu G400 rotator, all as new. Offers. (Okehampton) 0409 221063.

(1)IC781 tcvr: £3000. (2)TS940S tcvr with ATU: £1500. (3) Kenwood station monitr SM230: £450. (4)Kenwood SP930 spkr with filters: £50. (5)Kenwood AT230 aerial tuning unit: £90. (6)Datong FL3 m/mode filter: £85. (7)Homemade keyer: £50. (8)Starmaster memry keyer: £50. (9)AEA Morse machine: £50. (10)AEA Morsematic: £50. (11)MFJ Grandmaster memry keyer: £50. (12)8749 microcomputer contest keyer: £50. (13)MFJ 204B antenna bridge: £45. (14)Trio DM801 dip meter: £40. (15)Daiwa CS401 4-way coax switch: £25. (16)Kenwood MC50 mic: £35. (17)Tentec 705 Electret mic: £15. (18)Drake base stn mic: £15. (19)Icom HP2 hdphones: £20. (20)Fritzel Nr.1014 1:6 balun: £25. (21)Daiwa NS660 SWR & power meter: £50. (22)Leader LSG17 signal genrtr: £40. (23)RS Stabilised Power Supplies LOW Voltage 592155 (two): £10 ea. (24)ATA PK232 Data Controller: £160. (25)JRC NV88 spkr: £25. (26)Pfaff Silverblue tubular lattice tower, 4 telescoping 10ft sections, tiltover, baseplate mounting, with rotator head, Yaesu G800 SDX controller & rotator, 3el tribander beam 14/21/28MHz, 2el duobander beam 18/24MHz: £500 the lot. (27)Altron CM35 slimline telescopic tiltover mast baseplate mounting: £250. (28)Cushcraft A3WS beam 18/24MHz, new, bxd unopened: £130. G3BEX (Bucks) 0494 675 097.

132FT long wire possible! QTH 3-bed semi, cnsvtry, long gdn, urban setting, fertile soil, rotovator, garage, sea. G3DGT not QTHR (Portchester) 083 483 369.

4x9 ELEMENT Tonnas, ex cond: £70. 13cm LMW tnsvtr (2M IF): £60, 70cm Sota tnsvtr (10m IF): £40. New SV@10A tnsfrmr: £10. 8A Variac, ex cond: £15. Mutek 70cm Preamp 100W switching: £30. MM144/28 tnsvtr: £40. 28MHz Magmount whip: £10. David, G0LBK (Rotherham) 0709 818128.

50MHZ 120W output solid state linear, fully metered, professionally home brewed and very linear: £130. 70MHz Pye synthesised monitor receiver mains powered: £25. All vgc and little used. (Northampton) 0604 862803.

A1 CONDITION Hy-Gain TH3JNR beam antenna, unused, in orig packing, bargain at £150. GM4KWA. (Stornoway) 0851 702431.

AERIALS Capco AMA6 12-40m HF loop: £200. G4MH 2ele minibeam: £50. Both nearly new, vgc. Dave G0OIL (Sheffield) 0742 529975 (daytime) 0246 414995 (eves).

AIRSPEED indicator Karnish instr AC131: £40. Collins mechanical filter 455kHz BW3dB 2.7kHz with data: £25. Pye pilot airband mobile tcvr with service sheet: £35. Que Dee 144MHz 15-el Yagi: £35. SSB Electronics 70cm 100W linear amplifier 432-100: £95. (Horsham) 0403 864222.

ALTRON CM35 35ft galvanised telescopic tiltover mast complete with base wall bracket etc: £175. Buyer collects. G3IIW QTHR (Tunbridge Wells) 0892 30740.

AMSTRAD 464 computer, colour monitor, disk drive, joystick, DMP 2000 printer, plus s/ware, tapes, disks, Rembrandt Mini Office II: £250. (Southend-on-Sea) 0702 353676.

AMSTRAD PC1512 DD colour monitor, keybd, mouse. AEA PK232 tnc, all leads, manuals, mint cond, orig bxs: £650. No offers. (Plymouth) 0752 403593.

AQUARIUM 7.5ft long, 25in high 18in deep. All glass construction on mahogany 20in high cabinet. Absolutely complete with two Ehiem filter/pumps - pre-filters - GRO - lux and daylight lighting, heaters, rocks, plants and assorted tropical fish (about 80). Cost £1200 two yrs ago: Offers near £450. Transport arranged. Linear 13.8V fully reg PSU (G3ISD) design: £100. Linear 4x811A, 75% completed project, smart case (front panel complete) all parts required in package incl trnsfrmr for PSW: £50. Wide spaced capacitor 25-75PF: £70 Johnson r/coaster 7in x 3in: £10. (Grays) 0375 390268.

AR1000 scanner, nicads, chrgr case, box, as new: £195. 2m digital h/held Tx/Rx: £85. TS820: £380. (Thanet) 0843 294446.

ATU 10-160m CapCo components, immac finish, bargain: £105. Station now QRT. G3RWQ QTHR (Worcester) 0905 54303.

BBC A3000 plus colour monitor, 2MB RAM plus PC emulator, also Morley teletext adaptor and Pres DFS podule: £1000. G0FXS (Stafford) 0785 44023.

BBC-B Issue 7 40T disk sideways RAM, Wordwise Plus, Morley teletext adaptor, TEC daisywheel printer: £160. BBC-B not working: £30. TEC daisywheel printer, new, in box, with tractor unit: £60. Yaesu Yumi monitor: £60. Collins 51J-4 Rx, mint: £200. Cue Dee 15x144A, new, bxd: £80. Jaybeam PBM 18/70cm: £20. MET 50/3: £25. KLM KT-34A 6ele tribander. (Nr Norwich) 095378 8376.

BIRD Thruline power meter model 43 with 1GHz insert, bxd as new: £99. (Southport) 0704 78738.

BNOS linear amp 144 LPM 100W hardly used: £130. BNOS power supply: £130. Both as new. Betty G1UAQ (Ilford) 081 5502502.

BNOS LPM2m 180W linear: £200. Standard C500 2m/70cm + accessories: £350. CA-2x4 max 2m/70cm colinear: £60. Valve HT PSU 1500V: £100. Colour video camera: £80. Coax H100 25m length 6 off: £10 each. Televerta CM7122 VHF in UHF out: £20. Aerial bearing 1.5 mast: £15. P. Howarth G6OWI, 120 Ormerod Street, Accrington, Lancs BB5 0QG 0254 382423.

BOXFORD lathe, cabinet stand, two chucks, numerous tools: £350. Moore & Wright tools micrometers 0-1in 1in-2in 2in-3in 3in-4in TrySquare No414, various gauges and callipers: £50. Olympus OM10 35mm SLR, manual adaptor standard 50mm, telephoto 70-150mm, wide angle 28mm lens several filters: £150. Eagle PA Amp model TPA45, 12 & 240V O/P 30W: £40. 5mm thick brass sheet 24in x 48in: £10 sheet. Buyers inspect and collect. Peter G3UXH QTHR (Hoo, Rochester) 0634 250562.

CHANGING hobby. Yaesu FT102 in vgc, recent (May) KW overhaul, written report, features SSB, CW, FM, AM, 1.8 - 30MHz with WARC bands, plus KW ATU and desk mic: £500ono. Brian G4RYC (Gravesend) 0474 322350.

COLLECTOR'S item? CR100/8 (B28) Rx, plug-in modification using later valves. Manual and operator's instructions. Spare valves: £35. Alan Hargrave, G0AXA (Cheam) 081 644 0126.

COLLINS KWM2A + CC2 + PMZ: £400. 30L1 + CCZ inc new tubes: £400. MN2700 + B1000: £220. TR7 + DR7 + AUX7 + 4 filters: £400. PS7: £100. RV7: £50. MS7: £40. Nems-Clarke R1302B + REU300C: £320. FT290R + case + mount + mic + Mutek + nicads: £300. MML144/30LS: £50. SR165Rx: £40. Plessey PRS2282 Rx: £2500. 4CX1000OD: £50. SM3: £50. 75A3: £200. 1.5KVA generator: £150. R4C: £280. KW2000: £40. FL3: £75. Chris G8JFJ (Portsmouth) 0705 596836.

COMMODORE C64, Commodore modem and many extras. No reasonable offer refused. Also Amstrad PC modem. Steve G6XJU QTHR (Chandlers Ford) 0703 268682.

COMPLETE station, used only a few months. Moved to flat and cannot use. Kenwood TS440S w/built-in tuner, spkr, power supply, electronic key, mic and Cushcraft R5 vertical antenna. All in perfect cond. Station price: £1100ono. (London) 081-940 0510.

DATONG Model ASP RF speech processor for FT101ZD with leads: £60. Scarab MPTU-1 RTTY tuner for 48K Spectrum: £25. (Motherwell) 0698 53394.

DOT matrix printer Tandy DMP 106, serial/parallel, tractor and friction feed, mint cond, orig packing: £60. Ted G0GBT (Sandwich) 0304 611744.

DRAGON 32 less power supply, otherwise wking: £22.50. RadComs 1969-1989 - offers. Telequipment D31 oscilloscope, wking: £45. (Newhaven) 0273 514465.

DRAKE R-4C and T-4XC with PSU: £450. Collins 30L-1 linear: £550. Nevada TM1000 ATU: £100. (Swansea) 0792 390233.

DRAKE SPR4 Rx: £180. MS4 spkr: £30. Atlas 180 Tx/Rx AR230 PSU: £250. Datong UC1 upconvertor: £80. Jaybeam Q4/2m quad: £20. Acorn Atom computer: £30. Grundig TK5 tape recorder: £15. EMI TR52 Studio tape recorder: £40. G4DZS QTHR. (Chandlers Ford) 0703 261638.

DRAKE TR4 RV4 MC4C MS4: £350. Heathkit AG9V: £10. Kent keyer: £25. Katsumi keyer: £25. AVO minor: £15. (Huntingdon) 0480 300737.

DRAKE TR5 250Hz CW filter PSU: £500. Kantronics KAM m/mode packet AMTOR RTTY TNC: £200. G3PJT QTHR (Cambridge) 0223 263137.

DRAKE TR7, PS7, all selectivity crystals, noise blanker, fan, Shure mic: £750. RV7: £150. L7 2KW amp: £850. MN2700 ATU: £300. All excellent. R7A 0-30MHz Rx, all filters, mint: £1250. R4B, TX4B, MS4, mint: £495. Wkshop/manuals, extras, boxes. (Leamington Spa) 0926 313534.

DRAKE TR7A, as new, used only as spare, complete with PS7 power supply: £775. G3AAE QTHR 081 508 3669.

EGA graphics card and Princeton 12in colour monitor. Card OK, monitor very dim, needs attention: £85 pair. Sorry no split. G0NSH (Welwyn) 0707 331340.

FAIRMATE HP-100 1000 channel scanner, vgc, orig packing and accessories: £210. G8PRR (London N4) 081-340 4139.

FT101B with CW filter mains or 12V DC operation with FV101B and matching spkr, all in gd wking order: £250. G3HZG. (Redditch) 0527 27914.

FT101Z complete with narrow CW filter, fan, FM board, mic, and wkshop manual, latest Rx front end: £350ono. (Newark-on-Trent) 0636 86421.

FT101Z WARC, FM, CW filter, fan: £395. Westminster 70cm mobile, crystalled, tone burst, complete: £40. Pye Olympic 70.26/45 FM, complete: £35. AEL3030 S/state SSB tcvr, VFO 40/80m, 100W, mains, 12V, complete: £95. AEL3015 (similar) single chan 6990KHz, 12V, wking: £45. Tristar 777 converted 10m, m/mode, RA permit, C/W 20W linear: £70. Carr extra or collect. G3VKM QTHR since 1980. (Norfolk) 0502 77 622.

FT101ZD CW filter etc: £500. Trio 120S: £300. m/m 50W 2m linear: £80. Scope Hameg 203-6 20MHz dual trace: £250. (Tyne & Wear) 091-415 1550.

FT101ZD in excellent condition: £300. (Minehead) 0643 703754.

FT101ZD, FC902 mint cond with manuals and mic: £575ono. (QTHR as G1SWG) (Liverpool) 051-933 8796.

FT290R m/mode Mutek nicads chrgr case scratched lamp not wking, otherwise pwo: £175. 2m 7-el met: £10. G0NOE QTHR (Halesowen) 021 550 6050.

FT290R m/mode. nicads, chrgr case, r/duck, Mutek pre-amp, 2A PSU, Daiwa linear, Heatherlite boom mic, SWR meter, spkr, 12V rechargeable bttry, Yagi, HB9CV, mobile whip: £230. Howes factory-built 2m to 80m tnsvtr: £50. BBC Master: £250. (Cardiff) 0222 843493.

FT290R Mutek F/E nicads case chrgr m/mount: £265. m/modules linear 144/30LS: £50. FT790R with Alinco linear: £250. FRG7700 with memory fitted: £275. Heatherlite m/mic for 290/790: £15. Icom 32E dualbank h/held with m/mount cig lighter lead chrgr Heatherlite m./mic: £325. Daiwa p/supply 3 to 15V 10A: £60. All items with manuals bxs and ex cond. Peter G6WWV QTHR (Blackpool) 0253 591605.

FT480R 2m m/mode, cradle, bxd, manual, ex cond, little used: £285. (Keelby) 0469 61068.

FT690 Mk2 with h/brew 15W linear, very little used: £320, with 5A PSU: £335. G4JQY QTHR 061 432 7310.

FT690IIR FL6020 base hand mics plus 5-ele beam coax etc: £340 or consider similar 70cms eqpt or WHY. G7ADD QTHR (Skelmersdale) 0695 33095.

FT7 plus audio filter and power level control: £250. Lake DTR3 factory built: £85. Jon, G4LJW (Bristol) 0272 634167.

FT726R 2m, 6m, 70cm satellite modules, and desk mic: £750. FT2700RH 2m-70cm mobile: £200. FT730R 70cm mobile: £180. M/M 2m preamp 100W: £45. Vic G6RWV (Maidenhead) 0628 21765.

FT757GX, FP757GX, FC700, bxd, manuals: £500. MMT 28/144 10m/2m tnsvtr: £175. MMT 144/432R 2m/70cm tnsvtr: £70. G4LGK not QTHR (Bognor Regis) 0243 586743.

FT767GX with 2m and 6m modules fitted, boxed: £1100. John (G4TLS) QTHR (Horsham) 0403 53051.

FT790, as new, boxed: £200 or swap HF. G4GOC QTHR (Marple Bridge) 061 427 5303.

HEATHERLITE Explorer, used ten hours only, eight tuned bands ALC slow motion drives 3/500's full spec: £850. (Grimsby) 0472 882937.

HEATHKIT DX100 150W AM/CW 10/160m Tx 2x6146 PA int PSU: £40. Cossor D/B scope: £20. G3KBT QTHR (Liverpool) 051 220 5873.

HI POWER variable capacitors, 300 MMFD, 2500V for linears ATU: £4.50 ea. Crystal 'stick' mics with leads: £2.50 ea. 400 MFD 325V electrolytic capacitors: 50p ea. All incl P&P. G2DOJ QTHR. 081 452 9436.

HISTORICAL bulletins. Bound volumes T&R 10-16 1934-1940, loose volumes 17-20 two months missing: £65 incl carr. Eddystone 358X/B34 Rx with coils and psu: £50. Buyer collects. Wanted: copies Television Magazine 1983-1988 inclusive, also R&TV Servicing 1980 onwards. Willoughby (Wadhurst, E Sussex) 0892 883859.

HRO-M Rx 5 coils: £55. Pye 'Hamble' marine Tx/Rx: £55. KW2000B, VFO4B needs attn: £120. Blackstar video pattern generator: £100. 'Data Products' daisywheel printer, needs attn: £15. Monochrome TV monitors 20in: £20 each. Shack clearout, callers only. Chris G4RBR QTHR Luvly Jubbly! (Twickenham) 081-891 1263.

HYGAIN Explorer 4-el tribander, new, bxd: £350. Planning refusal! Kenwood TS850S new: £1250. FP700 PSU: £95. KW1000 linear: £275, poss take 757/747 etc. All CW boxes & mans, plus receipts. GW3XCR. (Swansea) 0792 816088.

IC751A, 500Hz and 250Hz filters cascadable, RC10 keypad, mic, bxd with manual, vgc. (Northampton) 0604 766325.

ICOM 290D 2m m/m, immac: £350ono. Pye A200 E Band linear: £30. Kenwood TH215E h/held: £145. Pye 201 Olympic 70.260 xtal fitted: £30. Pye 201 Olympic no xtal E/band: £17. (Caernarfon) 0286 830072.

ICOM 471"H" The Big One 10-75W variable, 70cm m/mode, programmable off-sets for all Continental and UK repeaters, all mode squelch. If you are a serious 70cm operator this is the ideal DX machine, with mic, ex cond, orig carton: £825. FT707 owners new FM-Board: £45 plus conversion information 160m 6m, also external VFO, high quality multi-meter, gd cond: £25. (Norfolk) 0328 710641.

ICOM 471, 25W 70cm base stn: £400. FT77 with FM: £325. Yaesu 221R, digital display and Mutek front end: £325. 20m length LDF450: £15. EHT tnsfrmrs and capacitors suitable for 4CX250 and 8877 PSUs 4CX250 valves (new) ITT: £15. Co-ax relays 13 & 8V, 10A PSU: £15. QQV640 valve with base: £10. (Brigg) 0652 54222.

ICOM 745 tcvr: £600; AT500 ATU: £400. Ameritron AL84 HF linear 600W: £400. All mint cond. (Harrow) 081-907 7977

ICOM 751A IC500 ATU IC15PS. Extras fitted CR-64 high stability crystal unit. ICEX310 voice synthesiser unit. RC10 frequency controller: £1575. Alan G4YYD QTHR (Bury) 061 797 7893.

ICOM IC251E, Mutek F/E plus desk mic, vgc, best offer over £400 gets. Not to be missed. Carr extra. G8IQO (Eastbourne) 0323 783123.

ICOM IC2E 2m h/held with charger, extra PSU IC-BP4, handbk: £125ono. 5**LAMBDA**/8 whip with magmount, long cable: £10. Daiwa CNW418 500W PEP antenna tuner/PWR/SWR meter, handbk: £85. Box of 50 valves, some old, some new: £20ono. 1950's radios, Roberts bttry portable RTI, Pye AC 3-band PT75A, Bush stereogram SRG81: £15 eachono. G8MY QTHR (Farnborough) 0252 511086.

ICOM IC735: £750, Datong D70: £40. Icom IC290D: £395. Icom AT500 tuner: £350. NAG linear 144MHz 250W: £350. PK232MBX: £250. Paddle key & keyer: £50. 6m linear 4CX250B: £250. 23cm tnsvtr and antennas: Wanted FT101E, FT780R, FT290 MkII 70cm linear Tec. John (Stoke-on-Trent) 0782 721888.

ICOM ICR7000 box complete diags etc, little use from new: £690. Bradley electronic meter 471C: £40 or swap SWR VHF meter. (Anglesey) 0248 713776.

ICOM ICR7000 with speech synthesizer unmarked: £680. Service manuals ICR7000: £5. Drake TR7: £10. GEM quad: £150. G3VXZ QTHR (Maidenhead) 0628 27350 or 045383 5510.

ICOM PS55 20A power supply, matches IC735, 725/6 etc. As new, hardly used, orig box: £140. NEC P1040E Betamax ptble video recorder, camera and power supply. Ideal for ATV, complete with several tapes, vgc and bxd.: £200. GM4ZMG (Kilmarnock) 0563 39350.

ICOM R72 Rx, used only once, as new: £550ono. ERA Microreader MkII same condition: £100. Both under makers guarantee. (Nr Preston) 0995 61539.

ICOM TS180S HF tcvr 1.8m - 30m with matching PSU/spkr, immac cond, v. reluctant sale: £375. G4AKD QTHR (Cambridge) 0954 782974.

JRC NRD 515 Rx with CFL 260 600Hz CW filter: £495. JRC NDH 518 memory unit: £95.

or both for £570. All mint with orig boxes and instructions. A rare opportunity to acquire a superb Rx at a bargain price. 0222 465 463.

JRC NRD 515RX NDH518 memory unit NCM515 remote controller, as new: £575. Revco RS3000 scanner|: £150. (Tenby) 0834 3057.

JUPITER MVT 6000 mobile or base scanner, 10 search bands, 100 memories, 25MHz to 1300MHz AM/FM. Cost £349, sell £235. (Choppington) 0670 855953.

KAM all mode tnc, latest version 3.0, manuals, leads etc. all unused, bxd: £280. Software available foc. G0OPG (Wilmslow) 0625 531154.

KANTRONICS KAM all mode TNC, bxd, manuals, latest software, ex cond: £220ono. GW0MOH QTHR 0745 338197.

KENT twin paddle Morse key: £35. ERA BP34 audio filter: £75. Both items almost new. George G6VS QTHR (Liverpool) 051 733 6415.

KENWOOD 530SP incl MC355 mic, never used on transmit: £550. ATU AT230: £140. All mint, bxd with manuals, hardly used since new. (York) 0904 654997.

KENWOOD AT230: £165. SWR/PWR meter SW-2100: £70. Little used, genuine reasons for sale. G0ONK (Sandbach) 0477 34601.

KENWOOD FM 2/70 dual bander TW4000A, ex cond: £300. G4GGV 0628 20651.

KENWOOD TS440 fitted with VS-1 and YK-88S, mint cond, bxd with operation and full service mans, complete with DRAE24 PSU. This PSU has both overcurrent and overvolt protection, also incl MC80 desk mic: £925ovno. G3DPR QTHR (New Milton) 0425 615676.

KENWOOD TS530SP purchased new July 88, very little used, pristine cond, bxd, incl manual mic: £535. Reason for sale upgrading. Racal 17L spare set valves up to spec, gd cond: £150. Can deliver 50 miles radius. G4KPT QTHR (Wiveliscombe) 0984 23762.

KENWOOD TS780, vgc, C/W CSO desk mic: £575. MM ATV cnvtr: £15. Hi-Mound HK705 Morse key: £12. Yaesu FT290 NiCads chrgr case: £230. Yaesu 2m linear 10 in 50 out, gives 25 Watts from 2.5in in: £45. Tonna 19 element crossed 70cm: £18. 10ele crossed Cushcraft 2m: £25. SMC polarphasers 2m and 70cm N type connectors: £35 each. (Bolton) 0204 594235.

KENWOOD TS830M, one owner: £525. Datong automatic RF speech processor: £60. Datong FL2 filter: £60. All bxd. G3UCE QTHR (Lancaster) 0524 822125.

KENWOOD TS830S with remote VFO. AT230 ATU, CW narrow filter, MC50 mic, ex cond: £700. John G0NAJ (Dukinfield) 061 338 8731.

KW2000A with PSU/LS, vgc, Shure mic, h/bk, spare valves: £160. G3HSK S/Key. (Banstead) 0737 350622.

KW2000B PSU & spkr, mint cond: £155. HRO Rx, vgc: £35. QMAX GDO: £20. Many items from shack clearance. (Birmingham) 021 373 1841 (after 6pm).

LARGE collection Radio Electronic Computer magazines, Radio books Components. Also FT980, mint cond: £1200. Will deliver within reason. (Bridgwater) 0278 455613.

LATTICE mast 20ft unwanted top section of three: £40. GW0FMQ QTHR (Bangor) 0248 600963.

LOUDENBOOMER HF linear amp 400W output on all bands, built-in PSU fan and low pass filter, C/W spare valves: £300ono. GJ0KY2 QTHR (Jersey) 0534 71233.

LOWE HF-225 with direct entry keypad, synchronous detector, whip antenna with preamp, as new, with manual: £400. Trio R600, manual, gd cond: £200. Both plus help with carriage. G3ENB (Scarborough) 0723 365093.

MARCONI TF2950 radio test set, gwo: £170. Marconi TF295S bttry pack, brand new: £380. Normal price £740. G1VRA (Cambridge) 0954 782271.

MFJ 949D versatuner: £100. Rotator CDE TR44: £50. Resistors .304 ohms, steel. Ideal loads for 13.8V PSU's: £2.50. G4DJC QTHR 0245 256416.

MFJ949D versa tuner 300W cross needle meter balun, vgc: £100. Jaybeam VR3 vertical 10-15-20, vgc: £50. (Milton Keynes) 0908 566266.

MICROWAVE modules 2m linear with preamp 200W output, 3, 10 or 25W input: £220. G4NTY QTHR (Manchester) 061-790 7673 (after 6pm).

MICROWAVE modules 432-144MHz tnsvtr: £110. Dynamco dual beam oscilloscope s/state: £185. Benson B85 A3/A4 desktop plotter: £395. PSU for 2x4CX250B linear: £80. 386DX-16 slimline computer 40mb hard disk VGA colour monitor 3.5in floppy: £920. Final cartridge II for C64/128: £16. G4BBR QTHR. (Cheltenham), 0242 527588.

MINIMITTER TOP2-7 HF Tx and power supply unit: £50. Deliver London and Surrey. Tim G1ASW 081-398 0114 (H) or 081 788 3553 (W).

MM4000 RTTY tcvr + keybd: £65. Heil HM5 desk mic: £35. HF2V Butternut: £100. TET HB9CV modified beam 19ft longest element: £110. Homebrew rotary dipole 24/18MHz: £40. 125A 13.8V PSU - offers. HiMound manipulator: £12. SEM Z Match noisebridge + 160: £85. HW77 4 x 40 Tasco sling. Keep the jackdaws away: £75. Pentax P555 date-back compact: £45. PCV covered lightning conductor/wallclips about 80m: £65. Wanted tiltover tower. (Kettering) 0536 522482.

MML 432-100W linear amplifier, as new, never used: £200ono. MMT 432/144 tnsvtr, ex cond: £90. (Houghton-le-Spring) 091 584 3563.

MORSE Talker by microwave modules model MMS1: £35. (Shropshire) 0691 623728.

MUTEK TVHF230C tvtr 2m to HF, nine bands, 10W output, fab performance in QRP mode for FT290: £200ono. G4UDT (Wembley) 081-902 5995.

POCKET phone PF8 working RB15: £35. Cobra 148GTL Eprom modified 10m: £80. Datong RF Proc: £25. G4FBA (Knottingley) 0977 672005.

PYE F412 UHF base with PC1 controller and aerials: £30. Six PF8 pocketphones (one converted RBO): £15 to £25 each. BC22 chrgr, bttries and mans available. RadCom magazines November 1986 to December 1990 incl: £15. Kitchener (Norwich) 0603 660711/610708.

QRT Kenwood TS680 HF+6: £650. IC271E 2m base, needs attn: £150. FDK750X 2m mobile: £100. AT230 ATU: £40. Daiwa PS30XMII: £70. Emotator 105TS almost new: £100. AEA MM3 Morse machine: £90. 15el Cushcraft: £40. Tennamast 3 section tiltover: £200. Marconi TF2015 sig gen: £75. G4VRW QTHR (Leeds) 0532 605662.

RACAL RA117 HF Rx: £185; MA79 HF Drive unit: £175 and RA98 SSB adaptor: £85 or all together for £400. All in gd cond, with handbooks. Yaesu FT707: £300. FC700 as new: £90. G0NYV (Reading) 0734 781782.

RACAL RA1217 Rx, solid state, USB LSB CW AM, 5 filters, digital readout (mechanical), manual: £300. Buyer collects. (SW London) 081 876 2070.

RADCOM 1960 to 1971 1981 to date. Vintage Stentorian 12in concentric duplex loudspkr. Offers please, must sell. (Blackpool) 0253 825223.

RADCOMS 1976 - 1990. Sensible offers? Deliver London and Surrey. Tim G1ASW. (Kingston-on-Thames) 081-398 0114 (H) or 081-788 3553 (W).

RN ELECTRONICS 6m tnsvtr, 2m drive, full wking order, almost half price at £110. G7CUY QTHR (Beds) 0462 814827.

ROBOT Model 400 slow scan TV convtr, stores picture for display on standard monitor: £195. G2HCG QTHR (New Miilton) 0425 617090.

SCANNER PRO2021 200 memories AM/FM 68-88MHz 108-136MHz 144-148MHz 138-174MHz 380-450MHz 450-512MHz 12V/240 mobile bracket: £140ono. (Shrewsbury) 0743 245896.

SILENT Key G4PCU sale. FRG9600 scanner with HF convtr: £300. KW107 ATU: £50. KR400 rotor complete 2m/oxy cables feeder: £100. Buyer dismantles. Powerbank 13.8V: £50. Hansen FS302 SWR/PWR meter: £20. Dactron 3A 13.8V PSU: £20. Tarren 7A 13.8V PSU: £25. All items gwo. Various items cables, plugs, valves available to clear, QTHR, Mrs Monger, (Falmouth). 0326 250652. Call for inspection.

SONY ICF2001D: £190. Tokyo HX240 40W tnsvtr: £190. CBM64/R8D CW/RTTY: £190. Gordon G4PDV (Sevenoaks) 454722.

SSTV Wrasse SC-1 SSTV + fax convertor (Tx/Rx), leads, filters: £280ono. Write only. 100% reply. Mark G1ANI QTHR (Barnsley).

STANDARD C528 dual band Handie tcvr, full duplex, dual receive, extended receive cover, PK88 tnc, Spectrum +3, all as new. (Bromsgrove) 021 445 2685.

STAR LC10C printer: £80. Seikosha GP-250X printer: £30. Pye T30/R18, 10ch, S20, S22, R3, R4, R6: £80. Pye 19in by 4.5ft cabinet, mains wired. Suit club or repeater group: £25. Buyer collects larger items. G8UHO QTHR (Lancaster) 0524 33742.

TELEPHONISTS headset: £5. Hdphones: £5. EL84: 50p. EF80: 50p. Tinned copper wire: 1p per ft. (Barking) 081 594 8675.

TELEPRINTERS (two), dot matrix, V24/RS232 interface: £35/45. 813 + base: £10. 9in monitor: £7. CTV + video recorder (NTSC): £45. G3WUN QTHR (Aylesbury) 0844 291095.

TENTEC Century 22, as new: £180. Transmatch ATU with Ezitune: £60. Hi-Mound key: £15 or £240 the lot. G0IMF QTHR (Stockport) 0625 876133.

TOKYO Hi-Power trsvtr HX240 144MH to HF: £200. FT290R nicads, chrgr: £190. G3ZJF QTHR (Shepton Mallet) 0749 830926.

TOKYO HL37V 2m 32W linear amp with GaAs receive preamp. Little used: £50. Doug G0VK40E returning to VK. (Bushey) 0923 31110.

TRIO 430S + FM + CW/SSB filters + MC50 base mic: £750. Yaesu FT290R + Mutek + Alinco 25W linear + 10el Cue Dee beam: £350. G0GGH QTHR (Dagenham) 081 593 7879.

TRIO 930 with ATU and CW filters, immac: £1100. Trio 751E 2m m/mode, as new: £440. Trio 4000E dual band with voice unit: £275. Altron minibeam covers 20m, 15m, 10m and 6m: £260. (Shrewsbury) 0743 367087.

TRIO 9R59-DS HF Rx with matching spkr. Works pretty well: £50. Tim G1ASW (Kingston-on-Thames) 081 398 0114 (H) 081 788 3553 (W).

TRIO Kenwood TS700G 2m all mode base stn with Mutek preamp. Fitted with 8 xtals and external digital display: £230. G4BRX QTHR (Cheltenham) 0242 675321 or 673150.

TRIO Kenwood TS940, mint cond, bxd: £1290. G4VIO QTHR (Durham) 0388 763501.

TRIO TR2300 nicads case charger: £110. Katsumi CW-202 peak notch filter: £25. Yaesu FT757GXI fist mic: £500. All plus postage. (Stoke-on-Trent) 0782 395017.

TRIO TS120S: £325. AMT-2: £130. Cartridge for AMT-2 C64: £25. Vic 20: £25. Kenwood TS700SP: £400. 021-353 3620.

TS430S, ex cond, together with FM board and HD power pack, 27.5 amp output. The lot for £600. (Kidderminster) 0562 67026.

TS530S mint cond, filters, serviced and revalved by main dealers: £500. No offers. G6CLX QTHR (N.Manchester) 061-766 6100.

TWO 'Eimag' 8877 triodes plus SK2216 sleeves: £25ea. 'Tektronix' RM564 storage scope plus 2A63 diff amp and 2B67 t/base plug-ins, lovely job for spares or repair: sensible offer. New 'Bird' 50W plug-in element, 2 - 30MHz type 50H: £25. Unused 'Eitel' type CR131 CRT: £20. 'Colour Genie' plus filter, manual and radio software: £45. New Kenwood VFO-120: £50. Nev Kirk G3JDK QTHR (Rotherham) 0709 541606.

VERSATOWER 60ft, complete with head unit, autobrake winches and shortened ground-post: £350. Microwave modules MMT28/4325 28MHz to 432MHz tnsvtr: £70. Icom ICB1050 modded to 28MHz with 28MHz PA and mag mount antenna: £45. G4LOO (Bedfordshire) 0462 811591.

VIDOR 3 band all dry bttry radio model 360: £16. Murphy bttry eliminator unit M281: £10. Mic DP4L: £4. G3OEG (Staines) 0784 454757.

WAVECOM W4010 data decoder incl fax, V5.0 s/ware, as new: £860. Drake MN2700 ATU with balun, as new: £365. (Aberdare) 0685 874880.

'WIRELESS World' bound volumes 1940-1960, valve catalogues, valve radios, AVO valve tester, 'Leak' mono amplifier, 'Quad' amp and tuner, 'Gramophone' magazines 1958 to 1982, many components. Any offers welcome. SAE for lists. G3JON QTHR (Sheffield) 0742 367774.

YAESU 727R h/h 2 & 70cm with all accessories: £295ono or exchange for 290RII Yaesu 757GX: £500. Trio TR2300 nicads charger: £110. Kenwood MC35S hand mic: £10. Katsumi CW filter: £25. (Stoke-on-Trent) 0782 395017.

YAESU FP757HD: £160. FP700: £130. Two Codan 100W PEP solid state xtal cont Tx/Tx incl PSU's: £100 each. G3TWE QTHR (Gt Yarmouth) 0493 664497.

YAESU FRG7 communications Rx, general coverage with 2.1kHz filter and PW BFO fitted, vgc, PWO: £110ono. G4DLM (Worcester) 0905 22522 (eves).

YAESU FRG7700 FRT7700 PRV7700 VHF cnvtr, mint cond: £350. Panasonic RF8000 world band receiver, cost £2000, sale: £450. 081-571-5759.

YAESU FT101-ZD, FM board, fan, CW filter, SP-901 external spkr, FV-101 external VFO, YO-844 desk mic, gd cond, as no spare time to use it! Only £450 the lot. (Hengoed) 0443 862127.

YAESU FT101ZD, gd cond, with manual and mic: £350. G4YSM QTHR (Doncaster) 0302 537686.

YAESU FT102 tcvr C/W AM/FM board, all filters, FV102DM digital VFO, FC102 antenna tuner, SP102 spkr, FTV107R tnsvtr C/W 2m module, MD-1 D/mic, all bxd, mint cond, all manuals YH55, h/phones, C-MOS e/keyer, Hansen W720S meter, Nentone 12A PSU VHF supp AEA computer patch CP1 C/W s/ware on DS disks for COM 64 RITTY, Comin 64 etc: £1450ono. Will not split. G1UWV QTHR (New Milton) 0425 615860.

YAESU FT290, nicads, chrgr, r/duck, mobile mount: £210. 2m 7/8 whip complete with gutter mount and cable: £20. Or both: £225. (Birchington) 0843 47294.

YAESU FT290R1 + nicads with Hokushin 2m colinear: £250. FT790R1 + nicads with Jaybeam 70cm colinear: £250. MMB: £10. Charger: £5. 081 868 1704 (day) 081 422 3821 (eve).

YAESU FT480R 2m m/mode tcvr, mint cond, bxd, matching mains power supply unit: £295. No offers. G6RLH (Bexley) 0322 523668.

YAESU FT620B 6m: £200ono. Yaesu FTV650B 6m trnsvtr, matches FT101 series: £130ono. G1DXQ (Norwich) 0603 745734.

YAESU FT7 10W 5-band tcvr with mobile mount and h/book: £200. Trio 7010 8W SSB/CW tcvr 144040 to 144055 and 144100 to 144315 with mobile mount h/bk and inboard preamp: £90. G3BUF QTHR (Norfolk) 0263 861434.

YAESU FT727 2m/70cm Handie, 3 NiCads, 2 bttry cases, mobile bracket, vinyl cases, chrgrs, vgc: £275. Yaesu FT790 Mk I, all mode, 70cm tcvr, ex cond, without NiCads or chrgr but with vinyl case: £225. Peter G0KUX QTHR 081-882 2351.

YAESU FT75B 100W 80-10m with ext VFO plus mobile and base PSUs. Wanted FC107 ATU. 0504 265675.

YAESU FT77 HF 80-10m inc FM bd, bxd, in good cond: £375. Yaesu FT690RII plus clip on amplifier: £375. Standard C5608 dual band mobile 50W O/P, vgc, bxd, still under warranty: £525. Kenwood TR751E 2m m/mode, bxd as new: £435. BSX TNC, gwo, bxd: £55. Could deliver 100 miles radius. (Kilsyth) 0236 824167.

YAESU FT7B, mint: £300. Yaesu FRG7000 Rx 0-30MHz: £200. Mutek 6m tnsvtr 144-50 10W o/p: £150. G3ZJY QTHR 0590 645872.

YAESU FT208R synthesised 2m portable, 2.5W: £100. FT708R synthesised 70cm portable, 1W: £125. YM24A spkr/mic, SB1 PTT switchbox, base PSU/chrgr, mobile mount for FT208/708: £25 the lot. FT730R synthesised 70cm mobile, 10W: £125. All ono. Denis G4KWT QTHR (Reading) 0734 698526.

YAESU FT902DM Tx/Rx, vgc, CW mic manual and orig packing: £510 inc post. I am looking for Icom IC551 6m base station and Icom IC251E 2m base station. Both must be in gd cond. Andrew (IoM) 0624 626080.

YAESU FT980 tcvr with MD1BH desk mic, vgc, bxd, manual: £850. FL2100B linear, little used, bxd, manual: £425. FT7 HF tcvr mobile or base SSB/CW with mounting brckt, mic, manual: £180. Bencher paddle unused, bxd: £45. All ono, prefer buyer arranges carr. Bill GM3DPK QTHR (Banff) 02612 5373.

YAESU FTdx401 tcvr with matching spkr and manual, vgc, little used: £180. Derek G8DEL QTHR (Romford) 04024 70450.

YAESU Rx FRG7000, A1 cond: £195. Koyo 11-band Rx Air/1.6-30KHz, vg condx: £100. Complete QRP station FT7TCR Welz ATU: £250. (New Mills) 0663 744087.

YAESU YO901 monitor scope: £150. Wanted Kenwood PS30, psu, MC35 mic, HS5 h/phones, also wanted FT290 and Yaesu YP601. Dave (Norwich) 0603 745512.

YAESU FT 101B: £275. KW107 antenna tuning system internal dummy load 1000W: £80. KW 160m ATU: £50. KW103 SWR meter: £30. FDK tcvr multi 2700 2m: £150. Yaesu FRG7 with fine tuning dial: £115. FRT 7700 receiving ATU: £40. Four 20ft sections of welded triangular lattice telescopic tower extends to 75ft by Riley and Neate, drawing available: offers. Datong RF clipper, Shure magnetic table mic: £6.50. (Merseyside) 051-426 6754.

ZX SPECTRUM 48K with overlay keyboard, printer, printer paper, basic tutor, took-kit program, joystick and games: £50. Tim G1ASW (Kingston-on-Thames) 081 398 0114 (H) or 081 788 3553 (W).

WANTED

'RADIO DESIGNERS HANDBOOK' by F. Langford-Smith. Late edition, red cover, about 1954 ? RSGB Radio Amateurs Handbook about 1955. Trimming tool for old-fashioned Philips 'Beehive' trimmers. Valve makers data books about B7+B9A valves. E.F.C. Owen (Crawley) 0293 520172. (office hrs Tue Wed Thur).

AP1086 issue one 1938/1952 (RAF Radio Stores Ref Nos). Also air publications relating to radio, radar equip, exc prices offered. Would purchase post-war to current magnetrons, klystrons, t/r cells, TWTs, photomultipliers, microwave and special CV types. Required unmodified Gee R/X type R1355. M. Gee, 6 Verbena Close, Pretoria Road, Canning Town London E16 4NU 071 511 4786 or 071 790 2846.

AVO valve tester, gd cond. Wireless World Radio Valve Data book. ARRL Radio Amateurs Handbook pre-1950, preferably 20's or 30's. Radio Designers Handbook (Langford Smith) large (1400 page) edition. G3JWW QTHR (Harlow) 0279 436660.

MEMBERS' ADVERTISEMENTS

COLLINS 32S-3A Tx, also consider mint 32S-3 Tx with or without 516F-2 PSU. G3JFC QTHR 0474 872743.

CAPACITORS paper dielectric 350V or higher. Sufficient quantity to total about 1000MFD. Chris G4GDW QTHR (Hemel Hempstead) 0819 501108 (W) 0442 242817 (H).

AVO valve data manual for AVO valve test set type CT160 No 2790 for local ATC Sqdn. Phone price Wilf G4EQG. (Walsall) 0922 682689.

B2 Tx & Rx units, any condx for rebuild, all bits and pieces welcome. Derrick G3LYU QTHR. Write or phone (Leicester) 0533 876459.

BENDIX RAIB h/book or any other data, spare parts etc. Ron Brown G6WRP QTHR 081-855 2300 or 071-584 5000 X4620.

CHEAP 15m portable SSB tcvr. Anything considered, must have circuit. Also FT221, infra-red binoculars and old physics lab equipment. G3MFW (St Austell) 0726 73608.

CINE film cameras, 16mm GSAP Bell Howell gun cameras 24V DC electric drive magazine load black crackle finish WW2 ex-govt item. Also 16/35mm cine film cameras WHY? Have Tx1360 WW2 Tx Racal Rx as exchange items. G0LJS (Chippenham) 0380 859088 (evenings).

CLUB for disabled amateurs would like to acquire equipment to complete their permanent exhibition station at Stevenage Day Centre:- 60ft heavy duty telescopic mast, Rotator for large HF beam. HF tribander, HF QRO linear amp, 70cm Module for FT726, VHF & UHF beams, and also station accessories. We can only pay very reasonable prices for these items from a non renewable fund. Peter, G0GTE, 0438 725820 (Day Centre) 0438 724991 (H).

COLLINS 75S3B 32S3 30LI 30SI other Collins equipment considered. G3ZIG QTHR. (Dereham) 036288 430.

CONTROL units No 1 and No 16, two 12 point connectors, one six point connector, headset complete with snatch-plug for wireless set No 19. Also required three knobs for Canadian VRL Rx. Cecil Duncan GM0EKM QTHR (Shetland) 09505 405.

CREED teleprinter eqpt, 7B,7Em (not 444) incl 85R & A.T.6S/S and associated military eqpt. G1ONZ (Stafford) 0785 223444.

DRAGON 64K working or not, also Alldream software cassette or disk, any disk drive cards for sale? G7EYV QTHR (Havant) 0705 475043.

EDDYSTONE EC10 HF Rx in gd wking cond, external appearance not important. Mike GM3PPE QTHR (Bathgate) 0506 53989.

EDDYSTONE plinth with inbuilt spkr to support 940/770R MkII type Rx. Tony (Worcester) 0905 641759.

FT767GX or similar. Must be in mint cond, preferably with additions. (Kidderminster) 0652 67026.

FTV-700 2m converter for FT707. GW3OMN May QTHR (Swansea) 0792 462124 (after 4.30).

G8RW would appreciate any info from members having experience of using MML 432/28S tnsvtr with MML 432/50 linear amplifier particularly stability problems. Reasonable expenses repaid. (Bromley) 081 462 1592.

HANDBOOK/Manuals for following to copy or purchase: Racal 9915 Freq counter, Racal 9008 Mod Meter, Schlumberger 4050 sub-audio meter, Schlumberger 4021 Stabilock, Quartzlock 282A test set, Bird 4381 power analyst, Weller EC4000 soldering station. (March, Cambs) 0354 741168.

HF TCVR with gen coverage IC751A TS4405 or similar; also separate ATU Daiwa Capco or MFJ preferred, also memory keyer MFJ or Samson plus vibroplex bencher or Samson paddle preferred but all considered in gwo. WHY. G0OPG (Wilmslow) 0625 531154.

I NEED all the coils for a MCR1 Rx. Can you dig them out for me? Details to G3CGQ QTHR (Luton) 0582 25519.

ICOM IC-µ2 type h/held tcvrs for 2m and 70cm. CDE rotator 40/45. Bird thruline kit. Weather satellite receiving kit. 0467 25365.

KENWOOD 811E tcvr, must be in very gd cond. (Guisborough) 0287 652822 (eves/wkends).

KENWOOD MC50 mic. Must be ex condn. Cash waiting. Colin G0PAO (Sudbury) (ex G1GPD) 0787 77004 (eves/wkends).

KENWOOD TS180S service manual. Wolf cub electric hand drill. G3NNI QTHR (Harlow) 0279 793155.

KENWOOD TS440S or similar Trio HF tcvr, with or without ATU and PSU, in pristine cond. Distance no object. G0OPG (Wilmslow) 0625 531154.

MARCONI digital synchroniser TF2171 and EHT trnsfrmr for Techtronics oscilloscope type S45A. G3OQC QTHR (Portsmouth) 0705 380705.

MIZUHO MX-14S or MX-7. GM3HVN QTHR (Nr Aberdeen) 0358 21324.

MK 119 Rx to complement my Tx, any condition. Any Mk 119 bits, cases, etc. These sets were fitted in die cast alloy waterproof cases or a wooden crate. Rx size 10.5in by 7in by 7in. PSU 11in by 7.5in by 7.5in. (Durham) 091 3861116.

PHILIPS PM3250 scope EHT section or EHT trnsfrmr, complete scope considered if EHT generator working. G8KGH QTHR (Bristol) 0272 514291.

PYE PF8 units and accessories wanted particularly desk bttry chrgr, wkshop manual. Working units preferred, anything considered. Peter G8BBZ QTHR (Hemel Hempstead) 0442 69544.

R1155 Rx, gd cond. Essential details and price G0KWS QTHR (Tyne & Wear) 091 252 7141.

SUNBEAM razor combs and cutters (new). Any models. GM3EVF (Kircaldy) 0592 260477.

TEN-TEC Delta HF tcvr. 160-10m, incl 10-18-24MHz, for CW use, full wking cond with handbk desirable. Any write-ups or modification literature will be much appreciated and paid for. Please contact even if you don't want to sell. Bernard G7CBX (Cornwall) 0736 753676.

TH331, TH326, YD1304 valves urgently required for 70cm. Will travel 200mi+ for good TH331! David GM6BIG QTHR Packet GB7SAN. (Braehead) 0555 811891.

TOWER wind up/tilt over to approx 40ft. Prefer staffs or neighbouring county. G0ICW QTHR (Rugeley) 0889 577260.

TRIO antenna tuner type AT200, must be in immac cond and no mods. (Larkhall) 0698 883306.

TRIO grid dip oscillator model DM801, must be in gd wking order. G0INU (Plymouth) 0752 343074.

URGENTLY need set connecting cables (5) FR101D to FT101ZD HF to RCV Ant mute to Acc tone to tone etc etc. G0KTT QTHR (Altrincham) 061 980 4357.

VALVE Hi-Fi output tnsfmr (S) Partridge P.4160, Parmeko etc, ultra-linear, for EL34s or KT66/88s. (Restoration project) G3LGK QTHR (Alfreton) 0773 833142.

VERSATOWER, trailer mounted. Bird model 43 power meter. Yaesu FT726. G4LOO (Beds) 0462 811591.

WILL pay a good price for a valve type 10 or 210, 50 or 250 and 47 or 247. Also needed: Eddystone full vision dial. Bernard Litherland G4IMT QTHR (Shippenham) 0225 891254.

YAESU FT747GX or Icom IC725 or similar, also ATU and Capco loop. Write G4GFV QTHR or phone 091 4882995.

EXCHANGE

85KHZ IF coil (Electroniques S3D-1-85 or S3D-6-85) and oscillator coil for conversion 1.62MHz to 85KHz (Electroniques HS01.6). Tony (Worcester) 0905 641759.

ALTRON SM30 ground hinge for Altron SM30 ground post with ground socket if available. Cash adjustment if required. (Basingstoke) 0256 468649.

SEM Sentinel 40 (x14) 2m linear preamp, less than year old, for desk mic or sell: £75. Stuart G7IJP (Langport) 0458 250124.

STANDARD CS28 dual band h/held CMB111 mobile bracket CAW150 cable CMP111 spkr/mic CLC520 soft case CBT151 cell cases extended Tx/Rx repeater (crossband) function. All bxd. Exchange for 2m m/mode base rig. G7EXZ QTHR (Gillingham, Dorset) 0935 814225 (W - PM only) 0747 85639 (H).

SUPERB Electronic Multimeter by Bradley type CT471C with RF probes, swap for quality UHF SWR meter preferably Bird. Cash adjust. (Llanfairpwll) 0248 713776.

YAESU FT902DM base, CW filter, and FTV901R tnsvtr for 2m, both nice cond, would like exchange (cash adjust?) for solid state HF base or will sell for £600ovno. Buyer inspects collects. G0LYG QTHR (Mottingham SE9) 081 851 3720.

YAESU FTV-901R tnsvtr, pristine cond, little use, 2m and 6m fitted, bxd, manual, leads, also CBM64C: £200+ games, many extras, plus full size music keybd and software ERA microreader Mk2, as new. 35mm camera outfit, extra lenses etc. Also Tornado 1000 10m linear, 5xEL519 valves, vgc variable power out to 1K. Wanted Icom IC-251E with Mutek in vgc. Also PRO2004 or WHY? Ian G7HXI 0692 580201 (day) 0692 581663 (eves).

EVENTS DIARY

CLUB NEWS

DEADLINE - Items for inclusion in the October 1991 issue must be sent to HQ marked "Club News - DIARY", to be received by 16 August latest. If news is received by the published deadline, it should appear in the listing. It is your responsibility to ensure that items are sent DIRECT to HQ in good time. News items should be sent in writing, preferably typed or written legibly, and be signed by the club secretary or the person responsible for publicity.

NOTE: This is primarily a service for clubs affiliated to the RSGB, to whom priority will be given.

AVON

SOUTH BRISTOL ARC - 7, 10m activity evening; 14, Dx broadcast TV activity; 21, Foxhunt; 31/Sept 1, SSB Field Day with NBARC. Details Whitchurch 832222

BERKSHIRE

BRACKNELL ARC - Meets 2nd Wednesday each month at 8pm, at Coopers Hill Centre, Bagshot Rd, Bracknell. 14, "bring and show" night; 20, inter-club quiz. Details from Ian Pawson, 3 Orion, Bracknell. Tel: 0344 57329.

MAIDENHEAD & DARC - 1, 2m Fox Hunt; 20, quiz v Bracknell ARC (at home); Sep 5, technical questions and answers. Details 0628 25952

BUCKINGHAMSHIRE

AYLESBURY VALE RS - 7, talk and demonstration "Fitting RF Connectors Correctly" by Dave Thorn, G8ZOM. Details 0296 437720 or 0908 560026.

MILTON KEYNES & DARS - 12, talk "AKD Products" by John Armstrong, G8MVH; Sep 8, Car Boot Sale at Cranfield Airfield. Details 0908 501310 or 0908 315435.

READING & DARC - 22, talk "Power Amplifiers" by Roy Church, G3KJC; 31, SES for Guide Dogs for the Blind; Sep 12, Autumn Junk Sale. Details 0734 476873.

CHESHIRE

MACCLESFIELD & DARS - **"NEW VENUE"** The Victoria Parkside Social Club, Victoria Road, Macclesfield. Every Tuesday at the new time of 8.30pm. Details 0625 424304.

NORTH CHESHIRE RC - 11, talk and slides "The Rose Garden". Floribunda for the average gardener. Bring xyl's and yl's as this is also for them! Details 0625 535644.

CLWYD

DELYN RC - 14, open forum and discussion night; 28, RSGB video night; Sep 11, talk "The Art and Science of Photography" by Glyn Jones of G&G Photographers. Details 0745 336939.

RHYL & DARC - 5, annual Fox Hunt; 19, home brew construction; Sep 2, Annual Dinner. Details 0745 336939.

WREXHAM ARS - 6, field evening and barbeque; 10, quiz. Details 0978 261482.

CORNWALL

CORNISH RAC - 6, activities night; 12, computer section; Sep 10, activities night. Details 0209 820836.

DERBYSHIRE

DERBY & DARS - 7, Rally preparation evening; 14, talk "Practical Home-Brew Aerials" by Tony Martin, G4XBY; 21, visit to Little Easton Waterworks - 7pm start; 28, video show; Sep 4, junk sale. Details 0773 852475.

DEVON

AXE VALE ARC - 2, visit to Sidmouth ARC and Planetarium. Details 0297 33756.

DARTMOOR RC - **"CHANGE OF SECRETARY"** Mr B. Johnson, G6URM, 12 Hessary Terrace, Princetown, Devon. Tel: P/T 546.

EXETER ARS - 12, free and easy evening; Sep 9, talk/demo "Frequency Measurements". Details 0392 78710.

PLYMOUTH RC - **"CHANGE OF VENUE"** RNCC, Raglan Road, Devonport, Plymouth. Now meets 1st and 3rd Thursday in the calendar month. Details 0752 787181.

ESSEX

BRAINTREE & DARS - 5, travel talk "USA and Australia" by David, G0KQV. Details 0376 27431.

CHELMSFORD ARS - 6, general discussion evening; Sep 3, talk/video "Low Bit Rate" by M. Whybray of BT Research Centre, Martlesham. Details 0245 260831.

GLOUCESTERSHIRE

GLOUCESTER ARS - 7, 'something different'; 14, construction group; 21, Morse sending practice; 28, homebrew clinic.

GREATER LONDON

ACTON, BRENTFORD & CHISWICK ARC - 20, talk "QSL Cards" by G0JRY followed by a critique of the club's performance on Low Power Field Day. Details 071-938 2561.

COULSDON ATS - 12, RSGB video evening with cheese and wine; Sep 9, talk "Linear Amplifiers" by John Stockley, G8MNY. Details 081-684 0610.

CRYSTAL PALACE & DRC - 17, provisional - day out; Sep 21, talk "Wireless Before Radio" by G8CYE. Details 081-699 6940

EDGWARE & DARS - 22, SSB Field Day briefing - Watling Centre..

HAVERING & DARC - 7, talk "Raynet"; 21, computer night; Sep 4, talk by John Brown, G3EUR. Details 04022 23310.

KINGSTON & DARS - 21, technical discussion. Details 081 398 1128.

SOUTHGATE ARC - 8, talk "The Black Box of Tricks" by Steve Reynolds of Icom; 22, club 'DF' equipment check. Details 081 360 2847.

WIMBLEDON & DARS - 3-11, annual camp, Barwell Estate, Chessington, Surrey; 30, general activity evening; Sep 13, talk "Radio With Computers" by G3XTC and G4XLM. Details 081 397 0427.

GREATER MANCHESTER

ECCLES & DARS - 6, talk "PCB Design Using CAD" by G8KRG; Sep 3, demonstration "Making Waterproof Co-ax Connections" by G6MEI. Details 061-773 7899.

SOUTH MANCHESTER RC - 2, talk "Direct Conversion Receivers" by G8UGC; 9, Novice DF; 16, talk "Solar Studies" by G4SNN; 23, quiz night; 30, talk "Dxpedition to Andorra" by G7FWE. Details 061 969 1964.

HAMPSHIRE

HORNDEAN & DARC - 1, talk "Antennas...the Beginnings". Details 0705 472846.

THREE COUNTIES ARC - 14, video of RSGB and other radio activities; 28, junk sale; Sep 11, talk "Wines of the World" by Michael J Schmidt. Details 0420 489847.

HEREFORD & WORCESTER

HEREFORD ARS - **"NEW SECRETARY"** Errol Robinson, 29 Folly Lane, Hereford HR1 1LX, tel: 0432 355297. 2, talk "Reflections on Dayton Ham Convention" by Stuart Jesson, G4CNY; 16, informal.

KIDDERMINSTER & DARS - 6, DF Hunt; 20, test gear; Sep 3, AGM. Details 02993 79229.

HERTFORDSHIRE

CHESHUNT & DARC - 7, portable evening, Baas Hill Common; Sep 2/3, SSB Field Day. Windmill Lane, Cheshunt combined with Fox Hunt and BBQ. Details 0992 464795.

VERULAM ARC - 27, talks "160m DF Receiver" and "Slow Scan Television" by Clive Asquith, G4ENB. Details from G4JKS, tel: 0727 59318.

HIGHLAND

INVERNESS ARC - 7, construction night; 21, amateur radio forum; Sep 4, key night. Details 0349 61783.

HUMBERSIDE

GOOLE R&ES - 2, discussion "TV Repeater Progress"; 9, video evening; 11, Treasure Hunt 3pm; 16, G0OLE evening; 23, Morse instruction; 30, social evening; Sep 6, discussion "Novice Licence"; 13, constructors competition. Details 0472 825899.

NORTH FERRIBY UNITED ARS - 2, latest QSL's of interest - members; 9, night on the air; 16, field night; 23, night on the air; 30, talk "Portability My Way" by Frank, G3YCC; Sep 6, night on the air; 13, construction competition. Details 0482 650410.

KENT

BROMLEY & DARS - 20, operating evening and Barbeque. Details G3UMI.

BREDHURST R&TS - 29, talk "HF Feeders and the Famous G5RV Antenna" by Louis Varney on a welcome return visit, plus demo on Measurement of Loss on Baluns and Feeders. Details Medway 271548.

DARENTH VALLEY RS - 14, construction night - Morse - 2m on air; 28, John Chumley SWL - Radio Waves and Receivers; Sep 11, construction night - Morse - 2m on air. Details 0689 876733.

DARTFORD HEATH DFC - 20, evening DF Foxhunt. Details 0689 854089.

SEVENOAKS & DARS - 19, open for members' suggestions; Sep 16, talk "RSGB" by John Greenwell, G3AEZ.

LANCASHIRE

FYLDE ARS -22, informal meeting with programme review. Details 0772 635464.

MORECAMBE BAY ARS - **"NEW SECRETARY"** J.D. Burrow, G0NYD, 36 Longfield Drive, Cragbank, Carnforth, Lancs LA5 9EJ. Tel: 0524 733212.

LEICESTERSHIRE

LEICESTER RS - 5, AMTOR & Packet on air activity night; 12, HF/VHF activity night; 19, talk "Remote Imageing" by Mike, G4YBB; 26, HF/VHF activity night; Sep 2, HF/VHF night on the air; 9, HF/VHF activity night. Details Leicester 762241.

LOUGHBOROUGH & DARC - 6, open forum; 13, night on air/construction; 20, DF 8pm start - College; 27, talk "The Other Man's Shack" by G0LBP. Details 0509 218259.

MERSEYSIDE

LIVERPOOL & DARS - 6, discussion G2MMM, plus discussion on SSB Field Day; 13, quiz "Albert"; 20, talk "Bandpass Filters" by G3XCP; 27, surplus sale. Details From G4VYR.

NORFOLK

ARC OF FAKENHAM - 6, final arrangements for GB2FSW with Dave, G4DCJ. Details 048522 633.

NORFOLK ARC - 4, club outing to Woburn Rally; 7, HF SSB NFD/Town & Country Show briefing; 14, 'real radio' evening; 21, QRP activity week - hints and advice; 28, talk "Science for All" by Arnold Tomalin, G3PTB; 31, Sep 4, Town & Country Show final briefing; 8, club station demo at Town & Country Show, Royal Norfolk Showground, Costessey. Details 0603 747992.

YARMOUTH RC - 1, talk "Antennas - Basic Principles" by G4GLI; 15, debate "Amateur Radio is Going to the Dogs"; 29, club quiz, organisedr G3YYQ. Details Yh 721173.

NOTTINGHAMSHIRE

AMATEUR RADIO CLUB OF NOTTINGHAM - 1, talk "AMTOR" by Alan, G3XOF; 8, forum; 15, talk "Lightning Protection" by Martin, G6ABU; 22, 2m Foxhunt and activity on the air; 29, talk and demo "Tuning HF Equipment" by Ian, G4JAE; Sep 5, forum; 12, Le Mans Start Foxhunt - organiser Rex, G1LRI. Details 0602 733740.

MANSFIELD ARS - 1, junk sale. Details 0509 672734.

SHROPSHIRE

TELFORD & DARS - 7, VHF on air. Details Bridgnorth 761203.

STAFFORDSHIRE

STAFFORD & DARS - 6, monthly business meeting; 13, night on the air; 20, talk "Home Wine Making" by G1LPW; 27, construction evening; Sep 3, monthly business meeting; 10, night on the air. Details from Bernard, tel: 0785 662350.

SUFFOLK

FELIXSTOWE & DARS - 5, night on the air (Orwell Pk Sch); 18, DF Hunt & Barbeque; Sep 2, work night - prepare tower and aerials for winter. Details 0473 642595 (daytime).

ISPWICH RC - ***NEW SECRETARY*** Mrs S.M. Elden, G8HYE, 124 Larchcroft Road, Ipswich IP1 6PQ. 8, Morse Test at Ipswich - details from RSGB; 14, new members' evening; 28, SSB NFD contest planning. Details Mrs. S.M. Elden, G8HYE QTHR, tel: 0473 742072.

SURREY

DORKING & DARS - 11, DF trial - organisers Chris, G1PXH & Nick, G7DND, assemble 10am start, venue TBA; Sep 7/8, IARU Region 1 HF FD SSB venue TBA. Details 0306 77 236.

WARWICKSHIRE

MID WARWICKSHIRE ARS - 13, Spectrum Computer SSTV & Screens - a live demo of how to join in the fun; 27, talk "VOGAD" by Van, G0IZZ; Sep 10, talk by Simon, G0GWA on his trip to and DX from Sierra Leone. Details 0926 513073.

RUGBY ATS - 6, visit to a comms site; 13, 2m Direction Finding Competition, 4th and final round. Details 0455 552449.

WEST MIDLANDS

COVENTRY ARS - 2&16, night on the air and Morse tuition; 23, outdoor operation evening - Hartshill Hayes Country Park; 30, night on the air and Morse tuition; Sep 6, indoor DF final; 13, night on the air and Morse tuition. Details 0203 523629.

MIDLAND ARS - 20, junk sale. Details 021 742 8712.

WORDSLEY RC - 1, Novice licence - 9pm; 15, HF on the air - 8.30pm; 23/24/25; expedition HF weekend, Broadway, Worcs; 29, treasure hunt - 7pm; Sep 12, talk "Crowd Dynamics" by Mr F. Carlin - 9pm. Details 0384 873666.

WEST SUSSEX

HORSHAM ARC - 1, talk "Photo Quiz" by Adrian, G4LRP. Details 073784 2150.

WEST YORKSHIRE.

BRADFORD ARS - 8, discussion evening - Novice Licence; 22, G3NN portable operation. Details 0274 494694.

DENBY DALE ARS - 7, talk "Lasers" by member of Bradford University; 16-19, "Youth in Action" project. Sep 4, talk "Computers and Communications" by West Yorkshire Police. Details 0484 532371.

HALIFAX & DARS - 20, White Rose project - John, G3TDZ; Sep 17, AGM. Details Halifax 202306.

KEIGHLEY ARS - 8, quiz; 29, talk "America's First 25 Years in Space", by G4ZVD; Sep 12, ideas for club events 1992. Details from Kathy, tel: 0274 496222.

NORTHERN HEIGHTS AR&ES - 7, D/F Foxhunt; 21, talk "Access Control" by Geoff Milner; Sep 4, talk "Jacquard Computer Principles" by Paul. Details 0274 673116.

WILTSHIRE

CHIPPENHAM & DARC Sea Cadets HQ, Long Close, Chippenham - 6,13,20, club net 145.525; 27, registration for CW/RAE winter tuition; 17, silver jubilee celebrations GX3VRE on air and BBQ. Details S.W.L. J. Rose, tel: 0225 465557.

TROWBRIDGE & DARC - 7, RSGB Video "Amateur Radio for Beginners"; 21 open evening & social; Sep 4, talk "HF Beam Antennas". Details 0380 830383 (evenings).

RALLIES AND EVENTS

4 AUGUST

WOBURN National Rally - Woburn Abbey, Bedfordshire. Trade stands housed in marquee 20,000 sq.ft. Talk-in by Dunstable Downs RC. Usual Woburn Abbey attractions. Trade stand enquiries to Norman Miller, G3MVV, QTHR, tel: 0277 225563. Organised by RSGB Exhibition & Rally Committee.

11 AUGUST

DERBY Mobile Rally - Littleover Community School, Rykneld Road, Littleover, Derby. Situated on the A5250 road, just north of its junction with the A38 on the south side of Derby. Talk-in on 2m. All usual attractions including the famous monster junk sale. The Society is 80 years old this year, so we are hoping to make this a bumper event. Details from Martin Shardlow, G3SZJ, QTHR, tel: 0332 556875.

FLIGHT REFUELLING ARS Hamfest 91 - Flight Refuelling Sports and Social Club Grounds, Merley, Wimborne, Dorset. Opens 10am. Trade stands; bring & buy sale; radio and electronics car boot sale, craft fair, field displays. Special disabled parking is available in the grounds and overnight camping on Saturday 10th can be arranged. Details and booking forms from John, G0API, tel: 0202 691649 or Rob, G6DUN, tel: 0202 479038.

18 AUGUST

WEST MANCHESTER RC Red Rose Rally - Bolton Sports & Exhibition Centre, Silverwell St, Bolton. Doors open 11am (10.00 for disabled visitors). Admission £1, children free. Usual trade stands, societies, bring & buy etc. All at pavement level with facilities for the disabled. Details from G1IOO, tel: 0204 24104.

23-26 AUGUST

OSCAR VICTOR ACTIVITY GROUP (WAB) Family Fun Weekend - Bent Rigg Farm, Ravenscar, North Yorkshire. Campers and caravanners welcome with the availability of a Bunk Barn for those wishing to have a roof over your heads. (Prices on application from the Farm). Working either HF or VHF pile-ups from the Control Station on site. Car boot sale, sporting activities arranged for the Kids, child minding facilities, live entertainment from SGB & The Old Crones on the Bench. Competitions for all the family. Cost for use of site irrespective of caravan/tent size including Bar B Q's: Adults & over 14's - £2.50 per day; OAP's & under 14's - free. Details from Peter Austin, G7BXA, QTHR, tel: 0532 563462 or Steve G. Bryan, G1SGB, QTHR, tel: 0709 543747.

25 AUGUST

TORBAY ARS Annual Mobile Rally - STC Social Club, Brixham Road, Paignton, Devon. Doors open 10am. Talk-in on S22. Details from W. Hipwell, G3HTX, QTHR, tel: 0803 526762.

GALASHIELS & DARS - Open Day - Focus Centre, Livingstone Place, Galashiels. All usual activities; bring & buy; traders; club stalls etc; refreshments. Details from John G Campbell, tel: 0835 22686.

26 AUGUST

THE HUNTINGDON JUNK SALE - The Medway Centre, Coneygar Road, Huntingdon, Cambs. Opens 10am. Trade stands - useful ones with junk, components, antenna bits, nicads, together with a bring & buy. Food/drink available all day; talk-in on VHF-S22, UHF-GB3OV Repeater on 433.125 RB5. Details from G1YVS, tel: 0860 433891; G8LRS, tel: 0480 456772 (eves); G7DIU, tel: 0480 431333 or G0JLO, tel: 0480 454858.

1 SEPTEMBER

PRESTON ARS 24th Annual Rally - University of Lancaster. Details from Godfrey Lancefield, G3DWQ, QTHR, tel: 0772 53810.

TELFORD Radio Rally - Telford Exhibition Centre, Telford. Details from Martyn, G3UKV, tel: 0952 255416 or John, G0GTN, tel: 0743 249943.

8 SEPTEMBER

LINCOLN SWC 10th Lincoln Hamfest which celebrates the 70th anniversary of G5FZ - Lincolnshire Showground. Entry £1; all the usual attractions; Caravans welcome. Details from Sue Middleton (XYL G8VGF QTHR), tel: 0522 525760.

MADLEY SATELLITE EARTH STATION ARG AR & Electronics Car Boot Sale - Madley Communications Centre, Madley, Hereford. Some traders, bring & buy, incorporating a conventional car boot sale, refreshments, toilets, ample parking. Opens 8.30. Talk-in on S22. Details from David Butler, G4ASR, tel: 087 387 679.

MILTON KEYNES & DARS 5th Annual Car Boot Sale - Cranfield Airfield (South Side), Cranfield, Bedford. Opens 9.30am; refreshments available. Talk-in on S22. Details from Tony, G6WXM, tel: 0908 316435, Dave, G3ZPA, tel: 0908 501310 or Ray, G1LRU tel: 0908 660798.

VANGE ARS Annual Rally - The Laindon Community Centre, Laindon High Road/Aston Road, Laindon, Basildon, Essex. The Centre is only a short walk from Laindon station (BR) on the Fenchurch Street to Shoeburyness line. Doors open 10.30am, admission 50p. Many traders, bring & buy, refreshments and a free raffle. Talk-in on S22. Approach roads will be signposted. Details from Doris Thompson, tel: 0268 552606 or Mike Musgrave, G4NVT, tel: 0268 543025.

13-15 SEPTEMBER

WACRAL CONFERENCE - Elim Bible College, Nantwich. Details from Geoff Peterson, G4EZU, tel: 0474 533686.

14 SEPTEMBER

BALLYMENA Annual Rally - Ballee High Community School. Details from GI4HCN, 154 Galgorm Road, Ballymena.

WIGHT Wireless Rally - CEM Wireless Museum, Arreton Manor, Nr Newport, IOW. Opens 11am. Talk-in on 2m GI3IOW. Exhibition station GB3WM on 3700kHz. Details from Douglas, G3KPO, tel: 0983 67665.

15 SEPTEMBER

BARTG Rally - Surrey Hall, Sandown Park Racecourse. Opens 10.30am. Admission - adults £1, children under 14 free if accompanied by adult. Over 250 tables - many exhibitor and special interest groups will be attending. Free parking for over 5000 cars. Easy access - well signposted. Talk-in on S22 and SU22. Details from Peter Nicol, 38 Mitten Avenue, Rubery, Birmingham B45 0JB, tel: 021 453 2676.

BRISTOL Radio Rally - Brunel's Great Train Shed, Temple Meads Station, Bristol. Doors open 10.30am; many trade stands; demonstrations including ATV; large bring & buy; refreshments; good access for disabled visitors; talk-in on S22; good parking facilities; venue is just 5 minutes from the M32. Details from David Farr, G4WUB, tel: 0272 839855.

EAST OF ENGLAND RADIO RALLY (Peterborough R&ES) - ICI Building, The East of England Showground, Oundle Road, Peterborough. Doors open 10.30am (10 for disabled visitors - toilet facilities available); admission £1; traders' main hall with bar and catering; traders' marquee with bring & buy, separate outside area with flea market plus radio and electronic car boot. Various other local attractions: Nene Park and Nene Valley Railway; golf driving range and Go-karts etc; acres of free parking. Details from Nigel, G1ARV, tel: 0733 78685 or Mike, G0CVZ, tel: 0733 222588.

PAKEFIELD Radio/Electronics Rally and Car Boot Sale - Pakefield Middle School, Kilbourn Road, Pakefield, Lowestoft. Doors open 10am; talk-in on S22; caravanners welcome from 6pm Friday until 6pm Sunday - make it a family weekend. Details tel: 0502 565986 or 715537.

22 SEPTEMBER

CENTRE OF ENGLAND Autumn Radio & Electronics Rally will be held at the British Motorcycle Museum, Bickenhill nr The NEC, Jct 6 M42. Doors open 10.30am; admission £1 (concession for RAIBC members and senior citizens); over 60 traders in 3 large halls, ample free parking, bring & buy, talk-in on S22, bar & restaurant facilies. Details from Frank Martin, G4UMF, tel: 0952 598173.

28/29 SEPTEMBER

RSGB HF CONVENTION - Penguin Hotel, Daventry, Northants. Talks and events as follows: Marti Laine, OH2BH; Peter Hart, G3SJX; Al Slater, G3FXB; Roger Western, G3SXW; John Allen, DTI Baldock; Roger Ballister, G3KMA; Packet Cluster Forum; Young Amateur of the Year Award; Presentation of RSGB HF Trophies; Novice Clinic; DXpeditions (provisional); Review of High Quality Transceivers; Contesting; Pile Up Operating; What's on 80m Tonight?; IOTA. Details from Bob Whelan, G3PJT, 36 Greenend, Comberton, Cambridge CB3 7DY.

29 SEPTEMBER

HARLOW AR&E Mobile Rally - Harlow Sports Centre. Doors open 10.30am; talk-in on 2m & 70cm by G6UT; bar; hot snacks; disabled facilities; giant bring'n'buy; special interest groups; free parking; admission £1. Details from: evenings & wkends: Liz, G0MDL, tel: 0277 364742; daytime: Ken, G0HRR, tel: 0279 426647.

7TH NORTH WAKEFIELD RC Rally - Outwood Grange School, Potovens Lane, Outwood, Nr Wakefield. Doors open 11am; admission 50p; fully licensed bar; raffle; bring'n'buy; computer & electronics traders and repeater groups; talk-in on S22 club callsign G4NOK. Venue is 2 miles from M1 and M62. Details from Dick, G4GCX, tel: 0532 622139.

6 OCTOBER

BLACKWOOD AR Rally - Oakdale Community College. Details from B. Matthews, GW0JWF, 25 Manor Park, Newbridge, Gwent.

GREAT LUMLEY Radio Rally - The Community Centre, Great Lumley, Nr Chester-Le-Street, Co Durham. Details from Barry, G1JDP, tel: 091 388 5936.

HORNCASTLE AR Electronics & Computer Fair - Horncastle Youth Centre, adjacent to the A128 Lincoln/Skegness main road. Opens 10.30am ((10am for disabled visitors); admission £1 per person (negotiated discounts for organised groups). Range of computer, radio and electronic components plus second hand and surplus equipment sale; flea market/car boot sale in the outside sports area. Louth & DARS will be running a bring & buy stall. Details - sae to Tony Nightingale, G6CZV, Horncastle Youth Centre, Cagthorpe Building, Willow Row, Horncastle, Lincs LN9 6HW.

13 OCTOBER

ARMAGH & DUNGANNON Rally - Gosford House Hotel, Markethill, Co Armagh. Details from T.E. Hall, GI0MSJ, QTHR GI6UMR, tel: 0861 523454.

HORNSEA Rally (ELHOEX Electronic Hobbies Exhibition) - The Floral Hall, Hornsea, East Yorkshire. Details from Jeff, G4IGY, tel: 0964 533331.

SOUTH DEVON RC Computer and Radio Rally - Hillhead Campsite, Dartmouth Road, Brixham, South Devon. Details from W.T. Trezise, G6ZRM, tel: 0803 522216.

19 OCTOBER

G-QRP CLUB Mini-Convention. Details from G3RJV.

25/26 OCTOBER

LEICESTER ARS Show - Granby Halls, Leicester. All usual facilities. Details from Frank Elliott, G4PDZ, tel: 0533 871086.

GB CALLS

1 AUGUST

GB0LBD	GBO Le Bacores DX
GB0SML	St. Mary's Lighthouse
GB2BBI	Boys Brigade International
GB2RCC	Radio Caravan Camping
GB2XJ	XJ Square
GB300FW	300 Years Fort William
GB300FW	300 Years Fort William
GB6SM	Summerlee Museum
GB8DFL	Drive For Life

2 AUGUST

GB0MKS	Milton Keynes Scouts

3 AUGUST

GB2CNS	Central Notts Scouts
GB4CGC	Corhampton Golf Centenary
GB4RAF	RAF
GB4RRM	Rutland Railway Museum

4 AUGUST

GB2MCG	Milford Coast Guard

5 AUGUST

GB2SRC	Strathclyde Regional Council

7 AUGUST

GB2MRI	Marconi Rathlin Island
GB2RAF	RAF

9 AUGUST

GB2YFT	Yeovil Festival Transport
GB4ASH	Ashfield Show

10 AUGUST

GB2XS	XS Square The Old QRA
GB8OEB	Operation Euro Baby

14 AUGUST

GB50ATC	Air Training Corps

17 AUGUST

GB2TS	Tollerton Show
GB4BBB	4th Bromley Boys Brigade
GB4RAF	RAF
GB4RAF	RAF
GB4SRG	Sir Richard Grenville

18 AUGUST

GBLCS	Lairg Crofters Show
GB2GMP	Greater Manchester Police

19 AUGUST

GB2FSW	Fakenham Splash Week

22 AUGUST

GB1OV	Oscar Victor
GB2RCC	Radio Caravan Camping
GB4TCF	Town & Country Festival

23 AUGUST

GB0SED	South East District
GB2SRM	Steamtown Railway Museum
GB8CSC	Cub Scout Camp

24 AUGUST

GB0ALG	Abingdon Lions Gala
GB0RNL	Royal National Lifeboat Ins.
GB2PLY	HMS Plymouth
GB2SOF	Stretton on Fosse
GB60S	60 Selsdon

25 AUGUST

GB50ATC	Air Training Corps

26 AUGUST

GB2GCC	Guides County Camp

30 AUGUST

GB2NTS	National Trust for Scotland
GB2NTU	National Trust Ulster

31 AUGUST

GB2CPS	Chigwell Police Show
GB2NTC	National Trust Cymru

The Last Word

QSL REPLIES

As someone who has been associated with the QSL Bureau since its move to Potters Bar it was a pleasure to read John Kay's very generous comments (*Last Word*, June).

It also gives me the opportunity to place on record the debt of gratitude owed to a number of volunteers who helped make the current situation possible. G8LY, G3HB, G4AGQ, G3ROK, G3JDC, together with my wife, played a significant part in tackling the huge backlog which had built up.

Together they sorted literally thousands of cards with cheerfulness and enthusiasm in the best traditions of amateur radio. Those many members who use the Bureau owe them a great deal. If I have missed out any other helpers then I apologise in advance and the omission should be attributed to advancing years.

It should not go unnoticed that the current success of the facility is due in no small way to the Bureau supervisor and her small band of regular staff. Jan Mair has put the QSL Bureau on a sound footing and members can rest assured the service is in excellent hands. She is also ready to answer members queries which should be addressed to her at RSGB HQ.

Visitors to the bureau are most welcome and I do hope more will take the opportunity to call in and see for themselves what is being done there.

John Hall G3KVA

Having served for forty years on 'both sides of the counter' in the QSL business, I can sympathise with G6OVO (*Last Word*, May) concerning unclaimed cards.

This problem has always been with us. Some years ago it was estimated that over £1000 of members finance was wasted on postage incurred in sending what amounted to waste paper from one point to another, and this amount will have increased since then.

From the Sub-managers' point of view the solution is simple - dispose of all cards which have been unclaimed for three months, in accordance with the contract under which the Society undertakes to handle QSL cards for its members. If a furnace or dustbin is not to hand, I understand cards make excellent compost. Some of our volunteer helpers retain the things for months if not years in an effort to be helpful, but surely if someone is interested in cards he will collect them anyway.

The reason for these unclaimed cards is two-fold. firstly many amateurs, especially newly-licensed ones, tend to send cards indiscriminately and also - let's be frank about it - many are less than honest when they say "Sure QSL" and have no intention of doing so. There is no disgrace in not wanting to exchange cards, any more than it is compulsory to bother with contests or awards, but very few people seem able to say "srino QSL hr" or its equivalent in the spoken word.

The solution to all this? I would suggest the whole QSLing set-up, which has been unchanged for some seventy years, be updated in the same way that our equipment and operating procedures have.

Possibly the fairest method would be to follow the example of ARRL and make an additional charge for outgoing cards according to the number sent, then the 'eager beavers' could send as many as they liked and know that they have made some recompense for the time spent by QSL Bureau staff and helpers.

Yesterday, I heard a TV announcement that parcel post charges are to be increased by 25%, which will obviously seriously affect all Society operations including the QSL Bureau. In order to help ease the burden, I entreat all members to remember it is 1991 and use common-sense and honesty in their QSLing activities.

E G Allen G3DRN

CRYSTAL PALACE GENEROSITY

I am writing on behalf of all members of the RAIBC to thank the Crystal Palace and District Radio Society for their most generous donation of £1058. Our membership is about 1600 and this money will be used to purchase equipment for the blind and disabled. Details of our activities may be found on page 30 and 64 of the latest RSGB *Call Book*.

Johnny Clinch G3MJK

5K WITH F2IG

I have today completed five thousand QSOs with the French station F2IG of Portet-sur Garonne in the Toulouse area. We made our first one on 13/6/58 and have operated on various HF bands with AM, CW and SSB.We have met on various occasions while passing through France.

Graham Layzell G3AMM

GOOD IMAGE

In our efforts to attract new blood to the hobby, it would appear to me that we have all overlooked the obvious. The 160 metre band has always been a favourite of mine and I work regularly using both CW and SSB.

However, a month ago I dug out my old home brew AM topbander, with the result that other locals followed suit and set up a 'natter net' on 1975kHz. The surprising outcome of all this activity is that no fewer than seven enquiring laymen have knocked on my door - not to complain of BCI or TVI, but wanting to know how to get started on amateur radio!

Each one of them admitted to having heard my CW and SSB on their 'trannies', but without a BFO it was to them so much double dutch. So there you are lads - knock down your power and join us on top band AM. There's no doubt in my mind that there isn't a better way to recruit for amateur radio, and you'll enjoy interesting QSO's at the same time - It knocks two metre FM into a cocked hat too!

Nev Kirk G3JDK

[This was how I first discovered amateur radio, too - Ed]

CAPITAL SERVICE

After reading and hearing about poor service from some traders at rallies, may I throw a bouquet in the direction of one such trader.

At the RSGB convention at the NEC, I purchased a PC and all its software and monitor. There was no long-term guarantee, although if it failed to work on taking it home, it would be changed. After discussion, the trader invited us to try the machine before we bought it.

I found a power point and tested, everything seemed fine. On reaching home and spending a fortnight getting used to the computer, I found that the disk drive did not work as it should. Oh dear!

To cut a long story short, I rang the company expecting the usual "You did test it, At that price what did you expect? etc . . .". Nothing of the sort. "Send it back right away", was the response to my phone call.

Living not too far away, I visited him and there was a new PC waiting on the bench to test before the exchange. "Any further problems, and I will exchange this one too", he said.

No problem this time, but for the service and courtesy we received we would like to say "Thank you, Darren". The company in question is Capital Products of Stockport. He will probably be at other Radio Rallies.

K Tyler G0ITI

FIFTY-CYCLE THIEVES

Recently during the weekend of 22/23 June working CW at a Coastal Defence event GB0CDF, a hiccup in the generator performance was noted. After a while it became necessary to check, only to find out it was in the process of being stolen, whilst running I may add! Chasing the scoundrels off gave us time to call the police. It seems, as well as working Coastal Defence, we should take up Self Defence. May I thank the police for their quick response to our plea.

A Johnsen G0DHZ

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.

MORSE 1

G3ENV's well-argued case for a code-free licence (*Last Word*, June) was very thought-provoking. However, there may be a snag with the argument. In just a few years, personal handsets (and Personal Communications Networks) will make possible high quality world-wide contact, a sort of amateur radio experience with no connection with the hobby. Why should anyone in their right mind invest effort and money in amateur radio?

Well, partly because it can be on a more human scale. Those handsets will contain the equivalent of maybe a million transistors. If you want to keep that access to the simplest, cheapest way of getting on the air and communicate long distances with low power and just a few transistors (or valves), you've got to keep CW.

Why keep it compulsory for HF operation? Because if you don't people will miss out. Before I became licensed 18 years ago, I regarded the morse test as an imposition. CW was certainly out of date then and my sole reason for learning morse was to operate voice on the HF bands. Having to do it, I discovered the pleasure of CW and have used it almost exclusively since at low power.

The RSGB is right to stick with morse code since, even at 5WPM, a few at least will become 'hooked'

Ian Braithwaite G4COL

MORSE 2

I agree with J Caledon-Scott, G4LRS, in his reply to Graham Lindsay, G8BZL, (*Last Word*, July) regarding Morse Code. I think G4LRS hit the nail on the head when he stated that, would-be class A licence holders are too lazy to bother themselves to learn Morse Code.

I believe that the Morse test separates the genuine amateur radio enthusiast from the half hearted person who only thinks he wants to be a radio ham. If these people are just handed a licence, they will very soon get bored, and realise that they really didn't want to become a radio ham after all, and this may even lead to 'jamming' through boredom.

When one spends weeks or months learning Morse, then one knows it was not just a passing notion they had about becoming a Radio Ham. I think that Morse Code should be compulsory before obtaining a licence at all. Then we would only need one licence. Why do things always have to get easier? Why not put the Morse test speed up to 20WPM?

Mark McIntyre GI3YDH

MEMBERSHIP SERVICE

All too often one hears criticism of RSGB Headquarters staff. I have not had a great deal of contact with them but following my recent contact with the Assistant to the Secretary, Sylvia Manco, I cannot praise them too highly.

On the late evening of 15 April, I was asked by the National Trust if I would set up a special event station at the South Foreland Lighthouse for International Marconi Day. The equipment and operators did not present too much of a problem but I felt it was very short notice as far as a special callsign was concerned. However, nothing ventured nothing gained, and on Tuesday 16th April I phoned the Secretary's Office and explained the position. Miss Manco was most helpful and on 17 April I received an application form. That was returned on the same day and by mid-afternoon on 18 April the allocated call was phoned to me. Two days later I received the Letter of Variation. A magnificent effort, much appreciated by all.

David J Bean G3TJQ

OVER THE MOON

Mr Frank Rhodes, G5WL, age 93 of Gillingham, Kent, wishes to thank his amateur radio friends for the provision of the transmitter for his use. He has been off the air for over a year following a stroke.

Especial thanks to G3BLI, G4VFQ, G0AES, G4RGN, G3WWI at the Gillingham Club, and others. Mr Rhodes has been an amateur radio enthusiast since before 1922. Many thanks and much joy; he is over the moon so to speak! 73 and thanks to all.

Miss F E Rhodes (daughter)

YOU CANNOT BE SERIOUS

Surely Mark Rogers G4RGB can't be serious about his criticism of the April Fool article? Surely any organisation that can cock a snook at itself is mentally healthy and alive. And where there's life there's hope.

PS. I like the new *RadCom*. It's addressing the new amateur - the novice.

Roy Smith G0IWU

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

AVAILABILITY. Goods are available less postage and packing from RSGB Headquarters between 9.15am to 1pm and 2pm to 5.15pm Monday to Friday. However you are advised to confirm availability of goods by telephone before visiting Headquarters. We attempt to keep ample stocks of all our sales items, however as this list has to be prepared several weeks in advance we cannot guarantee that any item on this price list is immediately available.

PAYMENT. Payment may be made by post enclosing a cheque or postal order. These should be crossed and made payable to 'Radio Society of Great Britain'. If sending cash please use registered post. You may use your credit card for payment by post or by telephone. We accept Visa and Access (Mastercharge) cards as well as RSGBs Credit Card. Our telephone number for orders is (0707) 49855. Our Giro account number is 533 5256.

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AMIDON/MICROMETALS TOROIDAL CORES, Ferrite, Beads, Rods etc. Send 50p for catalogue. Ferromagnetics, P.O. Box 577, Mold, Clwyd, N.Wales CH7 1AH.

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ALL RISKS" INSURANCE for portable/mobile/base station amateur radio and ancillary equipment. A service for RSGB members only. Also public liability and equipment insurance for affiliated clubs and societies. Details and leaflets from Sarah Baylis or Jennifer Lawson. Amateur Radio Insurance Services Ltd. 4a Russell Hill Road, Purley, Surrey CR2 2LA. Tel: 081-660 0820 or Fax: 081 660 9222.

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HEATHKIT UK spares and service centre. Cedar Electronics, 12 Isbourne Way, Broadway Road, Winchcombe, Cheltenham GL54 5NS. Tel: 0242 602402.

THE ANTENNA EXPERIMENTER'S GUIDE by Peter Dodd G3LDO. Over 200 pages and 120 illustrations on: Designing antennas and optimising existing ones, building RF test equipment, antennas and masts, £8.90 + p&p 78p UK, £1.20 overseas surface mail. Available from 37 The Ridings, East Preston, West Sussex BN16 2TW (0903) 770804).

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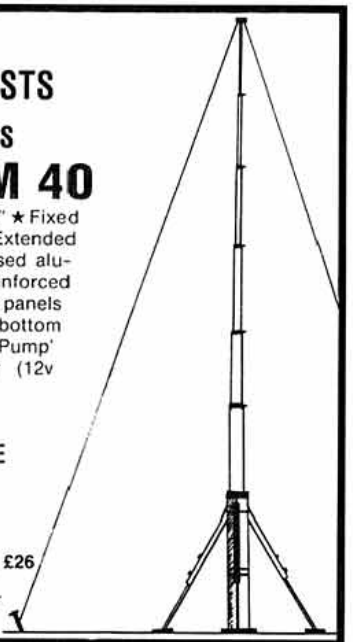

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ADVERTISERS INDEX

NEXT COPY DATE
The advertisement copy date for October is 20 August 1991

COMPACT COMMS

IC-735 FULL FEATURED TRANSCEIVER

As predicted the Icom IC-735 has rapidly gained the reputation it deserves. This compact transceiver is ideal for mobile, portable or base station operation. It has a general coverage receiver from 0.1Mhz to 30Mhz with superb sensitivity in all modes; SSB, CW, AM and FM.

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