Radio Communication

The Journal of the Radio Society of Great Britain

January 1992

Volume 68 No 1

THE VOICE OF AMATEUR RADIO FOR 79 YEARS

Prince Philip meets the Novices: page 5

KENWOOD

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

Radio Communication is published by the Radio Society of Great Britain as its official journal on the first day of the relevant month and is sent free and post paid to all members of the Society.

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

Filmset by JJ Typographics Ltd, Unit 4, Baron Court, Chandlers Way, Temple Farm Industrial Estate, Southend-on-Sea, Essex SS2 5SE.

Printed by Southernprint (Web Offset) Ltd, Unit 17-19, Factory Road, Upton Industrial Estate, Poole, Dorset, BH16 5SN.

RSGB membership at 30 June 1991: 34,581

Radio Communication

RadCom welcomes 1992 with . . .

* **Colour photographs on the News and Reports pages and on many other features,**
* **Easier to read full-page Propagation Predictions,**
* **And a new *QSL* feature: news of the RSGB Bureau and some of the most attractive cards – in colour.**

NEWS AND REPORTS

TECHNICAL FEATURES

COVER PICTURE:

In 1988, The Duke of Edinburgh, as the RSGB's Patron, launched Project YEAR. In 1991, to mark his 70th Birthday, the RSGB presented him with the evidence of the Project's success: Novice books, magazines and leaflets, plus some of the Novices themselves.

Photograph: Gordon Allis, G0LRS

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.

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Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE
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Microwave manager: C W Suckling, G3WDG
Trophies manager: Bob Harrison, G4UJS
VHF manager: Dave Butler, G4ASR
Society historian: G R Jessop, G6JP
Intruder watch (IARUMS): David Owen, G0OES
Morse practice co-ordinator: Mike Thayne, G3GMS
Audio visual library co-ordinator: David Simmonds, G3JKB

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

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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 Commmunication*): **£17.95** (excluding *Radio Communication*) (Subscriptions include VAT where applicable)

Membership application forms are available from RSGB HQ

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0707-49855

The Radcom Leader

The Work of AROS

THERE SEEMS TO BE A DEGREE of mystery and misunderstanding about the way in which the Amateur Radio Observation Service is organised and operates. I hope that these notes will help dispel this, and give an insight into the organisation's work.

AROS is formed of a small group of dedicated volunteers who offer to spend time observing and reporting upon the state of our amateur bands on an entirely confidential basis. Reports are also welcomed from the amateur population at large. The coordinator of the service is the only member of the team who is ever publicly identified, for fairly obvious reasons.

The vast majority of problems are resolved by a constructive word of advice from the coordinator to the amateur concerned. The amateur often may not realise that his or her activities are reported upon, not always from within the UK, or indeed that their operating contravenes the licence requirements or gives offence to others.

The service is intended to be one which assists the majority of responsible amateurs and great care is taken to ensure that observers do not identify themselves, or are seen to be prying or snooping, or indeed acting as self-appointed regulators of our hobby. The Service is intended to provide support and advice to the majority of responsible radio amateurs, and may be able to resolve disputes with the Radio Investigation Service or the Radiocommunications Agency.

The working relationships between AROS and the RIS are extremely cooperative and supportive, and they continue to improve as a result of almost daily contacts.

The service has a long and proud history stemming from the Intruder Watch which was formed in the early post-war years to lobby against the intrusion of commercial broadcasting stations into our amateur bands (see *RadCom* Dec 91).

Sadly the need is now seen for the policing of the amateur bands to be organised on a rather more formal basis. Particularly prevalent at the moment are the problems of repeater and packet abuse. The majority of problems dealt with by AROS relate to repeater abuse, and this area provides great frustration and annoyance to the repeater user. It also generates the largest volume of protest and complaint to the offices of the RA and RIS.

The majority of repeater abusers seem to be seeking an audience to perform to, so the most effective way of dealing with them is to deprive them of their audience. There is nothing more frustrating to the abuser than for the other users on channel to carry on with their contacts as if they were not there. I do realise how difficult that can be sometimes, but a normal amateur rag-chew carried on around their inanities and insults will often do the trick. Discussions are continuing with repeater groups and with the Repeater Management Group on ways of dealing with abusers more effectively.

If you are a packet operator, it is all too tempting to fire off a bulletin addressed to 'ALL @ GBR'. A moment or two's reflection would have led you to realise that a bulletin addressed to a specialist interest group, or indeed a private message to an individual would have been much more appropriate.

Don't forget that packet is a very special medium, providing as it does an opportunity for your words to be 'hard copied' and distributed very widely. Very often, things which you might say in ordinary conversation or in the heat of the moment are quite inappropriate for the printed page. And don't forget, too, that the licence requirements frown upon you transmitting any messages in which you have a monetary interest. Advertisements for club activities, or in relation to amateur radio in general are OK, but not offering a good home to a redundant TNC for example! May I suggest that you read again the excellent code of conduct published by the Society last year (*RadCom*, July 91, p 71).

The remainder of complaints received range from pirated call-signs, often the result of poorly sent or received Morse, to excessive powers and transgression of the band plans, with all the other possible licence infringements thrown in for good measure.

Usually, a constructive contact with the amateur provides a solution, but occasionally it is necessary to put together a case for the RIS to consider for further action, even possible prosecution. All cases submitted in this way have to be prepared to the standard required for submission as legal evidence, and here amateurs can assist by the careful logging of evidence which can be used in this way. Sadly, reports of problems, times, dates, frequencies, call signs and operating patterns are of very limited use.

In the current climate of limited resources and enormous workload of the RA, the state of the amateur bands depends very largely on the effort which we amateurs put into our own housekeeping. I hope that you will find AROS a useful tool in this task.

Geoff Griffiths, G3STG
AROS Coordinator

11 The Grove, Asfordby, Melton Mowbray, Leics LE14 3UF.

NEWS & REPORTS

● STARTING 6 January is an RAE course run by the Sony Broadcast Amateur Radio Club at Sony's HQ building in Jays Close, Basingstoke. The course, Mondays 7.30 - 8.00 pm, will comprise eleven modules and it is possible to attend (and pay for) only the modules for which tuition is required. Further details can be obtained from: Stephen Harding, Sony Broadcast Amateur Radio Training Group, Sony Broadcast and Communications Ltd, Jays Close, Basingstoke, Hants RG22 4SB.

● FROM THIS month, the booklet *How to Improve Television and Radio Reception* will no longer be available from the RA. However, the RIS has produced a leaflet *Advice on Television and Radio Reception* as a guide for the householder. It is available from the Library Service, The Radiocommunications Agency, Waterloo Bridge House, Waterloo Bridge Road, London SE1 8UA; tel 071 215 2352.

● TRINIDAD and Tobago now have a reciprocal licensing agreement with the UK. Licences will last for one year and the Trinidad and Tobago General Class licence is reciprocal with the UK Class A licence.

● STOLEN FROM a Vauxhall on 25 November: a Trio TR9130 S/N 4030072, and a Fairmate HP200E S/N 15075. Any information to G4AAQ, QTHR, or Whitley Bay Police on 091 232 3451.

● COUNCIL Member Clive Trotman, GW4YKL, is arranging another meeting with the DVLA regarding callsign number plates. More news as soon as it becomes available.

● THE C&G Advisory Group for the RAE, which includes RSGB representatives, has agreed that examinations set in 1992-94 would be based on the present (1989-91) syllabus.

● RSGB National Convention and Amateur Radio Exhibition – Saturday and Sunday, 30/31 May 1992, National Exhibition Centre. Woburn Rally – Sunday 2 August 1992.

● AT 4 DECEMBER, the latest callsigns issued were in the G*0RB* and G*7LE* series, and Novice calls were in the 2*0AA* and 2*1AI* series.

● NEW RSGB HF Awards Manager is Bill Ricalton, G4ADD. Previous Manager, GW4BKG is thanked for his service.

They're presenting Novices at Buckingham Palace, President Case went down with Allis

At the Palace

PROJECT Y.E.A.R
Youth into Electronics via Amateur Radio

ON THE afternoon of 20 November, four of the first Novice Licensees, four parents, and three RSGB VIPs arrived at Buckingham Palace to be entertained by HRH The Prince Philip, Duke of Edinburgh, KG, the RSGB Patron. They were accompanied by our photographer, RSGB member Gordon Allis, G0LRS.

The party was welcomed by Lieutenant-Commander Malcolm Sillars - Equerry to His Royal Highness – who led the way up several flights of stairs to an exquisite gallery adorned with oriental artefacts and portraits of many members of the Royal Family. The meeting room itself was also sumptuously decorated, containing many items which had been transferred from Queen Victoria's palace in Brighton.

The Patron arrived and RSGB President, John Case, GW4HWR, was introduced. He then presented the members of the party who were:-

Vicky Foster, 2E1AAD, and her father John Foster, G7FDV; Natasha Weir, 2E1AAE, and her mother Pamela Weir; Hugh McNeill, 2E0AAA, and his mother Margaret McNeill; Jonathan Page, 2E1AAA, and his father Bryan Page; Hilary Clayton-smith, G4JKS, RSGB Project YEAR Coordinator; and Sir Richard Davies, G2XM, RSGB President 1988.

PHOTOGRAPH: GORDON ALLIS, G0LRS

Prince Philip, the RSGB's Patron, with Novice licensees at Buckingham Palace: (l to r) Natasha Weir, 2E1AAE; Vicky Foster, 2E1AAD; Hugh McNeill, 2E0AAA; and Jonathan Page, 2E1AAA.

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Help Wanted for PSC!

A VOLUNTEER is sought to help the Propagation Studies Committe in its HF investigations.

His role will be to produce computer 'predictions' for comparison with collected data, initially on 28 MHz but eventually on 50 MHz. He may also wish to get involved in analysing and displaying the data by means of a computer. This will involve close liaison with other members of the Committee. He will have the status of Corresponding Member, and therefore not be expected to attend meetings. The only qualifications needed are possession of a powerful PC compatible computer, with co-processor, and an interest in propagation. Please apply with details to the PSC Chairman, Geoff Grayer, G3NAQ (QTHR).

Council Election Result

THE VOTES cast in the election for the 1992 Council were as follows:

ORDINARY MEMBERS

J Allaway, G3FKM	*2030
H Claytonsmith, G4JKS	*1900
N Roberts, G4IJF	*1432
G L Benbow, G3HB	*1403
E G Allen, G3DRN	1042
J Gannaway, G3YGF	1023
D W McQue, G4NJU	997
R G Wilson, G4NZU	887
E P Essery, GW3KFE	881
D J Hough, G4WRW	580
D J Gourley, G0MJY	416

ZONAL MEMBER

R Horton, G4AOJ	*458
N Lasher, G6HIU	248
Invalid Votes	301

* Elected. A full list of the 1992 Council appears opposite.

● IN LAST month's 'thank you' to retiring Council members, we inadvertantly omitted to mention Francis Rose, G2DRT, who has been a member of Council for six years. Apologies to him.

At the Palace

continued from page 5

John Case then made a very short speech:

"Your Royal Highness, in 1988 during our 75th Anniversary celebrations, when Sir Richard was President, you did us the great honour of launching our Project YEAR. Now in 1991 we would like to celebrate the success of the undertaking by presenting these four young people, the recipients of the first Novice Licences and to ask if you would accept this memento of the occasion".

Prince Philip was presented with a gift in the form of an embossed leather-bound box file in the shape of a book. Inside were several of the books relating to the Novice Licence and the training scheme. After a brief examination he expressed his thanks and said he would like to look at it more closely later.

PHOTOGRAPH: GORDON ALLIS, G0LRS

"Your Royal Highness . . . ."

There followed an informal session in which His Royal Highness chatted to the members of the party - especially to the Novices who appeared to be totally at ease with him. They talked about their activities on the air and the fun they were getting from amateur radio. Showing great interest, Prince Philip asked many questions, including the difference between Novice and ordinary licences and between A and B licences. Membership of the Society was discussed and he was surprised to find out that one did not have to be an RSGB member to be licensed. He asked when the 'YEAR' ended and the significance of the mnemonic - Youth into Electronics via Amateur Radio - was explained. After about 25 minutes he wished everyone well and left.

The visit was the end product of deliberations by Council to do something special to celebrate the Patron's 70th birthday year. It became a combined celebration which linked the launch of the Project YEAR initiative in 1988 by Prince Philip and its successful outcome in 1991.

PHOTOGRAPH: GORDON ALLIS, G0LRS

ABOVE: The entire party with the Duke of Edinburgh: (l to r) Sir Richard Davies, G2XM; Hilary Claytonsmith, G4JKS; Natasha Weir, 2E1AAE; Pamela Weir; Vicky Foster, 2E1AAD; John Foster, G7FDV; Hugh McNeill, 2E0AAA; Margaret McNeill; Jonathan Page, 2E1AAA; Brian Page; and John Case, GW4HWR.

PHOTOGRAPH: GORDON ALLIS, G0LRS

RIGHT: Prince Philip shares a joke with John Foster, G7FDV, watched by his daughter Vicky, 2E1AAD, Mrs Pamela Weir, Natasha Weir, 2E1AAE and John Case, GW4HWR.

PHOTOGRAPH: GORDON ALLIS, G0LRS

BELOW: John Case explains the contents of the ornate presentation box. The box was designed on behalf of RSGB Council by Hilary Claytonsmith and was made by London bookbinders Keypoint Franke Ltd.

● SIMPLE construction projects are required for *D-i-Y Radio*, the RSGB's magazine for beginners. For details, telephone 0707 59260 and ask for Marcia Brimson.

IARU Region III covers Asia (excluding the USSR) and Oceania. Tim Hughes, G3GVV, Chairman of the RSGB's IARU Committee, was present at its Conference.

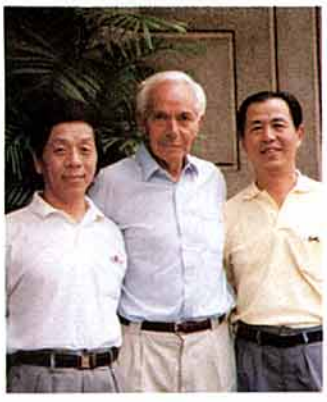
Region III Conference

THE TRIENNIAL IARU Region III Conference was held at Bandoeng in Indonesia last October. As at previous Conferences, there were many occasions on which RSGB's opinions were sought. Following speeches by JM1UXU (Secretary Region III), YB0AY (President of the Indonesian society, ORARI) and W1RU (President of IARU), the conference was opened by Mr Azwarr Anas (Minister for Tourism, Post and Telecommunication).

Delegates from 14 of the 24 member societies of Region III were present, plus 4 proxies; I had accepted an invitation to hold a proxy on behalf of the Hong Kong Amateur Radio Transmitting Society. It is pleasing to report that, for the first time, delegates from Bangladesh and Sri Lanka were present; licences have just started being issued in Bangladesh, largely as a result of the great effort made by the President of BARL Saif Shahid (formerly G1NWJ, now S21A), by Mr David Rankin 9V1RH/VK3QV, and by Dick Baldwin, W1RU.

Following the opening plenaries, four committees were set up: Credentials and Election, of which I was appointed Convenor, Editorial, Finance and Steering.

In addition, four working groups were established: WG1 dealt with constructional and administrative matters; WG2, of which I was a member, with bandplans, users of bands and other related matters; WG3 with the promotion of amateur radio in developing countries; and WG4 with conference recommendations.



Mr Wan Xun, BZ1WX, and Mr Chen Ping, BZ1HAM, with G3GVV.

Plenary session of the conference: (l to r) VK3ADW, ZL2AMJ, JM1UXU, YB0BNB (Conference Chairman), 9V1RH/VK3QV, 9M2DD and JAIKAB.

Bandplans

WORKING GROUP 2 recommended that:

- The 14MHz bandplan in Region III should not be altered.
- There should be common windows at VHF, UHF and microwaves.
- The extension of the 28MHz band from 29.7 to 30MHz was desirable.
- Beacons should be established on 18.110 and 24.930MHz.
- 10, 18 and 24MHz bands to remain contest free.
- Contest organisers to be encouraged to use restricted parts of the bands and make participants aware of this through national magazines. In selecting contest band segments, organisers to be encouraged to be mindful of the band limitations placed on the various licence and classes internationally and to note the needs of operators not taking part in the contest. Member societies to be requested to develop proposals for preferred contest segments for consideration at the next Conference.
- It was noted that New Zealand had an amateur band 614 - 622MHz.

Other topics included: Involvement in EMC and CISPR; and the lack of activity by the International Beacon Co-ordinator.

Papers

A VERY important Information Paper was submitted by W1RU and HK3DEU dealing with proposals for the 7MHz band and for discussion at the forthcoming WARC-92. (see *RadCom*, Dec 91, p 7 for details of this vital and imminent conference - *Ed*).

Before departing the UK, I had been briefed on specialist topics by the HF Manager (G3ZAY), the VHF Manager (G4ASR), the AMSAT-UK Secretary (G3AAJ) and the Licensing Advisory Committee Chairman (G3HCT). The RSGB produced two Conference Documents: 'A Novice Licence in the UK' (by G4JKS) and 'Packet Radio'.

Other meetings

PRIOR TO the Conference, and at no cost to the RSGB, I visited Singapore and met with 9V1RH/VK3QV.

Subsequently I visited Malaysia where I spent two days as the guest of 9M2CR; Colin was for many years seconded to several countries in Africa and Asia on behalf of the International Telecommunication Union.

Meetings were also held with 9M1DD (a Director of Region III) and with 9M2RS, 9M2WT, 9M2YB and 9M2SS. With 9M2SS I had the great privilege of separate meetings with the Deputy Director of Communications in Malaysia, and the Director General himself.

RSGB help

COPIES OF the syllabus for the UK Radio Amateurs Examination were sent to Bangladesh, China, Malaysia and Sri Lanka, and G3HB's *Radio Amateurs Examination Manual* was presented to several delegations.

9M2WT is helping to introduce amateur radio to youth organisations in Malaysia and he has been sent a copy of the RSGB video *Amateur Radio for Beginners* to assist his work.

Repeater Admin

A SUB-COMMITTEE of the Licensing Advisory Committee met with the Radiocommunications Agency on 1 November to obtain RA approval for formalised documentation to control the repeater network along the lines they had requested. It is intended that this will be introduced early in 1992 and detailed information will be supplied to repeater groups as soon as the scheme has been approved. A constructive discussion also took place concerning repeater abuse.

Wanted: Technical Sub-Editor

IN ORDER to strengthen the technical content of RadCom and to provide support for the current editorial staff, a Technical Sub-Editor is required.

Candidates must have a good command of English, must be able to work to exacting standards and must be happy working with computers. A wide range of amateur radio experience is preferable to specialist technical knowledge, (which is already available through the RSGB's committee system) though it would be an advantage to be an active constructor. Experience in journalism is advantageous but not essential. Salary is negotiable.

Write, with a CV, to the Editor, Mike Dennison, G3XDV, RSGB, Lambda House, Cranborne Road, Potters Bar EN6 3JE.

Council Brief

9 November 1991

- The Minutes of the Council meeting of 21 September were accepted.
- It was reported that a meeting had been held with the RA concerning various matters regarding repeaters, packet radio, and general licensing matters. Further work is in progress, and there will be another announcement concerning this at a later date.
- The President announced the arrangements for the presentation of several of the earliest Novice Licensees to the Patron, HRH Prince Philip.
- The GM announced that the contract for the rewiring of HQ had now been let.
- Council accepted a recommendation that all members of RSGB committees must be members of the Society; checks on this are to be made.
- Council decided that Raynet Group Controllers would be surveyed as to their members' desires on the future organisation of Raynet, and that Council would make a decision after receiving the results.

Special Meeting, 10 November 1991

This meeting discussed a wide range of options concerning the future organisation of the Society and the information requirements for a full five-year business plan to be prepared, and mapped a course for the evaluation of various inputs to enable finalisation and effective implementation of this plan.

A Statement

from Timestep and AMSAT-UK, 28 October 1991

Timestep and AMSAT-UK jointly refer to the article which appeared under the heading 'Instantrack Software' in the August 1991 issue of *Oscar News*.

As a result of a breakdown in communications, Timestep did not receive written confirmation from Franklin Antonio, the author, to sell under licence, although a licence has now been granted and all royalties have been paid (16 October 1991).

AMSAT-UK acknowledges that, although acting in good faith from information received, the other allegations concerning David Cawley and TIMESTEP Electronics are incorrect.

In view of this statement, both parties agree to take no further action.

PHOTOGRAPH: J J CLARKE

The 9 November aurora was so large as to be visible in the south of England. Rob McTait, G2BKZ, saw it at 0200 from Stevenage, Herts. He then woke his photographer neighbour and, presumably, the view more than compensated for the late hour. The result was this picture. See *VHF/UHF News*, page 17.

An Open Society - The Future

THE SOCIETY is planning its long-term strategy. As part of this project, a detailed survey of members will be carried out which will give members an opportunity to provide input so that they may have the Society they want.

Members of all committees and honorary officers, as well as key HQ staff, will be asked to attend a working conference session provisionally proposed for 12/13 June 1992. Observers and members who may like to participate will be given the opportunity to do so. More details next month.

70cm in North of England

THE RSGB has received a request from the Radiocommunications Agency on behalf of the Primary User of the band 432.0 to 433.5MHz for all amateur radio transmissions in the area of the North of England bounded by 53°North 02°East, 55°North 02°East, 53°North 03°West, 55°North 03°West, to be reduced to a minimum usable power level, not exceeding 10dbW PEP ERP, for the calendar month of **December 1991**. All UHF contest activity in December has been cancelled as a result.

SOS from war-torn Croatia

SOME 25 scouts and guides were involved with the Meirionnydd ARS Jamboree On The Air station, GC4LZC/P, on 19 October. But the fun turned into excitement when the station operator, RSGB member Bruce Morris, GW4XXF, picked up an SOS message.

The message from a Croatian amateur gave details of the terrible war taking place, accusing Serbia and the Yugoslavian army of 'genocide', the use of 'a war gas' and destruction of industry. It continued with a plea for medicines, blood, winter clothing and food. Bruce passed the text of the message to the Duty International Officer at the Headquarters of the British Red Cross Society.

Bruce Morris, GW4XXF, in his impressive museum/shack.

HQ NEWS

I AM WRITING this in November, counting down to the AGM. Lambda House seems to have developed into a building site with wiring people in every room in the building. Miles of new wiring has disappeared into conduit and trunking throughout all the offices and corridors. The noise of hammer drills has driven the staff into all sorts of odd corners for meetings and to try and carry on with their work. The men with the noise are everywhere and a light patina of plaster dust is settling over everything.

As I mentioned last month, I am trying to improve our response time for replies to letters and enquiries. This has been a long running sore with no easy solution. The level of frustration tends to exacerbate the problem as some callers, expecting a poor response, phrase their enquiry in as vague a way as possible. If I am to have a chance of improving response time I need to have feedback from members who have had a problem.

Delays are a function of staffing levels and systems, which are being improved. However, attitude problems are generally a reflection of morale and staff training. To help me, please obtain the name of the member of staff you make contact with at HQ when trying to sort out your problem. I get so depressed reading the sort of letter which starts "I telephoned headquarters and spoke to a girl who passed me on to another person who was unhelpful". I can do nothing to remedy that situation without the name of the member of staff to whom you spoke.

It is absolutely vital that genuine enquiries are dealt with in as efficient manner as possible. That is self evident. However it is important that your enquiry is presented to the right person in the right way. I shall include cameos of staff members and their functions over the next few months so that you can match a face with a voice.

Please let me know if your enquiry is not dealt with in a professional and efficient manner. My staff do want to offer an efficient service but you *must* ask them for their name when you telephone. It is a complete waste of time advising me of undirected complaints. Of course, if you receive especially good service from a staff member, let me know his or her name too.

Last July, the Society was invited by the Radiocommunications Agency to tender for the issue of amateur radio and CB radio licences. A new company, RSGB Licences Ltd, was acquired for this purpose. As the Society was unsuccessful in its tender, the new company will be left dormant.

Philip Smith,
General Manager

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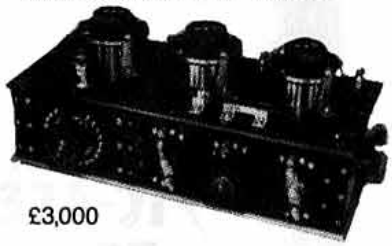

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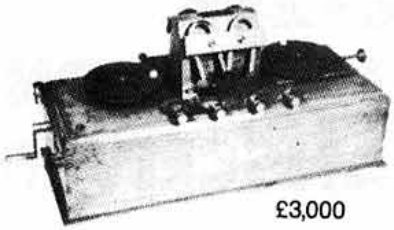

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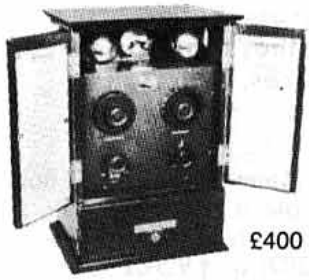

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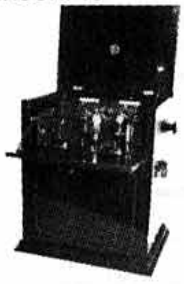

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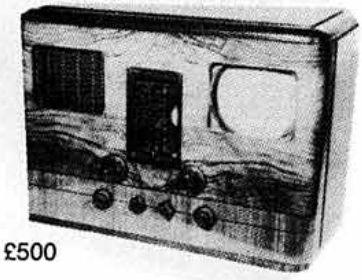

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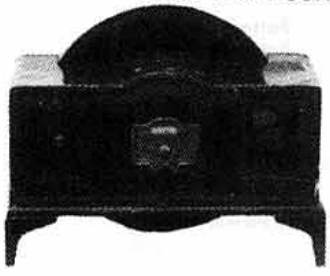

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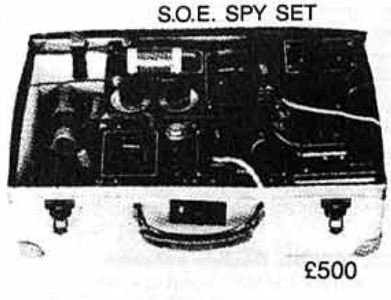

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ALL EARLY WIRELESS/TELEVISION SETS WANTED, ALSO HORN GRAMOPHONES/PHONOGRAPHS. MR. YATES, THE HEWARTHS, SANDIACRE, NOTTM. NG10 5NQ. TEL. 0602 393139 OR 0860 362655 ANYTIME.

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THE NEW IC-2SE, SIMPLE OR MULTI-FUNCTION 144 MHz FM TRANSCEIVER

Icom's tradition of building high quality, reliable handhelds continues with the IC-2SE an incredibly compact handheld designed with features that exceed larger, bulky handhelds. The IC-2SE proves that superior quality comes in all sizes.

IC-4SE 70cm. version available

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Slim and unbelievably compact.

The IC-2SE measures only 49(W) x 103.5(H) x 33(D)* mm with the BP-82 Battery Pack. Hold the IC-2SE in your hand to truly appreciate its miniature size. Weighing just 270g† with the BP-82, the IC-2SE will easily fit anywhere – on belts in shirt pockets, handbags, etc. *1.9(W) x 4(H) x 1.3(D) in. † 9.5 oz.

Simple design for operating convenience.

Even with its tremendous versatility and a wide variety of functions, the IC-2SE is easy to use. All functions are performed by a total of just six switches and three controls. The IC2SE includes both simple and multi-function modes. The result is two transceivers in one: both an easy-operation and multi-function transceiver. Simple mode ensures totally error-free operations. Multi-function mode allows you a variety of function settings depending on your operating requirements.

Other advanced features:

Reduced size doesn't have to mean reduced quality. The IC-2SE proves this with a wide variety of advanced functions.

- Tuning control on the top panel for quick QSYing.
- Monitor function that allows checking of the input frequency of a repeater.
- Function display that clearly shows all information required for operations.
- Splash resistant design and durable aluminum die-cast rear panel for dependable outdoor operations.

Options

• **BA-11, Bottom Cap.** Protective cap for terminals on the base of the IC-2SE.

• **Battery packs and case.**

BP-81	7.2V, 110mAh
BP-82	7.2V, 300mAh
BP-83	7.2V, 600mAh
BP-84	7.2V, 1000mAh
BP-85	12V, 340mAh
BP-86	Case for six R6 (AA) size batteries

• **BC-72E, AC Battery Charger.** Desk top charger for the BP-81 - BP-85.

• **CP-12, Cigarette lighter cable with noise filter.** Allows you to use the IC-2SE through a 12V cigarette lighter socket. Also charges the BP-81 - BP-85.

• **FA-140BB, 144MHz flexible antenna.** Flexible antenna for 144MHz band operation. Same type supplied with the IC-2SE.

• **HM-46, Speaker/Microphone.** Combination speaker and microphone equipped with an earphone jack. Clips to your shirt or lapel.

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

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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.

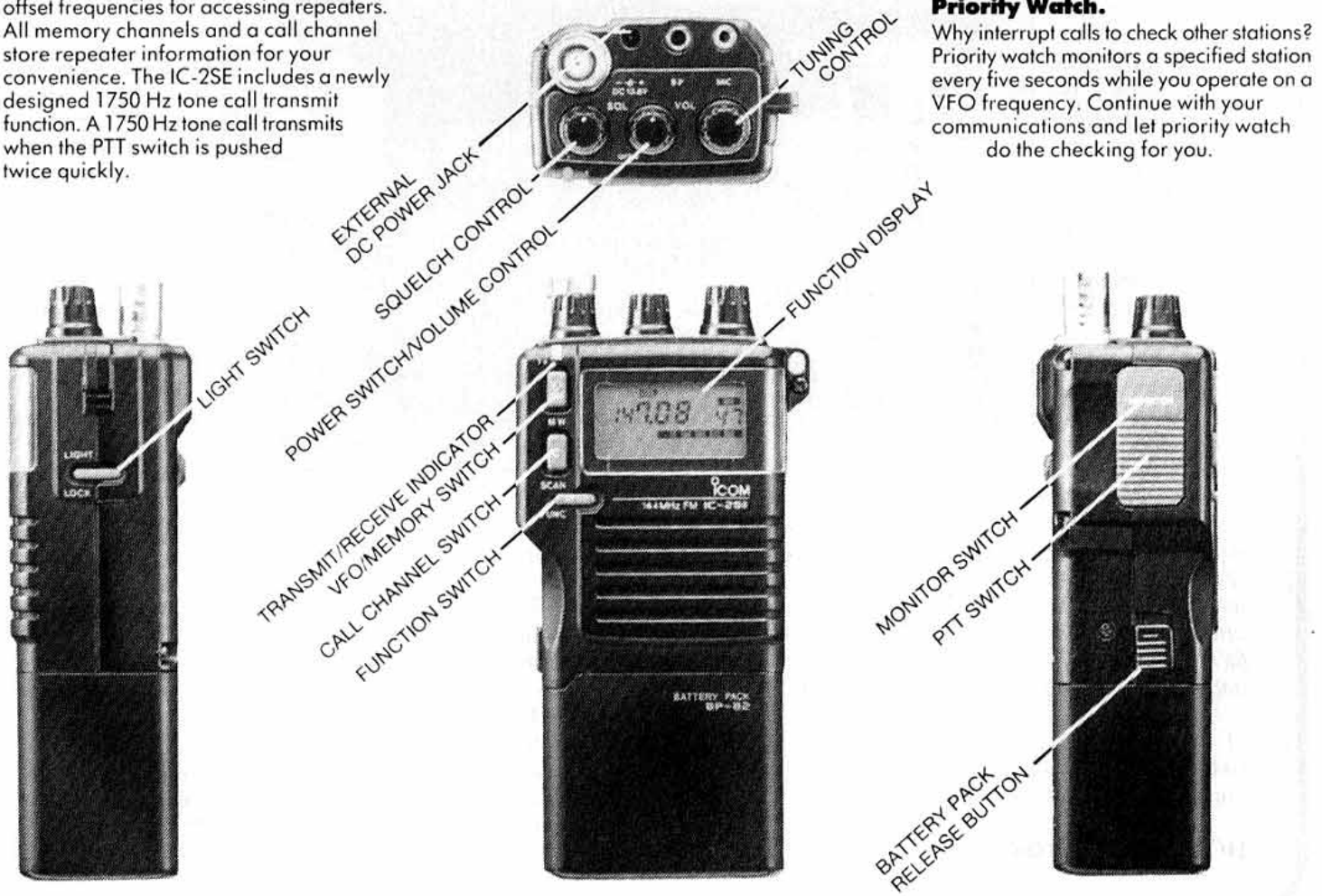
Power Saver for longer operating time.
The power saver ensures lower current flow during standby conditions. Operating times are much longer than with older, more conventional transceivers.

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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The "E" series, of rugged, "Black Brick" construction, are desigtned to be tucked away under the bench and forgotten.

The first number in the model description is the nominal output voltage; the second is the rated current output at 50% duty cycle.

The peak current capability is 20% higher than the rated output. (e.g. The 12/30E delivers 30A rated and 36A peak.)

12/5E **£79.00**
12/10E **£150.00**
12/20E **£209.00**
12/30E **£256.00**

The "E" series is also available in 5V and 24V output voltages at the same price as the 12V range.

I know, I know. You can get cheaper power supplies, but not with the in-built protection and RF immunity which come as standard features from BNOS.

The Linears

(1st number is the frequency band, 2nd the input power, 3rd the output power.)

CLX Range. Linears without pre-amp.

CLX144-3-100	**£230**	CLX432-1-50	**£230**		
CLX144-10-100 ...	**£196**	CLX432-10-50	**£196**		
CLX144-10-180	**£364**	CLX432-10-100 ...	**£364**		
CLX144-25-180	**£310**	CLX432-25-100 ..	**£310**		

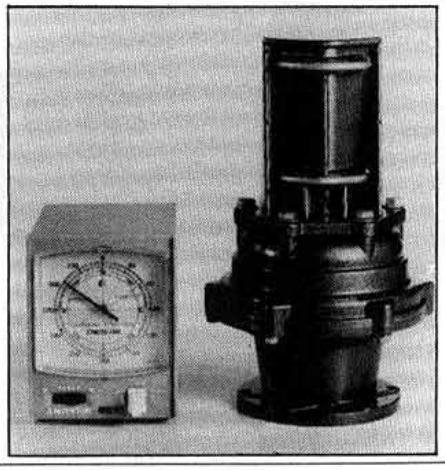
CLP Range. Linears with high performance Rx pre-amp.

CLP50-10-100 ...	**£263**	CLP432-10-100 ...	**£398**	CLP144-3-100	**£263**
CLP70-10-100 ...	**£263**	CLP432-25-100 ...	**£341**	CLP144-10-100 ...	**£230**
CLP432-1-50	**£263**	CLP144-3-50	**£155**	CLP144-10-180	**£398**
CLP432-10-50 ...	**£230**	CLP144-10-50 ...	**£155**	CLP144-25-180	**£341**

EMOTO ROTATORS

Rotators from this long established company are amongst the best engineered units we have ever seen. Designed by an engineer who knows his subject, the EMOTO rotators are a pleasure to own. All rotator controllers incorporate clear backlit compass scales for beam heading and the cabling is simple and straightforward. Models range from the 105TSX for VHF/light HF use, through the variable speed 747SRX to a mighty 1800SFX for turning large log-periodics. Buy the best you can; it's always folly to cut corners on your rotator. The best is EMOTO.

105TSX ..... VHF/light HF use **£163**
747SRX .... 3 element HF and up **£329**
1105MSAX . 3 element 40 metre beams, etc.. ..... **£459**
1200FXX ... even bigger and variable speed **£531**
1300MSAX .. I believe that this turns the 16 inch guns on the USS Missouri .. **£914**



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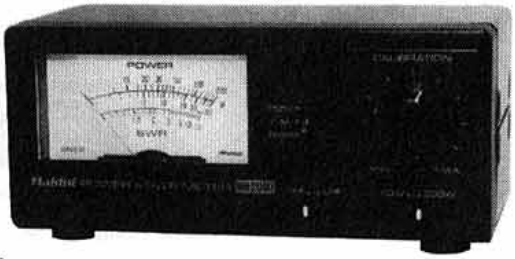
For many years now we have sold these highly reliable products. We are now adding to the range both aerials and meters and details on the full range are available upon request. Here are two examples.

HS-WX1
2-Band Vertical

Gain: 4.5dB (144MHz)
7.2dB (430MHz)
Power Rating: 200W FM
Glass Fibre GP
Height: 1.8m
Cost: **£60** + carriage

The perfect aerial for all current dual-band transceivers. Built to Hokushin top quality standards.



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MR-1000 HF/VHF

Freq. range: 3.5MHz - 200MHz
Measurable Power Range:
0 - 50W (CW) & 0 - 200W (CW)
Dimensions:
153mm(W) 70mm(H) 112mm(D)
Cost: £49.95 (inc VAT)

MR-2000 VHF/UHF

Similar spec. as MR-1000 with freq. range of 130MHz - 512MHz.
Cost: £49.95 (inc VAT)

BARRY (S Wales): 251 Holton Road Tel: 0446 721304 **BOURNEMOUTH**: 27 Gillam Road, Northbourne Tel: 0202 577760 **BRISTOL**: 6 Ferry Steps Ind Estate Tel: 0272 771770 **CAMBRIDGE**: 162 High Street, Chesterton Tel: 0223 311230 **CUMBERNAULD**: Cumbernauld Airport Foyer Tel: 0236 721004 **LONDON (HEATHROW)**: 6 Cherwell Close, Langley Tel: 0753 545255 **LONDON (MIDDX)**: 223/225 Field End Rd, Eastcote Tel: 081-429 3256 **NEWCASTLE**: Newcastle Intn'l Airport Tel: 0661 860418

Introducing the *DRAKE R8E* Communications Receiver

- ★ Wide frequency coverage (100KHz to 30,000KHz) plus additional VHF bands (35-55MHz and 108-174MHz) with the optional VHF converter. Multi-mode reception includes AM, FM, RTTY, CW, USB and LSB.
- ★ Five built-in filter bandwidths... for reception of most signals under virtually any conditions.
- ★ Synchronous detector... for improved quality of received AM signals, especially under severe fading conditions.
- ★ Non-volatile memory... for information retention during power outage.
- ★ Built-in, multi-voltage power supply... for operation in most parts of the world on nearly any type of power line voltage.
- ★ RS232C serial interface... for remote control of receiver functions.
- ★ Multiple scan functions... for scanning by carrier, time or seeks modes of frequency or selected memories.
- ★ 100 channel memory capacity... for storing of frequency, band, and mode data.

- ★ Two operating VFOs... for increased flexibility and convenience.
- ★ Built-in pre-amp and attenuator... for improved reception of extremely weak signals, as well as very strong signals.
- ★ Timer function... for automatic operation. Very useful for recording purposes.
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- ★ Built-in dual mode noise blanker... for reduced electrical interference.
- ★ Passband offset... for the reduction of nearby interfering signals while maintaining maximum intelligibility.
- ★ Selectable AGC... for improved reception of fading signals.
- ★ Built-in speaker. ★ PLL synthesised.
- ★ Dual antenna inputs.
- ★ Optimum tuning step selection for each operating mode.
- ★ Connections for an external speaker and tape recorder.

£965
including VAT

WARNING
The R8 is manufactured for Europe as the **R8E**, *the* **E** *model meets European safety specifications and is the only version that comes with Drake's full warranty for operation in Europe.*

DRAKE IS BACK!

Drake have been known for their craftsmanship and superior communications products, proudly made in the USA, since 1943.

After a few years break, we are pleased to announce the launch of our new **R8E** Communications Receiver. In the new **R8E** Receiver, you will find that we have gone beyond ordinary shortwave receivers to give you the only receiver you will ever need to own.

The **Drake R8E** has been designed as a "complete package" — in fact, the only peripherals you may wish to add are a VHF converter and an external speaker.

Drake are also pleased to announce the appointment of **Nevada Communications** as their sole UK distributor. Nevada have over twenty-two years experience in the Communications Industry and the management are all Drake enthusiasts. They will be pleased to offer advice and a full service back-up on the new **Drake R8E** Receiver. Call them now or write in for further details.

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HF NEWS

JOHN ALLAWAY G3FKM
10 Knightlow Road, Birmingham
B17 8QB

AFTER WISHING all readers of the column a very happy New Year I have to begin with an apology to *Les* Antrobus, 7Q7LA, whose picture appeared in the November column over the name *Lou* Antrobus! Something else in the same issue produced a letter from Peter Carbutt, now G2AFV, but 9V1TL between 1978 and 1987. He says that in fact the WARC bands were released in Singapore on 1 January 1987 and that he had used all three on the first day! This was followed up by a phone call from 9V1RH confirming what Peter had said.

If you are planning to attend the SEANET Convention this year you might like to know that it will be held in Darwin, Australia - a most interesting area to visit. It will take place in November. There were two offers to host this year's event - this time the loser was Shanghai.

IOTA HONOUR ROLL UPDATE

ROGER, G3KMA, director of the RSGB IOTA award programme, has asked me to include the following message. "IOTA Honour Roll members wishing to update their score for the 1992 Honour Roll and Annual Listing appearing in the late spring are reminded to mail their submission to the appropriate checkpoint *by 1 February at the latest*. The checkpoint for UK stations is John Kay, G3AAE, QTHR."

DON'T QSL VIA THE BUREAU . . .

THERE SEEMS to be a lot of confusion concerning QSL bureaux, and a list of countries where there is no bureau appeared in November 1991 *QST*. These include A5, A6, A7, C9, D2, EP, ET, J5, KC4 (US bases in Antarctica), KC6, KH0, KH1, KH4, KH5, KH7, KH8, KH9, KP1, KP5, OD, P5, S2, T2, T3, T5, TJ, TL, TN, TT, TY, TZ, V4, V6, VP2E, VP2M, VR6, XT, XU, XW, XX9, XZ, YA, YI, ZA. ZD7, ZD9, ZK3, 3C0, 3C, 3V, 3W/XV, 3X, 5A, 5H, 5R, 5T, 5U, 5X, 7O, 7Q, 8Q, 9G, 9N, 9Q, and 9U. That covers a lot of rare DX but fortunately most stations in the countries listed have QSL managers and QSLs for them should be very clearly marked with the QSL manager's callsign to be routed via him/her.

DX NEWS

XQ0X, ACCORDING to the *RSGB DX News Sheet* will continue to send out signals from **San Felix Is** until March. VP8CFM, on **S Orkney Is** has a habit of appearing near 14.250MHz from 2300 to 0100. Alternative favoured spots are near 18.140MHz from 2200 to 0100, 21.222MHz from 1900 - 2000, 24.950MHz from 2200, and 28.400 - 28.530MHz between 1400 and 1700.

Callsigns in **St Lucia** were due to be modified at the beginning of 1992 and novices will now use the J66 prefix, visitors J67, and residents J69.

4K2OIL closed down in October after making more than 30,000 QSOs but **Franz Josef Land** is now well represented by 4K2MAL.

Alain, 5R8AL, is expected to be returning to **Madagascar** either this month or next. F6FYD is now back in **Sudan** as ST2YD and likely to be there until July.

F2CW was due to return to **Afghanistan** in late October and hoping to be heard as YA2CW until he leaves again early this year. OK1IAI is also in Kabul and said to have a TS440S, linear and various antennas, and is trying to get permission to operate. IARU has received a letter from the authorities in **Qatar** asking for advice on the formation of a radio society. This would be very good news. It is believed that SP5EXA is there now and trying to get a licence. HS1BV might be found at weekends around 21.300MHz any time between 1400 and 2100.

FT4WC should have left **Crozet Is** by now and rumour has it that there will be no radio amateur with the 1992 crew.

DXPEDITIONS

THE MINERS Radio Club (see below) is planning an expedition to **N Korea** to take place sometime during 1992 and sponsorship is being sought. If interested contact the club at the address given below. This really could be something if it materialises.

According to *RSGB DX News Sheet* N0TG, WA4DAN, KW2P, and K5MK will visit **Navassa Is** and use their own callsigns /KP1 between 17 and 23 January. They will be on CW and SSB and possibly also RTTY, and will be on all bands (including WARC).

ZL8GBS is said to have had some problems with getting permission to operate from **Kermadec Is.** However, ZL1AMO is said to be trying to arrange a visit there this spring - more information awaited.

DX'press says that an expedition to **Clipperton Is** will probably take place in March. All that is known so far is that the callsign will be FO0CI.

According to *RSGB DX News Sheet* ,W5KNE and W5BOS will be visiting **Christmas Is** between 11 and 24 February. More details later.

An American led expedition to **Vietnam** which was scheduled to take place before Christmas now might happen this month.

MINERS RADIO CLUB

A NEWS ITEM received from Angus, G8PG, gives details of a 'Miners Radio Club' which has been formed in the USSR. It is open to miners and ex-miners world wide and it is called 'Club Miner'. Requirements for membership are a one year service in a mining enterprise and membership costs 20 IRCs but it is free to disabled amateurs and WWII veterans. Write to Klub Miner, PO Box 9, Shakhty, 346500 USSR, including details of amateur activity and mining service.

CONTESTS

ARRL RTTY ROUNDUP

1800 4 January - 2400 5 January.

CONTACT AND exchange QSO information with as many stations as possible using digital modes (packet, RTTY, AMTOR, ASCII). All bands 3.5 to 28MHz (not WARC) and only 24 hours of the 36 may be used. Two rest periods totalling six hours must be taken in two blocks and indicated in the log. Single-operator multi-band (1) less than, or (2) more than 150W output. Send report and QSO number from 001. One point per QSO (anyone can work anyone) and stations may be worked on additional bands for credit. Multiplier is each US state, Canadian province (plus VE8 and VY1), plus DXCC countries except W and VE. I have copies of detailed rules (SASE please).

Jimmy McDougall, GM3CIX, doing a spont of beam maintenance. Jimmy has been a member of the Society for more than 50 years and is a keen HF DX'er.

UBA CONTEST 1992

1300 25 January - 1300 26 January (SSB)

1300 22 February - 1300 23 February (CW)

3.5 to 28MHz (no WARC bands) using contest preferred frequencies on those bands which have them (SSB - 3.6-3.65, 3.7 - 3.8, 7.04 - 7.1, 14.125 - 14.300, 21.175 -21.350, and 28.4 - 28.7MHz; CW - 3.5 - 3.56, 7.0 -7.035, 14.00 - 14.06, 21.00 - 21.060, and 28.00 -28.07MHz). Single-operator single or multi-band, multi-operator single-transmitter, QRP (less than 10W output), and listener sections. Exchange RS/T and serial number from 001. Belgian stations will give their province (AN,BT, HT, LB, LG, LU, NR, OV, or WV). Multipliers are Belgian provinces, DA1 and DA2, and EC countries (CT, CU DL, EA, EA6, EI, F, G, GD, GI, GJ, GM, GU, GW, I, IS, LX, OZ, PA, SV, SV9, SY, TK, ZB2). QSOs with ON, DA1, and DA2 count ten points, with EC stations three, and with others one point. Listeners may also enter. The fifth European Community Trophy will be awarded to the highest scoring EC member station from both the CW and SSB single operator sections. Copies of rules are available (SASE please).

MIDWINTER CONTEST

0700 to 1900 11 January (CW)

0700 to 1900 12 January (SSB)

For all licensed amateurs and listeners. All bands. Exchange RS/T, country, and QSO number starting from 001. YLs start their QSO number at 2001. Separate consecutive numbers must be used in phone and CW contests which will be scored as separate events. QSLs with YLs count five points, with OMs three and stations can be worked on each band. The multipliers are the total of DXCC countries from all bands

added together (ie each counts once only). Logs have to be mailed before 9 February 1992 to Midwinter Contest, PO Box 262, Barneveld, Netherlands. I have copies of the rules (SASE please).

In the **1991 Midwinter Contest** G0FIP was eighth YL in the SSB listing with 24,010 points, G0NYL 15th with 9,800, and G4EZI 21st with 5,850. G0FIP came 13th on CW with 3,024 points.

Results of the **1991 ARRL DX Contests** are now to hand. In the **CW section** there were specially noteworthy performances by **G3FXB** who came world second DX on 7MHz, **G3LNS** who was 5th DX on 3.5MHz, and **G4BWP** who was top European on 21MHz. Other scores were : - **(All-band)** G3WPF - 2,223,560, G3MXJ - 2,101,185, G4BUO - 1,960,848, G0MFO - 1,312,656, GW8GT - 1,186,116, G2QT - 542,016, G4GIR - 481,824, G3NKS - 414,414, GM3YTS - 330, 480, G3TXF - 320,712, GW3JI - 275,799, G2HPF - 173,262, G4BKI - 165,888, G3HJF - 110,103, G4ZME - 107,640, GM3ZAS - 96,813, G3KNU (QRP) 64,881, G3LIK - 58,905, and G0NAT (QRP) - 20,352. **3.5MHz** - G3LNS - 54,288, G0/VE5ZX - 13,440. **7MHz** - G3FXB - 170,856, G5LP - 48,982, G3ESF - 26,448, G4ZOB - 26,160, G4AMT - 24,282, G0IDE - 19,116, G4OTY - 2,601. **28MHz** - G4BWP - 256,842, GW3WMN - 125,292, G4UZN - 96,096, GM3CFS - 37,632.

In the **Phone section GM0ECO** was ninth in the 'Top Ten'. **GW4BLE** was fourth DX station on 21MHz and G4CNY eighth. Others scores were:- **All-band** - GM0ECO - 2,743,000, G3LNS - 2,001,750, G2QT - 757,212, G4BUO - 671,088, GM3BCL - 444,444, GW4HSH - 164,322, G4BWP - 94,785, G4CVK - 52,056, G4MET(QRP) - 17,952, G4OBE - 13,596. **7MHz** - G0KBB - 27,639, G3NKS - 15,225. **21MHz** - GW4BLE - 395,676, G4CNY - 309, 510. **28MHz** - GW8GT - 411,768, G4OJH - 385,329, G0AEV - 156,240, G4LJR - 23,460. In the **Multi-operator** section G0CCH scored 600,003 points.

EA RTTY CONTEST

1600 8 February - 1600 9 February

3.5 to 28MHz. Single operator single and multi-band, multi-operator all band, and listener

Ron, 7Q7RM, (left) with 7Q7AP (Alan, G4REY) in Ron's shack.

sections. Send RST and *CQ* zone (UK is 14). EAs send RST and provincial indicators. Work anyone - multipliers are DXCC countries and Spanish provinces (52) on each band added together. QSO points on 14, 21, and 28MHz are one with same continent and two for others. On 3.5 and 7MHz they are three and six respectively. I have copies of the full rules (SASE please).

CQ WW 160M DX CONTEST

2200 24 January - 1600 26 January (CW)

2200 21 February - 1600 23 February (SSB)

Single and multi-operator (use of packet, DX clusters etc makes the entry a multi-op). Exchange RS/T and US/VE stations send state/province, others their prefix. QSOs with own country two points, with same continent five points, and with other continents 10. Each US state/VE province/DXCC country counts as a multiplier - but not W or VE as well. Logs go to 160 Meter Contest Director, Donald McClenon, N4IN, 3075 Florida Av, Melbourne, Fla 32904, USA before 28 February / 31 March respectively and clearly indicate SSB or CW on the envelope. Copies of rules are available.

PROPAGATION

[The HF Propagation report has been incorporated once again into HF News. This gives more space for the F-Layer-Propagation Predictions which are presented this month in a larger typeface. It is hoped that the extra space will permit a more useful format to be adopted in due course - *Ed*].

Due to the early deadline caused by the Christmas period G8KG's

continued on page 19 ▶

BAND REPORTS

A really mixed bag of conditions during the past month including some interesting auroral openings on 28MHz.

Thanks go to G0s AEV, AFE, G2HKU, GM3CSM, G3s GVV, KSH, LPS, G4IVJ, GW4KGR, G4's MUW, NXG/M, OBK, OJC, and the UK DX Packet Cluster (via G4PDQ). Stations using CW are listed in italics.

7MHz

0000	*P40V, PJ2/OH6RI, VU2TS, W7ZQ, JJ1VUL/4S7, 9J2SZ, VK2DXI/9M2*
0700	C6AFQ, KL7K, PJ9W, VP2EC, VP9AD, ZF2JR
2000	*JH1DAG, ZA1QA, ZA1TAC*
2100	*SM6DQO/OD5, VQ9RS, 4K1A*

14MHz

0700	GU0HND/MM (nr Fiji), KH6FKD, KL7CUS, T30DP, *3X0HNU*
0900	KH0AM, P29DX, P29KH
1100	*C6A/KR1S*, FT4YD, VU2DVP
1500	A71BS, *VK0WW, W6, ZA1QA*, 3B8FG
1700	*NH6NR*, ZA0DX
1800	*FR5GL*, ZS9S
2000	BV2BT, *FR5DD*, TT8SA, *VU2OQ*
2200	*HS0ZAB, KL7PJ*, S30UN, VK, YB8HX, *4S7WP*

18MHz

0800	*NL7YL, SU1HV*, PJ7/W1XP, G3VHU/TF, *ZL, 4J3GM*
1200	*YJ0ANU*
1800	*EA6EJ, FG7/F6AUS, ZA1s HA, QA*, ZD7KT
2100	*4K3AFM*

21MHz

0800	BY3CC, DX1UST, HL0BLA
1000	HS0E, PJ7Q, VK9AD
1200-1400	BY7JS, P40T, ZA1DX, ZA0DX (?)
1500-1600	BV8AF, *FY5FE*, 7Q7BX, 9L1SL
1700-1800	BY5RA, FR5AI/J, JX9EHA, KH6XT, XE2J
1900	TT8SA, VE8CB, ZA1HA

28MHz

0900	BV2BT, H44/KL7UB, JT1BS, JT1KAA, KH0AC, P29DX, S79MX, T20XV, XX9AW
1000	D44BC, HZ1HZ, KG6JJH, KL7, VS6CT, ZA1DXC
1100	BY4s AA, AOH, FG5FL, H44KA, PJ9W, PP0F, TY2AB, VK9NS, *4K1A*
1200-1300	FR5DX, HZ1AB, P40T, PJ1B, S0RASD, SO3UN, V47TV, ZA1DX, ZF8AA, ZS9A, 5V7JG
1400-1500	A61AD, AP2JZB, D68RH, FG0P, FT4WC, JX9EHA, KG4DD, P40V, TL8ML, TT8SA, VP5X, W6-W7, 9K0ZZ, 9M2ZA
1600-1700	*J8/K9FD*, KG4QQ, PY0FF, TU2XZ, V21GC, *V29W*, ZS4NS/7P8
1800	AC4IG/HP1, PJ7A, V31DX, VP8s CFM, CGQ, CII, 8R1UN
1900	KH6QH, J3/JP1DMX, ZF2DI, G3SMC/8R1
2100	FG5FC, *ZA1HA, ZA1QA*, ZL4LZ (LP)

QTH CORNER

D68RH	KE3A, W Kessinger, 1502-K Flanders Lane, Harwood, MD 20776, USA.
F6FNU	(new) A Baldeck, BP14, F-91291, Arpajon, CEDEX, France.
FR5AI/J	Yoland Hoarau, 4eme Km, St Francois, F-97400 Saint Denis, Reunion.
GD4UOL	via G4UOL.
H44KA	KC9V, Betty Collins, Box 263, State Line, Ind, 47982, USA.
PY0F	via PP1CZ, PO Box 2384, 29001 Vitoria, ES, Brazil.
YJ0AJU	WA6ZEF, 1249 N Cyprus Ave, Ontario, Cal, 91762 USA.
ZA1TAB	Marenglen Mema, Rruga Gogonushi, Pallati 17, Hyrja 10, Tirana, Albania.
ZA1ZVX	F6EXV, Paul Granger, 4 Impasse du Doyen Henri Visio, F-33400 Talence, France.
ZA1ZXV	via F6EXV.
ZA1ZMX	via F6EXV.
1S0RR	Box 812, Sofia 1000, Bulgaria.
4K2MAL	V Gorokhow, Box 252, 423 400 Ametevsk, USSR.

1991 28MHz COUNTRIES TABLE

G0OFE	224	(SSB)	G4CI	92	(SSB)
G0DOO	215	(SSB)	G4NXG/M	85	
G0JZA	202	(SSB)	G2FQR	80	
G0AEV	197		G4YNG	76	
G0KDS	196		GM0CEI	55	
G4DXW	171		G0DUS/M	54	
G4MUW	162		G4XAH	43	(RTTY)
LA0CC	137	(SSB)	G2AKK	31	(CW)
GM4CHX	106				

VHF/UHF NEWS

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

A VERY Happy New Year to all readers and contributors to *VHF/UHF News* and I hope that many more of you will send in reports in 1992 and participate in the tables. The two most important events in November were the exceptionally good aurora on the 8/9th, and the first 50MHz opening from New Zealand to Europe on the 10th.

TABLES AND AWARDS

THE ANNUAL table starts again on 1 January using the same bands and rules as in 1991 and the first appearance will be in the May issue. From next month, those who use the 70MHz band may include squares worked in the Squares Table. As with the other bands, the starting date is 1 July 1979.

To celebrate its Diamond Jubilee, the Scarborough ARS, current membership 72, is promoting an award for working its headquarters station, G4BP, plus five members during 1992. Any mode, any band but no repeater QSOs. For full details send an SASE to the Awards Manager, 10 Lowdale Avenue, Scarborough, N Yorks, YO12 6JW.

6 METRE AND UP DXER

THIS POPULAR Society monthly newsletter may shortly cease publication unless a volunteer can be found to edit it. Offers to the VHF Committee chairman Peter Burden, G3UBX, at 2 Links Road, Penn, Wolverhampton, WV4 5RF.

CONTEST NOTES

GUIDO JUENKERSFELD, DL8EBW, has sent details of an annual 144MHz Activity DX Contest sponsored by the VHF-DX-Gruppe DL-West. The idea is to promote activity throughout the year by working as many different stations as possible.

Only QSOs over 500km count, each being worth one point, but EME, repeater and satellite contacts are invalid. You may only claim for one QSO with a particular station unless you also work it from a different location or while mobile.

There are separate sections for phone, ie SSB and FM, and mixed which includes all other modes such as CW, RTTY, etc. The multiplier is the total number of squares worked and the total score is QSO points times multiplier. For details and an entry form, with squares map, send an SAE with IRC to DL8EBW, Geibelstr 13, D-5600 Wuppertal 11, Germany.

Contest buffs will be pleased to learn that Jochen Fischer, DH2NAF, is publishing a 1992 edition of his *All-Europe VHF/UHF/SHF Contest Calendar*. It runs to about 120 pages, A5 size, and lists over 450 events. These are separately listed by date, and by countries. Rules and adjudicators' addresses are given.

The calendar includes general information ". . . . and partly interesting stories about DX-peditions and other extraordinary projects." He offers a choice of English or German language editions for the very modest cost of four IRCs. Jochun's QTH is: Ham Press Verlag, Hauptstr 33, W-8061 Sulzemoos, Germany.

REPEATER NOTES

TO REDUCE paper usage, the Summer *Newsletter* of the West Wales Repeater Group consists of a single A5 page accompanied by an *Information Sheet* including comments on interference, management and linking.

A separate *Newsflash* advised that repeater GB3WW on R7 was operating from 8 Nov with a brand new phasing harness feeding the four folded dipoles. Six cavity filters were installed at the end of September; ". . . . to improve working conditions."

In common with some other repeater groups, the West Wales RG is in need of more income to continue running GB3WW. Anyone who regularly uses it ought to be a member of the group, whose secretary is John Gray, GW6ZUS, 36 Heol Pentre Felen, Llangyfelach, Swansea, SA6 6BY.

The Winter issue of *FM News*, published by the Central Scotland FM Group, includes status reports on its repeaters GB3AY (R2), GB3CS (R6), GB3DG (R7), GB3FF (R0) and GB3PA (R1). A stop press item states that the licence for GB3LG at Lochgilphead has been approved and that the hardware is well advanced. The newsletter includes information on awards sponsored by the Scottish Tourist Board Radio Amateur Expedition Group, a membership list and particulars of committee members. The secretary of the CSFMG is Alistair Fraser, GM3AXX, who is QTHR.

METEOR SCATTER

A REMINDER that the Quadrantids stream should produce a radio peak around 1500GMT on 3 January at which time the NE/SW and N/S paths should be quite effective. I would appreciate observations of the time of peak activity so that a benchmark can be established for future years.

Until the Lyrids in April, there are no recognized streams available for use in these latitudes. However, as mentioned in the October 1991 *VHF/UHF News*, Alastair McBeath, vice-president of the International Meteor Organization, has suggested we might try 22/23 Jan. Enhanced meteor activity has been recorded in the last three years so there might be an hitherto undiscovered stream at work.

MOONBOUNCE

18/19 JANUARY is a perigee weekend so favourable for EME work. For a London QTH, moonrise on the 17th is around 1345 at 50 degrees azimuth with an Asian window till 1500, maximum elevation occurring in the south at about 2210. Moonset next morning is just after 0630 at 309 degrees with a North American window from 0400 for a couple of hours.

Saturday moonrise is at 1500 at 53 degrees with a 75min Asian window. Maximum elevation is at 2315 and moonset occurs around 0720 at 304 degrees; the two hours North American window starts at 0445. Sunday moonrise is at 1625 at 59 degrees with a 75min Asian window. At 2400 the az/el are 173/56° respectively. The declination is +24.3° at 0000 on the 18th, dropping to +18.2° by 2400 next day.

Colin Morris, G0CUZ (IO82WM), was QRV on EME again from 23 Oct with his ". . . . junior system of four 11-ele Yagis set up on a quadrapod in the back garden." In the first leg of the ARRL contest on 26/27 Oct he worked 19 stations, all but one on random, with nine new initials. His all-time total was 37 by 18 Nov but he planned to finish his current EME activity at the end of November.

50MHZ

AT LAST a few lucky New Zealand stations have worked into Europe. During one of our regular 20m QSOs, Bill Dowman, ZL4AK in Oamaru, read me a message off a local BBS. It reported that from 0914 on 10 Nov, seven QSOs were completed. ZL stations involved included ZL2KT, ZL2TPY, ZL2UBG and ZL4AAA, while at the European end they were I4XCC, IK4BHO and YU3ZV.

I don't have the complete locators for the ZLs, but the QRB is around 18,390km between I4XCC and ZL2TPY and about 18,640km if Claudio worked ZL2KT. ZL3s and ZL4s used to be in the South Island but Bill thinks ZL4AAA was operating from North Island. The Antipodes for New Zealand are the Iberian peninsula, eg from Palmerston North to the Madrid area, or Auckland to the Gibraltar or Cadiz regions, so that will be the ultimate DX. Unfortunately for British Isles stations our Antipodes are landless in the South Pacific Ocean.

GENERAL NEWS

From Ted Collins', G4UPS (DVN), *6M Information* pages comes the following beacon information. HC2FG/B is now on 50.092MHz running 10W to a vertical antenna. New beacons noted are 3D2FJ on 50.084MHz; JA7YYL (QM08OW) on 50.048MHz running 10W to a ground plane, and VK7RSB (QE37), no QRG stated. All run continuously. The PJ4B (FK52TF) solar-powered beacon is back on 50.015MHz running 10W to a vertical five-eighths wavelength antenna. 9H1SIX (JM75FV) is operating again on 50.085MHz running 7W to a ground plane. Czechoslovakian amateurs were due to have access to the band from 15 Dec under similar conditions to the German stations. No further news on the Spanish situation. Swedish stations had their ERP limits, in relation to their distance from TV stations, raised on 1 Oct. All Estonian amateurs can now use the band; generally 200W ERP but 50W ERP in the Tallinn area.

New stations reported include: FY3FV in Cayenne, QSL to Box 999, F-97300 Cayenne, French Guiana; CN8BA (IM63), QSL to 114 Rue Chabab a Al Alia, Mohammedia, Morocco; 7Q7TT (KH74), QSL via home call N6ZZ, and XX9SW, QSL via KU9C. 3D2PO's call has been pirated by a station on CW ". . . . to the north of Malta." The genuine 3D2PO rarely uses the mode.

ACTIVITY

There was plenty of DX around during the four weeks from 23 Oct. VK2s were worked in the mornings by various Gs and GWs on 23, 25 and 26 Oct and 4, 7, 13, 15, 17 and 20 Nov, and by Mediterranean stations on other days as well.

On 28 Oct an aurora started about 1230 and lasted some five hours. British Isles stations from EI to eastern G and GM to GJ worked others in the near continent and Scandinavia as the A index reached a severe storm level of 100. Another aurora occurred next day, 1715-1900, but activity was limited even though the A index was still around 100.

The next strong aurora happened on 1 Nov around 1545 when all UK beacons were tone A. The pattern was similar to that on 28 Oct, with fadeout by 1830. The A index reached a storm level of 55. Another massive, Europe-wide event started in mid-afternoon on the 8th and went on till the early hours of the 9th. From mid-evening Auroral-E propagation was prevalent. The A index reached 99.

There was a massive opening to South America and the Caribbean on 2 Nov starting just before noon and lasting over three hours. Countries heard/worked included CX, HC, HI8, KP2, KP4, LU, PJ, PY, PZ, TI, YV and 9Y. Some weak Ws were heard and GI0OTC worked VE1YX. Further early afternoon openings to VE1 and W1 occurred on 12-15 and 17 Nov.

The last Es event reported was on 5 Nov from 1000 for an hour when several YU3 and I stations were copied. Afternoon openings to central and southern Africa occurred on 24-26 and 28 Oct and on 1-6, 8-10, 15-17 and 20 Nov.

Thanks also to the following for input to this section: John Hoban, G0EVT (YSW); Darrell Moody, G0HVQ (GLR); Frank Howe, G3FIJ (ESX); Ela Martyr, G6HKM (ESX); Rik Royall, G8ESB (YSN); Gerry Elliott, GI4OWA (LDR); Al Harvey, GU7DHI (GUR) and Paul Baker, GW6VZW (GWT).

70MHZ

JACK HUM, G5UM (LEC), wrote that: "Far too many operators continue to use the 70.45MHz calling frequency for local contacts, oblivious that they may be heard a hundred miles away." So please QSY immediately after establishing a QSO.

In the CW contest on 20 October, Ian Cornes, G4OUT (SFD), added G3LVP (AVN) and G3TCU (SRY) for new 1991 counties. G8ESB (YSN) has worked his own county at last, thanks to a mobile using FM. He mentioned that Peter Moore, GM0DNH (TYS), is now QRV from Dundee.

G0EVT has bought a second-hand transverter for the band but hasn't found room for more antennas. He wonders how others manage five bands; do they have more than one mast? Don't forget that challenging IRTS EI 70MHz Activity Award - see the December *RadCom*, page 18.

144MHZ

WHILE TROPO propagation has been rather mediocre, there have been several good auroras. Andy Kaleta, SP6GVU (JO81LC), operated in those on 1 and 28 Oct and 1 and 8/9 Nov getting ten new squares from them. Between 1524 and 1643 on 28 Oct, he worked into DL, G, HB, PA, SM, best DX being UA4UXK (LO14MA) at 1,782km.

In the 1 Nov event, 1313-2034, he contacted GM, LA, OZ and SM stations, best DX being GM3JFG (IO77XR) at 1,536km. The 8/9 Nov aurora was the best. He was QRV from 1717 to 0226 and worked 56 stations, about half of them in the British Isles. His tally included UA1/3/4 and OZ1EYE/MM (JO36) was a welcome wet square. Best DX were EI4DQ (IO51WU) at 1,730km and EI5FK (IO51RU) at 1,758km. Andy uses an IC-202S, 150W PA and 17-ele Tonna Yagi.

G0CUZ's best DX in the 8 Nov aurora were UZ2FWA (KO04FT), SP2OFW (JO93AC) and LY2WR (KO24). G4OUT was QRV 2116-0219 and completed 34 QSOs with DL, EI, F, G, GI, GM, GW, HB, OK, OZ and PA stations. Ian's best DX were SP2OFW and SP5EFO (KO02MD) at 1,552km. He uses an IC-271E, 40W to a 12-ele ZL-special antenna at 12.5m AGL.

G6HKM operated in the 28 Oct aurora, best DX on SSB being EI4AQB (IO53), EI2DNB (IO63) and DG8DAE (JO41). Ela made about 20 QSOs in the 8/9 Nov event in D, EI, G, GM, OZ, PA, SM and SP. G8ESB worked his first HB on any mode in the 28 Oct aurora.

Arlen Pardoe, GM0HUO (FFE), found the 28 Oct aurora very noisy with variable copy. At 1722, OZ2KZR (JN89DN) was a new square and his best DX by this mode at 1,477km; QTE 75°. It was still in progress at 0700 next morning with more activity later, 1739-2003, to DL, EI, LA, OZ and SM.

He listed 19 QSOs on 1 Nov, 1547-1716, optimum QTE being 55-60°. New squares included HB9DFG (JN37), Y32NL (JO61), F2GL (JN17) and F1JKK (IN87). Arlen was QRV from 1646 on 8 Nov and completed 40 contacts. Best DX included SP7EBM (JO91QR), SP5CCC (KO02NF), SP4MPB (KO03GS) and SP9AGV (JO90JH), all over 1,500km.

QTEs were 60-75° for the Europeans, but 15-20° for the Gs. He rated this event as good as, if not better than, the memorable one on 13/3/89 when he only had SSB mode. He wrote: "For a change GM was not bypassed by the aurora moving further south and the strength of the DX was impressive." He mentioned other, weak auroras on 15 and 18-20 Nov.

Lyn Leach, GW8JLY (GNS), very nearly missed the 8 November aurora which he discovered by chance at 2234 while beaming south-east. CQ calls brought QSOs with DL, EI, F, G, GI, GW, ON, OZ, PA, SM and SP stations till close-down at 0227. It is very rare for Lyn to work Scandinavian stations via aurora. Best DX was SP2OFW who answered a CQ call at 0139 for a new square.

At G3FPK the 8 Nov aurora was discovered at 1615 but I would not rate it as anything like as good as the 13/14 March 1989 event. There was a lot of deep fading and the reflecting regions were moving around quite a lot. Best QTE for central Europe was 45-50 degrees at first. Just after midnight SK4MPI was strongest at 10 degrees.

430MHZ

IN THE contest on 7 October, G0EVT worked G and PA stations. G6HKM was also on for this event and worked HB9/F1FHI/P (JN36) on the 6th. Ela did not participate in the Cumulatives due to bad weather and clashes of dates.

Novice licensees are restricted to 433.0-435.0MHz. I'm sure they would welcome the chance to contact A and B licensees so how about calling on the repeater and simplex channels from time to time?

1.3GHZ

G0EVT HAS bought a transverter for this band, too, but has not yet erected any antennas. G6HKM has taken part in the contests but found activity very low. G8ESB worked G4FCD (OFE) and G8PNN (NLD) for new 1991 counties.

PROPAGATION

GEOMAGNETIC activity was very high at times from the last week in October, caus- ▶

ANNUAL VHF/UHF TABLE
January to December 1991

	50MHz		70MHz		144MHz		430MHz		1.3GHz		Total
Callsign	Cty	Ctr	Cty	Ctr	Cty	Ctr	Cty	Ctr	Cty	Ctr	Pts
G6HKM	65	53	-	-	80	24	40	11	33	7	313
G0NFH	44	25	30	7	61	17	43	11	13	2	253
G4FCD	13	19	-	-	82	13	54	12	30	5	228
G8ESB	8	6	25	6	86	15	46	8	18	5	223
G0EHV	-	-	39	6	76	15	43	11	-	-	190
G4LDR	26	19	10	2	51	12	35	5	-	-	160
G0FYD	10	27	-	-	72	28	-	-	-	-	137
GW6VZW	78	56	-	-	-	-	-	-	-	-	134
G8XTJ	30	22	-	-	53	11	-	-	-	-	116
GI4OWA	12	33	-	-	51	18	-	-	-	-	114
G3FIJ	1	1	10	2	48	11	21	3	2	1	100
G8LHT	0	8	25	4	24	17	8	3	6	3	98
G6MXL	10	15	6	3	14	6	24	5	11	4	98
G4OUT	-	-	30	6	46	15	-	-	-	-	97
G8PYP	15	32	1	1	24	11	8	4	-	-	96
G3FPK	-	-	-	-	74	20	-	-	-	-	94
G7CLY	-	-	-	-	38	10	-	-	-	-	48
G6ODT	-	-	-	-	20	6	12	3	-	-	41
GW7EVG	-	-	-	-	24	7	-	-	-	-	31

British counties are those listed on page 64 in the January 1991 *RadCom*, but excluding HBN; 77 in all. Up to three different stations allowed in all 12 GM regions. Do not include EI counties. Countries are the usual DXCC ones plus IT9.

ing major auroral events on 28 October, 1 and 8/9 November. In the period 28/10 to 17/11 there were 32 M flares, and some significant proton and ten flares.

One result of the magstorm on 28 October was a 2.2dB pole cap absorption event. While this ruined HF propagation - 14MHz was dead at breakfast time on the 29th - it brought joy to VHFers in the way of a strong, if somewhat unstable, aurora.

Another large aurora occurred on 1 Nov when the A index was at a storm level of 55. A big magstorm started at 0640GMT on 8 Nov resulting in spectacular radio and visual auroras which continued well into the 9th. The A index reached severe storm level of 100 units.

The A index declined rapidly to unsettled levels after 9 Nov. On the 10th, with the solar flux at 195, there was propagation on 50MHz between the North Island of New Zealand and Italy (I4 region) and Yugoslavia (YU3 area).

With a solar flux hovering around the 200 mark, and low geomagnetic activity, stations +/-40 degrees of the geomagnetic equator have some chance of working antipodean distances. For southern British stations however, we would probably need 230-250sfu and quiet geomagnetic conditions, ie A<10.

Listeners to the *GB2RS* news broadcasts will know that the predicted MUFs for the north/south paths have been over 40MHz recently. The continuing high average solar flux has been responsible for F-layer openings to the Americas. On 2 Nov, with the SF at 218 and the A index rapidly dropping, there was an extensive opening to South America and the Caribbean. By mid-November, with the SF averaging around the 170s, openings to the eastern area of North America were becoming more frequent.

DEADLINES

THAT'S IT for another month. The **March** deadline is **Thursday, 23 January**, so don't forget to send your final 1991 Annual Table scores. The **April** deadline is **Thursday, 27 February**. If you have access to British Telecom Gold, my mailbox number is 76:MSX021 and the telex number is 9312 111074(CN).

HF NEWS

continued from page 16

report came in rather early and is shorter than usual. It goes "The last week of October saw a sharp increase in solar indices with the daily solar flux peaking at 273sfu on 29 October and the 27-day average climbing to 203 by the end of the first week in November. The sharp increase was accompanied by some major solar flares which in turn gave rise to major to severe geomagnetic storms during which HF band propagation was disturbed and sometimes disrupted, particularly on the peak day. As a result, HF band conditions which had been generally very good in the period from 11 to 21 October then suffered a major setback from which they were only just beginning to recover towards the end of the first week in November."

THANKS

FOR ITEMS copied from the *Long Island DX Bulletin* (W2IYX), the *RSGB DX News Sheet* (G4DYO), the *Lynx DX Group Bulletin* (EA2KL), *DX'press* (PA3DZN), *DX-NL* (DL3RK), and the *Ex-G Radio Club Bulletin* (WA8GTA).

For the **March** issue I need to have copy no later than **16 January** please.

QSL

RSGB QSL Bureau,
PO Box 1773, Potters Bar,
Herts, EN6 3EP

THE AIM of this new regular *RadCom* feature is to highlight the work carried out by the RSGB QSL Bureau, the second most popular benefit of membership after the magazine. In addition to news and information of use to Bureau users, we will feature interesting, attractive or unusual cards (not necessarily for exotic DX).

If you have any cards in these categories, even your own card, please send them to: *RadCom*, RSGB, Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE, and **not** to the Bureau's box number. Although we will do our best to return cards used, we regret that we cannot accept responsibility for any which become lost or damaged.

● Members will be interested to know that the RSGB QSL Bureau now checks the originator callsign of outgoing cards to establish whether they are being sent by a member of the Society. This is done by utilising a computer terminal located in the Bureau and prevents the use of Bureau facilities by 'free-loaders'. If the check reveals a violation, the Bureau writes to the person asking him or her if they are willing to join. Sadly, the majority ignore the letter and the cards are destroyed.

● An interesting fact about the USA '4' call area is that it has two bureaux. Cards with two letters then the '4' go to a different bureau. Simply put, cards destined for WB4 go to one bureau whilst cards for W4 go to another. It helps the sorters if the outgoing cards for USA '4' areas are grouped accordingly when sending them to the Bureau. We have no idea why this particular call area is split and it would be interesting to know why if any reader has the answer.

● For those waiting patiently for a QSL card acknowledging reception of signals from GB1MIR please bear with us. The cards will be printed shortly and will be despatched via the bureau just as soon as they are to hand. Because of the very special nature of the operation and the fact that the card will very likely become a collectors piece we thought it worthwhile taking a little more time than usual over the production of it. The card is being sponsored by the RSGB.

● The 'backlog' of cards awaiting sorting and despatch to Sub Managers is only a few thousand and that is a good working stock for the sorters to have in hand on any one day. Every effort is made to decipher routing instructions on cards but in some instances it is impossible to forward a card because no overseas bureau exists in the destination country. In such circumstances the card is returned to the sender. The sorting ladies, however, have accumulated much information on the routes that can be utilised and it is only as a last resort that they throw in the towel.

John Hall, G3KVA

An interesting card from the Gulf War theatre of operations. It was for an amateur located in the US embassy in Saudi Arabia during the war and will no doubt be highly valued by those amateurs fortunate enough to receive one.

HF F-LAYER PROPAGATION PREDICTIONS FOR JANUARY 1992

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	....59983...	....79995...	....99998...	....998991..	...3877786..	531765457854	886532224788	++42....24++
MALTA	....68875...	....899871..	....999993..	....9889971.	.1.287679951	662754457997	988631125799	+++3....25++
GIBRALTAR	.....7654...	....288761..	....599994..	....8989971.	....9777895.	342.75556896	888652224799	++++2....4++
ICELAND	.....2674...	.....4886...	.....79982..	.....89994..	....3888981.	231.76667862	787254335788	++++2...24++
** ASIA								
OSAKA	....3.....	....51.....	....84.....	....86.....	...1751..1.1	1...52123614	....2...2663	.........35.
HONGKONG	....774....	....886....	....7872....	....6774....	....354532..	2....2135641	1.......2675	353
BANGKOK	....8++82...	...179994...	...158887...	....27688...	.....54574..	3....2125855	2.......2677	355
SINGAPORE	....78882...	...169895...	...148887...	....277781..	.....44575..	2....1125855	1.......2685	352
NEW DELHI	....8884....	...17886....	...357881...	...225773...	.....2456.11	52....125566	72......2678	4........345
TEHERAN	...1+++83...	...388995...	...565888...	...6436782..	2..51.457621	7432..125876	772.....2677	54.......344
COLOMBO	...1+++94...	...267996...	...2258881..	.....26783..	1.....457721	51....125877	5.......2678	2........345
BAHRAIN	...1+8883...	...377895...	...5447882..	...5225785..	3..3..257842	853....25887	772.....2677	54.......344
CYPRUS	....+++96...	...1999981..	...4888994..	...67778972.	42.754568963	885521246898	8862...13788	++3......4+5
ADEN	...1++8961..	...3667982..	...43258951.	1..4..378841	52.2...57985	873....25888	772.....2676	54.......343
** OCEANIA								
SUVA/S	.....2651...	.....4873...	.....7886...	....177881..	....465574..	....532354..	...12...22..	....
SUVA/L	....3321.131	65421352	87654651	....8756674.	...27424661.	....241.144..	....2...11..	....
WELLINGTON/S	.....564....	....17861...	....48884...	....68787...	....755672..	....532353..	....2...21..	....
WELLINGTON/L	..........1.	....11.....	....431..111	....6521132.	....7423451.	...152.143..	....2...1...	....
SYDNEY/S	....75671...	....87783...	...188886...	...177788...	....554573..	....2213571.	.........251.	.........2..
SYDNEY/L	.....1.....	.....31...1.	....2641.131	47532351	....5534575.	....32.1462.	.........13..	....
PERTH	...166544...	...268766...	...148788...	....276782..	4457721	1125873	2662	.........33.
HONOLULU	....	.........1..	.........3..	.........6..	.12.1.1.16..	..42411143..	..253...21..	...3........
** AFRICA								
SEYCHELLES	...1346631..	...2447862..	...21258861.	1..1..378841	53.....57985	851....25888	73......2667	5........344
MAURITIUS	...1477771..	...2457883..	...22258973.	1..1..378962	63.....57997	84.....25899	62......2688	4........355
NAIROBI	....767873..	...26568952.	...332379851	31.4..168984	7612...37998	983.....5898	772.....2576	54.......243
HARARE	....3466752.	44578741	11.222259973	43.3...38996	8711....6999	983.....3799	762.....1588	53.......255
CAPETOWN	44677631	44568862	32..32237995	64.11..16998	9822....3799	984.....589	862.....268	53........45
LAGOS	....8+889741	1...87669863	32..73238996	65.161.16998	99343...3899	8985....1699	6782.....378	355.......45
ASCENSION Is	58556631	77556762	31..84224886	64..72..2798	98415....589	89852....279	7785......58	4552......25
DAKAR	....4++7873.	78768852	21..86336985	43..85114898	875.72..1699	88944....379	76861....158	4453......25
LAS PALMAS	....3998861.	....5999982.	89889951	.1..98778983	553.86556898	988463223689	888741...1379	+5+5......4+
** S. AMERICA								
Sth SHETLAND	....2444543.	46656552	11..77654454	43..87532246	664.642...14	355341.....1	12221.......	....
FALKLAND Is	....2556762.	47665641	1...77532354	321.8731.136	675.74....15	688351.....2	36652.......	.332........
R DE JANEIRO	.....653452.	17543551	47321374	321.661..166	765.73....48	98935.....16	77862......3	5454........
BUENOS AIRES	....1344562.	35544541	67421143	21..872...35	655.75.....5	789252.....3	57862.......	2453........
LIMA	......++761.	......97553.	1842231	....2361..13	324.653....4	6782521....1	47762.......	.454........
BOGOTA	......9+761.	......97663.	842241	.....162..33	324..44....5	7782321....3	67763......1	3444........
** N. AMERICA								
BARBADOS	.....2++772.	.....496663.	6832452	.....761.154	424..53...37	8782321....6	87662......3	5434........
JAMAICA	......7++61.	......88662.	863331	.....1741.33	324.1341...5	7782421....3	67763......1	3443........
BERMUDA	......8++71.	.....198773.	3865651	5742463	324..541.157	8782321...26	77663......3	5444........
NEW YORK	......5+96..	......79872.	....,..88674.	1775562	324..4442256	87823211..26	77663......3	4444........
MEXICO	.......886..	.......9851.	.......8531.	......173.11	224.1135...2	47824212....	27763.......	.453........
MONTREAL	......5996..	......79981.	......88774.	2776662	334..4453366	88823312.136	77663......3	4444........
DENVER	.......185..	.......396..	.......5862.	77531	233.1..55213	578342122..2	26863.......	.354........
LOS ANGELES	........64..	........85..	........861.	.......1841.	233.11.361.1	368242.23...	15863.......	.254........
VANCOUVER	........12..	........24..	........56..	........772.	233.11.27532	4682421252l2	24763...2...	.243........
FAIRBANKS	....	....	.........2..	.....11125..	242.14236721	4661432256l4	23553...2322	..23........

The provisional mean sunspot number for November 1991 issued by the Sunspot Data Centre, Brussels was 106.1. The maximum daily sunspot number was 183 on 1 November and the minimum was 73 on 16 November. The predicted smoothed sunspot numbers for January, February and March, are respectively: (classical method) 127, 124, 122; (SIDC adjusted values) 134, 132, 131.

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HL62V	2m	10W in 60W output	£137.95	C
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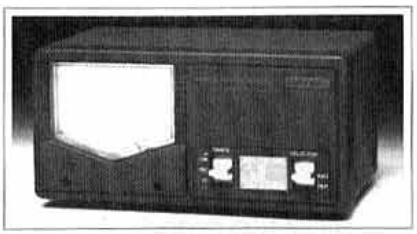

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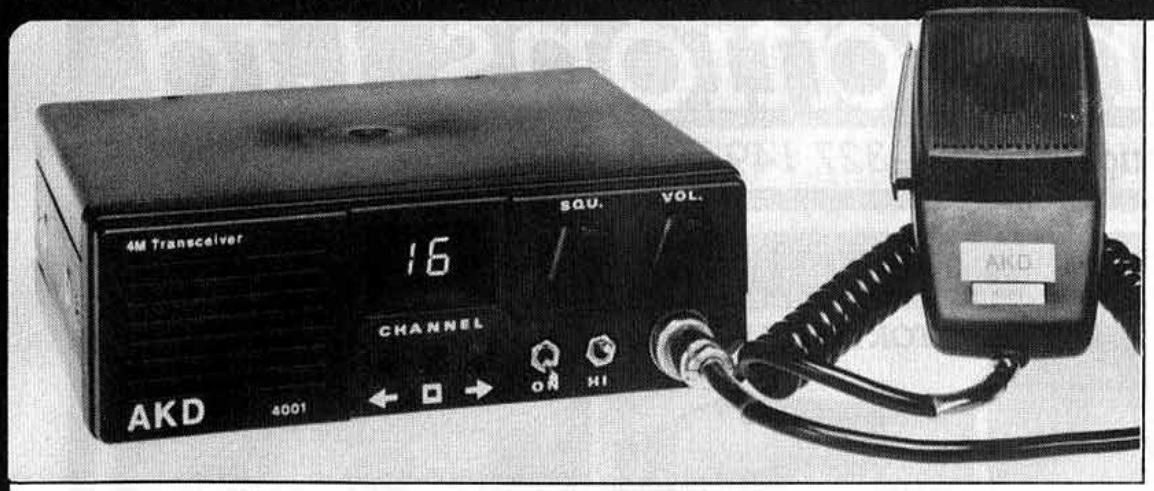

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SWL NEWS

BOB TREACHER BRS 32525
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THE VERY FIRST thing to do as we enter 1992 is to wish all our Short Wave Listeners a happy, heathy, prosperous and DX-filled New Year.

As we head into the New Year we should see much better DX conditions on 7 and 3.5MHz, but the solar cycle might not have declined enough to produce really good results on 1.8MHz. Only time will tell. Please let me have your reports so that I can take more space describing the LF DX which has been available.

CONTESTS AND AWARDS

LAST MONTH I said I would give details of the White Rose and UBA contests. First, however, news from the Awards Manager, Ian Cornes, G4OUT, who wrote with details of a splendid achievement by David Whitaker, BRS25429, on the 50MHz band. He has been issued with the Society's 50MHz Countries Award, having 50 countries confirmed and the 50MHz Squares Award, having 150 squares confirmed. A splendid achievement indeed.

This year is the eleventh year that the White Rose Amateur Radio Society has sponsored the event. Last year the format was changed to include the 18 and 24MHz bands. This year the SSB leg once again includes those bands, as well as 1.8, 3.5 and 7MHz. The CW leg covers 3.5, 7, 10, 18 and 24MHz. Both legs take place from 1400GMT on 11 January to 1000 on 12 January. Although the event straddles two days and involves an element of night time or early morning operating, I hope that listeners will support the event if only for a few hours to submit a token log. Listener entries to contests are becoming something of a rarity, so it would get the New Year off to an encouraging start if the entry was somewhat more sizeable than we have seen for listener events over the last few years. For those who admit to having trouble understanding contest rules, these are very plain indeed. If I have whetted some appetites, a copy of the rules can be obtained from the White Rose Amateur Radio Society at Moortown RUFC, Moss Valley, King Lane, Leeds LS17 7NT. Please don't disappoint the organisers.

The UBA affair is their usual January/February bash. The last full weekend of both months between 1300GMT Saturday to 1300 Sunday gives you the information you need to reserve a slot in your diary. If anyone wants the full rules, send an SASE to me at the usual address please.

While on the subject of activity events, the UBA year-long SWL rules have been received. The basic idea is that points are scored for each DXCC country heard on each of the six main amateur bands throughout the year. This is the tenth year of the event and British participation has never been good. Indeed, of 105 entries last year, only four Brits figured in the results - namely BRS22643, BRS91529, BRS84869 and the ISWL HQ station. Surely, we can do better. Again rules are available from me, but please send an SASE.

THE VE3ATR SAGA

READERS WILL recall that the November column led with a story of the possible pirating of the callsign VE3ATR. I am pleased to have been contacted by D W Alexander, BRS88266, who has cleared up the matter. He also heard VE3ATR/MM, but at 0448 on 20 June. On looking up the callsign in the 1991 *Callbook* he discovered that VE3ATR was indeed a silent key. He informed the VE3 QSL bureau that he had heard the callsign and it appeared that it was being pirated. However, he received a letter from the VE3 bureau explaining that the callsign had been re-issued.

HF NEWS

MAURICE WILCOX, BRS50930, starts off the HF DX Information this month with news that he has the French award for hearing all zones. He received award No: 60 in Europe. He explains that severe weather had damaged his HF wire antennas and that he was now using a Datong Active Antenna. Can any SWL boast that they have had a QSL returned by Registered Mail? Well, Maurice can. He received a registered confirmation from DU8DJ in the Philippines. Can anyone better that?

Back now to the normal format where we take a brief look at what has been on the bands. Quite a few reports this month as you might expect with the period in review covering the CQWW SSB contest. Taking that event first, conditions East-West were very poor due to solar disturbances. I did not hear a single W6 or JA the whole weekend, apart from a few JAs on 7MHz on the Saturday evening. Once again the Caribbean was the place to be. There were a great many DX-peditions active from there. Even my eight-year-old daughter heard KP2A, FG8Y, PJ1B, PJ7A, J80D and V29W. This, of course, proves how easy it is to understand strong signals from stations using 2x1 callsigns!

October was very much a month of mixed conditions, with occasional disturbances, but lots of good DX when conditions were good. As one reporter put it "Just as well the contest was not on the Monday and Tuesday all the bands were closed due to a solar flare". Indeed the A index on the 28th was 100!

Down to the reports:

3.5MHz - HI8A, HZ1AB, J82A, J3/JP1DMX, KP2A, P40V, UM8NU, VK5HB (2011 - his sunrise), VP9AD, ZA0RS, 4U46UN and 5B4BCC.

7MHz - BY1PK, C6AFQ, CM6HH, D73DX (HL), FG8Y, J37H, NL7DU, PJ1B, PJ7A, TI4IDX, V29W, VP2EC, ZA2EC, ZA0RS, ZF2JR, 4U46UN and 9K2LX.

10MHz - PJ2/OH5PT and ZA1QA.

14MHz - A22BW, A35KB, DU9EK, FK8CP, FW/AA7AF, J73A, KC6DX, KL7RA, S0ZUN, S79MX/D, ST0DX, TT0A, V63AR, V73AZ, V85GA, VP5X, YJ8RN, YN9BJ, YS1AG, ZD7CRC, ZF8AA, 3B8FG, 6I2A (XE), 5H3DC, 5U7M, 6D2X, 8P9Z, 8R1JV and 9M6RO.

18MHz - JT1/SP5PB, SU1HV, T20XV, VS6WV, YJ0AJU and ZA1HA.

21MHz - BV3AA, BY5RA, DU9CO, FM5CD, FG0P, FK8FS, FM8FS, FK8FS, FM6A, HL9AA, HR3/K5MK, KG4QQ, KH6XT, P29NMD, V31SW, V31SW, V63YL, V73CT, VP8CGR, IK1EDC/XE2, XX9SW, YI0EB, YJ0ARW, ZA1QA, 3D2VJ, 4S7JR, 7Q7LA and 9L2JK.

24MHz - N4JQQ/C6A, HF0POL, HR2BDC/HR3, J28FO, P43AS, PJ7/W1XP, PP0F, ST0DX, YS1DRF, ZA1A and 9L1US.

28MHz - A71CH, D68RH, FK/FD60TA, HL9TK, OA8K, P4OT, PJ7A, TJ1MR, V29W, V47TV, VK9NS, ZA1ZMX, 6Y5X, ZS4NS/7P8, G4SMC/8R1, 9K2LX and 9L1US.

VHF NEWS

THERE IS just enough room to comment on some spectacular DX on 50MHz. It seems that the F2 season will be good to us this year. During October and early November CE, CN8, CO, CX, HI, KP2, KP4, PJ, PY, TR8, TU, VE, VK, VS6, XX9, ZS, ZS9 and 9Y4 had been heard in the UK. More news next time.

There was also an aurora on 28 October (to coincide with the A Index of 100) and some good DX was heard on both 50 and 144MHz. Indeed, Ian Underdown, BRS93818 heard eight beacons on 144MHz via the aurora. The event took his squares tally for the band in 1991 to 129.

FINALE

THAT'S IT for the first issue in 1992. Any contributions for inclusion in the **March** issue must be with me no later than **Tuesday 7 January**.

SWL D W Alexander, BRS88266, in his shack. The main equipment is a Trio R5000 receiver, an AOR 3000 scanner, a Yaesu FRT7700 ATU and Datong FL3 filter. He has confirmations from 120 countries.

Novice NEWS

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

BY THE time this column is before you the third NRAE exam will have come and gone, and more hopeful candidates will be impatiently awaiting their results.

One point that I must mention, however. If, for whatever reason, you are not successful, you must try again. You have built the projects and completed the training course; in short you have everything except the pass slip. You are naturally disappointed but you must not give in, and you must plan a retake as soon as possible. Speak to your Instructor, read your notes and fill in any gaps in your knowledge.

The registration date for the next exam is quite close and, although you can register a little later than this date, there *is* a late entry fee of £15.

I suggest, therefore, that you re-apply *immediately* and commit yourself. This will give an incentive to get reading and plenty of time to make sure that next time you are successful.

Many of the great brains in history did not succeed the first time but, fortunately, they kept trying.

WHERE NEXT?

WITH THE results of the September exam out and new Novice B callsigns appearing, now is the time to look ahead. You will be with the hobby for a long time, so why not give early thought to extending your skills and gaining a wider circle of friends?

Morsum Magnificat, the magazine for Morse telegraphy enthusiasts, appeared on my doormat and I found many interesting and useful articles. This one is of special interest to those who are thinking of studying Morse in order to exchange that Novice B callsign for an 'A'.

On writing to the magazine and to the author, I was kindly given permission to pass the information on to you, where I am sure it will be gratefully received.

Roy Clayton, G4SSH, is the RSGB Chief Morse Examiner, so the article by him giving a full description of the UK 5WPM Novice Morse test is accurate and quite reassuring.

First, of course, you have to learn it. A few hints and tips before the description of the form of the test may also help, so here they are.

Everyone learns Morse in their own way and there is no 'correct' way. Help is always available in a number of ways. Remember your 'adopted' amateur, the radio club members who offered advice and the other Novices on your training course. Group practice is very good fun. Learning to receive and send Morse code successfully is rarely a steady progression. Quick progress followed by slower progress - or even a step backwards - is quite normal. A little rest and suddenly a leap forward. In the group, different stages of learning will begin to show. This is where you can help each other and start to show the real spirit of amateur radio.

Tapes can be obtained from club members or the RSGB. You can make each other tapes, it is all good practice for later to hear as many different 'fists' as possible. After all, not every amateur sends *perfect* Morse.

Listening provides the best form of training ground. As you listen, you will begin to recognise certain sequences; signal reports, weather reports, the lead-up to name and location. With name and location repeated, a picture begins to emerge, along with a growing feeling of success. Possibly, the station you are hearing cannot speak fluent English so cannot attempt SSB contacts. (Can you speak many foreign languages?) A CW contact is *always* possible, however brief, as it cuts across language barriers - remember the International 'Q' Code?

You know all about the advantages of CW in poor conditions, and many amateurs take great pride in using the absolute minimum of power. As Novice power is restricted, it follows that CW is going to give the greatest success in reaching distant stations in a more relaxed way.

The Morse receiving test for Novices is unlike the test for the full 'A' licence in that it is in the form of part of a typical contact between stations. This will consist of callsigns, abbreviations, Q-codes, procedural signals and some punctuation.

The receiving test contains a minimum of 120 letters and seven figures, and takes approximately six minutes. A maximum of six uncorrected errors are allowed.

In the sending test the candidate is given a card on which is written part of a typical QSO to another amateur station. This is sent on a manual Morse key and consists of callsigns, abbreviations, Q-codes, procedural signals and punctuation. The test will consist of a minimum of 75 letters and five figures and takes approximately three minutes to send. A maximum of four *corrected* errors are allowed.

The character speed in the receiving test is 12 words per minute (WPM), with extra-long spaces between the characters to reduce the overall speed to 5WPM. In the sending test, the candidate must use a hand key and may change the length of the spaces if he/she wishes as long as the overall speed is at least 5WPM.

To give a universal and completely fair test, the receiving test is sent from a cassette using computer-generated Morse, unlike the present standard (12WPM) amateur Morse test.

All callsigns, procedures and Q-codes are used in the proper context, with the callsigns correct for the locations sent. They have been chosen from typical countries heard every day on the HF bands. Name, QTH and signal report is not repeated, although the callsign will be repeated at the end of the 'over'.

To take the test when you feel ready, you need to find a suitable place and convenient time. If you write to the RSGB, you will be sent a list of centres and dates (and times) when tests are taking place. You can then choose a time and place (giving alternatives) and send off your application. The Examiners, while scrupulously fair, are not ogres. They are amateurs too and have 'been through the mill', so they will try to make you feel at ease, but of course success is up to you.

A 'net' of new Novice Licensees at the RSGB stand at the RSGB's Woburn Rally on 4 August 1991.

5WPM NOVICE MORSE TEST – EXAMPLES

Receiving Test:

CT 2E4DKZ DE F6JVX GE OM TNX FER CALL UR RST 579 = QTH IS 15 KM SOUTH OF PARIS ES NAME ANDRE = RIG IS TS830 ANT IS 4 EL BEAM SO HW CPY? AR 2E4DKZ DE F6JVK KN

Sending Test:

2M0AIZ DE 2E3DNO GD JACK UR RST 569 WID QSB = NAME VAL QTH HALIFAX HW CPY? AR 2M0AIZ DE 2E3DNO KN

When you are ready .... perhaps the full amateur A licence?

MINI AWARD

DEVON COUNTY Council organised a mini award day on Saturday 19 October for the Duke of Edinburgh's Award Scheme and Joy, G4OUZ, has sent a report:

1991 is Devon Year for Youth and the Mini Award Day was held at Dame Hannah Rogers School and The Community College in Ivybridge in South Devon. The event was specially designed to give young people, whatever their level of mobility, a taste of the kinds of activity which could be included in the Scheme.

Members of the West Devon Raynet group were up bright and early to shin up walls and scramble over roofs to erect the all-important antennas. This was in readiness for the special event station which was geared to give a general demonstration to visitors, rather than to search for exotic DX stations. Raynet's role was to provide communication between the two venues, help to keep a bus service on schedule and demonstrate amateur radio, using the callsign GB2DEA.

Two general-coverage receivers, an FT101ZD Mk3 transceiver, two 2 metre transceivers and a TS440s with computer and TNC for AMTOR messages was the equipment provided.

Much time was spent talking to the youngsters, allowing them hands-on experience and answering questions.

The day was voted a huge success - with the highlight being a surprise visit from Falklands veteran, Simon Weston, who has taken a great interest in Devon's youngsters.

MEET GEORGINA

THERE IS another amateur in the G8VDP household. Apart from dad, Ken, and brother, Neville, Georgina has passed the Novice exam and is waiting for her callsign. She has promised to tell me what it is when it arrives.

Georgina is 14 years old and she is planning to encourage other youngsters into the fun of amateur radio.

Her school (Holgate School in Barnsley) has a radio room that has been closed for some time which contains some equipment. Not only does she plan to re-open it, she also helps in the library, in which she plans to put radio books and magazines to interest other people. A few posters are on their way for her to make a start. With enthusiasm like that, someone is going to be busy running training courses in the Barnsley area!

SAFETY FIRST

GUS, G8PG, supplied me with a page of useful hints concerning the inner parts of discarded radio and TV receivers. The safety warning he gives must be mentioned, and merits a space by itself.

Many of you will have obtained discarded sets and your fingers itch to get at the goodies inside, of which there are plenty, but read this first:

If you are about to dismember an old TV, take great care not to put any strain on the cathode ray tube, particularly the neck. The slightest fracture in the glass of the tube will cause it to implode. Gus describes the effect of this as "the equivalent of an exploding hand grenade" - an effect to be avoided at all costs!

If you carefully cut all the wires leading to the tube and its focussing coils, then remove the board or boards holding the electronic components (taking care not to knock the tube while doing so) you can, with the main electronics clear of the cabinet, choose and unsolder them at your leisure.

Always remember: Just *one* moment's thoughtlessness - or bravado - can be damaging to your health!

SOLENT FORTIFICATIONS GROUP

A COMMENT was made in a previous column that - hopefully - Novices would always be welcome at Special Event stations to help in whatever way they could and to receive in return the fellowship of the amateurs running the station, the opportunity to *use* the station, and the insight into what is involved.

I received a letter from Alex, G0DHZ, asking me to make it known that he endorses every word.

Alex is Station Manager for the mainland Coastal Defence stations and relies heavily on a dedicated team of operators to keep them up and running. There are a few of these stations under the umbrella title of Solent Fortifications and they operate every month except December. By simple arithmetic, it is obvious that with several stations to be manned on eleven occasions throughout the year, a fair number of 'volunteers' are needed!

Any Novice who would like to pop in and give a hand will be welcome, but it is suggested that contact is first made with Alex (QTHR) or any member of the group, and every effort will be made to fit you in.

Peter Dombrowski, GW1NYO, Gwent RLO at the Telford Rally. Behind him can be seen the RSGB's flag designed by Mr G Royle, G4FAS, who won the design competition announced in June 1990 RadCom.

SPLATTER SPLATTER

THIS TITLE is the name of the Newsletter of the Radio Society of Bermuda, and a section is devoted to the progress of a few Novices there. I am sure that you will find it of interest - if only to realise that similar situations exist around the world!

The route to the Novice licence is obviously different there and I do not have full details of how the system works, but I can tell you that six people wrote various sections of the Novice and Advanced tests taken on 1 October which suggests that multi-choice questions are not the way into amateur radio in Bermuda.

Special mention is made of Jean Howes with good reason. Jean has been blind for many years but did not let that stop her from passing the 5WPM Morse code examination and she is now tackling Novice theory.

I had spoken to one gentleman on the air for nearly three years before I discovered that he was blind. When I asked him why he had never told me, his reply was, "on the air we are all *completely* equal - as long as we don't talk about our frailties and disabilities".

THINKING DAY ON THE AIR

GUIDES AND Brownies are looking forward to that weekend in February when, like Scouts at JOTA, they too have their chance to attend an amateur radio station and follow various activities including: passing greetings messages, making and filling in QSL cards, logging, listening to QSOs, marking maps, and all the other exciting things that go on then. It is hoped that the weather is kinder than last year so that the dedicated amateurs who erect aerials (and take them down as well) stay dry!

The event will take place from 0001GMT to 2400GMT on 22 and 23 February, when it is hoped to see as many stations active as last year when over 150 UK stations took part.

Apart from Guides and Brownies, Novices and student Novices will be very welcome at all stations. Any Guide Novices and student Novices will be especially welcome and a plea is made for them to send their callsigns to Jennifer Jackson, G8WWO, so that the local station can look out for them.

An information pack is available from the Girl Guides Association or from Jennifer, and her address is included below. There will be a range of advice sheets available nearer the time.

Amateurs - do you know of a Guide or Brownie pack nearby who has never yet put on a station? Why not approach their Guider and offer your services? Hard work it may be but it is very rewarding and, who knows, you may be instrumental in recruiting potential amateurs!

Anyone requiring further information should contact Jennifer Jackson, G8WWO, Castle Lodge West, Halifax Road, Todmorden, Lancs OL14 5SQ. A SASE would be appreciated, A4 size, for the information pack.

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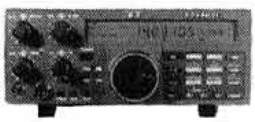

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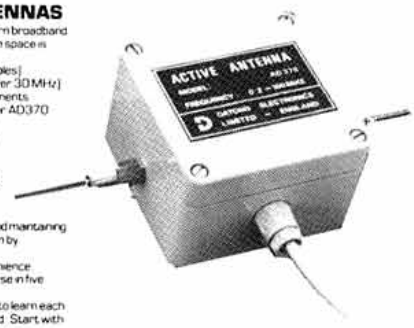

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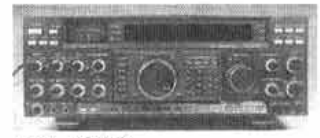

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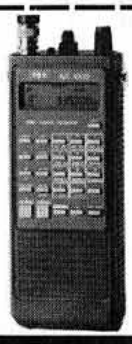

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RADCOM CONSTRUCTION FEATURE

A Solid State HF Linear Amp

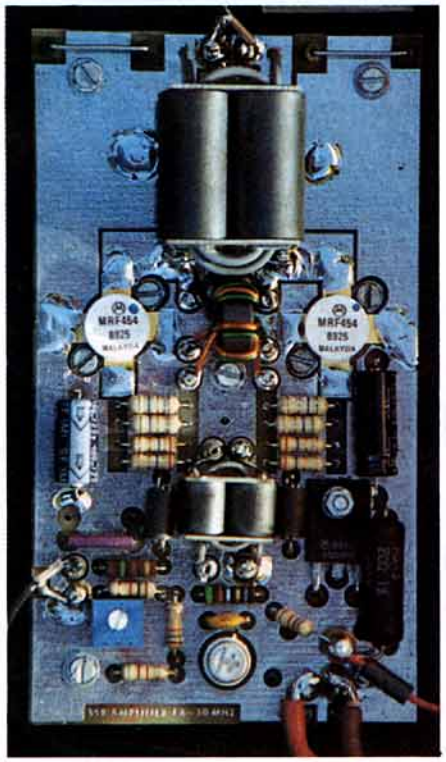
A medium to high power amplifier described by Mike Grierson, G3TSO

IN THE MARCH 1990 *RADCOM* [1] I described the construction of a medium power linear amplifier suitable for amplifying low power transmitters up to a medium power level (200W). One of the major problems encountered with the valve design that I described was the availability of suitable components, making it very tedious to build for the amateur who has no junk box to call upon. Valves are still readily available (at an increasing price), but the components surrounding them are in ever-decreasing supply.

The construction of a solid state linear amplifier now represents a realistic alternative to valve designs, even up to the maximum UK power level of 400W. The construction of solid state amplifiers has often been discouraged in the amateur press with claims that such projects can only be made with the use of expensive test equipment, and in particular a spectrum analyser. The recently described 'Simple Spectrum Analyser' [2], is ideal for the purpose, and fully justifies the £50 necessary for its construction. *[Photocopies of this popular article plus the PCB artwork are available from the Radio Communication office at RSGB HQ for £3.50 - Ed].*

A suitable design for a solid state linear amplifier producing up to 140W output first appeared in the *ARRL Handbook* [3] circa 1980. Another design is featured in *Solid State Design for the Radio Amateur* [4], and is capable of up to 300W output. Both designs are based on Applications Notes AN762 and AN758, available from Motorola in the UK [5]. The applications notes (AN) and engineering bulletins (EB) describe the construction and operation of suitable amplifiers using Motorola devices and include printed circuit foil information, making construction relatively easy. It is interesting to note that the PA units fitted to virtually all of the currently available commercial amateur radio equipment are based upon these designs by Motorola, with only a few individual differences to the original design.

With the availability of suitable application notes and reprints of the designs appearing in successive issues of the *ARRL Handbook* for a number of years it is perhaps surprising that few amateurs seem to have embarked upon such a project. At first sight the devices themselves may seem rather expensive in the UK; they are only available from a limited number of suppliers and I'm sure there is a feeling amongst many amateurs of "What if I blow



them up?"; "Valves don't blow up like the three legged fuse!"

Most of the amateur-built solid state linear amplifiers that I have encountered have been based upon surplus Mullard-type devices, often obtained at rallies for bargain prices. I have also seen the very same amateurs looking for replacement devices some years later and being horrified at the price, so was it really a bargain in the first place?

Browsing through the American amateur radio press reveals a number of sources of Motorola devices at considerably less than the UK price (typically a MRF454 capable of 80W continuous output is only $14), and what is more they can be obtained by mail order using Access, VISA or MasterCard (including the new Bank of Scotland RSGB card) direct to the UK - any duty payable is collected by the postman at the door. I have heard some amateurs express reluctance to use a plastic card for mail order, especially international mail order. I can assure them as a regular user of this system it works well and is really open to very little abuse. A supplier will only mail goods to the registered cardholder's own address. Always remember to quote the expiry date of your card when placing an order.

As well as being able to purchase the transistors for linear amplifiers from the USA, complete kits of parts for the Motorola designs are available from: Communications Concepts Inc (CCI) of Ohio [6]. These kits include the PCB, solid state devices, all the components and the various ferrite transformers already wound, so that all you have to do is solder them together. A large heat sink is necessary and is not supplied, these can be purchased from the same company, but may be costly in terms of postage. Construction of the PCBs for an amplifier is possible from the foil patterns available in [3] and [5], but it should be borne in mind that the thickness of copper on much of the laminate available to amateurs is unknown and inadequate for the high current requirements of a linear amplifier. A ready-made PCB is therefore a very sensible purchase and the kit of parts as supplied by CCI represents a very cost-effective way of building any of the Motorola designs.

CHOOSING AN AMPLIFIER

PERHAPS THE MOST useful amplifier for the radio amateur is described in AN762 and in [3]. It operates from a 13V supply and is capable of providing up to 160W output with only 5W drive. This design is the basis for the majority of commercial 100W PA units and lends itself to both mobile and fixed station operation using readily available power supplies. The following table illustrates a number of alternative designs:

Number	Power out	Supply voltage	Approx price
AN762	140W	12 - 14V	$US 93
EB63	140W	12 - 14V	$US 89
EB27A	300W	28V	$US 140
AN758	300W	50V	$US 161
EB104	600W	50V	$US 450

AN758 describes the construction of a single 300W output amplifier operating from a 50V supply and describes a method of using power combiners to sum the output of either two or four similar units to provide power outputs of 600 and 1200W. Two such units would be ideal for a full power linear amplifier for UK use, giving an output comparable to the FL2100 type of commercial valve amplifier. It is recommended that any pro-

spective constructor reads the relevant applications note before embarking upon the purchase and construction of such an amplifier.

The author, having constructed a number of low power transceivers and looking for an alternative to the valve amplifier described in [1], decided to commence with construction of the AN762 amplifier. The EB63 design is virtually the same, but uses a slightly simpler bias circuit. AN762 describes three amplifier variations, 100W, 140W and 180W using MRF453, MRF454 and MRF421 devices respectively, the middle of the road MRF454 140W variant being chosen.

OBTAINING THE AMPLIFIER KIT

AS A REGULAR VISITOR to the USA I could not decide whether I should obtain a kit whilst in the USA or send for it by mail order. On reflection, as I never go to Ohio it would be necessary to have it mailed in any case - please note Americans don't 'post' things, they 'mail' them. That would mean paying US State tax (about 6%) and then UK Customs duty and VAT on top at the worst case. Instead I wrote directly to CCI to order my amplifier kit quoting my VISA number and expiry date - you could phone if you wish. Delivery to the UK takes between two and five weeks and can be slowed down by the UK Customs. The postman asked for £12 which included duty, VAT and a £1 collection fee for the Post Office. The amplifier kit contained all the parts necessary, exactly as expected.

CONSTRUCTING THE AMPLIFIER

CONSTRUCTION OF THE amplifier seemed very straightforward, especially to anyone who has built up a solid state amplifier already; the PCB drawings and layouts are very good and a copy of the relevant application note had been included with the kit. There was one slight problem: how to fix the transformers to the PCB? Previous amplifiers that I had built had the components soldered directly to the PCB, but not this one. Examination of the *ARRL Handbook* showed 'turret tags' fixed to the PCB with the relevant components soldered directly to them. Turret tags, looking like a Napoleonic fortification, are often found on old PCBs but obtaining them new seemed a little difficult. In any event only 20 were required; Radiospares sell them by the hundred, but not in lesser quantities. On reflection this was the only shortcoming in the kit and was solved by a friendly amateur who very kindly sent me a handful.

The tags are riveted into the board and soldered on both sides. One modification will be required if you wish to switch the PA bias supply to control the T/R switching. The supply will need to be brought out to a separate terminal rather than being connected to the main supply line. This can be done simply by fitting a stand-off insulator to the PCB at some convenient point, the bias supply components are then soldered to this stand-off rather than directly to the PCB.

A number of small ceramic chip capacitors have to be soldered directly to the track on the underside of the PCB. It should be borne in mind when doing this that the clearance between the PCB and heat sink is slightly less than 1/8in and the capacitors must not touch the heat sink.

It is as well to mount the PCB to the heat sink before attempting to make any solder connections to it as it is necessary to mark the mounting holes accurately, ideally drilling and tapping them either 6BA or 3mm. The power transistor mounting is very critical in order to avoid stress on the ceramic casing of the devices. They mount directly onto the heat sink and should ideally be fitted by drilling and

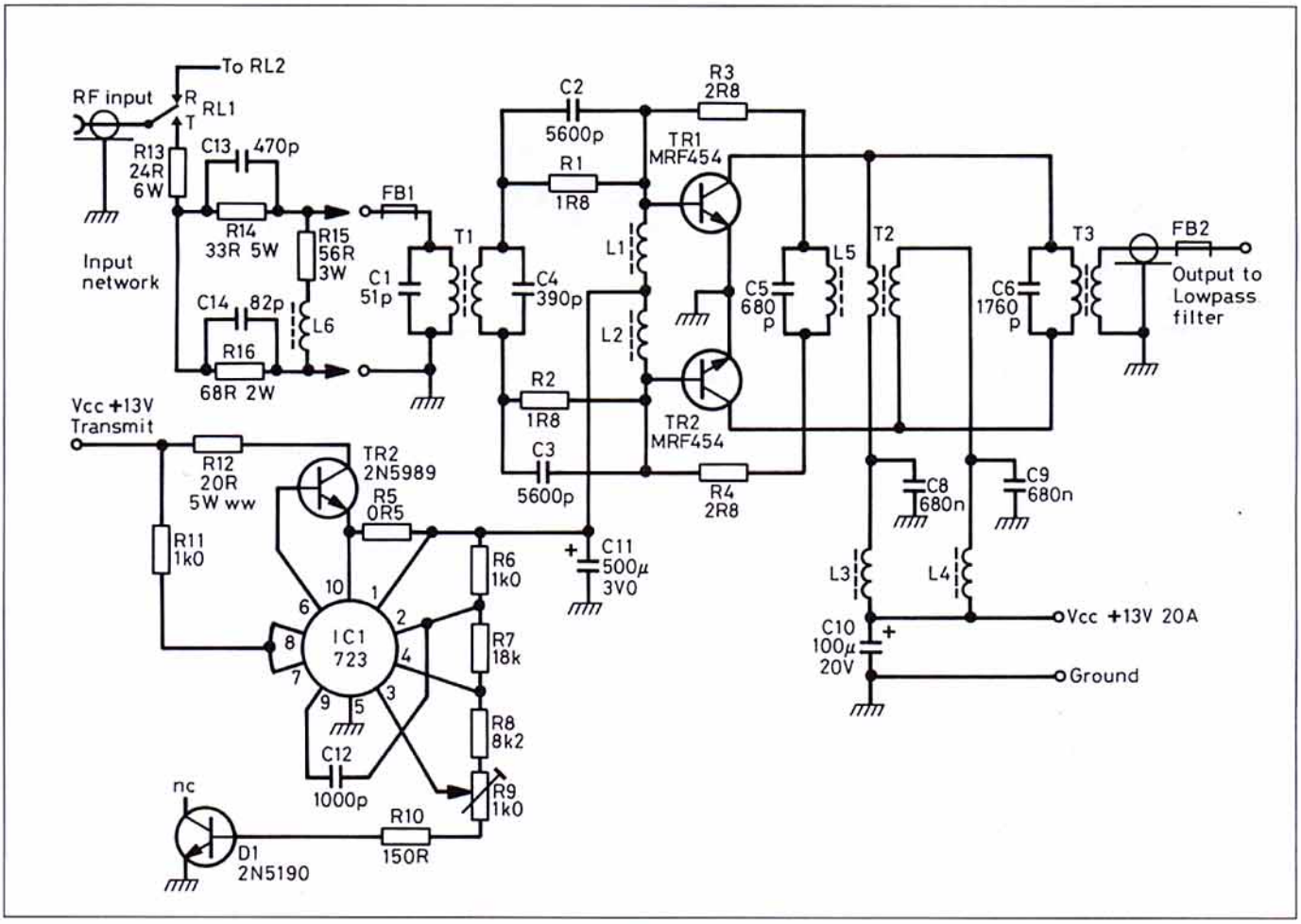


Fig 1: A solid state linear amplifier is now a realistic alternative to valve designs.

tapping it. The PCB is raised above the heat sink on stand-offs made from either 6BA or 3mm nuts, so that the tabs on the transistors are flush with the PCB - they must not be bent up or down. When the PCB and transistors have been mounted to the heat sink correctly, they may be removed for the board to be assembled. The transistors should not be soldered in at this stage. The nuts to be used as the stand-offs can be soldered to the PCB if required to make refitting the PCB to the heat sink a little simpler, but ensure that the alignment of the spacers is concentric with the holes.

Assembly should commence with the addition of the turret tags and stand-offs. Secondly the ceramic chip capacitors should be added under the PCB. D1, which is really a transistor, is also mounted under the PCB. Only the emitter and base are connected; the collector lead is cut off and left floating. This transistor is mounted on a mica washer and forms a central stand-off when the PCB is finally screwed down to the heat sink. The mounting screw passes through the device which must be carefully aligned with the hole in the PCB.

A number of holes on the PCB are plated through and connect the upper and lower ground planes together. It is a good idea to solder through each of these holes.

The upper side components can be mounted, starting with the resistors and capacitors, and finally the transformers can be soldered directly to the turret tags. Soldering should be to a high standard: some of the junctions will be carrying up to 10A or more.

When the board is complete it should be checked at least twice for errors and any long leads removed from the underside to ensure clearance from the heat sink. Mount the PCB to the heat sink and tighten it down. Now mount the power transistors which should fit flush with the upper surface of the PCB, and tighten them down, ensuring that there is no stress on the ceramic cases. If any of the connections need to be slightly trimmed to fit, cut them with metal cutters. Ensure the collector tab is in the correct place.

Once the transistors fit correctly, they can be removed again and very lightly tinned. The PCB should also be lightly tinned. The transistors can be refitted and tightened down. Now they can be soldered in but, once in, they are very difficult to remove, so take great care at this stage.

The amplifier board is now complete. It will need to be removed once more to allow the application of silicone heat sink compound to the devices in contact with the heat sink. Always unscrew the transistors first and then the PCB, refitting is a reverse of this process.

Construction of the amplifier takes very little time but requires considerable care to avoid damage to the output devices. The metal work may take a little longer - a large heat sink is required for 140W and an even larger one for 300W. It is recommended that the higher power amplifiers are mounted onto a sheet of 0.25in copper which is in turn bolted to the main heat sink. (Note: on no account should the transistors be mounted onto a die-cast box due to surface imperfections and poor thermal conductivity.) Blowing may be necessary at the higher powers or if a less than adequate heat sink is used.

COMPONENTS LIST

HF LINEAR AMPLIFIER

C1	51p chip
C2, C3	5600p chip
C4	390p chip
C5	680p chip
C6, (C7)	1760p (2 x 470p) chips plus 820p SM in parallel
C8, C9	0.68µ chip
C10	100µ 20V
C11	500µ 3V
C12	1000p disc
C13	470p SM
C14	82p SM
R1, R2	2 x 3.6R in parallel
R3, R4	2 x 5.6R in parallel
R5	0.5R
R6	1k0
R7	18k
R8	8k2
R9	1k0 trimpot
R10	150R
R11	1k0
R12	20R 5W WW
R13	24R carbon 6W*
R14	33R carbon 5W*
R15	56R carbon 3W*
R16	68R carbon 2W*

* Make up from several higher values in parallel.

L1, L2	VK200 19/4B choke (6-hole ferrite beads)
L3, L4	Fairite Beads x 2 (2673021801) on 16SWG wire.
L5	1t through T2
T1	2 Fairite beads 0.375in x 0.2in x 0.4in, 3:1 turns
T2	6t 18SWG Ferrite 57-9322 toroid
T3	2 x 57-3238 Ferrite cores (7d grade) 4:1 turns
FB1,2	Fairite 26-43006301 cores
RL1	OUD type
L6	0.82mH (T50-6)
TR1, TR2	MRF454
TR3	2N5989
D1	2N5190
IC1	723 Regulator

LOW PASS FILTER

C1	1200p
C2, C16	180p
C3	2200p
C4	470p
C5	1000p
C6, C13	680p
C7	90p
C9	250p
C10	560p
C11	390p
C12, 24	33p
C14	100p
C15, 18	330p
C17	27p
C19	75p
C20, 28	150p
C21	120p
C22, 27	12p
C23	220p
C25	100p
C26	82p
C29	39p
C30	68p
C31, 32	10n ceramic
C33	10p trimpot
C34	220p SM

Note: C1 - C30 SM 350VDC

L1	28t 22SWG T68-2
L2	25t 22SWG T68-2
L3	22t 22SWG T50-2
L4	20t 22SWG T50-2
L5	18t 20SWG T50-6
L6	16t 20SWG T50-6
L7	12t 20SWG T50-6
L8	11t 20SWG T50-6
L9	10t 20SWG T50-6
L10	9t 20SWG T50-6
L11	8t 20SWG T50-6
L12	7t 20SWG T50-6
T1	18t bifilar T50-43 pri:1t
R1	68R
R2, R3	22k trimpot
R4	1k8
L13	1mH RFC
RL2	OM1 Type
RL3 - 14	2A SPCO PCB mtg, 6V coil
D1, D2	OA91 or OA47

SWITCHING AND ALC

R1, R17, R20	10k
R2	4k7
R3 - 7	1k
R8, R9	33k
R10, 13, 21, 22	1M
R11	3k3
R12, R14, R18	47k
R15	47k trimpot
R16	390R
R19	220k
R23	8k2
TR1	BC212
TR2	BC640
IC1	LM3900
C1, C14 - 26	100n
C2 - 5, C7, C9 - 11, C13	10n
C6	0.22µ
C8	10µ 16V
C12	1µ 16V
D1 - 3	LEDs
D4, 5, D7 - 18	1N914
D6	10V Zener
S1	1-pole 6-way
S2	SPCO
S3	SPCO
Meter	500µA or similar

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[1] 'Medium Power HF Linear Amplifier', M J Grierson, G3TSO, *RadCom* March 1990.

[2] 'Simple Spectrum Analyser', R Blackwell, G4PMK, *RadCom* November 1989.

[3] *ARRL Handbook*, 1980-88 edns.

[4] *Solid State Design for the RA*, ARRL.

[5] Motorola UK, 69 Fairfax House, Buckingham Road, Aylesbury, HP20 2NF.

[6] Communications Concepts Inc, 508 Millstone Drive, Xenia, Ohio 45385 USA. Tel (513) 426 8600.

. . . to be concluded

Pat Hawker's Technical Topics

AN INDOOR 'VK2ABQ-TYPE' 28MHZ BEAM

IT IS VIRTUALLY impossible to predict how well or how badly an indoor transmitting antenna will behave among so many lossy materials: electrical wiring, water tanks and radiators and general domestic metalwork. Roof-space and attic-room antennas usually work reasonably well, rooms lower in a building or in tower-block apartment can vary from just acceptable to downright poor, compared with a similar antenna erected outside the house. For VHF operation, an antenna - foil or wire - taped to a window can give excellent results in the directions away from the building but tend to be pretty poor in the opposite directions where the building and contents will tend to attenuate signals by some 10dB or so - more in a reinforced concrete structure. Nevertheless, DX operation on HF is often possible. *TT* (September 1990, pp31-32 and July 1991, p26) gave brief information on W9BRD's 'Zapper' antennas (a form of unidirectional W8JK driven array) which he finds effective for working into Europe from the Chicago area.

Tony Baker, G3JSF, has found early retirement an incentive to get back on the bands with his TS520 transceiver after an interval of some eight years. One result is that he has devised a novel form of a single-band VK2ABQ compact array that gives his signal some gain and directivity, while fulfilling his belief in low-cost KISS philosophy and the value of lateral thinking.

In effect, he uses a fixed VK2ABQ-type of square wire structure arranged so that he can direct signals towards any one of the four quadrants simply by changing the feed point and inserting a 'jumper' wire across the opposite gap. As shown in **Fig 1**, the antenna comprises four quarter-wave lengths of wire - AB, BC, CD and DA - arranged with gaps at the points A, B, C and D. The array can be fed at any of the four points, A. B, C and D from 75Ω cable terminated with a couple of crocodile (alligator) clips. If fed at A, a jumper wire (about 2") similarly with crocodile clips is connected across gap C. Then to change direction in steps of 90°, the feedpoint and jumper are changed as required.

G3JSF writes: "I am currently using crocodile clips on the feeder and on the jumper wire. By using coax with no balun and then reversing the 'inner' and 'outer' connections at the feed-point, some slewing of the main lobe can be achieved. Direction of fire can be changed in about 30 seconds. My Monimatch SWR meter indicates an almost perfect match to 75Ω cable, flat from 28.3 to 28.7MHz. Standard DIY connecting strip is used to fix this beam horizontally to the ceiling of the room next to the shack, fixing the corners also with the same connector strip. This allows a good mechanical/electrical connection as the feed point is changed. Used with a home-brewed ATU and low-pass filter there is a complete absence of any TV/radio/telephone breakthrough and I find that I can put out a signal on 28MHz with around 90% success rate on the first call.

"Results have included RS58-9 from the Falklands, Brazil, etc. 59+ East Coast USA, 55-8 West Coast, RS58 Japan, 52 New Zealand, 59++ short skip. When not in use, the coaxial cable is simply coiled up and put away. If white PVC covered wire is used for the elements together with the clear connecting blocks for fixing, the beam itself is unobtrusive. The beam also provides a great talking point with my contacts!"

Clearly such a 28MHz beam could be put up in quite a small room sized some 9ft by 9ft. A 21MHz version would often be possible, although a 14MHz version would need a fair-sized room or a roof-space with easy access. But with different sites, different buildings, there can be no guarantee of achieving the same DX results as G3JSF. It can also prove difficult to clear EMC problems when using indoor antennas. But it should not cost more than a few pounds to give the idea a try-out should you be unable to put up an outside antenna giving the required directivity.

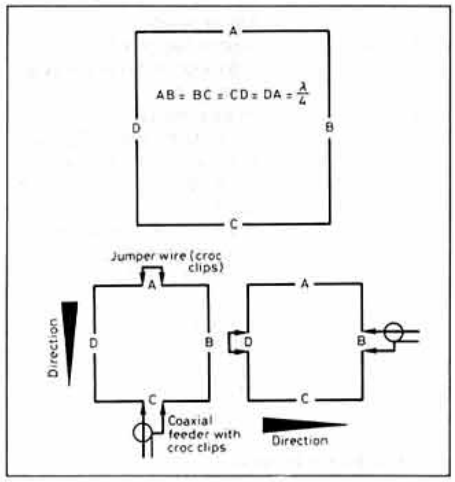


Fig 1: (a) Basic form of the indoor VK2ABQ-type antenna developed by G3JSF. (b) Showing how the directivity is changed by changing the feeder point and the jumper wire to form a driven element and reflector.

RF PROTOTYPING

ADDING TO RECENT discussions on forms of construction that do not involve the etching of one-off PCBs, Dave Lauder, G1OSC writes: "Various techniques for prototyping RF circuits have been described in *RadCom* recently, including those in the two-part article by Ian White, G3SEK (February and March 1991 issues) and the technique briefly mentioned in *TT* (October 1991, page 33) by Dick Biddulph, G8DPS, of combining Veroboard with an unetched piece of copper-clad board to form a ground-plane. Like G3SEK, my favourite technique is pin-and-wire with a ground plane. Although it takes longer than techniques such as 'dead bug' ('ugly construction') the result is neat, robust and easy to repair or modify. Having to drill all the holes for the Veropins is rather tedious, however, and it is necessary to plan the layout precisely before starting.

"When I worked as a design engineer for Marconi Avionics, we used pin-and-wire construction on what we called 'ground-plane Veroboard' (ie copper-clad board drilled as Veroboard). This was obtained on special order from BICC-Vero as "0.1 inch matrix SRBP Veroboard, pierced but not milled". It is an intermediate stage in the manufacture of the normal copper-strip Veroboard, after the holes have been pierced but before the strips have been milled out. Unfortunately, although relatively inexpensive and ideal for RF prototyping, it is not currently available to amateurs because of the large minimum-order charge which, some years ago, was £250. However, similar material may be available in the USA since a 1982 article in *CQ* magazine describing the home construction of a satellite TVRO refers to 'copper-clad perfboard' as 'ideal because you put the clad portion on the top and do the wiring at the bottom'.

"I have tried on several occasions without success to persuade BICC-Vero sales representatives that there is a market here for this type of board but they suggest that I should use Vero 'Microboards'. These are glass-fibre Eurocard boards with a 'colander' ground plane on the component side, ie the ground plane is etched around each hole to clear component leads. A similar product is available from RS Components, No 434-841 but costs over £10 plus VAT for a 100 by 160mm ground-plane board. Microboards are thus an expensive way of RF prototyping and the ground-plane is covered with solder resist which has to be scraped off to make a connection to ground. Perhaps, through *TT*, BICC-Vero might be persuaded to make copper clad perforated board available as a stock item. Or, alternatively, perhaps the Society might buy a batch from BICC-Vero for sale to members in small quantities? Or an enterprising trader could trace the USA source and import some for sale?

"Finally, on the subject of pin-and-wire, I would offer some constructional hints:

(1) When clearing copper away from holes for non-grounded pins, turn the board upside down and tap it sharply to remove all copper shavings to avoid being plagued later by shorts to ground!

(2) If fitting IC sockets to a board with a bare ground plane, ensure that there is a layer of insulating material under the socket to avoid shorts to the ground plane.

(3) If screening between the base and collector of a transistor is required, drill a hole in the board and mount the transistor upside down in the hole so that a screen may be soldered across it.

(4) Pins can be pushed in without force by heating and pushing them with a soldering iron".

A 144MHZ UNIPOLE ANTENNA

THE CONVENTIONAL quarter-wave 144MHz vertically-polarized rod antenna for repeater/mobile operation with horizontal radials (or metal ground plate) has a feed-point impedance of under 20Ω. This can be raised either by sloping the radials down-

wards or by lengthening the element slightly so that it is no longer an electrical quarter-wave. Another rather more elegant solution is the 'unipole' (folded-monopole element) which has the added advantage of increasing the bandwidth of the antenna.

Constructional details of a 144MHz unipole antenna are given by Des Greenham, VK3CO in the WIA's *Amateur Radio* (October 1991, p14). He writes:

"Performance of this antenna (**Fig 2(a)**) has been found to be marginally better than a normal quarter-wave vertical, and the impedance match (SWR) is certainly better with a broader frequency range. The construction is simple using readily available components along with some 'junk box' bits. The main component is a standard CB-type 'mirror mount' bracket used to mount whips on the heavy-duty mirrors of trucks, and is readily available from CB shops: those with workshop facilities, however, could easily fabricate a suitable bracket from 3/16" aluminium plate along with suitable 1/4" U-bolts.

"A standard PL259 flange type chassis socket is mounted on the bracket using four machine screws, reaming the hole slightly if necessary. This requires the use of a small file and some muscle. Place a solder tag under one of the mounting screws to terminate one end of the antenna. The radials are made from aluminium tubing of any diameter between 1/4" and 1/2" (scrap from old TV antennas is suitable). The radials are attached to the bracket with pop rivets, self-tapping screws, or small 1/8" diameter machine screws. Radials need to be mounted solidly as they are likely to be used as bird-perches.

"The antenna proper can be made from

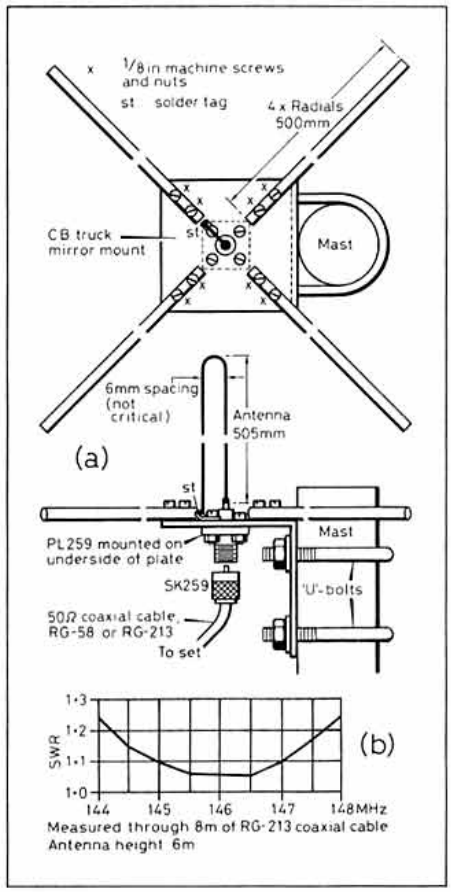


Fig 2: (a) Constructional details of the VK3CO 144MHz unipole antenna. Note that dimensions of element and radials are centred on 146MHz to suit Australian 144-148MHz band. For the UK it would be better to make them slightly longer to resonate at 145MHz.

any available suitable material such as aluminium, wire or brass. Salvaged copper wire should have a diameter of at least 1.5mm, thinner wires will be too fragile. Perhaps the best solution is to use 1/8" bronze welding rods, available in various lengths. If one length is not enough to form the folded element, a soldered joint can be easily made at the top bend. Bronze solders well and a good connection can be made to the PL259 socket and earth tag secured under the mounting screw. A good clean with steel wool will make for easier soldering. Don't forget to waterproof the exposed end of the coax cable at the antenna to prevent water entering the cable and ruining it. Finally mount the antenna on a mast at the maximum possible height and in the clear (eg chimney mounted mast).

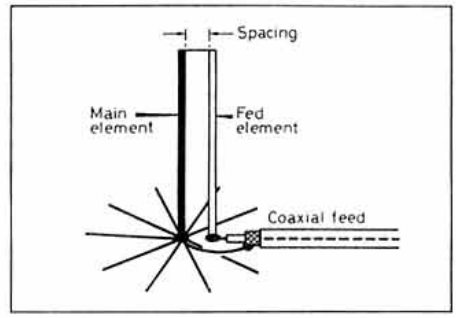


Fig 3: Basic form of the folded-monopole (unipole) antenna. Step-up ratio of feedpoint impedance compared with single quarter-wave element is approximately 4:1 for equal-diameter conductors in fed and main element.

If in the clear, such an antenna should give good 'omnidirectional' performance, but remember it is intended for working stations using vertical polarisation. *TT* July 1987, p497 and August 1991 gave more information on the fundamentals of folded monopoles, including the work of Arch Doty, K8CFU, and his colleagues on their use for HF, VHF and UHF, as well as their technique of bottom-loading. One of the advantages of the folded element is that by using different diameter wires or rods in the main and fed element it is possible to design into the antenna almost any required feed-point impedance for 50 or 75Ω cables etc. **Fig 3** shows the basic structure. VK3CO uses the conventional four radials but as *TT* has pointed out in the past, it should be possible to obtain virtually the same performance using only three or even two radials.

SITING VEHICLE ANTENNAS

TT HAS REFERRED several times to the paper and book by Melvin Weiner *et al* (the paper in *IEEE Trans on Ant & Prop*, May 1987, pp488 to 495) and the book *Monopole Elements on Circular Ground Planes* (Artech House, 1987)). These sources showed how the vertical radiation pattern (VRP) of a quarter-wave monopole antenna depends to a significant extent on the dimensions of the ground-plane (including a vertical with zero ground-plane) as noted in *TT*, November 1987 and March 1988. It has long been recognized that the low-angle radiation from verticals is also greatly affected by ground conductivity, but it was seldom fully appreciated that with certain dimensions of ground plane (as found for example when the metal-

RF SWITCH FOR FAN ETC

JAY F HAMLIN, WB6HBS, (*QST*, August 1991) describes a simple way of automatically turning on a fan during transmissions from a compact high-power VHF transceiver; such a system could also be used to indicate that the rig is delivering RF to the antenna. As shown in **Fig 4** a pick-up coil (L1) comprising a few turns of hook-up wire, is wound around a typical (leaky) coaxial feeder cable.

The RF is rectified by D1 and turns on the power transistor, TR1, for which he uses an "ultra reliable" National Semiconductor LM395 which has built-in thermal-overload protection and current and power limiting. R1, in the absence of RF, pulls the base back to ground and turns TR1 'off'. *TT* has in the past pointed out that most modern co-axial cables do not have 100% braid screening and thus leak out some RF. WB6HBS finds that with L1 about ten turns, 5W of RF into Tandy RG8-M (foam-dielectric miniature RG-8) cable will reliably turn on a small fan he has fitted in the transceiver.

Other cables may require some experimentation to find a suitable number of turns for the power involved. Such an RF-operated switch could also be useful for mobile operation by illuminating a 'transmitter on' display or pilot-lamp to overcome the problem of the microphone PTT being lodged between car seats etc and so jammed 'on' - a far from unknown occurrence in commercial PMR networks, causing a channel to be jammed out for long periods until the offending mobile can be traced.

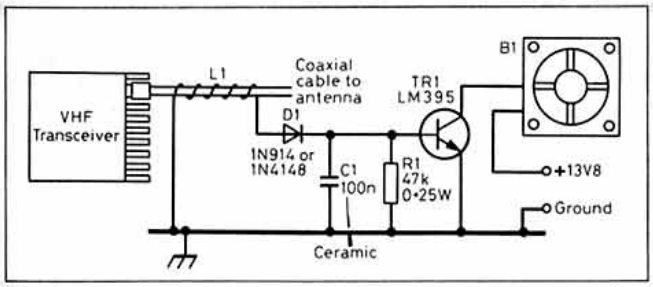


Fig 4: WB6HBS's arrangement for switching on a fan during transmission-only by sensing RF leakage or outer-shield current on the coax feeder cable. Alternatively the switch could operate a 'transmitter-on' indicator, etc.

work of a vehicle is used as the ground plane) the maximum radiation lobe may be at a high angle above the horizon.

In 'Reception - a function of radiating structures' (*Radio-ZS*, September 1991, pp4, 6-7), B N Jansen of Mikorntek summarises Weiner's findings (**Fig 5**) as part of an investigation into the factors affecting the performance of mobile antennas, including the effect of broadcast antennas and the mounting position of the mobile antenna on the vehicle. He demonstrated to SARL members the variation in the HRP at an Antenna Test Facility although emphasising that the results presented represent a demonstration only and do not come from detailed antenna measurements made under optimised conditions.

The demonstrations included the use of two types of antenna (a quarter-wave and a five-eighths-wave element) each tested separately on 149MHz in six different positions (**Fig 6**) on an Opel Monza car, using in effect the boot, the roof and the bonnet as ground-planes. **Fig 7** shows the composite results for all six positions: (a) being for the 5/8-wave antenna and (b) for the 1/4-wave. B N Jansen also provides six further diagrams, each representing a comparison of the results of the two antennas for each position but these are omitted here to save space. The patterns of Fig 7 are those 'seen' from above the car with the front of the car at 0° and the driver side of the car at 90°. He points out that: "The efficiencies and losses of the antennas are assumed to be of the same order of magnitude.

This implies that it cannot be said, purely on these tests, that the one antenna is better than the other just based on the radiation patterns. However, some conclusions can be drawn by seeing what effect the different positions will have on the antennas, and to what extent the ground-plane affects the pattern".

While personally, I would hesitate to draw firm conclusions on the effect of ground-planes from this test, it is certainly interesting to note that while the quarter-wave antenna shows a directivity variation of some 12dB, that of the longer antenna exhibited a variation of 6dB. It also seems that the roof positions, as might be expected, tend to be superior to the boot or bonnet mountings. Even with roof mounting, the broadcast antenna has some influence on the patterns.

B N Jansen suggests that the variations can be attributed to one of the following possible causes: "(1) The broadcast car antenna plays a role in acting as either a director or reflector with respect to the test antenna. (2) The relative size of the ground-plane plays a role. For the specific car, three sub-ground-planes can be identified, ie the boot, the roof and the bonnet. The sloping down to ground on the edges of the ground-planes may also contribute to the lowering of the pattern in that particular direction. (3) The physical length of the antenna plays a role. For the same ground plane, antennas of different lengths will have different radiation patterns".

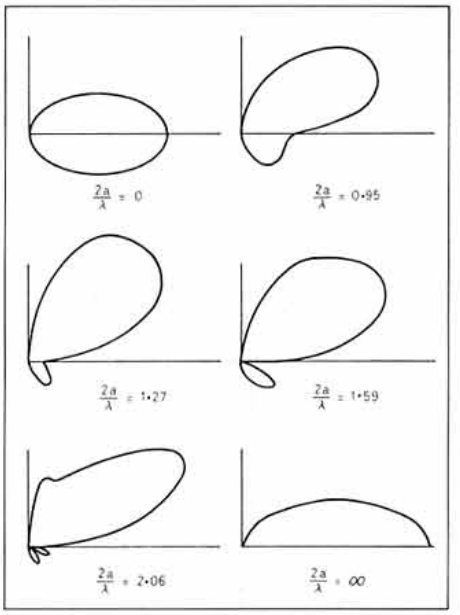


Fig 5: Elevation directive gain patterns (VRP) for any azimuthal direction of a quarter-wave element mounted on a solid ground plane of radius a (based on Wiener *et al*) as given in *Radio-ZS*.

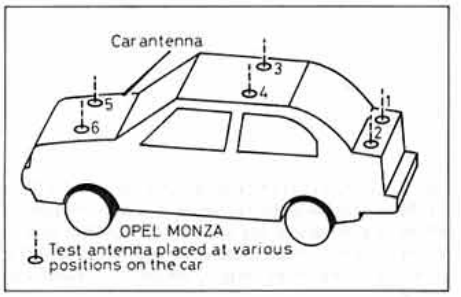


Fig 6: Test antenna positions on the vehicle used for the South Africa demonstrations.

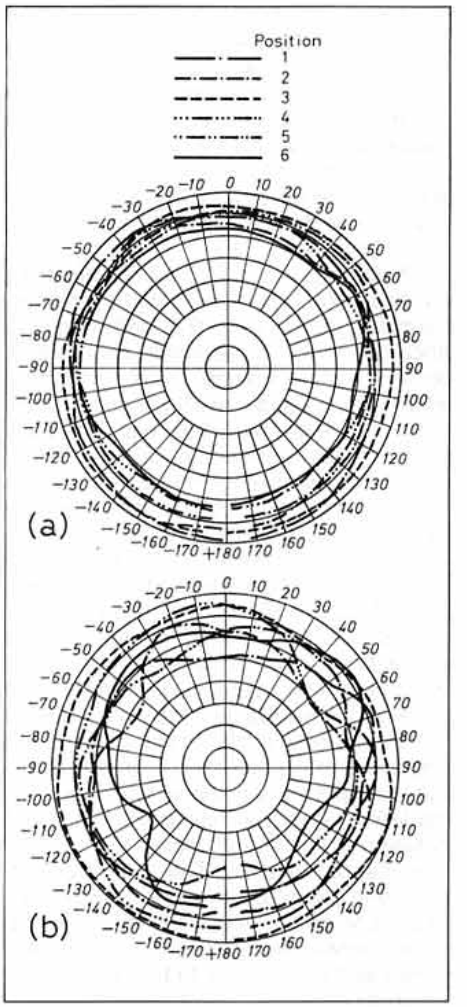


Fig 7: (a) Composite results for all six positions for the five-eighth-wave antenna. (b) Composite results for the quarter-wave antenna.

EEA GUIDELINES ON SOLDERING-FLUX HAZZARDS

THE JUNE 1991 *TT* ITEM 'safe soldering' drew attention, not for the first time, to the fact that solder-fluxes containing colophony (rosin) have been shown, for more than a decade, to present, particularly for heavy users in poorly ventilated areas, a very real risk of becoming sensitized to 'woodworker's asthma' as noted in *TT*, November 1979. Subsequently, the August *TT* included a note from Roger Blackwell, G4PMK, pointing out that Multicore Xersin flux appears to be free from this problem; he also found an asthma inhaler (Intal, disodium cromoglycate) useful for sufferers.

By coincidence, in late August, the Electronics Engineering Association (EEA) published a 12-page (A4-format) booklet *Guidelines on the use of colophony (rosin) solder fluxes in the electronics industry*. This booklet is intended to assist employers whose staff use resin-based fluxes, to help prevent illness as a result of exposure to solder fume. It does not cover risks that may arise from the involvement of other materials such as zinc chloride, lead, isocyanates (polyurethane coatings) or cadmium - some of which were mentioned in the *QST* article by NU1N.

The booklet (including detailed information on the requirements imposed by the Health & Safety Acts, and priced at £11 post free to UK destinations, from EEA, Leicester House, 8 Leicester Street, London WC2H 7BN), is clearly not aimed at the amateur-enthusiast. It has been produced by the Electronics Industry Working Group - a joint industry, trade union and Health & Safety Executive committee. It does, however, add some further information on the effects of colophony fume: "Colophony fume can give rise to respiratory irritation and in some persons it may also cause respiratory sensitization. Sensitization means that after an initial period of exposure, breathing problems such as asthma may occur which are triggered by very low levels of fume whilst colleagues are unaffected.

"Exposure of skin to colophony can also result in the development of allergic contact dermatitis . . . . The sensitizing effect of colophony is not caused by a single indentifiable constituent of rosin. A number of allergens appear to be present in both colophony and in pyrolysis products formed during heating or soldering".

The booklet noted that "some fluxes are available which do not contain colophony and these should be used where reasonably practicable, care being taken not to substitute a risk by a greater one". Colophony (rosin) is widely used as an adhesive and mastic in cold processes, but the main use of heated colophony is in the electronics and electrical industries: in liquid fluxes for wave soldering; as part of the core of solder wire 7/8 and in solder paste for application by screen printing or syringe dispensing. For the amateur, cored solder-wire is the main source of colophony fume.

The booklet covers legal requirements for employers and the choice of exhaust systems for workplaces. It is pointed out that "fume from hand soldering will rise vertically on thermal currents, entering the breathing zone of the worker as he or she leans over the work". Control is normally achieved by means of effective local exhaust ventilation. Details are given of (a) exhaust nozzle fitted to the soldering iron; (b) captor hood; (c) individual fume control units; and (d) exhaust ventilated benches.

A bibliography lists, inter alia, ten references to papers and articles in medical and trade magazines dating back to 1976, suggesting that the industry has not been in a rush to produce its guidelines!

NATTY FRONT PANELS - II

MY TECHNIQUE FOR finishing aluminium front panels is somewhat simpler than that of KA3RRF (*TT*, March 1991, p30-31). A 'brushed' finish can be achieved by rubbing an aluminium panel in one direction with 600-grade or finer 'wet and dry' abrasive paper on a block used wet with white spirit turpentine, then wiping with cellulose thinners to remove any oily residue from the white spirit. But beware, both these solvents are flammable and cellulose thinners contains xylene which is harmful by inhalation or skin contact.

Letraset can be put straight onto the aluminium followed by several coats of clear lacquer. I have found RS Components aerosol clear lacquer (568-477) suitable for this. However, a word of warning - some types of aerosol lacquer are not suitable for front panels as I learned to my cost.

One day I had no RS lacquer and bought some Holts 'Dupli Color' aerosol clear lacquer from a local car accessory shop for the front panel of my home-brew hi-fi tuner-amplifier. It looked very smart for a few weeks, then it started to develop an unsightly frosted effect around the most-used control knobs. This turned out to be small traces of natural skin oils which caused the Holts lacquer to develop a mosaic of tiny cracks. I was able to prove that a trace of any type of oil or grease - from Flora margarine to 3-in-1 oil, and especially skin oil, caused it to crack. Clearly this lacquer is totally unsuitable for front panels and should be used only for applications free of any traces of oil or grease and not touched by hand! I had to remove all the lacquer and lettering with cellulose thinners and start again with RS lacquer which has now stood up well to several years of daily use. *Dave Lauder, G1OSC.*

HERE AND THERE

PETER CHADWICK, G3RZP, in commenting on the April *TT* item about strong RF fields affecting voltage measurements, writes: "As far as RF in power supplies, test meters and the like is concerned, I've found that the ubiquitous 723 regulator suffers very badly in this respect. One of my friends had to rebuild his 12V PSU because the RF from his FT747 shut down the 723 regulator. In the end, he used a 741 op-amp to drive a string of discrete amplifiers, and a zener for reference.

"I have a 12V 5A supply that can be shut down by putting the antenna of a 144MHz handheld on low power about 3-in from the 723. Oddly enough, no amount of bypassing seems to cure the problem. This suggests rectification of the strong electric field is taking place somewhere on the chip itself, although the electric field from 200mW of RF can't be that great - there is certainly not enough to light a neon - an old-fashioned but extremely useful item of test gear. Another is a loop-lamp." (Two items of test gear that have retained their usefulness at G3VA over the years since 1938 and before that at 2BUH!)

Doug Allerston, G5PQ, in *TT*, March pp29-30, warned of low-cost 90° cable elbows he had bought at a rally and which proved to have only "a horrible little black metal spring" connecting the plug and socket ports, not even soldered. The same form of construction is reported by Barry Collins, W4TLV (*QST*, May 1991, p46) in a BNC-type 90° adapter (UG-646/M-359A) for PL259 sockets bought from a Californian mail order firm. Used at a 144MHz repeater station it resulted in the destruction of the power amplifier: "The elbow adapter had a coil spring made of 24-gauge wire slipped on (not soldered) to the input and output connections. Not only does this have the limited current-capacity of 24-gauge wire but it also adds inductance in the form of the coil spring. Running 100 watts at 146MHz through the connector caused the spring to heat up, slide off one of the connectors and arc every time the machine keyed up. In short order, the repeater's final amplifier was destroyed.

"Next time you're tempted to go for low-priced, no-brand-name connectors and adapters, think about this type of construction. In my opinion, they're not even adequate for audio use, much less RF."

Geoff Pendrick, G6BEI, has found a use for a small item that is readily available, in most cases free. He writes:

"As a keen constructor of QRP equipment, I am always looking for ways of keeping down costs. When constructing a project recently I needed a quantity of small pillars to support the circuit board on the chassis. On looking through my scrap box I came across four old spark plugs discarded from the last service. On looking at the plug tops (which unscrew) I found that these were just the right height for mounting the board. There was sufficient clearance around the board for isolation purposes and with a small drill to enlarge the hole

CHEAPER SOLAR POWER?

THE USE OF SOLAR CELL arrays to provide electrical power to charge storage batteries in conjunction with radio equipment has become established in professional communications in remote areas, particularly where the sun shines more predictably than in the UK. In *TT*, October 1988 ('Low cost systems aid the third world') it was noted that Dr S A G Chandler, G3UDD, was implementing in Sierra Leone a network of 'village' radiophones using low-cost 27MHz CB transceivers under microprocessor control with the batteries kept charged by solar arrays costing about £100 per station. But to provide sufficient charging power for regular operation of, say, an HF 100W transceiver, suitable solar arrays do not come cheaply.

In the 1980s, the Japanese launched a long-term project with the aim of bringing the cost of solar power down to about $1/Watt but that target does not seem to have been achieved.

A new possibility of reducing the cost of solar power - though still only on the horizon - seems to be opened up by a recent announcement in *Nature* (24 October 1991) of a novel form of photovoltaic cell created from low to medium purity materials and low-cost processes.

Brian O'Regan and Michael Graetzel of the Swiss Federal Institute of Technology, Lausanne writes: "The large-scale use of photovoltaic devices for electricity generation is prohibitively expensive at present: generation from existing commercial devices costs about ten times more than conventional methods". They describe a cell based on a 10-micrometres-thick, optically transparent film of titanium dioxide particles a few nanometres in size, coated with a monolayer of a charge-transfer dye with an overall light-to-electric solar energy conversion yield of 7.1 - 7.9% in simulated solar light and 12% in diffuse daylight.

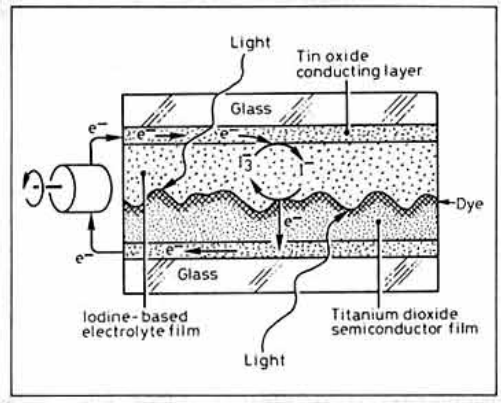


Fig 8: The form of solar panel announced by the Swiss Federal Institute of Technology could open the way for low-cost chemicals turning double-glazing into a solar generator at much reduced cost to silicon solar cells.

Following up this report, Andy Coghlan in *New Scientist* (26 October 1991) suggests that: "Buildings could be made much more energy efficient by fitting their windows with a new type of transparent solar panel (**Fig 8**) rather than glass". It is estimated that panels producing around 150W/m² might cost around £40 - £80 compared with around £400 for conventional silicon solar arrays: "The sandwich arrangement of the Swiss panel mimics the way that planets make their food by gathering energy from light through photosynthesis". There would still be the capital cost of the solar windows and storage batteries but solar energy then comes for free.

I found they could be installed using either a nut and bolt or a self-tapping screw.

The interesting point was that when I enquired at my local garage to see if they had any spare old plug tops, I was given 100 of them free of charge. Pillars designed for this purpose are surprisingly expensive."

Mark Rogers, G4RGB, draws attention to Parafilm 'M' Laboratory Film made by the American Can Company which he uses for his professional work in a laboratory for sealing test-tubes, flasks etc so that they can be shaken. He finds this material is very pliable and both weather and waterproof. He suggests it could have its uses for sealing the entry of co-axial cable into antenna connection boxes, for stretching around exposed electrical connections to keep out water, etc. He adds: "I have found that insulation tape tends to undo itself and lose its stickiness, PTFE is awkward to work with and tends to go into fine strands - so, hopefully, Parafilm may have its uses in amateur radio. It is available in the UK from laboratory suppliers in a variety of widths/lengths, for example from Gallenkamp, Bolton Road West, Loughborough, Leics LE11 0TR (Tel 0509-237371)". G4RGB does not mention whether this material lasts long when exposed to UV radiation.

Another tip for waterproofing co-ax fittings comes from VE7FLA in W6SAI's *CQ* column (October 1991): "An easy way is to use non-contaminating heat-shrink tubing. It is not as messy as coax tape".

In *QST*'s *Hints & Kinks* column (October 1991), Bob Raffaele, W2XM, suggests an unusual substitute for glass or porcelain insulators for temporary antennas for field days etc: "If great strength is not required and the installation is temporary, I use Wiffle practice golf balls. They work well and are far less expensive than porcelain insulators". I wonder if this applies to equivalent UK products?

TT has included in the past some brief details of the series of DC/AC inverters published in *Electronics Australia* permitting the operation of mains appliances from 12V or 24V vehicle batteries. An American design providing an output of up to 40 watts appears in *Radio-Electronics* (April 1991 pp43-44 & 68). This uses six of the relatively low-cost IRF511 power-FETs as switching devices providing a 75Hz square-wave output at about 120V (adjustable), but could clearly be easily modified for 240V or 220V by substituting a suitable transformer.

It draws about 5A full-load and about 0.5A off-load, making it suitable for use from the vehicle 12V cigarette-lighter socket, to enable a soldering iron, oscilloscope or other mains-operated appliances to be used in the field; it could also power a mains battery charger for a transceiver or camcorder etc from the vehicle battery, provided care was taken not to run down the battery while stationary. Although the output is square-wave rather than sine-wave, the RMS and peak voltage is the same as for a sine-wave supply, the 75Hz frequency (derived from a 300Hz clock) reduces the likelihood of saturating the core of the appliance transformer.

The number of public and private museums in the UK devoted to early 'wireless' receivers and communications equipment seems to be growing (see *RadCom* August 90 for details of some - *Ed*) though it is a pity that both the Science Museum and the Imperial War Museum and their field stations now impose entrance fees that tend to discourage casual or frequent visits.

In the USA, a relative newcomer is the Historical Electronics Museum, set up in 1980, which displays historical artefacts in communications, radar, counter-measures and space electronics. Located at 920 Elkridge Landing Road, Linthicum, Maryland, near the Baltimore-Washington International Airport (BWI) and not too far from the famous Smithsonian Institution museums in Washington DC. Among the exhibits is an S-Band (10cm) SCR-584 in working order, claimed as the first automatic tracking radar in the second world war and one of the first 'true weapons systems'. This type of radar was used at Anzio, Battle of the Bulge and in the UK as a very effective means of shooting down V1 buzz-bombs. There is also the SCR-270 (105-110MHz) which on Opana Point, Oahu, Hawaii detected the incoming Japanese planes which attacked Pearl Harbour in December 1941, but due to a human SNAFU did not alert the air defences.

Jim Brown, G0KZV, noted the brief obituary of John Bardeen in the May *TT*, and was reminded of a classic case of lost opportunities in sending along a *Wireless Engineer* abstract (reference 1683) of April 1939 of a paper by Hilsch & Pohl 'Control of Electron Currents with a Three-electrode Crystal, and a Model of a Barrier Layer' (*Zeitschr. f. Physik*, No 5/6, Vol III, 1938, pp399-408) which begins "Some experiments are described in which crystals of potassium bromide are used as a model of a barrier-layer rectifier and its control by means of a built-in grid; a 'three-electrode crystal' is devised which behaves in a manner analogous to a three-electrode valve." As G0KZV puts it: "Doesn't it prove there is nothing new under the sun? Had Hilsch and Pohl been interested in amplification and not rectification at that time, history might have been different." Or at least we might have had transistors a whole decade earlier! ***G3VA***

DIY SHELVES + TABLE = OPERATING POSITION

NOT ALL OF US ARE sufficiently skilled in carpentry to tackle the construction of a complete operating desk. But Larry Hill, AA4DJ (*CQ*, February 1991, pp34-36) shows that it is often possible to acquire a second-hand or auctioned off office table or disused kitchen table at a low-cost and then to add DIY wooden shelving custom-designed to accommodate transceiver(s), ATU, VDU, books etc in a manner acceptable in a domestic environment. He provides very full constructional details of the arrangement shown in **Fig 9**, made from a single panel (4ft by 8ft) of 3/4inch birch plywood for the shelves, supports and back with a little solid birch for trim. I will not attempt to digest his working notes since I suspect that those with sufficient experience of DIY carpentry would be capable of producing a suitable structure, while those, like myself, whose shelves always seem to collapse or wobble, would be better off adopting an alternative approach. But it seems a good idea.

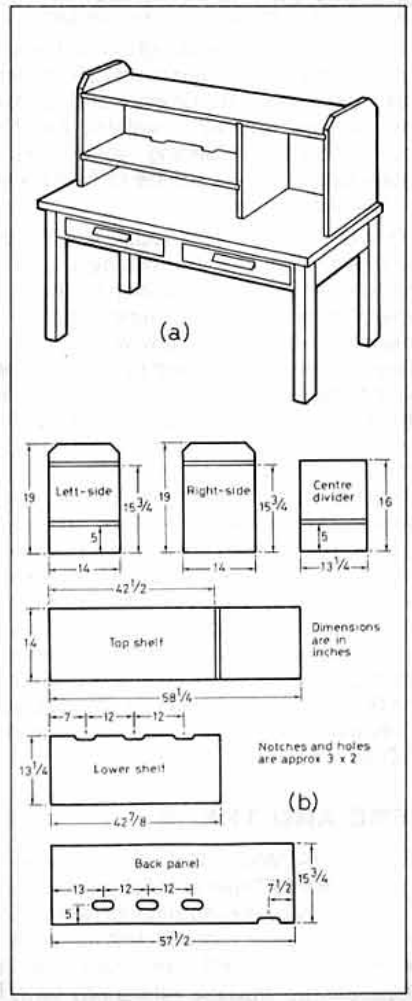


Fig 9: (a) AA4DJ's completed operating position with DIY shelving assembly placed on a strong table. (b) The parts as cut from a single sheet of plywood, but the design could be adapted to suit individual station requirements.

RADCOM TECHNICAL FEATURE

An Impedance Diagram for Transmission Lines

Geoffrey Billington, G3EAE, shows how a simple diagram can tell you nearly everything you need to know about the distribution of voltage, current and impedance on a transmission line.

THE CURRENT AND voltage on an unmatched transmission line will vary along the line. The ratio of the voltage between the lines to the current flowing in them is termed the *line impedance*, Z. This ratio varies from point to point, as also does the phase difference between voltage and current. The value of Z at every point is ultimately determined by the load which terminates the line, which in most cases will be the antenna. Reflection at this termination always takes place in such a way as to ensure that Z at this point is identical to the external load. The line impedance at the other end is the impedance which is presented to the transmitter.

The line impedance Z must not be confused with the *characteristic impedance* of the line, Z_0.

The problem dealt with here is how to predict the variation of impedance along an unmatched line, and thus describe how the line acts as a transformer between the transmitter and the antenna, and why this transforming action is critically dependent upon the length of the line.

The usual method of tackling this sort of problem is to employ a Smith chart and those who are familiar with its use will find that the operation rules for the diagram are very similar. On the other hand, there is no need to know anything about a Smith chart. The diagram is an alternative approach. No special chart or equipment is needed: simply a ruler, a protractor, and a pocket calculator which gives SIN, COS and TAN.

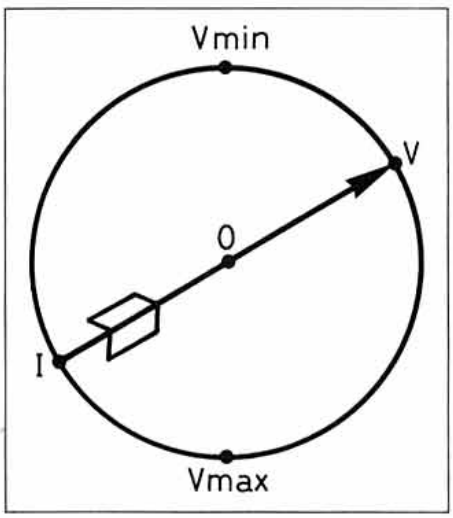


Fig 1: The basis of the diagram.

In fact the ability to predict numerical results is perhaps less important than the insight into transmission line behaviour which can be gained by sketching a few rough diagrams, without the necessity of making any measurements or calculations.

THE DIAGRAM

PICTURE A CLOCK FACE. The two hands have been replaced by a single pointer, the 'indicator', pivoted at its centre, O. The arrowhead end of this pointer is labelled V and the tail end I (see **Fig 1**).

The dial has two points marked on it: 12 o'clock is marked V_{min}, and 6 o'clock is marked V_{max}. The impedance at any point on the line may be found by setting the indicator to the appropriate position and then incorporating it into a diagram.

If, for instance, you wish to investigate conditions at a voltage maximum, the indicator is turned until the arrowhead points to V_{max} (6 o'clock). It is turned to 12 o'clock for a voltage minimum, and to 3 o'clock or 9 o'clock to find the impedance half way between a minimum and a maximum, and so on.

If you look at Fig 1 you can see that the indicator is set for a point one-third of the distance between a voltage minimum and a voltage maximum (ie the indicator points to 2 o'clock).

In order to find the impedance at this point we need to know (i) the characteristic impedance of the line (Z_0) and (ii) the SWR.

Suppose that the SWR on the line had been measured and found to be 3.0. Knowing the SWR, we use it to calculate the reflection coefficient k which is the number we actually use in drawing the diagram.

$$k = (SWR - 1)/(SWR + 1) \quad \text{Note 1}$$
$$k = (3 - 1)/(3 + 1)$$
$$k = 0.5$$

The diagram is now constructed as follows (see **Fig 2**):

Draw a vertical line - the 'main axis' - down the centre of a sheet of paper. Mark the point 'O', the centre of the 'clock face' somewhere on the lower part of the line. Next mark in another point 'P' on the line, at some convenient known distance (say 100mm) above O.

The main axis will pass through 12 o'clock and 6 o'clock on the dial when this is added later.

Next work out the length of the indicator or, more conveniently, the half length 'OV' (or 'OI'). This distance must be made equal to k x OP, eg to 100k millimetres if OP has been drawn 100mm long as suggested. The actual scale used is immaterial.

In this example the half length will be:

$$0.5 \times 100 = 50\text{mm}.$$

The clock face, radius 50mm, may now be

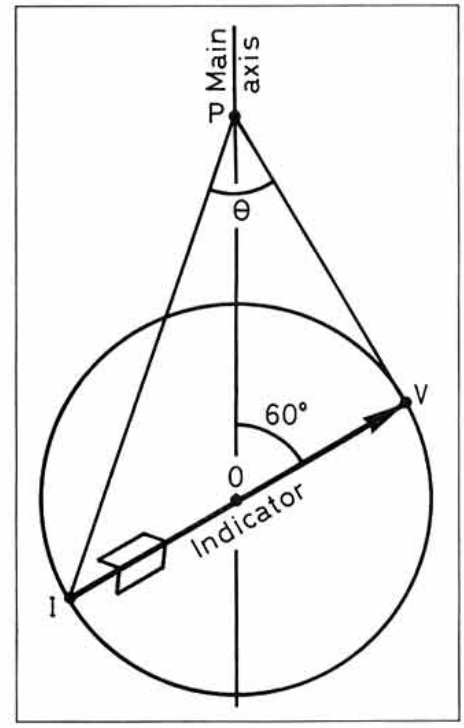


Fig 2:The diagram in use.

roughly sketched in (Note 2), and the indicator drawn accurately to size and making the correct angle with the main axis. As the indicator should point at 2 o'clock, the angle made with the main axis is 180/3 = 60°. The diagram is completed by joining the tip and the tail of the indicator to point P (see **Fig 2**).

FINDING Z

TO FIND Z, MEASURE PV and PI and work out (PV/PI).

Then $Z/Z_0 = (PV/PI)$
Or $Z = Z_0(PV/PI)$

In the given example (**Fig 2**), (PV/PI) = 0.655, so the impedance is 0.655 multiplied by the characteristic impedance of the line. For 50Ω coaxial cable, for instance, the impedance at this point will be 32.75Ω, say 33Ω.

However, knowing Z is not a lot of use. What is needed for practical purposes is the value of the resistive component (R) and reactive component (X). To find these quantities, the angle θ between PV and PI must be measured (Note 3).

In the example shown, θ = 49°. R and X are then found as follows: First find Z as previously explained.

$$Z = Z_0(PV/PI) = 33\Omega$$
$$R = Z \cos \theta = 33 \cos 49 = 22\Omega$$
$$X = Z \sin \theta = 33 \sin 49 = 25\Omega$$

Z is equivalent to a resistance R and a reactance X connected in series (whether X is capacitive or inductive is explained later.)

In order to understand the above equations better, picture what happens when the indicator is rotated. The lengths PV and PI change, showing that Z changes, and the angle between them (θ) opens out and then closes up again.

Put non-mathematically, the greater the angle θ, the greater is the reactive component (X) compared to the resistive component (R). When θ = 0 the reactive component is zero and Z is a pure resistance.

When the indicator is set to V_{max} or to V_{min}, PV and PI lie together, so θ = 0 at these two points and Z is a pure resistance. These are the only points on an unmatched line where this occurs. At all other points Z has a reactive as well as a resistive component. Picturing how PV and PI change as the indicator rotates also shows that the line impedance has its maximum and minimum values at a voltage maximum and voltage minimum respectively.

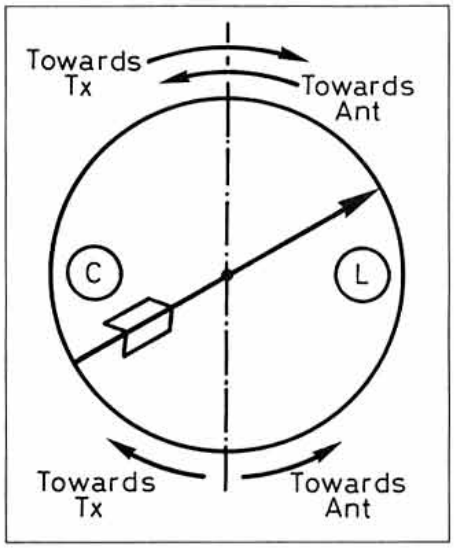


Fig 3: Another rule must be obeyed.

Note that because θ = 0 at a voltage maximum or minimum, the equations give

$$R = Z \cos 0 = Z \quad (\cos 0 = 1)$$
$$X = Z \sin 0 = 0 \quad (\sin 0 = 0)$$

This agrees with the statement above that at a voltage maximum or minimum, Z is a pure resistance with zero reactance.

The only remaining question is whether X is inductive or capacitive. This is easily settled.

Put the letter 'L' on the right hand side of the main axis, and 'C' on the left. If the arrowhead of the indicator lies to the right of the main axis, the reactive component is inductive, and if the arrow lies on the left it is capacitive.

In order that this rule works another rule must be obeyed: movement along the line *away* from the transmitter end of the feeder is represented by an *anticlockwise* rotation of the indicator. Movement along the line *towards* the transmitter is represented by a *clockwise* rotation. The rules are summarised in **Fig 3**. (These same rules are employed when using a Smith chart).

Before explaining how to use the diagram to solve numerical problems, it is worthwhile looking at a few of the many ways in which it can shed light on transmission line behaviour.

THE MATCHED LINE (K = 0)

IF A LINE IS MATCHED by termination in a pure resistance equal to its characteristic impedance Z_0, there will be no reflection from the termination, ie the SWR = 1, and k = 0.

To demonstrate how this affects the diagram it is easiest to consider first what happens when k is very small. It is then easy to see what will happen if k is made smaller and smaller, eventually becoming zero.

Fig 4 shows an example where the SWR = 1.2 and k = 0.09. It is clear that whatever the position of the indicator, PV/PI is never very different from unity, and the angle between PV and PI is always small. This means that the impedance for any length of line is close to Z_0 and has a negligible reactive component.

In the limiting case of k = 0, the length of the indicator dwindles to zero, so PV and PI are always the same length, and always lie one on top of the other: Z is always equal to Z_0, and is always a pure resistance. The line is matched.

IMPEDANCES AT VOLTAGE MAXIMA AND MINIMA

NEXT CONSIDER WHAT THE diagram has to say about the impedances (resistances) at the maxima and minima. In **Fig 5** OP is taken as one unit long, and the indicator half length is therefore k units.

At a voltage maximum

$$PV = (1 + k) \text{ and } PI = (1 - k)$$

$$Z/Z_0 = (1 + k)/(1 - k)$$

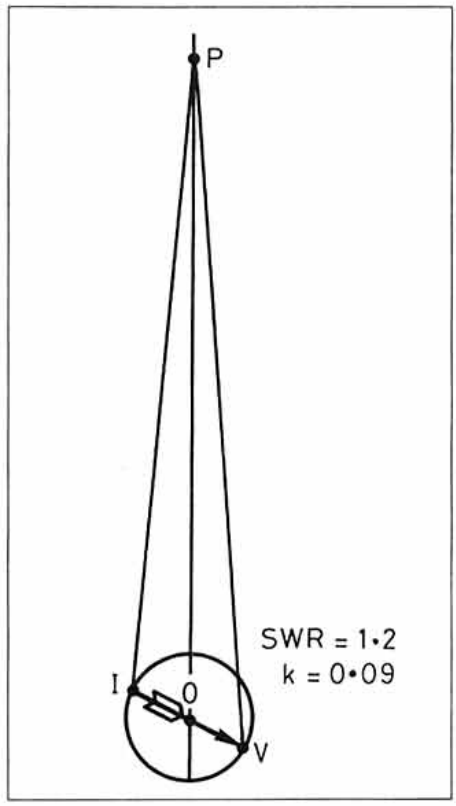


Fig 4: An example.

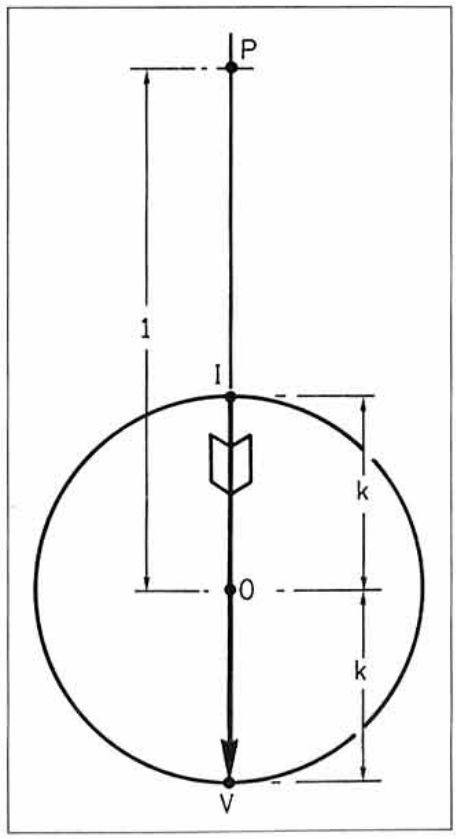


Fig 5: Impedance as a sure resistance.

But (1 + k)/(1 - k) = SWR (As can be shown by rearranging the previous equation for k). So at a voltage maximum the impedance is a pure resistance R given by

$$R/Z_0 = SWR$$

Conversely, when a line is terminated in a pure resistance R which is greater than Z_0

there will be a voltage maximum at the termination and the SWR will be equal to R/Z_0.

Applying similar arguments to a voltage minimum you can show that the impedance (again a pure resistance) is equal to Z_0/SWR, or conversely, if the line is terminated with a resistance R which is less than Z_0, there will be a voltage minimum at the termination and the SWR will be equal to Z_0/R.

PERFECTLY REFLECTING TERMINATIONS (K = 1)

K IS EQUAL TO UNITY (and the SWR is infinite) when a line is terminated by a perfect reflector which absorbs no energy, for instance an open-circuit, a short-circuit or a pure reactance. **Figs 6(a)** and **6(b)** illustrate cases where k = 1. OP is equal to the half length of the indicator, so 'P' is situated on the rim of the 'dial', and because of this it turns out that *the angle θ is a right angle for all settings of the indicator* (Note 4).

Since sin 90 = 1 and cos 90 = 0, Z is always a pure reactance with no resistive component. A length of open-circuit or short-circuited transmission line behaves as either a capacitor or an inductor, depending upon its length.

Now think about what happens at a voltage minimum. As the indicator approaches 12 o'clock, the length PV dwindles to zero. Thus (PV/PI) becomes zero at this point, and so does Z. Fairly obviously, this must apply at the short-circuit termination.

In a similar way PI becomes zero at a voltage maximum which means that (PV/PI) becomes infinite and so does Z. An open-circuit termination must be a voltage maximum.

The impedance (reactance) of any length of open-circuit or short-circuit length of line may be found by setting the indicator to 12 o'clock for a short-circuit, or 6 o'clock for an open-circuit, and rotating the indicator clockwise through the angle which represents the length of line.

The reader may feel unhappy about the prediction that for lines terminated in a perfect reflector, the impedance will be infinite at a voltage maximum and zero at a voltage minimum. Clearly this can never quite happen in practice. There must always be some slight loss of energy on the line or at the termination and this will prevent the ideal state from being realised.

A more realistic diagram is obtained if k is assumed to be very slightly less than unity. In this case the point P will lie just outside the circle as illustrated in **Fig 7**.

At 12 o'clock and at 6 o'clock PV and PI swing into line and the impedance converts into a pure resistance; a very high resistance at the voltage maximum and a very low resistance at the voltage minimum. At points not in the vicinity of a maximum or a minimum the diagram is almost indistinguishable from the case when k = 1. The angle between PV and PI is nearly a right angle, so Z is very nearly a pure reactance.

This clearly explains how open-circuit and short-circuit lines can exhibit resonance, in the same sort of way as a tuned circuit containing a coil and capacitor.

If it is arranged that an open-circuit or short-circuit line presents a voltage maximum to a generator, the behaviour of the line is very similar to that of a parallel-tuned circuit, with the impedance peaking up to a high resistive value at resonance. The impedance will be capacitive on one side of resonance, and inductive on the other. Similarly, if the line presents a voltage minimum to the generator, it behaves as a series-tuned circuit.

Of course the main difference between resonant lines and tuned circuits is that a simple LC circuit may (ideally) only have one resonant frequency. This can never be the case with transmission lines, where resonance can be obtained with any frequency which fulfils the required condition of a voltage maximum or minimum at the driven end.

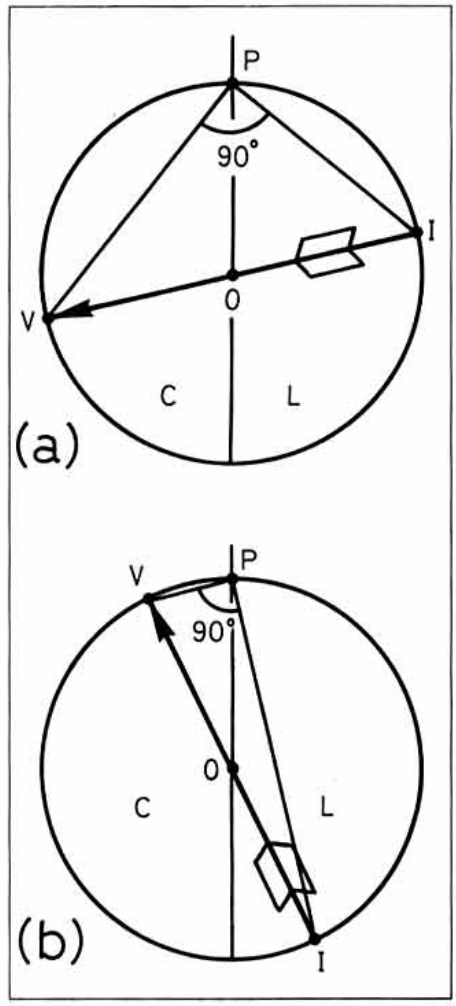


Fig 6: Perfectly reflecting terminations.

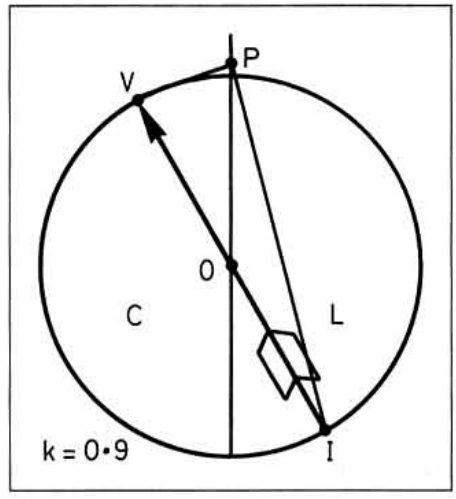


Fig 7: k is slightly less than unity.

FINDING THE ROTATION

ALL THE PREVIOUS results are of a general nature, and have been obtained without drawing any diagrams to scale or making measurements. Before applying the method to numerical problems, more should be said about determining the angle through which the indicator must be moved. So far, all discussion has been in terms of wavelength, but it is more convenient if the rotation angle can be found from the frequency of the transmitter.

It can be shown that the rotation (degrees) representing a length of L metres of line when the frequency is f megahertz is given by:

Angular rotation (degrees)
= 2.4 Lf/(velocity factor)

This may be derived as follows. A movement of one wavelength is represented by turning the indicator through *two* complete rotations: 720°. (The reason for the unexpected factor of two is mentioned in the final section: 'Meaning of the Diagram and its Limitations').

In general, a length L is represented by a rotation of 720 (L/λ) degrees. λ is the 'wavelength on the line'. This is usually less than the free space wavelength and is given by

$$\lambda = (300 \times \text{velocity factor})/f$$

where λ is in metres, and f in megahertz. Combining these two formulas gives the formula stated above:

Angular rotation (degrees)
= 2.4 Lf/(velocity factor)

The velocity factor depends upon the type of line used. For open-wire feeders it may be taken as unity, which means that you can forget it. For many common solid dielectric types of coaxial cable it is 0.66, though the figure for cable with air spaces in the dielectric is likely to be higher, and must be ascertained.

NOTES

Note 1: There are two versions of this formula:

(i) k = (SWR - 1)/SWR + 1)

Rearranging this gives:

(ii) SWR = (1 + k)/(1 - k).

Both versions are used in this article.

Note 2: There is no real necessity to draw the clock face, but it's not a bad idea to sketch it in.

Note 3: θ is in fact the phase difference between the line voltage and current.

Note 4: This is always true for the angle between two lines drawn from a point on the circumference to the ends of a diameter (the indicator in this case).

NEXT MONTH . .

IN PART 2, G3EAE goes through a worked example.

RADCOM TECHNICAL FEATURE

Budget Amateur Radio

by Alan Troy, G4KRN

WITH THE PRESENT COST of living, some radio amateurs may wonder whether they can really afford the increasingly expensive black box equipment. I hope to argue that such equipment is not essential for amateur radio operation and there are low budget approaches to remaining active on the air.

There are a number of alternatives to buying new transceivers on HP, these being: homebrew, kits, converted, old commercial equipment and second hand amateur equipment.

ON THE AIR FOR £20

THE MINIMUM AMOUNT needed to put yourself on the air is about £20. But this confines you to HF CW QRP using home built rigs. The G-QRP Club's *Sprat* magazine and their *Circuit Handbook* offer plenty of scope for viable circuits, including transceivers and separate transmitters and direct-conversion receivers.

This equipment is easy to build because only a few components are used. I have used very basic CW QRP crystal controlled transmitters using only a couple of transistors and with outputs of 2 to 5W and made plenty of QSOs on the 80, 40, 30 and 20m bands. With a good antenna, 1 or 2W output will produce QSOs on the busier HF bands and with 5W even an indoor aerial will produce results.

Despite low power your signal reports should be quite reasonable in most cases, although maybe not S9. At this level, phone operation is not really viable although there are designs for simple DSB transmitters or one can use a carbon microphone or series modulate a QRP transmitter but this would give a very limited phone facility, perhaps usable only on Top Band.

KITS FOR £50

THE RANGE INCREASES greatly if you can afford £50. There are several suppliers offering HF CW QRP kits or part kits at these prices and below. Many amateurs are using such rigs successfully on the 80, 40 and 20m bands. Monitoring the CW QRP calling frequencies on 3.560, 7.030 and 14.060MHz will reveal this.

These rigs are usually easy to build in an evening or two and operate reliably once put together. With a 20m QRP transmitter and an indoor dipole, my first CQ provided a contact with UA9. Articles reviewing available radio kits have been featured in *Radio Communication*. [1]

Direct-conversion can provide a good monitor facility with a minimum of components and costs. Many kits for such receivers are available. Worth noting is the RSGB's RC14 [2], designed as an introduction to home construction but with a stable VFO and good sensitivity and selectivity. Add-on units, such as converters can make such equipment more versatile [3]. The 'White Rose Radio' [4] is also a DC receiver designed for good performance at low cost at £25 to £30 for the basic unit. Converters at up to £6 each for construction costs are designed to match with it. A modular approach to construction is always a very useful method, starting with a basic unit and adding selections later as required to make the equipment more sophisticated.

Also at prices up to £50 we can obtain phone operation because second-hand converted CB rigs for 10m FM are available. Using such transceivers can take advantage of all the cheap and readily adaptable CB accessories. In good conditions a converted CB set with a dipole on 29 MHz can work DX stations. The 10m FM band is also popular with some as an alternative to 2 metres for local QSOs. (Note that any conversion must have been approved by the RA.)

£100 TO SPEND

WITH £100 TO SPEND the scope widens still further. Now we can consider getting on to the VHF bands. The older 2m hand-helds are available on the second-hand market. However, these will usually be the crystal controlled types with a limited number of channels, but this can still provide a useful facility, especially if repeater channels are fitted. We can also consider converted commercial equipment. At present low band Pye Westminsters suitable for conversion to 4m are being advertised by various dealers for low prices, but with the cost of crystals, fault finding and lining up, it is likely to cost a total of £80 or so to get one of these sets going on the band. It is worth considering as there is an increasing amount of activity on 70.450MHz FM using such sets. Also suitable for conversion are Pye Pocketphones for 70cm.

RIGS UP TO £150

WITH UP TO £150 the second hand market can provide older 2m mobile transceivers and some older valve HF transceivers as well. Valve HF communications receivers can also be obtained in this price range.

In recent years there has been an increasing number of small, synthesized, general coverage HF receivers at prices of £100 to £180, such as the types manufactured by Sony. These can be used for amateur communication purposes. I have used a pocket sized Sony ICF 7600D as my main station receiver for some years and made many QSOs using this paired with QRP transmitters. I have worked DX this way with only the set's rod for a receive antenna. To increase its usefulness one can construct home brew accessories such as 2 metre converters and ATUs.

ACCESSORIES

APART FROM THE transmitter and receiver we need other equipment, most notably the antenna. Aerials can be constructed from wire of course, although wire and coaxial cable is becoming expensive. The ordinary dipole is quite an effective antenna even when bent round or placed indoors. There are plenty of publications for test equipment with circuits for very simple but useful designs. DIY QSL cards are available very cheaply and the callsign can be put on with a rubber stamp. To power the station, a car battery is an effective PSU and it can cope with higher power levels than the cheaper mains PSUs, although you will need a battery charger and hydrometer. But beware of the potential safety hazards (see Technical Topics, *RadCom*).

Without an all mode, all band black box it will take longer to fill up the log book but QSOs will be more meaningful and interesting. Old converted and home built equipment may not be 100% reliable but you will certainly learn something about how it all works. Remember to collect and save as much as you can in terms of components and hardware and improvise. Above all, enjoy your amateur radio operation.

REFERENCES

[1] 'Kits * Kits * Kits' *Radio Communication*, May 1990.

[2] 'The RC14 Beginners Receiver' *Radio Communication*, June 1987.

[3] 'A 3.5 MHz Converter for the RC14' *Radio Communication*, April 1989.

[4] 'The White Rose Radio' *Radio Communication*, February 1990.

IDEAS FROM ABROAD

TRANSLATED AND EDITED BY ERWIN DAVID, G4LQI

RF-sensitivity of stabilized power supplies is the self-explanatory title of a contribution by **H-J Brandt, DJ1ZB** in the EMC column of DARC's ***CQ-DL*** **March 1991.** The problem is clearly defined and a practical way to trace and frequently eliminate its harmful effects is given.

MANY AMATEURS have observed how RF from their transmitter affects the output voltage of its own or another power supply in the shack. In this respect there are two kinds of power supply: bad and horrible. In the former, RF makes the DC output voltage go down; in the latter it rises, frequently up to the voltage on the storage capacitor. Sometimes by-passing of the power supply terminals is adequate, but a recent case here in Munich led to a more systematic investigation.

An amateur had made a half-wave plug-in antenna for his hand-held 2m transceiver. He tried it indoors, feeding the hand-held from a stabilized power supply through a pair of wires. Suddenly the power supply voltage rose to 30V and the hand-held was ruined.

To analyze what had happened, the offending power supply was loaded with a 10Ω 25W resistor at the end of 1.50m long wires. The repaired hand-held, with the same λ/2 antenna, but now powered by its own battery, was held near these wires and again the power supply output jumped; not as much as before, though, as now no increase of the transmitter power resulted.

This experiment was convincing but the RF polution of the power supply by irradiation was not suitable for finding the RF-sensitive spots within. The same effect could be produced in a more controlled manner by conducted RF from a 29MHz transmitter with adjustable output *(0-5W would be adequate - G4LQI)*. The transmitter output was fed through a 6dB power attenuator (to keep the transmitter load close to 50Ω) and a length of coax to a probe consisting of a terminating resistor and a DC blocking capacitor in series (**Fig 1**). The shield of the coax was connected to the common side of the storage capacitor of the PSU under test and the probe tip touched to all accessible points. At each, the RF power was increased until some effect was noticed, the transmitter output level then indicating the RF-sensitivity of that point.

With this arrangement we attacked a power supply, shown schematically in **Fig 2**, in which the power components - transformer, rectifier, storage capacitor and power transistors - were conventionally wired and the low-power components were on a PCB. It appeared that the PCB terminals were the most sensitive spots, so we started by inserting 33μH chokes in the leads to each of them. This was only moderately effective. Real improvement came only after the inputs of the two op-amps (one for voltage and one for current limit control) had been by-passed with 680pF ceramic disks right at the IC terminals. Specifically, the output voltage could no longer be affected by RF injection. It was now possible to remove the chokes, except those in the wiper leads of the voltage and current setting potentiometers, with no ill effects.

In principle, all linear circuitry can be probed for RF-sensitive spots in this way and the 'fixes' - by-pass capacitors, chokes and/or RC decoupling - tested for effectiveness. If the transmitter can be amplitude modulated, Hi-Fi systems can be probed to find the spots where RFI demodulation takes place.

Digital circuits, which depend for their proper functioning on signals with precise rise and fall times, often cannot be desensitized by any of the named fixes, all of which introduce time delays. Even though this method can find the RF-sensitive spots, relief can then only be found in better shielding and filtering of input and output leads.

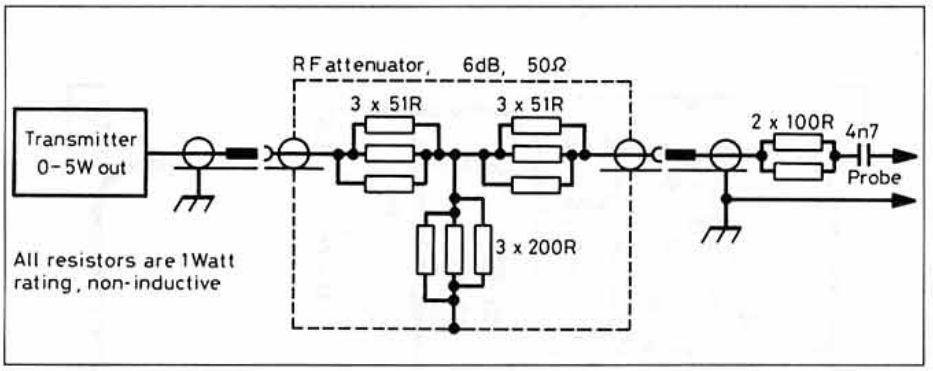


Fig 1: The test circuit to probe for RF-sensitive spots

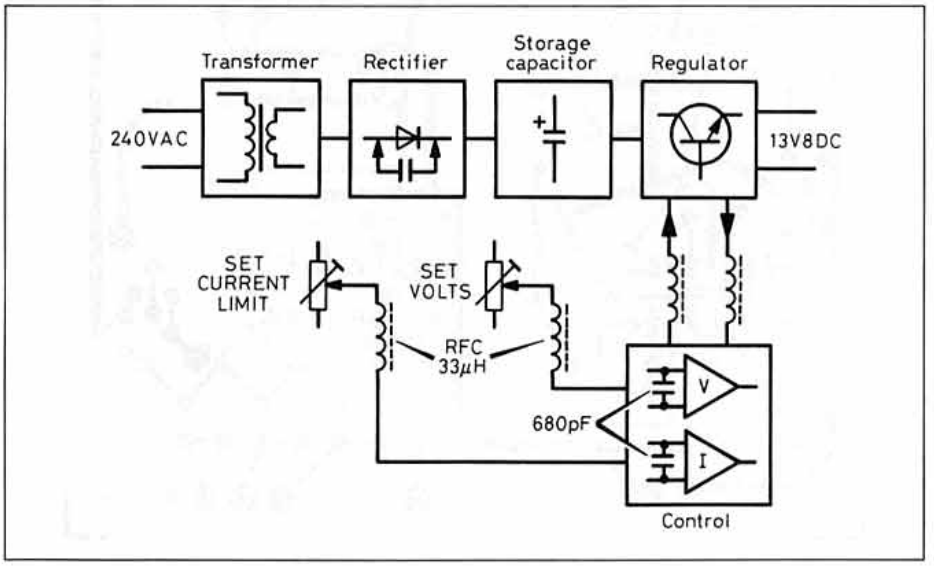


Fig 2: Block diagram of the power supply under test

RADCOM CONSTRUCTION FEATURE

A Novice CW Transmitter for 3.5MHz

by Steve Price, G4BWE

LAST MONTH, THE transmitter was described and block and circuit diagrams were given, now here's how to build it.Those who obtain the kit will only require a few basic tools in order to successfully complete this project:

- A soldering iron of between 15 and 25 Watt rating (no higher unless thermostatically controlled) having a bit diameter no greater than 1.5mm.
- A small pair of wire cutters.
- A flat bladed screwdriver, 4mm blade width is suitable.
- A junior hacksaw.
- A trimming tool for T1 (NB This is supplied with the kit).

The first job for those who have not purchased the kit will be the preparation of the printed circuit board. **Fig 3** shows the foil pattern for this.

Now proceed as follows:

1 Wind L1 and L2 using the 24SWG enamelled copper wire. Start by cutting the length supplied (1 metre) in half and then tightly wind 20 turns (avoid overlapping) onto one of the doughnut-shaped powdered iron toroids. Cut the tails of the winding to a length of approx 10mm and carefully scrape away the enamel (which serves as insulation) from the tails using wire cutters - this will make soldering easier later. Now prepare the other inductor but make sure that you wind it in the opposite direction.

2 **Fig 4** shows the printed circuit board component layout. Start by mounting some of the larger components - T1, RLA1 and the two IC sockets. T1 is enclosed in a tin-plated screening can which has two earthing tags. Solder these and the five pins which protrude from the underside of T1. The IC sockets are coloured black (NB do not insert IC1 and IC2 at this stage). RLA1 has a white rectangular casing with the manufacturer's name (Iskra) printed on the top.

3 The resistors are all mounted horizontally with their leads bent at right angles.

4 Next mount the electrolytic capacitors (C5, 9, 11 and 25). These components are polarized and must be positioned the correct way round. The four polystyrene capacitors (C19-22) are tubular in shape and have translucent plastic bodies through which can be seen the metal foil that forms their plates. They will either be marked InJ or 1000J (1000 meaning 1000pF which is the same as 1nF). C19-22 are mounted horizontally.

5 The polyester capacitors (C2, 3, 7, 8 and 18) are rectangular in shape and have metal end-plates to which their leads are spot welded - do not attempt to bend these leads as they can easily be broken off. The value and working voltage (the latter either 100 or 250) is marked but you may find that 100nF and 470nF are shown as µ1 and µ47 respectively.

6 The remaining ceramic capacitors are fairly easy to identify. They will probably be biscuit coloured although C14-17 may also be spotted at the top with either orange, red or black paint. The 1nF and 100nF values are normally shown as 102 and 104 respectively. You may have to bend the leads of the smaller ceramics outwards slightly prior to mounting.

7 Diodes D1-4 are the smallest components. They must be mounted the correct way round, as shown in Fig 4. Transistors TR1-3 have a flat face carrying their markings. Mount them with this face in the direction indicated by Fig 4.

8 RFC1 consists of a grey ferrite bobbin prewound with enamelled copper wire. The top surface of RFC1 will be marked with the type number 0084K. The quartz crystals are sealed into tin-plated cans and have their frequencies either printed or engraved on one side.

9 The link which connects pins 10 and 13 of IC1 to R7 is now inserted. This is made by cutting a short length (85-90mm) of insulated cable and baring each end with the wire cutters prior to soldering. Now mount L1 and L2 so that they are positioned as shown in Fig 4.

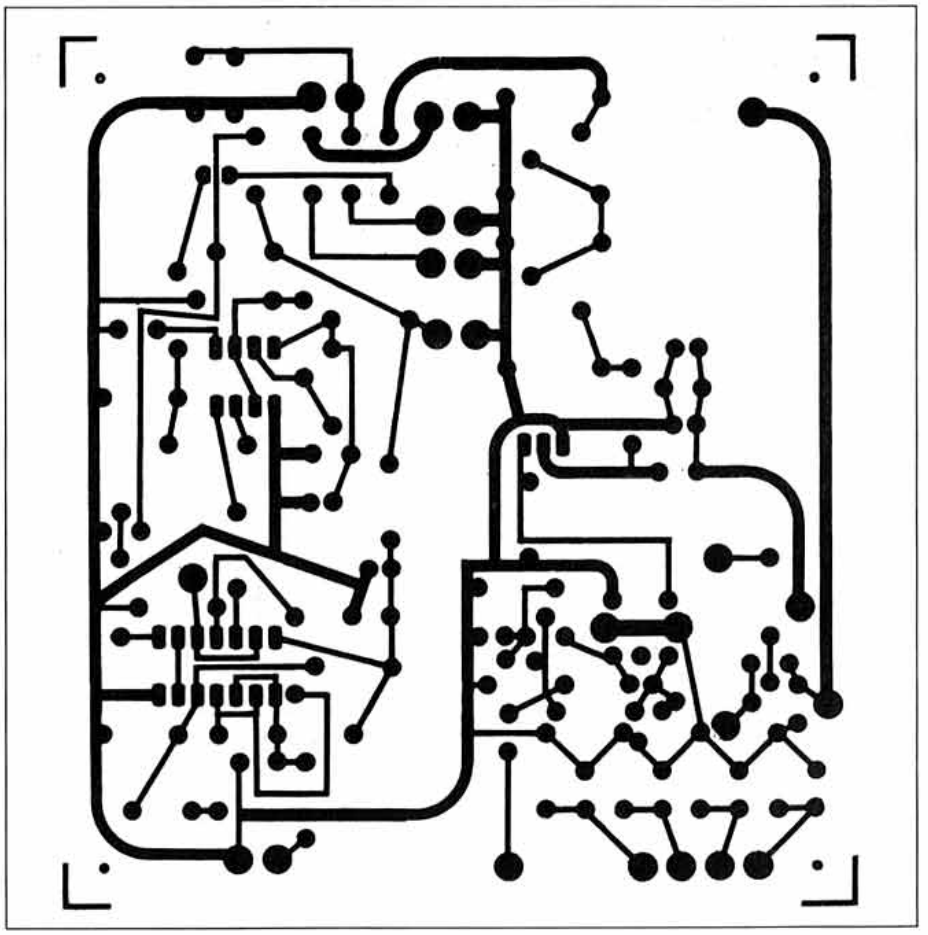


Fig 3: The PCB foil pattern – copper side shown.

10 The final component to be mounted is TR4. However, it is necessary to bolt the heatsink to TR4 first. **Fig 5(a)** illustrates how this is done. Note that the fins on one side of the heatsink (which is made of aluminium painted black) must be shortened by 7mm using a hacksaw - this prevents the heatsink, which will be live, touching the screening can of T1. Remember to apply some heat transfer compound to the rear surface of TR4's metal cooling tab before bolting it to the heatsink as shown. Once the heatsink has been attached, TR4 may be soldered in place.

11 The next job is to cut and solder the various flying leads. Fig 4 shows what is required, but you may also wish to take a look at the case in order to gauge the relative positions of the sockets and switches - this will give a better idea of how long each lead needs to be. Consider 'colour coding' the leads as appropriate - eg use cable with red insulation for the positive connections to SK3. It is preferable to make the leads slightly long at this stage as their far ends can always be trimmed before being soldered to the respective switch or socket. Also, remember that where two leads go to the same socket, they are best twisted together and this tends to make them shorter (the flying leads have not been shown twisted in Fig 4 for clarity).

12 The flying lead for SK1 (Antenna) is made from a length of miniature coaxial cable. Be careful when stripping the outer sheath from this as it is very easy to cut through the braid as well.

13 Final assembly involves soldering the far ends of the flying leads to their respective sockets and switches and then bolting the printed circuit board into the case using the four 6BA nuts and bolts - remember to use the spacing pillars here, otherwise the underside of the circuit board will short-circuit against the aluminium case. Other points to bear in mind are as follows:

- JK1 is mounted with its solder tags pointing upwards whereas JK2 and JK3 have their tags pointing downwards. Note the link joining two of the tags on JK3. A number of tags are left unconnected (ie those marked 'nc' in Fig 4).
- Only five of the tags on S1 are used. Those marked B, C and 5-12 are not connected (S1 is actually a 3 pole switch but only one pole is required in this design). Prior to soldering S1, cut its control spindle to length (approximately 9mm is suitable for the push-on knob supplied) using the hacksaw.
- SK3 has three solder tags. The two positive leads both go to the tag which protrudes from the rear of SK3. The negative lead is soldered to the tag which rests against the metal U-frame of the socket. The tag which is sandwiched between two layers of insulating material is not used.
- It will not be possible to solder the centre connections of SK1 and SK2 until after these sockets have been bolted in place. However, it is a good idea to solder the earthing tags prior to doing this, otherwise the case will conduct heat away from the earth tags and prevent them reaching a high enough temperature during the soldering operation.

14 IC1 and IC2 may now be inserted. Look for the notch in the encapsulation of these components and mount them in the direction indicated by Fig. 4. It may be necessary to bend the IC leads inwards slightly to match the spacing between the two lines of holes in the IC sockets. Integrated circuits can be damaged by static electricity (this applies particularly to IC1) so avoid wearing clothes that are known to generate static, such as nylon.

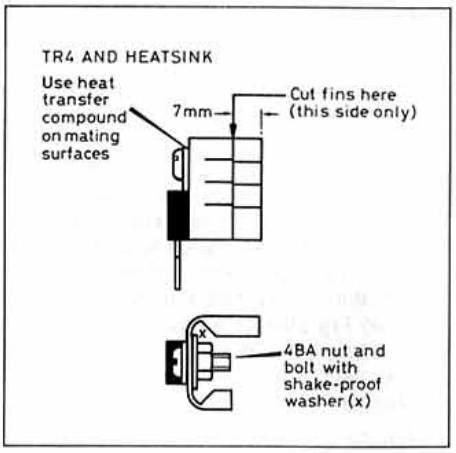
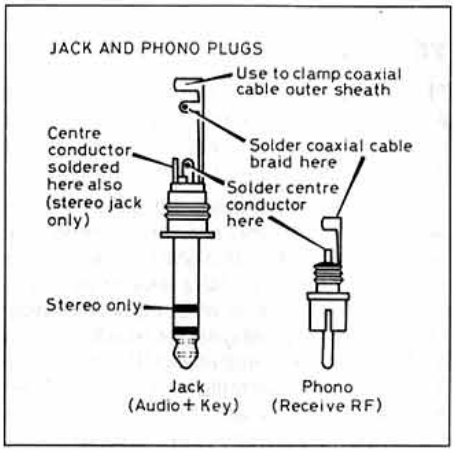


Fig 5(a): Bolt the heatsink to TR4 first.



5(b): Assembling the plugs.

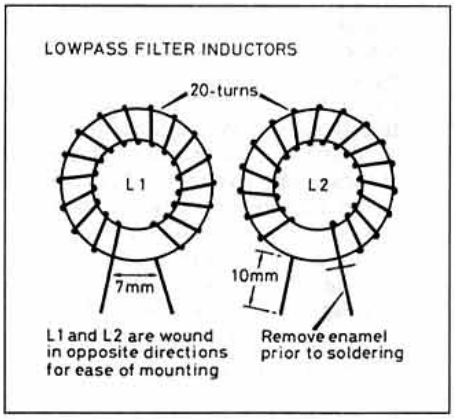


Fig 5(c): Winding details for L1 and L2.

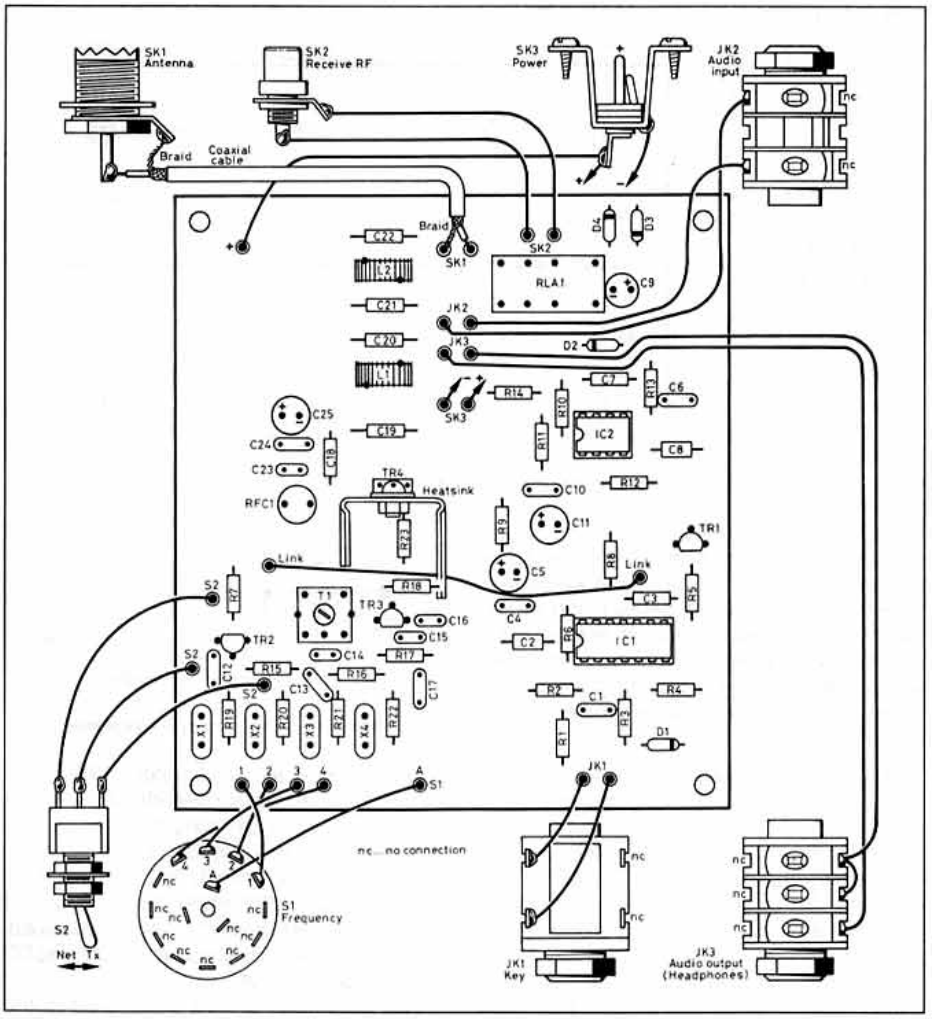


Fig 4: Component information and soldering.

15 Before the transmitter can be tested it will be necessary to make up a power lead using the plug provided with the kit ensuring, of course, that the positive lead is the one connected to the centre pin of the plug! Two coaxial patch leads are also required - one for receive RF, which has a phono plug at each end, and one for receiver audio which has a mono jack plug at one end and a stereo jack plug at the other. To make these, cut the remaining miniature coax in half and solder the plugs using **Fig 5(b)** as a guide. If you do not plan to use the RC14 + 3.5MHz converter you may, of course, need to use different plugs at the receiver end.

For constructors who have not obtained the kit, Fig 6 shows the case dimensions. The material is 18SWG aluminium.

TESTING

FIG 7 SHOWS THE LAYOUT OF the front and rear panels. S1 has four positions but remember that if you only have two crystals then settings three and four will be inactive.

The transmitter is designed to work with an antenna that presents a non-reactive load of approximately 50Ω at 3.5MHz. This means that we can employ a 50Ω resistor as a substitute for the antenna while tests are made. The advantage of using such a resistor (known as dummy load) is that all the RF power generated by the transmitter will be converted into heat, rather than being radiated as a signal. Using a dummy load therefore avoids causing interference to other stations.

As the transmitter has an output of just over 1W, our dummy load must be capable of dissipating this much power without over heating. Unfortunately, standard carbon film resistors of the type used in the transmitter are rated at only 0.25W. Larger carbon resistors rated at 1 or 2 Watts are available and one of these with a value of 47Ω could be used (NB avoid wire-wound types - these are not suitable for use at radio frequencies). Alternatively, a 50Ω 1.25W resistor can be made by connecting five 10Ω 0.25W carbon film resistors in series, but make sure that the resistors are soldered close together.

Fig 8 shows how the dummy load may be used in conjunction with a standard multimeter. The diode and capacitor (a disc ceramic type is suitable) convert the alternating RF voltage generated by the transmitter into DC so that the multimeter can give a sensible reading (more about this later). The diode and capacitor must be positioned close to the dummy load - you could mount all the components on a small piece of Veroboard. The dummy load must be coupled to the transmitter's antenna socket using coaxial cable. The length of the coax is unimportant and so it is possible to use the antenna feeder cable temporarily before this is attached to the dipole T-piece (see 'Antenna').

The dummy load has been described now because it is a good idea to couple this to the transmitter before first switching on the power supply and then leave it connected while all other tests are made.

Now plug one end of the phono patch lead into the transmitter's receive RF socket (SK2) and the other end into the 3.5MHz converter's antenna socket (the converter should, of course, be coupled to the RC14 for 3.5MHz reception using its own patch lead). The stereo jack plug of the audio patch lead is plugged into the RC14 headphone socket and the mono jack plug inserted into the transmitter's audio input socket (JK2). The headphones are now plugged into the audio output socket (JK3) on the transmitter's front panel. The Morse key must have a mono jack plug soldered to its lead (this is supplied with the kit) so that it can be plugged into the front panel key socket (JK1).

The transmitter, 3.5MHz converter and RC14 may now be connected to the power supply and the supply switched on. Using a multimeter with its negative test lead connected to ground (the case of the transmitter can be used for this), carefully check that 12V (assuming that this is the normal supply voltage) appears at the rear of the transmitter power socket (SK3). If all is well, set S2 to the net position, put the headphones on and listen for the receiver's background noise (remember that you are unlikely to hear any signals as we have a dummy load connected instead of the antenna).

Now press the key and check that the sidetone generator operates correctly. On releasing the key, the headphones should go dead for about 2 seconds and then the receiver background noise will return - this confirms that the changeover timer is functioning as intended. If there is no audio, take the headphones off and tap the key - you should be able to hear the changeover relay (RLA1) click once as you tap and then click again 2 seconds later. Minor faults can be detected using the multimeter - check, for instance, that the integrated circuits are both powered-up by measuring on their supply pins (pin 14 of IC1 and pin 8 of IC2). Also, measure the voltage on pins 1 and 3 of IC1 - there should be 12V when the key is up but hardly any voltage when the key is depressed. Finally, make absolutely sure that D1 and D2 are mounted the right way round!

The multimeter is now connected to the dummy load and rectifier circuit (Fig 8). Switch

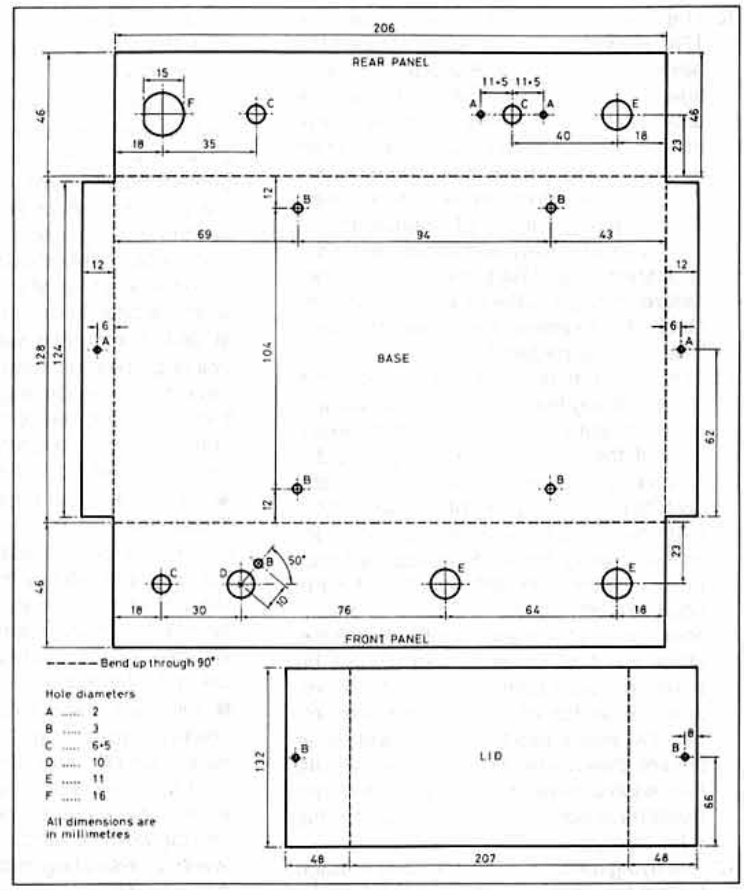


Fig 6: Dimensions of the aluminium case.

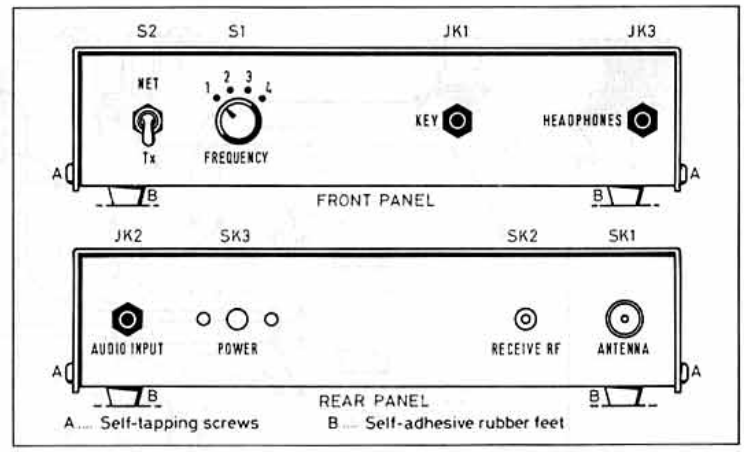


Fig 7: Front and rear panel layout.

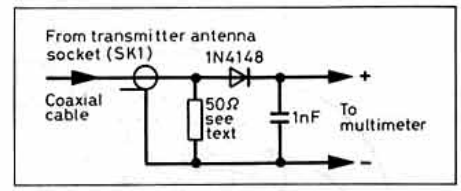


Fig 8: The dummy load and meter interface.

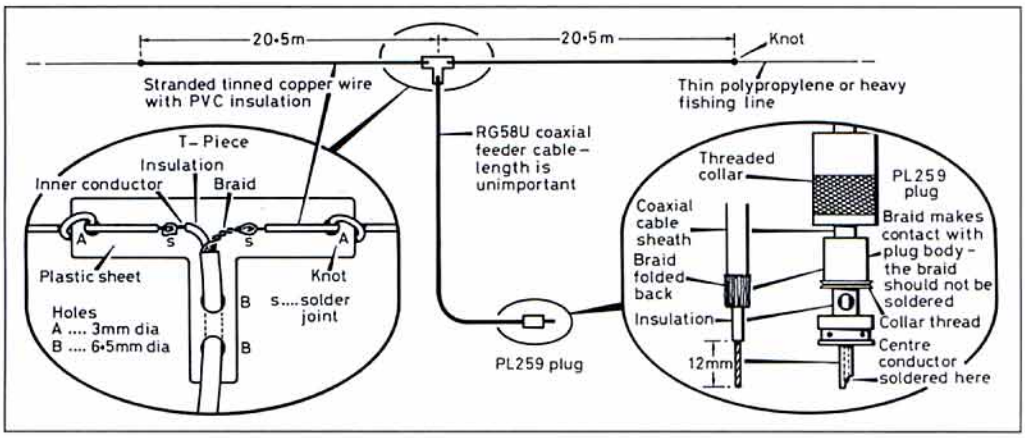


Fig 9: A centre-fed half-wave dipole for 3.5MHz. The T-piece may be covered with insulating tape to give protection from moisture.

S2 to Tx (transmit) and check that S1 is set so as to select a crystal. Depress the key and keep it held down (it may be easier to adjust the key so that its contacts short out - this will leave you with both hands free). There may or may not be a voltage reading at this point. Now adjust the core of T1 using the plastic trimming tool provided (the core is like a grub screw but is made of rather brittle ferrite material - so be gentle with it!). At a certain point, probably with the core positioned fairly low down into T1, a reading will be obtained (or will simply increase). The reading will peak at a certain point and this is the required setting. About 10 to 12V DC can be expected and this reading may be used to calculate the power output of the transmitter using the following formula (V is the reading obtained in Volts):

$$\frac{(V + 0.6)^2}{100} = \text{Power (W)}$$

As an example, let us assume that the reading is 9.4V

9.4 + 0.6 = 10
10 squared (ie 10 multiplied by 10) =100
100 divided by 100 = 1

So the output power is 1 Watt.

For those who are curious, we must add 0.6 to the reading in order to compensate for the unavoidable voltage drop across the diode. The reason for using the figure 100 in the calculation is a little more complex - but don't feel that you need to know everything at this stage! (For further reading, see our regular list of books available from the RSGB).

It should now be possible to key the transmitter as you would if sending Morse - check that when the key is up the output voltage drops to zero. This confirms that the carrier is being interrupted by the key. Finally, reduce the receiver's volume again and set S2 to the Net position. The crystal oscillator will now operate continuously. Tune the receiver until you hear a loud tone and check that the frequency is close to that of the selected crystal (if you are using a receiver with digital read-out it is possible to gauge this more accurately). The tone is rather loud and so it is a good idea to pull the headphones away from you ears while 'netting'. Later, when using the transmitter on the air, always attempt to tune the receiver so that the net tone is of the same pitch as the note produced by the sidetone generator. Those using the RC14 CW filter [3] will find that this pitch corresponds with the peak of the filter's response.

If you are using a superhet receiver with a control marked LSB/USB, but no CW position, simply select USB.

ANTENNA

THE SINGLE LENGTH OF WIRE which you may have been using as a receiving antenna is unlikely to be suitable for transmission. The Novice transmitter requires the use of a properly resonant (tuned) antenna - this means an antenna with dimensions that have been chosen to correspond with the wavelength of the signal. Furthermore, the transmitter must be coupled to the antenna in such a way that maximum power is transferred.

The wavelength (λ) of a 3.5MHz signal is approximately 80 metres (that's why 3.5MHz is often referred to as 'eighty'). This is a rather unwieldy length but, fortunately, a wire of one half-wavelength (40 metres) is also resonant at 3.5MHz. Conveniently, if we couple the transmitter to the centre of this antenna, which in practice involves cutting it into two quarter-wavelengths ($\lambda/4$), its impedance at resonance (3.5MHz) is fairly close to the desired 50 ohms. **Fig 9** shows the classic antenna which we have arrived at - the centre-fed half-wave dipole. It would be impractical to suspend the transmitter at the centre of the antenna, so a feeder cable (ie a cable used to feed power) connects the transmitter to the dipole' centre (the 'feedpoint'). The feeder should have an impedance approximately equal to that of the antenna and so 50Ω coaxial cable is the obvious choice. The length of the feeder is determined by the distance between the transmitter and the dipole feedpoint - the feeder, in this case, does not have to be a resonant length.

Notice that the centre of the coax is connected to one quarter-wave wire and the braid to the other. Do not worry if your garden is shorter than 41 metres, the ends of the dipole can be bent to fit without unduly reducing the antenna's performance. Although Fig 9 only shows insulating supports at each end of the dipole, it can in practice be supported at any number of points along its length (including the centre). When considering how best to site the antenna, it is worth bearing in mind that most power is radiated from near its feedpoint and so you should arrange for the centre to be as high above ground as possible (*WARNING* do not allow the antenna to pass close to any overhead power lines).

If you possess an SWR meter which is sensitive enough to give a full scale deflection for 1W of forward power, this can be used to check that the antenna is working properly. There is no need to be too fussy about the readings obtained, however, as an SWR of 1.5:1 or better is quite acceptable. If the reading is higher than 1.5:1, try adjusting the length of the antenna wires (with this in mind, you may wish to make the lengths slightly long initially so that they can be gradually cut until an acceptable SWR is obtained).

Finally, rest assured that the centre fed half-wave dipole will also work very well as a receiving antenna.

MODIFICATIONS

DEPENDING ON PERSONAL TASTE and the characteristics of your headphones etc; you may wish to consider the following modifications:

- The sidetone volume can be lowered by increasing the value of R13. Try 1kΩ for a moderate reduction or perhaps 2.2kΩ for greater attenuation.
- More experienced operators may prefer a shorter changeover delay. This can be achieved by reducing the value of R4. For instance, 2.2MΩ will give a delay of approximately one second.
- It has been noticed when using the transmitter in conjunction with the 3.5MHz converter that a temporary power rail short may occur when removing the converter's patch lead jack from its by-pass socket (this can therefore only happen if you have been listening on 14MHz). The problem is related to D3 which provides a current path to ground. Simply breaking the connection to the centre of SK2 (receive RF) and inserting a 10nF disc ceramic in series with the flying lead will cure this.

REFERENCES

3 'CW Filter for the RC14', *RadCom*, July 1989, pp42-44.

Kits and PCBs are also available from JAB Electronics and Badger Boards respectively – see page 20 for their addresses and telephone numbers.

RADCOM CONSTRUCTION FEATURE

A Simple HF Absorption Wavemeter

by E Chicken, MBE, BSc, MSc, CEng, FIEE, G3BIK

THERE IS A NEED for an absorption wavemeter in a licensed amateur's radio station. Its prime purpose is to check that the transmitter is radiating on the intended waveband, and that the transmission is free from spurious emissions such as harmonics of the carrier frequency.

It can also be very useful when tuning the frequency-multiplier stages of a transmitter or of a receiver's local oscillator, or for broadly checking the frequency coverage of a home-built oscillator. It can even be used as a relative field-strength indicator whilst experimenting with transmitting antennas.

What it cannot do is precisely measure the frequency of a transmitted signal. It will indicate the presence of a locally generated RF radiation, but can only approximate the frequency to within a band some kilohertz wide, eg the 3.5MHz or the 18MHz amateur band, or the harmonics of such emissions.

Basically, the absorption wavemeter consists of a parallel inductance/capacitance resonant circuit which is tunable, plus some form of indicator to show the presence of RF energy within the wavemeter's tuned circuit.

When located in the presence of a relatively strong electromagnetic field such as that from a transmitting antenna or the PA tank-circuit of a transmitter, the resonant circuit of the wavemeter absorbs a small amount of the radiated RF energy by electromagnetic induction into its coil.

As there is no built-in method of RF amplification, the indicator within the wavemeter must rely entirely upon the absorbed energy to power it. Possibly the simplest form of indicator would be the inclusion of a low-power torch bulb wired in series with the resonant LC circuit as shown in **Fig 1(a)**. Whilst that does work and should in principle satisfy the licensing authority, it is rather insensitive in practice, and hence would be of limited usefulness.

A more sensitive indicator is the moving-coil meter but it requires a DC electric current. Bearing in mind, however, that the RF energy absorbed by the wavemeter causes an oscillatory voltage to be developed across its tuned circuit, a simple diode detector can be used to convert that alternating RF voltage into a direct voltage, which in turn can be used to drive current through an indicating meter.

The voltage so produced will be very small in magnitude, hence the need for a sensitive moving-coil meter, ie one with microamps (μA) FSD (full-scale deflection).

Fortunately, physically small meters, often described as 'volume level' or 'battery level' indicators, can be purchased at very modest cost, and are typically rated at 100μA FSD. Such meters are ideal for use in a wavemeter which seeks only to give an indication rather than an absolute value of current or voltage, the meter scale being ignored.

The limited selectivity of a single tuned circuit is one reason why the RF tuning indication by the wavemeter is broadband. Further, the electrical loading effect of the detector/indicator can significantly worsen that selectivity. A bulb with its resistive filament is particularly likely to dampen the resonant circuit and hence broaden the tuning indication, so too would a diode detector if connected directly to the moving-coil meter.

One way to minimise the loading effect of the diode/meter on the tuned circuit would be to connect the diode detector to a tapping point some way down the coil rather than to the top of it, ie by not connecting it directly across the tuned circuit (**Fig 1(b)**). However, that would complicate the construction of what is otherwise a simple test instrument.

This minor design problem is overcome by including a low-value resistor in series with the meter, as shown in **Fig 1(c)**, to increase the impedance of the detector circuit. The resultant selectivity and simplification of construction more than compensate for the slight reduction in sensitivity.

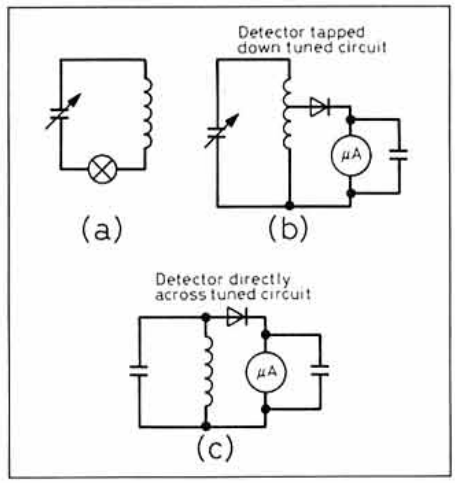


Fig 1: Evolution of the absorption wavemeter circuit.

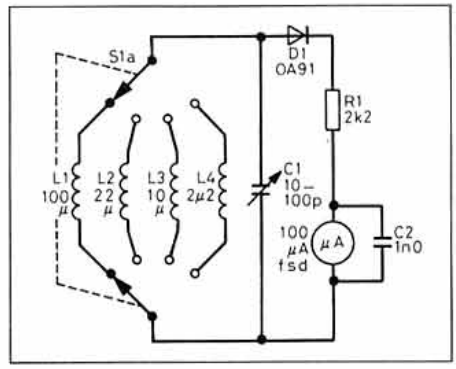


Fig 2: The simple but effective practical wavemeter.

Fig 2 shows the circuit of the HF wavemeter. The small-value capacitor across the meter terminals is theoretically intended to maximise the level of the DC voltage output from the diode rectifier/detector, and to some extent protect the meter from excess RF. It can be omitted without noticeable effect on sensitivity.

COILS

THESE CAN BE PURCHASED commercially or hand-wound as detailed later.

A convenient and low-cost range of encapsulated RF inductors, in the microhenry (μH) range and in a preferred series of fixed values, is available from a leading supplier of electronic components. Each consists of a coil wound on a ferrite-based former in polypropylene encapsulation, 11.4mm long by 5mm diameter, with axial lead terminations for ease of soldering into circuit.

Alternatively, coils may be hand-wound onto short lengths of readily available PVC water pipe or conduit, using enamelled copper wire. **Tables 1 and 2** give the details.

The frequency range for coils and capacitor of known values can be calculated quite simply by using the formula:

$$F\ (MHz) = \frac{159}{\sqrt{(LC)}}$$

where L is the inductance in μH and C is the capacitance in picofarads (pF).

A choice of 100pF or 150pF tuning capacitor would allow all HF bands to be covered. It would seem that all of the HF amateur bands 28-1.8MHz could be covered by omitting the 22μH coil and using only three of the above coils, but inclusion of this coil would in practice ensure that the bands were not at the extreme ends of the tuning scales.

CONSTRUCTION

HOME-PRODUCED COILS wound on 25 - 19mm dia PVC formers have close-wound single windings, with their wire ends secured by threading through two small close-spaced

holes drilled at each end of the coil former. 7.1mm coil formers come complete with soldering anchor-tags for the winding ends. Note that the inner ferrite core must be purchased separately.

The choice of a two-pole rotary switch allows the individual tuning coils to be mounted directly onto the switch for self-support.

If pre-moulded RF inductors are used as the tuning coils, they are small enough to be mounted onto a midget wafer or miniature rotary switch. The more substantial standard metric rotary wafer switch should be used to support the larger hand-wound coils.

The choice of a six-way switch allows for the possibility of extending the frequency-band coverage at no extra cost.

Coil tails should be kept as short as possible, preferably not exceeding 10mm, and the diode, resistor and wires should be self-supporting and reasonably rigid.

Fig 3 offers guidance for assembly of the wavemeter. Any form of metallic enclosure must be avoided. It is essential that the coils of the wavemeter must not be screened from the incoming RF electromagnetic waves. The simplest approach to construction would be the use of a low-cost plastic project box, with the tuning capacitor, range switch and meter mounted onto the detachable front panel.

For economy, a survey of the kitchen cupboard might well yield a suitable container. Indeed, the prototype was constructed in a clear plastic, Ferrero Rocher chocolate box of 145 x 70 x 70mm and it looked quite elegant!

Self-adhesive paper labels can be used for the tuning scale and range switch legends. Fig 3 shows a tuning scale with bands marked on it, but this should be taken only as guidance because each wavemeter will need to be individually calibrated.

PVC FORMER OF OUTSIDE DIAMETER 25mm

L (µH)	No of turns	Span (mm)	SWG
2.2	9	9	20
10	24	24	20
22	44	44	20
100	110	60	26

PVC FORMER OF OUTSIDE DIAMETER 20mm

2.2	10	10	20
2.2	9	5	26
10	32	32	20
10	24	12	26
22	63	62	20
22	41	21	26
100	134	70	26

PVC FORMER OF OUTSIDE DIAMETER 19mm

2.2	11	11	20
2.2	9	5	26
10	35	34	20
10	25	13	26
22	68	67	20
22	44	22	26
100	157	79	26

Table 1: Close-wound coil values

WAVEBAND CALIBRATION

A VERY CONVENIENT WAY to calibrate the tuning scale for the four ranges is to use the tuning-coils of a dip oscillator as the local source of radiated RF signal, as distinct from its usual resonance-dip application. The coil of the dip oscillator does actually radiate a signal strong enough to produce an indication on the wavemeter's indicator meter.

1. Switch the wavemeter to its lowest frequency range, ie 1.8 - 3.5MHz.
2. Select the appropriate frequency-range coil for the dip oscillator, switch it on and set its frequency to 1.8MHz, then bring the DO coil close to, and end to end with, the wavemeter's 100µH coil.
3. Rotate the tuning capacitor of the wavemeter until maximum deflection is obtained on its indicating meter, and write '1.8' on the inner ring of the wavemeter scale at that location.
4. Retune the DO to 3.5MHz and again rotate the wavemeter's tuning capacitor for maximum indication on the meter. Write '3.5' on the same inner ring of the wavemeter scale. Note that the tuning slug of a 7.1mm/100µH coil may have to be adjusted slightly to position the 1.8 and 3.5 scale points conveniently.
5. Switch to the next range on the wavemeter, and repeat the above procedure at frequences of 3.5, 7 and 10MHz with the DO coil in coupling proximity to the 22mH coil of the wavemeter.

   Repeat for the 7, 10, 14MHz range (10mH) coil, and then for the 14, 18, 21, 24, 28MHz range (2.2mH) coil.

An alternative source of calibration signal could be an HF signal generator with a single-turn loop of wire at the remote end of its output cable which is brought into close proximity with the end of the wavemeter's selected coil.

Ultimately, the radio station transmitter could be made to radiate a low-power signal on each of the amateur bands while the wavemeter is tuned for maximum indication on the appropriate range, and its tuning scale marked for each frequency band. When using the transmitter for this purpose, it would be good practice to use a dummy load if possible instead of the main antenna.

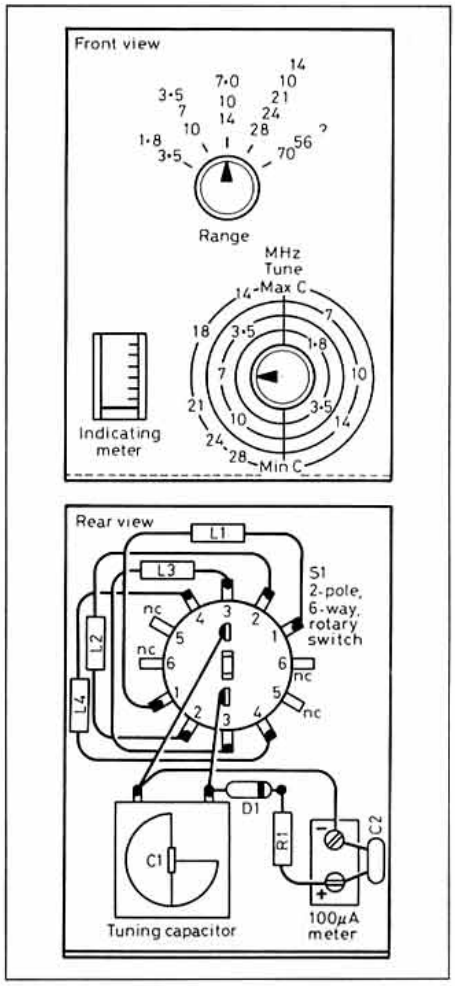


Fig 3: Suggested front panel and component layout.

Remember that the calibration marks now on the wavemeter tuning scale represent frequency bands, not precise frequencies.

Finally, for those who might wish to experiment with extending the frequency range upwards to VHF, the 50MHz band could certainly be embraced by including an additional self-supporting coil of 20SWG enamelled wire using 3 turns of 25mm ID, or 4 turns of 19 or 20mm ID, or 12 turns of 7.1mm ID.

COMPONENTS LIST

- R1 2k2 0.125W carbon
- C1 1000pF miniature ceramic 50V
- L1 100µH RS 228-179 or home-wound, see text
- L2 22µH RS 228-157 or home-wound, see text
- L3 10µH RS 228-141 or home-wound, see text
- L4 2.2µH RS 228-129 or home-wound, see text
- D1 Signal diode OA91 1N4148, or similar
- M1 Volume level or battery level meter, circa 100µA FSD
- S1 Rotary wafer switch 2-pole 6-way, midget, miniature or standard

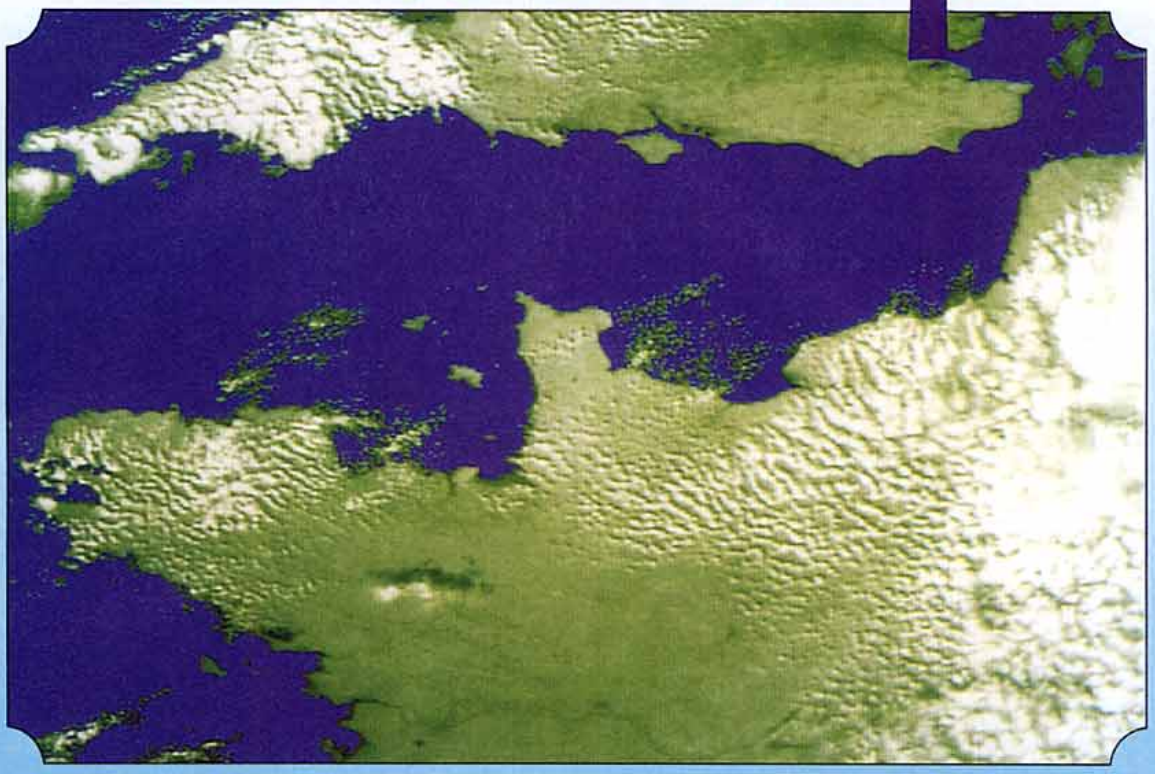
Electronics project box, plastic, approx 150 x 80 x 50mm

COMMERCIAL THREADED - INNER COIL FORMER OF 7.1mm OUTSIDE DIAMETER AND 28mm LONG

L (µH)	No of turns	Span (mm)	SWG
2.2	28	14	26 without ferrite core
10	60 in 2 layers each of 30t		26 without ferrite core
22	80 in 2 layers each of 40t		26 without ferrite core
100	80 in 2 layers each of 40t		26 *with core* ⅔ entered

Table 2: Close-wound coil values

Timestep



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OPERATING NEWS FROM THE WORLD ABOVE 1GHZ

SINCE THE LAST column was written, activity on many of the microwave bands appears to be picking up and quite a lot of significant activity has been reported, together with some excellent photographs. So this month, just to ring the changes, I'm going to concentrate mainly on some of the happenings during the latter half of 1991. It will also give me a bit of a 'breather' from all the detailed technical items of the past few months and get my thoughts together for a further push on the technical front!

A LITTLE PIECE OF 10GHZ HISTORY

I RECENTLY HAD A letter from Des Clift, ex-G3BAK, now VK5ZO. It was Des who started the 10GHz ball rolling in the UK in conjunction with G3LZ way back in 1949. This culminated in the first recorded 10GHz contact in January 1950, curiously enough hardly a dozen miles away from your writer's QTH. Des is still active on both the 5.7GHz and 10GHz bands and sent two photographs with his letter.

The 'enhanced Kodak Brownie photograph', shows his original mains-powered, klystron-based 10GHz transceiver installed on the flat roof of G3LZ's house (by the look of it, on a Services 'camp') at Glazebrook, near Warrington. The first UK contacts (of a few miles) with G3LZ portable, took place "across the Manchester Ship Canal" and, according to a three-part article by Des in the then *RSGB Bulletin*, used 70cm as talkback. This, in itself, was no mean feat at that time! The RSGB had, incidentally, already (1947) published its first 54-page microwave handbook, entitled *Microwave Technique*, costing two shillings (ten pence in today's terms). Thanks to Alan, G4BYP, I have acquired a copy of this publication for the Microwave Committee archive - it makes interesting reading, even today, 45 years later!

The other photograph shows the man himself. Des is particularly active at the moment on the 5.6GHz band, as evidenced by the car registration plates!

THAT CONTROVERSIAL MOVE AT 5.7GHZ!

THE FOLLOWING STATEMENT from the Microwave Manager, Charles Suckling, G3WDG, appeared in the October issue of the *Microwave Newsletter* and is of such importance that it is reproduced here. I quote verbatim and can do no better than echo Charlie's comments: "At the last meeting of the IARU Region 1 in Torremolinos, it was decided to move the narrowband segment to 5668-5670MHz in order to achieve common allocation throughout Region 1. Some resistance to this was aired in the *Microwave Newsletter* and some UK stations decided to follow the IARU recommendations while others did not. The present situation is that the IARU recommendation met with strong resistance in Germany and the Dutch also decided not to move! It should be pointed out that the delegates of both countries, and the UK, were all in favour of the move at the conference.

"It makes no sense for some countries to move and others not, so the RSGB Microwave Committee has decided to go with the majority and recommend that the UK stay on 5760MHz. I can only apologise for the trouble and expense incurred by some stations in following what turned out to be an unpopular recommendation. In future I can assure you that the UK will be very wary of agreeing to any further changes in recommended operating frequencies. My own view (*and that of the Committee - G3PFR*) now is that such changes must be discussed more fully before conferences take decisions. However, we might look upon this move as a *long term* aim . . . . keep those crystals!"

Why a long term aim? Quite simply that, in the Space allocation (which is world-wide), this choice of frequency may ultimately be preferred, as adjacency will allow the use of 'terrestrial' equipment for space, and vice versa. It seems to me to make a good deal of sense, in the long term, to go for such an arrangement, along with the possibility (no more than that, but WARC 1992 may tell) of Primary status. The same observations could well apply to other bands also. Think about it!

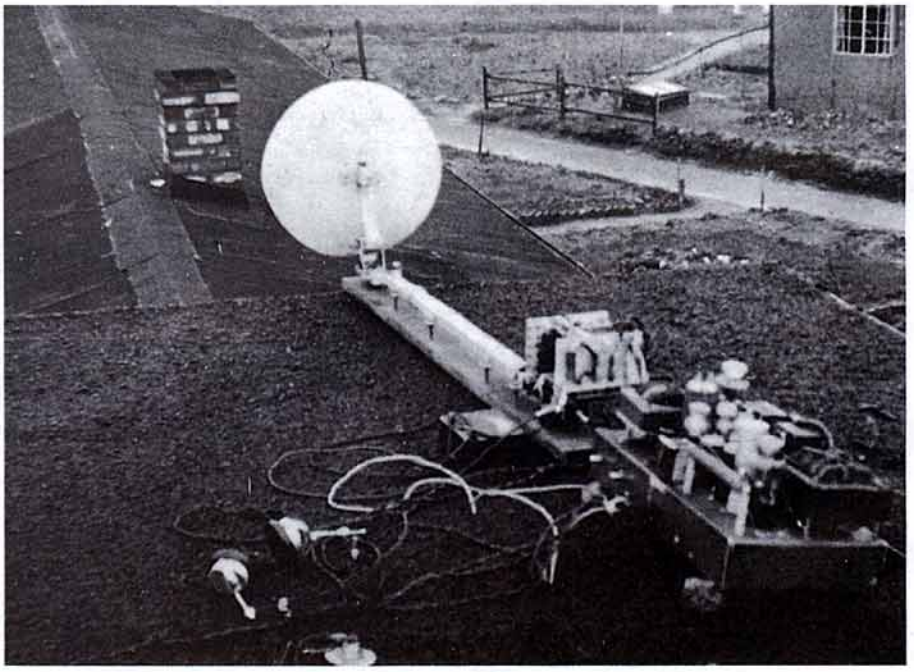
GB3TG AND GB3TV FULLY OPERATIONAL

SOME MONTHS AGO I mentioned the unique GB3TG/GB3TV ATV repeater project which was designed to provide a 10GHz 'gateway' from Great Brickhill, near Milton Keynes, into the existing 1.3GHz TV repeater GB3TV at Dunstable - and vice versa. I'm very pleased to be able to report that the project is now very much a feature of the ATV scene, largely due to the efforts of Dave McQue, G4NJU (RMG Special Project Co-ordinator), at the 10GHz end of the business.

Des Clift, VK5ZO, is particularly active on 5.6GHz, as his number plate shows.

GB3TV has, of course, been in operation for some long time, being the 'original' 1.3GHz TV repeater, as its callsign suggests. GB3TV has undergone a recent 'facelift' and whilst much of Graham G3VZV, original equipment is still in use, there is new equipment also, designed and built by G6JFN, G3LMX, G8IFF and G1YEB of the Dunstable Group. The power of the 1.3GHz unit has now been increased to the authorised limit of +14dBW.

Coming back to GB3TG, G4NJU, located some 4km away from the 10GHz device,



G3BAK - G3LZ, Damhead Hall, Glazebrook, near Warrington, 1950.

reckons to get better signals into GB3TV via GB3TG (using 10mW) than directly on 1.3GHz using 12W. The coverage of GB3TG has, generally, exceeded expectations, being well received some 25km away at Whittlebury in Northants. According to path profile studies, GB3TG should also be capable of linking into the proposed Northampton 1.3GHz and 10GHz TV repeater.

Could we have the makings of an embryonic TV 'network' here? Certainly this possibility (and the possibility of high-speed data links during periods when TV signals are not being passed) was recognised a long time ago by the Microwave Committee which recommended the 2.3 and 10GHz bands as the 'preferred' bands for point-to-point linking, cross band repeaters and similar experimental devices: unfortunately it has taken several years for the technology to become easily available at affordable prices! The G3WDG and G4DDK designs, often referred to in this column, should go a long way to furthering many of these objectives.

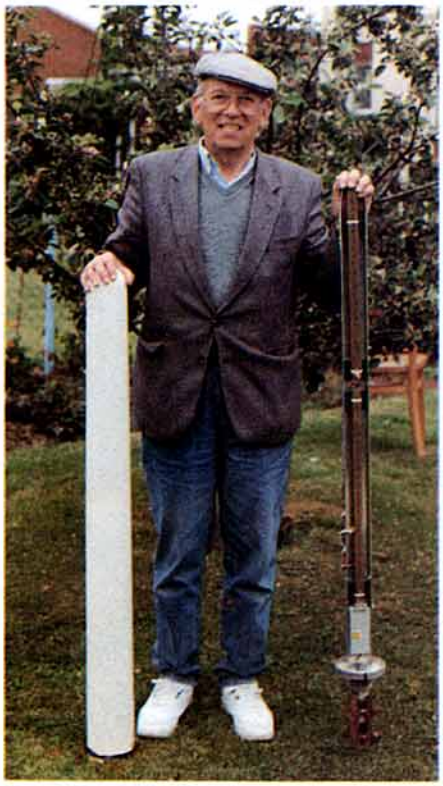
My thanks to the BATC journal *CQ-TV* for some of this information and to Dave, G4NJU, for the photograph of the nearly 'naked' GB3TG! Dave's right hand holds the weatherproof 'radome' which houses the equipment, whilst the device itself is in his left hand. What you see there is the antenna side of the repeater, consisting of two stacked slotted WG16 antennas, one for receive and one for transmit. There is, of course, a microcomputer program (by G8AGN) in Volume 1 of the *Microwave Handbook* to design such antennas, whilst in Volume 2 there is another program by G4KNZ which will design your iris-coupled cavity duplexing filters for you, although GB3TG does not rely on filters for T/R isolation. Antenna isolation and channel separation are sufficient without resort to filters. However, both these programs are recommended to anyone contemplating building any device of this sort.

Behind the structure supporting the antennas are the 10GHz modules comprising the receiver and transmitter of the repeater. The receiver consists of a 'tweaked' satellite TV LNB on 10.250GHz which Dave finds very sensitive and adequately stable, with a good noise figure. The Tx runs a Gunn oscillator on 10.150GHz into a 200mW PA. More of this at the next Sandown VHF Convention, together with a rundown on G3HBW's 47GHz exploits!

700KM+ FROM HOME ON 3.4 AND 10GHZ

ROGER BLAKEWELL, G4PMK, near Leeds, recently had a rather remarkable series of contacts from his home (fixed) station. In one evening he was able to contact DC9XG over a 702km path to claim both the 3.4GHz Distance Award (over 400km), and the 3.4GHz 5-Squares award (No 5). Hard on the heels of this came the same station worked on 10GHz, giving Roger the 10GHz Distance Award (over 150km - by a handsome margin!) No 106 and Horst, DC9XG, the 107th 10GHz Distance Award. Roger's 1.3GHz score also went up to enable him to claim 55 squares (No 6) on that band.

I can't immediately lay my hands on Roger's letter, but I recall that both Peter, G3PYB, and Keith, G6DER, were also involved in multi-band contacts with Horst. Conditions from a relatively small area of West Yorkshire to Germany must have been pretty remarkable that night.



Dave McQue, G4NJU, with the GB3TG repeater.

BEGINNER'S CORNER - MORE ON WAVEMETERS

SINCE THE LAST COLUMN, I had a long and informative letter from Bruce Carter, GW8AAG, (near Brecon) giving some most useful information on the Marconi Instruments' TF1026 series of wavemeters which I thought would be useful to pass on. You might want to keep your eyes open at rallies for such useful items which, as I mentioned before, occasionally appear at keen prices. The series is as follows:

TF	1026	125 - 250MHz
TF	1026/1	250 - 500MHz
TF	1026/2	500 - 1000MHz
TF	1026/3	1000 - 2000MHz
TF	1026/4	2000 - 4000MHz

All are housed in beautiful mahogany boxes, although Bruce mentioned that there seem to be some 'M' (military?) versions housed in grey steel cases with double steel doors. He is obviously interested in such devices, since he mentioned a number of other older, rather more obscure, items of ex-Services origin (mainly bearing W or TS numbers, W indicating Wavemeter in UK parlance and TS indicating Test Set in US terms) covering HF to UHF. Some of these contain valve detectors and amplifiers and 'magic eye' indicators - if you've forgotten what these are, or never knew, go and ask an 'old timer' who will almost certainly go into a rapture of reminiscence! Thanks, Bruce, for the information which is now on my 'archive' file.

TECHNICAL CORNER

THE LATEST SITUATION on the G3WDG 10GHz modules is as follows. Progress has been made since the last update with the two-stage general purpose amplifier (G3WDG-005) still being tested out by the 'proving panel'. Results are looking very promising and Charlie hopes to release this one any time now.

The next unit under development is a power amplifier to follow existing equipment having power outputs in the 50 - 100mW range, such as the G3WDG-001 and -003 units, and SSB Electronics gear. It was decided to concentrate efforts on this before a receive preamp since, for a similar development effort and cost of constructor's time, the PA offers 7-8dB system improvement compared to 1-2dB with a receive preamp. A source of power GaAs FETs has been located now, so serious development work is under way. The original 250mW prototypes have now been engineered and two final prototypes engineered by the designer. Both have given 250mW+ output and could not be improved by tuning, so the design appears, so far, to be reproducible. This criterion was, as previously mentioned, considered to be a very important feature of the whole design concept of the entire series of modules. The design is about to be put to the proving panel and, if all goes well, kits should be appearing in a few months' time.

On the kit supply front, there has been an unavoidable increase in price for the G3WDG-002 receive converter. This occurred as a result of a sharp increase in the cost of the mixer diode which was discovered when re-stocking.

The latest prices for both kits and components can, of course, be obtained from Petra Suckling, G4KGC, at 314A Newton Road, Rushden, Northants NN10 0SY.

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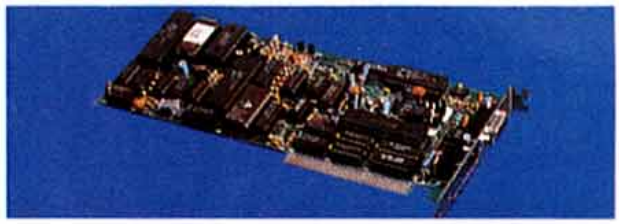

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RICK STERRY G4BLT
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West Yorkshire WF2 6JP

I FAILED TO CORRECT a slight mistake in the November 1991 column in time for printing. About one-third of the way down the centre column on page 58, the words "(or binary ANDing it with 20h)" should have read "(*or binary ORing it with 20h*)". Also, a spurious full stop appeared immediately after the 'GBR.EU' in my packet hierarchical address.

BARTG has a new membership secretary in the form of Peter Adams, G6LZB, 464 Whippendell Road, Watford, Herts, WD1 7PT, tel: 0923 220774. The retiring secretary, Ann Reynolds, G6ZTF, will still be a familiar sight on the BARTG stand at rallies.

HELL OUT THERE

THERE WAS A GOOD response to my appeal for information on the Hellschreiber; it still seems to have some active devotees in Germany, Holland, Norway and Sweden. The name literally means 'clear writer', but it's also a pun on the name of the inventor, Dr Rudolf Hell. He developed the idea in about 1931, but it really came into its own during and after the Second World War. Dr Hell is said to be aged 90 now, and living in Spain!

The Hellschreiber is a curious combination of RTTY, fax and dot-matrix printing; indeed, I wonder if it represents the earliest form of matrix printing? Unlike RTTY, the system can never print an incorrect character. If there is QRM, the figures become more blurred and indistinct, but the human eye and brain are very good at decoding the result. It's worth getting hold of a copy of the excellent article by Stan Cook, G5XB, 'Hellschreiber, what it is and how it works', published in the April 1981 *RadCom*. It makes fascinating reading. [A chapter in the *RSGB Teleprinter Handbook*, available from RSGB Sales, is devoted to the Hellschreiber - *Ed.*]

The original adaptation of Hell to computer was done on the Apple II machine, though I do not have a copy. However, thanks to Koos Fockens, PA0KDF, I now have Hell software for a variety of other machines; the Acorn Electron and Archimedes, (though not the BBC B and Master), Commodore 64/128, IBM PC and ZX Spectrum (cassette). I cannot copy the Commodore and Spectrum software, but I should have found someone who can by the time you read this. If you would like a copy, complete with some explanation, then please send me an appropriately formatted disk (or cassette for the ZX), noting the comments in the September 1991 column regarding postage etc. Please enclose an additional first class postage stamp or IRC to cover any photocopying costs etc.

There are actually two variants of Hell: the more common A1B unsynchronised Hell-feld described by G5XB, and the F1B synchronised Hell-GL system. Current Hell-feld activity is mostly on Sundays around 7035-7040kHz from 1230GMT and around 3575-3580kHz between 0900 and 1100GMT and from 1530GMT. (These activity periods are an hour later during British Summer Time.) Listeners have been known to confuse the signals with AMTOR on occasions.

9600 BAUD PACKET

I HAVE ALWAYS thought that 9600 baud packet in the UK was confined to dedicated links between nodes and mailboxes. However, Pesi Sorab, G3NDO @ GB7HJP, tells me that he and five other local amateurs in the Hampshire area regularly use 9600 packet with G3RUH modems. Pesi claims that they are not 'boffins', and that the necessary modifications to the rigs were carried out without difficulty. He says they manage to co-exist quite happily with 1200 baud traffic on 2m, though of course there is no dedicated frequency for high-speed packet on the band. He would like to see more high-speed activity, but regarding mail forwarding he comments wryly that rubbish is still rubbish no matter how fast you send it!

SYSOP-12 CONFERENCE

THE 12th NATIONAL Packet Radio SysOps' conference was held on Sunday 20 October in a very pleasant, but chilly, lecture theatre adjacent to the army Royal Signals museum at Blandford Forum in Dorset. This conference concentrated mainly on technical issues. I found it very interesting, though some of the more technically knowledgeable delegates did seem to me to be speaking in an obscure dialect of Martian! I've obviously got a lot to learn, hi.

During the coffee and meal breaks we were able to look at a couple of trade stands set up in another room, and to wander round the museum exhibits. If you are passing Blandford, I can thoroughly recommend a visit to the museum (see August 1990 *RadCom*).

Apart from being interesting, the conference was remarkable value for money. Congratulations to SUNPAC for their excellent organisation of the event. The next conference will be hosted by NWPUG in the Warrington area, probably this January. The one following that will be held during March or April in the Reading area, courtesy of the newly-formed Thames Valley Packet Group.

NOSVIEW

I HAVE YET TO tackle the subject of TCP/IP, but for those who are already familiar with it, there is a useful companion to the widely used KA9Q NOS (Network Operating System). Apparently, documentation for NOS is often incomplete, inaccurate or misleading. To overcome this, Ian Wade, G3NRW, (a previous *DataComms* columnist) has written a PD application called NOSVIEW. This is described as an 'on-line documentation package for NOS'. You can obtain further details from Ian by sending him an SASE to 7 Daubeney Close, Harlington, Dunstable, Bedfordshire, DU5 6NF. Enclose an IRC if sending from abroad.

Dick Rollema, PA0SE, with a working 1944 German army 'Feldfernschreiber' machine on loan from PA0AOB.

ANOTHER NEW MODE

I MENTIONED THE German PACTOR mode in the November column, but there is another new mode called CLOVER being developed in the USA. A series of articles about CLOVER was published by Ray Petit, W7GHM, in the American magazine *RTTY Journal*, and these are now being reprinted in the BARTG magazine *Datacom*. I understand that development has continued since the articles were written, though I have no specific information at the moment.

Like PACTOR, CLOVER has been developed primarily as a mode to achieve optimum performance on poor HF circuits. However, whereas PACTOR could be said to be a refinement of packet or AMTOR, CLOVER is claimed to be completely new in many respects. The objects of the exercise are to achieve very narrow bandwidth; to give much higher throughput rates than packet or AMTOR (especially on poor circuits); to correct transmission errors where possible (rather than merely detecting them and requesting a repeat); to avoid the unnecessary re-transmission of data; and finally to avoid data collisions.

There is an FEC broadcast mode, similar to AMTOR or 'unproto' packets, and an ARQ mode similar to that of AMTOR or 'connected' packet. The ARQ uses a combination of phase and amplitude modulation to produce five different modulation modes, designed to give optimum throughput under varying conditions from ideal to very poor. The two ends of the link maintain a dialogue to enable the most suitable mode to be used in any one transmitted block. This dialogue is phrased in a most amusing way in the articles!

The main problem in using CLOVER appears to be the fact that it demands very high standards of frequency accuracy and stability from the radios. It will be interesting to see how this novel mode develops.

PA0SE TYPED THIS ON A 1944 GERMAN ARMY HELLSCHREIBER

An example of Hellschreiber printout; note the fuzzy dot-matrix form of the characters.

Satellites

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

IT MIGHT NOT BE A bad idea to start the New Year with a resume of the operational amateur satellites which can be heard on a band for which most amateurs have equipment these days.

Clive Wallis, G3CWV, in *Oscar News* No 91, for October last gave a very comprehensive account of these satellites. With the editor's permission, I reproduce a summary of his article herewith. He writes:

The very first amateur radio satellites transmitted on two metres and almost every other amateur satellite has had either a downlink or an uplink on this band. The satellites which you should be able to hear are shown in the table below.

To find out when a satellite can be heard, there are three methods available to you. In order of cost and complexity:

1 Get the times directly from the 80m AMSAT net.

2 Use the OSCARLOCATOR and orbital calendar.

3 Use a computer.

For OSCARs 10 and 13, you won't need the OSCARLOCATOR, as the times are printed directly in the Orbital Calendar. A summary is also given every month in the *Oscar News* 'Month at a glance' page. On the day you wish to listen, look for the times at which the letter B occurs. This is when mode B is being transmitted.

OSCARs 10 and 13 are usually fairly weak signals, so you will need an efficient aerial and a sensitive receiver. The receiver should be set to SSB (upper sideband) or CW. Between the two frequencies given above you should be able to hear many different stations. At the bottom of the band there should be a beacon signal, OSCAR 10 has a steady carrier, OSCAR 13 is more complex. Most of the time the OSCAR 13 beacon is a gurgling/rasping sound, which is PSK (phase shift keying) telemetry. On the hour and half hour you should hear a Morse code bulletin. On the quarter hours there is an RTTY transmission. This is a rather more musical sounding signal than the PSK telemetry.

You will probably notice that the signals from OSCARs 10 and 13 are continually varying in signal strength. This is because the satellite is continually rotating about its axis in space.

OSCAR 11 (UOSAT-2) is a stronger signal, and is received with the receiver set to FM. You will hear a program of digital signals whose sound characteristics change approximately every minute, when the type of data being transmitted changes. Some of the sound patterns are repetitive.

OSCAR 17 (DOVE) is even stronger than OSCAR-11; the receiver should be set to FM. At the present time it transmits AX-25 packet, which sounds similar to the terrestrial packet mailbox signals which you can hear on 144.650MHz. Synthesized voice is expected soon.

OSCAR 21 (RS-14) is another strong signal. Morse code telemetry beacons can be heard on one of the frequencies in the table. Unfortunately the speed of sending is rather fast, so this will be a problem for many listeners. Since these last three satellites all use the same frequency, there are times when you may receive two or all three at the same time. When this occurs the digital signals are usually ruined, and you just have to try another time.

Lastly there is the **MIR** space station. This is another strong FM signal, mostly AX-25 packet, but some times voice.

There are of course the Microsats but these are far more specialised. As this column is intended to interest readers in amateur radio satellite communication, this summary should be a useful survey of those satellites which can be heard and used with VHF equipment readily obtainable or found in most amateur radio stations these days.

UKSEDS

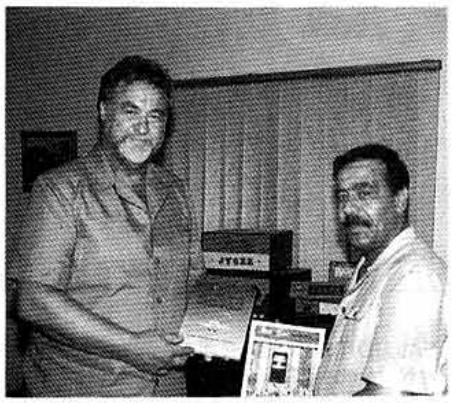
THIS STANDS FOR THE United Kingdom Students for the Exploration and Development of Space. It is a project of the Royal Aeronautical Society Space Education Trust.

They are currently developing a small amateur satellite designated ESPY, which it is hoped may be launched by the Russians in 1992/93. It will carry a single Space Science Experiment for use by radio amateurs and educational establishments. The objects of the project are to stimulate Amateur and Educational Space activity, to bring 'Space' to the attention of society and install an appreciation of its possible applications for the future.

A delegation from UKSEDS has recently returned from the USSR, where they signed an agreement of launch intent with the organisation VAKO Soyuz, which is also launching its own spacecraft in 1992.

RS 12 - IDEAL FOR THE BEGINNER

THE RECENTLY LAUNCHED Russian satellite RS 12 has been operating in Mode KT, that is with an uplink of 21.210 to 21.250MHz and a downlink of 29.410 to 29.450MHz. It has a beacon on 29.408MHz. This brings getting started on satellites well within the reach of any amateur who has a 'normal' amateur radio station. One of the deterrents to getting going on satellites has been the necessity of getting special equipment for the mode, ie transmitting/receiving equipment for the VHF/UHF frequencies. If you have not been involved in these bands the project can be a bit expensive and does need 'know-how' which you may not have acquired. So being able to use frequencies you may already have the equipment for makes the process very much easier. You will not need a rotatable antenna nor special VHF equipment.



Robin Bellerby, G3ZYE, presented a copy of the RSGB's *Space Radio Handbook* to JY5IM of the Royal Jordanian Radio Amateurs' Society on a recent visit. He also took with him several copies of July *RadCom* featuring Robin's trip to Jordan with the St Dunstans ARS.

Signals from RS 12 are excellent and are strong enough to be well received on a normal amateur bands receiver with a 10m band facility. Access to the satellite on 15m is easily accomplished with a transceiver with a 50W output into the usual antenna used with the transceiver. In the writer's case the transmitter is a Yaesu FT-707 transceiver with a trapped dipole 108ft long running N-S. The receiving antenna is a discone and an FT-726R receiver which gives excellent reception on 10m.

There is one snag which should be mentioned. When fifteen is open, as it usually is these days, the usual 15m operators will have their signals re-transmitted by the satellite into a 10m downlink - if they happen to be transmitting between 21.210 and 21.250MHz. So you'll hear these stations when looking for the RS 12's downlink, but don't mistake them for the satellite downlink signals! When calling on this frequency yourselves, it pays to distinguish your satellite activity by calling "RS 12" CQ or whatever. An interesting observation recently was to hear F9EA and an SP1 station in QSO via RS 12. Both were about S7. On listening on the 21MHz frequency the SP1 was heard 'direct'. Interesting to hear the same signal via two paths, one via the ionosphere; the other via the satellite. F9EA's signal was not audible on the 21MHz frequency - no doubt due to the distance between our respective QTHs.

OSCAR 10 and 13	145.810 - 145.970MHz	(SSB & CW)
OSCAR 11 (UoSAT-2)	145.825MHz	(AFSK data)
OSCAR 17 (DOVE)	145.825MHz	(AX-25 Packet)
OSCAR 21 (RS-14)	145.822, 145.948MHz	(CW telemetry)
MIR	145.550MHz	(AX-25 Packet)

Operational satellites audible on the two metre band

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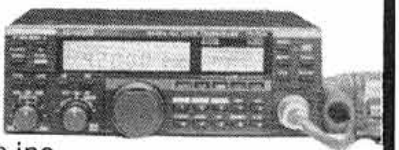

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TM-531E	415.00	IC-475E	1210.00
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CONTEST NEWS

All rules should be read in conjunction with the General Rules published in *Contest News* January 1992

HF RULES

GENERAL RULES FOR RSGB HF CONTESTS 1992

The General Rules for all RSGB HF Contests are given below. For each contest throughout the year, a short set of special rules will be published which must be read in conjunction with the General Rules.

The terms "UK" or "British Isles" shall be interpreted as: England, Scotland, Wales, Northern Ireland, Channel Islands and Isle of Man.

Please note that there are a number of important changes involving computer-logging.

1. Licensing: Entrants must operate in accordance with the terms of their licence.

2. Contacts:

(a) Only one contact per band may be claimed *with a specific operator or station*. It is not considered to be within the spirit of the contest to assist a particular competitor by making multiple QSOs (eg by the same operator using more than one location/callsign, or by a number of operators in the same shack), or by coming on to work only that one competitor. Although not presently HFCC policy, a number of overseas Societies already disallow automatically a contact with a station whose callsign appears in only one log (a *unique* contact).

(b) Duplicate contacts must be logged and clearly marked as such, without claim for points.

(c) Cross-band contacts may not be claimed for points. Where an overseas station is transmitting on the same band, but outside the UK frequency limits as specified by the licence or by the contest special rules, then a *split-frequency* contact may be made and claimed.

(d) Simultaneous transmissions on more than one frequency are not permitted.

(e) Pre-arranged contacts. Scheduled contacts arranged *before the start of the contest* may not be claimed for points. There is no objection, however, to the arranging of further contacts with the same station on other bands, provided it is done in contest time.

(f) Proof of Contact may be required. The HF Contests Committee reserves the right to approach any station for confirmation of contact, without reference to the entrant in whose log the contact appears.

3. Portable Stations: A portable station must operate from the same site for the duration of the contest and may not be located in any permanent building or shelter, nor may any such structure be used as an aerial support. (Trees are acceptable as supports.) Power for the station may not be drawn from from any public or private mains supply, but must be derived from a portable generator on the site, batteries or solar cells. No equipment or antennas may be erected on the site prior to 24 hours before the start of the event; equipment may be left in safe storage on site without time limit. A portable station may be located in a motor vehicle, or vessel on an inland waterway, provided that the station cannot be operated without alteration whilst in motion (otherwise it becomes a /M station!) and does not derive any of its power from the vehicle's (or vessel's) engine or electrical system.

4. Operators: Unless specifically stated, only single-operator entries will be accepted.

(a) A Single-operator station is one manned by an individual operator, who receives *NO ASSISTANCE WHATSOEVER* from any other person in operating, log-keeping, checking, etc. during the contest period. This restriction extends to the exclusion of the use of spotting nets, packet clusters, ring-round groups and so on for the finding of new multipliers etc.

(b) A Multi-operator station is one which does not conform to the definition of a Single-operator station given above. In those contests where Multi-operator entries are allowed, such entries will only be acceptable if

(i) The declaration is signed by one operator only, who will be regarded as the entrant.

(ii) Each contact or block of contacts in the log has the callsign of the operator concerned shown against it.

(iii) The names and callsigns of all the operators are listed on the summary sheet.

5. Eligible Entrants: Unless otherwise stated, only fully-paid-up members of RSGB resident in the British Isles may enter single-operator events, or operate in multi-operator contests. Entries from aeronautical or maritime mobile stations, or from stations using callsigns with special event or club prefixes (eg GB, GX etc.) will not be accepted unless specifically stated in the contest special rules. Amateurs elsewhere wishing to enter those events which are open to them are not subject to any such restrictions.

6. A Contact consists of an exchange *and acknowledgement* of callsigns and an RS or RST (as appropriate) report together with a serial number and/or other data as specified in the special rules for the event. Points may only be claimed for a COMPLETED CONTACT (ie if one end is unable to obtain a repeat when required, or loses contact, then the other end will lose the QSO credit also, as the contact cannot be regarded as complete). The full exchange must be sent to every station contacted. No points will be lost if the correct information cannot be obtained in return from a non-competitor provided that at least a report is received, but any additional information sent by the station must be logged.

7. Scoring:

(a) Details of the points scored per QSO and any bonus points or multiplier scheme will be given in each contest's special rules.

(b) Where Multipliers are specified the following will apply unless otherwise stated:-

(i) British Isles Stations score 1 multiplier for each country worked on each band. The DXCC Countries List will apply, except that JA, W, VE, VO, VK and ZL Call Areas (irrespective of prefix) will all be regarded as separate countries.

(ii) Overseas Stations score 1 multiplier for each British Isles County worked on each band.

(c) The Final Score is given by the total QSO points from all bands, either added to the sum of all the bonus points from all bands, or multiplied by the sum of the multipliers from all bands, as appropriate.

(d) For the purposes of scoring, aeronautical and maritime mobile stations will be regarded as being mobile stations in their country of origin, regardless of their actual location at the time of making contact.

8. Documentation:

(a) Log Sheets - Logs from British Isles entrants must be clearly written in ink or typed on RSGB HF Contest Log Sheets, or if these are unavailable, on one side only of International A4 size paper. Overseas entrants are invited to use the log sheets provided by their own National Societies.

(b) SEPARATE LOGS ARE REQUIRED FOR EACH BAND.

(c) Format: Each (non-pre-printed) Log Sheet should be headed with the following information: Name of Contest, Date, Band(MHz), Callsign of Station, Page X of N pages.

Each page should contain details of 40 QSOs, grouped in four blocks of ten, and tabulated in columns as below:

(1) Time GMT

(2) Callsign worked

(3) RS(T)/Serial Sent

(4) RS(T)/Serial Received

(5) Other Data (see special rules for event)

(6) Bonus points, or New Multiplier prefix, if any.

(7) QSO Points claimed

Any information required to be included in columns 5 will be detailed in the Contest special Rules.

(d) Computer-produced logs are welcomed provided they comply with the above format. Standard fan-fold paper (11" x 8.5") is perfectly acceptable. Please use a good ribbon, and NLQ if possible.

Computer Logs may now be submitted on disk . . . . please read carefully the following:

RSGB Standard for Contest Log Data on Computer Disk.

This standard is an extension of the format defined for the ARRL by Rich Assarabowski, K1CC, but is designed to be more 'general-purpose' and caters for all RSGB HF contests. This format is being introduced on an experimental basis and **comment is sought from UK contesters.** (Note that *CQ* Magazine has recently changed its rules so that paper logs are required to be submitted along with logs on disk. This is not RSGB policy at present but the HFCC reserves the right to call for paper logs (in the existing RSGB format) in addition to disk logs under certain circumstances, eg: Any disks which do not conform to the standard format defined below, or which cannot be read, will be returned to the originator with a request for a correctly formatted disk log or a paper log.)

(1) All files must be in standard ASCII format (ie No TABS or other control characters).

(2) All files must be on an MS-DOS formatted disk, 3.5 inch (720K or 1.44MB) or 5.25 inch (360K or 1.2MB). The lower-density formats are preferred at the present time, since they can be read by all drives. Logs must be submitted as a single contiguous file (in chronological order of contact) for each station, with the file extension ".LOG". Separate files for each band are **NOT** required. Where space permits, two identical copies should be written, with the second having the extension ".LG2". No other files should be put on the disk.

(3) The diskette label must clearly indicate the call used, contest name, section and date of the contest, and must indicate the density of the disk and the name of the log file(s).

(4) The log file must consist of one logical line of data per QSO, without headers, footers, page breaks or other non-ASCII characters. Each contact line **MUST** be terminated with a carriage return character.

(5) The QSO data defined below must appear in each line, except that a hyphen in any field, or a field which is all blanks (spaces) will be taken as indicating a data item *which is the same as in the previous contact*. Each field MUST be padded out to the correct length with blank characters and neighbouring fields must be separated by a blank character. Exact adherence to the start and finish columns given below is not mandatory but all data must be column-aligned within the specified field limits, eg: every callsign must start in the same character column and all must fit between character columns 22 and 36.

char 1-6	Date in YYMMDD format
8-11	Time in HHMM format
13-16	Band in MHz. (Embedded periods are allowed, eg: 1.8)
18-20	Mode (A1A, J3E, F3E etc).
22-36	Callsign (left aligned)
38-40	RS(T) sent
42-45	Serial number/Power/Zone/State sent
47-49	RS(T) received
51-54	Serial number/Power/Zone/State received
56-59	New Bonus/Multiplier (country prefix/county code etc)
61-64	Points
66-71	Operator/Station Callsign for multi-op events
73-128	Further contest specific data, e.g. postcode, county-code or QTH locator received. **THIS FIELD MUST BE TERMINATED BY <CR>.** Zero point QSOs such as Duplicates, unfinished contacts etc. must be explained here. This field may contain spaces but not tabs.

(6). The log data file name must consist of the callsign and the extension '.LOG', eg: G9XXX.LOG. Entries in contests where more than one callsign is used, eg: VHF Field Day, should contain all the entry's logs on one disk, as separate files.

(7) Standard abbreviations must be used, eg: RSGB three letter county codes, ITU Country prefixes, US Postal Service two-letter State abbreviations, ARRL sections, etc.

(8). A paper summary sheet is required to accompany all logs, either an official RSGB HF Contest summary sheet (form HFC2) or a close facsimile as defined in the General Rules.

(9) All diskettes become the property of the RSGB.

(e) Summary Sheet: Each entry must be accompanied by a Summary Sheet (form HFC2 or equivalent) detailing:

Name and Date of Contest, and Claimed Score.

Name, address and Callsign of entrant.

Name of Club or Group (if applicable).

Location of Station, if not as above.

County Code Letters, or other information sent.

Transmitter Power Output.

Details of Transmitter, Receiver and Aerials.

and the following Declaration, dated and signed by the entrant:

"I certify 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 shall be final in all cases of dispute. I have no objection to data from this log being entered into a computer for the purpose of contest adjudication."

(e) When a Multiplier scheme is specified, each band's log must be accompanied by a list of the multipliers claimed for that band.

(f) Checklists ('Dupe Sheets') : Entrants making more than 80 QSOs on any band are *REQUESTED* to include with the log a 'Dupe Sheet' . . . . a list of **ALL the callsigns** (not just the duplicates!!) worked on the band **sorted into alphabetical order** and with, ideally, either **the serial number sent or the time of contact** shown beside each callsign.

Whilst provision of a checklist for RSGB contests remains voluntary, entrants are reminded that a number of overseas contests now have a REQUIREMENT to produce one. An RSGB HF Contest Checklist sheet is available to assist entrants.

If a checklist is compiled in real time (ie during the event) it can be a valuable aid to avoiding unwanted and time-wasting duplicates. Its subsequent use to check the log after transcription and before submission should make unmarked duplicates a thing of the past. It can often aid the adjudicator in deciphering difficult writing, where points would otherwise have been lost. Further, as one can see at a glance whether or not a particular station appears in the log, not having to search through for each callsign can mean a reduction of the time taken to check a large entry from over an hour to a matter of a few minutes. This explains the popularity of the 'Dupe Sheet' with adjudicators, who are all UNPAID VOLUNTEERS. A half-an-hour's extra time from you can save the adjudicator a fortnight of evenings and weekends.

(g) Availability of Forms: Examples of Log-, Summary- and Check-sheets have been printed in various RSGB publications, and sample copies are available from Headquarters or contest adjudicators free of charge on receipt of a stamped, addressed envelope. All may be freely copied for personal use. Larger quantities may be purchased from HQ.

9. BINGO TABLES

(a) - Object: Entrants must note the Last Letter of Callsign (LLC) of stations with whom a completed contact is made during the primary contest. Suffixes and other qualifiers are ignored when determining the last letter, so LLC of G6LX/M is 'X'; of F/W2AZW is 'W'; of JY1 is 'Y' etc.

(b) - Eligible Entrants: BINGO TABLES are open only to UK entrants for the primary contest. *To qualify to enter the BINGO TABLE, entrants must contact a minimum of 26 stations, one with each possible LLC (A - Z).*

(c) - In addition to their normal entry for the contest, stations wishing to be considered for a BINGO TABLE must include a separate list of the log entries for the 26 callsigns concerned, in order of making contact. The entrant completing all 26 contacts in the shortest time will be adjudged the winner. In the event of a dead heat in respect of the timing of the last QSO, the time recorded by the station worked will be regarded as definitive and the HFCC reserves the right to seek this information from the station concerned, if not an entrant in the primary event. If the result is still tied, the station having the highest score in the primary contest will be adjudged the leader. **NB . . . . only ONE station may be nominated for each position in the BINGO TABLE** . . . . If the entrant makes an error in receiving the callsign of any of the stations for which credit is claimed, the entire entry fails!

10. Posting

(a) Unless otherwise stated, all entries must be postmarked not later than 15 days following the end of the contest. If acknowledgement of receipt is required a stamped, addressed postcard (or IRC) should be included with the log, and this will be signed by the recipient and returned to the sender.

(b) Entries must be sent to the following address:-

RSGB HF CONTESTS COMMITTEE c/o G3UFY, 77 Bensham Manor Road, Thornton Heath, Surrey, CR7 7AF, ENGLAND.

The name of the contest must be clearly shown on the OUTSIDE of the envelope.

Logs sent to the wrong address may not be forwarded in time, and may be excluded from the adjudication.

(c) Entries bearing insufficient postage or for which any payment is due will not be accepted.

(d) All entries become the property of the RSGB.

11. Penalties and Disqualification

(a) Errors in received information are penalized by deduction of points on a proportional basis: one-third off for one error, two-thirds for two and all points claimed for three or more errors.

(b) ANY ERROR in receiving a CALL-SIGN results in the loss of all points for that contact.

(c) Unmarked duplicate QSOs are penalized by the deduction of ten times the claimed points, in addition to the points claimed for the QSO, making a total of ELEVEN TIMES in all!

(d) Entries may be excluded from adjudication if

(1) They are posted late or are sent to the wrong address.

(2) Separate logs are not submitted for each band.

(3) The Summary sheet is not completed and signed.

(4) Logs are partly or wholly illegible, incorrectly formatted or do not contain all the required information.

(e) Entrants may be disqualified on any of the following counts:

(1) Failure to observe the Licence conditions.

(2) Frequent reports of poor-quality signals.

(3) The discovery of FIVE or more unmarked duplicate QSOs in the log.

(4) Persistent or deliberate failure to operate within the RULES AND SPIRIT of the contest.

(f) Minor contravention of the rules may result in the deduction of points as a penalty.

(g) In all cases of dispute, the decision of the Council of the RSGB shall be final.

12. Awards are made at the discretion of the Council of the RSGB and may consist of trophies, plaques or certificates. Certificates and plaques are despatched to winners after publication of the contest results. Trophies are normally presented at the HF Convention following the contest. Entrants should note that trophies will not be sent outside the British Isles and, with the exception of certain commemorative miniatures, remain the property of the RSGB. Full details of the awards for each event are published in the special rules.

GENERAL RULES FOR RSGB HF RECEIVING CONTESTS

The aim of this section is for entrants to log contest exchanges made by transmitting amateurs participating in an RSGB contest. Receiving contests will usually run in parallel with an RSGB transmitting event. The General Rules for transmitting contests apply except as detailed below:

1. Single-operator entries only will be accepted. Short-wave listeners or Amateurs holding licences to transmit on frequencies ONLY ABOVE 30MHz may enter RSGB receiving contests. British Isles (excluding Eire) entrants must be members of RSGB.

2. British Isles entrants should use RSGB HF RECEIVING Contest Log Sheets (available as for transmitting events) if possible. Failing this, log columns are to be tabulated as below:

(1) Time(GMT)

(2) Callsign of station heard

(3) Report and serial number sent by that station

(4) Callsign of station being worked

(5) Other Data (see special rules)

(6) Bonus points, or New Multiplier prefix, if any.

(7) Points claimed.

Any STATION HEARD may be claimed for points only once on each band. Any further claims for the same station will be penalised as for unmarked duplicate QSOs in the transmitting section. In certain contests (eg where British Isles stations may contact each other for points) it is permissible to log BOTH stations with a claim for points, provided both stations can be heard.

3. In the column headed "Callsign of station being worked" the same callsign may appear only once in any group of three consecutive contacts, except where the "Station Heard" counts as a new multiplier or bonus.

4. Summary Sheet: Entrants should use the RSGB SWL HF Contest Summary Sheet if possible. Failing this, the summary sheet should be made out as for a transmitting entry, but omitting references to transmitters and power and including in the wording of the declaration — "I do not hold a licence to transmit on frequencies below 30MHz."

5. Awards: Unless otherwise stated, certificates will normally be awarded to the leading three entrants in this section, unless there are fewer than five entries. Additional awards may be made at the discretion of the HFCC, or as detailed in the special rules.

UK COUNTY CODES FOR HF AND VHF CONTESTS

County	Code
Alderney	ALD
Co Antrim	ATM
Co Armagh	ARM
Avon	AVN
Bedfordshire	BFD
Berkshire	BRK
Borders	BDS
Buckinghamshire	BUX
Cambridgeshire	CBE
Central	CTR
Cheshire	CHS
Cleveland	CVE
Clwyd	CLD
Cornwall	CNL
Cumbria	CBA
Derbyshire	DYS
Devon	DVN
Dorset	DOR
Co Down	DWN
Dumfries & Galloway	DGL
Co Durham	DHM
Dyfed	DFD
Essex	ESX
Co Fermanagh	FMH
Fife	FFE
Mid Glamorgan	GNM
South Glamorgan	GNS
West Glamorgan	GNW
Gloucester	GLR
Grampian	GRN
Guernsey	GUR
Gwent	GWT
Gwynedd	GDD
Hampshire	HPH
Hereford & Worcester	HWR
Hertfordshire	HFD
Highlands	HLD
Humberside	HBS
Isle of Man	IOM
Isle of Wight	IOW
Jersey	JER
Kent	KNT
Lancashire	LNH
Leicestershire	LEC
Lincolnshire	LCN
Greater London	LDN
Co Londonderry	LDR
Lothian	LTH
Greater Manchester	MCH
Merseyside	MSY
Norfolk	NOR
Northamptonshire	NHM
Northumberland	NLD
Nottinghamshire	NOT
Orkney	ORK
Oxfordshire	OFE
Powys	PWS
Shropshire	SPE
Sark	SRK
Shetland	SLD
Somerset	SOM
Staffordshire	SFD
Strathclyde	SCD
Suffolk	SFK
Surrey	SRY
East Sussex	SXE
West Sussex	SXW
Tayside	TYS
Tyne & Wear	TWR
Co Tyrone	TYR
Warwickshire	WKS
Western Isles	WIL
West Midlands	WMD
Wiltshire	WLT
North Yorkshire	YSN
South Yorkshire	YSS
West Yorkshire	YSW

COMMONWEALTH CONTEST 1992 - RULES

1. General: The Commonwealth Contest is intended to promote contacts between stations in the British Commonwealth and Mandated Territories. Intending UK entrants are advised to study the General Rules for RSGB HF Contests, published in the January edition of *Radio Communication*, which apply to this event. *Overseas entrants especially are requested to note the new address to which logs must be sent.*

2. Eligible entrants: British Isles - Class A licence holders, who must be members of RSGB. **Overseas -** Licensed Radio Amateurs within the British Commonwealth or British Mandated Territories.

Single-operator entries only will be accepted and entrants may not receive any assistance whatsoever during the contest, including the use of spotting nets, packet clusters or other assistance in finding new bonuses. Entries will not be accepted from Headquarters stations, nor from stations using GB or other special event callsigns or operating maritime or aeronautical mobile.

3. When: 1200GMT Saturday 14 March 1992 to 1200GMT Sunday 15 March 1992.

4. Sections:

(a) Multi-band

(b) Single-band

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

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

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

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

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

9. Logs: Overseas entrants are welcome to use log sheets to the format specified by their national society. UK entrants are referred to the General Rules. **Separate logs and lists of bonuses claimed are required for each band.**

Duplicate contacts must be clearly marked and not claimed for points. Each unmarked duplicate contact found for which points have been claimed will result in the deduction of 55 points. Entries containing more than 5 such duplicates will be liable to disqualification. Entrants making more than 80 QSOs are requested to include a checklist 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.

Each entry must be accompanied by a cover sheet (HFC2 or equivalent) indicating the section entered and the scores claimed on each band (also don't forget details of equipment, your correspondence address and any interesting photographs for publication!).

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

11. Closing Date for Logs: Logs should be posted to ARRIVE before 19 April 1992. Overseas entrants are advised to forward their logs by Air Mail, as late entries may be treated as checklogs.

12. Awards:

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

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

RECEIVING CONTEST

Rules as for the transmitting contest except where specified below.

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

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

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

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

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

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

HF CONTESTS CALENDAR - 1992.

Jan 4	LF Cums 7MHz (Nov 91)
Jan 4/5	*ARRL RTTY Roundup*
Jan 5	LF Cums 3.5MHz (Nov 91)
Jan 6	LF Cums 1.8MHz (Nov 91)
Jan 11	LF Cums 3.5MHz
Jan 12	AFS (CW) (Nov 91)
Jan 14	LF Cums 1.8MHz
Jan 18	LF Cums 7MHz
Jan 18	AFS (SSB) - new event (Nov 91)
Jan 18/19	*HA DX CW*
Jan 19	LF Cums 3.5MHz
Jan 22	LF Cums 1.8MHz
Jan 25	LF Cums 3.5MHz
Jan 25/26	*CQ 160m DX*
Jan 25/26	*UBA CW*
Jan 25/26	*REF CW*
Jan 26	LF Cums 7MHz
Jan 30	LF Cums 1.8MHz
Feb 1	LF Cums 7MHz
Feb 1/2	LF SSB (Aug 91)
Feb 1/2	*YU DX CW*
Feb 2	LF Cums 3.5MHz
Feb 7	LF Cums 1.8MHz
Feb 8/9	1st 1.8MHz CW & Bingo(Dec 91)
Feb 15/16	*ARRL DX CW*
Feb 22/23	7MHz CW (Oct 91)
Feb 22/23	*CQWW 160 SSB*
Feb 22/23	*REF & UBA (SSB)*
Mar 7/8	*ARRL DX SSB*
Mar 14/15	Commonwealth (BERU) (Jan 92)
Mar 21/22	*Bermuda*
Mar 21/22	*BARTG Spring RTTY*
Mar 28/29	*CQ WPX SSB*
Mar 28/29	1.8MHz SSB

DON'T FORGET . . .
SSB AFS
SATURDAY 18 JAN 1992
RULES IN NOVEMBER RADCOM P75

COMMONWEALTH CONTEST 1991 CALL AREAS

The following call areas are recognised for the purpose of scoring in the Commonwealth Contest 1992:

A2	Botswana
A3	Kingdom of Tonga
AP	Pakistan
C2	Nauru
C5	Gambia
C6	Bahamas
G,GB,GD,GI, GJ,GM,GU,GW	United Kingdom (all one area)
H4	Solomon Is.
J3	Grenada
J6	St. Lucia
J7	Dominica
J8	St. Vincent
P2	Papua New Guinea
S7	Seychelles
T2	Tuvalu
T30	W Kiribati
T31	C Kiribati
T32	E Kiribati
V2	Antigua, Barbuda
V3	Belize
V8	Brunei
VE1	Maritime Provinces
VE1	Sable Is.
VE1	St Paul Is.
VE2	Quebec
VE3	Ontario
VE4	Manitoba
VE5	Saskatchewan
VE6	Alberta
VE7	British Columbia
VE8	North West Territories
VK1	Australian Capital Territory
VK2	New South Wales
VK3	Victoria
VK4	Queensland
VK5	South Australia
VK6	Western Australia
VK7	Tasmania
VK8	Northern Territories
VK9L	Lord Howe Is.
VK9M	Mellish Reef
VK9N	Norfolk Is.
VK9X	Christmas Is.
VK9Y	Cocos (Keeling) Is.
VK9Z	Willis Is.
VK0	Heard Is.
VK0	Macquarie Is.
VK0	Antarctica
VO1	Newfoundland
VO2	Labrador
VP2E	Anguilla
VP2K	St. Kitts, Nevis
VP2M	Montserrat
VP2V	British Virgin Is.
VP5	Turks & Caicos
VP8	Falkland Is.
VP8	S Georgia
VP8	S Sandwich Is.
VP8	S Shetland Is.
VP8	Antarctica
VP9	Bermuda
VQ9	Chagos
VR6	Pitcairn Is.
VS6	Hong Kong
YY1	Yukon
VU	India
VU7	Laccadives
VU7	Andaman & Nicobar Is.
YJ	Vanuatu
Z2	Zimbabwe
ZB2	Gibraltar
ZC4	Cyprus (Sovereign Bases)
ZD7	St. Helena
ZD8	Ascension Is.
ZD9	Tristan da Cunha, Gough Is
ZF	Cayman Is.
ZK1	Cook Is.
ZK1	Manihiki
ZK2	Niue
ZK2	Tokelau
ZL0	New Zealand
ZL1	New Zealand
ZL2	New Zealand
ZL3	New Zealand
ZL4	New Zealand
ZL5	Antarctica
ZL7	Chatham Is.
ZL8	Kermadec Is.
ZL9	Auckland & Campbell Is.
3B8	Mauritius
3B9	Rodriguez Is.
3D2	Fiji
3D6	Swaziland
4S	Sri Lanka
5B4	Cyprus
5H	Tanzania
5N	Nigeria
5W	Western Samoa
5X	Uganda
5Z	Kenya
6Y	Jamaica
7P	Lesotho
7Q	Malawi
8P	Barbados
8Q	Maldives
8R	Guyana
9G	Ghana
9H	Malta
9J	Zambia
9L	Sierra Leone
9M2	W Malaysia
9M6/9M8	E Malaysia
9V	Singapore
9Y	Trinidad & Tobago
GB5CC	**RSGB HQ Station + Various other Commonwealth HQ Stations.**

HF RESULTS

COMMONWEALTH CONTEST 1991

The 1991 Commonwealth Contest was, as always, a close-run battle, but this year saw a very welcome change at the top with both first and second places going to 'new' entrants. Jeff Morris, 9H1EL, made excellent use of his three monoband yagis and LF verticals to take overall first place, collecting the leading band scores on 20m and 10m in the process. Andy Chadwick, ZD8VJ, operating in only his second Commonwealth Contest, (with a more modest 3-ele tribander and doublet at 25 feet, but an eminently collectable callsign) pushed hard throughout, but in the end fell short by the narrowest of margins. Positions amongst the leading VE, VK and G stations show the now familiar pattern, winners being Lee Sawyer, VE7CC, Kevin Smith, VK6LW, and Al Slater, G3FXB, (back home to reclaim the Colonel Thomas Rose Bowl from G4BUO!). In the Single-band category, the most remarkable result was achieved by Peter Hobbs, G3LET, who was the only monoband entrant to win his band outright. The one-and-only entry in the Receiving section was a fine effort from the now sadly departed 'Brad' Bradbury, BRS1066 . . . . the Committee was saddened to hear of Brad's death, especially as he was unaware of his latest win.

For the second time the Commonwealth Contest was fought under extremely difficult conditions of interference due to clashing with another CW contest run by the Japanese *5-9 Magazine* which has 'camped' on the Commonwealth date established more than fifty years. This made it all the harder for the Commonwealth DX with exotic callsigns and the high scores in the table are a tribute to the remarkable endurance of those brave souls who battled on through the QRM. Seriously though, this clash of dates is proving to be a real problem. The RSGB has made a number of representations directly to the magazine, and also via IARU and JARL, for the event to be moved to a recognised IARU 'slot', but so far with no good result. Both Societies are continuing the lobby, and we can only suggest that all participants write directly to the editor of the magazine and to the IARU Region 3 Chairman to demonstrate the strength of feeling concerning this.

All Amateurs throughout the Commonwealth are cordially invited (and heartily encouraged) to enter the next RSGB Commonwealth Contest, to be held on 14 - 15 March 1992. Here's hoping for a bumper entry next year!

G4IFB

Comments received with Logs - *Almost everyone included comments with the log; the following are a representative selection:*

"Operated the contest with the Col Thomas Rose Bowl sitting above the rig . . . . but it didn't bring enough bonuses to beat 'FXB." (G4BUO); "A freak blow on the Friday broke the boom of the quad." (G3FXB) *[And STILL he prevailed!!]*; "Thanks to the many fine operators who copied my four-Watt signal." (VE2KN); "Had to pause for a couple of half-hour periods to let my ancient 807s cool down." (G3VDL) *[John used a 1956 home-brew TX and a 1959 Eddystone RX . . . . anyone beat that?]*; "BERU is definitely not a contest to use log sheets pre-printed with '599'." (G3WRR); "Must endeavour to get up earlier next year!" (G3GLL); "Lots of Gs, few VKs." (VK8HA); "Where was 6Y5HN?" (VK4XW); "Never raised so many VKs on 20m so easily . . . . can't remember the last time I worked a VU!" (G3JKY); "40m score would have been better if I hadn't spent an hour transmitting into my noise-bridge!" (G3HAL); "No time for a proper entry this year - condx very poor on 40m during the night." (G3LET) *[and this from the band-winner!!!]*; "Thanks again for another smashing weekend . . . . not just a contest but a chance to exchange greetings with old friends." (VK6AJ); "Had a ball - worked a lot of old friends." (P29PL); "Pleased to exchange dits and dahs with old friends around the Commonwealth." (VK5AGX); "Used the only TX I have, with its 2.7 Watts output." (VK8CW); "Great contest - VK audible throughout." (BRS1066); "Back to Earth with a bump this year." (G3XWK) *[ex C56/G3XWK!!]*; "My First over 9J station on CW, and on two bands at that!" (VK3BXA) *[only Eric's second entry!]*; "1104 - power cut ends contest!" (9J2BO); "7-hour power blackout and TX fault . . . . definitely not my day!" (ZL2TX); "Maybe I'm too far South." (VK7RY); "P29PL and A22GH made it all worthwhile." (G3NAN); "It may not be a winning entry but I sure worked some good DX!" (G3ZGC); "My First BERU from 'down-under' . . . . maybe a beam next year!" (VK2BJ) *[ex-G3PEK]*; "My first contest entry and I thoroughly enjoyed it." (VK2ETM); "My first competition . . . . great value and excellent conditions!" (VK8KV); "If only condx had been like they were a week later!" (VK3ZC); "My first single-op 'test - enjoyed it very much." (VK6BB); "First attempt at contesting for many years - very enjoyable, despite working night shift." (ZL2BCH).

TRANSMITTING SECTION

Posn		Call	80m	40m	20m	15m	10m	Total
1	*	9H1EL	462	723	2201	1763	1717	6866
2	*	ZD8VJ	195	1015	2130	1735	1690	6765
3	*	VE7CC	230	1165	2075	2144	1075	6689
4	*	VE3EJ	450	1115	2065	1855	1010	6495
5	*	VK6LW	645	875	2140	1315	1164	6139
6	*	VK2APK	545	810	1820	1435	625	5235
7		VK2BJ	500	730	1820	1170	935	5155
8	*	G3FXB	270	1030	1565	1530	660	5055
9		G4BUO	335	860	1505	1460	755	4915
10		G3MXJ	380	805	1430	1330	650	4595
11	*	VK4XA	325	515	1820	1005	865	4530
12		VE7UZ	94	730	1165	1315	900	4204
13	*	9J2BO	0	360	1215	1445	1100	4120
14	*	ZL1AIZ	605	750	1165	1315	585	3905
15	*	VK5GZ	410	390	1595	700	420	3515
16		VK5BN	405	600	1015	815	610	3445
17		G3TBK	128	250	1359	1195	500	3432
18	*	P29PL	175	405	745	680	1090	3095
19	*	VE6BF	0	0	1570	1213	306	3089
20		G2QT	175	490	1060	790	530	3045
21	*	VK3ZC	535	685	770	605	400	2995
22		VE3ST	75	432	1287	867	280	2941
23		G3GLL	175	175	960	1065	555	2930
24		VE3JKZ	203	411	1231	769	257	2871
25		ZL1HV	325	633	870	571	323	2722
26	*	VK8HA	0	350	1120	830	400	2700
27		G3OXC	75	275	1065	905	375	2695
28	*	5Z4FN	0	250	655	795	965	2665
29		VK3MJ	0	325	1035	835	450	2645
30	*	A22GH	50	360	740	670	760	2580
31		G3JJG	75	340	1075	885	200	2575
32		VK2DID	355	545	990	410	250	2550
33		VK4XW	300	480	825	575	250	2430
34		GM3CIX	125	305	1055	645	275	2405
35		GW4XXF	150	235	870	580	475	2310
36		VK6BB	304	384	760	530	295	2273
37		G3NKS	125	365	660	715	400	2265
38		G3WGV	100	300	704	702	450	2256
39		G3ESF	50	340	745	615	475	2225
40		G3MPB	175	330	925	480	300	2210
41		G3EFS	150	310	875	620	250	2205
42		G5MY	50	200	910	660	375	2195
43		G3GC	100	230	865	690	300	2185
44	*M	ZB2EO				2125		2125
45		VK2ETM	50	250	945	575	300	2120
46		VK3DNC	0	375	890	620	225	2110
47	*	VE2KN	100	325	985	540	125	2075
48		G3SWH	50	250	825	580	350	2055
49		G3VW	25	125	910	645	275	1980
50		G2HLU	50	200	795	515	400	1960
51	=	G3HKO	100	180	790	655	225	1950
		G3PJT	0	0	375	1070	505	1950
53		G3OLU	50	100	875	730	175	1930
54	*M	VK5AGX			1880			1880
55		VK8KV	0	0	582	721	483	1786
56		GW3JI	74	310	650	435	300	1770
57	=	VK6HQ	0	125	880	300	445	1750
		G3VDL	100	225	705	495	225	1750
59	*M	G4BVH			1735			1735
60		G0LZL	100	225	560	555	275	1715
61	M	VK6AJ			1695			1695
62	=	VK4OD	225	200	630	630	0	1685
		G4CZB	150	175	520	640	200	1685
64		VA3XN	160	375	618	529	0	1682
65		VK3AOR	275	0	1095	150	110	1630
66		VK3BXA	0	325	815	125	275	1540
67		VK6RU	0	300	590	185	435	1510
68		G3JKY	0	50	770	515	150	1485
69	*M	G3DYY				1466		1466
70	*	VK7FN	200	200	625	350	50	1425
71	*M	YU4OO/5B4			1395			1395
72		G2BLA	50	175	515	325	325	1390
73		G3BPM	25	150	735	300	150	1360
74		G3HAL	100	125	450	440	175	1290
75	M	VK5ZN			1275			1275
76		GM4SID	100	75	595	325	175	1270
77	*M	VU2PTT			1240			1240
78		G3NAN	0	75	325	590	225	1215
79		VK7RY	305	250	650	0	0	1205
80	*M	G3LET		1190				1190
81	=*	ZL2TX	0	25	1010	150	0	1185
		G3GMS	0	200	450	510	25	1185
83	*	VO1CA	165	355	245	410	0	1175
84	M	VK4TT			1170			1170
85		GM3SEP	125	150	550	125	150	1100
86		VK6RZ	125	425	445	100	0	1095
87		G4ZME	0	50	505	305	180	1040
88	=	G2VJ	25	150	685	50	100	1010
		G3KSH	25	75	325	435	150	1010
90	M	VO7AW				980		980
91	M	ZL1BSG				975		975
92	*	VE1EP	125	150	390	230	75	970
93		G3TEV	0	0	400	390	175	965
94		VK2AIC	0	0	330	385	225	940
95	M	G4IQM				885		885
96		VK3IT	400	100	355	25	0	880
97	M	VK7RO		865				865
98		ZL2BCH	0	0	300	355	175	830
99		G3CSR	0	25	400	225	175	825
100		VE3GCE	0	175	494	155	0	824
101		G3WRR	0	0	335	380	75	790
102	=	G8OZ	0	150	350	225	50	775
		G4ZIB	0	25	300	325	125	775
104	*M	Z23JO					750	750
105		VU2UR	0	0	0	260	485	745
106	M	G3ICH				715		715
107		VK7GB	25	71	262	213	70	641
108	M	VE3HX					635	635
109	=	G3ZGC	0	25	225	275	100	625
		G0HSD	0	150	275	100	100	625
111	M	VK8CW			615			615
112	*M	G0AEV					610	610
113		VE2AYY	0	65	210	280	50	605
114		G4FAM	50	0	150	175	225	600
115	M	G4ZOB		595				595
116		VK3XF	275	275	0	0	0	550
117	M	VK3JI/2			485			485
118	M	VE1ALJ			425			425
119		VK5HO	200	175	25	0	0	400
120	M	G3VYI		330				330
121	M	G3CQR/P				320		320
122	=*M	VK3XB		250				250
		G3ILO	0	25	50	0	175	250
124	*M	G0JNZ	205					205
125		G4OTY	0	75	0	0	125	200
126	M	VK3KS		175				175

RECEIVING SECTION

1	*	BRS1066	150	355	940	500	50	1995

* Award Winner
M Monoband entry

Checklogs received with thanks from: VK3WIA *(HQ - ops VK3VR & VK3VT)*, P29CAS *(HQ - op P29PL)*, GM3UM, ZL3GQ, G3LIK, GI5TK, GW3SB, G3WP, VK4CJB, G3OZF & GB5CC *(HQ - ops GW8GT Red Dragons)*.

SINGLE-BAND WINNERS

	80m	40m	20m	15m	10m
UK	G0JNZ	G3LET	G4BVH	G3DYY	G0AEV
OTHER	—	VK3XB	VK5AGX	ZB2EO	Z23JO

Commonwealth areas active during the contest (total 45): A22, A35, G (+GW, GM, GI, GD, GJ), GB(HQ), P29, P29(HQ), T31, V31, VE1/2/3/4/5/6/7, VK1/2/3/4/5/6/7/8, VK3(HQ), VO7(VO1), VP2, VP5, VQ9, VS, VU, Z2, ZB2, ZC4, ZD8, ZL1/2/3, 3B9, 4S7, 5B4, 5N0, 5Z4, 6Y5, 9H & 9J.

VHF RULES

VHF/UHF GENERAL RULES

The rules governing all RSGB VHF/UHF/SHF Contests held in 1992 (and thereafter unless changed) will include the following general rules.

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

The individual contest rules contain most of the detailed information on the sections, scoring systems and methods of tabulation. Please note that all points claimed for a contact will be lost by both stations if either station logs callsigns incorrectly, including any suffix. The receiving station will also lose all claimed points for a contact where other information is logged incorrectly. Ten times the claimed points will be lost for unmarked duplicate contacts. The committee reserves the right to inspect as per Rule 24 as and when felt necessary.

1. Entries

All entries must be sent to the contest adjudicator at the address shown in the individual contest rules. Entries sent to other addresses will be treated as check logs only. All entries become the property of the RSGB and cannot be returned.Recorded delivery or registered post shall not be used, and such entries may be disqualified.

2. Last posting date

All entries must be postmarked not later than 16 days after the end of the contest or last cumulative activity period, or as specified in the rules for individual contests or as modified by VHFCC. (See VHF/UHF Contest Rules for 1992, as published in Radcom).

3. Cover sheets

All entries must be accompanied by a correctly completed current RSGB VHF/UHF contest cover sheet (Form 427-86 or later) for each band used, including full details of antennas and final amplifier devices. In multiband events entrants must also complete a multiband sheet (Form 4422). In contest using a county/country multiplier scheme, a multiplier check list must also be included (see Rule 14).

4. Operators

All operators must be RSGB members.

5. Single-Operator fixed stations

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

6. Fixed stations

To be eligible to enter a fixed station section the station must be located at the main station address as shown on the license validation document.

7. Locations

In multiband events all stations forming one entry must operate from one site, defined as a circle of 1km radius. Entrants may not change the location of their stations during the contest.

For VHF Field Day only, no operation (except the normal tests undertaken immediately prior to start of contest), allowed in the 24 hours prior to contest start time. Equipment must only be set up within the 24h period prior to the contest start time. This includes tents, caravans on site, masts, towers, antennas, or anything else that is to be used in the contest.

8. Valid contacts

No points will be lost if a non-competing station contacted by an entrant is unable to supply an IARU Locator, serial number or any other letter code group that may be required, but the receiving operator must obtain and record enough information to be able to calculate the claimed distance score. Contacts with stations whose callsigns appear on the cover sheet will not count for points, or multipliers. Only one scoring contact may be made with a given station on each band in use during the contest, ie any callsign regardless of suffix or prefix may only be worked for points once. Any non-scoring contacts must be clearly marked in the log. Unmarked duplicate contacts will be penalised at the rate of ten times the claimed score for that contact. In cumulative contests one contact may be made with a given station (as defined above) during each activity period.

9. Radial ring scoring

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

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

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

10. Final Tabulation of multiband and cumulative contests

The final tabulation showing the overall results will be formed by taking the sum of the normalised scores on each band or from the three best sessions in a cumulative contest, or as decided in the rules for the individual contest as published in Radcom.The normalised scores will be calculated by dividing each station's points score by that of the band/session leader and multiplying by 1000, ie

Normalised score for each band/session =

Score achieved
x 1,000
Band/session leader score

11. Awards

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

12. Crossband contacts

Crossband contacts do not count for points, except where separately notified in the rules of individual contests.

13. Log keeping

The logs for contest entries must be made out on current RSGB VHF/UHF log sheets or, if computer listings are to be submitted, these must be cut to A4 size, RSGB log format, line spaced to contain 25 contacts per sheet, and be correctly collated (not Z fold). Each sheet must be headed with the entrant's callsign, IARU locator, contest title and sheet number, (the top of any computer generated log sheet must duplicate a standard RSGB VHF log sheet). Logs must be tabulated as follows.

(i) Date/time (GMT)
(ii) Callsign of station worked
(iii) My report on his/her signal and serial number
(iv) His/her report on my signal and serial number
(v) IARU Locator received
(vi) QTH or county received (when required) or comments
(vii) Points claimed Radial ring, Kilometres or both. The contest exchange must consist of both callsigns, RS or RST report followed by serial number, and IARU locator. Where QTH information must be exchanged it must be given as a point identifiable on an Ordnance Survey route planning map or equivalent (scale 1:625,000) or as a distance and direction not greater than 25km from such a point. Any complaints received or made about signals must be recorded in the comments column. Gross errors in logging can lead to disqualification.

14. County/country multipliers

a) In contests using a county/country multiplier scheme the contest exchange will include the full county name or the code letters shown in the operating guide. Your county must be shown on each log sheet.
b) Each new county or country worked is a multiplier and must be clearly identified on the log. Note this includes your own county and country, and that a contact with a station in another G prefix area can count for both a county and a country multiplier (eg GD Isle of Man). Where more than one station is worked in a particular Scottish region additional multipliers can be claimed for each contact, up to a maximum of three multipliers for each region.
c) The score obtained under rule 9 is multiplied by the total number of multipliers worked to provide the claimed score.
d) A separate multiplier check list must be included showing as a minimum the counties and countries worked in alphabetical order together with the callsign and serial number of the first claimed contact for each multiplier. If other contacts are to be considered as alternative multipliers, should the first contact be disallowed for any reason, then please include callsigns and serial numbers for subsequent contacts with each county or country.

15. Serial numbers

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

16. Power Limits

The DTI licence limits must be strictly adhered to. In an RSGB contest (sponsored or controlled by VHFCC) where the contest power limit is lower than the DTI licence limit then this limit, (as described in the rules for the contest in question) must also be strictly adhered to. If upon inspection a station is found to be running ILLEGAL power, or above the contest power limit, the station will be DISQUALIFIED, ALL operators of that station will be liable to a BAN on entering ALL VHFCC sponsored or controlled contest for a period of up to TWO years.

17. Antennas

The same antenna system must be used on transmit and receive, at all times.

18. Sub bands

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

19. Poor signals

Stations which persistently radiate poor-quality signals, or otherwise contravene the code of practice for VHF/UHF/SHF contest operation are liable to DISQUALIFICATION or loss of points.

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

21. Proof of contact

Proof of contact may be required.

22. Inspection

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

23. Appeal

The ruling of the Council of the RSGB shall be final in all cases of dispute, but must be decided in conjunction with the rules and spirit of the contest.

24. Site registration

Site registration may be required at VHFCCs discretion.

25. Foreign entries

Foreign amateurs are allowed to enter RSGB contests but will be placed in a separate section, thus allowing them to compare their entries with those of UK entrants. Winners and runners up certificates will be issued as appropriate. SWL's are also encouraged to enter and a certificate will be issued to the leading foreign SWL and to the runner-up if appropriate.

26. Special calls

Entries from stations using special event calls such as GB GX GS or any other special club prefix will not be allowed. Normal club callsigns can of course be used eg G4ZDA is OK, GX4ZDA is not.

GENERAL RULES FOR RSGB LISTENERS VHF/UHF CONTESTS

1. The 1992 general rules for VHF/UHF contests will apply except where modified by these rules.

2. Listeners contests are open to all non-licensed members of the RSGB, and to foreign SWL's. Only the entrant may operate the receiving station.

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

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

The Hansen Trophy will be awarded to the entrant with the highest aggregate score in all SWL contests between March and 10 September inclusive of each year. The aggregate score will calculated in accordance with General Rule 10.

CODE OF PRACTICE

VHF/UHF Contest Operation

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

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

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

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

5. If at all possible, critically test both receiver and transmitter for these undesirable characteristics, preferably by air test with a near neighbour before the contest. In the case of transmitters, aim to keep all in-amateur band spurious radiation, including noise modulation, to a level of -100dB relative to the wanted signal. Similarly, every effort should be made to ensure that the receiver has an adequate dynamic range.

6. Above all, be gentlemanly at all times. Be helpful and inform stations apparently radiating unwanted signals at troublesome levels - having first checked your own receiver! Try the effect of turning the antenna or inserting attenuators in the feedline; if the level of spurious signal changes relative to the wanted signal, then non-linear effects are occurring at the receiver. Some recent synthesized equipment has excessive local oscillator phase noise, which will manifest itself as an apparent splatter on strong signals, even if there is no overloading of the receiver front end. Pre-amplifiers should always be switched out to avoid overload problems when checking transmissions. If you receive a complaint, perform tests to check for receiver overload, and try reducing drive levels and switching out linear amplifiers to determine a cure. Monitor your own signal 'off-air' if possible. Remember that many 'linears' may not be linear at high power levels under field conditions with poorly regulated power supplies. The effects of overdriving will be more severe if speech processing is used, so pay particular attention to drive level adjustment. If asked to close down by a Government official or the site owner, do so at once without objectionable behaviour.

432 MHZ FIXED/AFS/SWL

2 Feb

NOTE: 0900 – 1500GMT

General Rules apply.

The contest is open to individual entrants (who must be RSGB members), or teams made up of a number of operators who must all be members of the same affiliated society (but do not have to be RSGB members themselves). All members of a team must operate from within 50km of the normal meeting place of the society. No station may represent more than one society. No operator is allowed to use more than one callsign during the contest. In the case of national societies each team must define a separate meeting place and each team member must operate within 5km of that designated meeting place. Multiple teams are encouraged from both national and local societies. The best three scores of each team will be used to form the entry, all team members' logs must be included as the "best" results may be downgraded if logging errors occur eg the 4th placed member may well have higher points after adjudication, than those notionally above.

Sections: Single operator fixed

Multi operator fixed

Listeners

AFS team

Please include RSGB Zone letter on each entry.

Each team entry must also include a signed declaration that each operator is a fully paid up member of the entering affiliated society. The address of the meeting place is also required as is a summary of team members, callsigns and respective scores.

Awards: Certificates will be awarded to the following:

Leading single operator in each RSGB Zone

Leading multi operator station in each RSGB Zone.

Leading AFS in each RSGB zone.

Leading SWL

Adjudicator: G4OUT, I Cornes, 6 Haywood Heights, Little Haywood, Stafford, ST18 0UR

VHF RESULTS

MARCH 1991 70 MHZ FIXED CONTEST

The general comment regarding this contest was that activity was very low. The number of entries supports this view, with only one more than last year when the rules didn't even make it into *RadCom*! In fact, there were more stations active than this level of entries may suggest, and there were several stations who, if they had taken the short time needed to write up their QSOs, would not have been at the bottom of the table!. It only takes a few minutes for a contest like this, so why not send an entry in next time - you can always have a position certificate for your efforts! Many thanks to G3UAX/M for his 200 mW check-log, and as usual congratulations and certificates go to the winners and runners-up in all sections. ***G4PIQ***

SINGLE OPERATOR SECTION

Pos	Callsign	Score	QSOs	Loc	Pwr	Ant	DX Call	km
1	G3UKV	246	45	82RR	100	5Y	GM4ZUK/P	467
2	G4FOH	164	33	83QC	25	5Y	G8MFV	318
3	G0EHV	105	16	94FW	50	3Y	G4SSD	522
4	G3BPM	71	11	80OW	50	4Y	G4KUX	410

MULTI OPERATOR SECTION

Pos	Callsign	Score	QSOs	Loc	Pwr	Ant	DX Call	km
1	G4KUX	575	60	94BO	150	2 x 8Y	G3YJX	496
2	G4SSD	336	43	80FJ	25	6Y	G0EHV	523
3	G3WSC	241	36	91VC	150	6Y	G0EHV	435

SWL SECTION

Pos	Callsign	Score	QSOs	Loc	Pwr	Ant	DX Call	km
1	BRS 52543	59	11	83LT		HB9CV	G3RSI	325

70MHZ TROPHY CONTEST SEPT 1991.

Entries are low, but this seems to be the same for all contests. Is it that groups or individuals believe that they do not have a chance of winning, so they do not even bother to compete? This contest will always have a natural bias towards those at the extremities of the UK. This I cannot change, nor do I believe that handicapping will help. Make your views known at the VHF Convention next year. Conditions were felt to be only average or worse. Congratulations to the section leaders and the Trophy winner GM4BVY/P. PS - G7APD you need a new calculator 31 x 267 does not make 1068! Must have been water in it! Score amended. *Bryn, G4DEZ*

OPEN SECTION

Pos	Call	Pts	Mul	QSOs	Loc	Pwr	Ant	Best DX	Km
1	GM4BVY/P	36708	46	64	IO85	160	2X7	GU2HML	667
2	EI9FK/P	24805	41	47	IO62	100	5	G3YXF	508
3	G4RFR	22968	44	60	IO90	160	2X12	GM4ZUK/P	686
4	G3UAX/P	21340	44	61	IO80	130	4X5	GM4ZUK/P	668
5	GM3TCU/P	17523	33	37	IO75	150	6/6	G4SSD	575
6	GI4TVV/P	14722	34	38	IO74	100	5	G4SJH/P	495
7	G7APD/P	8278	31	39	IO81	50	8	GM3TCU/P	494
8	GM4ZUK/P	8036	24	26	IO86	80	7	———	—
9	G4SJH/P	7168	28	34	IO91	30	6	GM4ZUK/P	645

FIXED SECTION

1	G3NAQ	12388	38	46	IO91	90	8	GM3TCU/P	506
2	G3WHK	5876	26	30	IO91	100	4	GM3TCU/P	649
3	G4FOH	5508	27	32	IO83	25	5	GM4ZUK/P	424
4	G4IOQ	2268	18	24	IO82	50	7	GM3TCU/P	319
5	G0EHV	1391	11	13	IO94	50	3	G4RFR	464
6	G4OUT	1092	14	14	IO92	10	3	GI4TVV/P	314

VHF CONTESTS CALENDAR 1991/92

2/3 Jan	*DARC Winter Contest (DL), 144MHz - Microwave, 1900-2200*
4 Jan	*DARC Winter Contest (DL), 144MHz - Microwave, 1500-2200*
19 Jan	144MHz CW (Dec 91)
26 Jan	70MHz Cumulative (Dec 91)
1 Feb	*Winter Field-Day (DL), 1296MHz, 0900-1100*
1 Feb	*Winter Field-Day (DL), 2320MHz - 47GHz, 1100-1300*
2 Feb	*Winter Field-Day (DL), 432MHz, 0900-1300*
2 Feb	*Winter Field-Day (DL), 144MHz, 1100-1300*
2 Feb	432MHz Fixed/AFS (Jan 92)
9 Feb	70MHz Cumulative
23 Feb	70MHz Cumulative
1 Mar	70MHz Cumulative
7/8 Mar	144/432MHz
15 Mar	70MHz Cumulative
29 Mar	70MHz Fixed/SWL
5 Apr	50MHz Trophy
12 Apr	1296MHz Fixed

For details of rules for European contests, contact G4PIQ, QTHR.

Members' Advertisements

RSGB Members wishing to place an advertisement in this section must use the official form incorporated on the label carrier of Radio Communication. This will prove membership and must be for the current month. No acknowledgment will be sent. Ads not clearly worded, or which do not comply with these conditions will be returned. If an ad is cancelled no refund will be due. An advertisement longer than 60 words will be charged pro rata. Trade or business ads, even from members, will not be accepted. Traders who wish to use this facility must send a signed declaration that the items for sale are part of, or intended for, their own personal amateur station. The RSGB reserves the right to refuse ads, and accepts no responsibility for errors or omissions, or for the quality of goods for sale or exchange. Ads for CB equipment will not be accepted. Each advertisement must be accompanied by the correct remittance, as a credit card payment, cheque or postal order made payable to the Radio Society of Great Britain. Please note that because this is a subsidised service to members, no correspondence can be entered into. Licensed members are asked to use their callsign and QTHR, provided their address in the current edition of the RSGB Amateur Callbook is correct. RS members will have to provide their name and address or telephone number. Please include your town and phone number in the free boxes provided to assist readers.

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

40's,50's, 60's VALUE RADIO'S - domestic. Suitable for repair- spares, must clear surplus from my vintage wireless collection. Prices from £2 to £20. More than 100 available, also meters, components (old) and lots of junk! Maybe just what you're looking for. Brian Maley G7JWX. (Whitstable) 0227 262491.

5KVA Generator. 115V x 3. (3-phase - 208V phase to phase voltage). Petrol, low hours from new (<60), with tool kit, spares, service record book, etc. 100kg wt. with carry handles (2 man). BARGAIN: £299. Delivery poss. UK mainland for £20-£50 extra depending on distance. Transformers: adapts 240v to 115v or vice/versa (range 95-260v approx) 4KVA/ 20amp rating: £40. Delivery extra. (Birmingham) 021 472 3688.

80486-33 upgrade your PC, 80486-33 motherboard isa 4MB ram 64KB cache new unused manual etc:£750. Also cpu 80386-20:£80. (Slough) 0753 883934.

A1 QRT SALE. Kenwood TH47-E, latest 70cm h/held:£225. Trio TR2300 2 metre portable:£110. Microset 2 metre linear, 3-25w:£65. G-comm 12 amp PSU:£45. Standard C7800 70 cm mobile:£135. Lightweight rotator, cable, bearing, controller:£20. Guttermount 2 metre 1/4 wave, 70cm, 5/8 + 5/8:£20. 2 metre base 5/8 + 5/8 colinear:£25. 70cm 9 ele yagi:£10. Morse key:£10. Headphones:£10. 6A PSU:£10. 70cm base colinear:£20. (Tamworth) 0827 282607.

ALTRON AQ6-20 3ele multiband spacesaver beam: £75. G4EHN QTHR. (London) 071 727 7376.

AMSTRAD PPC640 portable computer integral modem, two disk drives, and new external monitor. Carry case, manuals and software: £300 ono. (Wickford) 0268 732708.

AWAY ON holiday when last advertised. Various items for sale Butternut HF6V vertical. Ex condx. Together with 12/17m attachments g/ post: £140. Adonis AM802 mic:£25. Loudenboomer 400w HF amp: £400. All boxed and in exc condx. G4NQL. (Sheffield) 0302 782616.

DRAKE R8 digital HF communications rcvr, brand new model. Ultimate rcvr, offers!. QRO HF linear, home brew but very reliable, uses single 4-1000A, in GG vacuum variable. Tuning B&W plate coil. SKV at 1 Amp PSU, fully metered comes with one extra unused and boxed 4-1000A. Very heavy hence buyer inspects collects, sensible offers only please. Phone Peter G4HSB QTHR. (Middlesbrough) 0642 816608 after 6.30pm please.

EDDYSTONE type 898 spinwheel slow motion dials brand new with lrge knob and escutcheon:£15 +:£3 carr each. E1CO 753 trx 80/40/ 20 200W SSB/CW 100W AM with separate power supply and l/s in 751 matching cabinet, analogue dial, car bracket, brushed A1 finish, complete all manuals: £130 ono plus carr. Not used for several yrs, so capacitors need checking first. Walkie talkie 10m h/helds, fixed freq rx 28.045 tx 28.50, leather cases:£40. pair + carr. Three heath daystrow mohican coil packs plus complete test jig:£50 the lot plus carr. Ron Wilson G4RW QTHR. (Felixstowe) 0394 282722.

FL2100 B: £375, FR101S: £150, Dentso electronic keyer: £20, 204BA + Balun: £200, TH3JUN: £130, Butternut HF2V: £100, PL172 linear 1400W out: POA ,STV, robot monitor 7D camera 8D viewfinder: £500. All ono. Details Colin G3JEC (Norfolk) 0485 532378.

BOXED NEW tested unused Datong Morse tutor:£25. Hi-mound HK-702 Morse key:£25. Sony 2001D receiver:£150. Buyer inspects collects. (Stevenage) 0438 354857.

FT102 TCVR, all filters AM/fm board, FV102DM digital VFO, FC102 antenna tuner, SP102 spkr, FTV107R tnsvtr with 2m module, MD-1. D/mike, YH55 h/phones, all boxed with manual, mint condx. C-mos, e/keyer, hansen W720s meter, nentone 12A. PSU vHF supp. Aeh computer patch CP1 c/w s/ware on DS/ DD discs for com64, ritty, comin64 etc. All leads/connectors:£1450 ono. Brian G1UWV QTHR. (New Milton) 0425 615860.

FT726R 6m, 2m, 70cm satt: £750. FT290 mutek board: £195. FT730: £140. Standard 8800 2m mobile: £125. TB3 brand new: £300. TB2 brand new: £200. Jaybeam 2m colinear brand new: £35. KAM hardly used: £185. Bird 43 with 500W slugs for 2m, 70cm,: £150. Tonna 50MHZ beam, new: £40. Tonna 9ele 19ele combined VHF, UHF beam, new: £40. (Blairgowrie) 0250 2475.

HALLICRAFTER SR2000 2kw input 1kw SSB output 900W CW output. Includes P2000 power supply, HA20 second VFO with swr facility, and shure 444 mike. 80m to 10m bands not warc. Gwo and appearance. Buyer test my QTHR:£425 ono. GW3BAZ. (Cardiff) 0222 757556.

ICOM IC 745, desk mike SM8, mint cond: £600. Ameritron linear AL84, 600W, spare set new valves, mint: £400. (Kenton) 081 907 7977.

ICOM IC2E with case helical charger h/ book:£150. Murphy B40 receiver has power supply fault:£50. Jerry G80YY QTHR. (East Grinstead) 0342 324397.

ILLNESS forces sale. 5 element tribander, 40ft heavy duty lattice tower, DFC230. Not QTHR. (Newquay) 0637 850103.

KENWOOD 940S auto ATU 500Hz filters. SP930 spkr KENWOOD station monitor SM-220:£16,000. Consider split, all VGC. John G0IOR QTHR. (Grimsby) 0472 358449.

KENWOOD SW-2000 swr/power meter. Complete with SWC-3 covering 1.8-54MHz. 2kw pep. SWC-2 140-450MHz 200W pep. SWC-1 1.8-150MHz 400W pep. All 3 couplers can be used simultaneously. Absolutely mint/ boxed with instructions, practically unused. Sale : £115. Additional SWC-1 also available. CAPCO SPC-300D ATU 1KW.PEP 1-30MHz. Balanced/unbalanced outputs. Low loss relay switching. Automatic earthing. Mint/boxed/ instructions: £200. No offers please. G2FZU QTHR. (Notts) 0636 813847.

KENWOOD TS850, immaculate. Also TR9500 70cms multimode: £300. GM3WYL QTHR. (Glasgow) 041 776 6098 after 6pm please.

LATHE FLATBED drummond very meaty but compact bench top mounting with backgear and screw cutting has made several cavity pa's:£300. M/modules 144 to 70cms 10W transverter:£75. WANTED NEW ZC39 VALVES ALSO FINGERSTOCK. Offers on above, delivery to negotiate. G8VOP QTHR. (Barnsley) 0226 249873.

MILITARY RADIOS MK123:£100. B70 microwave tcvr with dishes feeds etc:£250. A14 2-8MHZ tcvr:£225. 40ft heavy duty clarke mast with legs and full kit:£275. Heavy duty tripod suitable large microwave dish:£60. Aluminium waterproof boxes various sizes from: £40. Kenwood TS4305 SSB filter FM only used rx mint boxed:£600. B47 military tcvr tray and tuner:£150. (Redditch) 05278 92282.

ICOM 720A solid state all band HF tcvr with general coverage:£550. ICAT500W automatic ATU: £395. ICPS 20 automatic switched power supply with integral spkr: £100. All top range when new. All boxed, little used. SEM iambic keyer:£35. G0OPG. (Wilmslow) 0625 531154.

OSBORNE 1 portable comp incl software, manuals etc: £60. Eddystone S640 rx needs alignment: £20. Telequipment SS1 scope 4 off: £20 each, good for monitor, spectrum analyser, display etc, Spectrum 2m to 6m tvtr kit built boxed not aligned; good construction: £20. Wavetek arbritary waveform generator working good 19in rack box: £40. Tektronix 549 scope big heavy working: £25. Must go. Jim GM0OFM. (Ladybank) 0337 30477.

PK-88 HF/VHF packet tnc: £95. BMOS linear Amp L50-3-25:£35. Jaybeam 6m 4ele yagi:£25. Jaybeam 2m 10ele yagi: £20. All vy good condx. (Derby) 0332 44979.

PK232 with PC pakrat: £190. Plessey PT224 VDU: £70. MM144/100 2m, 100w amp: £70. Epson MX80f/t printer: £70. G4FGJ QTHR. (Bedford) 02302 4457.

PROPERTY LATE G8ZHF, FDK multi 750E, 10W 2m all mode:£200. Yaesu FT290R 3W 2m all mode:£180. Pac-comm tiny 2 TNC:£90. Kenwood sw-100 swr/pwr 0-150w, 140-450MHz:£30. Mutek SLNA 144S 2 metre preamplifier:£35. Western electronics WE1135 rotator pre-set:£25. Farnell instruments 12v SA linear stabilised compact PSU's:£25. each, tonna mast and base:£50. Contact Mark G6CMS QTHR. After 6pm (Chelmsford) 0245 76801.

RAF WW1 Morse key circa 1918. Spark gap type: first edition amateur radio h/book 1939. Both excellent: offers. (Narberth) 0834 860397.

REALISTIC PRO35 H/Held scanner: £125ono. FRG 7000 Yaesu HF receiver: £250. Amstrad 2086/30 32MB hardrive 14" V6A colour monitor, Hi res external 51/4 drive, mouse, manuals etc: £650. Portable computer 1400FD, 728RAM nicad AC/charger manuals, mouse etc: £600. (Tonbridge) 0732 366704.

SELLING UP, HF, VHF, UHF, test equipment, SAE for lists. G0MEK QTHR. (Cambridge) 0353 722466.

SPECTRUM ANALYSER - texscan AL-60B exc condx all solid state 10MHz to 3GHz used as back-up to HP model:£1,250. G3PCN. (Pinner) 081 866 3300.

TEKTRONIX 561A 10MHz oscilloscope complete with manuals, probes, trolley. Mint condx: £110 ono. Contact Paul (Abingdon) 0235 530940.

TEN TEC Argosy II + PSU: £475. Ten Tec Century 22 + PSU: £350. Mizuho QRP, 14MHz H/held, 2W output with DC\DC adaptor, spkr mic, whip antenna, zepp antenna and 6 crystals: £275. Sony 2001 rx: £100. Will swap any item for Argonaut 515 or good ICS loop antenna. G0ORU. (Acton, W3) 081 740 7105.

TEN TEC Century-22 CW keyer, calibrator, manual, power lead with safety cut-out. A cherished radio: £285. 7-amp PSU: £35. Also FT290R 2m multimode CW, carrycase, nicads, charger, r/duck, manual: £235. G4WKJ QTHR. (Hatfield) 0707 271020.

TRIO TR751E all mode TCVR 2m 25W as brand new with PSU. (Cardiff) 0222 487299.

TS 520S HF tcvr: £250. Racal RA17 mkII rcvr, needs attention, nice condition: £65. G2HKW QTHR. (Chandlers Ford) 0703 265566.

TENTEC Corsair model 561 includes power supply manual also Yaesu set many extras. Deceased member, all must go: £500 receipts available. (Teddington) 081 943 2108.

TS711E 2 metre multimode: £600. SPC 3000D CAPCO ATU: £225. Daiwa CNW419 ATU: £125. All items ono. Buyer inspects collects. (Oswestry) 0691 657696.

YAESU FL2000B linear amp, GWO: £250ono. GW4IUN QTHR. (Cardiff) 0222 796780.

YAESU FL21001 1.2k 9-band, linear sparely used, immac, spare(2) new 572B valves G3LWH. (Lancs) 0695 579056.

YAESU FRG8800 receiver c/w FRV8800 VHF converter:£525. Welz D13ON Discone antenna: £38. Datong AD370 active antenna:£36, all in as new condx. GW8AWM QTHR. (Gwent) 02913 2466.

YAESU FT 902 DM and FC 902 ATU. As new less than 100 hrs use. Narrow CW 6kHz AM filters fitted complete with mic and workshop manual:£575. No offers.

YAESU FT101ZY Mk III fan, CW filter, FM mic + FV101DM external VFO: £550, MFJ 949C versatuner: £110, Yaesu FR101Y rcvr with spkr, 2m 4m fitted: £125, Yaesu 23R with spkr mic, soft case, charger, FNB10 battery pack: £165, Commodore 64C with new dataset and PSU: £70, Commodore 64: £45, Seikosha GP 100VC printer for Commodore: £45. All vgc. (Wirral) 051 608 1504.

YAESU FT221 2m m/mode base station with manual leads mic:£260 ono. Buyer collects or pays carriage. BBC micro model B twin 5 1/4" disk drive with PSU, cassette recorder. Amber monitor software, leads, manuals, fitted opus D. Dos comstar s/ware roms:£200 ono. Buyer collects or pays carriage. Motorola CD 100 UHF fm transceiver xtald RB6 auto tone burst manuals.:£50 carr extra. (Denbigh) 0745 813295.

YAESU FT767GX cvr fitted with 70cm, 2m and 6m modules as new, boxed with manual MD-1 mike:£1050. No offers. (Wolverhampton) 0922 494920.

132ft LONG WIRE possible! QTH 3 bed semi, conservatory, long garden, fertile soil. rotovator, garage, near sea: £65,000. G3DGT not QTHR. (Portchester) 083 483 369.

2M AERIALS cubical quad hzl/vert polarised complete:£14. 7/8 mobile whip with gutter mount, brodhurst throat mike, gearstick control harness, perfect:£35. Antiference 5 el yagi with balun: £10. 70cms 17 el unused:£12. G3MIZ QTHR. (Somerset) 0749 812473.

2MTR TONNA 17 element yagi:£35. Buyer collects, no cheques. G0PUX QTHR. (Marden, Kent) 0622 831478. Address in call book under G7ATI.

45ft CRANKUP tower on steel trailer, ideal for repeater or beam, complete sturdy outriggers, jacks, winches, only:£295. G0NTT QTHR. (Lancaster) 0524 823277.

4CX250B PAIR:£20. QQV06-40:£10. QQV03-10, QQV02-6, A2S21, 6AM4:£5 each also collection assorted AF, RF, B9A, B7G valves offers? All ex eqpt. Datong rf preamp:£10. MM, ATV, converter:£15. SEM 2m converter 24MHZ 1F:£15. MM 4m converter 28MHZ 1F:£15. Vidicon:£10. Scan coils:£12. Video lens:£15. UHF TV tuner full details:£10. (Guildford) 0483 575870.

600W DUMMY LOAD:£40. 2m 25W linear:£40. Gem 1st word plus wp:£30. 100k/volt multimeter: £25. RF signal generator:£5. Vox unit with mic:£15. frequency counter: £40. Able one:£10. Swop for 70cms multimode or 2m h/ h. Dave (Norwich) 745512.

ALTRON AQ6-20 minibeam 3 element, 4 band 10,15,20,6 metres. Good condx, comp dis-

mantled, all fittings and instructions: £50. John evenings. (S.E London) 081 857 8096.

ALTRON compact 'spacesaver' 3ele beam. 6, 10, 15, 20m. Ex cond. Full data. Half price: 85. GW3BAZ QTHR. (Cardiff) 0222 757556.

AMSTRAD PC1512DD 2x51/4" mono display, 40Mb HDD, software: £350. Steve G0KIO.(Leeds) 061 236 0942 or evenings leave message 0532 747432.

AOR 1000 scanner 12mths old, as new complete with accessories, boxed with manual: £180. Realistic DX200 general coverage receiver boxed with manual: £75. No offers. Buyer collects G7KDR not QTHR. (Basildon) 0268 280481.

ARRL HANDBOOK 1947. RCA tube manual 1950. Hobby circuits 1968. RCA ARRL Antenna Book 13th edition. Hints & kinks 1978. Antenna anthology. USA Navy Handbook recent radio electronics. RSGB Handbook edition 3. RSGB test equip 1974. Radio data G6JP. Operating manual G4FTJ. Offers for all or WHY?. G3KMH QTHR. (Hexham).

AVIATION ICOM ICA20 TCVR with HS20SB switch box for standard aviation headset as new: £250. Phone Mike G4HLT. (Reading) 0734 693766.

BBC B, issue 7 with 32k sideways ram, 40t DS drive, Tandy DMP100 printer, colour monitor, joystick, all leads, lots of extras:£175. Buyer inspects and collects. G0DLF. (Northampton) 0604 831061.

BBC B series 7 computer. ROM expansion board, two disk drives. W/wise plus, G3WHO rtty roms. Colour monitor, NEC dot matrix printer:£325. CTE 1600 2m h/h with charger:£95. Commodore Pet 32k. 4040 double disk drive, 4022 printer. GWO:£80. G0FDU QTHR. (Swanley) 0322 664077.

BBC MODEL B, 5 1/4" disc drive, 827, controller, Acorn datacorder, 14" colour TV:£225. 70cm parabeam:£10. G3ZNY QTHR. (Milton Keynes) 0908 562780.

BNOS 13.8v/12A PSU metered:£60. Microwave Modules MTV 435 70cms, atv tx:£95. Daiwa CN650 23cms swr/pwr meter:£75. Kantronics KPC4 dual port tnc:£155. Tokyo hy power HL120U (mint) 70cms DA. 3W/110w:£295 Tatung vga monochrome monitor new: £75. Panasonic KYP1180 printer/cable (New):£100. Western digital SVGA pc card (512K)0:£85. Phone Paul G4XHF QTHR. (Crawley) 0293 515201.

COLLECTORS ITEMS. Vidor vanity box, all dry M/L wave portable. WW2 miniature all dry superhet 5-13MHz, type RBZ. Details from G8NN QTHR. (Sheffield).

COLLECTORS items: GEC communications rcvr 5820-99-916-4679. Superb valve rcvr 2-30MHz in 8 bands. Separate IFs and spkrs for USB and LSB simultaneously. Fantastic performance. Manual: £175. CR100 S-meter and manual: £30. Rare radar search rcvr R1294 (AB 2) 500-3000MHz with mains power unit and manual: £90. Test set 373 (universal bridge): £10. Kay sona - graph (to record sound spectra of birdsong) with manual: £175. G3MFW QTHR. (St Austell) 0726 73608.

COLLECTORS plath audio/vis marine d/f SFP 700/2 with gyro repeater motor. 240/535kHz 1.5-3.2MHz GWO with English manual. Other items like hallicrafters, valve keyer HA1. Jasonkit fm tuner. Globe king s/w radio with five coils. Some old heathkit rx/amps. All wkg but prefer buyer inspects. Genuine interests cld travel reasonably from QTHR. G3ICB also fax 0635 72762 txl 848637. (Thatcham) 0635 64345.

COLLINS KWM2A, 516F-2 PSU, manual, gd cond: £400. Chris G3WCD (after 8pm) (Huntingdon) 0480 87351

COMMODORE Plus4 computer, MPS803 printer, 1551 disc-drive, cassette unit, PSU, joystick, all cables, software incl. packet terminal programs: £200ono. Commodore pet 2001 intermittent, fault on load: £50. FDK mult-750E 2m mobile m/mode: £250 RTTY reperforator and tape reader teleprinter 7A all working with governors for 50B and 45B. Offers. Buyer collects. G3NPF QTHR. (Horsham) 0403 66290.

CREED 444 teleprinter, one 50 baud one 45 baud: £50 for two or exchange IBM-PC Amateur programs. Both VGC, manual. G6BCG QTHR. (Darlington) 0325 482983.

CUSHCRAFT AV3 new: £60. Zetagi B300P HF amp new: £100. BNOS linear L432-10-50 as new: £80. Kenwood MC-435 up/down mic new: £15. Yaesu PA-3 car adapter and charger as new: £15. Dressler VV-interface 100-1000 MHz: £25. new. (Gravesend) 0474 357795.

DAIWA ATU CNW 419. 1.8-29MHZ. 20/200W. Crossed needle meter. Two inputs. Tune or through switching. Perfect condition: £130. G4XLX QTHR. (Crewe) 0477 32523.

DEWSBURY Supa Tuta Morse trainer, perf condx, the easy way to pass the CW test, only: £35. Daytime (Banffshire) 0542 32208.

DRAGON 32, single sided d/drive, Brother HR5 printer, cassette player, scarab RTTY T.U with PSU's leads & manuals: £80. complete, will split. Dragon user mags 1983-1989: £10. Assrtd s/ware, articles & books. SAE for full list. Buyer collects or pays carr. G4HOW QTHR. (Harrogate) 0423 531625.

DRAKE SSR-1 ideal beginners first HF rx any offers? Durst M302 colour enlarger, darkroom equipment:£250. SAE details, Jim evenings. (W London) 071 727 2141.

FORECAST VHF conditions and weather. Excellent barograph:£250. Wanted 1920's crystal set in good condx G3VXZ QTHR. (Maidenhead) 0628 27350 or 045383 5510.

FT-ONE, fitted AM and CW filters, FM board and memory board. Complete with h/book, workshop manual, fist & desk mics. Exc condx, weekly contacts with ZL. Original packing: £850 ono. FC707 ATU: £100. G0IAJ QTHR. (Isle of Wight) 0983 408041.

FT1012 desk mic, CW filters, fan VGC:£325. FC102 9 bands original:£125. Kenwood TR751E with DCL:£410. G4MH minibeam: £25. (Plymouth) 0752 775375.

FT101B: £200. FL2100: £250, IBM PC 20Meg HD 640kbyte colour GA: £300, all GWO. Paul G0ODP. (Peterborough) 0778 344852.

FT102 new relays fitted FC102 ATU MH188 good condx, no split: £640. Boxed and manuals collect or p&p extra. Bob (Workington) 0900 67226.

FT200B tcvr (80-10m) with FP200B PSU/spkr: £195. H/B speech processor: £20. KW204 transmitter (160-10m): £115. FRDX400 rcvr (160-10m) with 6m and 2m converters: £125. BBC B with Wordwise and RTTY Roms also H/B terminal unit: £175. All very good condition, original packaging. (Warrington) 0925 35330.

FT23R sm FM h/held 2.5W o/p with nicad, 5W o/p with PA6 12v adaptor/charger. Also with spkr/mic, extended frequency coverage and h/book:£150. DNT 10m FM with repeater shift and 50W amp:£50. Stuart G4KUR QTHR. (W. Midlands) 021 743 6701.

FT290 CASE nicads charger:£195. 25w linear pre-amp:£25. Howes HC220 10W 20m transverter with details components convert 40m:£40. A200 with convertion details for 2m:£15. RX80:£35. FT790 case nicads charger:£220. W + D 70 lin 10 linear and 70 PA 5 preamp:£30. Heathkit SB101 with HP23 PSU very clean:£185. Fairmate HP100 with details for extended coverage:£175. Martyn G4VA0 QTHR. (Norwich) 0603 872853.

FT290RII bxd, case, strap, nicads, chgr: £295. Kam m/mode TNC with WEFAX. Latest model: £235. SEM iambic keyer: £28. HF mobile amp 80m-10m. 10W drive for 100W+ out. Rx preamp: £60. G0OPG QTHR. (Wilmslow) 0625 531154.

FT480R mic, needs attention: £150, Kantronics KPC2400 TNC with leads for 480R: £150, CBM64C 2 datassettes: £300, games, mouse, joystick, paddles, Packratt cartridge for C64 to go as packet: £175, Full size 61 key keyboard to fit CBM64 with s/ware, boxed: £75, swap CBM64C for BBC plus d/drive. Haggle? 50 5 1/4" floppy discs, new: £30. Ian G7HXI. (Stalham) 0692 580201.

FT709R 70cm h/held, charger, soft case. Good condx:£120. Dave G1DWI QTHR. (RotherhAM) 0709 527049.

FT730R 70cms FM 10W mobile, mint condition, complete. (Huddersfield) 0484 603963.

FT747GX HF TCVR plus mic vgc, buyer must collect Reading, Berkshire: £480. 0734 483481.

FT747GX used once only: £500. MFJ versa tuner 949D new: £168. Era MKII microreader new: £150. FDK 700AX 2m multi: £125. Silent key sale GW4UWH. (Clwyd) 0492 532149.

FT747GX with FM and h/mic, boxed with manual, mint: £450. Nevada TM1000 ATU, 1KW, mint: £100. Both less than 1 year old. David G4JLU QTHR. (Harrow) 081 954 9180.

FT980 special FSK boards factory made to receive transmit FSK on European upper side band:£980 ono. FL7000 factory mod to give very sensitive measure of SWR:£1,000. ono. Both boxed, h/books, connecting leads, superbly aligned, reliable, also much other gear. (Cambridge) 0223 841304.

G0BSX TNC with clock module. Dumb terminal, k/board: £140. Sony camcorder: £300 or exchange RX. G3KNJ QTHR. (Watford) 0923 244069 (after 3pm).

HANDBOOKS Racal RA17 Pye Bantam HP1 AM/FM Westminster W15FM HRO AR88 ARRL 1947, 1967, 1973 GM3YGM. (Renfrewshire) 0475 522062.

HEATHERLITE Hunter HF linear amplifier. Mint cond: £650 or exchange for Ten-Tec Corsair. G4WXF QTHR. (Bodenham) 056884 580.

HEATHKIT HW100 in GWO, complete with original construction h/book and spare set of valves excluding pa:£100. (Hemel Hempstead) 0442 66787.

HEATHKIT SB230 linear amp 1200 PEP: £250 GWO. G0AKX. (Altrincham) 061 928 6828 anytime.

HF5B ANTENNA with specs man. Fully assembled. Only four months old. Little used. Ideal small locations with limited planning permission. Asking only £150 for quick sale. Gone QRT. Buyer inspects and collects. Phone Peter G0KMM QTHR anytime. (Merseyside) 051 628 1811.

HF5B BUTTERNUT 2 ele beam, nice condx:£150. G4NQL. (Doncaster) 0302 782616.

HP3406A broadband sampling voltmeter: £150. 5 x 400 scanner: £200. ICOM R7000 receiver: £650. Coaxial relays n-type connectors:£5 each. 15W broadband HF amplifier: £10. 3W broadband VHF amplifier: £20. Two 4-250 valves + bases: £20 each. Sony C9 video: £75. Avo 8 MK5: £50. (Cheltenham) 0242 233218.

HP5 HEADPHONES plus extra pads. Little used. G0GY2. 071 263 2983.

IBM/COMPATIBLE XT/turbo 1MB/RAM 51/4FD 20MBHD CGA/colour monitor + card, graphics card: £350. (Leicester) 0533 810431. after 7pm or weekends.

IC-240 2 metre mobile FM. Simplex and all repeater channels added packet frequencies 10W only. With mobile bracket, offers around:£120. (Whitby) 0947 810263.

IC2E 2m, h/held, spare battery pack and dry cell pack, charger: £120. Datong Morse tutor: £30. Both in ex cond. (Macclesfield) 0625 572663.

IC751A, immaculate: £775 or WHY? part exchange? RC10 keypad for above:£15. 250Hz/455 CW filter for 751 or 765: £60. WANTED: tower/beam for club. (Northampton) 0604 766325.

ICOM 726 plus ATU AT150 used receive only original boxes: £950. PU PS55: £140. Phone G2CGF (High Wycombe) 0494 529950.

ICOM 751A HF rx/tx with PSU, AT100 ATU and desk mic plus service manuals: £800. Prefer buyer inspects and collects. (Northwich) 0606 77146.

ICOM IC 735 with matching PS 55 HM12 mic. Perfect immac condx, boxes, h'book, carriage incl. UK: £725. G3RHM QTHR. (W. London) 081 423 2329.

ICOM IC 740 80-10m, TCVR + FM, Yaesu FP12 12A PSU-spkr AEA at 300W ATH, mic, manuals, boxes, mint condx, minimal QRP use last 2 yrs, Dee-com 20.15.10m, vert ant unused, prices TCVR: £450. PSU: £50. ATH: £125. ANT: £40. New equipment causing sale, ex opp. GW4RLP QTHR. (Caernarfon) 0286 5264.

ICOM IC251E 2m multimode: £475. Hanson FS5E SWR-power: £30. Datong PC1 general coverage converter: £105, turns VHF multimode into HF rcvr 0-30MHz AC adaptor and connecting cables. All mint cond, little used. G3XYP QTHR. (Lincoln) 0522 810348.

ICOM IC725 little used immaculate boxed:£650 ono. Phone anytime (Argyll) 0546 3625.

ICOM IC751 fitted with 250hz filters FL63 and FL53A:£750. Also IC251E fitted mutek front end:£400. Both radios immaculate condx, boxed with manuals. Also hygain 14avq/wb trap vertical antenna 10m through 40m £60. SMC polarphaser Mk2 for 2m: £25. (Basingstoke) 0256 478852

ICOM R7000: £570 ono as new. Olympic UHFM212 info: £19 ono. 500MHz 15W dumy load by revex: £12. (Llanfairpwll) 0248 713776.

ISOLATING transformer 240v. 4kvA:£25. Two large 19" rack cabinets, with side panels, rear panels, on casters, nice clean condition:£25 each. 250 assorted new boxed valves and CRTs:£50. Convector heaters (4):£10. each. 280,000 resistors on bandoliered drums from £1/1k. Tea-chest full assorted new capacitors:£50. Tea-chest full new motors, transformers, relays:£50. Wow and flutter meter:£50. (Birmingham) 021 472 3688.

JAPAN radio company HF tcvr, JST 100, all WARC bands, c/with matching power unit: £795. PK232 data terminal unit: £175. ERA CW/RTTY micro-reader with Morse tutor: £95. Adonis AM-503G compressor desk mic: £45. All with manual/instructions. G4GTR QTHR. (Bakewell) 0629 640475.

KENWOOD 140S HF tcvr with 500Hz CW filter, pristine cond: £650. Buyer collects or pays postage G0EZW QTHR. (Selston) 0773 810010.

KENWOOD SP930 spkr, built in filters, mint cond, boxed: £45, including carriage. Wanted Dewsbury FM unit for TS930S. GW4RLP QTHR. (Caernarfon) 0286 5264.

KENWOOD TM241E 2m FM mobile 50/10/5W four month old, boxed, manuals:£250. Heatherlite for same:£12. Yaesu FT221 with MD2 desk microphone:£215. Zetagi B300P mobile amp 14-30MHz 400W SSB:£55. Newbury 8926 12 pin 240cps printer:£65. GM0MGE QTHR. (Livingston) 0506 416365.

KENWOOD TR-751E 2 metre multimode, one careful owner: £425. GM0JKF QTHR. (Banchory) 03302 3324.

KENWOOD TS440s, SSB + CW Filters, 12 months old, bxd in original packing, exc condx:£800. Mutek TVVF144a, unmarked:£240. Hi-mound key:£10. (Bolton) 0204 852410.

KENWOOD TS940S mint cond. + MC60 desk mic + Capco SPC 300 ATU + LPF. All excellent cond: £1300. G0LUB. (Grantham) 0476 77453.

KW109 ATU:£120. Yaesu FRG7. Digital display (not connected). Battery unit: £100. G4LYX QTHR. (Hassocks) 0273 845388

KW2000B 'customised' 100W valve HF Tx Rx + AC Spkr/PSU in fair condition. 1.8 through 29 MHz including WARC bands:£260 or WHY similar for part exchange? (FT 401 etc?) Full service back up: buy with confidence. G3ROZ QTHR. (Beds) 0767 680828 (Weekends only).

KW2000B:£170 Avo MK8:£20. Avo minor:£12. ICL computer 2 x disc drive + monitor:£120. Sanyo green monitors:£15 each. Nikon FM camera body:£110. 35mm Nikkor lens:£40. 85mm Nikkor lens new:£175. Zenith photosniper kit 300mm lens + 50mm:£90. (Devon) 0647 21631.

LINEAR AMP, 4M, 60W output, Pye A200: £30. plus postage. (Tarleton) 0772 814200.

MACINTOSH plus 2.5meg RAM, 20mgb hard disc. Ideal shack companion providing packet, propagation and logbook applications. Plus WP and spreadsheet:£525ono, will deliver within 50 mile radius. G4PEL - Ross. (Stamford) 0780 52504.

MAG-LOOP 40-80-160 with additional vac-cap plus standbars cap. For sale or part ex radio equip or dedicated word processor. For full details (Scarisbrick) 0704 880345.

MAINS ISOLATING transformer 2KVA primary/secondary screened, with cooling fan:£60. CD45 rotator and controller: £60. Jaybeam 6Y/12Y Yagi:£20. Kenwood SM220 monitor with BS80: £250. Battery powered invalid tricycle, new batteries: £500. All instruction manuals. Buyers collect. (South Hampshire) 0425 619232.

MARCONI TF2015 and TF2171 signal generator and digital synchronizer C/W service manuals. Exc condx:£325. May split. Amstrad PC1512HDCM. 640k ram, 20MB HDD, colour monitor, V30 CPU VGC:£250. 3 station pc local area network system. Datapoint data LAN. Arc net compatible:£300. ono. (Portishead) 0275 818566.

MFS 1270B TNC: £65. RS eprom eraser: £35. Pair PF70 h'helds: £30. W&D atu tx receive convertor Sony b&w camera: £100. Hammorlund HF rcvr: £60. Nel PC8023BE dot printer fits IBM pc: £75. All have manuals etc. All ono + carriage. (Kettering) 0536 523979.

MOTOROLA MT500 handheld t/rec fm, 35 meg's: £20. Realistic 200 channel scanner model PRO 34 power pack. Hand/b, 2 x antenna's: £150.. Telequipment model D61 oscilloscope: £80. Tectronic storage monitor scope type 607: £40. Good working order. (Bicester) 0869 244166.

NAVICO AMR1000 2m tcvr, 25W FM: £140. Comet dual-band colinear CA-2X4 MAX 8.5/11.9dB. Used one month only: £70. (Portsmouth) 0705 752618.

NEW 8MFD 2.5kv:£10. Codar AT5TX:£20 plus h/b PSU:£5. RadComs volumes 25-54 £1 per vol. G3AIO QTHR. (Pembury) 089282 2836.

OLIVETTI computer 256K D/Disk, manual spare k'board: £180. G3SQM QTHR. (Henley on Thames) 0491 571443.

P40 VERSATOWER with 2ft silver steel extension, 2 brake winches, two brand new steel cables hand rotator with calibrated control unit. Manuals for tower & rotator: £350 cash. Inspect and collect. G3RRD QTHR. (Glos) 0453 872365.

PSION LZ64 with 128K & 16K datapaks plus 32K ramoac and comms link, boxed in good condition: £145ono. G6JNS. 12 Hamber Lea, Bishops Lydeard, Taunton, Somerset TA4 3NJ.

PSION Organiser II model XP, 32k internal ram, 64k datapak, 32k rampak, comms link, database, PSU manuals:£95. G3ZAR QTHR. (Hull) 0482 658984.

PYE PF85 on S22 c/w charger and spare battery:£85. Marconi 2950 test set GWO:£160. G1VRA. (Cambridge) 0954 782271.

QRT SALE TS940S mint:£1,250. Heathkit HL2200 linear amplifier mint:£495. Drake WH7 wattmeter:£95. Datong FL1 audio filter:£35. (Cornwall) 0566 773010.

RACAL ISB adaptor with inbuilt scope: £50. Epson RX80 FT printer: £80. G3VGO QTHR. (Truro) 0872 864255.

RACAL RA17L receiver c/w, racal case, manual. Circuit:£200. Grundig satellit 500 general coverage receiver. FM stereo, AM, usb, lsb. Two clocks 42 memories. C/w manual, rechargable cells and grundig NR90

charger: £235. G3RDG QTHR. Buyer collects. (NW London) 081 455 8831.

RX8 8 mode receive system cost £259. Want:£110 or swap for best hard drive offered for PC (Ipswich) 0473 310487.

SAIKO scanner, 12v, fm, 16ch, 78/476MHz, mobile brackets, teles. aerial. Brand new, unwanted gift:£60. New magnetic mobile aerial for above:£25. Avo valve tester, with manual £80. Carriage extra. GU3HKV QTHR. (Guernsey) 0481 47278 (Evenings please).

SCOPE OS25B dual trace DC to 5MHz h/book:£40. Vic 20 commodore interface RX4 multimode RX rtty CW tcvr complete data: £40. Viceroy MKIII h/book 10-80m. AM/SSB/CW 614ToBs 300PEP mic. LP filter ant c/o relay FB condx:£75. G3OSH + carriage. QTHR. (Ilminster) 0460 53349.

SPECTRUM 48k complete:£15. Spectrum 48k+ complete:£25. Offer me:£35 for both. PSU and leads to both, clean and working. Bargain. Collect or pay carr. Looking for spare microdrive cartridges amount and price please. Bill (Preston) 0772 683098.

SSTV Robot 400, 8/16 second b/w: £300. Standard C58 all mode 2m: £185. Pye Europa: £20. Paul G7ESK (Northants) 0933 56861.

STANDARD C528 h/held with accessories boxed never used:£355. FT767GX all modules boxed and manuals £1400. (Basildon) 0268 546523.

TEN TEC corsair 2, 500Hz filter PSU, recent service: £950. Buyer collects. G3JLB QTHR. Reason for sale buying OMNI 5. (Gravesend) 0474 534694.

TEN TEC Corsair immac. Optional 8 pole filter plus 500Hz and 250Hz CW filters. Matching PSU and mic, manuals: £600. G4AFU QTHR. (Penrith) 09312 514.

TEN-TEC Corsair 560 all extras:£750. Matching VFO 263:£150. Argonaut 515:£300. Matching notch/CW filter 208A:£30, immaculate, boxed with manuals. Trio R600:£200 with manual. TS950S/SD, full service manual: £25. Collect or carriage extra. G2HKU QTHR. (Sheerness) 0795 873100.

TEN-TEC Corsair 2 ham band tcvr, 18 months old, mint condx. Little use forces sale: £695. Ten-tec power supply/spkr: £135. Howes 20 + 40m receiver:£40. Standard C58 2m multimode, matching linear, mobile bracket, nicads, charger + leads:£275 ono, swap for dual-band mobile FM WHY? 40ft tilt-over tower:£325 ono. KR600 elev/A21m rotator:£250 ono. FT221 Mutek f/end:£265 ono. Apple II europlus:£20. Spectrum + interface for TNC software:£65. (Glastonbury) 0458 34917 (After 5pm).

TENTEC PARAGON, exc condx 1.8khz filter, Tentec power supply: £1200 ono, 3 x 10' Alumast tower sections:£125. (Leicester) 0533 674112.

TR3600 70cm H/H, spkr mic, DC/DC, adaptor, nicads, charger, boxed: £150. Also TR9130 2m m/mode with 100W linear and 12ele ZL: £400 or exchange HF mobile. Dave G4WBB. (Sheffield) 0742 465145.

TR9000 tcvr: £300. TS1305 complete with PS30 power supply: £500. TS120V together with TL120 linear and AT120 ATU:£450. Tentec argonaut 515 QRP tcvr: £300. Lowe 5R X 30 general coverage receiver: £100. Icom IC2 FM portable tcvr:£100. Datong FL2 audio filter: £70. HFS, 18AVQ antenna, Keyers, etc. (Leicester) 0530 242079.

TRIO R2000 good used cond: £365. Kenwood TS530S as above: £475. Lowe HF225, nearly new: £445. Akai X-200D, 4-track, 3 speed, reel-to-reel tape recorder, very heavy: £45. GW4RZU. (Haverfordwest) 0437 710544.

TRIO TR2600E 2M FM h/held, SMC-31 spkr/mic, ST-2 base chrgr/PSU, mint, boxed:£190. Yaesu SP55 mobile spkr:£12. Yaesu CSC-1A soft case, fits FT290 MK1 unused:£5. YHA-15 flexi helical for same:£7. House purchase forces reluctant sale!! Phone Paul G0KPH QTHR. (Leamington Spa) 0926 429719.

TRIO TS130S, with Adonis desk mike and Daiwa ATU:£550. Amiga A500 with software:£290. PC1512 with 640k, 32mb HD, loads of shareware:£500. Triband minibeam (10-15-20):£35. Paul GONGA. (Romford) 0708 748103.

TRIO TS130V with CW filter, PSU manual: £320. Mizuho MX-75 40m QRP. SSB, CW, tcvr with CW-25 sidetone, DC converter, 20W linear, nicads, manual, spkr, cost over £285, Sell for: £140. Carriage extra. Dave G4JXK QTHR. (Fareham) 0329 230737.

TRIO TS830S with CW filter, deluxe tuning knob, spare set pa tubes, comes with instruction manual, circuit diagrams, service history, and MC35 mic. Excellent performer and in full working order. Genuine reason for sale - upgraded earlier than expected:£650. Also wanted CW filters for TS940S and wanted paccom handipacket tnc. G4UDT QTHR. Wembley 081 902 5995.

TRIO TS9000, 2m multi-mode, good condx:£285 ono. Standard 5800, 2m multimode, v good condx:£285 ono. Both with /M brackets. Yaesu FT101B, new front end, v good £285 ono. HAM base power mic, 1/4 price:£12. Teisco base mike, as new:£12. All tx/rx consider exchange for hand-held or mobile tx/rx for 70cms or dual-band. Ring and discuss. Ask for Derek (Stratford on Avon) 0789 297158.

TRIO TS930S tcvr. Internal auto antenna tuner, extra 500Hz and 6kHz filters fitted, H/book, gwo, gd cond., boxed: £849 with free mint cond, Datong auto Woodpecker blanker with H/book, last call for this bargain. VLF converter: £20. G3HSW QTHR. (Wylam) 0661 853676.

TS440 1 yr old, recently checked Lowes gd cond, ATU fitted: £850. G0CKE (Ilford) 081 551 2333.

TS440, 270HZ filter, immac:£775. FR101 receiver 600hz filter, warc bands:£150. Drake TR6 50MHZ tcvr + PSU, 100w. Offers. Altronics superscaf switched capacitor audio filter:£80. PK88 TNC:£90. Pye Westminster 2m FM, 144.650, 144.675:£40. C64 computer £60. ICS packet software cartridge and RS232 interface:£25. Chris Page G4BUE QTHR or telephone (evenings and weekends) (Brighton) 0903 814594.

TS520 good cond:£235. FT290 MK1 with case, nicads, charger, mobile mount, BNOS 50W linear: £265. or swap both for FT102. Hi-lo pump-up telescopic mast. Model NK9 lightweight alluminium 30ft fully ext. Five section 50mm top diameter 102mm bottom. Complete with stainless steel kit for guys: £400 ono. Frank G0NCT QTHR. (Basildon) 0268 680596.

TS680S, mint condition, boxed with manuals: £675ono. SMC PSU, 25a, 35a surge: £100. Dewsbury Supa Tuta with keyer: £45. (Exmouth) 0395 277479.

TS830S worked 161 countries: £550 or good offer. Peter G3ELH QTHR. (Petersfield) 0730 64971.

YAESU 480R 2m multimode very good condx:£250. 690R exc condx c/w unused nicads:£325. G6YYN QTHR. (N. Yorkshire) 0757 638539.

YAESU FF50 low pass filter:£10. FT101ZD (6 band), fan, mic, h/book:£350. SP-90 spkr:£17. FT200/FP200 boxed, h/book, Shure 201 mic:£185. Datong FL2 brand new, boxed:£65. RF speech proc:£19. D70 morse tutor:£33. Trio 9R-59DR rx, h/book:£40. ET346 d/beam scope, leads, circuits:£39. 10m FM tx/rx, 4W, 40ch, mic, boxed new: £35. Suitable helical whip:£12. SMC monitorscope, h/book:£59. CDE AR40 rotator:£39. Heathkit sig-gen:£17. Tech valve v/meter:£9. BC221, PSU:£14. Avo8 (shunt o/c) movement sound: £9. TTC transistor tester:£12. 6A variac:£19. Eddystone 958 dial, new offers? G2HCY QTHR. (Middlesex) 081 866 4871.

YAESU FL2100.Z linear amplifier, handbook, little used, in original carton, buyer collect:£500 ono. G3LKQ John. (Wiltshire) 0672 40742.

YAESU FRG8800 Rx fitted VHF FRV8800 converter plus FRT 7700 ATU no mods, original packing c/w manual:£385. Diamond CP22J 2m vert. Antenna original pack never used: £20. Carriage or collection by arrangement. G0PAJ. (Lancaster) 05242 61578.

YAESU FRG9000 c/with power supply, manual as new:£280. G3UUG QTHR. (Maidstone) 831173.

YAESU FT 102 fitted AM FM narrow CW SSB filters amplified desk mic. FTV-901R TVTR 6, 2, 70m + sat. Tokyo hy-power HC 2000 ATU + SWR pwr meter:£875. (Bristol) 0272 649257.

YAESU FT One general coverage transceiver:£875 ono. Yaesu FT101z warc Mk3 FM fan manuals:£475 ono including carriage. GW0JLA Dennis. (Neath) 0639 730647.

YAESU FT101ZD Mk3 fan, mic, FM board, workshop manual, FC902 ATU, FV901DM synthesised scanning VFO with 40 memories, YO901 multiscope c/w Panoramic Adaptor:£850 ono. No splits G0FQX QTHR. (Milton Keynes) 0908 667250.

YAESU FT690R11 boxed, mint, little used includes chrgr, case etc:£400 ono. 1 month old. G6ZAM QTHR. (Middlesex) 0784 258196.

YAESU FT727R hand held dual band TXRX, soft case, two FNB-3 nicad battery packs and NC-9C mains charger:£260 G8PNX. (Sheffield) 0742 667730.

YAESU FT767 gx mint:£900. Kenwood TH75E 144/430 FM dual bander:£250. Mizuho 40m SSB h/held with AN-7 antenna:£125. Dual band mobile antenna:£15. Amstrad RS232 interface:£20. Doctor DX Morse contest:£20. Handipacket portable TNC £150. (Romford) 04023 74043.

YAESU FT770RH 25W 70cms FM mobile, vgc: £190. Alinco ALR22E 25W 2m FM mobile, vgc: £170. Realistic PRO 2004 wide band scanner: £185. Yaesu SP767 extension spkr, as new: £40. Yaesu FTH 2005 (commercial version of FT23R) fitted keypad for full coverage of 2m band: £95. Kenwood TH77E dual band handie, as new: £300. BBC-B computer series 8, c/w data recorder, green monitor and some software. Packet terminal in ROM, case tacky but good working order: £150ovno. President HR2600 10m M/Mode (same as UNIDEN 2830) vgc: £200. Microwave modules 144MHz tcvtr MkII model 28MHz IF, would suit above radio, vgc: £115. (Kilsyth) 0236 824167.

YUPITERU MVT-5000 multiband scanner with case original box:£199 ono. Kenpro KT22 2m handheld as new:£100 ono. (Baldock) 0462 896141.

WANTED

AP1086 ISSUE one 1938/1952 (RAF radio stores ref. no's). Also air publications relating to radio, radar equip, exc prices offered. Would purchase post-war to current magnetrons, klystrons, T/R cells, TWT's. photo-multipliers, microwave and special cv types. Required unmodified GEE r/x type R1355, M.GEE (E. London) 071 511 4786 or 071 790 2846.

BP4, A3, B2, MCRI, MK123 covert radios. Also BC611 handie or WHY?. For WW2 and post war collector. G8BXO QTHR. (South Molton) 0769 573382.

COLLINS 32 S transmitter, SM3 & MM1 mic, 51 S rcvr. (Steyning) 0903 814516.

DUAL BAND TCVR 20m 70cms similar Kenwood TW 4100E duplexer, mains prefered G4PDN. (Northumberland) 0661 72950.

KENWOOD external VFO type VFO-30G preferably working but anything considered. Steve G8JZT QTHR. (London) 081 855 6878 (Evenings).

POLARPHASER required for 70cms. Will pay postage. Contact Bill GM0NRT QTHR. (Aberdeen) 0224 591606

1 **DIAGRAM** for LG300. I have the set laid out ready to wire. Will pay for photocopy etc. New member RS94074. Any ham using a LG300 is welcome. Contact John Forster, 51 Ilfracombe Gdns, Whitley Bay, Tyne & Wear NE26 3LZ.

6M MODULE to fit FT726R. G7HSA. (Ludlow) 0584 872618.

ACCESSORIES for Drake TR7/7A, eg NB-7 blanker, SL4000 SL1800 filters, RV-7 VFO WHY? Stuart Senior G4MIB QTHR. (S London) 081 674 6452.

ARRL handbook for 1987 or 1988 in good condition. G3UGL QTHR. (Bedford) 0234 750050

ATU FC902. G4XSG QTHR. (Ashbank) 0781 303969.

AVO VALVE data manual, Avo valve data handbook. Any other valve data handbooks. (Wolverhampton) 0902 781726.

BS8 PAN adaptor unit for Kenwood SM220 scope. T Smithers, 9 Penning Close, Melksham, Wilts SN12 7RX.

CIRCUIT diag for Pye Europa MF25FM. All costs paid. Call or write to Richard G4VCQ QTHR. (Poole) 0202 691021.

CIRCUIT DIAGRAMS for Ekco broadcast rcvr type AD75 serial no. 57368 about 1932/3. Will reimburse costs. Tony G4HFN QTHR. (Twyford) 0734 343959.

COLLINS 75A4, KWSI, 51S1-3, 30S1 amp, 312B-S VFO, 302 C-3 wattmeter, DLI, DX engineering processor. Any Collins equip considered. Any Collins information ie handbook, manuals, adv lit, technical articles, history. G3ZIG QTHR. (Dereham) 036288 430.

DRAKE R4245 DSR2 MSR2, RR3 receiver. 5NB blanker. Z3100 protector. FS4 synth. R4c above 28000. Any Sherwood parts. Looking also for TR4310. Will import any rack mounted drake gear WHY? Thanks G3YFK. (Shrewsbury) 0743 884858.

EDDYSTONE EA12 in nice condx; also KW vanguard, valiant, etc am tx. (Ipswich) 0473 311665 (after 7pm).

EINSTEIN TC01 ram disc, circuit for 80col card or complete unit. Any condition considered. G4HRY QTHR. (Coventry) 0203 618648.

HANDBOOK manual for Trio TS515 tcvr will pay for photocopying and postage. After 6.15pm (Braintree) 0376 44538.

KAM TNC ideally with wefax plus BBC and/or pc software and leads. G4WJX. (Stoke-on-Trent) 0782 330613.

KOKUSAI MECHANICAL filter type MF455 10ck. No CZK0270. (Aldridge) 59150.

KW2000 PSU or T x HT transformer DS 3533-2 only. Circuit diagrams for rig and PSU. Also 19 set mains tx/rx PSU. Clive G4SLU. (Poole) 0202 748360.

KW2000ABE non working wanted. KW ATU PSU etc, mechanical filters working also wanted. Phone Clive G0FBO. (Brownhills) 0543 370663.

MARCONI marine manual Morse key wanted. G455H QTHR. (Scarborough) 0723 862924.

MODERN MOTORCYCLES 3 vols Caxton Press 1945 era. Auto mobile electrical maintenance A Judge. Modern electrical equipment for auto mobiles A Judge 1945 era. Any Lucas bth Miller, Bosch, Wipac, Wico, Cav, Sims publications. G4EGB QTHR. (Scarborough) 0723 362537.

PHILIPS Video 2000 tapes, four 8hr double sided as cheap as poss. G4TLY QTHR evenings. (Malmesbury) 0666 822935.

QSO LANGUAGE cassette with Italian supplement. G4MAQ QTHR. (Oxford) 0865 718430.

R308 receiver and or h/book. R206 receiver, case for W518 or scrap set. Eddystone 830, EA12 or 880. Dial for Eddystone 680x or scrap set. PSU accessories for W519. Valves 6973, 6CY7, 6EU7, 6AN8, 6AW8, 6SC7. G4XWD QTHR Jim. (Kidderminster) 0562 823674.

RACAL RA1770 any price paid. Also Eddystone '880' or AR88. (Glasgow) 041 649 2328.

ROTATOR (medor heavy) c/w control unit (for 2 ele quad) wihtin SE England. Also inexpensive 2 metre tcvr for local qso's (mobile FM etc). Craig (Maidstone) work hrs only 0622 671241 (x3203).

ROTATOR and control unit, also VHF YAGI prefer matched pair. Gen coverage receiver prefer Trio but WHY. Dave G0IBW QTHR. (Guisborough) 0287 633816.

SIGNAL GENERATOR AM - range 100kc/s - 30/40mc/s approx. Good attenuator essential. G3PTN QTHR. (Leeds) 0532 654644.

SINCLAIR Spectrum ZX overlay keyboard: Maplin or similar type, also wanted; Sinclair ZX plus. G0LEO QTHR. (S Birmingham) 021 453 3111.

STILL REQUIRED: metal 6A8 wartime style valve, with complete lettering. Small parmeko HT transformer, not WD. Bernard Litherland G4IMT QTHR. (Chippenham) 0225 891 254

TO COMPLETE working T1154 R1155 installation any aerial plugs and sockets. Esp sockets type 135 104/319 and 136 104/320. M/c/tel panel type 192, operators plugs & sockets 10H2206 4 way jacks. Any AP's. Loop aerial plug type 209 10H/433. G4CCW QTHR.

TS790E in good order only please. Also old RX valves type DD620, ZD13C, PEN36C for restoration. Dick G0HPM QTHR. (Nr Newbury) 0734 713332.

TU UNIT(S) any suffix. Six metre solid state amplifier. GW3KAJ QTHR. (Llanidloes) 05512 3511.

WANTED FOR collection rx's 1155. TCS12, RA17 also 898 dial used or new condition cash waiting. (Shropshire) 0939 34605.

WANTED very late Collins S-Line. G0AQH QTHR. (Brighton) 454108.

WELZ Diamond 80 metre mobile antenna. John G0IOR QTHR. (Grimsby) 0472 358449.

EXCHANGE

B2 TX for B2 Rx in reasonable condition in order to complete set. (Hemel Hempstead) 0442 66787.

KENWOOD dualband, handheld for dualband mobile or 70cms multimode, 6m rig or TS670 quad band or similar cash adjustment. Dave (Norwich) 0603 745512.

MARCONI Marine apollo rcvr, modified for telex with local oscillator 15kHz to 28MHz and high stability VFO covering Marine bands spector FEC and ARQ equipment. STC 3000 perfector teleprinter, built in VDU, 48K store. ITT creed 2300 teleprinter with tape reader and punch (all with manuals) exchange for all mode allband HF tcvr for more details phone G7FNI QTHR. (South Shields) 091 455 3956.

RADIO control equip futaba 6ch, 4 servo built aircraft trainer flown once, many extra's flight box, electric start control panel, fuel spare prop exchange for amateur radio equip 70cm. Dual bander WHY?. G0CEL QTHR. (Teignmouth) 0626 779455.

TRANSVERTER RN electronics 25W o/p used daily works superbly. Ex condx want same but 2m IF or WHY?. G7DGH QTHR. (Ormskirk) 0695 572933.

CLUB NEWS

DEADLINE - Items for inclusion in the March 1992 issue must be sent to HQ marked "Club News - DIARY", to be received by 13 January 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 - 1, talk 'Simple Circuit Designs'; 8, talk 'Hands on Pottery'; 15, soldering iron evening; 29, video evening - please bring your own. Details Whitchurch 832222 on a Wednesday evening.

BEDFORDSHIRE

SHEFFORD & DARS -16, Annual General Meeting. Details 0908 274473.

BERKSHIRE

BRACKNELL ARC - 8, Annual General Meeting. Details 0344 57329.

BURNHAM BEECHES RC - 6, Welcome to Farnham Common Hall; 20, talk 'FAX'. Details 0628 25952.

MAIDENHEAD & DARC - 2, talk 'Direct Conversion Transceivers' by John, G3TWG; 21, Great Egg Race; Feb 6, talk 'Making Printed Circuit Boards'. Details 0628 25952.

BORDERS

BORDER ARS - ***NEW SECRETARY*** Alex M McCreadie, GM0BPY, 16 Fancove Place, Eyemouth, Borders TD14 5JQ; tel: 08907 50492.<dh>CAMBRIDGESHIRE

BUCKINGHAMSHIRE

AYLESBURY VALE RS - 8, club Christmas Dinner; 22, Annual General Meeting. Details 0296 81097.

CAMBRIDGE & DARC - 10, talk 'Starting Out in QRP' by John Smith, G4KKJ; 17, talk 'Vintage Wireless' by Mike Kemp; 24, talk 'What's New?' by Tony, G4NBS of Lowe Electronics; 31, talk and demonstration 'Remote Imaging' by Brian Shaw, G6HFS. Details 0763 243570.

CHESHIRE

CHESTER & DARS - 7, Annual General Meeting; 14, construction contest winners night; 21, surplus equipment sale; 28, talk 'Ancillary Equipment' by Harry, G3MCN. Details 051-608 3229.

CLWYD

DELYN RC - 15, talk 'The Work of the British Legion' by Rose Massey; 24, talk 'Amateur Satellites - What They Are, What They Do and How to Work Them'; Feb 12, talk and demonstration by MGR Communications. Details 0244 819618.

RHYL & DARC - 6, talk and demonstration 'Satellite TV' by Roy, GW8XLL; 20, homebrew night; construction of GDO; Feb 3, talk 'Marine Radio Licence' by Barrie, GW7EXH. Details 0745 338276.

CORNWALL

SALTASH & DARC - 17, talk 'Air Mail'; Feb 7, talk 'Inside your VCR'. Details 0752 844321.

CUMBRIA

WESTMORLAND RS - Meets third Wednesday each month at the Methodist Church, Burneside Road, Kendal. Details from Ray Hills, tel: 05395 63621l.

DERBYSHIRE

DERBY & DARS - 8, talk 'The Work of the RSGB' by John Allen, G3DOT; 15, talk 'The Work of the Amateur Radio Observation Service' by Geoff Griffiths, G3STG; 22, talk and demonstration 'Modular Kits for the Constructor' by Derek, G3ZOM of Jandek; 29, video show; Feb 5, junk sale; 12, visit to Drakelow Power Station near Burton-on-Trent (numbers limited - 7.45 start). Details 0773 852475.

DEVON

TORBAY ARS - 24, construction cup judging. Details 0803 526762.

DORSET

POOLE RAS - ***CHANGE OF VENUE*** Lady Russell Coates House, rear of the Jelico Theatre, Poole College of Further Education, Constitution Hill Road, Poole. 10, talk 'Making Printed Circuit Boards' by Tony Emery, G3YWG; 17, Annual dinner (details from G0KKL on 0202 742453); Feb 14, talk 'Radio Astronomy' by Peter Werba, G7FXO. Details 0202 760231.

SOUTH DORSET RS - 7, talk 'Further Jottings from Ed' by G3VPF; Feb 4, talk 'More Adventures of a Wartime RAF Radio Operator' by Ted, G3ETA. Details 0305 781164.

ESSEX

BRAINTREE & DARS - 20, The club entertains Braintree Air Training Corps ARS. Details 0376 27431.

FIFE

DUNFERMLINE RS - 2, A Guid New Year at 'Outh'; 9, video evening - including the RSGB video; 30, slides 'Pot-pourri of the Society Over the Last 2 Years'. Details 031 331 4340.

GLOUCESTERSHIRE

GLOUCESTER ARS - 8, slide show 'Review of the Year'; 15, construction group; 22, Packet self-help group; 29, homebrew clinic. Details from Mrs J Beckingham, c/o 7B The Courtyard, Lysons Avenue, Gloucester GL1 5QE.

GRAMPIAN

ABERDEEN ARS - 10, New Year's grand junk sale, auctioneer GM0LNQ. Details 0224 780519.

GREATER LONDON

ACTON, BRENTFORD & CHISWICK ARC - 16, Annual General Meeting. Details 071-938 2561.

BROMLEY & DARS - 21, Annual General Meeting. Details 081-462 2689.

CLIFTON ARS - 3, test gear evening; 13, annual dinner at The George, Catford at 7.30pm; 24, ARRL/RSGB/NFD videos; Feb 7, computer evening. Details 081 691 2341.

COULSDON ATS - 13, talk 'History and Development of the Harrier Aircraft' by Andy Boyne, G4RFX. Details 081 684 0610.

CRAY VALLEY - 9, talk and slides; 23, donated surplus sale; Feb 6, talk 'Servicing VCRs' by G0GIR. Details 081-699 6940.

CRYSTAL PALACE & DARC - 18, talk 'Design of a Solid State HF Transceiver' by R F Burns, G3OOU; Feb 15, AGM. Details G3FZL, QTHR.

EDGWARE & DARS - 9, Annual General Meeting; 23, club archives. Details 081 205 1023.

HAVERING & DARC - 8, Annual General Meeting; 22, Oliver's Twist No. 2. Pencils & paper required. Oliver Tillet, G3TPJ; Feb 5, talk 'Gliding and Motor Gliding' by Eric Couzens, G0PGO. Details 04022 23310.

SILVERTHORN RC - meets at Chingford Community & Adult Education Centre, Friday Hill House, Simmons Lane, Chingford. Details 081 529 4489, 6-7pm wkdays.

GREATER MANCHESTER

ECCLES & DARS - 7, talk 'X25 and Packet Radio' by G8KRG; Feb 4, discussion 'Club Stand at the Norbreck Rally;. Details 061 773 7899.

GWENT

PONTYPOOL ARS - ***CHANGE OF ADDRESS*** Secretary's address is: 6, Oaktree Close, New Inn, Pontypool, Gwent NP4 0DG; tel: (unchanged) 0495 762604.

GWYNEDD

DRAGON ARC - 6, talk 'The Work of Rotary' by Mr Andrew Laing; 20, talk 'Repeater Linkage' by Brian Davies, GW4KAZ; Feb 3, talk 'Electrical Distribution and Earthing' by Tony Rees, GW0FMQ. Details 0248 600963.

HAMPSHIRE

HORNDEAN & DARC - 2, talk 'British North Greenland Expedition 1952-54' by Richard Brett-Knowles, G3AAT; Feb 6, Hampshire Fire Service Communications. Details 0705 472846.

ITCHEN VALLEY RC - 10, talk 'QE2 Wireless Room' by Phil, G3YPQ; 24, talk 'Switched Mode Power Supplies' by Geoff, G8DXK. Details 0703 736784.

HEREFORD & WORCESTER

BROMSGROVE & DARC - 10, talk 'Operating Awards' by G4IVJ; Feb 14, questions & answers by team. Details 021 477 7447.

HEREFORD ARS - 3, talk 'Commercial Antennas' by Mr Rick Logan, G4WXF; 17, radio quiz. Details 0432 355297.

KIDDERMINSTER & DARS - ***NEW SECRETARY*** Geoff Philpotts, G7JIR, 62 Emeley Close, Stourport on Severn, Worcestershire DY13 0AH, tel: 02993 79229.

REDDITCH RC - 9, talk and demonstration 'Introduction to Packet' by G3FVV and G4STE. Details 0789 762041.

HERTFORDSHIRE

CHESHUNT & DARC - 15, talk 'The Novice Licence' by Hilary, G4JK; 29, talk 'RTTY and AMTOR' by John, G3WFM. Details 0992 464795.

STEVENAGE & DARS - 8, talk '2 Metre D/F Aerial' by Alf, G7KPV; 22, talk 'DTMF & CTCSS' by Tony, G0OVO; Feb 5, Round Robin, VHF mobile/base station aerials. Details Stevenage 724991.

VERULAM ARC - 28, talk 'Medical Lasers' by Mr S McKeever, G0NND. Details 0727 59318.

HUMBERSIDE

BARTON & DARC - ***CONTACT*** A A Smith, G0HXI (Secretary), 5 Maltkiln Road, Barton-on-Humber, South Humberside DN18 5JT; tel: 0652 34704.

GOOLE R&ES - 3, Club twinning meeting; 10, talk 'Novice News' by G0GLZ; 24, film 'Microwave Links'; Feb 14, junk sale - 8.30pm. Details Goole 769130.

KENT

MAIDSTONE YMCA ARS - 3, talk 'Interesting Keys and Their History' by G3VTT; 17, Anything interesting, G3ROO; 31, talk 'Novice Licence', RSGB video. Details from Colin L Roberts, 16 Derby Road, Maidstone, Kent.

WEST KENT ARS - 17, talk 'Cellular Radio' by Bill Hunter. Venue - School annex, Albion road, Tunbridge Wells. Details G3OHV, QTHR.

LANCASHIRE

PRESTON ARS - 9, illustrated talk 'Lancashire's Colour and Charm' by Mr Shaw; 23, Annual General Meeting. All members to attend.

THORNTON CLEVELEYS ARS - 6, quiz organised by G2CBH; 13, demonstration of Amateur Television by G0AJQ and G1TXV; 27 design of club stand for Norbreck Rally. Details from G4BFH, QTHR.

LEICESTERSHIRE

LOUGHBOROUGH & DARC - 7, open evening; 21, talk 'The Callsign' by Jim, G0FTT; 28, talk 'Computers and Things' Details 0509 218259.

MERSEYSIDE

ST HELENS & DARC - "NEW SECRETARY" R T Bennett, G4DIY, 17 Truro Close, Carr Mill, St Helens WA11 9EL.

WIRRAL & DARC - 8, Annual General Meeting; 22, surplus equipment sale; Feb 5, D&W Ring o'Bells, West Kirby. Details from Andy, G7HUD, tel: 051-677 4448

NORFOLK

AMATEUR RC OF FAKENHAM - 7, talk 'How to Help the QSL Bureau and Your QSL Manager' by Dave, G4DCJ. Details 0603 747992.

NORFOLK ARC - 8, talk 'Getting Signals Out of Noise' by Stuart Dodson, G3PPD; 15, 'Real Radio' evening; 22, talk 'Homebrew Test Gear' by Mike Coan, G4EQL; Feb 5, talk 'Construction Techniques (PCBs etc)' by Gary Parkhurst, G3TOZ. Details 0603 747992.

NORTHAMPTONSHIRE

KETTERING ARS - ***SECRETARY*** Mr L J L Davies, G7EHM, 113 Headlands, Kettering NN15 6AB, tel: 0536 514544 - 14, slide show of old Kettering by Terry Green, G7AJS; Feb 4, talk 'BBC Transmitters and Transmissions' by Mike Higgins, Senior Transmission Engineer BBC (Radio). Details 0536 514544.

NORTH YORKSHIRE

HAMBLETON ARS - 13, RAE course; 20, visit to RAF Leeming (7pm start); 27, Annual General Meeting. Details 0609 776608.

YORK ARS - 10, Annual General Meeting. Details from G3WVO, QTHR.

NOTTINGHAMSHIRE

SOUTH NOTTS ARC - 3, Annual General Meeting; 17, RSGB videos on Amateur Radio Sats FUJI and OSCAR; 31, visit to Central TV (provisional); Feb 2, open forum. Details 0509 672734.

SHROPSHIRE

TELFORD & DARS - 15, contest planning; 22, G4EAB videos; 29, quiz night. Details Bridgnorth 761203.

SOMERSET

TAUNTON & DARC - 3, talk and demonstration 'A Balanced Balanced Antenna Tuner' by Doug Hall, OBE, G5JJ; 17, talk 'The Use of Weather Satellites in Schools' by Mr Mike Platt, Head of Geography, Queen's College, Taunton. Details 0823 680 778.

SOUTH GLAMORGAN

CARDIFF RSGBG - 13, talk 'Fibre Optics - an Overview' by Jim Baker of British Telecomms. Details 0446 773212.

STAFFORDSHIRE

STAFFORD & DARS - 21, talk 'Reciprocal Licensing' by G4DGM. Details from Bernard, tel: 0785 662350.

STRATHCLYDE

WEST OF SCOTLAND ARS - 17, talk 'The Voluntary Interceptor Service' by Tommy, GM3EDZ; 31, talk 'The CAA Air Traffic Control Service' by Mike, GM4SUC; Feb 14, talk 'Operating from the Arctic/Antarctica' by Laurence, GM4DMA. Details 041 776 4181.

SUFFOLK

LOWESTOFT DISTRICT & PYE ARC - 2, talk by G8JBD; 16, visit to Lowestoft College. Demonstration of Navigational Aids Equipment, organised by G6MCB. Meet at College at 7.30pm; 30, surplus equipment sale. Details G4KDL, QTHR.

MARTLESHAM RS - ***NEW SECRETARY*** Roy Smith, Software Technology, G44, SSTF Building, BT Laboratories, Martlesham Heath, Ipswich IP5 7RE; tel: 0473 646091.

SURREY

DORKING & DARS - 28, Annual General Meeting - Friends' Meeting House. Details 0306 77 236.

ECHELFORD ARS - 23, talk 'Ham Radio in Sri Lanka' by Doug Goodison, G0LUH; Feb 13, talk 'Linear Amplifiers' by John Stockley, G8MNY. Details 0344 843472.

TAYSIDE

DUNDEE ARC - 14, talk 'Fire Prevention' by Allan Martin, Fire Prevention Officer, Tayside Fire Brigade; 28, talk 'RADAR' by Paul Bradberry, GM7GUC. Details from GM 4FSB, QTHR.

WARWICKSHIRE

STRATFORD-UPON-AVON RS - 13, projects evening (bring along your project); 27, New Year social (venue to be confirmed). Details 060 882 495.

WEST MIDLANDS

SOLIHULL ARS - 16, talk 'RSGB Affairs' by John Allen, G3DOT. Details 021-783 2996.

STOURBRIDGE & DARC - 20, talk 'How Not To Dx' by G3UBX. Details from G0HTJ, QTHR.

WEST SUSSEX

HORSHAM ARC - 2, talk 'Digital Signal Processing' by G3ZBU. Details 073784 2150.

MID SUSSEX ARS - 16 Annual General Meeting. Details G0OIO, QTHR.

WEST YORKSHIRE.

BRADFORD ARS - 23, slide show 'A Visit to Sydney' by ex-VK2FUV; Feb 13, display and discussion - bring your homebrew equipment. Details 0274 474674.

HALIFAX & DARS - 21, talk 'The Sky at Night' by J Hosty. Details Halifax 202306.

KEIGHLEY ARS - 16, talk 'ELF' by G3OTE; 30, Annual General Meeting; Feb 13, talk 'Scout Tour of America' by G7HHD. Details from Kathy, tel: 0274 496222.

NORTHERN HEIGHTS AR&ES - 15, annual dinner; Feb 5, video show. Details 0274 673116.

WILTSHIRE

AXE VALE ARC - ***CHANGE OF VENUE*** 'The New Commercial', Trinity Square, Axminster. - 3, receiver construction contest. Details 0297 33756.

DEVIZES & DARC - 17, Annual General Meeting. Details 0380 724533.

TROWBRIDGE & DARC - 15, Annual General Meeting. Details 0380 830383.

RALLIES AND EVENTS

This is a list of all rallies, hamfests, exhibitions and conventions notified to HQ (as at press date). Items are given in detail for the next three months inclusive and in brief thereafter. Please send detailed information, including contact callsign and telephone numbers direct to HQ and marked 'Rally News - DIARY'.

19 JANUARY

OLDHAM ARC Rally - Queen Elizabeth Hall, Civic Centre, Oldham. Doors open 11am. Free parking. Catering & bar facilities. Morse test available. Details from Mrs K. Catlow, 137 Haven Lane, Moorside, Oldham OL4 2QQ, tel: 061-624-7354 (daytime) 061-652 8617 (evening), fax: 061-633 0550.

26 JANUARY

2ND LANCASTRIAN Rally - University of Lancaster. Doors open 11am (10.30 for disabled visitors). Details from Sue, G1OHH on 0524 64239 or QTHR.

2 FEBRUARY

SOUTH ESSEX ARS Radio Rally - Paddocks Long Rd (A130), Canvey Island, Essex. Doors open 10am. Trade stands, bring & buy, RSGB book stall, home-made refreshments, free parking plus parking outside the main door for disabled visitors. 2m talk-in on S22 (G4RSE).The Paddocks is at the end of the A130. Details from Dave Speechley, G4UVJ, tel: 0268 697978.

9 FEBRUARY

CAMBRIDGE & DARC Mobile Rally and Boot Sale - Ambulance Station, Addenbrooke's Hospital, Cambridge. All the usual attractions. Doors open 10.30. For information and to make bookings contact George, G0OEL, QTHR, 0954 719273.

22 FEBRUARY

KIDDERMINSTER & DARS Rally - Harry Cheshire School, Habberley Road, Kidderminster. Doors open 10am. Normal trade stands, bring & buy, car boot sale, refreshments available, free admission and car parking. Talk-in on S22. Details from G4HFP, 16 Marlborough Drive, Stourport-on-Severn, Worcs. DY13 0JH, tel 02993 3818.

23 FEBRUARY

5TH TAW & TORRIDGE RALLY - BAAC Halls, Bideford. Doors open 10.30am (10am for disabled visitors). Trade stands, bring & buy, refreshment room, lincensed bar. Talk-in on S22. Details from John, G0GFK, 0237 476402.

EAST COAST AR & Computer Rally - Clacton Leisure Centre, Vista Road, Clacton-on-Sea. Details from Terry, G7DNS, tel: 0255 222207 or Tony, G0MBA, tel: 0255 422843.

WAKEFIELD & DARS Northern Cross Rally - Rodillian School between Leeds and Wakefield (at junction M1/M62). Open 11am (10.30am for disabled visitors. Parking for 1000+ cars. Dealers, Groups and Craft stands, bring & buy, Morse test, RSGB Propagation Studies Stand, Car crime prevention demo, Wakefield & DRS stand, bar and refreshments. Talk-in on S22. Entry 50p (programme draw prizes). Details from G0FLX, tel: 0532 827883.

29 FEBRUARY

BREDHURST R&TS Rainham Radio Rally - Parkwood Community Centre, Parkwood Green, Gillingham, Kent.(Exit 4 on M2 Motorway). Bring & buy, traders, cafe and bar, free parking. Talk-in on 2m. Details from G0LKE, tel: 0634 362154.

TYNESIDE ARS - Temple Park Leisure Centre, South Shields. Usual traders; catering facilities including bar. Free parking. Details from Jack, G0DZG, 091 265 1718. (This Rally was previously scheduled for 7 March).

1 MARCH

TRAFFORD Rally - G-Mex, The Greater Manchester Exhibition & Events Centre, City Centre, Manchester. Doors open 10.30 (with disabled visitors' priority queue). All usual traders, RSGB stand, Bring & Buy and new traders. Morse Tests (apply via RSGB HQ). Free cash draw, licensed bar, refreshments, ample car parking. Admission £1.50. 2m talk-in on S22 via GB1GMX. Details from Graham Oldfield, G1IJK, tel: 061-748 9804.

7/8 MARCH

LONDON AR Show - Picketts Lock Centre, Picketts Lock Lane, Edmonton, London W9. Details 0923-678770.

14 MARCH

RSGB VHF CONVENTION - Sandown Park Exhibition Centre. Stand booking to Les Hawkyard, G5HD, tel: 040-928 342. Details from Geoff Stone, G3FZL, tel: 081-699 6940. Please note this is on a Saturday this year.

15 MARCH

NORBRECK ARE&C Exhibition - Norbreck Castle Exhibition Centre, Blackpool. Details from Peter Denton, G6CGF, tel: 051-630 5790.

WYTHALL RC Rally - Wythall Park, Silver St, Wythall, (near Birminghham, on the A435 2 miles from Jnct 3 on M342). Doors open 11am. Usual traders in three halls; bar and refreshment facilities. Bring & Buy stall run by the club. Talk-in on S22. Admission 50p. Details from G0EYO, 021-430 7267.

22 MARCH

MAGNUM Radio Computer Rally (Cunningham & DARC) - Magnum Leisure Centre, Irvine, Ayrshire. Doors open 11am (10.30 for disabled visitors). Trade stands, Bring & Buy, Raffle. Lucky-programme prize. Details from Peter, GM0FCI, 0294 72253.

PONTEFRACT & DARS 12th Annual Components Fair. Details from Colin Mills, G0AAD, 0977 643101.

5 APRIL

LAUNCESTON 6th AR Rally - Launceston College. Details from Maggie 040921-219 or Rodney & Joy, 0566-775167.

25TH WHITE ROSE Rally. Details from Tony, G4DXA, PO Box 73, Leeds LS1 5AR.

19 APRIL

CENTRE OF ENGLAND Easter Radio & Electronics Rally. Details from F Martin, G4UMF, 0952 598173.

26 APRIL

BURY RS Hamfeast - Castle Leisure Centre, Bolton St, Bury. Details from L H Jones, G4KLT, 061-762 9308.

MARSKE-BY-THE-SEA Radio Rally (East Cleveland ARC) - Marske Leisure Centre, High Street, Marske-by-the-Sea, near Saltburn. Details from Mike Tennent, G7ION, tel: 0473 610030.

SWANSEA ARS Rally - Swansea Leisure Centre. Details from Roger Williams, GW4HSH, 0792 404422.

3 MAY

9TH ANGLO-SCOTTISH Rally - Tait Hall, Kelso. Details from Bruce, GM4UIB, QTHR.

4 MAY

MID CHESHIRE ARS Rally - Civic Hall, Winsford. Details from David G4XUV, 0606-77787.

10 MAY

MARS/DRAYTON MANOR Radio Rally. Details from Peter, G6DRN, tel: 021-443 1189. Trade stand bookings - Norman, tel: 021-422 9787.

YEOVIL ARC 8TH QRP Convention - Preston Centre, Monks Dale, Yeovil. Details from Peter Burridge, G3CQR, QTHR.

16 MAY

SWINDON & DARC Radio Rally - Oasis Leisure Centre, Swindon. Details from G0LTP, tel: 0793 852855.

30/31 MAY

RSGB NATIONAL CONVENTION - NEC Birmingham. Details from Norman Miller, G3MVV, QTHR.

14 JUNE

ELVASTON CASTLE Mobile Rally. Details from John, G4PZY, tel: 0332 767994; trade enquiries Peter, G3WFU, tel: 0332 700265 (evenings).

RNARS Annual Mobile Rally. Details from Cliff Harper, G4UJR, 0703 557469.

21 JUNE

DENBY DALE & DARS Annual Mobile Rally. Details from Philip, G4FSQ, 0484 644827.

NEWBURY & DARS Annual Car Boot Sale. Details from N Jaques, G0HFU, 0635 63310.

28 JUNE

LONGLEAT AR Rally. Details from Shaun, G8VPG, QTHR, tel: 0225 873 098.

LOWER WICK Country Fair - rear of Bennetts Dairy, Lower Wick, Worcester. Details 021 477 7447.

5 JULY

YORK Radio Rally - York Racecourse. Details from David Moreland, G7FGA.

11 JULY

CORNISH RAC Rally - Penair School, St Clement, Truro. Details from Mr B Thomas, tel: 0872 862046.

12 JULY

SUSSEX AR & Computer Fair. Details from Ron Bray, G8VE, QTHR, 0903 763978.

25/26 JULY

Norfolk ARC & Hewett School Rally. Details M J Cooke, 4 Geddes Way, Mattishall, Norfolk NT20 3RE.

30 JULY-2AUG

AMSAT-UK Colloquium - University of Surrey. Details from G3AAJ, tel: 081 989 6741.

2 AUGUST

RSGB NATIONAL MOBILE RALLY - Woburn Abbey. Details N Miller, G3MVV, QTHR.

13 SEPTEMBER

BARTG Rally - Sandown Park Exhibition Centre, Esher, Surrey. Details from Peter Nicol, G8VXY, tel: 021 453 2676.

20 SEPTEMBER

EAST OF ENGLAND Radio Rally (Peterborough R&ES) - ICI Building, East of England Showground, Peterborough. Details from Mike Bowthorpe, G0CVZ, tel: 0733 222588.

GB CALLS

The list below shows all special event stations licensed for operation during this month and up to 31 January. It was taken from the HQ computer on 25 November. These callsigns are valid for use from the date given but the period of operation may vary from 1-28 days.

1 DECEMBER

GB2GM	Guglielmo Marconi
GB2HBQ	Happy Birthday Quay

8 DECEMBER

GB5OATC	Air Training Corps

10 DECEMBER

GB2NOV	GB Novice
GB2PYM	Paisley YMCA
GB5SG	Season's Greetings

13 DECEMBER

GB2DX	'DX'

14 DECEMBER

GB4KIM	Kelham Island Museum

15 DECEMBER

GB5OATC	Air Training Corps

1 JANUARY

GB2NEW	New Year

4 JANUARY

GBOCDB	Coastal Defence "B"

7 JANUARY

GB2NOV	GB Novice

18 JANUARY

GB2RAG	University Rag Week

SILENT KEYS

WE HAVE BEEN advised of the deaths of the following radio amateurs:

J Swinnerton MBE, TD, G2YS

John Swinnerton G2YS died on 1 August, he was 75. He obtained an AA (artificial aerial) callsign while still a minor; it was in fact the one relinguished by Arthur Milne when he became G2MI.

He was a founder member of the Coventry ARS and one time active member of the Chester and Scarborough Clubs. He served on Council for several years before becoming President in 1969.

In 1979, John was appointed MBE for his services to the National Savings Movement. For many years John struggled courageously against Parkinsons Disease but this did not deter him from sending CW; he just moved from a key to a keyboard.

G0BYB	Mr R T Precious	07.10.91
G0HII	Mr D Bowker	14.11.91
G0MCX	Mr V N Price	10.09.91
GM0HQY	Mr J Kilpatrick	
G0MDH	Mr J Hull	
GM1WZ	Mr J Dovaston	Sept 91
G2BXJ	Mr A F Thompson	14.07.91
G2HKF	Mr H D Wills	25.10.91
G3AFC	Mr P Beresford	04.10.91
G3LPD	Mr F J C Bray	25.10.91
G3MDO	Mr D N T Williams	
G3OIE	Mr P MacRae	07.11.91
GI3OLJ	Mr J W Campbell	27.11.91
G3WIF	Mr K W Clark	01.09.91
G3XYR	Mr B Rooke	
G4AKV	Mr T Allen	01.11.91
G4AMA	Mr C F Burgess	
G4LY	Mr W B Martin	24.08.91
G4WVV	Mr J B Powell	16.04.91
G4ZNV	Mr G W Draper	05.09.91
G6WCB	Mr C C Moore	
G8CKX	Mr G Elks	01.11.91
G8FG	Lt Cmdr H G Cunningham	12.11.91
G8JZF	Mr P Harries	14.02.91
G8OQL	Mr N E Turner	
G8PWL	Mr E Smith	
G8VMM	Mr L Grimshaw	
RS13512	Mr R Knowles	
RS38311	Mr W Longstaff	

RSGB BOOKCASE

A SELECTION OF THE FINEST AMATEUR RADIO PUBLICATIONS DELIVERED TO YOUR DOOR

ANTENNA BOOKS

		NON-MEMBERS	MEMBERS
All About Vertical Antennas	(RPI)	OUT OF STOCK	
Antenna Compendium Volume 1	(ARRL)	£12.35	£10.50
Antenna Compendium Volume 2	(ARRL)	£12.35	£10.50
Antenna Book 16th edition	(ARRL)	£19.41	£16.50
Antenna Notebook, W1FB	(ARRL)	£7.99	£6.79
Beam Antenna Handbook	(RPI)	£8.70	£7.40
All About Cubical Quad Antennas	(RPI)	£7.17	£6.09
HF Antennas for All Locations	**(RSGB)**	**£9.35**	**£7.95**
HF Antenna Collection - *NEW*	**(RSGB)**	**£10.65**	**£9.05**
Novice Antenna Notebook	(ARRL)	£8.65	£7.35
Practical Wire Antennas	**(RSGB)**	**£8.65**	**£7.35**
Radio Amateur's Antenna Handbook	(RPI)	OUT OF STOCK	
Reflections: Transmission Lines and Antennas	(ARRL)	£14.71	£12.50
Simple Low Cost Wire Antennas	(RPI)	£9.12	£7.75
The Antenna Experimenter's Guide	(DDP)	£10.68	£9.61
Transmission Line Transformers	(ARRL)	£14.71	£12.50
Yagi Antenna Design	(ARRL)	£11.89	£10.10

AWARDS BOOKS

Amateur Radio Awards Book (3rd Ed)	**(RSGB)**	**£10.89**	**£9.25**

BEGINNERS AND NOVICES

Amateur Radio for Beginners	**(RSGB)**	**£4.56**	**£3.88**
DIY Radio (pilot issue)	**(RSGB)**	**£2.23**	**£1.90**
DIY Radio (2nd pilot issue)	**(RSGB)**	**£2.23**	**£1.90**
DIY Radio (colour) Subscription (6 per year)	**(RSGB)**	**£9.00***	**£7.65***
First Steps in Radio	(ARRL)	£6.47	£5.50
Novice Licence Proposal by the RSGB	**(RSGB)**	**£7.17**	**£6.09**
Training: Novice Licence Instructor's Manual	**(RSGB)**	**£7.30**	**£6.21**
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The Last Word

THE REAL EFFICIENCY OF SMALL LOOP ANTENNAS

Pat Hawker (*Technical Topics*, October 1991) presents, without demur, a graph relating the efficiency of a loop antenna to its circumference, attributed to Dick Kelsall (G4FM).

This graph suggests that, if the loop circumference is 1/8th wavelength (ie 0.04l diameter) an efficiency of 80% can be expected. This is evidently based on the premise that the losses in the antenna are solely those of the copper conductor. However, as even the most simple measurement will indicate, this is very far from true in any practical system.

As I showed in my article ('Loop Antennas, Facts not Fiction', *Radcom* September/October 1991) losses come from many sources and not all of these are under control of the designer. The real efficiency possible from an antenna of, say. 1/8λ circumference at 3.5MHz is well below 10% and the published graph is in error by an order of magnitude or so, depending on the factors involved.

Dick Kelsall was kind enough to send me some measured data from his 80m loop which has a circumference of almost exactly an eighth wave. These data show that the efficiency he is achieving in his own antenna is just below 3%; a far cry from the 80% claimed by the curve.

This misconception is far from uncommon: just one further example can be found in Craighero's 'Electrically Tunable HF Loop' (*Radcom*, February 1989) in which a BASIC computer program is given which calculates efficiency. The algorithm used in that program assumes only one loss source - the conductor resistance.

These misunderstandings were what prompted me to write my article: there is a real risk of amateurs, not aware of the true situation, being exploited by less than scrupulous manufacturers whose performance claims for their products cannot be realised in practice. These antennas can be very expensive: the buyer must beware - they are not always the best thing since sliced bread.

A J Henk G4XVF

TRUE WARMTH AND FRIENDSHIP IN MALAYSIA

Following a recent four-week DX trip to Malaysia, I would like to take this opportunity to say a very big thank you to all hams in 9M2 who made my wife and I feel so very welcome, both at 'eyeball' QSOs and on the local 40m nets. The true warmth and friendship will live in our memories for a very long time.

Two people require a special mention: Cham, 9M2YB, and his XYL Amy, 9M2YA, who made every effort to ensure our stay enjoyable. They acted as hosts at meetings with local personalities in the hobby and took time off work to show us the sights and to drive us where ever we wanted to go.

The spirit of amateur radio in 9M2 was quite overwhelming, bearing in mind that in this part of the world radio hams often operate under severe licence restrictions: no B licence, no Novice, the first year QRP CW only, separate licence for mobile operation which is issued to a specific vehicle, and in some cases no mobile or portable operation is permitted. Special permission is required to import radio equipment all of which is individually inspected and details of the equipment shown on your licence but you cannot import without a licence ('Catch 22'). Finally government approval of any antenna system. When you do get on the air you will find semi-official intruders on large sections of the HF allocation from adjacent National administrations.

I wonder, therefore, what drives the paranoid cynicism often heard on local nets in certain areas of the UK. After all, our rules and regulations display a greater latitude and understanding. So let us stop knocking the hobby and start enjoying the fraternity for its own sake.

Finally a note to impatient DXers who failed to hear the 9M2 suffix (especially in CW) and called "DX" over our replies, thinking we were a G-station. on ground wave or backscatter. How much valued DX is being lost because a number of administrations in the Far East and Pacific use the suffix (rather than the more usual prefix) for visiting hams. Also it is very frustrating for those who get up in the small hours of the morning for a good path to Europe! Your loss was our gain; we went back to bed.

Tony and Suzanne Cadney
G0HUZ and G0LUZ

EMC CURE – THANKS

May I, through your columns, express my sincere gratitude to Mr Bob Peace, G8SOZ, Chairman of the RSGB's EMC Committee.

My neighbour informed me that she had breakthrough on her telephone when I operated SSB. I told her to contact British Telecom and inform them of her problem. On doing this she was told to call at the local Post Office and fill the radio interference form in. When she told me this, I was to say the least a little annoyed. I phoned BT myself and spoke to the Manager of the 'Faults Department'; he insisted that this was BT's policy on this kind of problem. I suggested that this was the procedure for TVI and not telephone breakthrough but he was adamant that it was not BT's problem.

I offered to take my own phone next door and try a few tests and if it proved it was their telephone to blame, would he then send an engineer out to try and cure the problem? This he flatly refused to do. After a lengthy telephone confrontation I realised I was up against a brick wall.

I contacted the EMC co-ordinator for my zone (Neil Carr, G0JHC, at Preston); he realized I was in a sticky situation and put me in touch with Bob Peace. Mr Peace phoned me as soon as my letter arrived to say he would be in touch with BT that day. I got the shock of my life when a BT engineer arrived next door an hour and a half later (you must have some clout Bob!).

To cut a long story short, BT has had three visits next door and installed filters and a new phone and the problem in now solved. Since this, Bob Peace has phoned me again to check if all is OK and has even phoned my neighbour to check if she is happy with the way things have turned out. Now, this is what I call service, and I will be eternally grateful for the prompt action of our EMC Chairman and the help of my EMC coordinator. Where would our hobby be if it wasn't for the help of people like these?

Tom Furness G4WNG

PROFESSIONAL SERVICE

I recently experienced a problem with a winch on my tower. The winch was purchased from Strumech, although the tower was not. The level of service given by Strumech, and by the Fulton agents, was what I might have expected had I been spending thousands of pounds a year with them as a professional customer. A new winch was forwarded virtually by the next carrier, without question; I can only say that this experience has really demonstrated what a 'quality' approach means, and has ensured that for me Strumech is the automatic choice in the future.

Dave Powis, G4HUP

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 it is not possible to publish all letters received.

NOW YOU SEE IT . . .

I always look forward to your magazine, you all do a good job. I never put pen to paper but I felt I should do this time. November's *HF F-Layer Propagation Predictions* in colour was, I thought, your best idea yet - brilliant. Now your December issue is black and white again - I wonder why?

Andy Kersey G0IBN

The presentation of the *HF F-Layer Propagation Predictions* for November was in my opinion the ultimate for ease of reading and immediate understanding. Whoever thought of the three-colour idea deserves congratulations. However, the December issue has reverted to the old black and white, although colour has been used elsewhere in the issue for less important areas. May I enquire why?

R S Evans G0FQT

November's predictions page was beautifully decked out in black, blue and red, making it extremely easy to read, as I usually head right for the 8s and 9s - having a very basic set-up here of ancient Heathkit SB400/ Atalanta. But I see that December *RadCom* has reverted to black. I regret this, but if expense is the reason I accept it. However as you do not ask for comments from members, can I assume it was a one off? As the corresponding page (66) was also in colour I expect it has something to do with the printers.

Mr Stewart G0AML

[Glad you liked it. We were testing members' reaction to the coloured Propagation data, and more experiments are planned. By popular demand, we are pleased to present the table as a whole page from this month - Ed]

MARLBOROUGH RIFLE CORPS

I have been asked to reinstate the callsign G5MC, originally issued to Marlborough College in Wiltshire. This callsign (along with G5MS - the extra mobile licence required at the time) was issued in 1934 for use by the Signals section of the School Rifle Corps.

The callsign itself is of great historic significance, as members of the Wireless Society (as it was then called) designed and manufactured in 1936 the first 5-metre 'walkie-talkie' sets to be used by the British Army. The Officer In Charge at the time, Lieut A R Pepin was later awarded the MBE for this development work.

The College has decided to continue with similar (albeit up-to-date) activities and thus it has befallen upon my humble self to research the possibility of the callsign resurrection. The RA has kindly supplied me with the relevant information on the re-issue of licences. It appears that I have to find several ex members or officials of the society willing to verify the original existence of the callsign and of their agreement that the callsign can be re-issued.

It may not be possible to find any original members, but I would like to hear from any amateur or SWL who has QSLs, Log Books, etc, or any contact with G5MC in its heyday so that I can produce documentary evidence in support of our claim. It is thought that operation under the callsign may not have been carried out since the 1960s. Write to me at: The Science Dept, Marlborough College, Wiltshire SN8 1PA.

P A Knight G6EPN

LOWERED STANDARDS?

I enclose my subscription for the next twelve months. It is only after a lot of thought that I decided to maintain my membership of the Society.

I and a number of fellow amateurs feel that the Society is placing too much emphasis on the Novice Licence. Far too many pages and articles in *Radio Communication* are for the Novice. You should not forget that a large number of Class A and B members make up the bulk of the RSGB membership. We all passed the RAE without the aid of a Novice Licence. In my opinion the Novice Licence has lowered the standards of amateur radio.

Mr D G Blake G3MWV

[Apart from the two Novice News *pages each month, there is nothing in* RadCom *exclusively for Novices. Even the Novice construction articles are useful to full licensees, a majority of whom requested an increase in simple technical constructional articles in response to our 1990 survey. What do other members think? - Ed]*

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