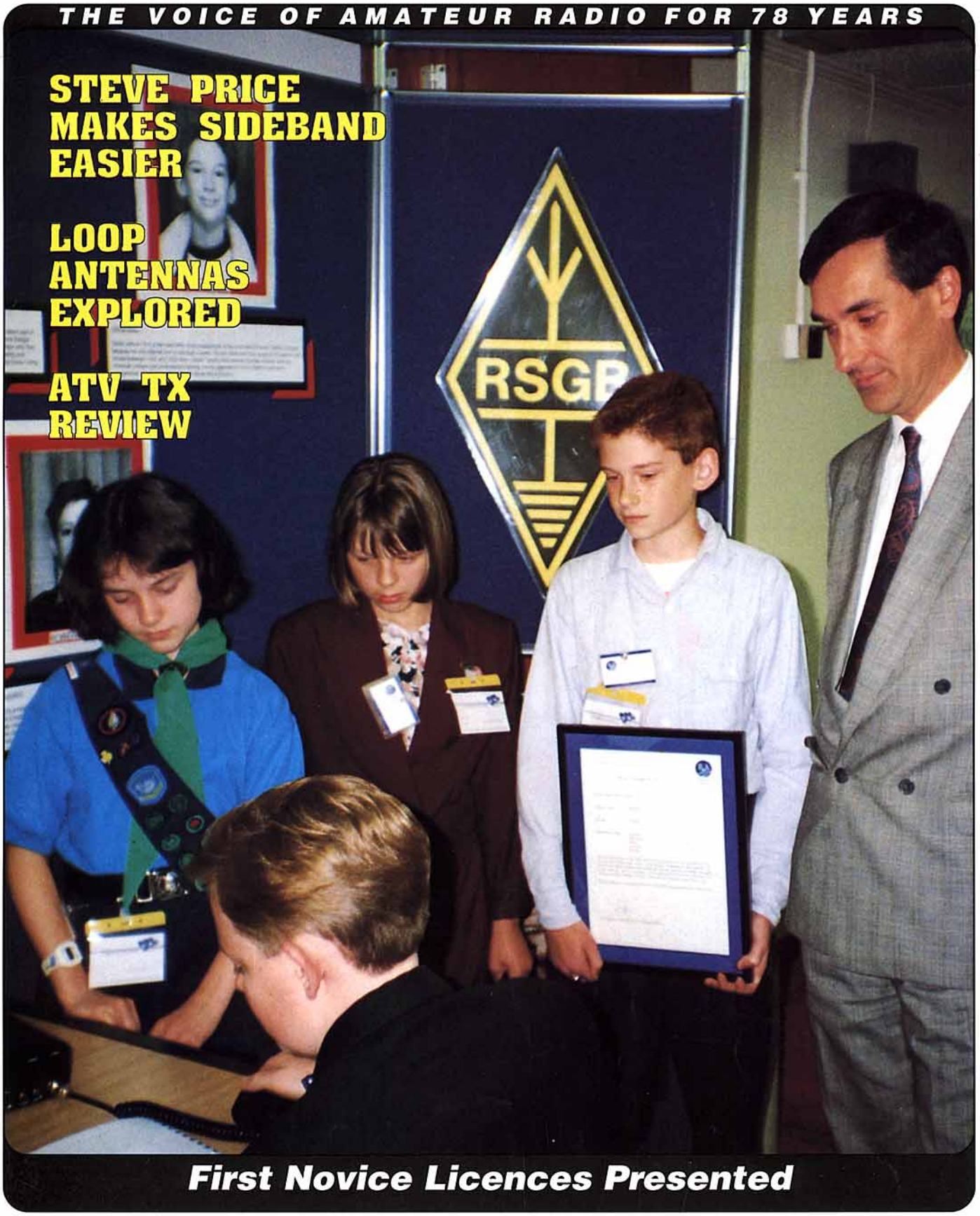
Radio Communication

The Journal of the Radio Society of Great Britain

September 1991

Volume 67 No 9

THE VOICE OF AMATEUR RADIO FOR 78 YEARS



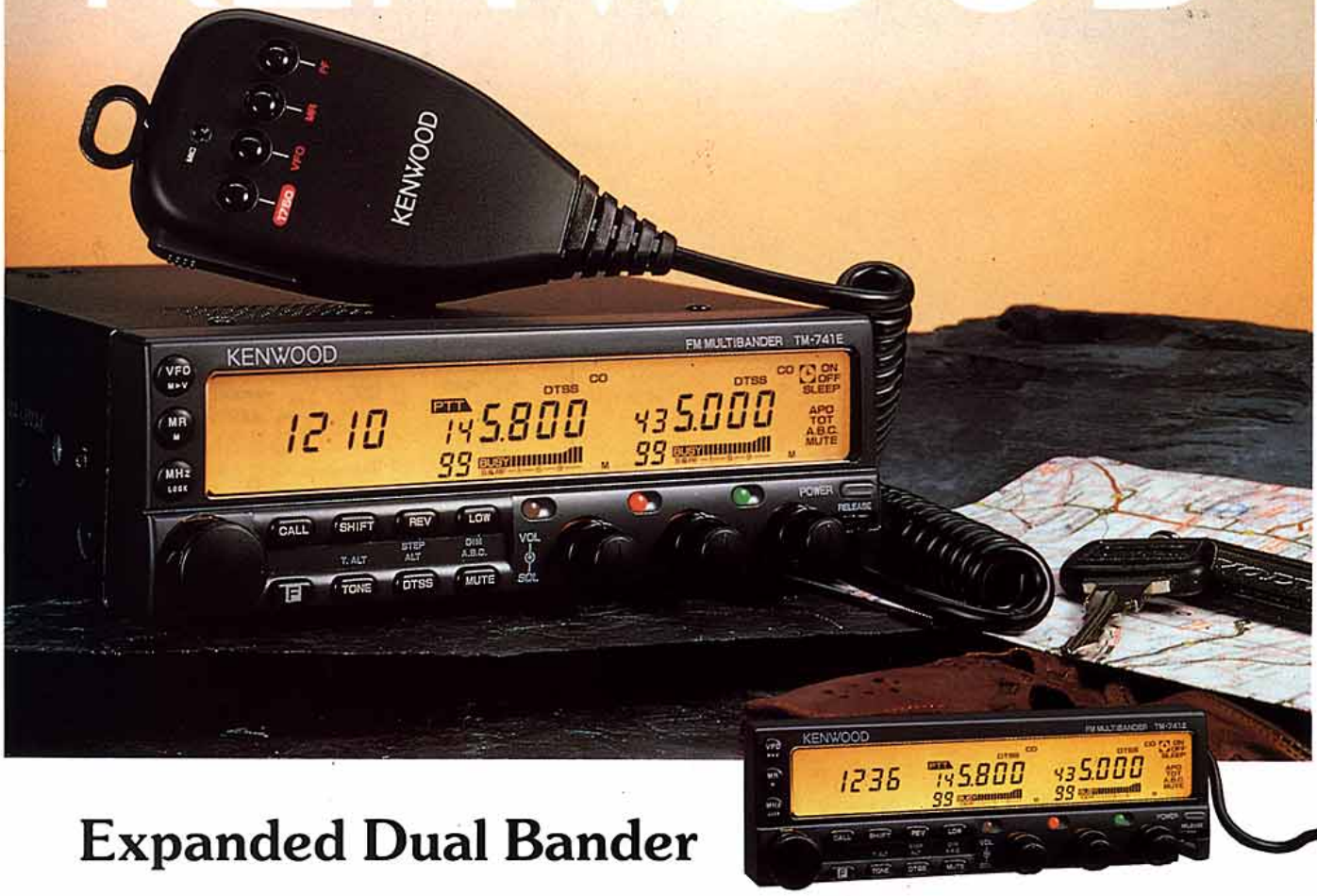
STEVE PRICE MAKES SIDEBAND EASIER

LOOP ANTENNAS EXPLORED

ATV TX REVIEW

First Novice Licences Presented

KENWOOD



Expanded Dual Bander

The new Kenwood TM-741E is a Multi-Band FM transceiver designed to meet the demands of the mobile radio amateur. The revolutionary design of the TM-741E provides dual band (144MHz/430MHz) operation, with the capacity of expanding to triple band operation by adding optional modules for 1200MHz, 28MHz, 50MHz.

■ Full Features, Ultra-Compact Design ■ Optional Band Units (28MHz, 50MHz, 1200MHz) for Tri-Bander ■ Easy-To-Operate, Easy-To-Install Detachable Front Panel ■ High Power Output (144MHz: 50W, 430MHz: 35W), with a 3 Position Power Switch ■ Independent Receive Function ■ Multi-Function Scan ■ Tone Alert System with Elapsing Time Indicator ■ Dual Tone Squelch System (DTSS) ■ Pager Function ■ Clock Function ■ Automatic Band Change Function ■ Auto Power-Off Function ■ Multi-Function Microphone Supplied

FM MULTIBANDER

TM-741E

LOWE ELECTRONICS LIMITED

Chesterfield Road, Matlock, Derbyshire DE4 5LE Tel: 0629 580800 Fax: 0629 580020

Barry (S Wales): 0446 721304 ***Bournemouth**: 0202 577760 **Bristol**: 0272 771770
Cambridge: 0223 311230 **Cumbernauld**: 0236 721004 ***Darlington**: 0325 486121
London (Heathrow): 0753 545255 **London (Middlesex)**:081-429 3256 **Closed all day Monday*

Sole appointed UK Distributor for KENWOOD Amateur Radio

Full demonstration facilities at all Lowe Centres

LOWE *PRIVILEGE* MEMBERSHIP CARD
Personal Number: 100000

FOR DETAILS, TELEPHONE 0629 580800

Managing Editor
Mike Dennison, G3XDV

Assistant Editor
Marcia Brimson

Production Editor
Sid Clark

Draughtsman
Derek Cole

Editorial Secretary
Erica Fry

Typist
Belinda Gannon

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

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

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

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

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. Each edition is valued at £3.50.

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

Welcome Novices:

As the first UK Novices are licensed, this edition features:

* **Nineteen pages of technical information,**
* **The return of the *DataComms* column,**
* **Our regular full-colour section,**
* **Our two-page monthly column exclusively for Novices**

NEWS AND REPORTS

TECHNICAL FEATURES

COVER PICTURE:
Minutes after being presented with his Novice Licence by DTI Minister John Redwood (right), Robert Cherry, 2E1AAC, makes the first ever UK Novice contact, watched by Natasha Weir, 2E1AAE (left), Victoria Foster, 2E1AAD, and David Hull, 2E0AAB. Full story - page 5.

REGULAR ARTICLES

RADIO SOCIETY OF GREAT BRITAIN

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

PATRON: HRH PRINCE PHILIP, DUKE OF EDINBURGH, KG

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

Headquarters and registered office:
Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE
Telephone: 0707 49855 - Members Hotline and book orders
Telex 9312 130923 (RSGB)
Electronic Mail Via Dialcom/Telecom Gold: 87 CQQ083
Fax: 0707 45105
Telephone: 0707 49805 - Subscriptions queries
Telephone: 0707 59260 - *Radio Communication* only
General Manager: Philip Smith
Company Secretary: John C Hall, OBE, G3KVA

COUNCIL OF THE SOCIETY
PRESIDENT: John Case, GW4HWR
EXECUTIVE VICE PRESIDENT: Terry Barnes, GI3USS
IMMEDIATE PAST-PRESIDENT:
Frank Hall, GM8BZX
HONORARY TREASURER: Peter Tucker, FCA, ATII, GU4DWZ

ORDINARY MEMBERS OF COUNCIL
J Bazley, G3HCT
G L Benbow, Msc, CEng, MIEE, G3HB
Mr N Roberts, G4IJF
J D Forward, MBIM, G3HTA
G R Jessop, CEng, MIEE, G6JP
T I Lundegard, G3GJW
A McKenzie, MBE, CEng, FIEE, FAES, G3OSS
F S G Rose, G2DRT

ZONAL MEMBERS OF COUNCIL
Zone A: See Council Brief
Zone B: J Allen, G3DOT
Zone C: J Greenwell, AMIEE, G3AEZ
Zone D: P E Chadwick, G3RZP
Zone E: C Trotman, GW4YKL
Zone F: J T Barnes, GI3USS
Zone G: I D Suart, GM4AUP

HONORARY OFFICERS
Observation service co-ordinator: Geoff Griffiths, G3STG
HF Awards manager: S Emlyn-Jones, GW4BKG
VHF Awards manager: Ian L Cornes, G4OUT
Chief morse test examiner: Roy Clayton, G4SSH
HF manager: M Atherton, G3ZAY
Microwave manager: C W Suckling, G3WDG
Trophies manager: Bob Harrison, G4UJS
VHF manager: D Butler, G4ASR
Society historian: G R Jessop, G6JP
Intruder watch (IARUMS): Martin Atherton, G3ZAY
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.

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

Membership application forms available from RSGB HQ

HQ NEWS

A VITAL ELEMENT of our strategy is a continuing effort to consolidate and streamline our operations and improve the quality of service from HQ. We are now in the process of changing the way the amateur radio side of the Society is dealt with.

In future, a small team of trained personnel will provide the contact between our members and HQ. The staff who will be recruited over the next few months will liaise with our Committees, RLOs and volunteers and will provide support for the volunteer field organisation. The recent survey has overwhelmingly indicated that members wish for more active support at local level. The overall cost to the Society will be no greater than at present initially, as the Amateur Radio Manager's post has been cut out. This endeavours to replace one 'chief' with several 'indians' trained in specific areas of amateur radio interest.

As a result of this change, David Evans has left the employ of the Society although I am sure he will take a continuing interest in Society and amateur radio affairs. His many friends at Headquarters and throughout the membership wish him well and every success in the future. I would like to thank him for passing on to me much of his knowledge of the Society and for his unfailing cheerfulness during a difficult period. I have much to be grateful for.

I have just returned from a visit to ARRL in the United States as part of a re-appraisal of the way societies such as ours are run. Many of the problems facing the RSGB have been encountered in the United States and, because of our good relations with our sister Society, I was able to discuss their solutions before deciding how to address ours. We were given a most generous welcome and a great deal of time by ARRL staff; this was greatly appreciated. The benefits are difficult to quantify immediately, but I expect to be selling many more publications in the United States, and have returned with many ideas and projects. The Gulf war and a new no-code licence has boosted the hobby in that country.

Back home we have the results of our survey to assess (full details next month). They provide a statistical sample of the likely opinion of the whole membership. The survey will be continued in order to ensure that August renewals were not exceptional in any way. Many of the questions beg further questions of course, but the aim was to keep the survey simple to maximise the response, and this seems to have worked. The survey will help guide the setting of objectives within a long term strategy, so sudden or immediate action should not be expected.

Philip Smith
General Manager

Minister Presents 1st Novice Licences

THE FIRST new type of UK licence for over 25 years was issued on 25 July when Telecommunications Minister John Redwood presented Novice Licences to seven randomly selected applicants, all youngsters. Mr Redwood said that the Novice Licence (which resulted directly from detailed proposals from the RSGB) "is open to all age groups, but holds particular benefits for the young; it gives training of a practical kind." He added that the DTI would like to see more people enjoying the pleasure of amateur radio. Responding to press questions, Mr Redwood said that "if you are willing to continue learning once you are on the air . . . . it may lead to a science based career".

The first Class B Novice, 17 year old Jonathan Page, 2E1AAA, being presented with his licence by Minister John Redwood. Watching are (l to r) Sue Tipper (City and Guilds), David Evans, G3OUF (RSGB) and Stephen Spivey (RA Head of Branch).

The first Class A Novice Licence, 2E0AAA, was presented to 13-year-old Hugh McNeill who comes from Lancashire and the first Class B licensee, 2E1AAA, is Jonathan Page, (17) from Dorset. The youngest of those present at the ceremony was 11-year-old Vicky Foster, 2E1AAD, from South Yorkshire. All are RSGB members.

The ceremony was chaired by the RA's Head of Mobile Radio Licensing Stephen Spivey and was attended by a representative of the City and Guilds as well as the Press.

Following the formal presentations, an historic first Novice contact took place between Robert Cherry (15), 2E1AAC, and RSGB President John Case, operating as G4HWR/M. The equipment used was kindly loaned by British company AKD. Afterwards, the other Novices had an opportunity to air their new callsigns.

Each Novice was given a special presentation pack by the RSGB and the G-QRP Club

The Press was well represented, in the shape of the *Early Times* (a teenagers' newspaper), the *Times Educational Supplement* and the BBC, plus of course all of the amateur radio magazines.

Next day, BBC1's award-winning *Newsround* showed Natasha Weir, 2E1AAE, in QSO with G3OUF and BBC Radio 5 featured Vicky Foster, 2E1AAD. There was local

continued on page 6 ▶

Novice Prefixes

Country	A	B
England	2E0	2E1
Wales	2W0	2W1
Scotland	2M0	2M1
I of Man	2D0	2D1
Jersey	2J0	2J1
Guernsey	2U0	2U1
N.Ireland	2I0	2I1

The Schedule to the Novice Licence showing the frequencies and modes available to Novices was published in March *RadCom*, page 56.

Council Brief

July 18, 1991.

- Minutes of the Council meeting of 12 May were accepted.
- Terry Barnes, GI3USS was elected as President for the year 1992.
- Council agreed that Council Minutes would not be published until they had been confirmed at the subsequent meeting.
- The 1991 AGM will be held at the Royal Society of Chemistry, New Burlington Place, London W1.
- In view of the resignation of David Jackson, G4HYY, from the co-opted position for Zone A, and the lateness of the year, it was decided to leave the post vacant.
- Clive Trotman, GW4YKL, was appointed as Chairman of the Training & Education Advisory Group on a temporary basis. He has also been appointed Liaison Member to the Raynet Committee.
- Council approved recommendations from committees that:-
  - The Company Secretary be appointed a full member of the Finance & Staff committee.
  - The 70th year of the Patron be marked by a suitable presentation
  - Ms Helen Sharman be made an Honorary Member of the Society for her efforts in promoting amateur radio in space.
- G3HCT presented the results of a meeting held by a working group to consider repeater charges: the report was accepted.
- Council agreed to the proposals to modify certain of the Articles of Association at the Extraordinary General Meeting to be held on the day of the AGM. These include the possibilities of the introduction of subscriptions by instalment, modification of the period of grace after expiration of subscription, and allowing the Chairman of Council to stand down as Chairman at any particular meeting where a conflict of interest could be involved, and to introduce Articles defining the position of a General Manager. Full details of these, and any other proposed changes to the Articles will appear in full in an early edition of *Radio Communication.*
- Council agreed to the award of an RSGB Certificate of Merit to Shaun O'Sullivan, G8VPG, (who is, among other things, RLO for Avon, local EMC Co-ordinator, and Chairman of Longleat Rally Organising Committee) for his work for the RSGB in his area.

Headquarters Staff Vacancies

AS A RESULT of recent re-structuring of the HQ operation, the RSGB is now looking for two radio amateurs to promote, support and coordinate the amateur radio side of the Society's business.

The successful applicants will need to be well-versed in amateur radio matters and able to pass on information from many sources.

Improving communications within the amateur radio community, and throughout our membership, is a main plank in the current year's strategy and one of the posts will be clearly identified with this objective.

Please write to the General Manager if you feel you can make a significant contribution and would like to discuss this further.

IOM RLO

THE NEW RLO for the Isle of Man is Brian Brough, GD4PTV, Kimmeragh View, Ballacorey Rd, Bride, IOM.

Zone A

MR T D JACKSON, G4HYY, has been unable to take up the co-opted position of Zone A Council Member. Council has decided that, as the time scale was so short, it would not be appropriate to make a further co-option. To provide members of Zone A with the necessary representation until the end of the year, Council has arranged that those members seeking advice should contact the Zone B or Zone G Members of Council, depending on their location.

Minister Presents Novice Licences

continued from preceding page

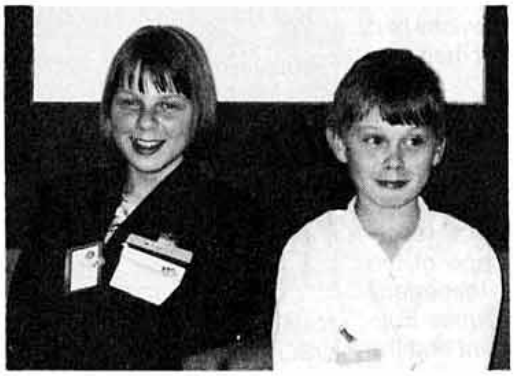
newspaper interest in many towns, and more media coverage is expected.

No doubt most members will remember their first contacts, and how nervous they were. Novices should be a little less nervous because of their training but all licensees should endeavour to be as courteous and helpful as possible to Novices (including keeping Morse speeds down). They are, after all, the Class A and B full licence holders of the future.

The first Novice radio contact was made by Robert Cherry, 2E1AAC.

Simon Khan, 2E1AAB, shows off his new licence with his Dad, G3RTU, Mum and brother Daniel (9) who has also taken the NRAE.

DTI Minister John Redwood presented 2E0AAB to David Hull who has appeared on TV demonstrating his other interest – American Indian dancing.



Somewhat overshadowed by the fame of his big sister Vicky, 2E1AAD, was 10-year-old Andrew Foster who was half way through his Novice course. He assured *RadCom* he was now even keener to complete it.

Hugh McNeill being congratulated on holding the first Class A Novice Licence, 2E0AAA, by RSGB President John Case, GW4HWR, who contributed a great deal to the success of the Novice Licence.

A BBC TV *Newsround* team visited Natasha Weir, 2E1AAE, (r) and her sister Suzanne, who also passed the Novice exam.

The Novices

2E0AAA: Hugh McNeill (13) is from Preston and is in his school and church choirs. His brother Matthew now also holds a Novice Licence.

2E0AAB: 15-year-old David Hull lives in Telford and was taught by his stepfather, G0KYD. He passed the 12WPM Morse Test when he was 13. As a professional American Indian dancer, David has appeared on television on many occasions.

2E1AAA: A Corporal in the Air Cadet Corps, Jonathan Page became interested in radio through CB. He hopes for a career in electronics. Jonathan's brother Gareth is now 2E1ADG.

2E1AAB: Simon Khan (12) is no stranger to *RadCom* having been featured in April's *Novice News*. He has already passed the RAE but could not take out his full licence until he was 14, so the no-age-limit Novice Licence came to the rescue. According to Simon, the RSGB's Novice course was more useful than the RAE because of its practical content. He is now learning Morse.

2E1AAC: As a pupil of Douai College in Reading, Robert Cherry (14) has been involved in contacting a replica Viking boat tracing Eric the Red's voyage from Norway to America. He took the Novice course at school which now has a thriving radio club. An internal telephone system was used to practice QSOs with exotic callsigns. Robert is considering electronics as a career, though he may follow his father into the RAF.

2E1AAD: No prizes for guessing what Victoria (Vicky) Foster from Yorkshire wanted for her 12th birthday, the day after she received her licence (apart from having her ears pierced, that is). She was hoping for a 70cm handheld from Dad, G7FDV. Although a Class B Novice, Vicky proved to be a 'natural' when she tried out an iambic key at a rally, and she has strong opinions on the value of Morse code which differ from her father's! She enjoyed listening to Helen Sharman and would love to meet her. Vicky's classmates have shown an interest in amateur radio and the Barnsley ARC is holding its rally at her school.

2E1AAE: With her Girl Guide uniform packed with badges, it comes as no surprise to learn that Natasha Weir (12) first became interested in the hobby through Thinking Day On The Air.

Thousands of Potential Novice Licensees are Trained in Radio by the ATC

In the Air and On the Air

THE AIR Training Corps (ATC), a uniformed youth organisation, aims to encourage amongst young people a practical interest in aviation and the Royal Air Force. It provides training intended to be useful both in the Services and in civil life, such as fostering a spirit of adventure and developing qualities of leadership and good citizenship.

Cadets have an oportunity to fly in powered aircraft and gliders and to take part in adventurous traing and many sports. Training is also provided in such subjects as Principles of Flight, Navigation, and Space Vehicles.

Another subject taught and tested is Radio Communications which includes Morse code at 8WPM. ATC squadrons have their own radio stations and an assortment of frequencies are allocated at HF, VHF and UHF.

Cadets proudly showing their VHF/UHF Operators Certificates. L to r WO I A Halliwell, G6TSW; Sgt H King; Cadet G George; Cadet M Littlewood; Wing Comm J B Parker; Cadet R Halliwell (son of G6TSW); Cadet G Wood (son of G4LED); and Mrs V Middleton, G1LFD.

First Novice

MANY ATC Instructors are radio amateurs and it follows that many cadets will become interested in the Amateur Novice Licence. It is no coincidence, then, that ATC Corporal Jonathan Page became the first ever Class B Novice licensee, 2E1AAA. Jonathan, who has held a full Radio Officers Certificate for the last two years, found the ATC course somewhat harder than the NRAE as it involved more theory. He has operated on ATC frequencies often, giving displays at Air Shows etc.

Part of the ATC stand at this year's Royal Tournament at Earl's Court.

Royal Tournament

1991 IS THE 50th Anniversary of the ATC and many special event stations have been put on air using GB50ATC. The RAF stand at this year's Royal Tournament featured the ATC and GB50ATC was operational, together with GB8RT (a theme of the Tournament was Communications). An HF station was organised by Ray Degg of the RAFARS, and Malcolm Wood put together the VHF side which involved feeders going 200ft up an old chimney to the roof of Earl's Court. The station proved to be a great success despite competing with noise from the arena which ranged from band music to gun shots and explosions!

RSGB Council Nominations

THE FOLLOWING vacancies exist for the term 1992-94:

Zonal Members:

Zone A: A vacancy exists in this zone.

Zone C: John Greenwell, G3AEZ, retires but is not eligible for re-election (Article 26).

Zone D: Peter Chadwick, G3RZP, retires and is eligible and willing to stand for election.

Zone F: Terry Barnes, GI3USS, has been elected President for 1992 and is therefore not eligible for election to Zone F.

Ordinary Members

Francis Rose, G2DRT, retires but is not eligible for re-election (Article 26).

George Benbow, G3HB, retires and is eligible and willing to stand for election.

Angus McKenzie, G3OSS, retires but is not eligible for election (Article 26).

Nigel Roberts, G4IJF, was a co-opted member and is eligible and willing to stand for election.

Article 26 of the Society's *Memorandum and Articles of Association* prohibits re-election after two consecutive terms of office.

Full details of how to nominate prospective Council Members is given on page 6 of August's *RadCom*.

Council Candidates

EACH YEAR there are vacancies to be filled on RSGB Council. Details of these, along with information about what is involved in this commitment and the rules for nominations were published last month. This year there are vacancies for both Zonal and Ordinary Council Members. Both have the same responsibilities at Council but Zonal Members additionally supervise RSGB affairs within their Zone and are elected by Corporate Members who reside in the Zones.

Some Members may be encouraged by others to stand for election, while some may feel that they have a certain ability or expertise to offer. What is not always appreciated by new candidates is the size of the commitment and the need to be either involved in, or to have had, active business or commercial experience. Meetings throughout the year on weekdays or at weekends, reading, preparation, correspondence and travelling all require substantial dedication and time. There is also the responsibility of a Council Member both to Members and legally as a registered Company Director.

While a prospective candidate might be willing to meet this commitment, members must be satisfied that they would be voting for, or perhaps nominating, someone who has the skills both commercially and personally to serve on a board of directors controlling the destiny of the Society for the next three years. It is *essential* that a candidate must posses qualities apart from amateur radio involvement which will allow him or her to share in making a positive contribution to the control and future development of the RSGB. In order that Members may make this important choice on their ballot form, candidates intending to seek election should concentrate on details of their abilities when submitting their CV with the nomination. Their achieved excellence in amateur radio need form only a small part of the permitted 200 words.

If you feel you can serve the Society by seeking to become a Member of Council, consider now whether you can give the time that will be required of you and whether you have the ability to participate actively in running a company with an income in excess of £1 Million. If so, then check the August edition for how to become a candidate.

John Forward, G3HTA

RAE and Morse Courses

ORPINGTON – Poverest School, Poverest Road, will start an **RAE course** on Wednesday evenings 7.30 - 9.30 commencing 18 September. For enrolment please write to Bromley Adult Education Centre, Church Lane, Prince's Plain, Bromley, BR2 8LD, Tel 081-462-9184. Early enrolment is advised. For details please contact the Tutor: A E Betts G1HIQ, Tel 0689 831123. The course leads to the May 1992 examination which will be held at the school.

GREATER MANCHESTER – Radio Amateurs Exam course will start at the beginning of the September term from 7-9pm at Reddish Vale Evening Centre, Reddish Vale Road, Stockport, Cheshire, SK5 7HD. The course will be run on 25 Monday night sessions leading up to the May 1992 exam. Also a **Morse Code Course** of 25 lessons for all levels of ability up to about 17WPM on Thursday evenings 7-9pm. For further information please telephone Dave Wood (Course Tutor) on 061-430 6246 most evenings.

Oldham ARC is running an **RAE course** and examination at its club premises. The course starts on 2nd September. For more details contact Mrs K Catlow, 137 Haven Lane, Moorside, Oldham, Lancs, OL4 2QQ. Tel (Daytime) 061 624 7354 (Evening) 061 652 8617.

Avondale Adult Education Centre, Heathbank Road, Edgeley, Stockport, Cheshire are enrolling week commencing 16 Sept 1991, for **Morse Code** Test and **RAE Course**. Morse Code Course will be held on Monday evenings 7-9pm and RAE will be held on Tuesday evenings 7-9pm. For further information please contact Rik Whittaker, G4WAU (Course Tutor), on 061 427 4730 (evenings and weekends).

LEICESTER – RAE Course at Charles Keene College of Further Education, Painter Street, Leicester. Classes will be held on Tuesday evenings 6-9pm. Enrolment is 2 and 3 September or on the first night (10 September). For further details please telephone 0533 516037 ext 255/278.

KENT – Maidstone YMCA Amateur Radio Society, **RAE Classes** every other Friday 8-10pm. For further details contact Keith Maskell on 0634 831504. **Morse** Tuition every Friday. Learn CW in the relaxed and comfortable surroundings of your own club; take a 'dummy' test before the real one here in the club. Practice transmissions 8.30pm GB2CW 144.25MHz Sundays. Club net 9.05 every Sunday. **Novice** Tuition classes here in the club every Wednesday but first contact Martin Nash, G0LCH, on 0622 744545.

LONDON – Hendon College is offering an evening class for the **RAE**. It will be held on Thursday evenings 7.30-9.30pm at the Grahame Park, Corner Mead site (near the RAF Museum) starting on Thursday 19 September 1991. Please phone 081-200 8300 for further information.

BUXTON – High Peak College, Harpur Hill, Buxton, Derbyshire, SK17 9JZ is running an **RAE course** on Tuesday evenings for 30 weeks. It will be of 2 hours duration and start in September. For further information please contact Clive Smith, G4FZH, on 0298 85539.

THE WIRRAL – The Wirral ARS is running an **RAE course** commencing September 1991. Norman, G3CSG and Denis, G0OTD, both retired school heads of physics, are conducting the course. Prospective candidates should contact Norman Kendrick, G3CSG, at 77 Grampian Way, Moreton, Wirral, L46 0QF Tel 051-677 6368.

NOTTINGHAMSHIRE – West Nottinghamshire College, Derby Road, Mansfield is holding an **RAE course** commencing 9 September 1991 for the May 1992 examination. The classes will be held on Monday evenings, 7-9pm. Course Tutor is Alan Lake G4DVW. For further information please contact the College or ring 0602 382509.

SUSSEX – Boundstone Community College, Lancing, West Sussex will be running an evening class entitled "**Morse** Code for the Radio Amateur". The course fee is £32. Full details from the college on 0903 755895.

BRENTFORD – Brentford Community Education Centre, Brentford School for Girls, Clifden Road, Brentford, Middx, TW8 0PG (tel 081-560 6292) is running an **RAE Course and Morse Class**. Enrolment is on Thursday 5 September 6.30-9.00pm. Enrolment will also be possible by coming to the class. RAE classes start on Monday 23 September. Morse Classes start on Wednesday 25 September. Both start at 7.00pm and finish at 9.00pm. If there is sufficient interest it may be possible to arrange a **Novice RAE Course** on another evening, please contact me or the centre. For more details phone Mr Frank Coles, G3PZC, on 081 977 5343.

W.YORKSHIRE – Keighley College, offers the City and Guilds 765 **RAE Course**. Fees and course information is available by ringing Mr J Simpson, on 0535 618502.

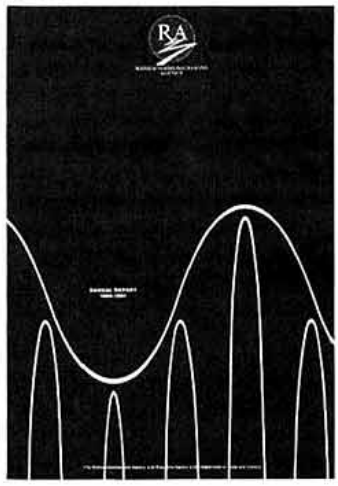
Silent Key Sale

A LARGE collection of amateur radio equipment gathered over a period of 50 years, is to be sold at a Silent Key Sale on Saturday 21 September. The sale, which is being organised by radio amateurs on behalf of Mrs E Verrinder, will start at 11am and take place under cover in the garden of her home in Dorset.

Equipment to be sold ranges from vintage receivers and books, to modern transmitters, receivers, test gear, antennas, magazines and much radio 'bric-a-brac'. Full details of how to get to the sale, with short-form listings of equipment can be obtained by sending an A5 sized SASE to: Silent Key Sale c/o 48 Priory Road, West Moors, Ferndown, Dorset BH22 0AY.

RA Report

THE RSGB was present at the launch of the Radiocommunications Agency's first *Annual Report* on 2 August (see next month for full details). This very readable glossy publication covers all radio services, including amateur radio, and is available from the RA Library, telephone 071 215 2368.



Stolen

FROM HALIFAX, W.Yorks, a Trio/Kenwood TR-751E (with voice synthesiser chip installed) S/N 7100176. Anyone with information should contact Halifax Police. A **reward** of £100 is offered.

On 29 July 1991, an Icom IC-280E, S/N 8902204. Information to D J Cowley, G1OUI, QTHR.

● AN EXHIBITION of Amateur radio will run from 2 to 28 September at the Central Library, Wellgate Centre, Dundee.

Writers Wanted

RADCOMs SISTER magazine, *D-i-Y Radio* features simple construction projects primarily for youngsters. We are looking for members who like experimenting with such projects and can write them up. Circuits may have been constructed 'ugly fashion', on pinboard, tag-strips, PCB or whatever, but must have been tested and found to be reproduceable. Perfect English is not important but it would help if a basic technical explanation were provided. All published circuits will be paid for.

Write to: The Editor, *D-i-Y Radio*, RSGB, Lambda House, Cranborne Road, Potters Bar, Herts, EN6 3JE.

Repeater Papers Wanted

THE SOCIETY proposes to hold a technical meeting to discuss methods for improving repeater usage and a reduction of abuse. Any member wishing to contribute is invited to make a written submission to Repeater Management Group member G4NJU, QTHR, for circulation to other contributors. Submissions are due by 7 September.

Straight Key Day

THE NEXT RSGB Straight Key Day is on Saturday 5 October. It is not a contest; it is an activity period for those who enjoy using straight Morse keys. Frequencies are 7010 - 7030kHz, and times 0900 - 2000GMT. Participants are invited to send details of their key during contacts.

Appointments

AT THE LAST meeting of RSGB Council, Terry Barnes, GI3USS, who is currently Zonal Member for Northern Ireland, was elected President for 1992. The current President is John Case, GW4HWR, who did much to ensure the success of the Novice Licence.

Council also appointed Clive Trotman, GW4YKL, as Chairman of the Training and Education Committee, following the resignation of David Jackson, G4HYY, for personal reasons. The appointment is until the end of 1991 when former Chairman John Case will take over the committee once again.

REALISTIC®

PROGRAMMABLE Scanners

■ **Covers: 68-88, 108-136 (AM), 136.005-174, 380-512 And 806-960 MHz**

A **Realistic PRO-2022.** Selectable priority channel, two speed scan lockout, scan delay. Also features backlit LCD display. Jacks: 3.5mm headphones, external speaker, external DC power, BNC aerial input. Mains operation or 13.8 VDC negative ground (power cord extra). Memory backup requires 9v battery.
20-9127 ..... **£199.95**

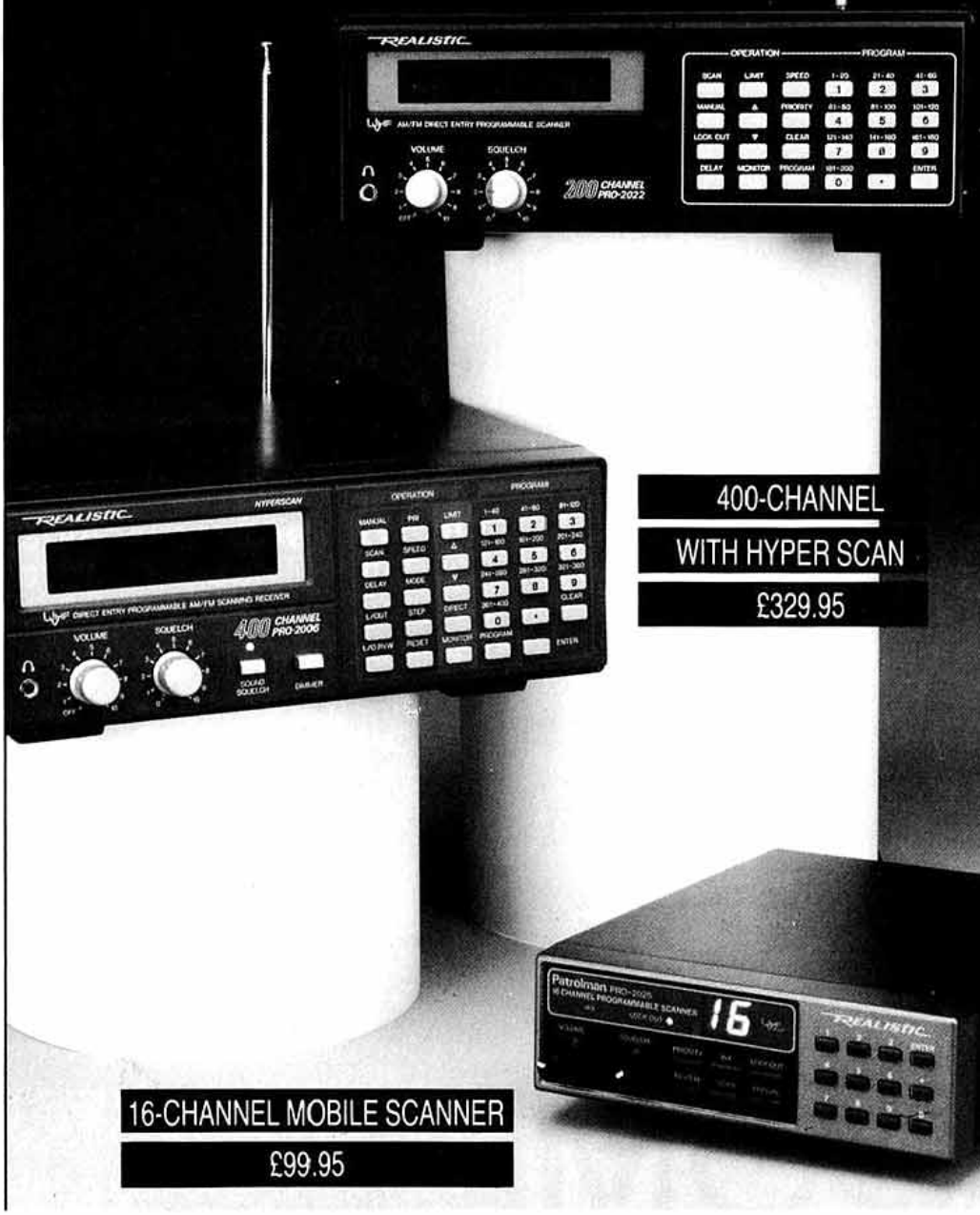
■ **Covers: 25-520, 760-1300 MHz**

B **Realistic PRO-2006.** Features search and favourite channel priority functions. Sound-squelch control prevents lockups on unmodulated carriers. Backlit LCD display with dimmer. AM, FM-narrow and FM-wide modes. Jacks: tape out, 3.5mm headphone, external speaker, external DC power and BNC aerial input. Memory backup requires 9v battery. Mains operation (or 12 VDC cord, extra).
20-9145 ..... **£329.95**

■ **Covers: 66-88, 136-174 And 406-512 MHz**

C **Realistic PRO-2025.** You can select up to 16 channels to scan and you can change your selection at any time. Features automatic two-second scan delay, memory backup, priority channel and lockout function that lets your scanner skip over specified channels. Squelch and volume controls. Jacks: power, external speaker and aerial. 12 VDC neg. gnd. only.
20-9146 ..... **£99.95**

200-CHANNEL WITH 800 MHZ
£199.95



400-CHANNEL
WITH HYPER SCAN
£329.95

16-CHANNEL MOBILE SCANNER
£99.95

Tandy

ALL THE ACTION AS IT HAPPENS!

InterTAN U.K. Ltd., Tandy Centre, Leamore Lane, Walsall, West Midlands. WS2 7PS Tel: 0922-710000

DUAL-BAND

IC-W2E Dual-Band FM Handheld

ICOM have produced the hand-held with the perfect combination of size and features. This exciting new transceiver is one of the smallest in it's class yet contains so many functions you'd think it would burst!

IC-W2E features include:

- Optional pocket beep and tone squelch for quiet standby.
- High speed scan and priority watch.
- Full 5W output power with external 13.5-16V power supply.unit
- 24 hour clock with ON/OFF timer.
- 1750Hz tone call to access repeaters.
- Programmable offset frequency.
- Monitor function that allows you to check repeater input frequency.
- External DC power jack.
- Memory mask to hide seldom-used channels.
- Memory transfer function.
- PTT lock function.
- Keypad and tuning control lock.
- Automatic power save.

ICOM

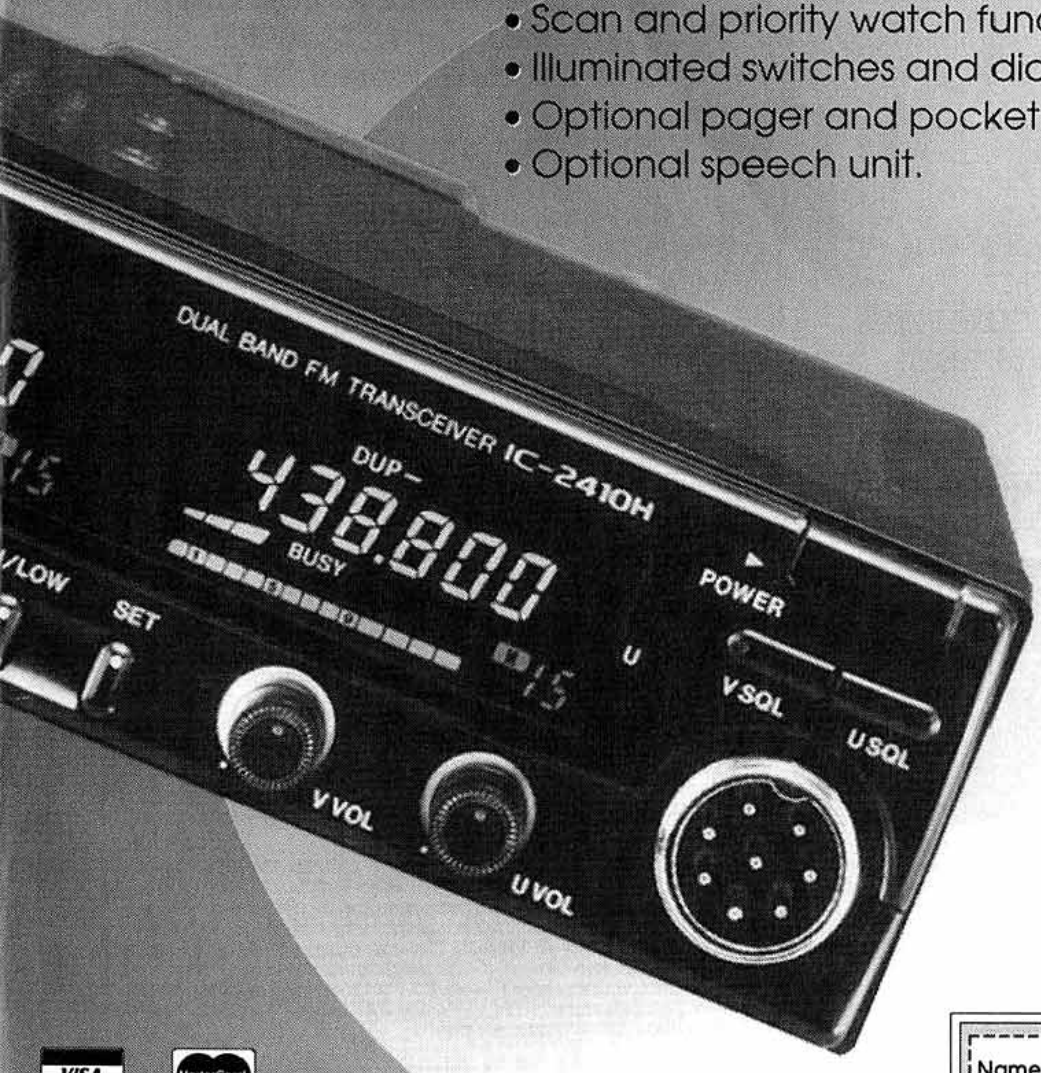
SUPERIORITY

IC-2410E Dual-Band FM Mobile

ICOM introduces simultaneous reception of two frequencies in the same band!, combine this with simultaneous dual-band receive and you have a breakthrough in features not found anywhere with any other radio. Compact design fully utillses the latest technology while using a minimum of knobs and switches. One-touch controls activate both primary and secondary functions, this ease of operation makes the IC-2410E especially safe when in mobile use.

Outstanding IC-2410E features include:

- Independent volume controls and squelch setting.
- 20db RF attenuator effective against strong signals.
- Built-in duplexer for easy dual-band antenna connection.
- Scan and priority watch functions.
- Illuminated switches and dials for night ops.
- Optional pager and pocket beep for selective calling.
- Optional speech unit.



VISA MasterCard

Mail orders taken by phone. Instant credit & interest free H.P. Interlink despatch on same day if possible

Post to: Icom (UK) Ltd.
Dept RC Sea Street Herne Bay Kent CT6 8BR
Telephone: 0227 741741 (24hr). Facsimile: 0227 360155

Name/address/postcode .....

.....

.....

.....

Call sign: .....Tel: .....Dept: RC

South Midlands Co

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

HF EXCELLENCE

Have you always wanted to stand out from the crowd? Well now's the time to stand head and shoulders above the crowd with the FT1000 and FT990 HF transceivers, from Yaesu, arguably the crown king and prince of all HF transceivers.
Designed with no expense spared, these transceivers offer exceptional performance combined with the ease of operation, a truly marvellous step forward in HF communications. The FT1000 and FT990 feature the very latest in electronics and microprocessor technology to ensure a highly reliable and exciting-to-use transciever for all modes of operation on the HF bands.

FT-1000

- ★ Amateur Bands Tx 160-10m.
- ★ General Coverage Rx.
- ★ Dual Independent Rx capability.
- ★ Power output up to 200W PEP.
- ★ Auto ATU and internal P.S.U.

FT-990

- ★ Amateur Bands Tx 160-10m.
- ★ General Coverage Rx.
- ★ Power output up to 100W PEP.
- ★ Auto ATU and internal P.S.U.
- ★ 50 Memories.

FANTASTIC PERFORMANCE, REALISTIC PRICE

- ★ 160-10m HF TRANSCEIVER
- ★ GENERAL COVERAGE RECEIVER
- ★ ALL MODE (FM OPTIONAL)
- ★ 0-100W OUTPUT (25W AM CARR.)
- ★ CW NARROW (500Hz) STANDARD
- ★ LARGE CLEAR LCD DISPLAY
- ★ SIMPLE OPERATION (see picture)

All major controls are grouped together for convenience and ease of operation.

The FT-747GX is a compact SSB/CW/AM and (optionally) FM transceiver providing 100 watts of PEP output on all hf amateur bands, and general coverage reception continuously from 100kHz to 30MHz. A front panel mounted loudspeaker and clear, un-obstructed display and control layout, make this set a real joy to use. Convenient features include operator selectable coarse and fine tuning steps optimised for each mode, dual (A/B) vfos, along with twenty memory channels which store mode and skip-scan status for auto resume scanning of selectable memories. Eighteen of the memories can also store independent transmit and receive frequencies for easy recal of split-frequency operations.

Wideband (6kHz) AM and narrowband (500Hz) CW IF filters are included as standard, along with a clarifier, switchable 20dB receiver attenuator and noise blanker. User programming for more advanced control by an external computer is possible through the CAT (Computer Aided Transceiver) System. The transmitter power amplifier is enclosed in its own diecast aluminium heat-sink chamber inside the transciever, with forced-air cooling by an interNal fan allowing full power FM and packet, RTTY, SSTV and AMTOR operation when used with a heavy duty power supply.

Southampton (0703) 255111
SMC HQ, School Close,
Chandlers Ford Ind. Est.
Eastliegh,
Hants SO5 3BY.
9am.-5pm. Mon-Fri
9am.-1pm Sat

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

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

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

Axminster (0297) 34918
Reg Ward & Co. Ltd.
1 Western Parade.
West Street,
Axminster,
Devon EX13 5NY.
9.00am.-5.20pm. Tues-Sat

mmunications Ltd.

0246) 453340 **Birmingham** 021-327 1497 **Axminster** (0297) 34918

DAIWA PRODUCTS

SMC are pleased to announce that we are now the official UK Distributor for the complete range of DAIWA products.

PS 304

POWER SUPPLIES

PS120 Mk2	3-15v Variable	9A/12A max.	£69.95
PS304	1-15v Variable	24A/30A max.	£129.95
RS40X	1-15v Variable	32A/40A max.	£189.00

COAX SWITCHES

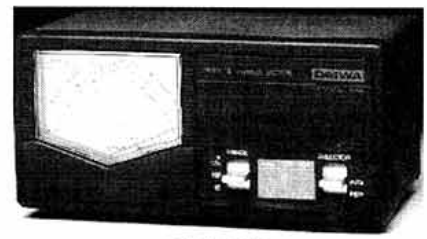
CS201	2 Way SO239	DC-600MHz	1kW	£13.95
CS201G2	2 Way N	DC-2GHz	1kW	£27.50

SWR METERS

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

LINEAR AMPLIFIER

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



CN 101

SMC FOR ALL YOUR ACCESSORIES

COMET ANTENNAS

SMC are proud to be associated with COMET Co LIMITED

COMET produce arguably the best quality base and mobile antennas available today on the amateur radio market. Discerning radio amateurs will appreciate the stunning combination of amazing performance and aesthetically pleasing styling of some of the latest range of antennas available from **COMET** via SMC, the authorised UK distributor. New additions to the range, which will be available soon are the:

B10	2m/70cms Mini Dualbander (Black)	0.3m long	CF-520	2m/6m Duplexer c/w flying leads	
B22	2m/70cms Dualbader (Black)	0.89m long	CA-14HR	20m Monobander	2.1m long
RS-9	Mini Trunk Mount (Black)		CA-21HR	15m Monobander	2.1m long
CX-702	6m/2m/70cms Tribander	2.1m long	CA-50HR	6m Monobander	2.1m long
CA-7HR	40m Monobander	2.1m long	CA-285	6m/2m Dualbander	1.32m long

TOKYO HY-POWER

BALUNS

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

HANDHELD ANTENNAS

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

MOBILE ANTENNAS

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

DUPLEXERS

CF-305	50/144 Duplexer UHF conn.	£25.00	B
CF416MN	144/430 Duplexer UHF/N conn.	£26.00	B
CFX-514	50/144/430 Triplexer UHF conn.	£36.75	B
CFX4310	144/430/1200 Triplexer UHF/N conn.	£36.75	B

MOUNTS

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

MINI MOBILE ANTENNAS

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

BASE ANTENNAS

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

FILTERS

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

METERS SWR/PWR

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

COAX SWITCHES

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

ACCESSORIES

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

TUNERS

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

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

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

TRANSCEIVERS

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

LINEARS

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

TRANSVERTERS

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

Access

VISA

- *Free Finance on selected items, subject to status. Details available on request.*
- *Up to £1000 instant credit, a quotation in writing is available on request, subject to status.*
- *Yaesu Distributor Warranty, 12 months parts and labour.*
- *Carriage charged on all items as indicated or by quotation.*
- *Prices and availability subject to change without prior notice.*
- *Same day despatch wherever possible.*

HF NEWS

JOHN ALLAWAY G3FKM
10 Knightlow Road, Birmingham
B17 8QB

A LETTER HAS been received from VK3MI with an apology saying that he is receiving a lot of QSLs for contacts he is supposed to have had in early July 1990 with UK stations on 14MHz CW. Unfortunately the person responsible was not VK3MI and was probably located much nearer to Europe.

John, G3HCT, tells me that propagation indices can be obtained at any time by calling WWV on +1 (for USA) 363 297 3235. They give the solar flux, A and K indices, and a propagation forecast for the next 24h.

Sad news for those who knew Dave Porter, ZD8DX. He sustained serious back injuries some weeks ago and has since died. He must have given many their first contact with Ascension Is.

72 FROM RUSSIA

ANGUS, G8PG, has sent along the following which is believed to be the first operating code to be introduced for specific use by QRP operators. He writes "Some months ago the U QRP Club suggested to the G QRP Club that a new operating code - namely "72" - meaning "wishing you good QRP" should be adopted by QRP operators. The G QRP Club organised a world-wide poll of major QRP clubs to ascertain their views on the subject. The result was a unanimous vote to accept 72 as a new operating signal. It will now be brought into general use by the low-power fraternity, so if you hear a station sending "72 es 73" you know now what it means. The fact that this suggestion came from our Russian friends is particularly pleasing, as it is a sign of their ever increasing integration into the world-wide network of QRP operation.

CONTESTS

CONGRATULATIONS to **G4PIQ** who headed the UK entry in the **1991 Bermuda Amateur Radio Contest** and will therefore be travelling to Bermuda to collect his trophy at the RSB annual banquet in October. There were 14 British entries whose scores were as follows : G4PIQ (884,400), G4CNY (820,160), GU4IUW (564,185), G4SZD (398,800), G0CCH (132,600), G0HAS (91,460), GD4HOO (70,760), G4MKT (50,255), G4SDJ (28,350), G0MMI (23,625), G0NYL (22,980), GM3BCL (12,420), G4OYY (12,240), and G4MGZ (800). As a matter of interest other top scores were - Germany Y33UL with 190,050 points, US WB2YQH with 294,295, and Canada VE3RM with 174,995. The organisers are worried by the low level of interest which they believe the contest attracts and are seeking your views - if you have any please write to Edward O'Brien, VP9LO, President, Radio Society of Bermuda, PO Box HM 275, Hamilton, Bermuda. The next contest will take place on 21 and 22 March 1992. Modified rules will be given nearer the time.

VK-ZL-OCEANIA CONTEST

1000 5 October - 1000 6 October (CW)

1000 12 October - 1000 13 October (SSB)

ALL BANDS (except WARC). One QSO per band with stations in VL, ZL, or Oceania which each count two points. Final score is total QSO points multiplied by the total of VK/ZL/Oceania prefixes worked on all bands added together. Exchange consists of RS/T plus serial QSO number beginning from 001. Separate logs for each band and indicate each new prefix worked. Logs must reach Frank Beech, VK7BC, 37 Nobelius Drive, Legana, Tasmania, Australia 7277, no later than 25 January 1992. I can supply photocopies of the rules (SASE please).

XIV CONCURSO IBEROAMERICANO

2000 5 October - 2000 6 October

SSB ON 1.8 to 28MHz (no WARC bands) observing IARU recommended band-segments. Exchange RS plus serial QSO number from 001. Three points for QSOs with Latin American stations, one with others. Latin Americans for this purpose include CE, CO, CP, CR, CT, CX, C3, C9, DU, EA, HC, HI, HK, HP, HR, HT, KP4, LU, OA, PY, TG, TI, XE, YS, YV, ZP, 3C, and their DXCC dependencies. Final score is total QSO points times sum of multipliers from all bands. Logs must be sent before 30 November to Concurso Iberoamericano, Gran Via de les Corts Catalanes 594, 08007 Barcelona, Spain. I can supply copies of rules (SASE please).

LZ DX CONTEST

0000 - 2400 1 September

CW ONLY. 3.5 to 28MHz (no WARC bands) in IARU Region 1 designated segments. Exchange RST and ITU zone (UK is 27). I can supply copies of rules (SASE please). If you chase awards you can apply for the BFRA awards NRB, W-100-LZ, 5 Band LZ, W-28-Z, Black Sea, and Sofia using a submitted log instead of making a separate claim if your log contains evidence of the relevant contacts.

EUROPEAN DX CONTEST

1200 7 September to 2400 8 September (SSB)

RULES FOR THE CW section of this one were given in last month's column. However, if you would like a copy of the official handout please send me a SASE.

Colin Sykes, G3XJZ, with his very impressive HF set-up.

AGCW HTP 40

1300 - 1600 7 September

CONFINED TO 7MHz CW *using straight keys only*. Logs to be sent to F W Fabri, DF1OY, Wolkerweg 11, D-W-8000 Munchen 70, Germany. SASE for rules please.

SCANDINAVIAN ACTIVITY CONTEST

1500 21 September - 1800 22 September (CW)

1500 28 September - 1800 29 September (SSB)

THESE CONTESTS cover 3.5 to 28MHz (no WARC bands) and the object is to work stations in Scandinavia only. I can supply copies of the 1990 rules but there may have been changes.

QSL ROUTES

I HAVE received a copy of this new publication, compiled by Y41VM and Y58ZA. It contains lists of 38,000 QSL managers, 4,000 QSL managers' addresses, and a section on 40 "top managers" and lists of the stations for whom they act. This pretty comprehensive guide consists of 234 pages in A5 size and costs US$ 15.00. Copies are obtainable from Theuberger Verlag Berlin GmbH, Oberwasserstrasse 11/12, D-O-1080 Berlin, Germany.

DX NEWS

IT SEEMS THAT VK9 stations are once more being issued with callsigns according to the island on which they are located. Thus VK9C = Cocos-Keeling Is, VK9M = Mellish Reef, VK9N = Norfolk Is, VK9W = Willis Is, and VK9X = Christmas Is. The *Long Island DX Bulletin* says that C21NI, in **Nauru** usually appears near 10.105MHz at 1030 and will arrange schedules on other bands.

The DX Advisory Committee of the ARRL has voted unanimously to recommend that North Korea be added to the DXCC countries list. The new prefix block E2A - E2Z has been allocated to Thailand. Novice stations in Sri Lanka are now being given the 4S6 prefix - they are allowed to operate on CW between 3.5 - 3.6, 21.125 - 21.200, and 28.000 - 28.500MHz.

Stations in **Botswana** will be celebrating their country's 25th independence anniversary during September and October by using the A25 prefix. The four currently licensed Botswanan novice stations will use A26.

T5RR is active again from

continued on page 17

Radio Society of Great Britain

HF Convention

28 and 29 September 1991

Friendly Hotel, Daventry, Northants

The Friendly Hotel, formerly called The Penguin Hotel, is immediately south of Daventry on the A45. Junction 16 from the M1.

Programme

(SUBJECT TO CHANGE WITHOUT NOTICE)

Saturday 28 September

BOOK IN ADVANCE

12.00
13.30
15.00 } Visits to BT Radio Station, Rugby*

19.30 DX Dinner, Speaker John Forward, G3HTA. Tickets £18**
Followed by informal slide show and presentations

Sunday 29 September

ADMISSION £4

(DOORS OPEN AT 9.30 AM)

Martti Laine, OH2BH ..... Where do we go next?
Peter Hart, G3SJX ..... High quality transceivers
Al Slater, G3FXB ..... Contesting
Roger Western, G3SXW ..... Pile up operating
John Allen, DTI, Baldock ..... What's on 80m tonight?
Roger Balister, G3KMA ..... Islands On The Air Award
John Clayton, G4PDQ (with W6GO/W6HHD) ..... DX Packet Cluster

RSGB Stand ● Clubs ● Trophies ● Software Demos ● Raffle ● Young Amateur of the Year ● and MUCH MORE!!

** Booking for BT Radio Station Visits and General Information:*
*** Dinner Tickets (cheques payable to R C Whelan):*
Bob Whelan G3PJT 36 Green End, Comberton, Cambridge CB3 7DY. Tel: 0223-263137.
Hotel bookings direct to Friendly Hotel. Tel: 0327-77333, quoting HF Convention.
Lunches available or bring your own sandwiches.

HF NEWS

continued from page 15

Somalia and has been worked on 14MHz SSB. According to *DXpress*, 5R8AL will be back in **Madagascar** this month. TL8MB, in the **Central African Republic** often appears on 18.069MHz around 1730 and will make skeds on other bands.

FR5ZU is expected to be FR5ZUI/G from **Glorioso Is** this month before going on to **Tromelin Is** in October, and to **Juan de Nova Is** in November. FR5AI should be on Juan de Nova Is in October.

RSGB DX News Sheet says that KA3DBN will be in Africa for the whole of this month and hopes to be on the air as ZS6JR and KA3DBN/ZS1 and later from **Botswana**, **Lesotho**, **Swaziland** and **Mozambique** if a licence can be obtained. QSLs should go to his home QTH (see under VP2EBN in *QTH Corner*).

The UR prefix will in future be used for stations in the Ukraine, and ES will be used as a primary prefix for Estonia.

DXPEDITIONS

K1RH HOPES to be on from **St Pierre & Miquelon Is** early this month. He expects to have the callsign FP9SPM (the first time this prefix will have been used) and will have other operators with him. FP5DX has probably left the islands by now and returned to France.

Rumours at the time of writing suggest that the projected visit to **Myanmar** by Romeo Stepananko may take place this month. A group of Romanians was planning to climb in the Himalayas and their schedule means that there is a possibility of some operation from **Bhutan** at the end of this month, and from **Tibet** in the first half of October.

The expedition to the **South Sandwich Is** which was planned to take place last winter seems to be being re-scheduled to take place from 6 to 20 December. A team of eight operators will be on Thule Is. (Having said this, it is rumoured elsewhere that the expedition may take place earlier). Donations are still being solicited by AA6BB.

JA2NQG, JH2BNL, and JI2UAY will appear as KC6CW, KC6DX, and KC6MZ respectively from **Belau Is** from 8 to 12 September. They will be on all bands 1.8 to 50MHz on CW, SSB, RTTY, and FM.

According to *DX'press*, 3B8CF is preparing an operation from **St Brandon**. This will be an all-bands affair with SSB and CW covering the WARC bands too. No dates fixed but probably this year. The same newsletter says that UA3DK is planning a new operation from **Spratly Is** sometime before the end of 1991.

From 2 to 9 October a group of Dutch amateurs will be visiting Luxembourg. They will use their own callsigns preceded by LX/ and will be on all bands from 1.8 to 28MHz, SSB, CW, RTTY, and packet. If you have three QSOs with them you can apply for the 'DAGOE Award' by sending your QSLs to the DAGOE Foundation, PO Box 356, Dordrecht, Netherlands (NB - there is no charge).

RSGB DX News Sheet reports on a rumoured expedition to **Albania**. According to information received two Hungarian amateurs would be there for four or five weeks commencing 2 August. This should cause quite a flutter on the bands and if you need Albania their signals should not be hard to find!

UA9's XC, XLN, XBE, XLZ will be on from **Vaygach Is** until 2 September. This is in Oblast 114 and is IOTA EU-86. They will use their own calls with the 4K3 prefix on CW and SSB on all bands 3.5 to 28MHz. Afterwards they will go to Amderma as UV1P/UA9XC, RZ1P/UA9XLN, RV1P/UA9XBE, and RW1P/UA9XLZ. Any contacts with this group will count for the 'RAEM Award'.

AWARDS

3A CW AWARD

ISSUED BY the 3A-CW Group for CW contacts (or confirmed reports) with stations in Monaco since January 1981. Each counts one point and repeat contacts with the same station may be made on different bands. There are three classes - (for Europe) Basic (four points), First Class (eight points), and Excellence (12 points). Stations outside Europe need half these points. 3A0CW, 3A2ARM, 3A200SM, 3A7A, 3A8A, 3A9A, and 3A7JO count as 'jokers' which count two points but can only be worked once. Send log entries certified by "an official country CW club" plus 20 IRCS or US $8.00 to Claude Passet, 7 rue de la Turbie, MC 98000 Monaco.

THANKS

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

To be included in the **November** column everything to reach me no later than **18 September**.

BAND REPORTS

A lot of complaints about disappointing conditions this month. G3KSH has found the DK0WCY beacon on 10MHz very useful during disturbed periods and recommends listening to the whole of its transmission - not just the callsign.

This month I have to thank G2HKU, GM3CSM, G3GVV, G3KSH, G4DXW, GW4KGR, G4s MUW, NXG/M, G0s JZA, KDS, LRX, and the UK Packet Cluster (via G4PDQ). Calls in italics were stations on CW.

14MHz

0600	D2ACA, FK0BK, FO4DL, KL7, KH6IJ, P29DX, VK9ND, 3D2AG
0700	*FK8FS, KE2AA/KH3, VK9NS*, VR6KY
0800	HL9HH, VR6TC, VR6YL, *ZK1CQ*, 9K2HA
1100	EJ7FRL, VY2TD, 3A2LZ, 4K5ZI
1400	*4K1A*
1500	AP5HQ, JT1CS, VU2NI, 9M8FH
1600	V3AO, 4S7VK
1800	ST0DX, V51/7Q7JA, ZD9BV
1900	C9RTC, JA, T5RR, T6AS, TU2XB, VQ9IO, YI1BGD, 3X1AU, 5Z4BP, 8Q7PJ
2000	A71BK, BV2CI, BY5RY, *FH5EJ*, V85IR, *XU1NQ*, ZD7XW, *3D2CA*, 7Q7JH
2100	*HL9HH, JA, JY9SR*, ST0DX, TT8SA, V63WP, VK5, 9M8PV
2200	*EP2ASZ, HS0AC*, S79KMB, SU1DZ, *TL8FD, 4K5ZI*, 8Q7P
2300	HC8GR, *T6AS*, V85IR

18MHz

0800	VK7GK
1100	VS6BD
1900	HF0POL, PZ1AP, UM8MBA, VP8CBL, ZD8LII, ZP6DW
2000	A22AA, J37AJ, JY9SR, PJ8AD, XT2BW, 4K2BOU
2100	HZ1HZ, JA, 7Q7JH, 9L1US
2200	CE3OXZ, DU4DX, HI8A, VP2EE, ZC4TJ
2300	OA4US, TI5GLF, 4S7EA

21MHz

0700	FO5FO, HL9TK, JT1BG, 4K4/UA0KBZ
0800	AH6HB, D68JM, VU2DPG, *3W4DK*
0900	BY5RA, FO5CS, KH3AE, TT8SA
1000	A35KB, 5W1IU
1100	FK8CP, VP2EY, 5W1JA
1300	T6AS, VP2MAO
1400	*FR5FA*, TY2AB, 9M8s FH, LL, *3B8FK, 3B9FB*
1500	*FH5EJ*, HF0POL, T5RR, TT8SA, 9V1YC
1600	BV3AI, BV4AS, *D2ACA, HS0AC*, P29DX, *TA9/F1LXZ*, TZ6VV, VQ9RS, 5B9A, 9V1US
1700	VQ9RR, VS6CT, 5R8JD
1800	A92EV, SV2ASP/A, YB8NA, 3X1AU, 7Q7RM, 9L3BM, 9U5BZP, 9M8MK
1900	A22AA, BV4CG, BY5SY, HS1BV, PY0FF, 3B9FR, 7Q7JH
2000	A71BP, HL, JA, S01A, TR8RLA, *XU1NQ*, 5Z4FN
2100	TI00SUN, V31PC, ZF2QJ, 9M8ZZ
2200	*TL8FD, VP2EI*, VQ9RR

28MHz

0800	T5RR, VQ9IO, *XU1NQ*, 4K5ZI, ZS6AIS/7P8
0900	1AP2AC, BZ4RBX, TR8XX, V51P, VK6BA, 5T5HH, 9U5BZP
1000	FR5ZA, 3B8FU, 3W4DK, 9L1US
1100	TR0D, VU2KFC, 7Q7LA, 9K2SH
1300	A22AA, JY5FA, VQ9IO, ZD8WD, 7Q7JH
1400	BY7QH, V51SW, ZS9A, 3DA0BK
1600	VP8AWU, 3B8DB, 5R8JD
1700	WP4KAG, V51P, Z21DL, 6V1A
1900	S79KMB, WP4EPC, 5N9BHA

QTH CORNER

GW3INW/HK3	via RSGB or A Davies, A. A 93780 Bogota, Colombia.
T6AS	IT9AZS, Dr Salvatore Alescio, Corso La Masa 67, I-90010 Trabia (PA), Italy.
VP2EBN	KA3DBN, 2703 Bartlett Lane, Bowie, MD 20715, USA.
VR6YL	via WD6GUD, George Stevens, 11130 Dempsey Av, Granada Hills, CA 91344, USA.
XU1NQ	via OK1NQ, Josef Kordac, Liunskych 3 888, CS-14000 Prague 4, Czechoslovakia.
4K3/UA9XC etc	PO Box 1247, 167001 Syktyvkar, USSR.
8Q7PJ	PA0CRA, Fagelin 1, NL-3445 EZ Woerden, Netherlands.

1991 28MHz COUNTRIES TABLE

G0JZA	190		G4YNG	72	
G0DOO	187		G2FQR	63	
G0AEV	166		G4NXG/M	62	
G4DXW	159		GM0GEI	55	
G0KDS	146		G0DUS/M	54	
G4MUW	133	(SSB)	G4XAH	43	(RTTY)
LA0GC	113		G2AKK	31	(CW)
GM4CHX	81				

Propagation NEWS

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

VHF

WHEN A MAJOR aurora occurs, there is a good chance of a repeat event about 27 days later. This is because the region responsible for it, perhaps a flare or coronal hole, might still be active when it faces Earth again after one revolution.

The Sun rotates on its axis in 24.7 days at its equator, but in that time Earth will have progressed 24.3° on its orbit around our star. So the Sun has to rotate a little more before the active region appears at the same apparent position as viewed from Earth. At the solar equator this works out to 26.5 days.

Being a gaseous body, different latitudes of the Sun rotate at different rates, in the case of the poles, up to 34 days. The active regions which caused the June and July auroras were roughly at latitude 32°North, so these areas would come round in a little over 27 days, eg the 13 June aurora repeated on 9 July.

Every *GB2RS News Broadcast* on Sundays includes a brief resumé of solar data, immediate past events and predictions for the week ahead. The data accumulates in our electronic mail box and is decoded by Charlie Newton, G2FKZ, who then E-mails it to Headquarters where the news scripts are edited. The terms used in these broadcasts are all explained in the Propagation section of that mine of information, the *RSGB Amateur Radio Call Book*. You can plot auroral events on the convenient Solar Rotation Base Map. 1991 has been a poor year for Sporadic-E propagation on 144MHz. Those who have used the Es Hotline will often have heard Jim Bacon refer to the Boulder K-index and that if it is over three, Es is unlikely. From past records, Es propagation is more frequent in years of low sunspot activity. Perhaps 1993-4 will be better? ❑

GB2RS NEWS SERVICE

The RSGB is one of the very few British organisations granted a licence to broadcast. Using the special callsign GB2RS, the Society provides a free service of news and information on 3.650MHz SSB, 145.550MHz FM, and via the packet radio network; additional transmissions are made on a number of VHF and UHF repeaters. The news is also transmitted on CW on the 7MHz band and on the 1.3GHz television repeaters GB3TV and GB3HV.

The script is produced by the *RadCom* team and is read by an army of volunteers to provide a nationwide service. In addition to topical items, each week there is news of contests, rallies, repeaters, beacons, packet, satellites, special events, HF and VHF DX and the latest callsigns issued by the RALU. Every bulletin includes a comprehensive propagation report and forecast, and concludes with details of the week's club meetings all over the British Isles.

The GB2RS service is coordinated by the Membership Liaison Committee under the Chairmanship of Ian Suart, GM4AUP. News reader appointments are dealt with by the appropriate Zonal Council Member, not by RSGB HQ.

News items for GB2RS should be addressed to: GB2RS News, RSGB, Lambda House, Cranborne Road, Potters Bar, Herts, EN6 3JE. Alternatively, telephone 0707 59261 during office hours (0915 to 1715, Monday to Friday). The deadline is 1200, Tuesday, for the following Sunday's bulletin.

Further details of GB2RS transmissions are included in the 1991 edition of the *RSGB Call Book*, available from RSGB Sales at £6.95 to members.

HF F-LAYER PROPAGATION PREDICTIONS FOR SEPTEMBER 1991

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

Time / / GMT	28MHz 000001111122 024680246802	24MHz 000001111122 024680246802	21MHz 000001111122 024680246802	18MHz 000001111122 024680246802	14MHz 000001111122 024680246802	10MHz 000001111122 024680246802	7MHz 000001111122 024680246802	3.5MHz 000001111122 024680246802
** EUROPE								
MOSCOW	....233332..	...1455554..	...47777872.	..1788888952	524766667997	976433335799	864211112578	+4.....25+
MALTA	....332222..	...15554541.	...48778741	21.788888973	754876677998	998644445799	987311112589	++4.....2++
GIBRALTAR	....111..11..	....333223..	....6665563.	...288777861	431787777996	987764445799	998532122589	++52.....2++
ICELAND	.....	.....11111..	.....443441.	....2666674.	2..267777884	864665445788	897532223467	++52.....34
** ASIA								
OSAKA	....231.....	...2452.....	...36542....	...364322121	....31.14564	....1...2572	.....24.	.....
HONGKONG	...2444421..	...3666542..	...26656752.	...144347752	2...11115886	1.....2586	363	.....3.
BANGKOK	...3555552..	...46667751.	...246568831	1...24347863	4....1.15897	3.....2588	1.....366	33
SINGAPORE	...3555653..	...46767751.	...246568841	1...14347874	4....1.15898	3.....2588	365	32
NEW DELHI	...456562...	...5666751..	..2435567421	212213347653	631....15788	72.....2589	4.....367	34
TEHERAN	...5666663..	..166677752.	1.3644568853	425422347885	8651...15899	862.....2589	73.....367	4.....34
COLOMBO	...4666663..	...55677862.	1.1235568853	411..2347986	73.....15899	72.....2589	4.....367	2.....34
BAHRAIN	...56666631.	..1666778531	213534568864	535311347987	965....15899	962.....2589	73.....367	5.....34
CYPRUS	...57667651.	...788888731	213887889974	535866778997	987643456899	986311123689	8731....1478	+4.....45
ADEN	...676777521	1.1666778743	423533468986	746311247998	985....15799	973.....2589	75.....267	52.....34
** OCEANIA								
SUVA/S	.....111.1..	....133312..	...13444351.	...35434572.	..164111472.	...41...15..	...1.....2..	.....
SUVA/L	21.211....63	32.4321..174	23276321.473	123863221751	..2741..272.	...41...15..	...2.....2..	.....
WELLINGTON/S	....1221....	...13433.1..	...35544231.	...66434463.	..1741.1474.	...41...252.	...1.....2..	.....
WELLINGTON/L	11.1.....22	32.22.....54	342641...175	234752...373	.13741..1651	..141...152.	...2.....2..	.....
SYDNEY/S	...245541...	...466663...	..167656523.	..1564347551	...331115772	.....255.	.....32.	.....
SYDNEY/L	....1.....21	11..31....43	2212621...75	211463211.185	...441..2472	...11....44.	.....22.	.....
PERTH	...566643...	...5777651..	1.136656741.	3.1154347742	4...21.15786	1.....2586	363	.....3.
HONOLULU	.....1..	.....1..131.	....12..452.	...13311562.	..2441.144..	..442...11..	..12.....	.....
** AFRICA								
SEYCHELLES	...566774321	1.1656776543	423323567886	7441.1347898	973....15799	961.....2589	83.....267	5.....34
MAURITIUS	...677777631	2.1666778854	523433568987	854211337999	973....14899	95.....1589	83.....367	5.....34
NAIROBI	1..677778742	311766678865	633633368998	8664.1147999	9961....14899	984.....1588	861.....367	53.....34
HARARE	1..577788753	411766678976	753633358998	976511137999	9972....4799	985.....1588	872.....267	54.....34
CAPETOWN	1..477678864	31.676678986	741854368999	973731136999	9975...14799	9972....1589	784.....267	55.....34
LAGOS	21.387778864	43.586668986	8638633337999	985841115899	99871...2799	8984.....589	6851.....267	352.....34
ASCENSION Is	11..87667753	43..87567885	763284335898	985572112899	99874....699	89851....389	7762.....67	443.....34
DAKAR	11..77777862	32.287667984	662585334898	885772112799	99874....589	89851....278	7762.....57	443.....24
LAS PALMAS	....6766674.	1..188877862	331498888995	663787777898	998865545799	998642212589	88741....268	++4.....3+
** S. AMERICA								
Sth SHETLAND	1....5778862	31..16778884	642246558887	875454336688	998741..3467	79851...1135	5762.....2	243.....
FALKLAND Is	1...16777862	22.137777884	652456555687	885764332478	998741...158	89851.....26	7862.....3	4+3.....
R DE JANEIRO	1....8765762	22.128755784	552446533587	8856542.1389	998741....69	98851.....38	8762.....16	543.....3
BUENOS AIRES	7776762	21.117766774	552336533487	885654311278	998741....48	99851.....16	7862.....3	453.....
LIMA	765651	1...11765563	331143542246	66435332..27	898641.....6	79852.....3	5862.....	253.....
BOGOTA	1654551	3754553	321114532246	65333431..27	997641.....6	89852.....3	6862.....1	353.....
** N. AMERICA								
BARBADOS	6755651	1...17755673	331146522376	6633543..158	998641....27	99852.....5	7862.....2	553.....
JAMAICA	644541	2654552	32...4542245	54212431..27	887541.....6	79852.....3	5862.....	253.....
BERMUDA	3544541	4654662	21..15543466	542134321257	986541....27	89852.....4	6862.....2	353.....
NEW YORK	.....43343.	1554552	21...3554465	531.13332246	885431....26	79852.....3	5762.....1	253.....
MEXICO	.....13343.	254441	21....353333	431.2.331113	675441.1...1	48852.....	1662.....	.33.....
MONTREAL	.....33333.	1554552	21...3554564	431.13332356	875331.1..26	78852.....3	4762.....1	243.....
DENVER	.....1211.	23331	1.....44333	32....134223	56431..11..2	37742.....	1462.....	..3.....
LOS ANGELES	.....221.	14421	1.....36432	21.....35212	35332..12...	15742.....	.262.....	..3.....
VANCOUVER	.....	.....111.	13221	21.....14322	34332..141.1	14741...1...	.252.....	..2.....
FAIRBANKS	.....	.....	11111221	1..121123432	223541.14422	12441...11..	..22.....	.....

The provisional mean sunspot number for July 1991 issued by the Sunspot Data Centre, Brussels was 174.1. The maximum daily sunspot number was 250 on 4 July and the minimum was 89 on 18 July. The predicted smoothed sunspot numbers for September, October and November, are respectively: (classical method) 131, 128, 126; (SIDC adjusted values) 128, 127, 126.

VHF/UHF NEWS

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

THE LAST year when there was so little Sporadic-E propagation on 144MHz was 1979, when there were two openings in May and one in June. But although well passed the sunspot peak, the sun continues to be very active geomagnetically, producing many significant flares. These were the root cause of two more big auroras in July, so the DX-chasers were able to work many countries that are more usually contacted via Es.

BEACON NEWS

THE MID-CORNWALL Beacon and Repeater Group's beacons were due to change to their new callsign, GB3MCB, on 28 July, but the 144MHz one was still signing GB3CTC that evening. Secretary TJ Cooper, G4XOP, wrote that the group, which runs five beacons, is planning to build new equipment, so would welcome donations. These can be sent to either G4XOP or G4WVD, who are both QTHR.

REPEATERS

THE AYLESBURY VALE Repeater Group has 158 members according to its July *Newsletter*. Its two repeaters, GB3VA (R4) and GB3AV (RB2), have been operating faultlessly. For details of membership contact the AVRG Secretary G8BQH, who is QTHR.

Talkthrough is the newsletter of the UK FM Group (Western) and the Summer 1991 edition is the first issue for a year. The group manages four VHF, nine UHF and two microwave relays, so the proposed RSGB levy of £25 plus VAT per repeater will doubtless be a major topic for discussion at the AGM on 16 September. For membership details write to G4WSS at PO Box 3600, Altrincham, Cheshire, WA15 9LU.

BAND PLANNING

THE ITEM ABOUT proposed additional packet radio frequencies in the 144MHz band in the August *VHF/UHF News* brought a letter from Reg Belshaw, G3UTS (DHM). He strongly opposes the suggestion that 144.475MHz be designated for AFSK packet radio, pointing out that a lot of SSB MS skeds are deliberately arranged in this part of the band to avoid the main area of SSB activity.

If you have any comments on this important topic - see pages 7 and 19 in the August *RadCom* for full details - please write immediately to either Peter Burden, G3UBX, chairman of the VHF Committee, or to me, so that we can consider your views during our meeting on 14 September.

NOVICE NOTES

THE FIRST NOVICE licences having been issued, we can expect to hear new prefixes in some of the VHF/UHF bands. On 6m, only data transmission is allowed in the 50.620-50.760MHz section, but Morse, telephony and data in the 51.250-51.750MHz part. On 70cm, Morse, telephony and data are the permitted modes in the 433.000-435.000MHz section. Licensees have all-mode access to the entire 23cm band, but no permission to use 70 or 144MHz.

All novice callsigns begin with the figure 2 - see page 25 of the March issue of *RadCom* for full details. The maximum power is 5W DC input, 3W RF output. The final draft text of the Amateur Radio (Novice) Licence (A) and (B), to use the official title, was published in the June 1990 issue of *RadCom*.

DX NOTES

JOHN HUNTER, G3IMV (BKS), reported that PA3BZL and PA3FOC will be QRV on 144MHz from Ischia Island (JN60) 9-20 Sept. Their equipment will comprise a Ten-Tec Paragon HF transceiver, transverter, 3CX800 PA and 17-ele Yagi with MGF1302 masthead preamp. Tropo QRGs are 144.045 and 144.225MHz; MS skeds 144.115 and 144.215MHz, random CW MS on 144.125MHz. No prearranged skeds but they will be QRV on 14.345MHz daily at 1600. No calling on sked QRGs. Callsigns should be IC8/own call.

Another group of Dutch amateurs, members of the DAGOE Foundation, plan to operate from Luxembourg, 2-9 October. They will be QRV on 144MHz CW, phone, RTTY and packet radio. No frequencies, times or equipment details were given, but calls will be LX/own call. An award is offered for contacting at least three, different LX/PA stations or making three QSOs with a single one. Apply to PO Box 356, NL-3300 AJ Dordrecht, Netherlands; no money or IRCs necessary but QSLs required.

INTERFERENCE

FOLLOWING THE comments on page 17 of the July *RadCom*, a reader has sent a copy of the RA's leaflet *Low Power Devices Information Sheet* which lists the many low power devices that are now exempted from licensing, together with the bands in which they are permitted. These include telemetry, telecommand, alarm, model control, etc.

To quote from the leaflet, RA 114: "The 49.82-49.98MHz band is intended for a very wide range of general purpose use, such as toy model control, baby and car alarms, walkie-talkies, etc. The current performance specification is MPT 1336." The maximum ERP is 10mW. Copies of RA 114 and MPT 1336 can be obtained from; The Information and Library Service, Radiocommunications Agency, Room 605, Waterloo Bridge House, Waterloo Road, London, SE1 8UA.

RA 114 mentions illegal devices on the UK market which do not conform to MPT 1336. They are cordless phone base stations on the low end of 49MHz, the associated handsets often using our 70MHz band. Complaints of interference from these should be sent to your local RIS office, the addresses of which are in the current *RSGB Amateur Radio Call Book*.

Al Harvey, GU7DHI (GUR), had problems with a close neighbour who uses a 'Tomy Walkabout' baby alarm. He receives it on 51.035MHz and elsewhere in the band. After a lot of haggling with the shop which sold the alarm, he was given a UK telephone number for technical queries and learned that they use 49.875 and 49.902MHz. The two-way interference was largely overcome after Al re-sited his antenna.

Mr G Pollitt, G4NPQ (YSN), reported receiving FM telephone conversations on 144.23MHz which he traced to a nearby cordless telephone. The owner became very aggressive when he used a 2m handheld to demonstrate the phenomenon, so with hindsight, G4NPQ thinks it was a mistake to tackle the problem that way. The unspecified model was bought from a well-known, nationwide chain store.

Most users do not appeciate that 'wireless' baby alarms and cordless telephones are radio transmitters and what they say could be broadcast over some considerable distance. Obviously one has to be very diplomatic when dealing with these kinds of interference. For example, it would be unwise to infer you have been deliberately listening into, let alone recording, intimate family conversations.

MOONBOUNCE

THERE IS NOT much EME activity to report this month so here are the Moon data for September. 31 Aug/1 Sept is a day sked weekend. For a London QTH, moonrise on the Friday night is about 2030UTC at an azimuth of 59° with moonset on Saturday morning about 1220 at 304°. The next moonrise is at 2100 at 53° with setting around 1335 at 309°. Moonrise on 1 Sept is at 2145 at 49°.

The declination at 0000 on 31 Aug is 20.6° and at 2400 on 1 Sept it is 25.2°. For about 75min from moonrise there is an Asian window and from about two hours before moonset a North American one; in between these times, when the Moon is high in the sky, only European stations will be workable.

New Moon is on 8 Sept so the 7/8 Sept weekend will be marred by Sun noise. During the following two weekends the Moon will be in the south. 28/29 September will be another good, near-perigee weekend, similar to 31 Aug/1 Sept.

50MHZ

The following items were taken from Ted Collins', G4UPS (DVN), *6M Information* pages for July. The 9H1SIX beacon is now running on 50.0245MHz with 10W to a ground plane antenna. During an opening to Brazil on the 10th, several Gs copied beacon PY2AA on 50.060MHz using FSK, and PY1AA, probably using A1A keying, on the same frequency. Is this a time-share operation?

EA4CGN telephoned G4UPS about a meeting with Spanish PTT officials on 16 July. Joe reported that an official announcment in September would give details of 50MHz operation. In summary, only Class A licensees will be invited to apply for permits for one year duration on a secondary, non-interference basis. Suggested band 50.000-50.200MHz, CW and SSB only, 30W ERP. No beacons but the unofficial EA3VHF on 50.070MHz will probably continue. About 100 licences could be issued before the year end.

OK3CM suggests that it might not be too long before some Czechoslovakian stations are issued with 50MHz permits, following discussions with the PTT. There is a similar chance that Polish amateurs might gain access to the band by about the same time.

Ted is the QSL manager for A45ZN who reported that talks are still going on with the authorities to try to get 50MHz permits for operators in Oman and for a beacon. Tony has been operational from a yacht in the Arabian Sea and worked into DL, ON and PA on 16 June using his other call ZS1D/MM.

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	Points
G6HKM	62	45	-	-	72	16	30	7	31	6	269
G4FCD	9	11	-	-	79	13	42	10	26	4	194
G0NFH	39	9	17	2	29	2	27	3	6	2	136
G4LDR	23	9	8	2	43	11	32	3	-	-	131
GW6VZW	75	51	-	-	-	-	-	-	-	-	126
G0EHV	-	-	25	5	48	9	28	9	-	-	124
G0FYD	9	21	-	-	62	22	3	1	-	-	118
G8XTJ	28	20	-	-	46	10	-	-	-	-	104
G8ESB	4	2	13	3	36	6	25	6	4	2	101
G8PYP	15	32	1	1	24	11	8	4	-	-	96
GI4OWA	11	28	-	-	38	14	-	-	-	-	91
G3FPK	-	-	-	-	66	19	-	-	-	-	85
G4OUT	-	-	25	6	33	9	-	-	-	-	73
G3FIJ	-	-	-	-	39	10	7	2	-	-	58
G7CLY	-	-	-	-	32	6	-	-	-	-	38
GW7EVG	-	-	-	-	17	5	-	-	-	-	22

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.

ACTIVITY

While Es propagation was lacking on 144MHz in July, it was almost a daily occurrence on this band, up to the 22nd. Longer distances seem to be workable on this mode on 50MHz than on 144MHz; for example, Ela Martyr, G6HKM (ESX), contacted 5B4JE on 29 June for a new country.

Several readers submitted extensive lists of DX worked from Scandinavia, through central Europe and the Balkans, down to the Mediterranean including Gibraltar. Some new Italian squares were activated by people on holiday in various Italian districts. G4UPS reported a major opening to Scandinavia on the 20th, 2300-0100 - very late.

There were significant auroras on 9 and 13 July. The first one started at about 1400 and produced many QSOs with DL, G, GD, GI, GW, LA, ON, PA and SM stations up to about 1530, with some more in the mid-evening. The second event was a major affair which started about 1400 and faded by 1800. It yielded QSOs with DL, EI, F, G, GD, GI, GJ, GM, GU, GW, ON, PA and SM stations.

An opening between the Mediterranean and North America occurred on the 7th when 9Hs worked into W1 and VE1. On 10 July, PY5CC (GG54) was worked by a few readers around 2015. On the 15th Paul Baker, GW6VZW (GWT), heard KH4S at 1715 and 9J2HN shortly afterwards. G4UPS heard 7Q7RM on 50.110MHz at 1712 on the 21st; he was RST599.

70MHZ

GARY PARKHURST, G3TOZ (NOR), reported Es most days from 7 July. On the 22nd he worked ZB0W at 1455 on 70.20MHz, using just 400mW to a 3-ele Yagi at 15ft AGL; he got an RS31 report. Ian Cornes, G4OUT (SFD), worked into EI, GD, GM and GW on 6 July in VHF NFD and added ten more 1991 counties.

144MHZ

THE MAIN EVENTS in July were the two major auroras. The first, on the 9th, was a 27-days repeat of the 12 June one. In a QSO with LA1K (JP53) on the 20m VHF net at 1147, operator Mange relayed the strong auroral signal he was getting from SK4MPI. My first QSO was at 1342 with OZ1BVW at QTE 30°. Best CW DX were SPs 4MPB (KO03), 5EFO (KO02) and 9EWU (JO90) at 35-40° in the mid-afternoon period.

This was an unusual aurora since, between 1800 and 2000, reflections were from the west at 270-290°. Only local British Isles and near-continentals were heard in this phase.

The second event on the 13th was every bit as good as the memorable one on 5 June. It started around 1300 and became a very southerly affair. Lyn Leach, GW8JLY (GNS), worked eight EA1s on SSB, some of them being up to S9. Mark Holloway, G4YRY (DOR), worked EA1WY (IN73) at 1642 for his first Spaniard via aurora. Does anyone know if EAs have been worked via aurora from the British Isles before?

G0CUZ's best DX was HG0HO (KN07) and Colin also contacted the Fastnet Rock station, EJ7FRL. The main event fizzled out around 1800 but at 2108 he worked DL1EJA (JO42) at 300°. In a further phase at 2336 he worked GM4AFF (IO87). The most southerly DX seems to have been IW0AKA (JN61), contacted on CW by GW4LXO.

Steve Crane, G0CUH, is now QRV from St Mary's (IOS/IN69QV). He found 40-60° the optimum QTE for this aurora. He worked EA1EBY in northern Spain but couldn't penetrate the strong wall of Gs in IO91-93 to contact any deeper Euro-DX. G6HKM made 79 QSOs including HB9/HE7, F, one LX, Italians in JN35, 44, 45 and 55, and many DLs.

There have been a few fleeting Es openings. GW8JLY caught a two minutes one on 8 July when he worked 9H5L at 1132. At 1807 on the 12th, Lyn contacted IW8BZN (JN70), also worked by GW4HDF (IO81). Andy Steven, GM4IPK (SLD) had an auroral-E contact with LA6HL/TF (HP95) at 2215 on 8 July.

Some reasonable tropo propagation was reported in July. On the 4th, GW8JLY worked DL2LAX (JO43) at 2229, but heard no other DX. On the 10th, G0CUH, G0CUZ, G4YRY and GW8JLY worked into EA1 and EA2, squares IN63, 73, and 93. Richard Girling, G4FCD (OFE), has been back on the band since mid-April. On July 11 he worked FC1NZK (IN96) and EA2ARD (IN93).

There were more openings to SW France and northern Spain on 20, 22 and 23 to IN52, 63, 93 and JN03. GU6WDK/P was a welcome signal from Guernsey, worked by Terry Chaplin, G1UGH (SFK), at 2146 on the 22nd. Frank Howe, G3FIJ (ESX), enters the Annual Table and used NFD weekend to enhance his scores; he intends to get going again on 50, 70 and 1296MHz.

430MHZ

WELCOME TO ROB BRIGGS, G1GHA (SFD), who reported for the first time. He is ". . . . irritated by the constant repetition of the self-perpetuating myth that 70cm is virtually dead. Nonsense!" he insists. He runs an FT-726R, 100W to a 21-ele Yagi at 40ft AGL with LDF4-50A feeder and a preamp. Rob reckons he can work into DL, F, ON and PA under flat conditions.

In NFD he manned the station at Thorpe Cloud, Dovedale (DYS), but suffered sun stroke so had to return home early but not before he had worked 60 stations, best DX being PE0MAR/P (JO21). Tropo conditions were good on the 22nd with HB9F copied at S4 at 1905.

G4FCD got going again in May and wrote that GD4s GCM/P and XUM/P were "fantastic signals" on this band and on 1.3GHz throughout NFD. G6HKM collected useful table points in the contest including a couple of GM regions. G0CUH should have put IOS on the map by now and Steve has ideas to assemble an EME station later ". . . . if the XYL allows a QRO amplifier for the band."

1.3GHZ

G1GHA (WMD) IS QRV on the band with his FT-726R and SSB Electronics transverter running 10W to a 23-ele Yagi at 30ft AGL. He operates from his parents' home in IO92CM - or ZM31d as he prefers - as he has severe TVI problems in Featherstone. He started on the band on 18 July and suggests anyone wanting a sked should telephone him on 0902 722830. He is QRV every Monday evening and at most weekends.

G6HKM concentrated on this band in NFD and says it restored her confidence. Ela made 31 QSOs in 14 squares, JO00 being new. She worked G0NFH (AVN) on the 15th and carried out SSB and FM tests with ON5NY on the 22nd. G4FCD started up at the end of June in time for NFD; Richard still needed Wales as of 20 July.

DEADLINES

THAT'S ALL for this month. Please send your **November** reports by **Thursday 26 September** and the **December** ones by **Thursday 24 October**.

SWL NEWS

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

IT APPEARS that HF conditions at the end of May/beginning of June were among the worst experienced for a long time. Listeners (and amateurs) can blame several sunspot regions which together produced an almost continuous stream of M-class flares.

These flares caused several short-lived shortwave blackouts on the sunlit side of the earth, and kept the geomagnetic field very active for days at a time. The polar paths that pass through polar latitudes were useless, and signals strengths on the other paths were low.

Thankfully, propagation improved through the rest of June and early July, although at the time of penning this piece, conditions were poor again. We will find out what has been on the HF bands later on, but first, it might be worthwhile looking at Solar Cycle 22.

It seems that come autumn 1992, the decay of Cycle 22 will commence. The DX type propagation we experience now will gradually decline for four or so years until the winter of 1996/97 at which time Cycle 23 will be born. It now seems most likely that, looking well forward, we will bring in the new century with the beginning of the peak in good propagation.

MORE ILA NEWS

THE LATEST *ILA News* hit the mat before the deadline. It seems as though the subscription increase did not go down too well in some quarters, resulting in a loss of some members.

Such a mood is always experienced in whatever society or organisation you belong to if the words "subscription increase" are mentioned. However, the subscription is still only £5 per year which really is peanuts when you consider the service which GW4OXB provides. The latest Newsletter provided the usual mix of interest ranging from HF DXing, Medium Wave DXing, news about the Marine bands and a piece on the Airbands.

CQ AWARDS

THIS IS THE third mention I have given to trying to attract British Listeners to support the Belgian SWLs who are trying to get *CQ* Magazine to open the doors for listeners to claim these prestigious awards. It doesn't matter if you are not a keen DX-hound or an awards chaser, I really do need some support from British listeners so that a 100% licensee domain is opened up to the listener. The American magazines are, dare I say it, considered to be 'anti-SWL' so anything which can be done to change their way of thinking towards the SWL has to be a plus. All you need to do is drop me a line saying you support the move to bring listeners into line with their amateur brothers in being able to claim listening achievement awards.

50MHZ AWARD

ALTHOUGH IT appears to me that the number of listeners who scan 50MHz for interesting DX can be counted on one hand, it is worth noting that the UK Six Metre Group has organised ten special plaques for proof of working/hearing 100 countries on the band. Eight plaques are available to the first eight Class A licensees to present proof of working 100 countries and their is one on offer to the first class B, too. However, the good news for listeners is that the group has organised one for the first SWL to show proof of hearing 100 countries. Of the 'regulars' there is some way to go, with heard totals ranging from 48 countries up to 77, but I should like to congratulate the Group for taking the time to spare a thought for the SWL, who we have shown do sometimes get forgotten.

HEARD ALL BRITAIN NEWS

AT THIS year's WAB Annual General Meeting, Dennis, GW6JNE, had the pleasure to present Awards to Ged Coker, Chris Gibbs, Frank Parkhurst and Anne Hague. Trophies were presented to listeners who won HAB contests this year, which is good news indeed, with listener activity in contests seemingly at an all time low.

Judging from the long list of recent certificate winners it would seem that the HAB movement is attracting listeners at a faster rate than ever before, not just here, but overseas as well. This can only be good for the listener movement. If any SWL wants details of the HAB Award scheme, they should write with a large SASE to: Dennis Sartin GW6KMA, at 7 Penrhos Cresent, Rumney, Cardiff CF8 8PB.

ISLANDS ON THE AIR

ANOTHER AREA which is beginning to attract listeners' attention is the Islands On The Air Award scheme. Roger, G3KMA, is the Awards Manager and he has just issued a new 50 page Directory which is a must if you are collecting Islands for any of the awards. Any one listener who wants more information about the scheme should write to G3KMA at "La Quinta", Mimbridge, Chobham, Woking, Surrey, GU24 8AR enclosing a large SASE and a cheque for £5.

50MHZ

THE MAIN NEWS to report this month is of the superb conditions over the weekend of 15/16 June, when even your scribe caught eight new countries on the band.

An interesting QSL card from a Russian SWL who does all his listening from a boat in the Caspian Sea. Even more surprising was that the report was for a CW QSO. The receiver in use was a Wolna-K (whatever that is!) and the antenna a long wire.

The weekend got off to a very slow start, but at 1653 CN8ST was heard rag-chewing with G4UPS. Soon after, Tarik was involved in an immense contest-style '59, IM64' type operation to give as many people as possible their first contact with Morrocco while conditions held. IK6HMG in JN72 was a good signal at 1724, and at 1740 EA6/DF5JJ was heard - a good one if the license was OK, (if permits had been issued). George, GD3AHV, was heard via backscatter working an IS0 at 1842. The Sporadic-E propagation lasted until 2054 when FC1BLL in the South of France was heard.

On the Sunday, an early morning telephone call from David Whitaker, BRS25429, alerted me to good conditions to Austria, the first YU - YU3EU, and YO2IS. A rare island for the IOTA chasers then showed in the shape of ID8/IK8MKK from Dino Island (EU144), but then, at 0900, the prize catch of HV3SJ, who had special permission to use 50MHz for a few hours that day. Amazingly, there was an Es opening in full swing for many to log a choice piece of DX on the band. The band still held surprises, and at 1321 SM1ALH on Gotland Is (JO97) was 59+. What else could happen? At 1333, EJ4VNX was 59+ from I043. After a good spell of SMs, including SM3BIU, an old 3.5MHz DX man from JP73, amazingly A22BW in Botswana was heard at 1507. More Scandinavians followed until at 1929, a phone call from Mick Toms, BRS31976, again alerted your scribe to an outstanding signal from OY9JD!. Anyone who says 50MHz is boring should have witnessed the amazing activity over that weekend.

Other openings came and went, mainly while Dave, Mick and myself were at work, but other notable scalps during the period in question included IK2GSO/IM0 (JM48), SV1OE (KM18), OH6MPC (KP12) at 0004 on 24 June, and OH2MZA/5 (KP41).

HF LOGGINGS

VERY FEW reports to take account of this month, but at least conditions seemed better than they were at the beginning of June. Some DX has been noted on the LF bands, but the best band was, once again, 21MHz. Quite a lot of IOTA activity was mentioned and the WARC bands continued to provide some interesting loggings without the QRM. To put some detail on these comments, we had CE0ZIS (Juan Fernandez) heard on 3.5MHz, while 9J2HN seems to have been the best on offer on 7MHz. 28MHz has been poor, as had 14MHz, but 21MHz provided AP2KAH, BY5TS, CE9GEW, D2ACA, HS0AC, KH3AE, HH2BN, TU2VM, VP2EY and XU1NQ.

FINALE

ONCE AGAIN, space has well and truly beaten me. Please, please send in your news. At the moment, it seems that everyone is relying on everyone else to provide it. There are many stories for the SWL and about listeners out there. How about letting this column into some of the secrets? Copy for the November issue should be with our scribe no later than Tuesday, 10 September.

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

THE SECOND RAE Novice exam is about to be faced by the next group of Novice students. The very best of luck to every one of you. Waiting for the result is harder than sitting the exam - ask the first group!

By now, also, the first morse tests are upon you. Again, I wish you luck. To anyone who is unfortunate enough to fail - in either field - you may not believe me at first, but the world does not stop. What you do is try again.

Perhaps you weren't quite ready, perhaps you were too nervous, perhaps it was just a bad day. The experience gained in the first exam should help you in the next. Whatever you do, don't give in, you'd miss far too much fun!

Just a thought. More novices, more contributions for this column? I'm trying to twist your arm!

A NOVICE NEWSWRITER

RICK SAT the NRAE in June. I shall not be able to report his success in this column due to holidays starting before the results are published, but I am sure he *will* be successful, and he is already deciding to put something into the hobby.

He has written to the others who took the exam with him, offering to be the East Kent Novice *Newsletter* writer, bringing news and views together for the first Novices there, and for those to follow in the months ahead.

I wish him great success and I am sure he will enjoy the role. Rick is thirteen years old so he has very many years ahead in amateur radio. He is making an excellent start! *[His contributions to D-i-Y Radio would be welcome, too - Ed]*

Anyone in the area with anything to say that could be of interest to young Novices, or indeed anyone likely to read Rick's newsletter, please get in touch with him, Richard Marks, 146 Ramsgate Road, BROADSTAIRS, Kent CT10 2ER.

. . . AND A CLUB

THE SOUTH Dartmoor School Amateur Radio Club has been formed and will be active after the school Summer holidays. All eight members of the Committee are in the middle of the Novice training course.

Nine students and one teacher from the school and five more from Knowles Hill Comprehensive School will all be ready for the NRAE in September. They will be the first Devon exam takers and there should be Novice callsigns by the end of October. Support from parents, teachers and headteachers has been total and there are plans to put the whole project to good use.

Headmaster Ray Tarleton, Head of South Dartmoor school is keen enough to make a room available for a radio club *and* some funds for some equipment. So that the room can justify its existence, there will also be weather satellite facilities and then the Geography and Science departments can benefit too. Local radio amateurs will help and a club callsign is proposed. Summer holidays will be busy with final preparations for the exam and setting up the station ready for those first calls in September, and the Novice calls by the end of October

Thanks to Peter, G6ZKQ, for the information. I, and many others, wish you all the best of luck and hope to hear further news of the project. Like little Topsy, this can only grow, so Peter you will have a very busy time ahead.

Assuming 100% success, fifteen new Novices four times a year *in one area alone*, is a prospect I find rather exciting.

REAL NOVICE NEWS

TWO LETTERS have reached me from youngsters - apart from the one from Rick. One from ten-year-old Andrew in Peterborough asking for information on how to gain a Novice licence and one from Louise who sat the first NRAE in June.

I have sent the information to Andrew and asked for a progress report, and have replied to Louise, asking her to tell us more about herself. She says in her letter that she was very nervous, and gives a hearty "Thankyou" to her Grandad, Eric, G4MXS, who roused her interest, and to her teacher, Duncan, G3TLI.

This is *really* what this column is about - news from and for Novices. Please keep them coming - I promise to answer *all* letters as soon as I can.

FROM LITTLE ACORNS GROW!

A PHONE CALL during our Novice class told us of successes in the June NRAE. Congratulations to all, and to the two dads awaiting the RAE results - I hope that you are equally successful.

A general invitation to take part in Thinking Day on The Air started it all, and Elizabeth was hooked. Husband Richard was to run a construction stand at the local primary school and Brownie daughter Rowena was to wave the magic soldering iron and build the prototype.

Tony, G6YTW, and Terry, G0LUQ, were most helpful, inspecting the potential radio station, and on hearing that Richard was considering the RAE, swept everyone, including Rowena, off to the first Spring lecture on 'propagation' at Harwell ARS. No escape now!

Details of the proposed TDOA station and the unveiling of Richard's prototype radio were highlights of the Christmas Dinner menu, with copies of the phonetic alphabet being the take-home presents. It paid off. GB4KGB was a great success. Seven year old Clare built a radio. Sarah, G0MSR, a Guide who had gained her licence at fourteen, was given pop-star treatment and a list compiled of those wanting to go for the Novice licence.

When Bob, G0KNJ, Senior Novice Instructor visited the station, he was surprised to find a class formed, a ready workshop, and eight pairs of eyes waiting for him to agree. What could he and Roy, G0KNV, do but say "Yes"? The course started in March. Another father, Mark, joined Richard on the RAE course, sitting the exam in May.

With Novice exam results out there are more plans to make. Licence applications to send, QSL cards to order, Morse to practise, shack organisation and a radio club to plan to encourage others. An added bit of excitement is for Natasha to collect her licence from the DTI on 25 July. Where will it all end? Not here for Elizabeth, she intends to sit the RAE in November.

Up and down the country similar stories can be told, the satisfaction and sense of achievement felt can only be guessed, but to all of you and those who follow, "Welcome".

NOVICE	RAE
1. Examined & identified components.	1. Didn't touch a single piece.
2. Understood resistor colour code. Worked out values of resistors.	2. Didn't see a single resistor.
3. Learnt how to use a soldering iron. Soldered two test sets, a piece of Veroboard, an audio amplifier and a simple radio.	3. Didn't touch a single tool and constructed nothing.
4. Used a multimeter (analogue & digital). Measured - Volt, Ohms, Amps. Calculated - Input power - Resistance of active component, eg, an LED.	4. Didn't touch a single piece of test equipment.
5. Practical application of: (a) Ohms Law, (b) Frequency and Wave-length (c), SWR, (d) Detecting Harmonics.	5. ditto
6. Used a receiver, got to know the controls, listened and filled in a log sheet. Set up a transceiver using dummy load.	6. Saw a transceiver but not allowed to touch. Heard nothing.
7. Fitted a PL259 plug, BNC plug and a 13 Amp plug.	7. No practical work.
8. Simulated QSO - Audio.	8. Theorised about QSOs.

Table 1: GW0ABL's comparison of the Novice and RAE training courses (*see What's in a Name*)

WHAT'S IN A NAME?

I HAVE HEARD many comments and discussions on the value - or otherwise - of the Novice licence. They have ranged from: " I think it's the best thing possible", to "But they won't be *proper* amateurs if they didn't take an exam like me". I would ask you to read **Table 1** carefully and then make further comment. It came to me from Dewi, GW0ABL, who has been licensed since the '70s, so is not a newcomer to the hobby and has obviously given the matter some thought.

Speaking personally, the Morse test itself was not difficult, but *using* the stuff frightened me to death. Why? Because I was totally unready to mix abbreviations, numbers and the conversational bits between. I know that fear was shared by others. The Novice way seems a much more relaxed and pleasant way to become proficient. Back to the heading. Amateur? Novice? You choose.

SPECIAL EVENT HELP

SPECIAL EVENTS are often enthusiastically planned with volunteers aplenty for all sorts of jobs. When the day itself comes around for the big event, the number of bodies around is often less (occasionally many less) than expected or hoped. There may well be very good reasons why individuals cannot appear, but that does not make the prospect of running the station any easier with all the jobs to be done behind the scenes. And in front of them for that matter.

A visiting public needs information, possibly on the walls. Visitors need to be welcomed, the local press perhaps who *must* get the facts right, refreshments for the operators - a supply of coffee is always welcome and needed if the station is as successful as hoped. What else? Spare operators, loggers .... Ah! Loggers! They are often in short supply. But help is now possibly at hand.

What good listening practice it would be for student Novices to sit in on a Special Event station. Logging calls is part of the training, and this is a station where a greetings message could be sent by the trainee, and his or her own QSL card sent and received. Spare operators too can come from the same source. Fully fledged Novices can work any part of the amateur bands using higher power than their licence allows *under the direct supervision of a Class A licensee (or Class B above 50MHz).*

Come to think of it, Novices and Novices-under-training could be a tremendous help in all similar cases. I am sure that they would help with other chores, (but not to be made 'dogsbodies'), and would meet local amateurs who would in turn see that Novices were getting the sort of introduction that will stand them in good stead in later years. Now, isn't that a good idea?

Pupils of Jurby Community School, Isle of Man, with Darryl Hall, GD4DEL at the microphone of GB2MSR.

A REMINDER IF NEEDED

I PROMISED to mention Jamboree On The Air (JOTA) well in advance for those intending to run such a station. Those who have run stations in the past will have their arrangements under control and those breaking new ground have had guidance, so this is just to jog memories if necessary depending on whether you are an amateur helping or a Scout Leader needing help. You are possibly both, in which case you are permitted to ignore the rest, as you have probably done all this many times.

The licence is arranged, the callsign for the station and the design for the special QSL cards decided and ordered. As September arrives, with about seven weeks to go, there are still things to do. Aerial requirements, electrical power, catering arrangements to discuss with the Scout group. Check on insurance arrangements for equipment, aerials, liability etc. If you do this for yourself, you know that it is done.

Send for the JOTA special callsign listing from the RSGB, (Self-Addressed Stamped Envelope (SASE) please) so that the Scouts can check the other JOTA stations contacted during the event.

Among the Scouts who will visit the station, there will possibly be both Novices and budding Novices. Some may be already known to you, others not. Why not make use of them? They will probably be hoping that you will - they may already have read through this column and know they would be valuable as loggers. Given super-efficient loggers keeping an eye on logbooks there will be no incomplete reports sent in because "the operators took the logbooks away with them" They will also be able to help filling in QSL cards (including their own?) If you spend some time during September getting to know one another the event itself will be even more fun for all.

Local amateurs will be giving their time and possibly using their own equipment for the event. Novices, would-be Novices, Scouts, and anyone interested should locate these amateurs and offer their services in advance. That way lies new friendships and no-one turns those down.

JOTA will be held over the weekend 19 and 20 October. Where *has* this year gone?

MORE MANX ACTIVITY

JURBY COMMUNITY School held an indoor camp at Ardwhallin Outdoor Pursuit Centre at West Baldwin, Isle of Man, 24 - 28 June. Under the supervision of Head teacher, Mrs Carol Beck, and two other teachers, 17 pupils had an experience to remember. There were educational trips to the Manx Museum, Cregneash Village Folk Museum, Laxey Wheel and mines, Langness and Peel. The children went to see stock car racing and Silverdale Glen plus a swimming trip to the Aquadrome in Douglas.

In case that was not enough excitement, Denys Hall, GD4OEL, the IOM Scout and Guide Adviser, set up a Special Event station with the callsign GB2MSR at Ardwallin. The children heard from Denys about amateur radio. How the station was set up, how the aerials worked, QSL cards, and how, through radio, friends could be made worldwide. This point was proved as the youngsters heard Denys contact many countries.

As Denys was also active at Ardwallin for the Guides' Thinking Day with the callsign GB4MGR, he certainly gives a lot of time, help and encouragement to youngsters in the IOM. Well done, Denys, your efforts could lead to many 2D callsigns in the future!

SCROOGE'S CORNER

REMEMBER THOSE 35mm film containers? Geoff, G4NPQ, finds that they make good coil formers. I'll give you his other tip next time - it's a beauty!

When building radio equipment - a kit perhaps - egg boxes make useful holders for smaller components, and the sort of cases which originally contained 'exceedingly nice' apple pies for larger ones. Riley, G7GOD, sent that one.

And from David, G7GPR. The magnet of an old loudspeaker holds those screws that would otherwise take a walk after removal, in the length of time it takes to blink. *[It can also be useful to magnetise a small long-bladed screwdriver so that lost nuts and bolts can be retrieved from being dropped into the depths of a radio - Ed].*

Those brass paper fasteners with legs and a head have been found another use by John, G3BDQ. Any insulating board with holes made in it will do. Push the fasteners through the holes and Hey Presto! you are in business. Soldering can be done on either side, but do work out the layout on paper first or you may have more holes than board. This idea was used successfully with ten and eleven-year-old boys.

LOWE ELECTRONICS LTD

TS-850S HF Transceiver

The rig which has proved to be a world beater in the HF field continues to take the world by storm. We have a queue of eager folk waiting for delivery; and it's no surprise when you see and hear the TS-850S in action. All-band operation from 160 to 10 with a general coverage receiver which beats everything except the TS-950S. A full colour brochure is available on request, but better still, it is available at all our branches for you to try for yourself.

TS-850S . . . £1,325 (inc VAT)

TS-690S/TS-450S

The new HF transceiver from Kenwood which gives competition class reception from 500kHz to 30Mhz and 100W transmit on all 9 HF amateur bands. The TS-690S also includes 6 metres with 50W output. These rigs come with a host of exciting new features including Direct Digital Synthesis (DDS), 'fine' tuning of 1kHz per revolution, filter options, Kenwood's Advanced Intercept Point (AIP) and many others. A full colour brochure is yours on request and a demonstration unit is available at our centres across the country.

TS-690S . . . £1,325 **TS-450S . . . £1,150**

HOKUSHIN Aerials and Power/SWR Meters

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-WX290
3-Band Vertical

Gain: 3.0dB (144MHz)
6.0dB (430MHz)
8.4dB (1200Mhz)

Glass Fibre GP
Height: 1110mm
Cost: **£64.95** (inc VAT)
Ideal for use with the TM-741E (see Sept RadCom inside front cover.)

Power & SWR Meters
MR-2000 VHF/UHF

Freq. range: 130MHz - 512MHz
Measurable Power Range:
0 - 50W (CW) & 0 - 200W (CW)
Dimensions:
153mm(W) 70mm(H) 112mm(D)
Cost: £49.95 (inc VAT)

MR-1000 HF/VHF

Similar spec. as MR-2000 with freq. range of 3.5MHz - 200MHz.
Cost: £49.95 (inc VAT)

PRIVILEGE CLUB - Are you a member yet?

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

Can you afford NOT to be a member of the Lowe Privilege Club? It has many benefits. Phone, fax or write to us in Matlock for details or pop in to one of our centres.

LOWE *PRIVILEGE* MEMBERSHIP CARD

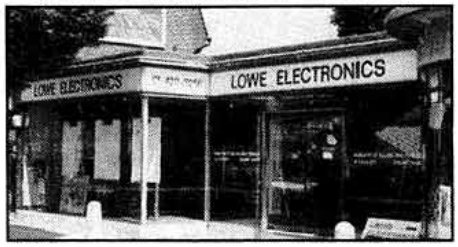
Personal Number: 100000

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

Buy locally - Trust technically
Look to Lowe

This month we are highlighting our two London centres at Eastcote and Heathrow. Lowe Electronics has nine centres spread across the country. Each one is managed by an enthusiastic licenced radio amateur and supported by a team of knowledgeable RF engineers at Matlock. When buying sophisticated electronic equipment, there is no greater reassurance than being able to deal locally with a company you can trust technically.

LONDON (EASTCOTE)



Our London centre at Eastcote has been open for many years and is managed by Fred Butchart G4RJS. It is one of our largest branches and carries an extensive range of both amateur radio equipment, short wave radios and specialised products for air band listening.

As part of the complex of Eastcote Underground Station, it is just 30 minutes away from Central London on the Piccadilly or Metropolitan Lines. An extremely convenient (and dry!) journey for London's visitors and residents.

By road, we are only 10 minutes from the junction of A40/A312 (Target Roundabout) with ample parking both outside the shop and in a large car park to the rear.

We carry a good range of useful books and are open six days a week. Telephone and postal sales are most welcome but we feel that our customers receive a far greater benefit from our personal and friendly service.

Fred is waiting to welcome you to our branch.

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

LONDON (HEATHROW)

Our manager, Tom Crosbie G6PZZ, tells it in his own words:

"We've just finished a major refurbishment here and increased display space fourfold; so there's very much more for you to see. All major equipment is set up and working, ready for instant demonstration. The showroom is bright and spacious and provides a comfortable environment for you to try out any transceiver, receiver or scanner before reaching your decision.

"We're expanding the product range quickly these days so make a point of calling regularly in order to be kept fully up-to-date with the latest special offers and new products. We do all the other bits and pieces as well; mobile/base antennas, hardware, connectors, etc. We're just 200 yards from junction 5 of the M4 and a quick phone call will give you exact directions.

"With many years of amateur radio business behind me, I am keenly aware of the value placed on customer care and service by those that visit me here at this centre.

"See you soon, I hope! 73, Tom"

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

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

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

BRISTOL
Lowe Electronics Ltd
Unit 6, Ferry Steps Ind Estate
Bristol BS2 0XW
Tel: 0272 771770
Fax: 0272 772500
Managed by Tony G4CYE

CAMBRIDGE
Lowe Electronics Ltd
162 High Street, Chesterton
Cambridge CB4 1NL
Tel: 0223 311230
Fax: 0223 315099
Managed by Tony G4NBS

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

DARLINGTON
Lowe Electronics Ltd
56 North Road
Darlington DL1 2EQ
Tel: 0325 486121
Fax: 0325 381485
Managed by Hank G3ASM
(Closed on Mondays at present)

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

WATERS & STANTON

Call our HAM RADIO STORE anytime on 0702 206835 or 204965

ALINCO YUPITERU REVEX MIZUHO AZDEN JAYBEAM ICOM YAESU KENWOOD

SAGANT ADONIS SONY PANASONIC DATONG TONNA DIAMOND PAKRATT AOR ERA

NEW! ALINCO DJFIE

£239 2m FM 2.5W + Airband Rx

Rx option:
AM 108-143MHz FM 137-174MHz.

- 40 Memories
- 5 Watts Max.
- 8 Scan Modes
- 6 Chan. Steps
- Battery Saver
- DTMF etc.

The DJ-1FE is a "block-buster" of a handheld that many dealers have been waiting to get their hands on. Now it's arrived and with a specification and appearance unequalled. Its small size and robust construction combine with an internal circuit design that is nothing short of brilliant. ALINCO will dominate the market with this one!

DIAMOND BASE AERIALS

50 watts 70cms input = 800 watts output ERP (X-700) See below

Fibre glass encapsulated, pre-tuned, very low SWR and above all, superb gain! The figures in brackets will give you an idea of approx ERP from 50 watts input!

X50 2m/70cms 1.7m long 4.5/7.2dB (ERP 150/350W)	£59.95
X-300 2m/70cm 3.1m long 6.5/9dB (ERP 225/400W)	£95.00
X-500 2m/70cm 5.2m long 8.3/1.7dB (ERP 350/750W)	£119.00
X-700 2m/70cm 7.2m long 9.3/13dB (ERP 450/875W)	£219.00
X-5000 2m/70cm/23cms 4.5/8.3/11.7dB (ERP 150/350/750W)	£109.00
V-2000 6m/2m/70cm 2.15/6.2/8.4dB (ERP 80/200/350W)	£95.00

ALINCO DR-590E DUAL BAND

2M-45W
70cm-35W **£539**
Full Duplex
Remote Option

Rx option:
137-174/410-470MHz.

The DR590E represents great value, giving you both 2m and 70cms in one package and with the optional cable kit the head display can be mounted remotely. Full duplex operation and an extendable receive coverage combined with the usual memories and scanning modes all help to make this the ideal mobile station. Then take a look at the price and you will realise why so many people are turning to ALINCO.

ALINCO DJ-560E 2m/70cms **£359**

Receive option:
137-180/400-520MHz

- Full Duplex
- 6.5 Watts Max
- Full DTMF
- CTSS Tone Squelch
- 40 Memories
- 700mAh pack

The DJ-560E is a great performer and offered at a price that puts it head and shoulders above the competition. A complete dual band station that you can take anywhere engineered by the firm that revolutionised the hand-held market. Send for full specification brochure.

We list below just a few of our tested, secondhand bargains. All guaranteed 3 months!

TS-520 hf tcvr 100w	£299	DFC-230 vfo	£49
SP-250 speaker unit	£20	FR101 hf receiver	£169
VFO-520 remote vfo	£55	FL101 transmitter	£189
FT101ZD tcvr 100W	£419	SP901 speaker	£39
FT101ZD tcvr 100W	£395	SP230 speaker	£37
FT102 tcvr 100W	£495	Nevada TM1000 atu	£149
FC707 100W atu	£95	YVM1 monitor	£99
FP707 20 amp PSU	£98	R600 receiver	£229
FT707 tcvr 100W	£329	R2000 receiver	£399
TS130V QRP 100W	£299	FT1000 tcvr MINT!	£2499

HF DEALS GALORE

Kenwood TS850S

TS850S + PSU
£1,323 inc PSU
The Kenwood TS850S has taken the market by storm. A superb HF transceiver whose design and performance are unequalled in this price bracket. There's also a host of interesting accessories to upgrade it.

Kenwood TS-450

TS-450 + PSU
£1150 inc PSU
The Kenwood TS-450 is a superb budget hf rig from the top manufacturer of hf equipment. Its size makes it ideal for mobile or base operation and it can be thoroughly recommended for those on a budget.

ICOM IC725

IC725 + PSU
£775 inc PSU
The ICOM IC725 is proving extremely popular because of its size, price and reputation. This transceiver coupled with our free AC PSU offer represents an absolute bargain!

TONNA ANTENNAS

The best VHF/UHF Beams

Superbly constructed with Gamma match and "N" sockets. The complete range is available direct from us or our many dealers. Send for colour brochure today.

Retail and Mail Order: 22 Main Road, Hockley, Essex SS5 4QS. Tel: (0702) 206835/204965
Retail Only: 12 North Street, Hornchurch, Essex. Tel: (04024) 44765
VISA & ACCESS MAIL ORDER, 24 Hour Answerphone.
Open 6 days a week 9am-5.30pm.
Rail: Liverpool St./Hockley or District Line/Hornchurch

12 MONTHS FULL WARRANTY
LARGEST IN SOUTH EAST

ALL MAJOR BRANDS STOCKED
INSTANT CREDIT

MARTIN LYNCH

G4HKS

THE AMATEUR RADIO EXCHANGE CENTRE

286 Northfield Avenue, Ealing, London W5 4UB. Tel: 081 566 1120 Fax: 081 566 1207

MARTIN IS ONE YEAR OLD TODAY!

AND HE'S HAVING A BIRTHDAY PARTY!!

Saturday, September the 14th is the day. Open from 8 o'clock in the morning, until 8 o'clock that evening, I have got special bargain offers across the board - NEW and USED, a massive saving and unbelievable offers on trade-ins you would not believe. First come first served, I have stocked up to the ceiling with all the major brands including all the latest models - I am not going to list them - you are invited to the largest display of bargains ever offered!

Food and drink is on offer all day - whether you are buying, selling or just browsing, come along and do you and your pocket a favour. It is a celebration for me and all the Lynch Mob, that includes Valerie, Graeme George and John. Customers old and new are welcome, but hurry - this is the only first Birthday Party, I cannot afford to repeat this again! If you cannot make it on Saturday, then visit us at the B. A. R. T. G. Rally on Sunday the 15th, at the Sandown Race Course - I cannot guarantee I will have anthing left, but it will be worth a visit to the stand!

73 MARTIN G4HKS

BUYING OR SELLING...
DIAL 081-566 1120 NOW!

TOPICS

PAT HAWKER G3VA

DIRECT-CONVERSION CW RECEIVER WITH SIMPLIFIED PHASING-TYPE DEMODULATOR

AS MENTIONED BRIEFLY in *TT* (November 1990, p29), Tim Walford, G3PCJ, has been developing a phasing-type demodulator for use in a CW-only 7MHz direct-conversion transceiver taking advantage of the fact that the accurate quadrature (90°) phase difference needs to be maintained only over the relatively small AF bandwidth involved in CW reception through fairly sharp audio filtering.

His prototype transceiver (**Fig 1**) has its audio bandwidth restricted to about 800+/-300Hz and is based on the use of NE602 double-balanced mixers, BC109 band-pass AF filters centred on 734Hz, all-pass plus and minus 45° phase shifters using a TL072, sharper 734Hz audio filter (TL071) and audio amplifier (LM380). In effect, it requires an extra mixer, filters and audio-phase-shift networks compared to a conventional DC receiver, but reduces the unwanted audio-image sideband by -35dB (voltage). He writes:

"The receiver (**Fig 2**) uses NE602s (or 612s) whose oscillator section can be driven by an external signal from low-impedance RF phase shift networks to obtain +/- 45° phase shift relative to the local oscillator. I used a 3.5MHz VFO with doubler in order to improve stability but this is not essential for the phasing aspect of the receiver.

The incoming signals are fed to both 602 devices, in this case from the two windings on the output of the RF amplifier stage. Outputs from the 602s are filtered with a resonant load (0.1H and 470nF) and further filtered/buffered with a two-pole low-pass filter. These drive the op-amp all-pass phase-lead and phase-lag stages which provide the +/- 45° audio phase shifts required to obtain phase cancellation at the centre frequency of 734Hz.

"The two audio signals are 'added' (combined) at the input to the final narrowband CW filter. The desired audio sideband is most easily selected by changing over one of the 602 outputs to its other output (the two outputs differ by 180°.

"The circuits are set up by tuning a steady signal to produce the undesired beat note at its loudest frequency (which should be about 734Hz) and then adjusting the RF phase-shift trimmer capacitor (65pF) and the audio-balance potentiometer (10k) for minimum signal.

"My measurements show the undesired audio sideband level to be at least 54 times down (-35dB voltage) over the whole audio band compared to the desired 734Hz sideband. While this is not as good as could be achieved by a more complex phasing-type or filter-type receiver it is very good for the small amount of extra circuitry involved. Digital RF phase shifters might be used for a multiband receiver but then the complexity approaches that of a filter rig and is much more complex than the two-capacitors, two-resistors used in this 7MHz receiver.

"At present I am working on a 3.5MHz CW phasing design with improved roll-off of the audio response (hence selectivity for a direct-conversion receiver), and with better strong signal performance by avoiding an RF amplifier stage and incorporating audio AGC. I hope to have this 3.5MHz design available in kit form in the region of £45."

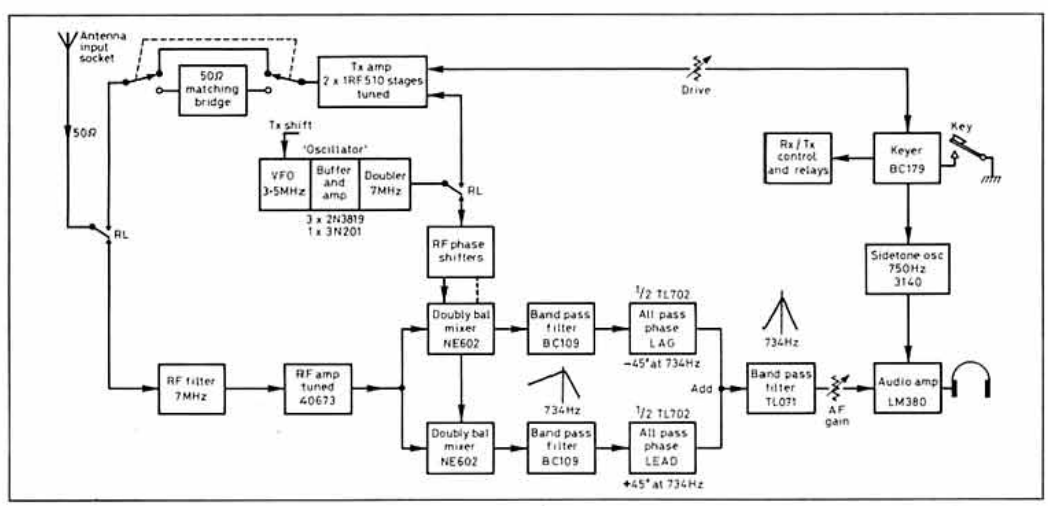


Fig 1: Block outline of G3PCJ's 7MHz CW transceiver incorporating a phasing-type direct-conversion receiver.

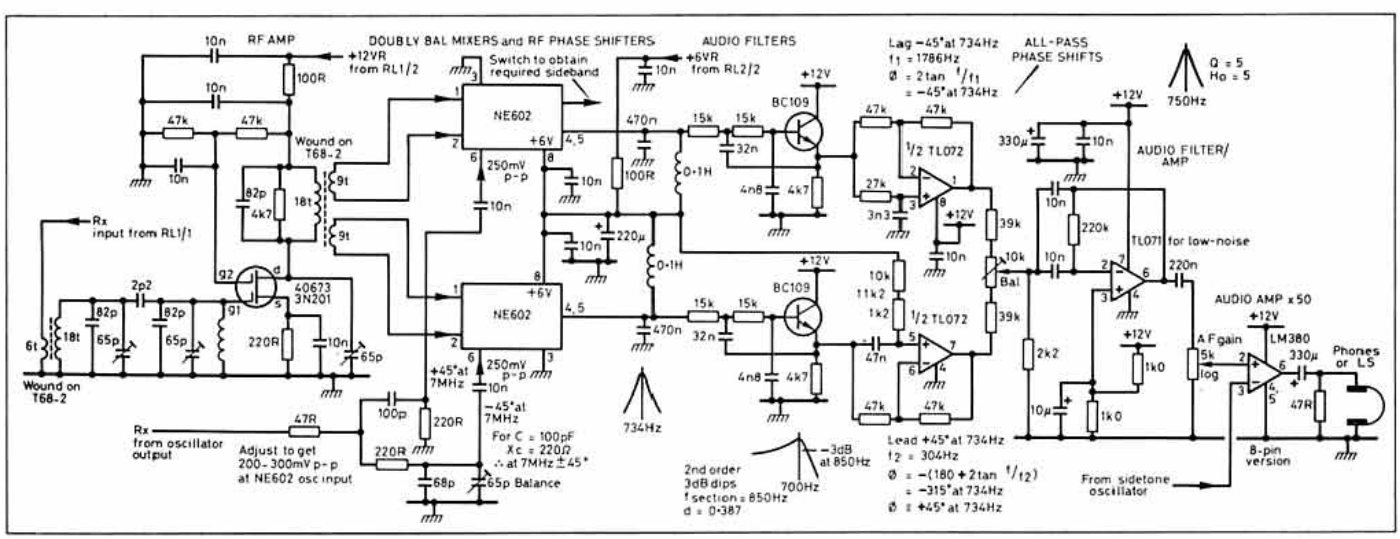


Fig 2: G3PCJ's 7MHz phasing-type receiver which reduces the unwanted audio-image sideband by a factor of 54 (-35dB voltage) measured overall. The 65pF balance trimmer for the NE602s and the 10k balance potentiometer at the output of the TL072 phase-shifters are adjusted for lowest level of the unwanted 734Hz sideband.

ELECTROMAGNETIC FIELD EXPOSURE

THE PUBLIC IS STILL BEING confused by the wide difference of expert opinion on possible biological (athermal) effects of long-term exposure to electromagnetic fields. An article by Robert Pool in *Nature* (14 February 1991, p554) was headlined 'EMF - cancer link still murky' and pointed out that the mystery surrounding the claimed connection between EMFs and cancer was deepening as more epidemiological studies showed up such odd and inexplicable correlations between childhood leukaemia and black-and-white (but not colour) television and with hair-dryers but not other domestic appliances! One sometimes feels inclined to quote the old adages that statistics can prove anything and that there are 'lies, damned lies and statistics'.

Perhaps more relevant was a BBC Research Report last year (RD 1990/4 'Electro-

magnetic field exposure in broadcast environments' by S Wakeling). To quote from the introductory remarks: "Recently, there has been renewed concern at possible deleterious health effects from exposure to electromagnetic fields with international authorities recommending ever more stringent exposure levels . . . . the areas around broadcast antennas to which a person can safely gain access are becoming increasingly restricted. Broadcasters face a variety of problems when trying to ensure safe operational practices in areas with significant levels of electromagnetic fields, such as exist close to transmitting antennas. The exposure guidelines have become more stringent each time they have been updated . . . . international authorities are tending towards an 'as low as reasonably achievable' principle in the light of inconclusive biological evidence which will create more problems in future . . . . Safety factors are being compounded by incorrect assumptions regarding exposure conditions. The derived field strengths of exposure standards are calculated assuming optimum coupling conditions and far-field, plane-wave exposures whereas, in broadcasting, the potential for hazard is generally confined to the near-field around the transmitting antennas and hence the derived field-strength values are inappropriate for determining true SAR (specific absorption rate) levels and hence the actual level of potential hazard."

SAR is the power (in watts) absorbed per kilogram of tissue, and the BBC Report points out that the biological effect (heating) of a given SAR will depend on the thermoregulatory system of the animal being exposed; humans, it is pointed out, have a very efficient thermoregulatory system.

The Report covers such questions as RF shocks and burns, thermal effects, athermal effects, epidemiological studies etc. It notes that the cancer links have been found only in some studies; others have not found any significant correlation.

An American study, reported by F P Ziemba (*Nature*, 21 February 1991) into possible hazards from the electric and magnetic fields emanating from TV and VDU screens suggests that natural radioactivity (from radon gas) and high electrostatic fields are more likely than EMF to be the cause of various common complaints from computer operators. Radiation levels as high as 6000 alpha disintegrations per minute per 100cm² of viewing-screen area have been detected in computer displays and TV screens. He considers his measurements show that this phenomenon is caused by the electrostatic deposition of charged radon progeny onto the faces of viewing screens. Radon-22 gas is formed by the radioactive decay of naturally occurring uranium-238 and comes from the first metre of underlying soil and rock in many areas. This enters living areas by diffusion, convection and ventilation, with charged clusters of dust and aerosol particles attracted to CRT displays by the electrostatic fields that build up on CRT screens, providing a pumping action that can continue even after the TV or VDU has been turned off. VDU colour monitors show the highest levels of activity.

EARTH LOOP FEEDBACK

AN ARTICLE 'EARTH CURRENTS' by Bob Vernall, ZL2CA, which originally appeared in *Break-in* (date unknown) has been reprinted in *Radio-ZS* (February 1991, p4). It draws attention to what can appear to be a mysterious RF-feedback problem that can occur when a solid-state transceiver *and* an auxiliary unit such as an external speech-processor are fed from the same high-current 12V PSU or battery.

ZL2CA points out that a transceiver rated at 100W RF output fed from a nominal 12V supply may draw up to about 20A at full output which, with SSB, occurs *only* on audio peaks. Even if the wires between transceiver and PSU have a DC resistance of only 5mΩ, then each lead will drop 100mV at the peaks, and this voltage appears between transceiver earth and the mains-earth of the PSU. With a speech processor, handling audio input voltages of about 10mV, connected both to the transceiver earth and the PSU earth line, there can exist the type of earth loop that so often results in problems with assemblies of hi-fi units, but in this case varying along with the SSB waveform. These earth loop cur-

MORE ON THERMISTOR TEMPERATURE COMPENSATION

JOHN BEECH, G8SEQ in describing the most effective VFO temperature-compensation technique using an NTC thermistor/varicap-diode (*TT*, April, p33) wondered whether he could claim genuine originality, or whether the idea had been used in TV tuners or somesuch.

No claims have been received of any use of this technique in professional electronics but Derek Money, G3MKD, who ran the now-closed Hamgear Electronics of Norwich has sent along evidence that he also hit upon using this idea in an amateur-radio VFO in "early 1989" which may or may not have been before G8SEQ began to use it "a couple of years ago". What matters more, is that he also found the system effective. After building a prototype, he advertised "The Hamgear 3-band VFO" intended for use by QRP operators and providing a switched output on three CW bands (3500-3585, 7000-7050 and 10,100-10,150kHz): **Fig 3.**

He still has the prototype built in early 1989 but lost interest in the technique when he received no enquiries from his advertisements. Temperature compensation was optimised at room temperature to around 15Hz per degree shift. Long term stability (3 hours on 7MHz) at room temperature the shift was less than 20Hz.

Postscript: Since writing the above notes, further evidence of thermistors providing temperature compensation of oscillators has come to hand. D A Bundey, G3JQQ, described a similar system to that of G3SEQ in *Two Improvements to the FT7B* (*RadCom*, July 1982, pp582-3). In July 1981, Mike Walters, G3JVL, used an STC G24 thermisor in a stabilised crystal oscilator providing a reference signal at 10,368.000MHz (described shortly afterwards in the *Microwave Newsletter*). The idea of using thermistors to stabilise oscillators (including an 8GHz Gunn diode oscillaor) is discussed in the book *Thermistors* by E D Macklen (1979). Clearly, this idea is an excellent and thoroughly practical method of improving the temperature stability of a VFO and should become an established part of the amateur's armoury.

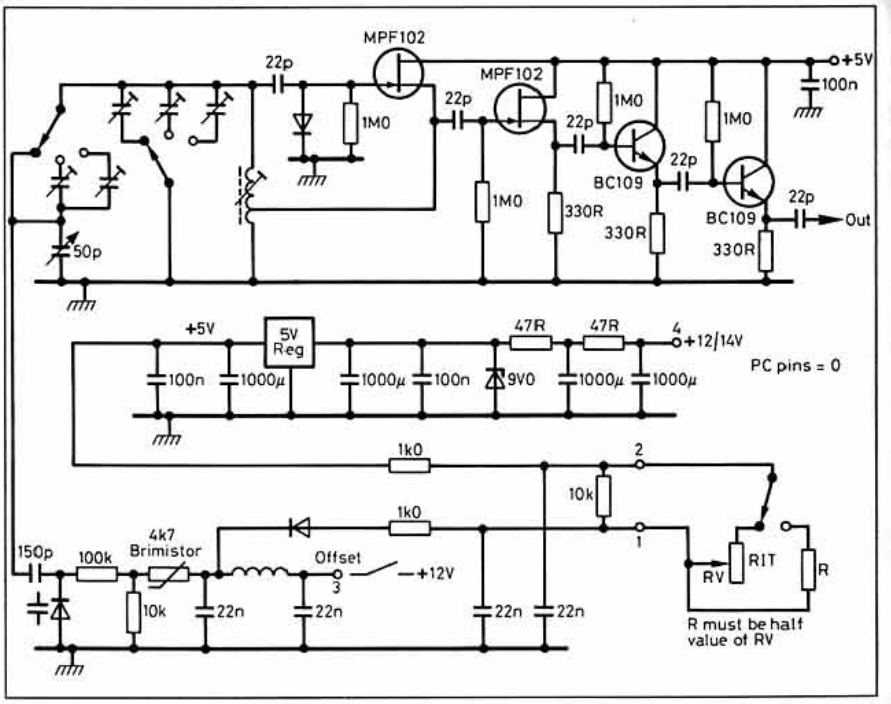


Fig 3: 'Hamgear' three-band VFO with Brimistor (KED 472CY) temperature compensation as announced in 1989 but which never went into production. The prototype built in early 1989 still exists.

rents and voltages can then result in audio distortion not unlike that produced by RF feedback, although in this case RF is not involved and the distortion does not disappear when the transceiver output is fed into a non-radiating dummy antenna.

ZL2CA writes: "A fairly sensitive test of 'power supply feedback' is to use an SSB two-tone tester in place of the microphone. Look for RF envelope variation on an oscilloscope. The two tone signal produces maximum envelope changes and consequently the current drawn from the main power supply is similarly modulated and 'lumpy'. As two-tone drive is increased, look for a form of hum modulation showing up on the RF envelope. If this occurs then it is either a poor power supply or the result of an earth loop causing a form of audio feedback provided that RF feedback is discounted by using a dummy load and provided that the two tone tester is not itself introducing a new earth loop."

If audio feedback of this type is detected, a possible solution is to use genuine double-insulated PSUs for all accessories. These usually have split bobbin transformers, and ZL2CA points out that this is a similar approach to that used for hi-fi audio systems in countering hum loops by using equipment with two-wire mains cords. If the transceiver PSU has negative earth then the station will have all connected accessories earthed, but with a minimum of loops.

For a TNC set-up, a mains isolation transformer can be used to feed power to the computer. An alternative approach is to provide a DC break in every cable that is required to carry low-level audio signals to the transceiver. Audio isolation transformers rated at 600Ω impedance, 1:1 ratio can adequately isolate low or medium impedance audio inputs or outputs. ZL2CA adds that if the PTT control is a DC type (usually grounded to transmit) then an opto-isolator is one of the only ways of providing an equivalent DC signal past a DC break. He also gives further advice on using opto-isolators in connection with TNC installations but points out that each solution usually needs to be customised to the particular combination of TNC and transceiver.

ZL2CA, himself, uses a combination of solutions. An external speech processor has a double-insulated power supply. A TNC cable has 1:1 audio isolation transformers and a 4N33 opto-isolator for PTT control.

I have no idea how common is this problem of 'power supply feedback'. As ZL2CA points out, no such problem exists with SSB linear power amplifiers using valves since the HT currents vary at most by a few hundred milliamps rather than the tens of amperes of all-solid-state transceivers with their external power supplies and connecting cables.

THE UNIVERSAL VFO

IN AN UNUSUAL coincidence, the June 1991 issue of both *QST* and *CQ* included articles on building general-purpose VFOs by the same author (Doug DeMaw, W1FB) with much in common, although some circuit details of the two VFOs differ. In 'Build a Universal VFO' (*QST*), W1FB describes a straightforward VFO suitable for a variety of applications, such as tunable oscillator for superhet or direct-conversion receiver, transmitter/transceiver VFO, signal generator etc. His unit covers 2.137 to 2.586MHz but, with an appropriate tuned circuit, can work in any required band between about 1.8 and 10MHz. It has two output levels for driving active or passive mixers; with a 12V supply the 'high' output is about 22.3dBm from an extra bipolar amplifier stage (not in the 6.45 to 6.75MHz *CQ* design) which provides about 6.6dBm (4.2V P-P over 500Ω). Both designs use 2N4416 FETs as the oscillator with a source-follower FET isolating buffer, although the *QST* oscillator is a Hartley with tapped coil; the one in *CQ* is a Colpitts, with a source-follower buffer: **Fig 5**.

W1FB's *CQ* article 'The practical aspects of VFO design plus how to build one' concentrates on the choice of VFO components, advice on obtaining good stability, questions of short and long-term stability/drift, etc. The following is a digest of some of the points made in this article:

(1) Avoid using silver-mica fixed capacitors in VFOs; although once a popular choice they do not exhibit uniform temperature characteristics. W1FB prefers NP0 ceramic types, with polystyrene capacitors (slight negative drift characteristic) as a low cost second choice.

(2) An 'ideal' VFO would have no magnetic core in the tuning coil but would be air-cored on a ribbed ceramic former, seldom suitable for modern 'miniature' equipment. W1FB uses No 6 material toroid cores (eg Amidon T50-6; yellow) or equivalent slug-tuned core material. Coils after winding should be doped twice with, for example, General Cement polystyrene Q Dope.

FERRITE-BEAD CHOKE BALUNS

JOHN S BELROSE, VE2CV, in 'Transforming the Balun' (*QST*, June 1991 pp30-33) shows how the W2DU choke 1:1 balun, comprising simply a number of ferrite beads slipped over a short length of coaxial cable, can serve as the basis for excellent ferrite-bead-choke current baluns with 4:1 and 9:1 impedance transformations. He considers that the W2DU balun is: "The best so far devised. By *current balun* I mean a balun that, with each of its balanced output ports terminated in unequal resistances, forces essentially equal, opposite-in-phase current into each resistance. The traditional toroidal balun is a *voltage balun* in that, terminated as just described, it produces equal, opposite-in-phase *voltages* across the two resistances.

"For minimal radiation from a balanced transmission line, the currents on both its conductors must be equal in amplitude and opposite in phase; that is, there must be no current discontinuity on the radiator at the antenna feed point . . . . For antennas fed with a coaxial transmission line, the goal to achieve is little or no current on the outside surface of the coax shield. *In general, these requirements cannot be met without a current balun.*" The original W2DU balun (as described some years ago in *TT*) used 50 beads of No 73 ferrite (eg Amidon No FB-73-2401) on about twelve inches of Teflon dielectric cable, with suitable connectors to make a practical balun for 1.8 to 30MHz.

VE2CV provides a detailed resume of the differences between the performance of toroidal and choke baluns, but also breaks new ground by showing how two ferrite-bead baluns can be used to provide a 4:1 transformation (50Ω to 200Ω-balanced) using short lengths of 93Ω cable (RG62A up to 100W, RG-133A for 1kW level), and three 1:1 baluns for 9:1 impedance transformation (50Ω to 450Ω-balanced) using 150Ω cable (RG-125 is difficult to obtain even in the USA and VE2CV suggests that other impedances can be used rather less effectively). **Fig 4** shows the connections for 1:1, 4:1 and 9:1 impedance transformations.

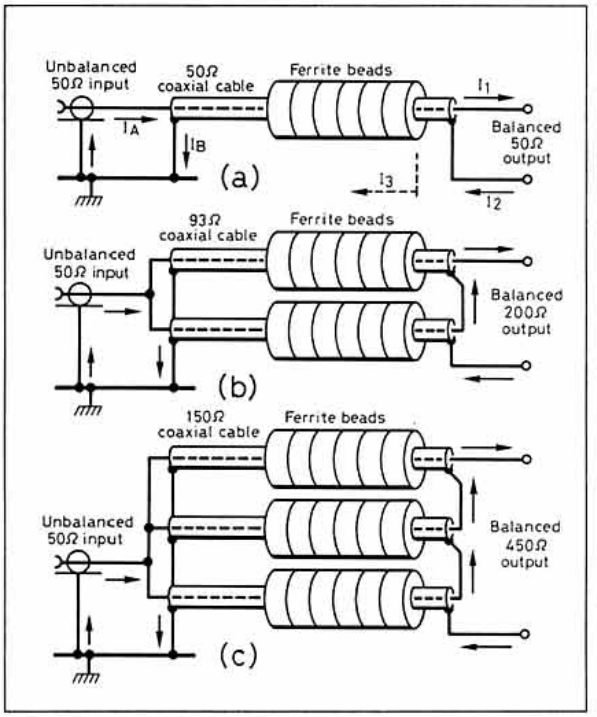


Fig 4: Ferrite-bead choke baluns as described by VE2CV (*QST*, June 1991). (a) The basic W2DU 1:1 choke balun using about 50 ferrite beads threaded on 12-inches of coaxial cable, using 50Ω coax for 50Ω balun; 75Ω cable for 75Ω balun, etc. (b) A 4:1 current balun based on two ferrite-bead coax-shield chokes. (c) Three ferrite-bead-choke baluns can be combined to form a 9:1 impedance transformation.

(3) Select the right oscillator device: W1FB dislikes bipolar transistors for this application as they tend to exhibit greater changes of internal resistance and capacitance with temperature than a JFET or MOSFET. He considers that the 2N4416 is his favourite device for VFOs since it has a high pinch-off characteristic and gives more output than is available from the MPF102 family of FETs. Dual-gate devices (40673, 3N211, 3N212) provide good performance and gates 1 and 2 can be tied together so that they function as single-gate devices without the need to bias gate 2.

(4) If possible, use a good mechanical tuning capacitor rather than an electronic tuning diode (which changes capacitance with temperature): "Double-bearing capacitors that turn freely are best; avoid using capacitors with aluminium vanes - plated brass or iron vanes are better."

(5) Use 1/2W carbon-film or carbon-composition resistors. Because of their greater physical size they tend to be more stable than 1/4W or 1/8W resistors as they can absorb more heat.

(6) Two-or-more fixed capacitors in parallel (eg two 50pF NP0 ceramic capacitors to provide 100pF) provide more surface area than a single capacitor, minimizing heating from RF current.

(7) W1FB uses single-sided G-10 glass epoxy board material for VFO PCBs and advises against using double-sided PCBs or phenolic-base board material. He thinks that with double-sided boards, the etched-side conductors form unstable low-Q capacitors in combination with the ground-plane side of the PCB. He does not mention constructional practices not based on etched PCBs but see G3KMG's remarks in July *TT*.

(8) Physically separate, with a dividing heat-shield made from PC board, the oscillator from the buffer/amplifier stages. The cover for the VFO box can then be vented above the buffer/amplifier stages with the PCB-stock shield acting as a heat baffle.

(9) Use lowest practicable oscillator voltage (eg 6 to 8V) to reduce internal heating, regulated by a zener diode or a small three-terminal regulator.

(10) Filter the DC leads entering the VFO box with an RF choke and 0.001µF feedthrough capacitor to keep RF energy from entering the VFO circuit.

(11) Do not use low-cost plastic trimmer capacitors in a VFO. Use miniature air trimmers or NP0 ceramic units.

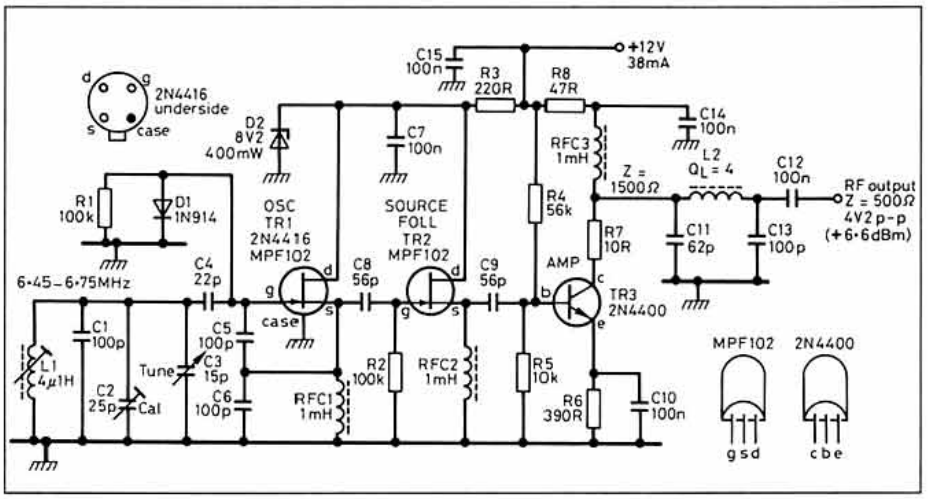


Fig 5: The VFO described by W1FB in *CQ* covering 6.45 to 6.75MHz but suitable for other frequency ranges by appropriate changes to L1/C1. C1, C4, C5 and C8 are NP0 ceramic or polystyrene types. C2 is a ceramic trimmer and C3 a miniature 15pF air variable. L1 is 32 turns of No 28 enamel wire on Amidon T50-6 (yellow) toroid. L2 has 25 turns (No 28 enam) on Amidon FT-37-61 ferrite toroid.

SHUNT-TYPE CRYSTAL LADDER FILTERS

TO THE BEST OF MY knowledge, the first appearance in the amateur radio press of a description of constructing ladder-type crystal MF filters was by J Pochet, F6BQP, in *Radio-REF*, May 1976, with an English-language digest in *TT*, September 1976 (and a full translation in *Wireless World*, May 1977). This was soon followed by the excellent series giving full design data by J Hardcastle, G3JIR (*RadCom*, December 1976, January, February, September 1977). Both F6BQP and G3JIR drew upon the classic paper by M Dishal (*Proc IEEE*, September 1965). Since then, most designs have followed basically similar lines but show that it is possible to cut costs by using low-cost colour-TV crystals (4.43MHz PAL, 3.58MHz NTSC).

"A different approach to ladder filters" by John Pivnichny, N2DCH, (*Communications Quarterly*, Winter 1991, pp72-76) is subtitled 'Another way to make crystal filters'. In effect, N2DCH puts the crystals in shunt with the signal rather than in the usual series configuration. The main difference between them is that the shunt filter has its steeper cut off on the low-frequency side (termed an upper-sideband filter) whereas the series filter has its steep cut off slope on the high frequency side (lower-sideband filter). N2DCH considers that the shunt filter may be preferable for narrow bandwidth filters (eg CW filters) particularly when using relatively low-Q plated crystals in HC-18 holders, although he admits that the series-type lower-sideband filter is usually preferable for the wider SSB filters. He points out that it is possible to create a pair of filters (one shunt, one series) to provide switched sideband selection with just one BFO crystal. N2DCH provides design data for shunt-type filters plus an example of a CW filter designed for 3470Ω termination; **Figs 6 and 7.**

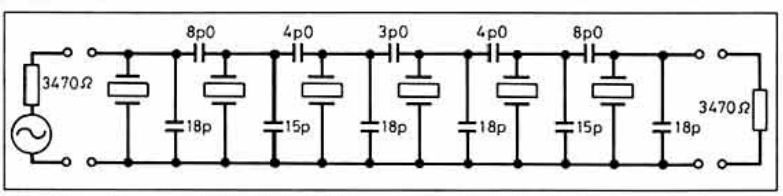


Fig 6: Shunt-type crystal ladder CW filter using six 3.58MHz NTSC crystals designed for 3470Ω terminations. Crystals should be matched to within 100Hz (TV crystals are often only specified as within 300Hz but usually are within 200Hz).

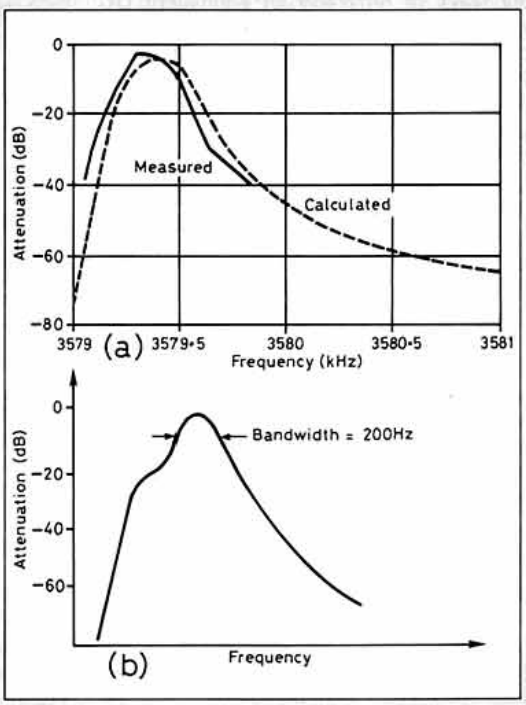


Fig 7: (a) Calculated and measured response curves for the CW filter. (b) Filter response resulting from use of poorly matched crystals.

Performance tests for the *CQ* unit are given for a frequency of 6.7MHz with a room temperature of 70°F (21°C). Short-term drift amounted to 2Hz during the first 5 minutes of operation; over a period of some 35 minutes, the frequency drifted 75Hz lower, then back to within 10Hz of the initial frequency before stabilization occurred. This was with the unit terminated with a 560Ω resistor; when this was shunted with a 10Ω resistor, the frequency shifted by 4Hz showing good isolation. The ARRL Laboratory test on the *QST* unit at around 2MHz gives the frequency drift as less than 4Hz in the initial 4 minutes.

MODIFIED G2DAF LINEAR AMPLIFIER

IT IS NOW AROUND 30 years since publication by G R B Thornley of the G2DAF series of SSB designs, including his high-grade HF receiver, his Mark 1 and 2 SSB transmitters, and the G2DAF 400W PEP linear amplifier. The linear amplifier, first published in the April, 1963 *RSGB Bulletin* (former title of *RadCom*) with additional notes in the May issue, was later published in a condensed form in *SSB Equipment* which also reprinted the G2DAF SSB Transmitter Mark 2: **Fig 8**.

The linear amplifier was based on the passive-grid technique suitable for being driven from an SSB exciter/transmitter of around 50W PEP. The original model used two 4-125A (Mullard QY3-125) valves but it was noted that the method of operation was suitable for any of the commonly used tetrode or pentode amplifier valves including the 4-65, 4-125, 4-250, 4X150A, 4X250B and 813. The valves were operated under zero bias conditions without any of the complications of carefully regulated screen supplies, the screen voltage derived by rectifying a small portion of the input signal in a voltage-doubler.

G2DAF pointed out that "in many ways the 813 is a quite remarkable valve - its performance in the G2DAF amplifier is quite outstanding. With 2.5kV anode potential, it is possible to run *one* 813 valve to 400W PEP output. This is possible without degradation of linearity, and 'on the air' reports indicate that the intermodulation distortion products are at a level 45dB down in relation to the wanted voice sideband signal. This is about 5dB better than the writer's amplifier using a pair of 4-125A valves."

The G2DAF linear amplifier still in the 1990s represents a valid approach but the input circuit may require a minor modification for use with current solid-state transceivers and/or for different valves. A modified 2DAF amplifier has been described by P J Liebenburg, ZS2PL, (*Radio-ZS*, January 1991) with additional suggestions by Lou Gatzke, ZS6AOZ, (*Radio-ZS*, April 1991). ZS2PL, (formerly ZE5JU) has been using a modified 2DAF with two 4X150A valves since 1970, driving it from a Collins KWM-2 transceiver, but then added a 1:3 step-up toroid transformer to avoid a mismatch to his ICOM 730 solid-state transceiver.

Fig 9 shows modification to the original G2DAF design which had two 4-125A valves and a single passive-grid resistor (300Ω) made up from five 1W resistors for SSB operation, The three 50Ω, 50W dummy-load resistors used by ZS2PL would seem very generously rated, even when driven by an

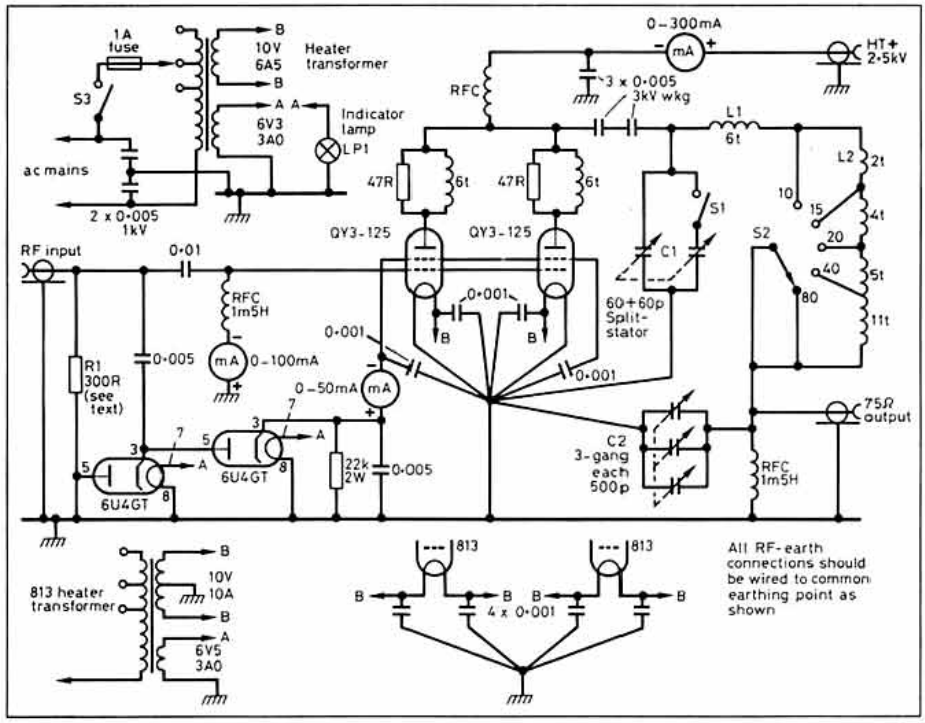


Fig 8: Circuit diagram of the 1963 G2DAF linear amplifier. S1 open for 28, 21 and 14MHz, closed for 7 and 3.5MHz. Fixed capacitors are mica except the three 3kV 0.005uF disk ceramics. The anode RFC should be of the split-winding type without series resonances on any of the HF bands, particularly if the amplifier is intended also for use on 10, 18 and 24MHz.

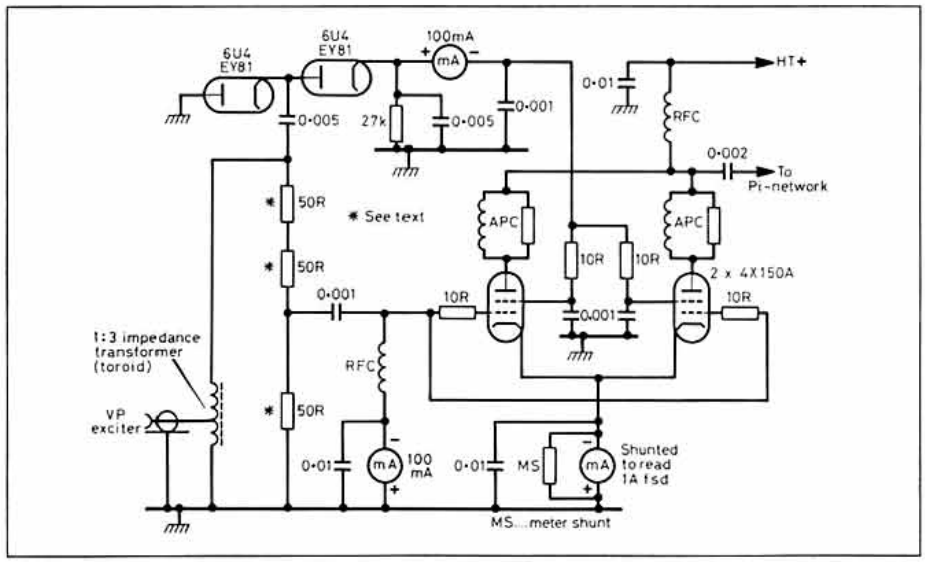


Fig 9: Modified input arrangement of the G2DAF linear as recently described by ZS2PL/ZS6AOZ.

ICOM 730. ZS2PL states: "The 1:3 toroid step-up transformer provides a better match to modern solid-state rigs. The RF voltage at the top of this resistor chain is of the order of 100V or more and is rectified and doubled as an 'audio varying DC voltage' and applied to the screen-grids of the amplifier valves, with excellent linearity. In the absence of RF drive there is no screen voltage and the standing current is very low.

"The reason for the voltage divider input circuit was due to the fact that 3W of drive would destroy the 4X150As (μ = 12mA/V) and the grid drive is therefore taken from the lower end of the chain. This will have to be taken from higher up the resistor chain, even from the top as G2DAF did in his original design, for driving a pair of 4-125A valves.

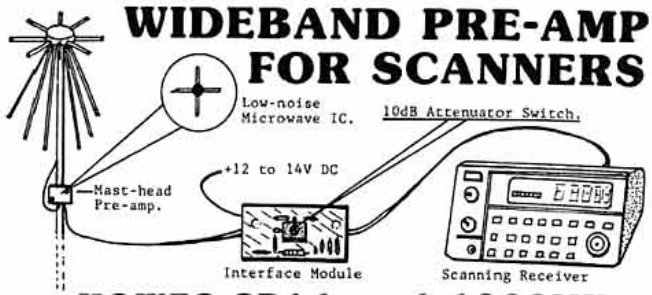
"This type of linear has many desirable features, including low cost, low component count, stability due to the swamping effect of the passive grid input load and simplicity of construction. To the best of my knowledge there are no solid state diodes which will reliably handle the RF input voltages, and thermionic diodes are used in the voltage-doubler arrangement as in the original circuit; note that the cathodes and heaters of these rectifiers must not be connected; I have used two EY81 television rectifier valves without failure since 1970 and can recommend them. The meter shunt is earthed right at the amplifier cathodes, and the leads run in shielded wire away from RF to the meter which is mounted in a shielded can."

It must be stressed that a linear amplifier with an EHT supply of around 2.5kV calls for very careful construction and generously rated components as well as stringent safety precautions during setting up and testing, etc. ❑

C.M.HOWES COMMUNICATIONS

Mail order to: EYDON, DAVENTRY NORTHANTS NN11 6PT
Tel: (0327) 60178

WIDEBAND PRE-AMP FOR SCANNERS



HOWES SPA4 4-1300MHz

The **HOWES SPA4** wide-band pre-amplifier is designed to add extra gain to passive antennas (discone, nested dipoles etc.). The low noise combined with at least 15dB of gain over the whole frequency range overcomes the losses in the antenna's down lead, and adds extra sensitivity to the scanning receiver.

The SPA4 uses advanced technology adapted from our very popular AA4 active antenna. Now you can add this extra performance to your discone!

- ★ Fully broad-band covering 4 to 1300MHz
- ★ Low noise microwave IC (NF <3dB). Over 15dB gain. IP3 +15dBm.
- ★ Coax powered pre-am. 12 to 14V DC at less than 20mA.
- ★ 10dB switched attenuator on the receiver interface board.
- ★ Pre-amp only 40 by 28mm. Easy-to-build kit or ready-built modules.

If you would like to improve your scanner reception, and you already own a passive broadband antenna, then the **HOWES SPA4** could be just what you need to boost those weak signals.

SPA4 kit: £14.90 **Assembled PCB modules:** £20.90
Weatherproof (IP65) case for outdoor pre-amp mounting: £6.90

AA4 ACTIVE ANTENNA for scanners. The **HOWES AA4** Active antenna gives full coverage from 25 to 1300MHz in a neat compact unit. The answer to antenna space/visibility problems for home, holiday and portable operation. Reviewed in the November '90 *Short Wave Magazine*. Excellent performance in a small space!

AA4 Kit: £19.80 **Assembled PCB modules:** £26.80

RECEIVER KITS		KITS	Assembled PCB
DXR10	3 Band (10,12 & 15m) for DX amateur work	£26.60	£39.90
DcRx54	5.4MHz HF Aircraft band (rescue etc)	£15.90	£22.70
DcRx20, 40 or 80m	Single band amateur receivers	£15.90	£22.70
TRF3	Simple Shortwave Broadcast receiver (TRF)	£15.50	£21.70
RECEIVER ACCESSORIES			
AA2	150kHz to 30MHz active antenna	£8.50	£12.90
ASL5	Externally fitted SSB and CW audio filter	£15.90	£24.60
CSL4	Extra SSB/CW filtering for our receivers	£10.50	£17.40
CTU30	All HF bands and 6M ATU (up to 30W TX)	£31.50	£38.40
CV100	HF to VHF converter for scanners	£26.50	£37.90
CBA2	Buffer for adding counter to our SSB/CW RXs	£5.90	£9.50
DFD5	Digital frequency counter/display	£41.50	£64.50
DCS2	"S meter" for our receiver kits	£9.20	£13.80
XM1	Crystal frequency calibrator (8 markers)	£16.90	£22.80
TRANSMITTERS			
AT160	AM/DSB/CW 80 & 160M 0.5-10W PEP TX	£39.90	£61.80
CTX40 or 80	Single band QRP CW transmitter	£14.80	£21.80
HTX10	10 & 15M SSB and CW Exciter (filter type)	£49.90	£78.70
HPA10	3 or 10W PEP Power Amp to suit HTX10	£33.90	£51.20
MTX20	20M 10W or QRP CW Transmitter	£24.50	£32.50
TRANSMITTER ACCESSORIES			
AP3	Automatic Speech Processor	£15.90	£23.80
CM2	Quality Mic with VOGAD	£12.50	£17.10
CVF20, 40 or 80m	VFO for above TXs or TX+RX	£10.90	£18.40
MA4	Filtered Microphone Amplifier (suits AT160)	£6.20	£11.50
ST2	Side-tone/practiCe oscillator (sine-wave)	£8.90	£14.30
SWB30	SWR/Power Indicator/Load 30W 1-200MHz	£12.90	£18.50
VF10	Matching VFO for HTX10/Transceiver	£17.50	£31.60
VF160	80 & 160 Hetrodyne VFO for AT160/Transceiver	£22.80	£39.20

PLEASE ADD £1.20 P&P to your total order value.

HOWES KITS are produced by a professional RF design and manufacturing company. They contain a good quality printed circuit board with screen printed parts locations, full clear instructions and all board mounted components. Sales and technical advice are available by phone during office hours. Please send an SAE for our free catalogue or specific product data.

73 from Dave G4KQH, Technical Manager

JAYBEAM CUSHCRAFT TONNA BUTTERNUT MIRAGE
MET **ANTENNAS** KLM
BNOS **and Accessories** DATONG
YAESU ROTATORS MFJ LANDWEHR DRAE SANDPIPER

HF TRIBAND BEAMS

Cushcraft
A3S-3EL £360.00
Jaybeam
TB3-3EL £403.00
MM3-MINIMAX £417.00
KLM
KT34A-4EL BEAM £439.00

HF VERTICALS

Butternut
HF2V-80 + 40 ..... £149.00
Cushcraft
R5-20-10M £265.00
AP8-8 band £185.00
Jaybeam
VR3-20-15-10 ..... £94.00

6 MTS

MET
50-5 5EL.YAGI £75.63
Cushcraft
A50-6 6EL £186.00
A50-5 5EL £119.00
Tonna
20505 5EL £59.00
KLM
7 EL.YAGI £190.00

4 MTS

MET
70-5 5EL.YAGI £66.43
70-3 3EL.YAGI £43.85
Jaybeam
4Y/4M 4EL £55.40

Full range of coax plugs, masts, brackets etc etc.

PLEASE SEND LARGE SAE FOR FULL PRICE LISTS.

PRICES DO NOT INCLUDE CARRIAGE

2 MTR YAGIS

Cushcraft
4218XL 18EL.BOOMER ... £149.00
215WB 15EL.BOOMER £106.00
MET
144-19T 19EL.YAGI £81.25
144-14T 14EL.YAGI £67.86
144-7T 7EL.YAGI £35.16
Jaybeam
PBM14 14EL.P/BEAM £93.53
LW8 8EL.YAGI £31.96
Tonna
20817 17EL.YAGI £64.00
20813 13EL.YAGI £55.00
20809 9EL.YAGI £39.00
20089 9EL.PORTABLE £39.00
KLM
20EL.LONG YAGI £220.00
16EL.LONG YAGI £176.00
HB9CV 2EL.BEAM £5.50

2 MTR VERTICALS

MET
144GP GROUND PLANE ... £20.95
Jaybeam
LR1 4.3dB CO-LINEAR £50.99
Cushcraft
ARX2B RINGO RANGER ... £49.00

70 CMS

Tonna
20921 21EL.YAGI £53.00
MET
432-5B 5EL.YAGI £24.63
432-17T 17EL £57.18
Jaybeam
PBM24 24EL.P/B £72.03
MBM48 48EL.M/B £58.63
MBM88 88EL.M/B £81.78
KLM
20EL. LONG YAGI £131.00
30EL.LONG YAGI £154.00

23 CMS

Tonna
20623 23EL.YAGI £35.00
20655 55EL.YAGI £55.00
Jaybeam
D15/23 15EL.DBL £76.84
Sandpiper
20TURN HELICAL £48.34
28TURN HELICAL £56.21

13 CMS

Tonna
20725 25EL.YAGI £41.00

70 CMS VERTICAL

ARX450B R/RANGER £49.00

SPECIALIST ANTENNA SYSTEMS LTD
(WESTERN ELECTRICAL)
Maesbury Road, OSWESTRY, Shropshire SY10 8EZ
Phone: 0691 653221 Fax: 0691 670282

SATELLITE SPECIALS

145 Mhz
J/B 10EL.X YAGI £76.96
Tonna 11EL.X YAGI £95.00
KLM 14C RHC/LHC ..... POA
KLM 22C RHC/LHC ..... POA
435 Mhz
J/B 12E.X YAGI £87.42
Tonna 19E.X YAGI £48.00
KLM 18C RHC/LHC ..... POA
KLM 40CX RHC/LHC ..... POA

MIRAGE PRE-AMPS

2MTR G/F IN-SHACK £96.00
2MTR G/F MASTHEAD £135.00
70CM G/F IN-SHACK £96.00
70CM G/F MASTHEAD ... £135.00

MIRAGE LINEAR AMPS

With Pre-Amps
A1015G 6MTS 10-150W ... £309.00
B23G 2MTS 2-30W £141.00
B108G 2MTS 10-80W £176.00
B1016G 2MTS 10-160W ... £283.00
B3016G 2MTS 30-160W ... £252.00
Without Pre-Amps
D15N 70cm 2-20W £158.00
D1010N 70cm 10-100W £329.00
D3010N 70cm 30-100W £304.00

M.F.J.

948D. VERSATUNER £120.00
901B. A.T.U. £71.80
815B. HF METER £80.70

YAESU ROTATORS

G250 BELL TYPE £79.70
G400 BELL TYPE £152.24
G400RC BELL TYPE £182.89
G500A ELEVATION £203.32
G5400B.AZ/EL £383.15

Phone your order for same day despatch.

ACCESS & VISA WELCOME

Become a regular D-i-Y'er

"Brilliant!"

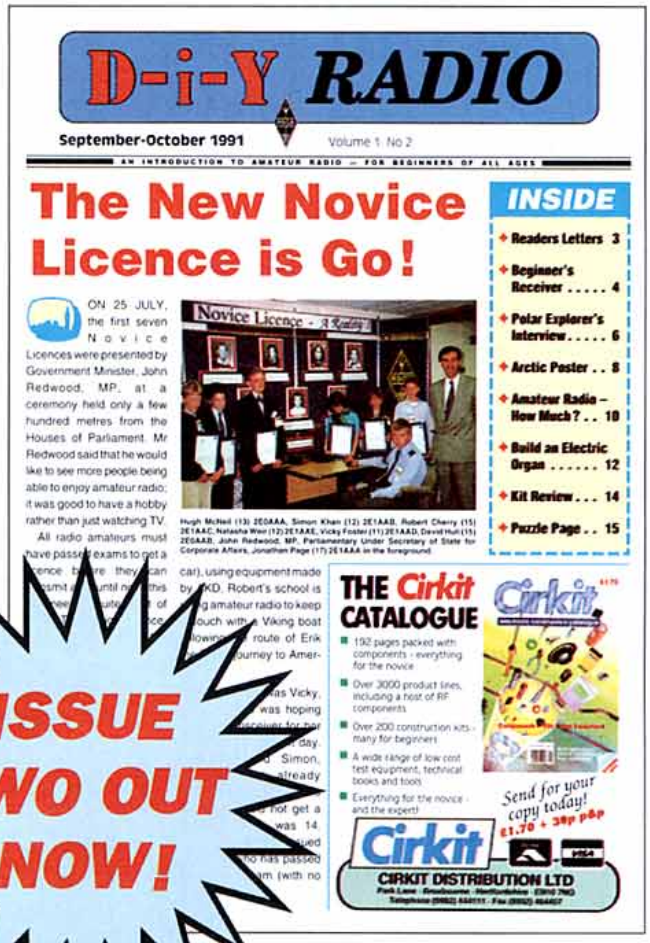
Vicky Foster aged 11, new Novice Licensee, 2E1AAD

"Smashing! At last here is something which I can understand and start to learn from"

R. Collins, South Humberside

"The new D-i-Y – a huge improvement"

C. Quinnin, Northumberland



***D-i-Y Radio** offers a new and exciting introducton into electronics for the young and not so young, with complete projects in every issue!*

ISSUE TWO OUT NOW!

Get *D-i-Y Radio* for the next year*

✦ plus ✦

- ✗ **A "Can't wait for my Novice Licence" badge**
- ✗ **A plastic wallet so you can keep your issues of *D-i-Y Radio* safe**
- ✗ **An RSGB Map of Western Europe (900mm wide and 1200mm high)**
- ✗ **Money-off vouchers**
- ✗ **D-i-Y Club card**
- ✗ **An RSGB pen**

** D-i-Y Radio is published six times a year.*

Special prices for RSGB Members only:

UK and BFPOs: £7.65
(non members £9.00)

EEC: £8.97
(non members £10.32)

Overseas Airmail: . . . £10.35
(non members £11.70)

Send cheques or postal orders, made payable to RSGB, to:

DIY Radio,

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

RADCOM CONSTRUCTION FEATURE

First Steps in Home Construction

A series of articles by John Case, GW4HWR

PART FIVE: DIODES, TRANSISTORS AND THE PCB

How to test diodes and transistors, plus (at last!) putting the components onto the printed circuit board.

THE ONLY DISCRETE diode used on the PCB is a voltage reference or zener diode. However, the method of marking is the same for almost all small diodes. Type numbers are either printed on the body in 'plain language', eg OA91 or 1N914, or in coloured bands when each colour indicates a digit, eg yellow-brown-yellow-grey = 1N4148. '1N' indicates a diode and is not coded.

It is my opinion that a very large number of failures in projects built from published designs are due to incorrect fitting of diodes! This is brought about by the apparent anomoly in the marking of the polarity. **Fig 9a** shows the various ways commonly used. The + sign often found at the *cathode* causes the unsuspecting to believe that this must be the anode because the theory tells us that the anode must be positive with respect to the cathode to cause conduction. The simple circuit shown in **Fig 9b** gives the reason; the + sign indicates the positive end of the load when the diode is used as a rectifier.

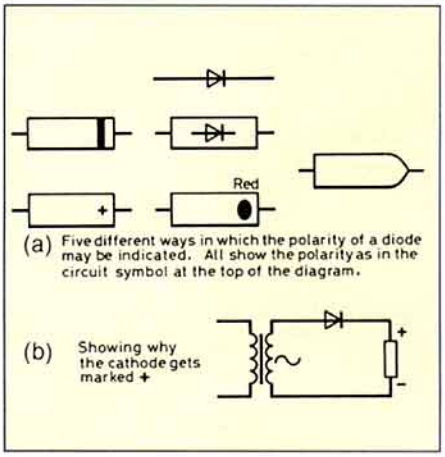


Fig 9: (a) Diode markings; (b) The markings on a diode can confuse.

To test a diode, measure its resistance in both directions as shown in **Fig 10a**. Again, note that the actual polarity of the meter terminals is reversed while in the resistance mode. If the meter has several resistance ranges, *use the lowest one*. The forward resistance should be in the region of 1000Ω or less depending on type, and the reverse value should be 1MΩ or more. If a zener diode is being checked, a low reverse resistance may be indicated if any other range of the meter is selected. This would be due to the battery voltage, on the higher ranges, exceeding the zener voltage.

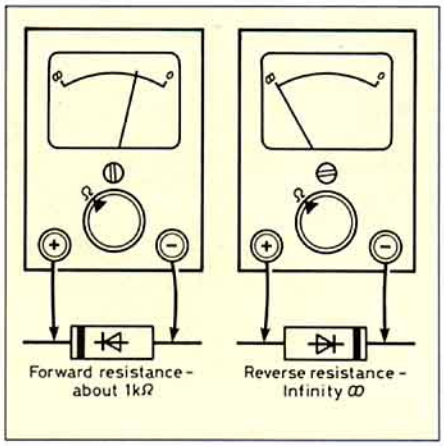


Fig 10(a): Testing semiconductors – diodes .

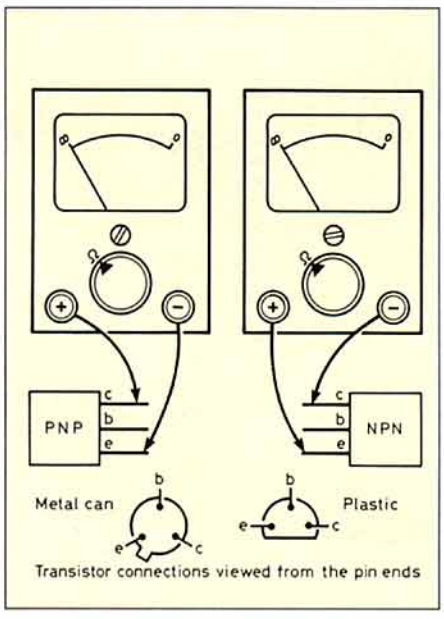


Fig 10(b): Testing semiconductors – transistors.

TRANSISTORS

THREE DIFFERENT TYPES OF silicon transistor are used in the PSU circuit. Q1, Q2 and Q5 are NPN general purpose types and Q3 is a PNP complementary type. They are not critical but the pin out must be correct. A number of alternatives are suggested and any combination will work equally well. The inset of **Fig 10b** gives the pin connections. Q4 is not mounted directly on%% the PCB but is bolted to the heatsink. The overlay diagram (**Fig 11**) shows the pin out. Test the transistors using the Ohms range of the meter. Connect them as shown in Figure 10b. Note the polarity for each of the types, PNP and NPN.

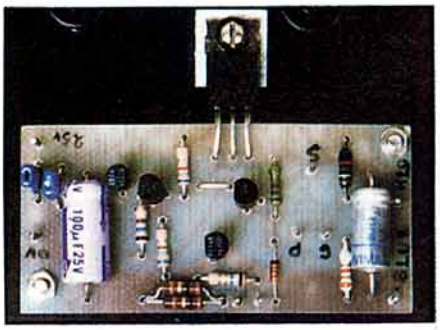
In each case the resistance indicated should be very high; 1MΩ or more is quite normal for silicon types. Now connect a resistor of between 47 and 100k between base and collector (I always use a wet finger!) and the resistance should fall towards zero. The amount that the resistance decreases depends on a number of factors such as the meter range used, the value of the resistor (or the wetness of the finger) and the gain of the transistor. The fact that the resistance falls proves that the device is *working* even if its gain is not as high as it should be. A few tests will enable the relative 'goodness' of transistors to be assessed. You have now tested all of the PCB components and greatly reduced the chances of PCB failure.

THE PCB

THE FOIL PATTERN IS GIVEN full size in **Fig 12** for those who wish to produce their own, but it is generally assumed that a ready-made board will be used *[details of PCBs and full kits for the PSU Project will be published next month - Ed]*. Before mounting any components, mark through the fixing holes onto the heatsink, noting the position from **Fig 13**. Be sure that the board is held with the copper

side towards the heatsink and that the holes for Q4 are at the bottom.

Insert the nine terminal pins from the print side of the board so that the shoulders of the pins are flush with the copper. This kind of statement appears in many published projects. It sounds easy but can be surprisingly difficult and frustrating in practice. The board must be supported very close to the pin as quite a lot of pressure is required to push the pin so that the splined section enters the hole.



A very simple jig (**Fig 14**) makes all the difference. A short piece (25mm is plenty) of brass or steel tubing, about 5mm outside diameter is required. Car brake pipe, caravan gas pipe or a spacer from a rotary switch are all ideal. Fix vertically in the vice with a few millimetres sticking out. Pass the pin through the correct hole, rest the component side of the board on the tube with the end of the pin inside. If the pin is a single-ended one, press it home with the flat end of a pair of pliers, etc. Double-sided pins are a little more difficult and it is worth making a 'pusher'. A small pin chuck pushed into a small file handle makes the job easy. Pins on the print side of the board are not required and should be cut off with side-cutters if double-sided pins have been used. If a pin needs to be inserted after the board has been completed, the above technique makes an impossible task easy! Solder the head of each pin but look out for excess solder either filling adjacent holes or causing 'solder bridges'.

If the board is being built for a fixed voltage PSU, do not put in the pins marked: slider, G and P, but instead insert a miniature, horizontal 4.7k preset in the holes.

Now insert the eight resistors and C4 and C5, all of which should lie flat on the board. Check that the polarity of the last two items is correct. If the markings are not clear, remember that the 'crimp' at one end of axial type electrolytic capacitors indicates the positive. Double check - insert them the wrong way round and you have a miniature time bomb! C2 and C3 are mounted as close to the board as possible, depending on type. It is good practice to keep the leads above the board as short as possible. It will probably be easier to fix one component at a time if this is your first PCB. Bend the leads to about 45° on the copper side of the board to stop the component falling out, then clip off close to the copper. About 0.5mm - 1.0mm protruding is ideal. Solder, then proceed to the next component. The link is made from one of the off-cuts from a resistor. D1 is treated in the same way as a capacitor - *note the polarity.*

Transistors Q1, 2, 3 and 5 are now fitted. Push them down so that the body is no more than 5mm above the surface of the board. Check that Q3 is the PNP type. Finally, fit Q4. Carefully push the leads into the PCB until they protrude by 1mm, then solder. The marking TIP31A should be facing the opposite edge of the board. Leave it in a vertical position for now. To complete, label the terminal pins, on the component side of the PCB, with a fine fibre tip pen. ❑

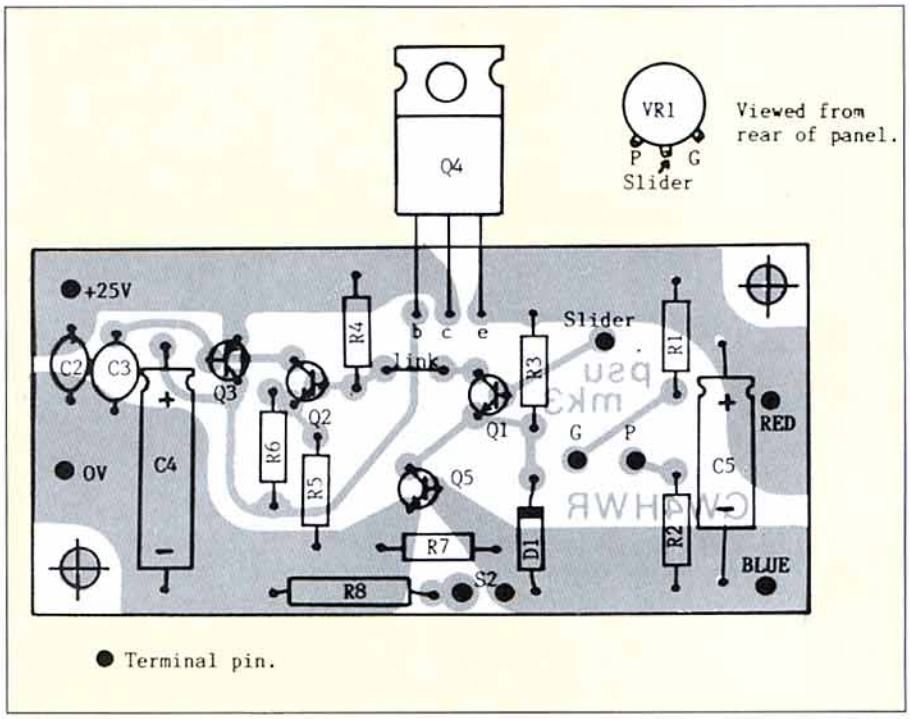


Fig 11: PCB Component overlay.

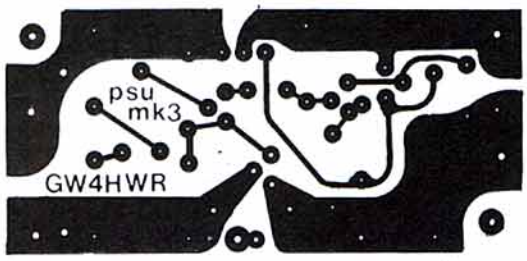


Fig 12: The PCB layout (actual size)

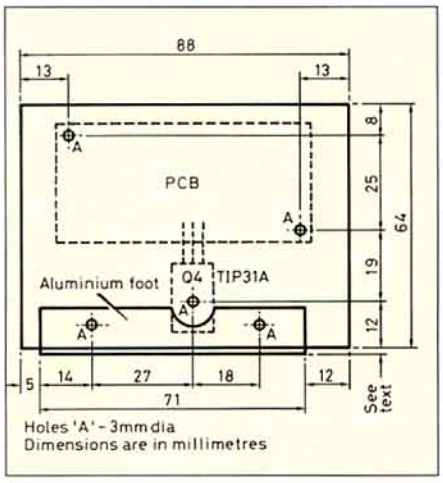


Fig 13: Positioning the PCB and heatsink.

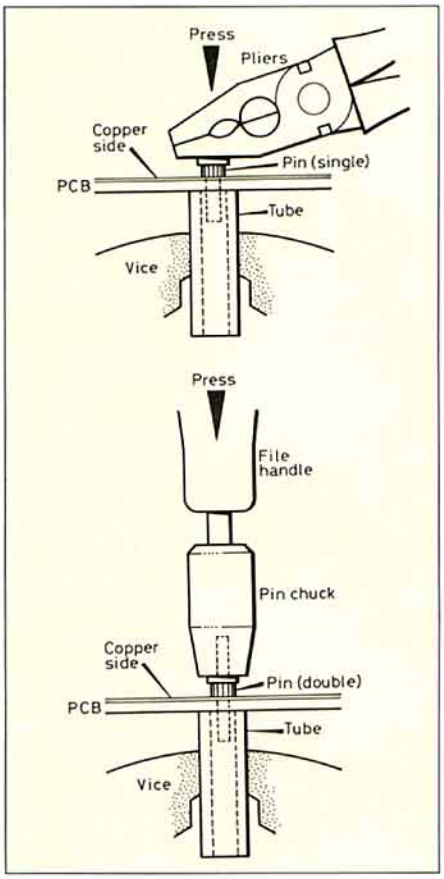


Fig 14: A simple jig makes pin inserting much easier.

. . . to be continued

NEXT MONTH

Adding the heatsink, and testing the power supply

IDEAS FROM ABROAD

Eurotek

TRANSLATED AND EDITED BY ERWIN DAVID, G4LQI

AN IDEAL HF RECEIVER FRONT END

Guenter Schwarzbeck, DL1BU, devotes 15(!) pages of *cq-DL* (March, April and May 1991) to Yaesu's FT-1000 top-of-the-line transceiver. Surprisingly, he finds that the compromises causing the greatest deviation from 'ideal' receiver front-end behaviour can be avoided by a home builder.

JAPANESE DESIGNERS are surprised when they try their products amid the European 'aethersoup' containing hundreds of strong and superstrong HF broadcast stations. In Japan, Australia and in parts of the USA their night-time carriers produce antenna voltages of a few mV while here in Europe the closely spaced broadcast signals from simple dipole or Windom antennas often exceed 50mV. Expert users demand ever better rejection of both close-in and out-of-band 'super-signals'.

REJECTING FAR OUT QRM

TWO STRONG out-of-band signals or their harmonics, mixing to produce a strong in-band beat, can distort or even swamp a weak wanted signal by overloading the first mixer. The multitude of strong broadcast stations, spaced at 5kHz intervals, actually can and do create a 'comb' of whistles throughout an amateur band. This is called intermodulation; 2nd order if this beat is of the form $f_1 \pm f_2$, 3rd order if $f_1 \pm 2f_2$.

Assuming this mixing of offenders takes place in the first mixer, there are two defenses; the FT-1000 scores well in both.

First, one can prevent offending signals from reaching the first mixer by preselection, ie by placing between antenna and first mixer a multi-pole LC filter which, ideally, attenuates all frequencies but the wanted one, or at least all outside the amateur band in use. In an amateur-band-only receiver this is not hard, but in a general coverage receiver things are different. Our percentually widest amateur band, 1.81 - 2MHz, is just over 11% wide. To constantly cover the range of 1.8 - 29.7MHz with filters of that width would take 27 filters, unaffordable in space and cost even in top-of-the-line radios.

In the FT-1000, 12 filters cover this range, while some of the amateur bands are favoured with additional filtering for a total of 17 segments. This is a big improvement over the eight half-octave filters frequently seen in general coverage receivers.

Second, one can design the first mixer to remain linear up to very high signal levels. While ten years ago third-order intercept points of +5 to +15dBm were acceptable (much earlier even -30dBm), in present-day receivers +20 to +25dBm is expected and the FT-1000 double-balanced 4-FET first mixer complies; **Fig 1**. Note that balanced local oscillator injection of $2V_{RMS}$ is required but this is not a problem because of the high impedance of the FET gates.

What then if, in spite of all this sophistication, the 5kHz comb of whistles is still there? One must conclude that the intermodulation takes place in non-linear components ahead of the mixer; the RF pre-amp is not the culprit, as its being switched in or out does not make any difference. I established, sometimes by quite tricky test procedures, that the subminiature ferrite cores in the coils in the preselector filters saturate due to high circulating currents when one of the intermodulating signals falls within the filter's pass band. This affects 3rd order intermodulation. Worse, however, is 2nd order intermodulation oc-

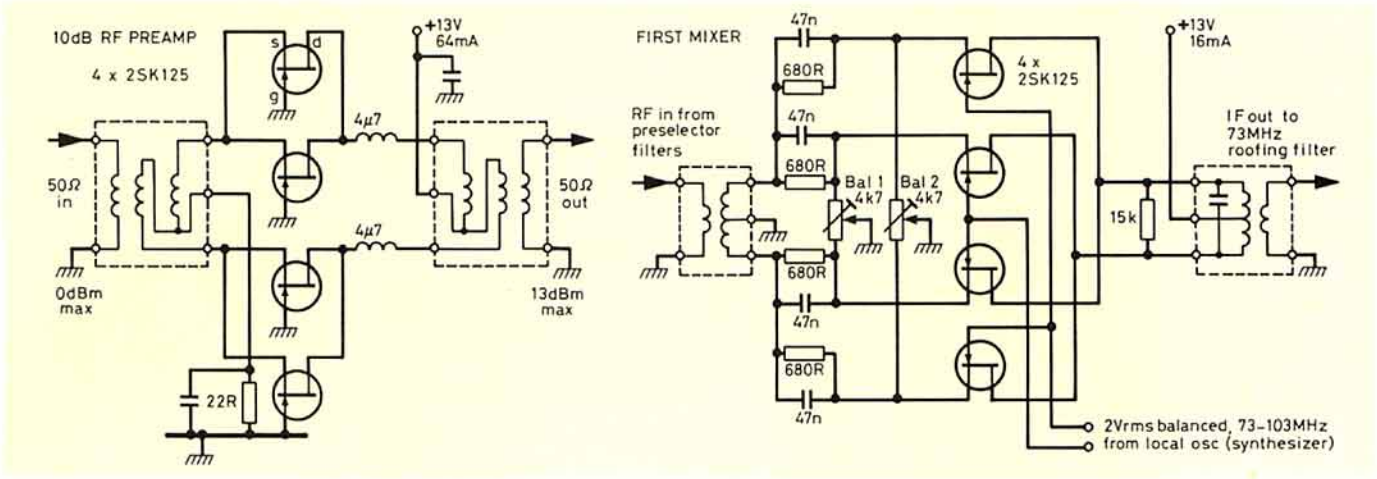


Fig 1. RF preamp and 1st mixer of main receiver in the Yaesu FT-1000 transceiver.

curing in the switching diodes between antenna and preselector, sometimes three of them in cascade! Shorting any one of them improved intermodulation performance by 4dB at an antenna signal level of -10dBm.

REJECTING CLOSE-IN QRM

AFTER THE FIRST 73.62MHz IF with a 16kHz-wide roofing filter, there is a second IF at 8.215MHz with four crystal filters as standard equipment: 2.4 and 2kHz wide for SSB, 500 and 250Hz wide for CW. These can be backed up by optional filters in the 455kHz 3rd IF to permit pass-band tuning and further improve selectivity. Before buying expensive optional filters, however, remember that their selectivity is meaningful only to roughly 60dB down; beyond this, reciprocal mixing caused by synthesizer phase noise broadens the selectivity curve. In this respect the FT-1000 is good but by no means outstanding.

CONCLUSIONS

THE FT-1000 WAS designed as a Jack-of-all-trades. As such it is remarkable.

Experienced constructors willing to trade flexibility for optimum performance on few bands or spot frequencies might combine the excellent FT-1000 mixer circuit with preselector filters using air-wound coils, or formers with cores of more generous dimensions. Each filter would be no wider than the band of interest, or even be hand-tunable across that band. Filter selection would be with wafer switches or miniature relays.

The reciprocal mixing problem, at least for spot frequencies, could be solved by using a simple crystal oscillator having low phase noise; even a good FET VFO followed by the usual buffer and amplifier would outperform all but the best commercial DDS synthesizers; the latter apparently still are too expensive for amateur radios.

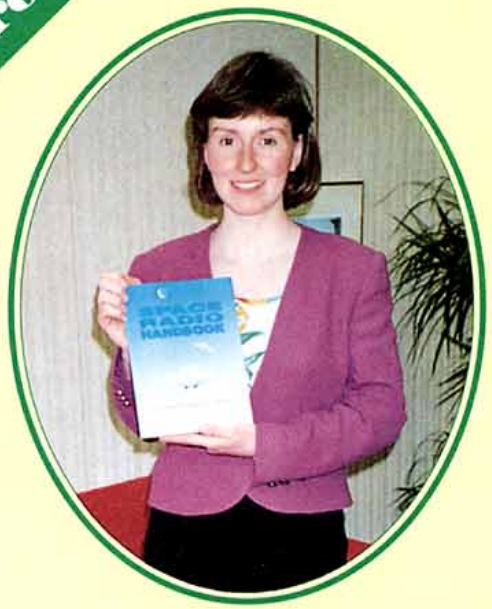
NEW! from RSGB!

Space Radio Handbook

by John Branegan, GM4IHJ

The most comprehensive guide to the subject available.

- **Meteor Scatter**
- **Moonbounce**
- **Weather Satellites**
- **Astronaut Communication**
- **Amateur Radio Satellites**
- **Simple Radio Astronomy**



British astronaut, Helen Sharman, shows off her copy of the RSGB's Space Radio Handbook.

Available from RSGB Sales
See pages 78/79

Special price for RSGB members:
£11.34
inc p&p

OUT NOW!

SUMMER 1991 CATALOGUE

- 192 pages
- £££'s discount vouchers
- 100s new products
- New range kits
- Over 3000 lines
- Fast same day despatch

Available from most large newsagents or directly from **Cirkit**

£1.70 plus 30p postage

Cirkit

CIRKIT DISTRIBUTION LTD
Park Lane · Broxbourne · Hertfordshire · EN10 7NQ
Telephone (0992) 444111 · Fax (0992) 464457

Access VISA

RADCOM TECHNICAL FEATURE

Sideband Can be Simple!

by Steve Price, G4BWE

ALTHOUGH SSB IS A HIGHLY popular mode, if a survey were to be carried out in order to ascertain what kind of equipment amateurs home-construct most, the SSB transceiver would almost certainly come way down the list.

Is this ironic situation understandable? Yes, because the very obvious complexity of modern factory built sideband rigs is enough to discourage the vast majority of home-brewers. That said, there has been something of a renaissance lately in the construction of QRP CW transceivers for the HF bands. Many of the operators who are responsible for this trend have openly declared that they are depressed by the current state of affairs within our hobby. "You need a degree in electronics and computer science to understand how transceivers work nowadays" is a typical reaction.

However, when arguments become emotive it is sometimes all too easy to lose sight of the real issues. Modern commercial transceivers are highly complex, but their complexity is due in large part to the application of digital frequency synthesis - a technique which has been made almost mandatory in the case of HF transceivers because of the need to provide reliable operation on no less than nine separate bands, with general coverage receive thrown in for good measure!

Yet SSB is not, in itself, a difficult mode, and when drawing comparisons between CW and SSB transceivers it is important to make sure that we compare like with like. Indeed, a simple sideband rig does not necessarily have to employ many more components than its CW counterpart.

In short, a good deal of fun can be had from the construction of rudimentary sideband transceivers if we are prepared to accept certain limitations in their functionality. Firstly, it is far easier to start with a single-band rig, as the requirements of multiband operation lead inevitably to compromises in performance when using simpler design techniques. Restricting the transmit power to around 5W PEP is also advisable because a small PA is much cheaper and easier to construct. Provided we make our choice of band with this in mind, many enjoyable QSOs can still be made: I have found that 7MHz is a particularly good band for low-power SSB operation during daylight.

Having accepted the restrictions outlined above, the constructor may console himself/herself with the fact that a VFO-controlled single-band SSB transceiver giving 5W PEP can still be built with high quality components for under £100. Although some of the front panel features associated with commercial rigs may be missing - digital readout, for instance - the 'essentials' such as PTT operation can easily be provided. Furthermore, the receive performance of the homebrew transceiver will probably exceed that offered by many factory-built multi-band designs.

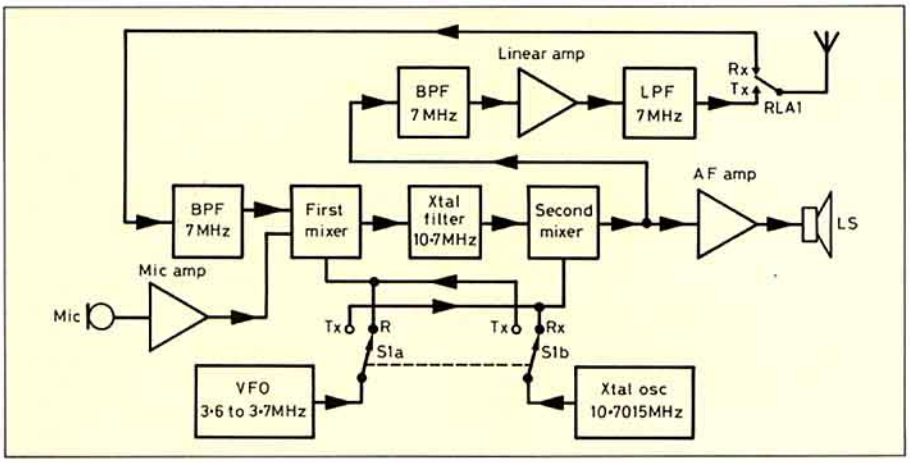


Fig 1: A simple SSB transceiver for 7MHz.

BACK TO BASICS

FIG 1 SHOWS THE BLOCK DIAGRAM of an SSB transceiver for the 7MHz band. In deciding on this architecture two fundamental decisions have been made. Firstly, the filter method of SSB generation is adopted. Much has been written in recent years about various phasing techniques for SSB, but although phasing systems appear to offer certain advantages - notably the elimination of an expensive crystal filter - further investigation throws up so many performance shortcomings that in the final analysis phasing systems are shown to possess little more than curiosity value. This is perhaps a rather harsh judgement and there are those who would argue with my conclusion. Nevertheless, it is a decision I have reached after much careful thought. It is based, ultimately, on the realisation that the filter method not only outperforms practical phasing systems, but does so using far simpler circuitry. As a footnote to this argument it should be pointed out that the phasing method may yet have its day, but only because DSP (Digital Signal Processing) offers the prospect of almost perfect implementation of phasing in the digital, rather than analogue, domain. DSP transceivers are bound to appear over the next few years but at the moment it would be a brave home-brewer who decides to try and 'knock one up' on the kitchen table!

The second decision is to use a single-conversion signal chain, ie there is only one intermediate frequency. This may seem an unwise choice when the majority of commercial HF rigs use either double or triple conversion. Remember, however, that these transceivers are multi-band and also multimode, with possibly general coverage receive as well. In complex transceivers multiple IFs are a necessary evil, although they can easily cause problems of their own - spurious responses/outputs and receiver 'birdies', for instance. In contrast, the single-band transceiver presents a glorious opportunity to eliminate whole blocks of signal circuitry without compromising performance in any way. Choosing the right intermediate frequency involves a number of important considerations, not least of which is the resultant image frequency (more about this later). As a general rule, however, the higher the IF the better, even though this may result in received signals being up-converted by the first mixer.

On receive, the transceiver operates as follows. Incoming signals are routed via the antenna changeover relay (RLA1) to a band pass filter. This filter, which will typically comprise a pair of closely coupled parallel-tuned circuits, is fixed tuned and has sufficient bandwidth to cover the range 7.0 to

7.1MHz, thus eliminating the need for a preselector control. In the interests of achieving absolute simplicity, constructors might be tempted to use just a single tuned circuit here - be warned, however, that paring down the design at the very beginning of the signal chain will result in performance degradation 'across the board' with a reduction in the receiver's effective dynamic range, poor image rejection and the increased likelihood of spurious responses.

The first mixer is driven directly from the output of the bandpass filter. Provided that a mixer of reasonable quality is chosen, there is absolutely no reason to employ an RF amplifier. It might be suggested, of course, that the increase in sensitivity provided by RF amplification could facilitate the use of electrically short antennas (ie less than $\lambda/8$). This is a spurious argument in the case of low-power transceivers because it would be foolish to compromise very much on the size of the antenna when it will inevitably reduce the radiation efficiency on transmit.

During receive, S1a couples the VFO to the first mixer. Although shown conceptually as a double pole switch, S1 will in practice be either a relay or some form of semiconductor gate which is controlled by the PTT. The IF is 10.7MHz and so for reception of a signal on 7.05MHz, for instance, the VFO must be tuned to 3.65MHz (ie 7.05 + 3.65 = 10.7). The mixers must be balanced types in order to satisfy the requirements of SSB generation on transmit, and the receiver also performs better if balanced mixers are used. The crystal filter, which has a bandwidth of around 2.4KHz, selects the wanted signal and presents it to the input of the second mixer or product detector. The 10.7015MHz crystal oscillator drives the second mixer's LO port via S1b. This enables the second mixer to function as a product detector so that it gives an audio output.

An IF amplifier is not shown in Fig 1 because the transceiver is quite capable of functioning without one. This does of course mean that the audio amplifier must have a much higher gain than would otherwise be necessary. It also helps if active mixers configured to give a modicum of conversion gain are employed, rather than the alternative diode ring mixers which have a conversion loss. If an IF amplifier is used, this should be placed between the filter output and the input to the second mixer. In the interests of avoiding instability it is best to restrict any IF gain to no more than 50dB. This latter statement may cause a few raised eyebrows - it is, after all, not unusual for commercial designs to employ 90-100dB of IF gain. Remember, however, that a major reason for this is to enable superb AGC characteristics to be achieved. Admittedly, it is nice to know that the level of signals arriving at your antenna can vary over a range of 90dB without there being any noticeable change in loudspeaker volume - especially if you have just forked out £2000 for the rig - but in the context of a simple homebrew project such performance amounts to overkill.

When transmitting, S1 is toggled so that the amplified microphone signal can be mixed with the output of the crystal oscillator. A double sideband, suppressed carrier signal at 10.7015MHz now appears at the output of the first mixer. This signal is passed through the crystal filter which removes the unwanted (upper) sideband, leaving us with 10.7MHz SSB. Note that the carrier crystal frequency may need to be changed to match the available SSB filter. The second mixer, which is now coupled to the VFO, produces two outputs - 10.7 + 3.65 = 14.35MHz and 10.7 - 3.65 = 7.05MHz. It is, of course, the latter output that we desire to transmit and so this is selected by the bandpass filter interposed between the second mixer's output and the linear amplifier. At the output of the linear amplifier is the obligatory low-pass filter. This serves to attenuate not only the harmonics of the 7.05MHz signal but also any residual image and crystal oscillator leakthrough at 14.35 and 10.7MHz respectively.

CIRCUIT IDEAS

FIGS 2 TO 4 FEATURE CIRCUITRY developed for a homebrew 7MHz SSB transceiver. Despite having a transmit power of only 5W PEP this rig, when used in conjunction with a half-wave dipole antenna, has provided a host of effortless day-time contacts.

Hopefully, the circuits themselves and the notes which form the rest of this article will inspire many home constructors who until now have stopped short of attempting to build a fully-fledged sideband rig. Although the frequency-dependent component values have been calculated for 7MHz these may, of course, be scaled accordingly for other bands. My own transceiver is housed in a commercial metal case and apart from the potentiometers, switches and sockets, all components are mounted on Veroboard.

Fig 2 shows the major part of the signal chain, including the microphone preamplifier and PTT switching circuitry. IC1 and IC2 are the first and second mixers (refer to Fig 1 for clarification). The SL6440C integrated circuit bipolar mixers [1] are strongly preferred to the alternative diode ring types for the following reasons:-

- Diode ring mixers require a high local oscillator drive power (typically 10mW), accurately matched into a 50Ω LO port. In contrast, the SL6440C features an integral local oscillator buffer. The input impedance of this buffer is 1.5kΩ (typical) and a drive voltage of 250mV RMS is perfectly adequate. This means that in many applications an external VFO buffer is unnecessary. Furthermore, it is far easier to implement the Tx/Rx LO switching discussed earlier.

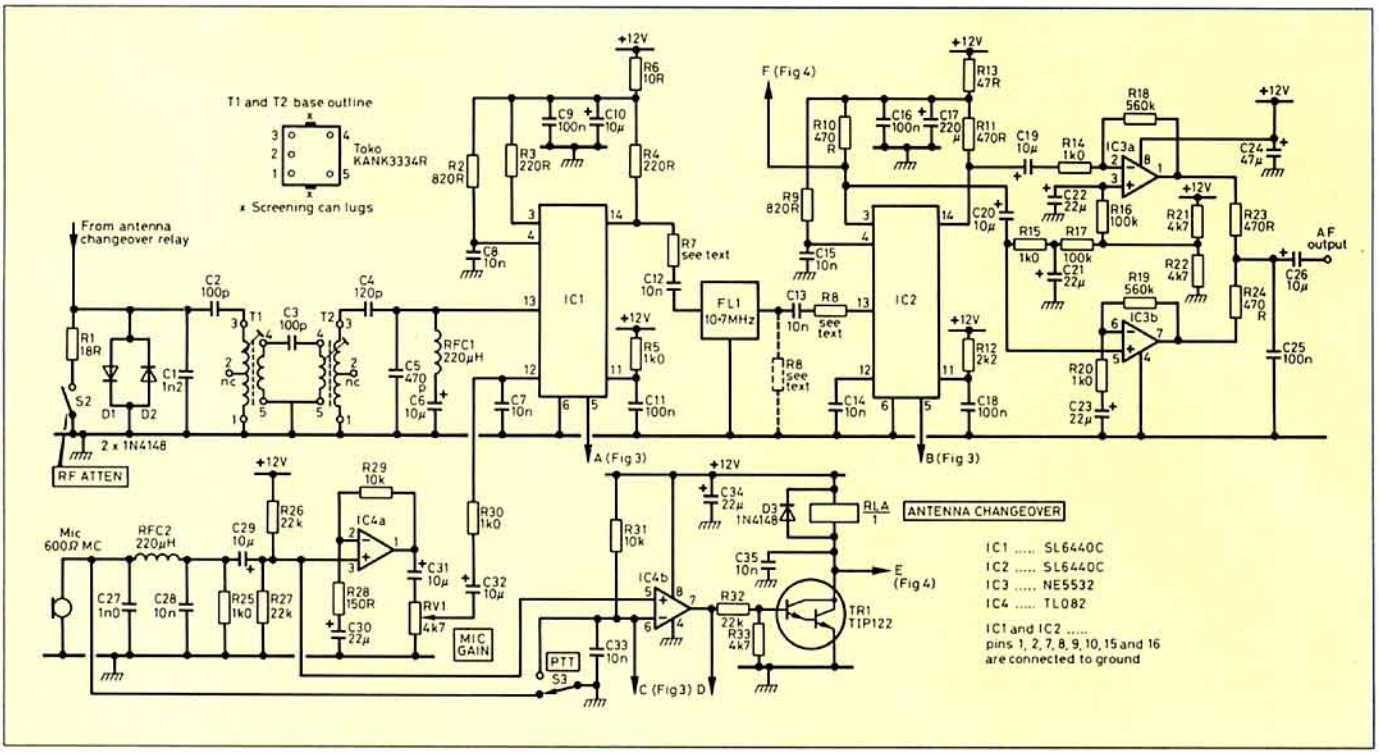


Fig 2: The transceiver signal chain and PTT circuitry. C1-C5 may be polystyrene or ceramic plate.

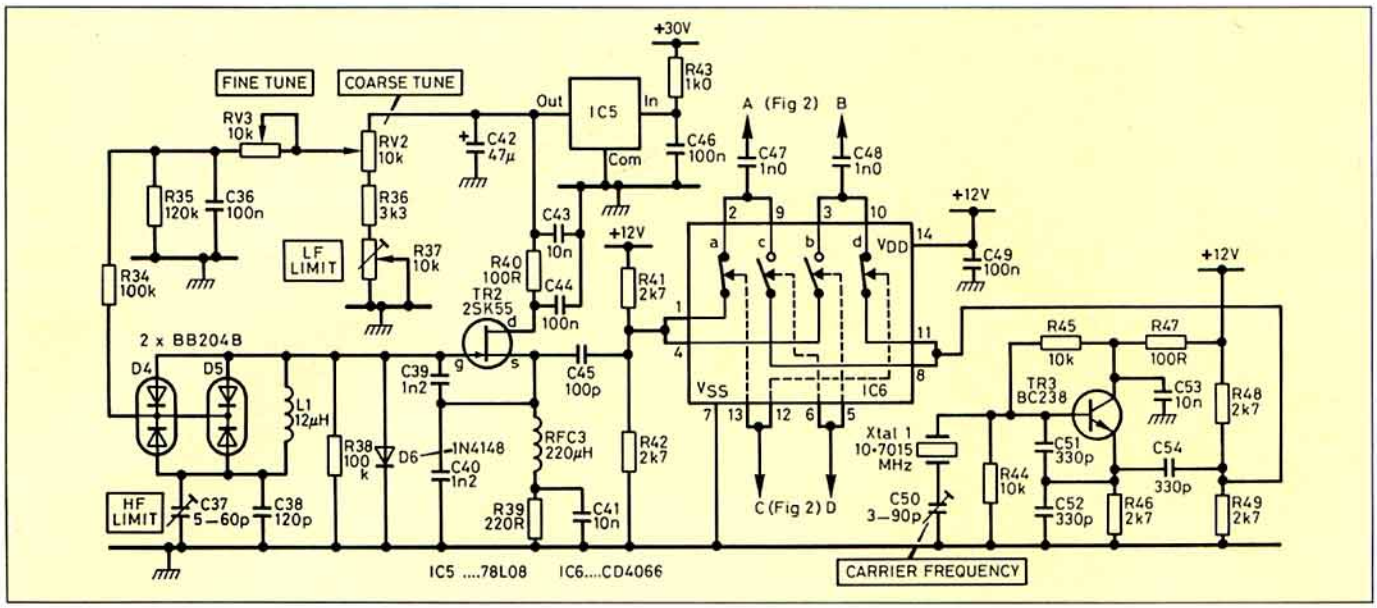


Fig 3 The oscillators and their switching circuit. L1 is 51 turns of 26SWG enam on a T68-6 powdered iron toroid.

- The SL6440C is a programmable device and can be operated so that the best trade-off between dynamic range and gain is achieved. In practice, this means that it is possible to design for entirely adequate 'intercept' performance while still obtaining a useful degree of voltage gain. Diode mixers, however, will always incur a signal loss (typically 6-7dB).
- The input impedance of the SL6440C, when used in the simpler single-ended mode adopted by the author, is 500Ω. The required terminating impedance of typical crystal filters is close to this value, so filter matching is particularly straightforward. Diode ring mixers normally have an input impedance of 50Ω which necessitates either transformer matching or, alternatively, the use of a buffer stage.

The receiver has a very simple RF attenuator consisting solely of resistor R1. This is activated by closing S2, whereupon R1 will shunt the receiver's input, thus reducing the level of signals presented to the first mixer via protection diodes D1, D2 and the bandpass filter comprising T1, T2 and C1-C5. Rather than trying to re-invent the wheel I have based the bandpass filter on designs published by Lorin Knight, G2DXK [2].

IC1 has two inputs. Although originally intended for balanced input, one is used here for RF and the other for AF. Pin 13 is used as the RF input on receive and pin 12 as an AF input on transmit. IC4(a) is the microphone preamp and provides a voltage gain of 36dB which is adequate for close speaking into a communications-quality 600Ω moving coil microphone. C27-28 plus RFC2 remove unwanted RF from the audio input. C7 bypasses pin 12 at RF, thus effectively grounding this input on receive. C6 and RFC1 provide a low-impedance path to ground for audio frequencies, thereby introducing a complementary action on transmit.

The microphone must be muted on receive in order to prevent ambient noises from modulating the incoming signals. This is easily achieved by using an SPDT PTT switch (S3), the normally-closed contact being wired to the microphone insert as shown. Microswitches are usually double-throw types (eg Maplin FP42V) and make excellent PTT switches.

Positioned at the heart of the signal chain, between the output of the first mixer and the input of the second, is the all-important crystal filter. The values of R7 and R8 are calculated to provide correct terminating impedances at each end of the filter. For instance, if the filter requires 800Ω terminations then the values are calculated as follows: R3 and R4 provide external collector loads for IC1 and thereby set the first mixer output impedance at 220Ω. This means that R7 must have a value close to 580Ω (ie 220 + 580 = 800). In practice, the use of a 560Ω resistor is perfectly acceptable. We can assume that the input impedance of IC2 is 500Ω and thus R8 needs ideally to be 300Ω (500 + 300 = 800). The 300Ω value is indeed available from the E24 series, but once again the nearest preferred values in the E12 series - 270Ω or 330Ω are also suitable.

If a filter requiring 300Ω terminations were to be employed, R7 would need to be 80Ω so 82Ω would be the obvious value to choose. As the input impedance of IC2 is greater than 300Ω, R8 must then be re-positioned so that it shunts the mixer's input (ie it must be connected between the junction of FL1, C13 and ground). The appropriate resistance is 750Ω (750 in parallel with 500 = 300Ω) - either this E24 value or the more common 680Ω would suffice.

The 10.7MHz filter employed in my transceiver was obtained for a ridiculously low price from Birkett [3]. Another way of saving money is to roll your own - G3UUR has shown that it is possible to fabricate a high-performance ladder-type filter using the 4.43MHz crystals intended for use in domestic TV receivers [4]. Because these crystals are manufactured in huge quantities they are very inexpensive. Needless to say, there is no particular reason to avoid an IF of 4.43MHz.

On receive IC2 functions as a product detector. The recovered audio appears at pins 3 and 14 in antiphase It is not strictly necessary to employ both outputs but doing so will result in the cancellation of any common-mode components. By the term 'common-mode' I am referring to in-phase outputs that typically result from supply line modulation. Modulation of the supply voltage can occur when a later stage - possibly an audio output chip - draws a varying current according to the level of the signal it is passing. Even though there may be a number of decoupling components present (and possibly some 'active decoupling' courtesy of voltage regulators), it is difficult to avoid this phenomenon completely.

In a receiver where there is little or no IF

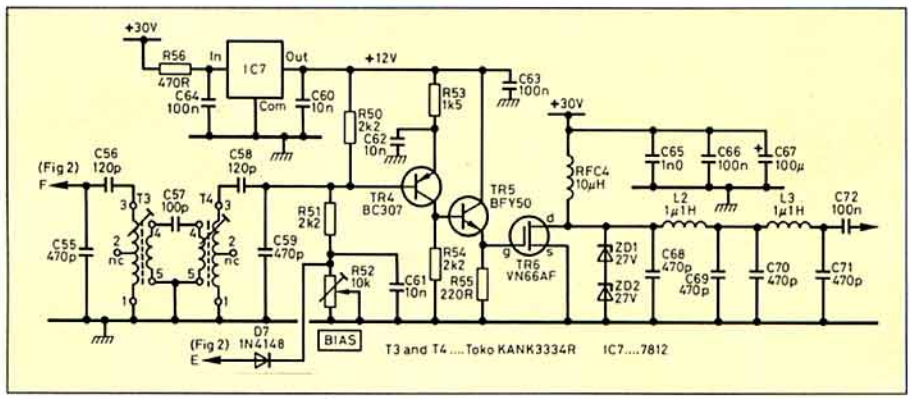


Fig 4: A simple 5W PEP linear amplifier for 7MHz. The RFC is 12 turns of 22SWG enam on a FT50-61 ferrite toroid. L2 and L3 are both 15 turns of 22SWG enam on T50-2 powdered iron toroids.

amplification, the audio stages must provide very high gain. In these circumstances it is likely that instability, even oscillation, will occur if common-mode signals are allowed to appear at the input of low-level stages, thus establishing a positive feedback loop via the supply line.

A differential audio preamplifier based around IC3 (a) and (b) raises the level of demodulated signals by 55dB. It is possible to configure a differential amplifier by feeding antiphase signals to each input (inverting and non-inverting) of a single op-amp. However, through summing the outputs of two separate amplifiers, we increase the signal to noise ratio by 3dB.

The audio stage(s) which must follow IC3 are not shown. Of the many possibilities, I chose to employ a VOGAD IC (SL6270C) which provides approximately 40dB of AGC. The VOGAD drives an LM380 audio output chip via the AF gain control. In order to help prevent audio instability, the LM380 is powered from an entirely separate voltage regulator. The output stage must be silenced during transmit. This can be achieved by placing an audio gate ahead of the output stage, or alternatively an audio chip having a mute pin (eg the Plessey SL6310C) could be used.

The transmit SSB signal is taken from pin 3 of IC2 and fed to the input of the linear amplifier. IC4 (b) in conjunction with the relay driver TR1, provides the necessary PTT switching. Instead of the usual 13.8V power supply I have employed 30V - the higher voltage being more suitable for the type of linear amplifier used (see later). The internal 8 and 12V rails are generated by a number of IC voltage regulators. My 30V PSU consists of just a mains transformer (secondary approx 21V RMS), a 5A bridge rectifier and a 6800µF reservoir capacitor. Because my transformer has beefy 6.4A secondaries the voltage drop on speech peaks during transmit, when the rig draws around 500mA, is less than one volt. An alternative PSU might comprise a smaller transformer, having a 30-35V secondary rated at 1-2A, with a series regulator comprising perhaps a TIP122 Darlington power transistor and a Zener reference.

Fig 3 shows the VFO, crystal oscillator and a switching circuit based around a CD4066 (IC6) which provides the DPDT function of S1 shown in Fig 1.

The 3.6 to 3.7MHz VFO is a standard Clapp arrangement using a JFET (TR2). Varicap tuning is employed as this avoids the need for an expensive variable capacitor and reduction drive. The coarse tune potentiometer (RV2) is a slider type - thus allowing the use of a straight frequency scale which looks more contemporary. The fine tune control (RV3) is rotary and has a range of plus or minus 5kHz. This tuning system is basically the same as that developed for the RC14 Beginner's Receiver [5]. C37 sets the HF limit (3.7MHz) while R37 dictates the range and therefore the LF limit. The calibration procedure involves adjusting C37 first (making sure, of course, that RV2 is in the appropriate position and RV3 is at mid-travel) and then, after re-setting RV2, R37.

TR3 is used in a simple Colpitts oscillator circuit with the 10.7015MHz crystal. C50 enables the output frequency to be trimmed slightly to facilitate alignment with the crystal filter passband - this allows an optimum level of carrier rejection to be obtained and tailors the audio response accordingly.

The CMOS quad bilateral switch (IC6) contains four signal gates which are controlled via pins 5, 6, 12 and 13. On receive, pins 12 and 13 are held at +12V (logic 1), thus closing gates a and d. Pins 5 and 6, which are connected to the output of the inverting op-amp IC4 (b) - see Fig 2 - are held at a potential close to 0V (logic 0), so opening gates c and b. This means that the output of the VFO will be coupled to the oscillator input (pin 5) of the first mixer, IC1 (Fig 2). Conversely, the crystal oscillator drives the second mixer, IC2.

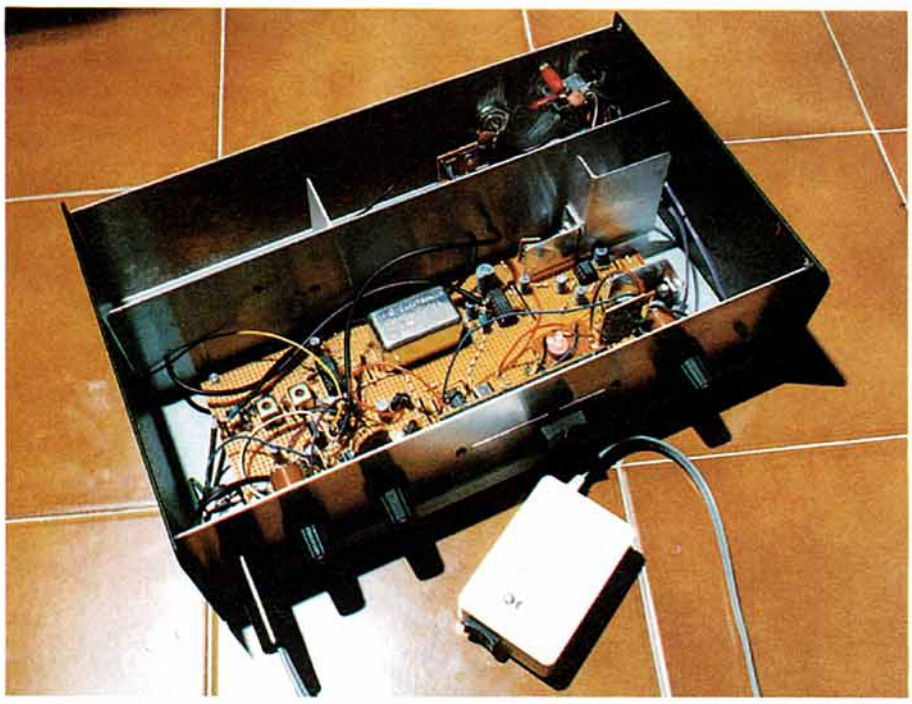
When S3 is pressed in order to transmit, thereby reversing the potentials at points C and D, the opposite situation pertains. The CD4066 functions perfectly well as an RF switch in this application, although account does have to be taken of the through loss, which rises with frequency. Luckily, the SL6440C mixers require only 250mV of drive so a significant degree of attenuation can normally be tolerated. For instance, the 10.7MHz xtal oscillator has an output of approximately 2V peak and the CD4066 loss (nearly 20dB at this frequency) conveniently serves to reduce this voltage to the appropriate level! Surprisingly, the specification of the CD4066 published by National Semiconductors in their CMOS Databook (I have a 1978 edition) indicates that the attenuation of each gate is only 3dB at 40MHz (where RL = 1 kΩ). Perhaps I should also mention that the CD4066 used in my prototype is a Toshiba device. Clearly, when using the CD4066 in RF applications it would be prudent to make some voltage measurements using either a diode probe and a multimeter, or an oscilloscope, before finalising the circuitry and/or component values.

The linear amplifier (**Fig 4**) features a simple single-ended output stage using the popular VN66AF VMOS transistor. Much has been written about VMOS devices over the last few years and I will therefore try to avoid too much repetition. Suffice it to say that this type of transistor has two main disadvantages - namely Rds and gate capacitance. Rds refers to the residual resistance that exists between the drain and source connections even when the device is turned hard-on. Rds varies between device types and figures are available from the relevant data sheets.

However, as a general rule the ohmic losses attributable to Rds may be minimised by using the highest possible supply voltage - ie reducing the drain current for a given power input and so lowering the voltage drop across the device. This is the primary reason for choosing a 30V supply.

The gate capacitance of an RF VMOS device is normally about 50pF and this must be taken into account when designing the driver stage (remember that the reactance of 50pF at 7MHz is only 455Ω). In the circuit of Fig 4 an emitter follower (TR5) provides the required 'slew rate' and can therefore develop the necessary drive voltage of 1 - 2V at the gate of TR6. Many experimenters have sung the praises of audio VMOS transistors which are available quite cheaply. The first point to make here is that the RF types are hardly expensive (my VN66AF cost just £2.07!). Secondly, the audio devices have a much higher gate capacitance - typically 1000pF. The circuit of **Fig 5** is unsuitable for an audio VMOS transistor.

As TR4, TR5 and TR6 are direct coupled, the PA bias current is determined by TR4's base voltage. This is controlled using the preset R52 which should be adjusted to give a standing current of 60 mA through TR6 under no-drive conditions. The connection via D7 (labelled E) to the collector of TR1 (Fig 2) kills the PA bias on receive - it is important that this is done because the antenna changeover relay will disconnect the antenna from the PA during receive and, if forward biased, TR6 would probably oscillate. There is, indeed, a tendency for TR6 to oscillate whenever the antenna is incorrectly matched - the good news is that TR6 does not appear to be



harmed by the self-oscillation! Constructors who wish to reduce the possibility of PA instability might like to consider a push-pull output stage using a pair of VMOS devices. Push-pull configurations are attractive because they obviate the need for an undecoupled drain choke, thus removing a potentially troublesome reactance. Recently, G3PCJ [6] has had published some reasonably straightforward push-pull VMOS circuits, albeit for higher power levels.

The input signal to the PA is bandpass filtered by T3, T4 and C56-59. The output lowpass filter comprising L2, L3 and C68-71 attenuates any harmonics. ZD1 and ZD2 combine to produce a 54V Zener which helps protect TR6 against excessive voltage. I have constructed this linear, which develops an output of 5W PEP, on a strip of Veroboard measuring approx 40 by 180mm. An aluminium screen isolates the PA from the rest of the transceiver and also serves as a heatsink for TR6. A word of warning here - it is the *drain* and not the source which is connected to the VN66AF cooling tab. You *must* therefore use an insulated mounting for TR6.

IF AND IMAGE CONSIDERATIONS

FINALLY, WE RETURN TO THE choice of IF. I stated earlier that in the case of single-conversion transceivers, the higher the intermediate frequency the better.

As an example, let's assume that we wish to build a transceiver for 21MHz and have acquired a 455kHz crystal filter for this purpose.

In order to receive a transmission on 21.200MHz the VFO could be set to 21.655MHz (21.655 - 21.200 = 0.455). The image frequency will be 22.110MHz (21.655 + 0.455 = 22.110). Readers with long memories, or perhaps those with an interest in vintage equipment, might well point out that valve receivers such as the legendary AR88 and the earlier Eddystone models offered an acceptable level of performance despite their use of a single IF in the range 300 to 600kHz. That may well be the case, and in the final analysis it is simply a matter of personal judgement as to whether the relatively poor suppression of signals at the image frequency, a deficiency noted especially when listening on the higher frequency bands, can be tolerated.

However, the situation becomes somewhat alarming when we consider what might happen on transmit. In our example, the first mixer is required to generate a DSB signal close to 455kHz which is then fed through the crystal filter to produce SSB at 455kHz - so far, so good. The second mixer is now coupled to the VFO and this generates the 21.200MHz transmit signal by subtracting 455kHz from 21.655MHz. Unfortunately, this mixer also produces another, equally strong, SSB signal at 22.110MHz (21.655 + 0.455 = 22.110).

Clearly, the task of designing a filter to precede the linear amplifier which will pass the wanted signal at 21.200MHz and yet attenuate the 22.110MHz 'image' by at least 60dB is going to prove quite formidable. Furthermore, even if you were successful, it is almost certain that the circuit would have a very narrow passband. This, of course, implies that it would need to be completely retuned for operation in another part of the band.

It should not be assumed from the above that an IF as low as 455kHz is completely unsuitable for use in any single conversion design. A transceiver for Top Band (1.8MHz) might well use 455kHz because the image spacing (910kHz) is a much larger proportion of the transmit frequency, -making the construction of the necessary filter a practical proposition.

REFERENCES

[1] *Linear IC Handbook*, Plessey Semiconductors.

[2] 'A Transceiver for the HF Bands (part two)', Lorin Knight MIEE, G2DXK. *Radio Communication*, July 1984 pp566-571.

[3] J Birkett, 25 The Strait, Lincoln, LN2 1JF.

[4] 'Filters using TV crystals', Dave Gordon-Smith, G3UUR, from *Technical Topics*, Pat Hawker. *Radio Communication*, December 1980 pp1294-1295.

[5] 'The RC14 Beginner's Receiver', Steve Price, G4BWE. *Radio Communication*, June 1987 pp397-399.

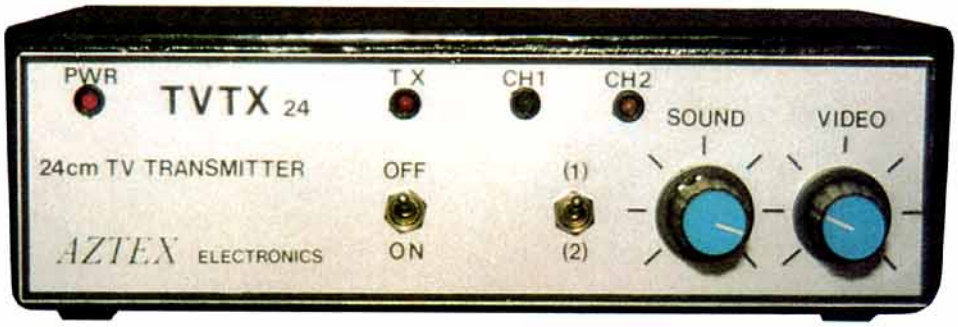
[6] 'More on FET power amplifiers', Tim Walford, G3PCJ, from *Technical Topics*, Pat Hawker. *Radio Communication*, May 1990 p30.

RADCOM EQUIPMENT REVIEW

Amateur TV Equipment

The Aztex TVTX 24 FM Tx and the Ulna 23-24 GaAsFET Pre-amp

by Mike Wooding G6IQM



THE AZTEX 24cm FM ATV TRANSMITTER was first seen at the 1990 Leicester Show and created a lot of interest. Since it was first advertised in *CQ-TV*, I have often been asked for details of this unit so I contacted the Severnside TV Group, through whom it was marketed, and arranged to obtain one for review. At the same time I also requested a look at one of their G4BVK 24cm preamplifiers.

THE AZTEX TVTX 24 FM ATV TRANSMITTER

DEVELOPMENT INFORMATION

According to the designer, Ken Stevens G4BVK, the need for a stable output was one of the governing factors, so the SP5060 Phase Lock Loop chip was an obvious choice. Using surface-mounted components was another way of maintaining stability. The video pre-emphasis network, although based on the standard CCIR circuit, was designed to give an extra HF lift to overcome the HF losses within the modulator. DC restoration of the signal was also deemed necessary before injection into the modulator, and the circuit adopted to achieve this is very effective in preventing the video content from altering the black-level position.

The two sound inputs are actively mixed using a TL072 op-amp before they are fed to the modulator. There is a separate PCB-mounted preset for adjusting the line input only, the front panel sound control adjusting the composite level of both inputs. There is also a subcarrier injection level preset provided on the PCB.

DESCRIPTION

The unit comes fully assembled in a black-painted diecast box measuring 188 x 120 x 57mm. A professionally produced front panel features four LEDs, one indicating the connection of the DC supply, another indicating transmit and two more indicating which channel is selected. There is a main ON/OFF switch and a CHANNEL select switch. Two potentiometers are provided, one for SOUND and the other for the VIDEO deviation. On the rear of the transmitter are the various connecting points. An N-type socket is provided for connection to the aerial, a BNC socket for the video input, a phono socket for the audio line input and 1/4in socket for the microphone. The DC input is a 3-pin plug with a matching line-socket and lead provided.

Internally the transmitter is neatly laid out with the main printed circuit board bearing the audio amplifier, modulator and subcarrier generator circuitry and the video circuits. This circuit board is held in place with four nuts, bolts and spacers, facilitating removal for future servicing needs.

A smaller diecast box occupying approximately one-third of the main case contains all the RF circuitry. This has the advantage of providing a further level of screening between the baseband and RF sections of the transmitter. The RF output N-type socket is mounted through the case directly into the inner box and is soldered directly to the PCB, leaving no RF cables floating around inside. Interconnections between the RF box and the main PCB are by means of several feed-through terminals carrying the baseband signal, power supply and frequency switching control signals. Although a little intricate, removal of the RF assembly and the RF circuit board for servicing can be achieved with care.

Three user adjustment points are provided inside the transmitter: a preset potentiometer for audio subcarrier injection level, a trimmer capacitor for the audio subcarrier frequency and a preset potentiometer for the line audio level. Supply protection is by a miniature wire-ended fuse soldered between two posts on the PCB.

BENCH TESTS

Two transmit frequencies are available on the transmitter, selectable by the CHANNEL toggle switch. Knowing that the unit has a crystal-controlled PLL exciter I expected the frequency stability to be good, and it is. The review unit exhibited a downward drift of only 2200Hz over a 30-minute period.

The RF output power was monitored over a 30-minute period at 1249MHz. After an initial 20-minute period during which the power output dropped 0.37W (0.65dB) the output remained to all intents and purposes constant at 2.34W. A similar check was carried out at 1255MHz, the switch-on power being slightly higher at 2.84W with the final output power settling at 2.54W.

MANUFACTURER'S SPECIFICATIONS

Frequency	Channel 1, 1249MHz
	Channel 2, 1255MHz
RF output power	2.5W (typical)
Harmonics	less than -50dBc
Modulation system	FM with built-in pre-emphasis
Audio subcarrier	pre-set to 6MHz at least 17dB below carrier (variable with deviation setting)
Video input	1V peak-to-peak into 75 ohms
Audio inputs	dynamic microphone, adjustable line input (VCR etc)
Power consumption	1.6A at 13.8V

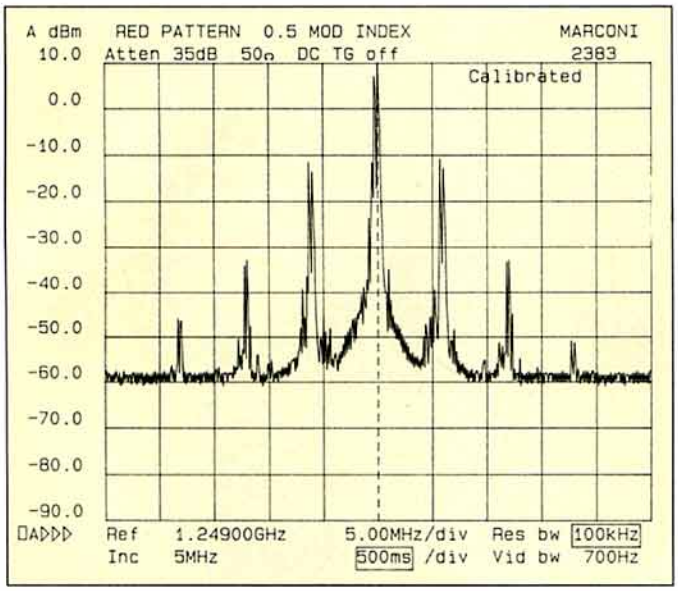


Fig 1: The spectrum obtained using a plain red pattern.

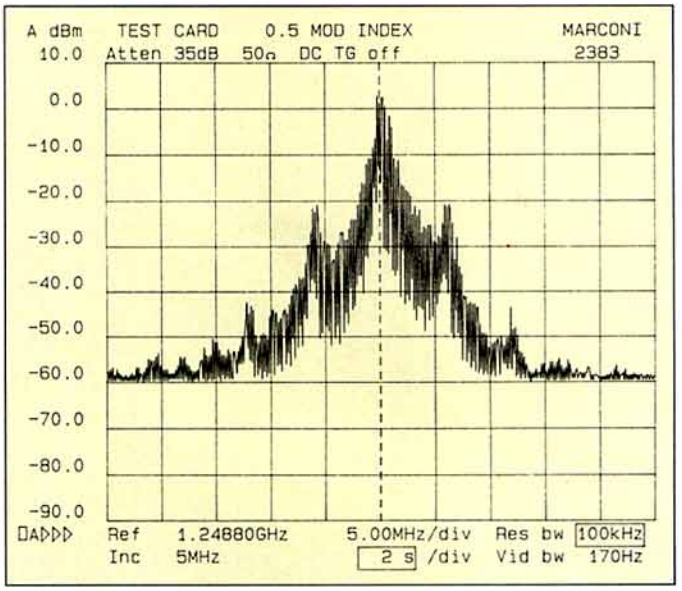


Fig 3: The spectrum obtained using a Philips PM5534 test card.

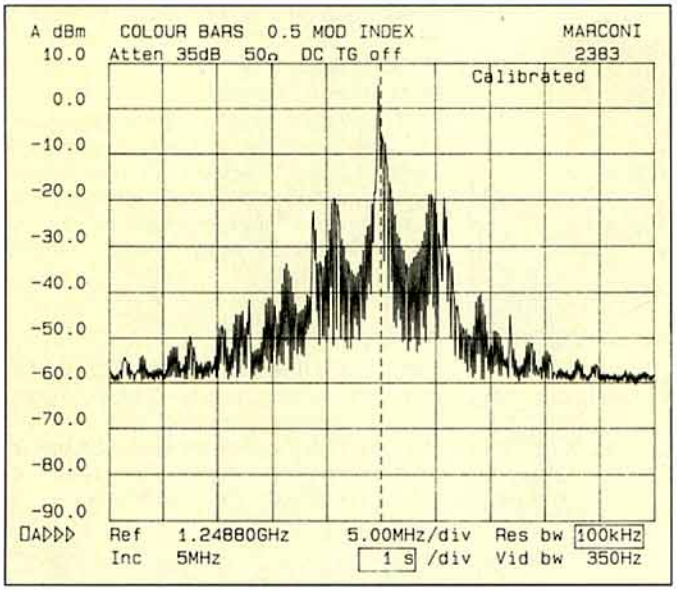


Fig 2: The spectrum obtained using 100% saturated colour bars.

The harmonic content of the unmodulated output was very low indeed, probably in the main due to the inherent out-of-band rejection of the SC1043 PA output device. The second harmonic was measured at slightly less than 50dB down on the carrier. Third and subsequent harmonics were not detectable above the -75dB noise floor of the analyser.

VIDEO AND AUDIO CHARACTERISTICS

A test system has been developed by the BATC for ascertaining a modulation index of 0.5. Apply a 5MHz sinewave to the video input and, viewing the output on a spectrum analyser, adjust the video amplitude (deviation) from the signal generator so that the sidebands coincide with the recommended modulation index of 0.5. Using this system the output from the signal generator into the transmitter was then measured and this level used as the reference output level from the Philips TV pattern generator for the spectrum plots. **Fig 1** shows the spectrum obtained using a plain red pattern, **Fig 2** the spectrum using 100% saturated colour bars and **Fig 3** the spectrum with a Philips PM5534 test card.

The audio subcarrier generator, unless otherwise specified, is set to 5.9996MHz for UK use. However, the subcarrier oscillator trimmer capacitor is accessible with the unit's cover removed, and the subcarrier can be easily reset to whatever frequency is needed for Continental DX.

At maximum video deviation the subcarrier level was measured at 17dB below carrier. However, as the video deviation is reduced (using the front-panel VIDEO control) the relative difference becomes greater, and at minimum video deviation the subcarrier was measured at 32dB below carrier (dBc). With a standard video input level of 1V p-p the front panel VIDEO control needed to be set at approximately 50% in order to achieve a normally deviated picture; at this setting the audio subcarrier was measured at around -24dBc, which proved to be quite adequate for good audio with P5 contacts. I felt it necessary to adjust the internal subcarrier injection control to bring the relative level back to -17dBc at this VIDEO control setting, and this provided very good audio fidelity commensurate with picture reception. If the input video level to the transmitter is adjusted such that the VIDEO control on the transmitter has to be set towards fully clockwise in operation, then the audio subcarrier level will be satisfactory without any internal adjustment.

ON-AIR TESTS AND CONCLUSIONS

Overall I was very impressed with the workmanship and presentation of the transmitter. Upon receipt it was simply a matter of connecting 13.8V, plugging in the camera and microphone, connecting the aerial, switching on and adjusting the video and audio controls. The Aztex TVTX is ideal for those amongst us who are not of the home-brewing fraternity. Furthermore, the output level of around 2.5W is enough to drive a 2C39A valve linear to quite a useful output (in my case to approximately 60W). The colour handling characteristics of the unit gave excellent results, as did the audio response, when tested over a P5 path between myself and G0HOV.

My only criticism is the use of the soldered-in PCB mounted fuse. Whilst obtaining and changing this should not be a problem, some users might prefer a fuseholder. Finally, suffice it to say that I am so impressed with the transmitter that I am now using one myself.

THE AZTEX ULNA 23-24 GAASFET PREAMPLIFIER

DESCRIPTION

THE ULTRA LOW NOISE preamplifier comes in a blue hammer-finished die-cast box measuring 110 x 60 x 30mm, with N-type input and output sockets mounted one each side. NOTE - as stated by the manufacturer, this enclosure is not water-proof and needs to be mounted inside another weather-sealed enclosure for external/mast mounting.

The small printed circuit board is secured inside by solder tags, fixed to the PCB and secured on two of the N-type socket fixing bolts on each side. The AFT10135 GaAsFET is mounted on a vertical PCB screen soldered to the main circuit board. A horizontal brass screen is soldered to the vertical PCB screen and is also clamped to the output end of the box by two of the screws retaining the output socket. The input and output trimmer capacitors are mounted at the respective sockets and a preset bias potentiometer is located on the main PCB. The DC supply is fed into the box by two insulated solder terminals and a reverse-polarity protection diode is provided.

BENCH TESTS

The two plots shown in **Figs 4 and 5** show

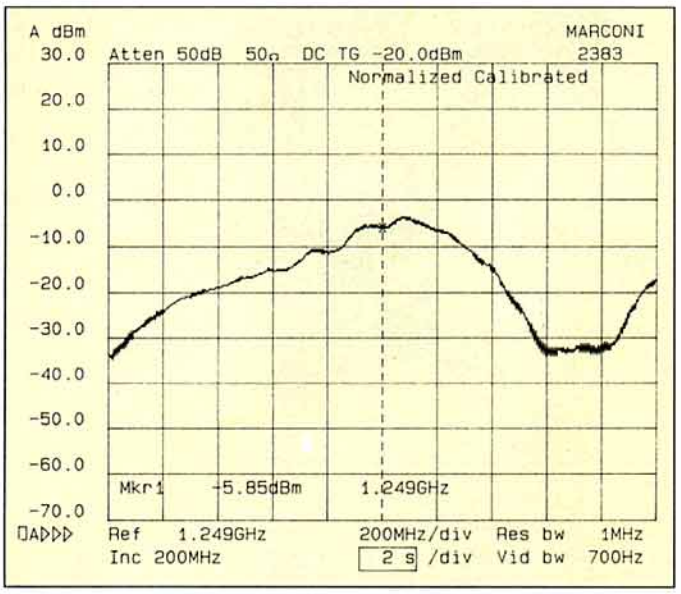


Fig 4: Gain over frequency range, 1249MHz to 2240MHz.

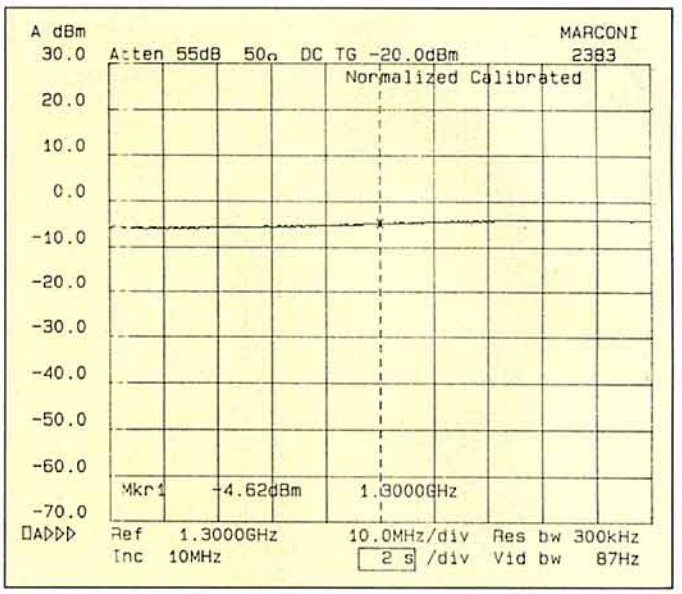


Fig 5: Gain over frequency range1250MHz to 1350MHz.

gain versus frequency. Fig 4 shows the gain over the frequency band from 1249MHz to 2240MHz. The reference input level from the tracking generator of the spectrum analyser was -20dB and the centre frequency of the plot is 1249MHz. It can be seen that the 0dB gain points are approximately 600MHz and 1700MHz and the -3dB band is approximately 1150MHz to 1500MHz, with the rejection at 700MHz being in the order of 11dB.

Fig. 5 covers a frequency band from 1250MHz to 1350MHz, with a centre frequency of 1300MHz. Over this frequency range, essentially the 23/24cm band, the response is almost flat. The reference input level from the tracking generator is again -20dB and the gain at 1300MHz was measured at 16.1dB. The gain at 1249MHz was measured at 15.5dB and at 1318MHz it was 16.4dB.

MANUFACTURER'S SPECIFICATIONS

Typical gain	17dB
Noise figure	1dB
Bandwidth	1250 to 1350MHz +/- 1dB
Rejection	8dB at 700MHz
C supply	7V to 18V

ON-AIR TESTS AND CONCLUSIONS

The flat, even response of the preamp over the entire 23/24cm band meant that I was able to tune to signals at both the RMT2 repeater input and output frequencies (1249 and 1318.5MHz) without any loss of preamplification. Also, the very low claimed noise figure means that the 15.5dB of gain appears to be a great deal more when compared against results obtained from other noisier preamps with perhaps higher gain figures.

My overall impression of the preamplifier is of a sound, well made unit with very good performance, and I wholly recommend that anyone requiring a preamp for 23/24cm (that just about encompasses everyone working 24cm ATV to my mind) should seriously consider this unit.

AVAILABILITY

ENQUIRIES ABOUT these products should go to: Aztex Electronics, 20 Coberley, Footshil Road, Hansham, Bristol, BS15 2ES; tel: 0272-677005. The Severnside TV Group can be contacted at 15 Witney Close, Saltford, Bristol, BS18 3DX. Tel: 0225 873098. ❑

Supplementary Information

G3TSO Miniature Transceiver

THE G3TSO MINIATURE 80 METRE transceiver was primarily designed as a one-off project to see how small a single band transceiver could be made. It was not designed as a kit type project.

As the interest in the project has grown, a number of companies have started to offer the transceiver as a kit. In order to have success in constructing any of these 'kits' the following notes should be read.

1. R56 (33Ω) gives the maximum gain for IC5, if this is too much, ie, unstable, increase R56 up to a maximum of 120Ω.
2. RL2 and RL3 can be 12V types or two 6V types connected in series. On the component layout, the wiring shows connections for 6V types. If you use 12V relays, connect RL2 and RL3 in parallel.
3. C71 is mounted under the pcb.
4. C89 is mounted under the pcb.
5. The DC connection on the mic skt is for a 3-wire electret mic, a 2 wire type can be accommodated by connecting DC directly to the mic input pin. the unused pads on the pcb are provided for this purpose. A DC blocking capacitor must be used as per electret data sheet.
6. R12 has been connected to the wrong 6V line, it should be removed and replaced under the pcb from the drain of Q1 to pin 8 on IC1. This ensures the receive and transmit frequencies are the same. Switching Q1 pulls the VFO.
7. Pin 4 on IC3 should be grounded, this was omitted on the circuit diagram.

IMPORTANT NOTICE REGARDING PCB

PCBs ARE AVAILABLE FROM a number of sources, including the author. Most boards are drilled with a single hole size of 0.8mm, this is the majority hole size, some holes however will need to be enlarged to take certain components. Drill the hole to the correct size, do not drill them excessively large.

Ensure before placing components that they have sufficient clearance from the groundplane, use a 'VERO Cutter' or an old 0.125in drill to make the clearance larger if required.

Check against the circuit diagram to ensure that all components that are shown connected to ground are soldered to the groundplane directly. There are very few ground tracks on the underside of the PCB. Do not connect anything to ground that is not shown grounded on the circuit diagram, ie coil taps. When mounting the PCB use small nylon stand-offs if required, so as not to short anything to the case.

Do not mount components on long leads, where possible all leads should be bent at right angles and components should be mounted flush with the PCB; ICs can be raised no more than 1/32in to ensure that the pin shoulders do not contact the groundplane. The use of IC sockets is not recommended.

Do not use low wattage soldering irons or those with huge bits. A hot pencil bit solders quicker and more efficiently without raising the track. ❑

THE DATA COMMUNICATIONS COLLECTION

ICS pioneered amateur radio data communication in the UK, and we now have the finest product range available. Whatever data mode most interests you, we probably have the optimum solution.

PK-232 MBX. The world's favourite multi-mode terminal unit. Morse, RTTY, ASCII, Amtor, Packet, Packet Lite, Fax, Navtex and a signal analysis mode. Over 50,000 users worldwide can't be wrong. The PK-232 has the best HF demodulator around and the latest firmware includes an Amtor mailbox, together with Packet Lite - a new mode for more efficient HF packet operation. A new edition of PC-Pakratt II for the IBM-PC makes it even easier to use. Upgrades available for existing users.

PK-88. The packet only version of the PK-232. Includes an HF modem, Packet Lite and full mailbox facilities. New PC-Pakratt 88 software now available for the IBM-PC.

PCB-88. A plug in card version of the PK-88 for the IBM-PC. Comes with a true DCD circuit built in and a standard modem disconnect header.

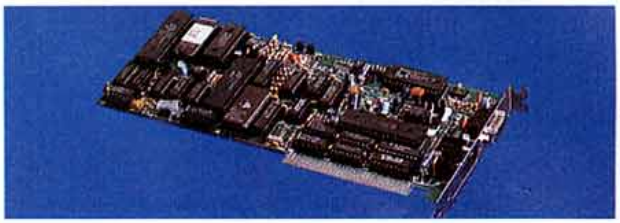
AMT-3. A third generation product, optimised purely for Amtor and RTTY use. Extremely compact, and now includes backwards compatible upper/lower case Amtor, which is compatible with HF mailboxes.

ICS-FAX. A low cost system for the IBM-PC. Receives 16 grey level facsimile at 640 x 480 pixells. Colour fax receive mode. On-screen tuning indicator. Zoom. Store to disk and printer. Starts where the PK-232 leaves off on facsimile.

Software. All of the above products come complete with user friendly support software for the IBM-PC as standard. We also support the Apple Macintosh, Amiga and Commodore 64 computers.

Send for latest free catalogue and price list.

Our products are available direct and from dealers throughout Europe.



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

Specifications may changed without notice

VISA

ICS

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

RADCOM TECHNICAL FEATURE

Loop Antennas

Facts, Not Fiction

by A J Henk, C. Eng., M.I.E.E., G4XVF

In the first of a two-part article, A J Henk takes a factual look at how to quantify the real performance of a loop antenna. Next month: do loop antennas really work as well as is frequently claimed?

NOT ANOTHER LOT of words on loop antennas, surely? So much has been written and said on the subject - at least in the amateur journals - but how much of it is of any use to the serious radio amateur? This article is intended to clear away some, at least, of the intellectual fog surrounding these devices and to address areas which have been generally neglected. For instance, how efficient are they, how effective are they (not the same thing) and how can they be made better?

Notwithstanding the proliferation of references to the subject, it is not intended to provide an extensive list of papers; others have already done this. The references which are included have something useful to say appropriate to this article.

DEBUNKING THE MYTHS

LET'S MAKE ONE THING CLEAR from the outset: there is no mystique of any sort associated with loop aerials. They obey the standard laws of physics like anything else and the principles are quite simple. Anyone who tries to make it sound otherwise and wraps it all up in arcane language or presents it as a 'black art' should have his credibility suspected immediately. It is hoped that this article will explain the operating principles, without too many shortcuts, and in language which is easily understood by anyone with sufficient technical knowledge to have passed the RAE. There will be some maths presented but, again, the simplest and most basic knowledge of AC theory (RAE level) will be quite adequate to reveal many of the loop's innermost secrets.

WHAT IS AN AERIAL?

AN AERIAL (OR ANTENNA, if you must use the Americanism - both terms will be used synonymously here) is a device for coupling an electrical circuit to a medium through which radio waves propagate, in our case free space, or vice-versa. It was the development of this component (by Marconi) which took wireless communication out of the realms of a laboratory curiosity and turned it into practical reality. Without the 'elevated electrode' the signals don't go very far. A pair of aerials can form a simple four-terminal transmission network: four terminals because you feed the signal into one pair and a smaller version of it emerges from the other pair. Such a network is reciprocal, that is to say it works both ways. Any two antennas, of any sort, will exhibit this reciprocity, a feature which has been of great value to the author during the study of loops.

Reciprocity works like this. Firstly the two antennas must be correctly matched to the transmitter and the receiver respectively and this matching must be preserved. If this is the case and you feed, say, a one-watt signal into one aerial and then find that you get one microwatt from the second (receiving) antenna, you can be sure that if you now reverse things and feed your one watt (matched, of course) into the second antenna you will have a microwatt now out of the first. There are no exceptions to this rule.

Most common transmitting antennas are 'electric' or 'E-field' devices, and work basically by making as large an electrical disturbance as possible across a chunk of space. The bigger the chunk the better the aerial because the disturbance is more widespread. This is what you might expect; after all, particularly at low frequencies, big aerials work better than small ones if everything else is the same. Extracting big performances from little antennas is the aim of many amateurs, particularly in the UK, and smallness is one of the main attractions of the loop.

Where there is an oscillating electric field, there is also an oscillating magnetic field produced by it in space. A radio wave must contain both magnetic and electric components in order to exist. In the case of the loop, a strong magnetic field is generated by passing a heavy current through the radiating conductor and this magnetic field then generates a corresponding electric field in space, thus providing the two elements needed. For this reason the antenna is sometimes referred to as a 'magnetic loop'.

WHAT IS A LOOP AERIAL?

LET'S STOP FOR A MOMENT and have a look at loops from another perspective. Firstly, what do we mean by a 'loop aerial'? In this article the term is taken to refer to a loop of one or more turns of conductor whose dimensions are small compared with the wavelength of the signals being transmitted. It may be circular, square or any other shape. Anything larger than about one-eighth of a wavelength across is becoming a bit big for this definition; such devices as 'delta-loops' are a different kettle of fish and this article does not apply to them.

Magnetic loop aerials are as old as wireless itself; indeed some of us remember very clearly the frame aerials used quite effectively by the early broadcast receivers before they became modernised by the availability of efficient magnetic materials and turned into ferrite rods (indeed the US term *loopstick* testifies to their origins). They have not gained widespread popularity for transmitting because of the great difficulty of achieving high efficiencies, but for receiving they have many desirable properties. It should be noted that, even though reciprocity applies (yes, also to ferrite rods) you cannot just interchange transmitting and receiving aerials and achieve the same communications quality or performance. However, that's another story.

Loops which are used for transmitting do not generally use ferrite and therefore need to be larger to be effective, and they have fewer turns, typically below five and quite often only one. Whereas you can't necessarily transmit on a receiving loop, you can normally receive very well with a transmitting unit. This, of course, applies equally to E-field aerials.

THE LOOP AS A RADIATOR - RADIATION RESISTANCE

WE HAVE SPENT QUITE enough time and space now looking at aerials in general and seeing how the loop fits into the scene - let's now examine it more carefully and see how it works. There is a simple but very useful concept which we can use to help us, and that is the idea of 'radiation resistance'. This can be used in connection with any antenna but here we are going to restrict ourselves to the loop. As we have seen, this works by pumping as much RF current as we can muster through a conductor, thus generating our oscillating magnetic field in true Faraday tradition. In order to do this we need RF *power* and this normally comes from our transmitter - in the interests of simplicity, let us assume a 100W rig . Let us also assume that the transmitter, feeder and aerial are all properly matched so that all of our 100W goes into the

aerial system. With any luck, some of this power will be radiated off into space - the rest disappears into the system losses and is dissipated as heat.

If we have been very lucky and manage to radiate 10 out of our 100 watts, 90 must go in loss resistances of one sort or another. Note that all losses are resistive, as pure inductance or capacitance cannot dissipate power. Since power only dissipates in resistance, it is seductive to consider the *radiated* power also as being absorbed into a resistance, although this is not a real resistance, just a concept. Our circulating current might be, say, 10A. We know from basic theory (power=I^2R) that, because we are losing 90W, our total loss resistance (from all sources) must be 0.9Ω, as $10^2 \times 0.9 = 90$W. Therefore why not consider the other (radiated) 10 watts as being in a resistance of 0.1Ω? (Again $10^2 \times 0.1 = 10$W) This is called the 'radiation resistance' and every antenna has some. It must be remembered that, because this is not a *real* resistance, it is not an embarrassment (not in an aerial anyway) and, indeed, our aim is to push as much power into it as we can. It is therefore in our interests to achieve as high a value for this radiation resistance as possible. Low values are bad news.

Once we know the radiation resistance of our antenna and the current flowing through it (ie that flowing in the loop), we can calculate the power actually radiated and, since we know how much power we are feeding in, the efficiency follows very easily. More of this later - it is a key point in assessing the performance of a magnetic loop.

BASIC OPERATION

WE CAN NOW START TO LOOK at the antenna in a little more depth and see what makes it tick. **Fig 1a** shows the physical arrangement normally employed, stripped of all the non-essentials. It is shown for a single-turn loop but the principles are the same irrespective of the number of turns. A conductor is bent into a circle (or some other suitable shape) and the free ends connected across a capacitor. The arrangements for connecting this to the transmitter or receiver are discussed later. This forms a tuned circuit, resonant at the operating frequency and can be considered, to a high degree of accuracy, as comprising three simple components, as shown in **Fig 1b**. The inductance L is that of the bent conductor, and the capacitance C is that of the tuning capacitor (plus any stray capacitance) which resonates with L at the desired frequency F. The third component is resistive and represents, as one component, all the resistive parts of the system, or R_t (for total resistance). R_t will mainly be losses of one sort or another (no circuit being perfect) but there is a further non-lossy part of this component which we mentioned earlier, the radiation resistance, R_r.

In connection with these resistive components it should be realised that they are not all physically in series as shown in Fig 1. The conductor losses are clearly series losses, but losses in the capacitor dielectric appear across the capacitor terminals as a shunt resistance. Even so, we can still use a series resistance to represent these parallel losses by giving it a value which will have the same effect on the circuit as the parallel losses themselves, and doing it this way brings great simplicity to the analysis. Also, in with this series resistance, we can include any losses which occur outside the physical confines of the loop, such as ground losses (which will affect the loop performance and Q) and therefore bring all losses, from whatever source, together in a single component. This keeps life very straightforward.

It is our avowed intention to make as much current as possible flow in this circuit. This will, of course, occur at the resonant frequency of L and C, given by

$$F = \frac{1}{2.\Pi.\sqrt{LC}} \qquad (1)$$

This current flows equally through all the circuit elements (their being in series) but actual power appears only in the resistive part as you cannot dissipate power in a pure reactance. Therefore the total power in the system is

$$P_t = I^2R_t \text{ watts.}$$

If a transceiver, for example, is correctly matched to this system, then P_t is equal to the power output of the transmitter, let's say 100W.

Now, R_t is the total resistance of the circuit and is made up of many different parts. All but one of these parts will correspond to losses of various sorts and can be considered as forming a single aggregate loss resistance R_l. The one remaining non-lossy part is - yes, you've guessed it - our old friend R_r, the radiation resistance. Therefore we can say, because the total loss is the sum of all these separate parts,

$$R_t = R_l + R_r.$$

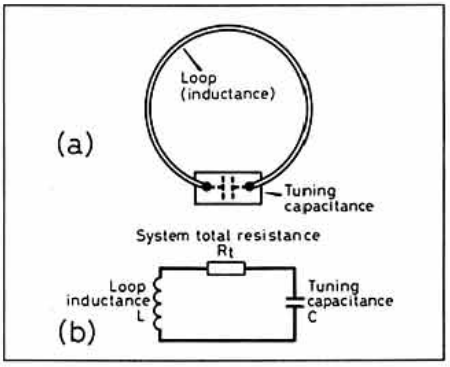


Fig 1: a) Loop antenna arrangement, b) Equivalent circuit.

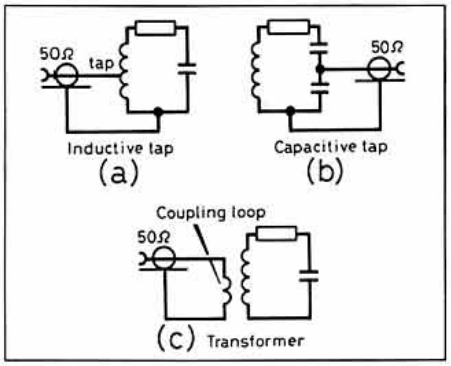


Fig 2: Methods of coupling to a loop antenna; a) inductive tap, b) capacitive tap, c) transformer.

EFFICIENCY

POWER DISSIPATED IN R_l is, of course, lost as expensively generated heat. However, power 'dissipated' in R_r is our precious radiated power and we cherish it tenderly as that is precisely what we are trying to achieve with our antenna. Suppose we radiate 25 out of our 100W, then our aerial is 25% efficient. The other 75W (ie three times as much) goes in the loss resistance. This means that Rl must be three times as big as R_r in this example since I and therefore I^2 is the same value for both Rl and R_r. We can write a simple equation to define our efficiency if we know these resistance values:

$$\text{Efficiency } (\eta) = \frac{R_r}{R_r + R_l}.100\% \qquad (2)$$

We can now define the term 'efficiency' as the proportion (percentage) of the power fed to the system which is actually radiated. For transmitting, this efficiency is obviously of great interest because you will need to pump 1000W into an antenna which is 10% efficient in order to achieve the same results as 100W into a 100% efficient radiator. There's money in there somewhere, as always. Notice that we have not needed to bother with L or C in arriving at this conclusion. That is not to say that they don't affect efficiency, far from it, but they do it by altering the values of these resistances and the current flowing through them.

COUPLING THE RADIO TO THE LOOP

LET'S TAKE A BREAK FROM the theory for a while and look at another practical aspect of our aerial. So far we have not considered how best to connect, or couple, the transmitter or receiver to the loop. Whilst obviously very important, it is in practice not at all difficult. There are three basic methods, all of which have one thing in common: they form an impedance matching function between the transmitter feeder and the resonant circuit. They are shown in **Fig 2**. It is assumed that 50Ω coaxial feeder is used although other types can be accommodated. It is possible to achieve a virtually perfect match at a spot operating frequency with any of these coupling systems.

The **inductive tap** method (**Fig 2a**) is quite convenient; simply connect the coax outer to the electrically neutral point on the loop (this should be the mechanical centre if the construction is symmetrical) and move the inner along the loop conductor until the VSWR at resonance becomes 1:1. If you are actually doing this in practice you will find it necessary to move, re-tune, move, re-tune and so on until it reaches the right point. This is not difficult though it might be a bit tedious.

Capacitive tapping (**Fig 2b**) is similar in principle to inductive tapping but is far less easy to achieve and it is less easy to synchronise the feeder connection point to the electrically neutral point. The author is not aware of any practical transmitting systems using this method. It is worth noting, in connection with the electrically neutral point, that the system will work wherever the connection is made but, if it is not at the neutral point,

current will flow down the feeder and this will introduce performance differences which are not readily calculable and, more importantly, will introduce extra losses.

Transformer coupling (**Fig 2c**) is one of the most popular methods and involves connecting the radio equipment to a small loop which is placed near to the main conductor, the arrangement acting as a tuned transformer. The small loop can be moved in and out to affect the matching, and a position will be found at which the correctly matched situation results in a precise 1:1 VSWR at the selected frequency.

It is a happy coincidence that, with any of these coupling methods, the matching condition stays much the same over a very wide bandwidth. That is to say, if you change frequency or frequency band you will have, of course, to re-tune the loop but the coupling will remain correct. For those interested in the reason for this, a useful qualitative treatment is given in [1] (part two).

RADIATION RESISTANCE - HOW MUCH?

MUCH REFERENCE HAS BEEN made to radiation resistance, but this concept is only useful if we know what the value is in real engineering units, like Ohms. Fortunately, it is a very simple matter to calculate it for a loop of any shape. It depends only on the area of the loop (=Πr^2 for a circular loop of radius r), the number of turns N, and the frequency. If the frequency is expressed as a wavelength, no units need be specified provided the same are used for wavelength and area. The simple formula is:

$$R_r = 320.\Pi^4.\left(\frac{A}{\lambda^2}\right)^2.N^2\ \Omega \qquad (3)$$

where A is the area and λ is the wavelength, both in the same units. N is the number of turns.

This is true *for any shape of loop.*

For example, take a single turn loop, 1 metre in diameter, at 10MHz. Here the wavelength is

$$\lambda = \frac{3.10^8}{10.10^6} = 30 \text{ metres}$$

and the area is

$A = 0.5^2.\Pi = 0.785$ square metres.

Since N = 1 for the single turn, the radiation resistance is

$$R_r = 320.\Pi^4.\left(\frac{0.785}{30^2}\right)^2 = 0.0237\Omega\ (23.7m\Omega)$$

Note that 23.7 milliΩ is not a large value and the problem of making enough current (65A) flow in this to radiate 100W of RF can be appreciated.

A graph showing R_r against size for most practical loop sizes is given in **Fig 3.**

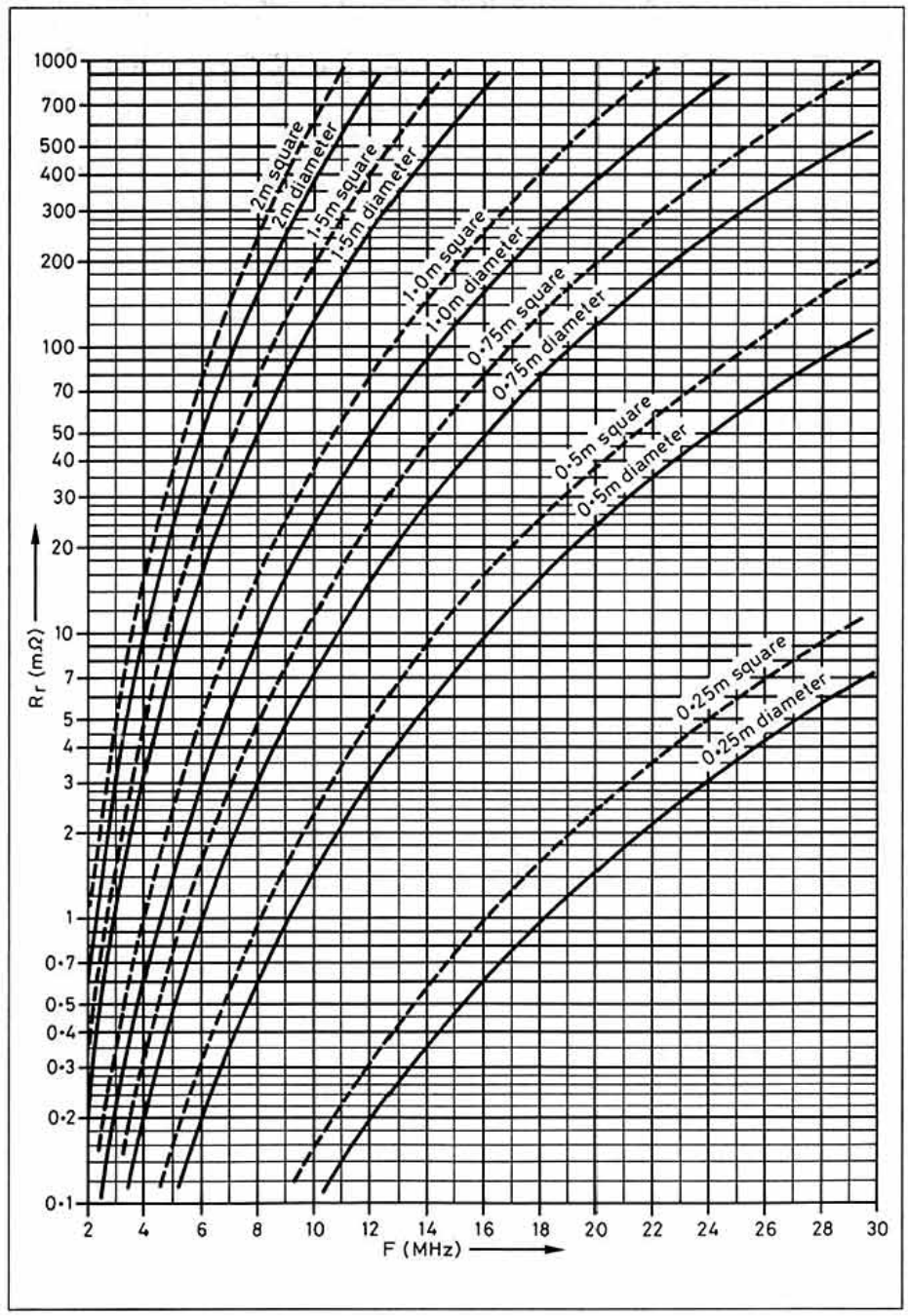


Fig 3: Radiation resistance of square and circular loops.

THE MISSING LINK

WE HAVE HAD A BRIEF (qualitative) look at coupling the transmitter into the loop and we have seen how we can determine the radiation resistance. We still need to know more, though, before we can claim to have a full picture of how the system works. What happens between the RF feeder and the radiation resistance? Here we need to consider the loop inductance, the tuning capacitance and our loss resistance. It is interesting to note that the physical loop of conductor serves two different electrical purposes. One is to provide the radiating action (R_r, the aerial function) and the other is to provide inductance L for the matching function we are now going to examine. This is where everything finally comes together.

Returning to our diagram (Fig 1b), we have a standard tuned circuit. The loop provides the inductance L, the value of which can be deduced in a number of ways. The loop dimensions are, particularly at low frequencies, generally chosen to maximise R_r, and the resulting inductance accepted whatever its value is. This is not always the case, but happens far more often than not. The inductance value can be measured on a bridge or other inductance meter, it can be calculated (see opposite) or it can be derived when it is resonated at a known frequency by a known capacitor using the relationship:

$$L = \frac{1}{4.\Pi^2.F^2.C} \qquad (4)$$

where L is in Henries, C is in Farads and F is in Hz.

Because the circuit is resonant (at our operating frequency), we know L, C and F. The relationship of Equation 1 applies, of course. What we don't know is the resistive component. We know part of it, though, because we can calculate R_r from Equation 3, which only leaves the loss resistance, R_l.

. . . to be continued

Professional Electronics at Amateur Prices!

AUDIO FILTERS

Model FL3 represents the ultimate in audio filters for SSB and CW. Connected in series with the loudspeaker, it gives variable extra selectivity better than a whole bank of expensive crystal filters. In addition, it contains an automatic notch filter which can remove a "tuner upper" all by itself. Model FL2 is exactly the same but without the auto-notch. Any existing or new FL2 can be up-graded to an FL3 by adding Model FL2/A conversion kit, which is a stand-alone auto-notch unit. Datong filters frequently allow continued copy when otherwise a QSO would have to be abandoned.

FL2 £99.95 FL3 £149.95 FL2A £54.95

ACTIVE RECEIVING ANTENNAS

Datong active antennas are ideal for modern broadband communications receivers — especially where space is limited. • Highly sensitive (comparable to full-size dipoles) • Broadband coverage (below 200kHz to over 30 MHz) • Needs no tuning, matching or other adjustments • Two versions AD270 for indoor mounting or AD370 (illustrated) for outdoor use • Very compact, only 3 metres overall length • Professional performance standards • Both include mains power unit.

AD270 £59.95 AD370 £79.95

MORSE TUTOR

The uniquely effective method of improving and maintaining Morse Code proficiency. • Practice anywhere, anytime • Generate a random stream of perfect Morse in five character groups. • D70's unique "DELAY" control allows you to learn each character with its correct high speed sound. Start with a long delay between each character and as you improve reduce the delay. The speed within each character always remains as set on the independent "SPEED" control. • Features long life battery operation, compact size, built-in loudspeaker plus personal earpiece.

£64.95

TRY BEFORE YOU BUY at your local Datong Dealer

A R Communications Ltd, 38 Bridge Street, Earlstown, Newton Le Willows WA12 9BA. Tel: 0925 229881.

Bredhurst Electronics Ltd, High Street, Handcross, West Sussex RH17 6BW. Tel: 0444 400786.

Holdings Amateur Electronics, 45 Johnston Street, Blackburn BB2 1EF. Tel: 0254 59595.

Jaycee Electronics Ltd, 20 Woodside Way, Glenrothes, Fife KY7 5DF. Tel: 0592 756962.

Lee Electronics Ltd, 400 Edgware Road, London W2. Tel: 071-723 5521.

Leeds Amateur Radio, 34 New Briggate, Leeds, LS1 6NU. Tel: 0532 452657.

Photo Acoustics Ltd, 58 High Street, Newport Pagnell, Bucks, MK16 8AQ. Tel: 0908 610625.

Reg Ward & Co, 1 Western Parade, West Street, Axminster, Devon EX13 5NY. Tel: 0297 34918.

A.R.E. Communications Ltd, 6 Royal Parade, Hanger Lane, Ealing, London W5A 1ET. Tel: 081-997 4476.

SMC (Headquarters), S M House, School Close, Chandlers Ford Ind Estate, Eastleigh, Hampshire SO5 3BY. Tel: 0703 255111.

S M C (Northern), Nowell Lane Industrial Estate, Leeds. Tel: 0532 350606.

S M C (Midlands), 102 High Street, New Whittington, Chesterfield. Tel: 0246 453340.

S M C (Birmingham), 504 Alum Rock Road, Alum Rock, Birmingham. Tel: 021 327 1497.

Waters & Stanton Electronics, Spa House, 22 Main Road, Hockley, Essex SS5 4QS. Tel: 0702 206835.

Waters & Stanton Ltd, 12 North Street, Hornchurch, Essex RM11 1QX. Tel: 04024 44765.

Martin Lynch G4HKS, Electronics Hobbies Exch Ctr, 286 Northfield Avenue, Ealing, London W5 4UB. Tel: 081-566 1120.

FREE CATALOGUE

DATONG ELECTRONICS LIMITED

Department RC,
Clayton Wood Close,
West Park, Leeds LS16 6QE
Tel: (0532) 744822 Fax: 742872

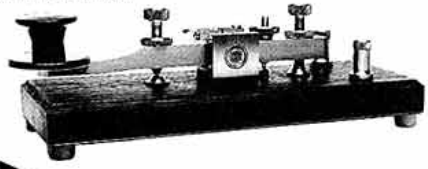
Quality

MORSE KEYS

from R.A. KENT ENGINEERS

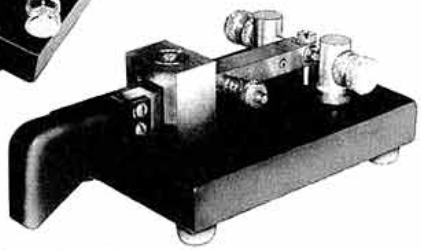
The **LEADING** British manufacturer of top quality Morse Keys — renowned throughout the world for their outstanding performance and reliability.

SOLID BRASS MORSE KEY
Base 8" x 3" Weight 1kg
£42.50 (Assembled)
£34.95 (in kit form)
P. & P. £3.00



TWIN PADDLE MORSE KEY
Base 4" x 3" Weight 1.5kg
£53.95 (Assembled)
£43.95 (in kit form)
P. & P. £3.00

SINGLE PADDLE MORSE KEY
Base 4" x 3" Weight 1.5kg
£44.95 (Assembled)
£36.50 (in kit form)
P. & P. £3.00



All Kent keys use shielded ball race bearings which are renowned for their superiority over keys using plain and bush type bearings. Kent keys are available in ready assembled or kit form. The kits take less than an hour to assemble with no special tools required.

KEYS OF UNBEATABLE QUALITY AT UNBEATABLE PRICES!
Please write, phone or fax for further details.

KENT **R. A. KENT (ENGINEERS)**

243 Carr Lane, Tarleton, Preston, Lancs. PR4 6YB
Telephone: Hesketh Bank (0772) 814998 Fax: (0772) 815437

The Revolution is Here

The NEW multimode data controller based upon the latest DSP technology is now available
Send a large SAE for full details and prices

ICOM RADIO EQUIPMENT

IC 735 HF transceiver	IC R7000 multimode receiver
IC 726 HF + 50MHz	IC R72 HF receiver
IC 2400 144 + 432 mobile	IC R100 wideband receiver
IC 3220 144 + 432 mobile	IC R1 pocket receiver
IC W2E 144 + 432 handheld	IC 24E 144 + 432 handheld

Ring for the latest prices on the above

PACKET RADIO EQUIPMENT

Tiny 2 VHF	**£139**	TNC320 HF + VHF	**£189**
PK88 VHF/HF	**£139**	KPC 2 HF/VHF	**£168**
KPC 4 dual VHF	**£247**	Handi Packet	**£199**
KAM multimode	**£291**	DSP-12 multimode	**from £599**
DRSI PC TNC	Single port **£139**		Dual port **£169**

SATELLITE MODEMS
PAC COMM PSK-1 1200 PSK ..... **POA**
G3RUH 1200/9600 PSK kits and built ..... **from £35**

SATELLITE TRACKING SYSTEMS
The Kansas City Tracker will operate with most azimuth and elevation rotators. It will also tune the radio for you. KCT PC cards ..... from **£179**

JUNGHANS RUGBY MSF CLOCKS
Black or white digital **£46.50** Analogue mantle **£67.50**
Radio Controlled wrist watch in stock .....Watch from **£159**

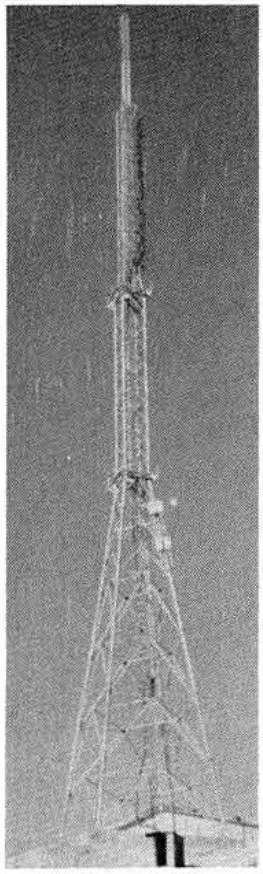
Junghans Clocks & Watches Prices Inclusive Postage

BOOKS & MAGAZINES — We keep a good range of amateur radio books, maps and monthly magazines in our Bristol shop.

All the above can be seen operating in our new Bristol shop where we also have a large range of computer equipment and other amateur radio accessories

AMDAT 4 NORTHVILLE RD NORTHVILLE BRISTOL BS7 0RG (0272) 699352

CREDIT AVAILABLE



THIS WESTOWER IS 335′ HIGH!

SELF-SUPPORTING TOO!

It is one of seventeen 82m and 102m towers covering the whole of **IRAN**

Your 'average' 60′ amateur tower would go inside the bottom legs!

With this technical expertise you can be assured that your

TINY TELESCOPIC TOWER

of a mere 25-117′ will stay up!

WESTOWER
THE ONLY CHOICE!

For further information send 3x22p stamps to:

Western Electronics (UK) ltd
FAIRFIELD ESTATE, LOUTH, LINCS LN11 0JH

GAREX ELECTRONICS

WIDEBAND SCANNERS

All major brands available, with the all important service back-up. AOR; BLACK JAGUAR; JIL; REVCO; ICOM; YUPITERU. Also good stock of secondhand sets: ask for list.
"SCANMASTER" Scanner Controller: versions for AOR2002, REGENCY MX8000, ICOM ICR7000, YAESU FRG9600. **£153.25**
Complete with full software for any computer.

WIDEBAND ANTENNAS

Premium quality British antennas & accessories from REVCO. "REVCONE" VHF/UHF Discone (guaranteed free from exaggerated advertising claims!) SO239 connector: **£37.75** N-type for improved UHF performance: **£39.80**
Optional vertical whip feature for experimenters.
"RADAC" nest of dipoles: imitated but not equalled. Guaranteed Tx capability over customer-specified 6 bands in the range 27-470MHz, with excellent wideband Rx performance:
SO239 Conn: **£86.85**
N-type: **£88.89**
Special VHF/UHF Airband RADAC: 108-380MHz: **£80.72**
Top quality cable and connectors also available.

WIDEBAND PREAMPS

PA3 series 20MHz-1GHz; min. 13dB gain fitted with HPF to reduce breakthrough problems.
PA3 Masthead with special mains psu, PL/SO connectors: **£51.04**
PA3/N, as above with N connectors: **£54.61**
'Back-of-set" models: PA3I/B (BNC connectors) **£36.27**
PA3I/S (SO239): **£36.27**
PA3I/N (N conns): **£39.83**
Mains adaptors for "back-of-set" models: **£8.68**

MOBILE ANTENNAS

REVCO super Mag-mount + ⅝ for 2m: **£35.71**
Mag-mount + 4.5dB 70cm: **£35.71**
Body-mount ½" or ⅜" hole (state which) + ⅝ for 2m **£20.38**
⅜" hole body mount + 70cm colinear (4.5dB) **£20.38**
Mag-mount with 3dB 900MHz whip: improve the performance of your cell-phone or 900mHz scanner; in the car or on the office filing cabinet: **£35.71**
All with 4m feeder. Plugs on request.
REVCO unbeatable glassmounts, with tuned matching units for peak efficiency: 2m or 70cm: standard model **£40.82**; deluxe model: **£52.06**

Write, fax or phone for lists. Regular lines, components and bargains for callers. Open 10am-5pm Mon-Fri (occasional Sats).
ALL PRICES INCLUDE UK CARRIAGE AND VAT.

GAREX ELECTRONICS
STATION YARD, SOUTH BRENT, SOUTH DEVON TQ10 9AL
Phone 0364 72770 Fax 0364 72007

ENTERPRISE RADIO APPLICATIONS LTD.

5 Clarendon Court
Winwick Quay
Warrington
WA2 8QP
Tel: (0925) 573118

MK.II MICROREADER

The easiest way to receive CW & RTTY without all the fuss of computers. Just plug into your speaker socket and switch on. The Microreader automatically decodes both amateur and commercial stations displaying the received text on its own LCD screen. The Microreader also incorporates a MORSE TUTOR facility that allows you to check both your receiving and sending performance.
£170.00

BP34 AUDIO FILTER

Someone once said that this filter is too good for amateur radio use. We, along with hundreds of BP34 users would disagree. The BP34 combines ease of use with a degree of performance not found in any other filter. Exceptionally sharp cut off and guaranteed 80dB stopband attenuation make this filter a must for the more serious user.
£109.50

RS232 DISPLAY

Don't tie up your computer while monitoring. This new unit will display, store and print messages sent via the RS232 output from the MICROREADER or PACKET TNC. Text is stored in memory and at the same time displayed on the large 160 character backlit screen. A unique scrolling facility allows you at any time to scroll back and forth through over fifty screens of text messages while still receiving data. The display incorporates a PARALLEL PORT that allows printing of all or selected sections of text at the touch of a button. **£185.00**

BP12 DATA FILTER

A compact low power filter specifically designed for data applications such as CW, RTTY & HF PACKET. Both audio and TTL tone data outputs are provided. Ideal for use with computers. **£44.00**

All products are guaranteed for two years and all prices include VAT and postage and packing.

NEW PK-232 AMTOR MAILBOX EPROMS JUST ARRIVED!

PACKET RADIO FROM THE SPECIALISTS!

Siskin Electronics have a policy of supplying the best range of packet radio equipment available for the radio enthusiast. We have examined the products of many manufacturers and are pleased to be able to offer what must be the widest range of equipment available from just one UK supplier. All prices include VAT and were valid when going to press.

AEA
PK-232/PK-88 Real Time Clock....£29.95
AMT 3 AMTOR/RTTY £179.95
PK-232+MAILBOX £319.95
PK-88 VHF/HF TNC + new MBX £139.95

PACCOMM
Real Time Clock fits BSX etc. too! £29.95
STATE MACHINE DCD (3105) £19.95
HANDIPACKET as used on MIR! £199.00
PSK-1MICROSAT MODEM £189.00
PC-320 dual port PC card £159.00
TINY-2 with PMS version 3.0 .....£139.00
TNC-320 dual port HF/VHF £199.00
9600 baud modem £95.00

KANTRONICS
"Smart Watch" Real Time Clock £29.95
KTU Weather Node £294.00
KPC2 HF/VHF with Wefax £168.59
KPC4 VHF/VHF dual port £247.25
KAM all mode with Wefax £291.20
DATA ENGINE .....£POA

LATEST UPDATE RELEASE INFO
PacComm V1.1.6D4 (PMS V3.0)
Kantronics Version 3.06 (KAM 4.00)

COMPUTERS
Goldstar GT212 80286 AT computers, Landmark 17MHz, wide range of options, from £700 incl. VAT!!! Phone for details.
ATARI Portfolio pocket PC £204.29
ATARI 520STE + "Ham Pack" £289.00

BOLT ON GOODIES
ICS Fax (on screen PC fax system) £99.95
RLC 100 4 port PC card £289.00
32K (62256) static ram £12.50
Custom made audio leads from £11.95
Custom made RS232 leads from ...£10.95
Amstrad PCW/CPC RS-232 interfaces back in stock!!
In house custom RS232-TNC lead service!
HF-225 Gen. Coverage Receiver £434.25
ALINCO DR112E 25watt mobile £239.00
KENPRO 2M handie inc. access £139.00
KENPRO 70cm handie now here £159.00
Practical Guide to UK Packet £6.95
Guide to Personal Computing (PC) £3.95

SOFTWARE
We supply driver software for most computers FREE of charge with all TNC purchases.

If it's in stock (and it usually is!) we will despatch it same day.
NOTE: Prices do not include carriage

Siskin Electronics Ltd

2 South Street,
Hythe, Southampton,
SO4 6EB.
FAX: 0703-847754

Tel: 0703-207587, 207155

Satellites

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

EVERY SO OFTEN AMATEUR RADIO gets a really good dose of favourable 'public relations' coverage by the media. The latest, of course, has been Helen Sharman's mission which included a real boost for the hobby. One of the best aspects of the project was the encouragement given to young people to get interested in amateur radio through the JUNO project. We continue to hear examples of schools and individuals wanting to get into amateur radio through their participation in the JUNO project.

Some indication of the enthusiasm generated by activities of this sort in the young is illustrated by Richard Ensign in May's *AMSAT Education News*. This is devoted almost entirely to an Australian's school's experience with Mir, in particular the efforts of VK3CFI and her students at Western Victoria, Australia. Maggie had tried for two years for a contact with Mir on 2m FM, but it was not until January 1991, that she achieved a voice contact with U2MIR, who subsequently played a leading part in the JUNO mission. She followed this up with a proposition that a Soviet cosmonaut should speak to a group of school children. On 14 February, a group of about 50 parents, teachers and students gathered at Maggie's home to join in the history-making event. Some 21 children spoke to the cosmonauts during three orbit passes while Mir was in range for about ten minutes each time. It is believed to be the first radio contact of its type in the western world. Maggie said: "The students are still working through their experience - it has made quite an amazing impact. Their horizons and thoughts have been broadened beyond belief. A lot of kids in a very small town now know a heck of a lot about satellites, space, cosmonauts and the human side of these space pioneers". This event got much coverage in several major Australian newspapers and on news and talk programmes on radio. Tammy Fleming (15), summed up the general enthusiasm by her comment "The best 10 minutes of my life!".

One of the difficulties of getting involved in amateur radio satellites is the lack of literature for the newcomer to this mode. The well informed radio amateur will have little difficulty in extending his knowledge and equipment to cover satellite activity. However, those who are new to amateur radio and who want to participate in satellites will find the going difficult and frequently disappointing.

BOOKLETS

I HAVE JUST HAD the opportunity of reading three booklets and a 240 page manual recently written by John Branegan, GM4IHJ, which really do present amateur radio space information in a readable and intelligible way. John wrote the first book on computer satellite tracking and supplied software for the early satellites way back in 1982, the proceeds from which he generously donated to AMSAT-UK. He has now ventured into Desk Top Publishing and his first efforts are *Space Station Mir, Satellite Dove Operating Manual* and *UoSAT 3 Oscar Operating Manual*. Their aim is to "bridge the informaton gap which accompanies all new satellites".

The contents of the Dove manual include:- Description of frequencies and operating modes, special telemetry, simple reception equipment, Space Station units, Cosmonaut's operating schedule, typical VHF Ground Station equipment and much else. A very interesting feature in this book is the inclusion of a number of experiments which can be carried out using the satellites enabling students to get 'hands-on' experience of satellite working. This should prove most helpful to teachers who want to add some practical work to their lessons on Space Science.

The Mir Booklet includes a description of the Space Station, the Cosmonauts' operating schedule, typical ground station units, the AREM - Austrian Amateur Radio Experiments to be carried eventually on Mir - and experiments using both Mir's radio signals and Mir as a visual target for eclipse and tracking studies.

The contents of the UoSAT 3 Manual include frequency, modes and operating data, simple receiving equipment, how to transmit to UoSAT 3, TNC modules, receiving and transmitting systems, etc. John comments:- "Please note UoSAT 3 is a very complex satellite requiring both 2 metre transmitter and 70cm receiver, a complex satellite 9600bps modem, a TNC and a computer with special software". If you only want to read UoSAT's bulletin on the downlink you do not of course need a transmitter, but you do need all the rest! This booklet also describes the operating facilities of the forthcoming UoSAT F. John thought the booklet would be slightly unpopular because of the complexity of the satellite dealt with, but he has in fact already had to do two reprints of it. "In fact", he says, "Many of the purchasers really want to learn about using 9600bps FSK packet for terrestrial purposes rather than satellites. I had not considered this group but they have bought a lot of copies from quite a few places around the world because there is no other book anywhere about 9600bps operating". These booklets can be purchased directly from John Branegan, 8 Whitehills, Saline, Fife, Scotland, KY12 9UJ. The prices are: *Satellite Dove Operating Manual*, £4.50 (inc P&P). Foreign orders should be accompanied by UK Sterling cheques or money orders to cover cost and an extra £1 for postage. The *UoSAT 3 Oscar Operating Manual* is priced at £4.00, with an extra £1 for overseas purchasers. *Space Station Mir* is the same price. The three booklets are produced on a 'non-profit' basis.

SPACE RADIO HANDBOOK

FOR ANYONE LOOKING for a book covering the overall space scene, the RSGB has published a large book by John Brannegan, called the *Space Radio Handbook*. It costs £11.34 to RSGB members and £13.34 to non members. This is a very good publication indeed. It covers just about every topic the satellite enthusiast needs to know about. The easiest way of giving the reader some idea of the comprehensive nature of this Manual, is to give the list of Chapter headings:- Space Radio Physics; Types of Satellites; Orbits and Tracking; Satellite Radio Reception; Amateur Radio Satellites; Weather and Experimental Satellites; Experiments in Space Radio; Man in Space; Space Radio Computing; Meteors; Comets; Moons and Asteroids; Amateur Radio Astronomy; Future of Amateur Radio in Space. Appendix 1 - useful addresses. Appendix 2 - Glossary. A really useful instruction Manual - an absolute must for the satellite enthusiast.

UOSAT F

UOSAT F, OR OSCAR 22 as it will be designated when launched, will be in orbit by the time you read this. At the time of writing, the expected date and time of launch was 0145GMT on 16 July. It should be launched into a 800km, polar sun-synchronous orbit. It will be able to support both amateur and non-amateur activities. The primary non-amateur mission is to provide store-and-forward communication for SatelLife, formed by 1985 Nobel Prize winner, Dr. Bernard Lown. SatelLife will use UoSAT F for a non-profit E-mail network for professional health services called Health Net, organised by five African medical schools. When not serving Health Net, on non-amateur frequencies, UoSAT F will transmit and receive on Amateur Satellite Service channels. The uplink will be on 2 metres with a 70cm downlink (same frequency plan as UoSat-Oscar 14), so that stations already equipped for UO-14 will be able to use UoSAT F with the same software and hardware. There is to be a CCD camera aboard which incorporates all the lessons learned from previous UoSAT CCD experiments. It has a wide angled lens of 110° giving a field of view only slightly smaller than the satellite's footprint.

DataComms

RICK STERRY G4BLT
1 Wavell Garth, Sandal Magna, Wakefield
WF2 6JP

JUST WHEN YOU THOUGHT it was safe to open the pages of *RadCom*, *DATACOMMS* returns! This column will now appear regularly every *two* months. I would very much like to know what you want to see in this column, and obviously I would be very grateful for any contributions.

First the ground rules for contributing to the column. I am active on Packet, (G4BLT @ GB7WRG), though please bear in mind that messages sometimes can and do get delayed or lost in the system. Please restrict message size to no more than 5k, as many UK mailboxes will not forward messages greater than 7k, (including headers). I can accept 3½in or 5¼in disks in 360/720k DOS format, (though not 1·2/1·44Mb), and in any BBC/Acorn DFS/ADFS format you like. Text should be in plain ASCII format, with no special formatting codes etc. Finally, there is conventional letter post. If you would like an acknowledgment of a letter, or require the return of a disk, then please enclose a return SASE, stamped address label, or postcard, as appropriate. Overseas readers should of course use IRCs instead of stamps. This will save a great deal of time, and the expense of postage.

Packet radio is very much a self-advertising medium, so I would like to turn the spotlight away from it to some extent, and remind readers that it is just one of many data modes available to the radio amateur. I hope to be featuring RTTY, AMTOR, FAX, synchronous CW, and anything else you can think of. That reminds me; is anyone still using the old German *Hellschreiber* system I wonder? My knowledge of German is rather rudimentary, but I translate that as 'brightness writer', and I recall that it was somewhat similar to Facsimile.

RTTY AND AMTOR

BOB CANNING, G0ARF, has written a couple of very interesting letters, in which he points out the almost complete absence of references to RTTY and BARTG in *RadCom* since 1989. *[Actually 134 'RTTYs' and 11 'BARTGs', but who's counting? – Ed]*. He says . . . .

"State-of-the-art RTTY is far removed from the smelly oily rag image of yesterday, and we now use some pretty sophisticated software, especially in contests. Although I have a collection of Creed machines that I use for demos, I also run an XT clone with a variety of UK and USA software covering most data modes. Many of the 'old brigade' have upgraded, or are doing so, to take advantage of enhanced facilities."

Well, I rather liked the smell of oil and ozone associated with the old machines, but in fairness they were very bulky and noisy, and lacked the ability to do any other job; contrast that with the versatility of a computer.

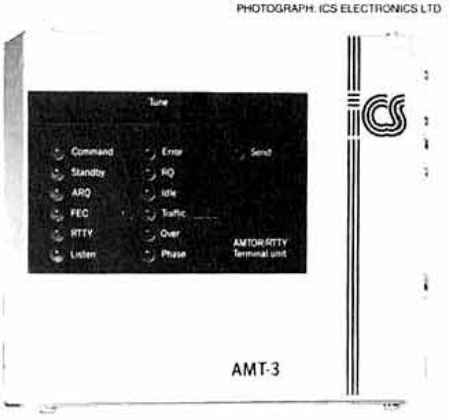
Packet is arguably best as a medium for sending and receiving information and files of various sorts. It certainly can be, and is, used as a 'live-QSO' mode, but in many cases it would be easier to pick up a microphone. However, though there are mailboxes for RTTY, and especially AMTOR, perhaps they are modes which are at their best when used for live QSOs. Packet is a frustrating mode for 'listeners', because a contact appears as many fragments intermingled with packets from other stations. AMTOR also can be a bit tricky to monitor, but RTTY is very easy, and listeners can enjoy it to the full. Unlike packet, which needs a fairly 'clean' frequency to work satisfactorily, RTTY and AMTOR, especially AMTOR, really come into their own when the going gets tough. With a good terminal unit and appropriate software, you can have a QSO under conditions that would be difficult or impossible on 'phone. Anyone who has not seen what AMTOR can do under conditions of heavy QRM, and with quite low transmitter powers, would be astonished.

RTTY/AMTOR EQUIPMENT

RTTY IS PROBABLY the easiest and cheapest data mode to become QRV on. All that is required is a simple 'unintelligent' RTTY Terminal Unit, a radio, and a suitable computer and software. In fact, in some cases the computer will do most of the work of a TU too, requiring minimal external hardware. AMTOR requires little or no extra hardware to RTTY, being effectively a sophisticated form of that mode, though the software has to be a lot more clever. For example, if you have a BBC microcomputer, then you can use the ROM software by Peter Harris, G3WHO, which caters for RTTY and AMTOR. This has been enhanced recently, and requires a simple TU such as the BARTG ST5 or the G3LIV board, plus an external clock generator from G3LIV. The only snag is the BBC Micro's infamous habit of generating S9+ RFI over a large portion of the radio spectrum!

RTTY and AMTOR are available on expensive multi-mode terminals such as the PK232 and KAM, but there are cheaper alternatives. A British company, ICS, make the AMT3, which is a dedicated AMTOR/RTTY unit, or if you are lucky you might well be able to pick up a cheap secondhand AMT1

PHOTOGRAPH: ICS ELECTRONICS LTD



The AMT3 dedicated RTTY/AMTOR intelligent terminal unit. The older AMT1 and AMT2 units can make attractive secondhand buys.

or AMT2 unit. These older units also work very well. Like a packet TNC, these are intelligent devices that connect to the computer via a simplified RS232 serial link. The computer requires only a simple 'dumb terminal' program to communicate with the TU; specialist software is not required to get started. Unlike packet TNCs which have only a few indicators on the front, the ICS units are positively festooned with LEDs, telling you everything you need to know about what the unit is doing. I hope to go into more detail in a later issue as AMTOR is a somewhat strange mode to use, and rather demanding of the radio, but well worth the effort.

VHF RTTY

I WONDERED RECENTLY if there was still any RTTY activity on the 144MHz band, and if there had ever been much on 430MHz. There is still plenty on the HF bands, as a listen around 14·090MHz will tell you. However, there does seem to be a small but dedicated band of RTTY operators on Two. Bob, G0ARF, says that about six stations in the Worcester/Birmingham area often meet on AFSK (FM) RTTY on 145·300MHz at 2030UTC. They normally use 50Baud, but most can also handle 45·45Baud. Ted, G8CDW, tells me that he runs a small AFSK RTTY net on 145·300MHz in West Norfolk. The net is on Mondays at 1930 local time, and there are usually three to four regulars, plus the odd other station showing up from time to time. Does anyone in the UK use FSK (SSB) RTTY on Two, or is activity confined to local FM natters?

BARTG

G0ARF REFERRED TO BARTG, and I think it worth giving them more than a little mention. This formally stood for the British Amateur Teleprinter Group, but 'Teleprinter' has since been replaced with the more appropriate 'Teledata'. BARTG now supports all radio data modes, and produces an excellent quarterly magazine called *DATACOM*. The Spring 1991 issue covered everything from AMTOR and synchronous CW, to dot-matrix printers, iambic keyers and packet. The Summer issue will feature a new data mode called CLOVER, and how to cure computer-generated RFI. The group also has its own RTTY news bulletin service on various bands and frequencies, rather like *GB2RS*, but using the callsign GB2ATG. The current UK subscription is £10·00, and for further details write to the membership secretary, Ann Reynolds, G6ZTF, 169 Bell Green Road, Coventry, Warks, CV2 7GW or telephone 0203 668491. To my shame, I let my BARTG membership lapse some time ago, but have since rejoined.

FUTURE TOPICS

ALTHOUGH I HAVE ALREADY SAID that I would like to pay more attention to modes such as RTTY and AMTOR, packet is very much a growth area, and I shall certainly not be ignoring it. DX Clusters and TCP/IP will be featured, and I am already assembling the necessary information. However, I shall be listening to what readers think should appear in this column, so who knows where that will lead?

Microwaves

MIKE DIXON G3PFR
'Woodstock', Gazebank, Norley, Warrington, Cheshire WA6 8LL

10GHZ OPENS TO LA (AND ELSEWHERE)

A LETTER FROM CHRIS, G4LOJ (near Norwich), tells the epic story of a recent contact he had with Norway - yes, on 10GHz! It reads as follows: 'For weeks prior to 30 May, I had been struggling with the mechanical nightmare of rotating a new dish through 360 degrees with the whole contraption bolted to the side of the tower . . . . I managed to get it fitted up on the 30th and had hopes of hearing the Martlesham beacon (GB3MHX), which I couldn't . . . . the next night (31 May) I went on 70cm to look for G3LQR to get him 'spotted' on the (changed) rotator . . . . I found him working LA1T on 70cm and bemoaning the fact that he was having problems with his gear . . . . He suggested some of the other locals might be around, so I called in . . . . I worked LA1T on 23cm (with 500mW) and one way on 13cm (my TX had failed) . . . . then an attempt was made on 6cm - no contact . . . . I didn't have much hope for 3cm, but put the 10W transmitter on and beamed in their general direction. After five minutes, they couldn't find it . . . . I said I'd leave it on for a while. Suddenly I heard a shout 'We've found it, can you key it?'. . . . Oh dear! I run a fixed oscillator source on TX and to key it isn't easy . . . . a hastily fitted diode in the power lead with the key across the diode via some resistors, I eventually sent them some chirpy CW! . . . . reports were 519(?C) in both directions . . . . in the direction of LA the dish fires through the tower and rotator, I guess signals would have been much stronger without this obstruction . . . . lots of tests have been carried out with G3ZFP, G3LQR and G3JVL over the past few weeks and I have been very surprised with the level of activity on 3cm . . . . Propagation, be it rain scatter, tropo or ducting, often makes the signals on 3cm better than those on 2m or 70cm'. Chris describes his equipment as 'definitely not state of the art . . . . The preamp is an old tunnel diode device, no GaAs FETs yet, but working on it . . . . The plan is now to get a beacon going here as per (his personal beacon on) 6cm'. Shows what can be done when you are in the right place at the right time with the determination to do it! Congratulations on a noteable contact, believed to be a 'First'.

FURTHER EXPLANATION!

I OMITTED, LARGELY because of available space, to mention some other PCBs available from the Microwave Components Service, in addition to those described last time. Briefly they are as follows:

G4FRE Beacon callsign generator and keyer PCB. This is designed to accomodate the G4FRE EPROM beacon keyer which is fully described in volume 2 of the RSGB *Microwave Handbook*. Four messages (of 4kb) and the appropriate control channels, can be programmed into a 2732 EPROM which retains its memory even when the power is switched off. Useful for either formal or personal beacons. If you are unable to program EPROMS yourself, I can do it: all you need supply to me is a blank 2732 EPROM (21V programming voltage), *exact* text of the message(s) required and return postage for the programmed EPROM.

The **Microwave Committee UHF source (UC04)** is an older design which is still available and useful as a microwave source. Generating at least 100mW (and often much more) in the 350 to 450MHz range this design, also, is fully described in volume 2 of the *Handbook*. It could be used as a low power 70cm transmitter/driver in addition to its more usual use as an LO source for microwave converters and transmitters.

A useful **low-voltage-drop regulator** circuit, derived from a Wood and Douglas design, used to stabilise power supplies where there must be a minimum voltage drop, eg when operating portable from almost discharged accumulators, is available as UC05. It, too, is described in the Handbook!

Remember that the Components Service is now operated by Mrs P Suckling, G4KGC, at 314A, Newton Road, Rushden, Northants NN10 0SY. Orders or enquiries must go direct to Petra, *not to RSGB HQ*.

TECHNICAL CORNER

DEVELOPMENT OF THE G3WDG series of 10GHz modules has continued, since the last update, with a major new module released at the end of June. This was the G3WDG 003 144 – 10,368MHz up-converter which completes the modules for a basic, but nevertheless 'hi-tech', transverter system. I say 'basic' because there are other add-on modules being developed to increase the performance of the '002/003 combination making up the basic transverter.

The '003 module requires LO drive at 2556MHz from the G4DDK-004 crystal controlled source, as usual. The circuit of the transmit up-converter is shown in **Fig 1**. The thick black elements in the circuit are representations of the microstrip lines and the black triangles are the radial decoupling stubs used widely in these modules. Note that a microwave monolithic integrated circuit (MMIC) -an Avantek 'Modamp' or MODular AMPlifier, IC1, - is included (and is, indeed, mandatory) and that this is followed by a 3dB splitter to divide the amplified LO signal, one half being fed to the coaxial connector, J2, for the receive converter and the other half via C4 to the x4 multiplier GaAs FET, TR1. This is followed by the now-familiar cavity resonator to select the required harmonic. TR2 is an active mixer requiring a 144MHz signal (via the coaxial connector J3) of about 1mW to be fed, along with the 10,224MHz LO signal, into the gate of this GaAs FET. Then follows an amplifier chain consisting of an image rejection cavity, filter FL2, amplifier TR3, filter FL3, amplifier TR4, filter FL4 and two further stages of amplification, this time without additional filters, to the final output socket, J4. The module fits into a type 7760 tinplate box from Piper Communications.

During development of this module, it was found that the input VSWR of the Modamp was rather poor, resulting in less than the maximum available gain from this stage. The poor match can also cause the 'DDK-004 output circuit to require retuning when connected to the module. The coaxial cable length between the modules will then become critical. These problems were overcome by modifying the input circuit to the modamp to include a 1pF capacitor to ground at a certain point on the input line. Users of the G3WDG-001 multiplier/PA module could probably also benefit from this modification. Full details of the modification, together with a suitable 1pF chip capacitor and Veropin are available from G3WDG, at the Components Service address given earlier, on receipt of an

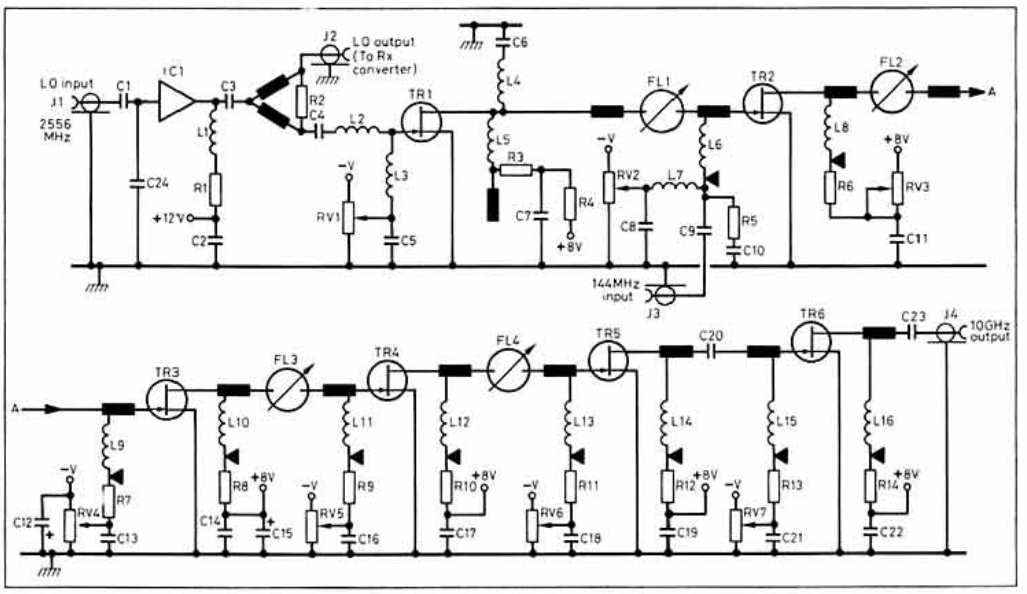


Fig 1: G3WDG – 003 transmit up-converter.

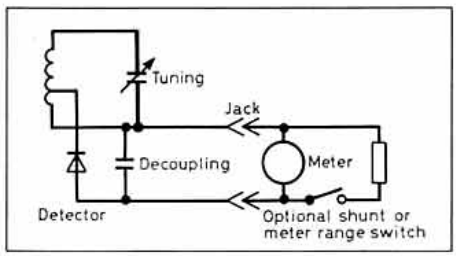


Fig 2: Wavemeter circuit.

SAE. Details and current price/availability of the '003 mini-kit (and other items in the Components Service) can be obtained from Petra, G4KGC.

The next modules in the pipeline are the G3WDG-005, a two-stage 10.0 - 10.5GHz amplifier with optional image rejection filter. Applications for this module are to improve the performance of existing 10GHz narrow-band equipment eg a G3JVL transverter, and as a front-end for recently available surplus equipment. This latter application requires the use of an image rejection filter, hence this option is included on the board. The module is, as I write (June), undergoing trial construction.

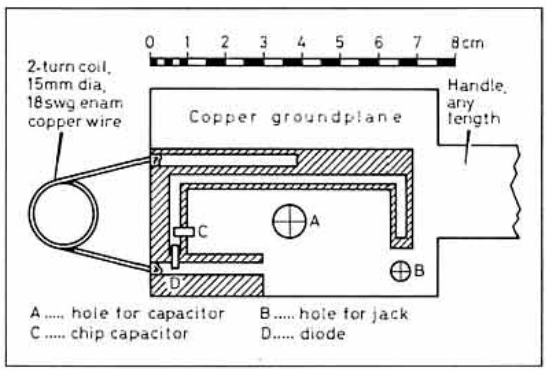


Fig 3: VHF wavemeter PCB.

Future plans are to produce a PA module to follow the G3WDG-001 or '003 units, with a power output of 200-250mW. A version with 500mW output is also being considered, if a source of reasonably priced GaAs FETs can be located. Some work on a single-stage low-noise preamplifier (G3WDG-004) has also been done. A version using a reasonably priced HEMT (High Electron Mobility Transistor) has produced noise figures around 1.25dB with a gain of 14dB. Thanks to Charlie, G3WDG, for this latest update.

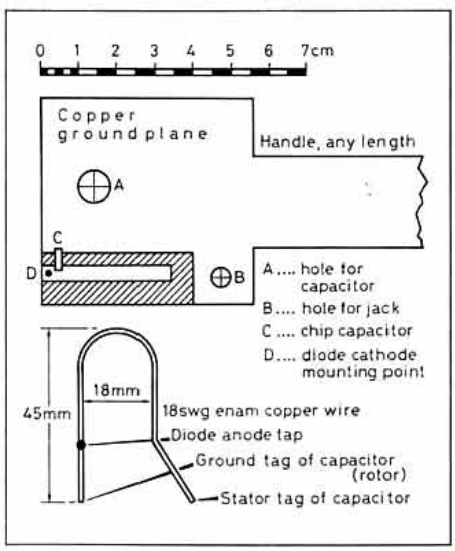


Fig 4: UHF wavemeter PCB.

BEGINNERS CORNER

FIRST, APOLOGIES FOR an omission in the July column. Somehow I managed to omit, in the PCB milli-Wattmeter layout, the fact that the two chip resistors fit between the pads labelled A and B and the input line, the diode fits across the space marked X (with the shortest leads possible) and the four decoupling capacitors between pads C and D and the line and E and F and the line - where the dotted lines are. Also the caption read 1A419 but should have been 1N419.

Now to this month's subject, which is how to make frequency measurements in the VHF/UHF range. Thanks to Mike Scott, G3LYP, for supplying the following ideas for methods of measurement which don't require expensive or elaborate equipment. In fact, most of the ideas which follow need only cost tens of pence, rather than tens of pounds!

Typical microwave oscillator sources such as the G4DDK-001 (reviewed in the May column) usually start off with crystal frequencies around the 88 to 108MHz mark, depending on the application. That should immediately suggest a way of checking that the crystal oscillator stage is functioning correctly - yes, tune it in on an FM broadcast receiver with the antenna disconnected and the squelch disabled! The crystal is unmodulated and the signal will only be detectable by quieting of the hiss. The frequency reading on the tuning scale should approximate to that of the crystal. If it appears to be a long way out, the circuit could be self-oscillating at a frequency not controlled by the crystal. If the oscillator is controlled by the crystal, touching the oscillator coil or moving the core slightly will have little effect on the signal heard on the receiver. If it is self- oscillating, there there will be a large change of frequency when the coil is touched or the core moved.

Checking the frequencies of the multiplier stages which follow the oscillator is a little more demanding! These frequencies might lie anywhere within the range 150 to 2500MHz. The simplest solution is to use absorption wavemeters. Note the plural! It is difficult (but possible) to build a single wavemeter covering the whole of this range and so it is better to build two or three covering, for instance, 60 to 160MHz, 150 to 300 MHz and 250 to 2500MHz.

The first two are easily and inexpensively made. **Fig 2** gives the circuit of the first two. Either consists of a coil or loop of wire, a variable tuning capacitor, a diode to detect the RF, a decoupling capacitor and a meter to indicate resonance. Note that the diode is tapped into the tuned circuit. The tapping point is a compromise between obtaining enough signal to give a decent meter reading and reducing the Q of the circuit to an extent which affects the sharpness (or resolution) of the tuning. The use of a sensitive meter eg 10 to 50 or 100µA helps in this respect.

The suggested method of construction is shown in **Figs 3 and 4**. Each is built on a piece of 0.1in thick single clad PCB material cut to roughly the dimensions shown: the sizes are not critical, except you'll find difficulty in coupling the wavemeter to the circuit under test if the wavemeter is too large. Again, it is possible to use thinner (1/16in) board, but this is less rigid. Etching patterns are also given in the figures: again, these are not really critical and you could produce the tracks by cutting through the copper with a sharp blade and stripping off the unwanted copper by applying a hot soldering iron to the *unwanted* copper and peeling it off whilst the board bonding is soft. The tuning capacitors were small 50pF types with 5/16in bushes and 7/32in shafts, obtained from a rally. One was used 'as is' for the 60MHz to 160MHz version. For the other, half the rotor and stator plates were removed. The copper track forms part of the tuned circuit in the lower frequency unit and the junction between the track and the rest of the coil forms a convenient tapping point for the diode. To keep the stray capacitance to a minimum, the loop on the higher frequency unit is soldered directly to the tags on the tuning capacitor, with the diode soldered between the loop, about 1/2in from the ground end, and a track on the PCB. The tuning capacitors are mounted on the track side of the board and a paper calibration scale on the other (tuning knob) side. Once calibrated, the scale can be protected by a coat of varnish or lacquer.

To keep the units small, a 3.5mm jack socket is fitted and used to connect a screened lead to a separate meter - either a multimeter or, for instance, an inexpensive miniature panel meter, again often obtainable from rallies and often with a sensitivity of 50 or 75µA. The scale on the meter does not matter, all that is required is an indication.

Once completed, how do you calibrate the wavemeters? This is best done with a Dip Oscillator or signal generator, maybe at a 'Round Table' for instance, or by enlisting help from another local amateur. Calibration does not have to be exact, because what you mainly are interested in is whether the stage being measured is within, say, 10 or 20MHz of where it ought to be. In other words you need to know whether that stage you've just peaked up by measuring voltage drop across an emitter resistor is doubling and not simply amplifying or tripling! Failing help, you could use Lecher lines (RSGB *VHF/UHF Manual*, pages 9.2 to 9.4) to calibrate a tunable oscillator (page 11.40) which is, in turn, used to calibrate your wavemeters. If really desperate, you could even buy ready-made wavemeters! More about that next time.

Next time we'll consider how to build a wavemeter covering the rest of the required range, from about 250MHz up to 2500MHz, using standard copper tube and plumbing fittings, plus a few more bits and pieces. ❑

QUALITAS RADIO

High performance VHF/UHF GaAsFET preamplifiers by Landwehr Electronic of Germany

★ Professionally manufactured and individually calibrated 2m and 70cm preamplifiers
★ Very low noise figure, ideal for satellite communications
★ Very low insertion loss ★ Very high stability
★ Superb large signal handling
★ Maximum transfer power with ptt operation; 750 watts
★ Maximum switchable power in vox operation; 150 watts
★ In weatherproof aluminium diecast box for masthead use
★ High quality N sockets
★ Supplied with mast clamps
★ Separate connector for dc supply and ptt control

No VAT increase!

MODEL NO	FREQ RANGE	NOISE FIGURE	GAIN (dB)	IP3 (dBm)	PRICE (inc. VAT)
145MA	144-146	<0-8dB	17-20	-3	£119.00
145MAS	144-146	<0.5dB	17-20	-3	£137.00
435MA	430-440	<1.1dB	16-19	-3	£142.00

WRITE OR CALL FOR FREE DATA SHEET AND LIST OF ACCESSORIES.

Above prices include VAT, but add £3.00 for post and packing. Make cheques payable to QUALITAS RADIO. *VISA and ACCESS accepted.*

Landwehr Electronic preamps are available exclusively through QUALITAS RADIO, 23 Dark Lane, Hollywood, Birmingham, B47 5BS. Tel: 021 430 7267.

We are UK importers of world famous DL6WU double optimised yagi antennas.
Send for details

flexaYagi®

QUALITAS RADIO

WISE BUY BARGAINS!

ALL PRICES INCLUDE P&P + VAT

T1154 type Morse keys part no. 10F/1047561 ..... **£15 ea**
PYE M293 H/B A.M. + mic L/S **£75**
PYE P5002 H/B A.M. H/Held + batt **£31**

SPECIAL OFFER
RACAL-DECCA mobile mikes, PTT, with curly lead/plug. 500Ω.
2 for **£7** inc p&p

PYE M212 UHF. Olympic T Band 1 channel **£30**
PYE P BAND. Olympics FM will mod to 4m 6ch. Mod info **£27**
PYE PF2FMB. L/B plus speaker mic and used batt **£26**
PYE M201 Olympic H/B AM units only **£18**
AIRLITE 62 H/Mike Sets, moving coil mikes, as new, less plug **£20**
DARTON Thermographs excellent condition **£58**
RACAL CLANSMAN Head/mic sets Nato no 5965-99-649-8166. Unused **£21**
RACAL CLANSMAN Handset Nato no 5965-99-620-5669. Unused **£21**
PYE WI5U 6 channel. Units only **£23**
PYE REPORTER MF6AM H/B **£32**
RACAL MA675 9m fibreglass mast *with* accessories. New **£120**

plus carriage

BARGAINS FOR CALLERS. SURPLUS AND SECOND-USER EQUIPMENT ALWAYS WANTED

G.W.M. RADIO LTD

40/42 PORTLAND ROAD, WORTHING, SUSSEX BN11 1QN
TELEPHONE: 0903 34897 FAX: 0903 39050

FREE POWER
from the wind!
RUTLAND
WINDCHARGERS

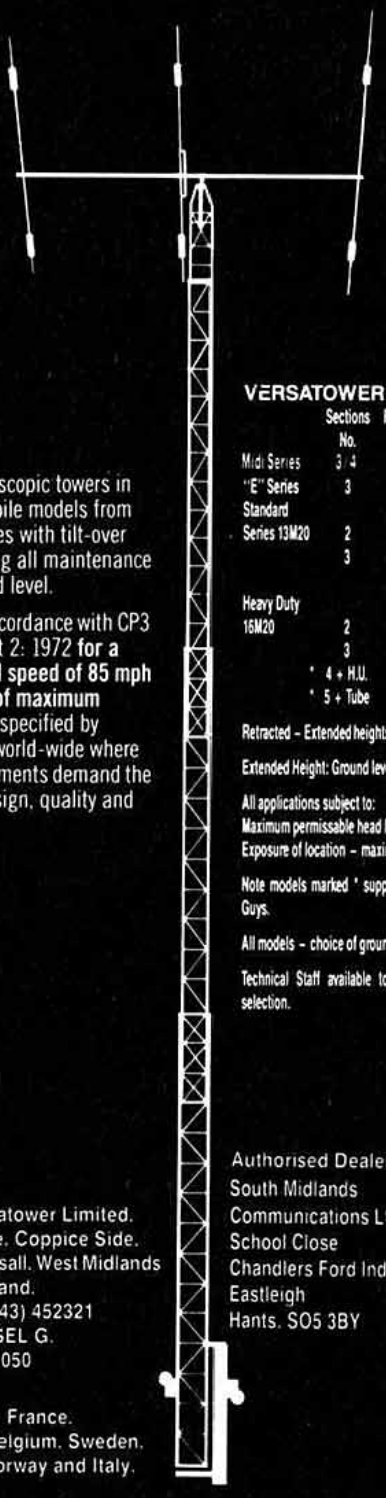
★ Independent battery charging systems
★ Charging commences at 4mph (2m/s)
★ Charges 4Amps at 22mph (10m/s)
★ Ideal for remote telecoms, ham radio sets, lighting barns, sheds, etc.

For free brochure contact:

1989

MARLEC ENGINEERING CO LTD,
Unit K, Cavendish Courtyard,
Sallow Road, Corby,
Northants NN17 1DZ.
Tel: 0536 201588 Fax: 0536 400211

Versatower: XXV+ Still first choice



A range of telescopic towers in static and mobile models from 7.5 to 36 metres with tilt-over facility enabling all maintenance to be at ground level.

Designed in accordance with CP3 Chapter V: part 2: 1972 **for a minimum wind speed of 85 mph in conditions of maximum exposure** and specified by professionals world-wide where hostile environments demand the ultimate in design, quality and reliability.

VERSATOWER RANGE

	Sections No.	Retracted M.	Extended M.
Midi Series	3/4	4.5	9/10
"E" Series	3	6.7	13.7
Standard Series 13M20	2	7.8	12.0
	3	8.0	18.0
Heavy Duty 16M20	2	7.8	12.0
	3	8.0	18.0
	* 4 + H.U.	8.15	24.0
	* 5 + Tube	8.25	30.0

Retracted - Extended heights listed, nominal only

Extended Height: Ground level to centre of Array.

All applications subject to:
Maximum permissable head load - weight/area.
Exposure of location - maximum wind speed.

Note models marked * supplied with obligatory Guys.

All models - choice of ground mounting.

Technical Staff available to advise on model selection.

VISA

Available from
Strumech Versatower Limited.
Portland House. Coppice Side.
Brownhills. Walsall. West Midlands
WS8 7EX. England.
Telephone: (0543) 452321
Telex: 335243 SEL G.
Fax: (0543) 361050

Agents in
West Germany. France.
Netherlands. Belgium. Sweden.
Switzerland. Norway and Italy.

Authorised Dealer
South Midlands
Communications Ltd
School Close
Chandlers Ford Industrial Estate
Eastleigh
Hants. SO5 3BY

CONTEST NEWS

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

HF RULES

SECOND 1.8MHZ CONTEST 1991

1. The General Rules for RSGB HF Contests (as published in January 1991 *RadCom*) will apply.

2. When: 2100GMT Saturday 16 November to 0100GMT Sunday 17 November 1991.

3. Sections: Single-operator entries only.

(a) British Isles.

(b) Overseas including EI.

4. Frequency and Mode: 1820-1870kHz, CW only.

5. Exchange: RST plus Serial Number starting at 001. British Isles stations must also send their County Code.

6. Scoring:

Overseas stations work only British Isles stations for points.

Section (a) Three points per QSO plus a bonus of five points for (i) the first QSO with each British Isles County worked and (ii) the first QSO with each Country (outside the British Isles) worked.

Section (b) Three points per QSO plus a bonus of five points for the first QSO with each British Isles County worked.

7. Address and closing date for logs: as per General Rules.

8. Awards:

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

The Maitland Trophy will be awarded to the Scottish entrant with the highest aggregate number of points in this contest combined with the First 1.8MHz Contest 1992.

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

RECEIVING CONTEST

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

Eligible entrants:

(a) British Isles - RSGB members only

(b) Overseas - all SWLs

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

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

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

Awards: Certificates of merit will be awarded to the leading entrants in each section.

RSGB CLUB CALLS CONTEST ('CCC') 1991

1. General: The aims of this contest are to encourage contacts between Affiliated Societies, to give Club Callsigns an airing, and to encourage Class B licencees to operate under the appropriate supervision. Unless otherwise stated below, the **General Rules for RSGB HF Contests**, as published in January 1991 issue of *RadCom*, will apply.

2. Eligible Entrants: All licensed Amateurs and Shortwave Listeners. Entrants may operate Mobile and Portable, as well as Fixed stations. Multi-operator entries will be accepted in the Transmitting Contest.

3. Date and Time: From 2000GMT to 2400GMT Saturday 9 November 1991.

4. Frequencies and Mode: 1900kHz - 1990kHz, any licensed mode.

5. Exchange: RS(T) + serial number commencing at 001 + **(Other Data)** name of Club (or "No Club") or name of Club + "Club Station" if operating a Club station.

6. Scoring: Only ONE contact may be claimed with any station, regardless of mode. Score three points for each completed contact, with the following bonuses . . . . five points for the first ordinary member worked from each new club; twenty-five points for each new Affiliated Society Club Station worked; fifty points for working the RSGB HQ Station.

7. Definitions: Members of more than one club may claim membership of whichever one they prefer, but must use the same one throughout. Club names should be kept brief. All Club Calls must belong to bona-fide Affiliated Societies as listed in the RSGB *Call Book*.

8. Address and Date for Entries: as per General Rules.

9. Awards: Certificates of Merit will be awarded to the leading Radio Society/Club station, the leading individual club member, and the individual non-club member giving away the most points.

RECEIVING CONTEST

Rules as for the transmitting contest except as modified below

SWLs may log only stations participating in the transmitting section.

Log column 'Other Data' to show name of Club (or "No Club"), or name of Club + "Club Station" as appropriate. Any particular station may appear only once in the 'station heard' column, regardless of mode.

A **Certificate of Merit** will be awarded to the leading entrant.

HF CONTESTS CALENDAR - 1991.

Sep 1	*LZ DX (CW)*
Sep 7/8	SSB FIELD DAY (inc IARU Region 1) (Jun 91)
Sep 7/8	JARL All Asia SSB (Jun 91)
Sep 14/15	*WAE SSB (p16, Aug 91)*
Sep 15	28MHz Cumulatives (Aug 91)
Sep 21/22	*CQ WW RTTY*
Sep 23	28MHz Cumulatives (Aug 91)
Oct 1	28MHz Cumulatives
Oct 5/6	*VK/ZL SSB*
Oct 5/6	*Ibero-American SSB*
Oct 9	28MHz Cumulatives
Oct 12/13	*VK/ZL CW*
Oct 13	21/28MHz Phone (Apr 91)
Oct 17	28MHz Cumulatives
Oct 19/20	*Wkd all Y2 CW/SSB*
Oct 20	21MHz CW (Apr/Jun 91)
Oct 26/27	*CQ WW SSB*
Nov 9	Club Calls Contest (Sep 91)
Nov 9	*YL/OM CW/SSB*
Nov 9/10	*OK DX CW/SSB*
Nov 9/10	*WAE RTTY*
Nov 16-17	2nd 1.8MHz CW (Sep 91)
Nov 16/17	*Austrian 1.8MHz CW*
Nov 17/17	*Oceania QRP (WIA)*
Nov 23/24	*CQWW CW*

HF RESULTS

LF CUMULATIVE CONTESTS 1991 -

The HFCC thanks those who made the not inconsiderable effort to enter these contests and to send in checklogs, and congratulates the leading entrants. An encouraging number of newcomers took part. Two overseas stations in particular contributed exceptionally to the event *and* sent in comprehensive checklogs - although not eligible entrants, their scores are nevertheless shown in the listings.

Quite a number of overseas contacts were made, the majority with Europe but with the occasional USA station surfacing here and there. The French Contest, coinciding with the fourth weekend, spiced things up considerably. More than 800 calls appear in the logs: entries and checklogs account for 53, and a further 17 were well-known contesters making brief visits. After deducting the overseas contingent, more than half the remainder appear regularly in RSGB contest logs. Indeed, a number of non-entering participants were active in all the sessions on all three bands. It doesn't matter if you can't make all the evenings (one operator made his 404 points in just 128 minutes on the air) - why not put in an entry and see your callsign in print!

Once again, thanks to all those who included comments with their logs - they are always very welcome, although usually too numerous to print. Suggestions for changes and improvements in the contest format (eg replacing the RST element of the exchange with the County Code, to add more interest) are always considered by the Committee, so keep them coming in! Those who support these contests seem thoroughly to enjoy them, so let's hope for another good entry next year.

G3MXJ

1.8MHZ

Posn	Callsign	7/1	15/1	23/1	31/1	8/2	Score
1	G3TBK+	-	168	171	-	192	531
2 =	G3JJG	158	-	159	ck	177	494
2 =	G3YAJ	-	-	153	164	177	494
4	G0IVZ	-	-	147	153	174	474
5	G3SWH	149	ck	ck	152	168	469
6	G0JNZ	-	-	132	147	186	465
7 =	G4ARI	ck	ck	149	147	165	461
7 =	G40GB	153	-	ck	146	162	461
9	G3ZGC/P	162	135	-	157	ck	454
10	G3OXC	ck	ck	141	144	156	441
11	G0IDE*	123	ck	129	147	ck	399
12 =	G3BPM	138	ck	129	ck	129	396
13 =	G4ENA (D)	108	ck	-	126	162	396
14	G2HLU	119	ck	132	135	-	386
15	G3LIK	ck	ck	126	110	149	385
16	G3YLC	128	126	-	120	-	374
17	G3GLL	131	123	117	ck	ck	371
18	GW3SB	ck	ck	126	131	102	359
19	G3AWR (S)	98	ck	ck	141	108	347
20	GM3UM	ck	92	ck	119	131	342
21	G3GMS	ck	ck	102	120	89	311
22	GW4HBK	83	ck	99	97	ck	279
23	G3OLU	120	62	-	83	-	265
24	GM4SID	135	117	-	-	-	252
25	G3JSR	92	-	71	83	-	246
26	G3GMM	62	-	87	93	-	242
27	GW4KVJ	ck	-	66	83	90	239
28	G4BUO	-	-	-	105	125	230
29	G4JSN	63	ck	ck	72	69	204
30	G3LET*	-	-	147	-	-	147
	EI4VEJ(G3HZL)	-	-	120	139	144	403
	LA1IE	-	66	75	-	91	232

Checklogs received with thanks from G3EAO, LA8NC.

3.5MHZ

Posn	Callsign	7/1	15/1	23/1	31/1	8/2	Score
1	G3TBK+	243	262	248	-	-	753
2	G5LP	228	260	238	-	ck	726
3	G3SQX	ck	245	227	216	-	688
4	G3OXC	207	231	246	ck	ck	684
5	G3JJG*	-	237	234	210	-	681
6	G4ARI	213	246	221	ck	ck	680
7	G3LET	252	-	-	240	186	678
8	G0IVZ	ck	249	226	201	ck	676
9	G4OGB	209	213	215	ck	ck	637
10	G4KGK	213	215	192	ck	-	620
11	G3YAJ	195	216	205	-	-	616
12	G3GLL	210	-	219	ck	177	606
13	G3SWH	198	218	184	ck	-	600
14	G0JNZ	199	-	197	201	-	597
15	G2HLU	ck	209	192	195	ck	596
16	G4LZB	186	206	-	198	-	590
17	GM4SID	189	189	193	ck	-	571
18	G3LIK	-	162	203	191	-	556
19	G3YLC	168	183	190	-	-	541
20	GM3UM	177	176	171	ck	ck	524
21	G3OLU (D)	157	198	165	-	-	520
22	G0IDE	168	147	186	ck	ck	501
23	G3WKL	177	ck	172	149	-	498
24	G3GMS	161	147	174	-	-	482
25	G4BLI	-	-	174	154	153	481
26	G3JSR (D)	171	-	187	122	-	480
27	GW3SB	-	173	150	148	-	471
28	G4XPE	150	-	174	ck	138	462
29	G3AWR (S)	ck	152	159	150	ck	461
30	G3BPM	162	ck	164	ck	132	458
31	G3ZGC/M*	129	114	150	ck	ck	393
32	G4AXD	-	-	107	138	132	377
33	G4JSN	108	125	125	ck	ck	358
34	GM4WLN	116	120	ck	108	ck	344
35	GM0JKF	ck	90	ck	93	94	277
36	G3GMM	81	-	121	-	63	265
37	G4EBK	95	-	-	-	165	260
38	GW4KVJ	60	84	-	96	-	240
39	G3EAO (D)	-	-	72	99	54	225
40	G4BUO	-	84	90	-	-	174
	LA1IE	98	81	102	ck	-	281

Checklog received with thanks from G3WPK

7MHZ

Posn	Callsign	7/1	15/1	23/1	31/1	8/2	Score
1	G5LP+	215	233	ck	231	ck	679
2	G0IVZ (D)	210	168	ck	240	-	618
3	G3OXC	197	201	ck	216	ck	614
4	G0JNZ	201	207	-	182	-	590
5	G3SWH*	174	186	ck	216	-	576
6	G4LZB	162	192	-	203	-	557
7	G3TBK (D)	-	-	189	221	146	556
8	G3LIK	-	147	177	231	-	542
9	G4OGB	192	ck	156	194	ck	542
10	G2HLU	171	185	ck	180	ck	536
11	G4KGK	180	-	158	189	ck	527
12	G4ARI	162	-	161	198	ck	521
13	GW3WWN	162	185	-	165	ck	512
14	GM4SID	180	174	153	-	-	507
15	G3JSR	179	-	-	183	144	506
16	G3ZGC	ck	168	ck	195	135	498
17	G3YAJ*	153	-	159	180	-	492
18	G0IDE	144	174	ck	168	ck	486
19	G0OAA	161	168	ck	153	-	482
2 =	G3OLU (D)	-	108	147	207	-	462
20 =	GM3UM*	141	159	ck	162	ck	462
22	G4XPE	143	ck	ck	147	143	433
23	GW3SB*	153	-	135	135	-	423
24	G3AWR (S)	125	ck	129	153	ck	407
25	G3BPM (D)	110	148	ck	147	ck	405
26	G3WKL (D)	117	155	-	125	-	397
27	G0IEI	112	97	-	-	99	308
28	GM4WLN	96	99	-	108	-	303
29	G4ZYF	ck	ck	90	93	110	293
30	G4JSN	89	95	93	ck	ck	277
31	G0OGN	-	-	87	97	90	274
32	G3YLC	134	-	-	-	123	257
33	G3GMS	126	119	-	-	-	245
34	G3EAO	-	-	51	79	87	217
35	GW4KVJ	88	ck	-	35	87	210
36	G3LET*	-	-	-	-	87	87
37	G3GMM*	-	-	75	-	-	75
	LA1IE	ck	81	65	68	-	214
	EI4VIJ	-	-	-	195	-	195

Checklogs received with thanks from G3RWL, G3SQX, G3WPK and OK1DMS.

3-BAND COMBINED COMPETITION

Posn	Callsign	Score
1	G3TBK+	1840
2	G0IVZ	1768
3	G3OXC	1739
4	G4ARI	1662
5	G0JNZ	1652
6	G3SWH	1645
7	G4OGB	1640
8	G3YAJ	1602
9	G2HLU	1518
10	G3LIK	1496
11	G0IDE	1386
12	G3ZGC	1345
13	GM4SID	1330
14	GM3UM	1328
15	G3BPM	1259
16	GW3SB	1253
17	G3OLU	1247
18	G3JSR	1232
19	G3AWR	1215
20	G3YLC	1172
21	G3GMS	1038
22	G3LET	912
23	G4JSN	839
24	GW4KVJ	689
25	G3GMM	582
	LA1IE	727

+: Certificate of Merit
*: Error-free entry
(D): Unmarked Duplicate(s) found
(S): Arithmetic Error/Claimed for too many evenings
ck: Checklog submitted (thanks)

VHF RESULTS

144/432 MHZ CONTEST MARCH 1991

Conditions were generally poor, as was activity. Usual moans and groans about the weather: when I was a lad and you could still get a bag of fish and chips and get change from a tanner, we thrived on the glorious weather that comes with the March contest! I can remember when the milk froze inside the tent! Congratulations to the section winners and runners-up where appropriate. Certificates will be sent out as soon as possible. Thanks to GI4KIS for adjudicating. *G4DEZ*

MULTI OPERATOR OPEN PORTABLE

Pos	Group	144	Norm	432	Norm	Total
1	Sheppey Western Contest Grp.	5968	837	2097	1000	1837*
2	Victory Contest Group	7130	1000	747	356	1356*
3	Flight Refuelling A R Society	3932	551	1450	69*	1242
4	The Essex Cowboys	4707	660	1157	551	1211
5	Three Spires amd Wulfrun CG	3576	501	1125	536	1037
6	Surrey Radio Contact Club	4035	565	473	225	790
7	Scunthorpe VHFCG	4229	593	0	0	593
8	Watford CG	1759	246	470	224	470
9	11th Hour CG	1815	254	313	149	403
10	Hereford VHF CG	955	134	281	134	268
11	SJB & SSF	69	9	0	0	9

MULTI OPERATOR FIXED OPEN

Pos	Group	144	Norm	432	Norm	Total
1	North Wakefield Radio Club	696	938	198	1000	1938*
2	Leicester Radio Club	693	934	186	939	1873*
3	Nunsfield House ARG	652	878	175	883	1761
4	Southampton University ARC	742	1000	120	606	1606
5	The South Devon Radio Club	736	992	103	520	1512
6	Imperial College A R Society	561	756	65	328	1064

SINGLE OPERATOR FIXED OPEN

Pos	Call	144	Norm	432	Norm	Total
1	G4PIQ	5065	1000	1074	1000	2000*
2	G4WKN	2058	406	350	325	731*
3	G6ZTU	1604	316	246	229	545
4	G8HHI	844	166	366	340	506
5	G1GEY	0	0	311	289	289
7	GM4AFF	488	96	53	49	145
8	GM8MJV	142	28	51	47	75

SINGLE OPERATOR PORTABLE OPEN

Pos	Call	144	Norm	432	Norm	Total
1	GM4ZUK	598	1000	6	1000	2000*

SINGLE OPERATOR FIXED

Pos	Call	144	Norm	432	Norm	Total
1	G1HSK	113	1000	127	1000	2000*

LOW POWER SINGLE OPERATOR

Pos	Call	144	Norm	432	Norm	Total
1	G0MTV	1016	1000	90	900	1900*
2	G0CLP	547	538	100	1000	1538*
3	G4BZP	226	222	4	40	262

FOREIGN STATIONS

Pos	Call	144	Norm	432	Norm	Total
1	DA4RG	0	0	826	1000	1000*

SWL SECTION

Pos	Call	144	Norm	432	Norm	Total
1	28198	226	1000	0	0	1000*

Certificates to those marked*
Place per Band (no certificates).

2 METRES

Pos	Callsign	Pts
1	G8LNC/P	7130
2	GW4TTU/P	5968
3	G4PIQ	5065
4	G6PZT/P	4707
5	G4ERG/P	4229
6	G8TB/P	4035
7	G4RFR/P	3932
8	G8IFT/P	3576
9	G4WKN	2058
10	G6CTU/P	1815
11	G0KEG/P	1759
12	G6ZTU	1604
13	G0MTV/P	1016
14	GW1YBB/P	955
15	G8HHI	844
16	G3KMI	742
17	G4SDD	736
18	G4NOK	696
19	G3LRS	693
20	G3EEO	652
21	GM4ZUK	598
22	G5YC	561
23	G0CLP/P	547
24	GM4AFF	488
25	G4BZP/P	226
26	GM8MJV	142
27	G1HSK	113
28	G4BZP/P	4

70 CENTIMETRES

Pos	Callsign	Pts
1	GW4BVY/P	2097
2	G0RFR/P	1450
3	G8ZHF/P	1157
4	G4HRY/P	1125
5	G4PIQ	1074
6	DA4RG	826
7	G0LNC/P	747
8	G3ZPB/P	473
9	G0KVA/P	470
10	G8HHI	366
11	G4WKN	350
12	G8MNY/P	313
13	G1GEY	311
14	GW1VDF/P	281
15	G6ZTU	246
16	G0LHV	198
17	G6XRS	186
18	G8KGC	175
19	G1HSK	127
20	G8KMI	120
21	G7FDC	103
22	G0CLP/P	100
23	G0MTV/P	90
24	G8EYC	65
25	GM4AFF	53
26	GM8MJV	51
27	GM4ZUK	6

MARCH 1989 70MHZ CUMULATIVES

Yes folks here they are at last, over 2 years late! They were originally produced in May 1989, but unfortunately got lost.

Whilst tidying my office I found my copy of the results hidden amongst the rubbish. They are as follows:

G4DEZ

SECTION F

Pos	Call	Pts	QSO's	Loc	Periods	B DX	Km
1	G3UKV	2972	143	82RR	1,2,5	GM0FRT	482
2	G4APA	2789	128	83TD	2,3,5	G4WEM	273
3	G4ULS	2076	105	82TI	3,4,5	G8PNN	323
4	G4ZTR	1795	62	01LV	2,3,4	EI9FK/P	97
5	G0EHV	1779	38	94FW	2,4,5	G4RFR	464
6	G4EPA	1703	109	92KI	1,2,5	G8PNN	321
7	G4JNT	1539	62	90IV	2,4,5	EI9FK/P	412
8	G4CIZ	1339	80	91KI	2,3,5	EI9FK/P	392
9	GW4HBK	1003	49	81KP	2,3,5	EI9FK/P	261
10	G4BVY	832	74	82TD	1,3,-	G8PNN	346
11	G8DXC	750	34	02DL	1,2,4	G4RFR	246
12	G6CSY	713	42	01BJ	1,2,3	G4APA	258
13	G4OUT	627	38	92AT	2,3,5	G4RFR	227
14	G4SJH	132	16	91SM	1,3,4	G4RFR	133

Disqualified: G3NAQ Rule 2 (late entry).

SECTION O

Pos	Call	Pts	QSO's	Loc	Periods	B DX	Km
1	G4RFR	3000	189	90AS	1,2,3	GM0FRT	699
2	G4BVY/P	2553	163	82LB	2,4,5	GM0FRT	559
3	EI9FK/P	2375	91	63WC	1,4,5	G0BPU	508
4	G3UAX/P	1216	115	91GI	2,4,5	G0EHV	398
5	G7APD/P	1046	106	92LJ	3,4,5	EI9FK/P	351
6	G3ZXX/P	925	95	81UC	1,2,5	GD6ICR/P	475
7	G8EIK/P	669	82	92TC	3,4,5	EI9FK/P	404

23 CENTIMETRE TROPHY CONTEST JUNE 1991

Usual complaints of flat conditions, and lack of activity. The conditions we cannot do anything about, but lack of activity is something that can be changed if only those people with 23cm equipment would come on. Even though most people complained about poor conditions, just take a look at some of the distances; a lot of operators would like to be able to match them on 2m, on a flat band. Congratulations to the Northern Lights yet again and to David, G8OPR, winner of the fixed section, certificates go to the runners up. Just an aside, do you think Bob Harrison of the NorthernLights has taken on the job as Trophies Manager for the RSGB just so that he doesn't have to keep taking the Trophies back to the VHF Convention every year? Welcome to 23 to Barry, G0CFM; he thought that his entry was only worthy of being a checklog, I welcome all entries however many contacts there are.

Bryn Llewellyn. G4DEZ.

OPEN SECTION

Pos	Call	Pts	QSO's	Ant	Pwr	Best DX	Km
1	G4XUM/P	552	43	16X23	250	DK1VC	639
2	G3CKR/P	502	58	184 Array	210		
3	GW4HWA/P	305	45	16X23	200	FF8OU	526
4	G4IEV/P	278	44	1.8m DISH	400	DL2KBB	533
5	G0CFM/P	69	9	55	10	G4XUM/P	450
6	G0GZQ/P	53	7	55	10	G4XUM/P	358

FIXED SECTION

1	G8OPR	194	32	55	130	PA0EZ	479
2	G8TFI	137	21	2m DISH	280	F6CTT/P	417
3	G6HKM	80	12	43	10	G4XUM/P	295
4	G6YTZ	44	6	23	40	G3CKR/P	325

13CM TROPHY CONTEST JUNE 1991

Yet again, complaints of lack of activity and poor conditions. Perhaps I'll have to arrange a contest where the start date and time are advised over the air at the beginning of the next opening! Congratulations to the Three Spires Group, the 1991 Trophy winners. This one you'll have to give back Bob! Commiserations to the runners up, the Northern Lights, who blew up their amplifier (so that's the meaning of air cooled!). Congratulations to G8TFI Chris winner of the fixed section, certificate also to G8OPR the runner up. *Bryn Llewellyn G4DEZ.*

OPEN SECTION

Pos	Call	Pts	QSO's	Ant	Pwr	Best DX	Km
1	G4DSF/P	3811	17	1.8m DISH	25	PA0WMX	485
2	G0EMG/P	3104	12	2.0m DISH	2.5	DC0DA	630
3	G6PHJ/P	1927	14	2.4m DISH	10	G3LQR	246
4	GW4HWA/P	1025	11	1.8m DISH	60	G4DSF/P	221

FIXED SECTION

1	G8TFI	1691	9	1.2m DISH	50	G0EMG/P	323
2	G8OPR	1005	8	25 BEAM	40	G3LQR	231

DIRECTION FINDING

RIPON AND DISTRICT QUALIFYING EVENT

Date: 8 September

Map: 104 (Leeds, Bradford and Harrogate)

Assembly: 1300 for start at 1320

Location: The Stray 200 Acres, NGR 311552

Competitors requiring tea should notify John Hall, 30 Chatsworth Road, Harrogate. Tel: 0423 567390, no later than 1 September.

VHF CONTESTS COMMITTEE MEMBERS WANTED

The VHFCC (VHF Contest Committee) is looking for more members. Prerequisites are a love of bands above 50MHz, contests, work, adjudicating and inspecting entries and sites and more work. We normally meet every 4 to 6 weeks at London House, which is in London WC1, on a Thursday evening between 1830 and 2130hrs.

Here we discuss what we did wrong last time, who we've upset this time, how to ensure bad weather and flat conditions during contests, and to make sure that contests clash with the Cup Final, Wimbledon and anything else of interest, but don't tie up with contests that our neighbours are running on the Continent! Please write to me Bryn Llewellyn, 110 South Avenue, Southend, Essex, SS2 4HU.

The VHFCC would like to hear from hardened contesters, newcomers, and those who think that they might like to try a contest, we want to know what you want from a contest, and how we can get more people interested. Switch off your packet machine and talk to somebody.

I live in an area of high amateur population, the continentals are my near neighbours, but where is everybody? I can call my socks off on 6m 2m 70cm and 23cm but the response is very poor, apart from the sporadic E contacts on 6m. Again write to me, Bryn Llewellyn, G4DEZ.

RSGB VHF CONTESTS CALENDAR - 1991

4 Sep	144MHz CW Cumulatives (Mar 91)
7 Sep	144MHz CW Cumulatives
7/8 Sep	144MHz Trophy/SWL (Mar 91)
15 Sep	3.4-24GHz Summer Cumulatives (Apr 91)
20 Sep	144MHz CW Cumulatives
22 Sep	50MHz CW (Mar 91)
29 Sep	70MHz Trophy/SWL (Mar 91)
5/6 Oct	432MHz-24GHz SWL and IARU (Mar 91)
8 Oct	1.3 & 2.3GHz Cumulatives (Mar 91)
16 Oct	432MHz Cumulatives (Mar 91)
20 Oct	70MHz CW (Mar 91)
23 Oct	144MHz CW Cumulatives
24 Oct	1.3 & 2.3GHz Cumulatives
27 Oct	2nd 1296MHz Fixed/SWL (Mar 91)
1 Nov	432MHz Cumulatives
3 Nov	144MHz RSGB CW (Mar 91)
2/3 Nov	144MHz CW Marconi/RSGB 24 Hour (Mar 91)
8 Nov	144MHz CW Cumulatives
9 Nov	1.3 & 2.3GHz Cumulatives
17 Nov	432MHz Cumulatives
25 Nov	1.3 & 2.3GHz Cumulatives

A full list of 1991 RSGB VHF Contests appears on page 65, December 1990 *RadCom*. Dates of publication of rules in *RadCom* are shown in brackets.

HEATHERLITE COMMUNICATIONS

FOR ALL YOUR RADIO NEEDS

HEATHERLITE MOBILE MICROPHONES

FOR SAFER DRIVING

All mobile microphones complete with control box (PTT, scan option, LED, audio gain control) and plug to suit your rig.

Mobile mic without scan buttons **£26.50**
Mobile mic with scan buttons **£29.50**
Mobile mic with scan and tone buist **£42.50**
for a single earphone/mic add **£5.10**
post and packing **£1.50**

We fit each rig individually, phone your order to get exactly the right rig.

FOR HAND PORTABLES

Our SW range comes with or without an earphone and with a switch box and plugs fitted to suit your portable

SW1 for Icom, Standard, some Alinco
SW2 for older Trio
SW3 for Trio 2400
SW4 for all Yaesu
SW5 for Alinco 203E
SW7 for Icom, IC32, IG2GE
SW8 for Alinco DJ120
SW20 for all latest Kenwood

With earphone **£20.50**
Without earphone **£16.00**
p+p **£1.50**
(NB all Trio/Kenwood must have earphone)

COME AND SEE US AT WOBURN, DERBY AND BOLTON RALLIES

HEATHERLITE HF VALVE AMPLIFIERS Retail inc VAT
HF EXPLORER for 3.5, 7.0, 10.0, 14.0, 18.0, 24.0, 28.0 Mhz 2 x 3-500Z valves **£1,250**
HF HUNTER for 3.5, 7.0, 10.0, 14.0, 18.0, 24.0, 28.0 Mhz 1 x 3-500Z valve **£925**
Add £15 to all amplifiers if carriage is required.

COMMERCIAL VALVE AMPLIFIERS MADE TO SPECIFICATION
SPARES AND COMPONENTS FOR VALVE AMPLIFIERS
Many spares and parts available on request.

AUTHORISED DEALER... KENWOOD... YAESU... ALINCO... R&D... CUSHCRAFT... TONNA HI-MOUND... BENCHER KEYS... MORSE TUTORS and KEYERS... DIAMOND ANTENNAS...

KENWOOD

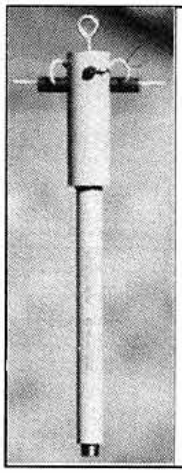
TS950SD Deluxe HF Transceiver with DSP & ATU **£2,995**
TS950S Standard version of TS950SD with ATU **£2,299**
TS850S HF Transceiver with general coverage receiver **£1,325**
TS140S HF Transceiver 160-10M **£880**
AT230 All Band ATU and Power Meter. General Purpose ATU **£213**
TS790E 2M/70cm Base Station Dual Band all mode Transceiver **£1,525**
TS711E 2M Base Station Multimode Transceiver with DCS **£915**
TR751E 2M Multimode mobile/fixed station Transceiver **£610**
TM241E Compact 2M Mobile Transceiver 50/10/5w **£295**
TM441E Compact 70cm mobile Tx/Rx 35/10/5w **£325**
TM702E Compact 2M/70cm mobile transceiver 25w **£455**
TH27E LATEST compact 2M FM Handie **£254**
TH47E LATEST compact 70cm FM Handie **£275**
TH77E LATEST dual band 2M/70cm Handheld **£395**
LOWE HF225 High performance HF monitoring receiver **£429**
ALINCO DR590E Dual Band mobile with remote head **£499**
ALINCO DJ560E Dual Band Portable **£349**
ALINCO DJ-S1 VHF & UHF small handheld—AM Airband available ..... **£TBA**

ALSO IN STOCK... a good range of 7amp, 10amp, 20amp & 30amp Power Supplies, Power/Watt meters, antenna switches, mobile antennas and mounts, HF & VHF base antennas, rotators, plugs, coax, cable. ALSO... HEATHERLITE MOBILE MICROPHONES... HF EXPLORER & HUNTER VALVE AMPLIFIERS. COMMERCIAL AMPLIFIERS TO ORDER UP TO 10Kw.

CALL IN
or try our fast mail order service

PHONE/FAX 0964 550921
HIGH RAVENSTHORPE (The Old Station Yard)
MALTON ROAD, CHERRY BURTON, NORTH HUMBS
Open Mon-Fri 10am-5pm, Sat 9.30am-1pm
OTHER HOURS BY APPOINTMENT

VISA



THE UNIQUE FERRITE SLEEVED
"CHOKE BALUN"

★ This is the most effective broadband current balun (1.7-30 MHz and 30-250 MHz 1:1) that has ever been made available to the Radio Amateur.
★ By stopping completely any current flow down the coax feeder braid (outer) it allows the total current from the transmitter to be passed into the antenna and consequently perfect balance is achieved with zero radiation from the feedline and more importantly no current flow to earth via your equipment. On receive better balance improves the noise level as well.
★ Because it is a coaxial device there are no losses or impedance mismatches due to coils as in normal transformer wound baluns.
★ Two HF models are available, one for a dipole, Inv Vee or Quad and the other is for boom mounting on Yagis, fittings are for 1.5" or 2" booms. Please state which when ordering.
★ Power handling on the HF models is 4 KW @ 30 MHz (1:1 SWR) and 200w on the VHF model. QRO to order.
★ All models are fully encapsulated and carry a 12 month guarantee.

Std model	Yagi model	VHF model
£28.54	**£29.95**	**£16.95**
P&P £1.75	**P&P £2.25**	**P&P £0.90**

Send SAE for full details, or cheque or PO with order.

FERROMAGNETICS
PO BOX 577, MOLD, CLWYD CH7 1AH.

SUNDAY SEPTEMBER 29th at 10.30am

33rd HARLOW RALLY

Harlow Sportcentre
Hammarskjold Road, Harlow, Essex

EVEN LARGER WITH THIRD HALL

Giant Bring & Buy
Ample FREE Parking
★ Licensed Bar & Refreshments
★ Special Interest Groups

ACCESS: M11 (Junction 7) Harlow A414
Talk-in:S22 & SU22 Call G6UT

DETAILS: Harlow (0279) 418392 (day)
(0279) 722569 (evening and weekends)

EAST OF ENGLAND RALLY

PETERBOROUGH RADIO AND ELECTRONICS SOCIETY

SUNDAY 15th SEPT

EAST OF ENGLAND SHOWGROUND
OUNDLE ROAD, PETERBOROUGH
Doors Open: 10.30 am

★ Superb location — adjacent the A1 ★
★ Modern hall and marquee ★
★ Radio car boot and flea market ★
★ Local and national events on showground ★
★ Nene Park and Steam Railway ★
★ Great day out for all the family ★

MIKE BOWTHORPE G0CVZ, 2 CHANCERY LANE, EYE, PETERBOROUGH
0733-222588 or NIGEL 0733-78685

PHOTO ACOUSTICS LTD

58 High Street, Newport Pagnell, Bucks. MK16 8AQ.

Telephone: 0908 610625
FAX: 0908 216373

TS-850S Greatness Reasserted

Once again Kenwood stamp their authority on the HF transceiver market with the introduction of the latest in their ever popular "8" series transceivers, the TS-850S.
Designed to fit the market between the TS-440S and the TS-950S, the TS-850S is another landmark in top performance transceivers for the operator who knows what he wants and can appreciate the real performance advantages which come from owning Kenwood equipment.
In a major new transceiver, there are so many features and subtle details of operating convenience that it is quite impossible to describe them in a few words. Suffice to say that 1Hz tuning rates from an advanced DDS driven synthesiser, and a +24dBm intercept point will give you a flavour of receiver performance, whilst a transmit output power of 120W and an optional Digital Signalling Processor (DSP) will put you in top place on the bands.
New Product information sheets are available on request, and of course the TS-850S will be on show. We are happy to talk about and demonstrate why we sincerely believe that the TS-850S will satisfy your operating needs; whether these are keeping in touch with friends on 80 or chasing some rare DX on 20.
The TS-850S; Kenwood have taken you another step forward. See it soon.

TS-850S . . . £1,325.00 inc VAT

KENWOOD

TH-77E DUAL BANDER

- ★ World's smallest package for 2M/ 70cm dual bander
- ★ 5W & hi-low power output
- ★ Dual scan-dual VFO's
- ★ Built in DTSS and pager function
- ★ Larger dual displays
- ★ 40 multi-function memories

TH-77E £395.00
Full range of accessories for all models
P&P £5.00

AUTHORISED AGENTS FOR KENWOOD. ICOM. YAESU & STANDARD. FULL SERVICE FACILITIES AVAILABLE
SPEND UP TO £1,200 INSTANTLY WITH A PHOTO ACOUSTICS LTD. CREDIT CHARGE CARD — APPLY FOR DETAILS
PART EXCHANGE WELCOME. ASK FOR KERRY G6IZF OR ANDY G4YOW
RETAIL SHOWROOM OPEN MONDAY-FRIDAY 9.30-5.30. SATURDAY 9.30-4.30
Goods normally despatched within 24 hours. Please allow 7 banking days for cheque clearance. Prices correct at time of going to press — E&OE

VISA MasterCard

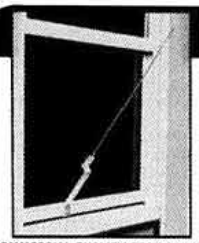
B. BAMBER ELECTRONICS

Ex PMR Equipment

PYE WESTMINSTERS W15AM Low Band & High Band	£20
PYE MOTOPHONES MF5AM Low Band	£15
PYE EUROPAS MF5U, UHF	£35
PYE EUROPAS MF5FM High Band & Mid Band	£35
PYE OLYMPICS M201 AM Low Band	£35
PYE REPORTERS MF6AM High Band & Low Band	£65
PYE PAGERS PG1FM High Band	£20
PYE M294 FM High Band & Low Band	£160
PYE M293 AM High Band & Low Band	£140
PYE M296 UHF U Band	£120
PYE M295 Band 111	£100
PYE BASE STATION F496 UHF 24 volt	£250
PYE POWER UNIT Type AC200	£100
PYE CONTROLLER Type PC1	£50
PYE CONTROLLER Type M81	£190
PYE BASE STATION Type F9U, UHF	£45
PYE BASE STATION Receiver Type R414, UHF	£45
PYE BASE STATION Transmitter Type T414 UHF	£45

All equipment is less Mikes Speakers Crystals etc.
All Prices Exclude Carriage and VAT.
WANTED EX PYE PMR EQUIPMENT
Callers by appointment only

VISA
5 STATION ROAD, LITTLEPORT, CAMBS CB6 1QE
PHONE: ELY (0353) 860185



PORTABLE ANTENNA

FROM BARKER AND WILLIAMSON INC
MODEL APIO **£81.50** inc. VAT + £3.50 p+p
Designed for Apartments — Motels — Vacations
Quick Simple Installation. Operates on 70cms, 2, 6, 10, 15, 20, 30 and 40 metres. All coils supplied. Folds to only 22½ inches long. Weighs less than 2lbs. Supplied with 10ft. RG 58 coax and counter poise. Stainless steel whip extends to 57 inches. Handles up to 300 watts. VSWR — 1.1:1 when tuned.

COMMERCIAL QUALITY COAX SWITCHES as supplied to the BBC. Portable and permanent aerials — HF + 2m + 6m filters. Linear amplifier plate and filament chokes.

THE WORLD FAMOUS B&W AIR WOUND INDUCTOR STOCK and much much more in the B&W catalogue. Send 50p to the appointed UK distributor for your copy.

RF ENGINEERING LTD
Main Street, Coln-St-Aldwyns, Cirencester, Glos GL7 5AN
Tel: 0285 75665 Fax 0285 75657

Our stockists include Waters & Stanton, Dee-Comm, Photo-Acoustics, Pro-Comm UK, Lee Electronics

ACCESS VISA

PC KITS and PC Bits

SOME EXAMPLES of Kits:-

10 MHz XT - 199.00	12 MHz AT - 550.00	25MHz 486 - 2185.00
Single floppy, No Display	20Mb, MGA	40Mb, VGA Colour

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

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

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

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. BRS & A 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

3.8 TO 7.6Hz signal generator (untested): £50. Valves all £1 ea: 807, PL519, ECC81, EB91, EL32, 305 baretter and many others - please enquire. New rotator cable, 6-core substantial construction and quality 100 metres: £35, 55 metres: £20. Ex-IBA 4-ch TV Tx, tunable UHF range, full manuals, silly price only £100. 4 teachests of junk (but useful!!): £50. New CRTS: £3. (Birmingham) 021-472 3688.

6-MONTH let available from September of farmhouse on the Isle of Anglesey complete with shack and towers. Excellent for DX. (Amlwch) 0407 830282

70cm clearout. K2RIW Prof metalwork 2x8930 requires wiring. MML432/100 linear: £200. Marconi TF1152 power meter: £60. 4way Tonna Splitter: £25. KR500 elevation rotator: £100. Various preamps from £25. Wideband preamp BBBA500V: £30. Peter G3SMT (Manchester) 061-439 6746.

AMSTRAD Laptop computer. ALT286 16MHz 80286, 20MB hard disk. Full 4MB RAM, Superb VGA Graphics. 1.4MB floppy drive, 2 serial, one parallel port. Reluctant sale £750. Also tiny compaq LTE286 20MB hard disk, carry case, etc: .£1050. (W London) 081 567 8909.

AMSTRAD PC1640DD, mono display complete with instruction mans DMP3000 printer Wordstar Supercalc Accountmaster, all in orig bxs, all in vgwo. Bargain at only £400. G0NBB QTHR (Canterbury) 0227 738248.

COLLINS S-line: 75S-3B; 32S-3 (with Dx-Engineering processor); 516F-2 PSU. Unmarked and all manuals: £550. SB220 2x3-500Z linear: £425. Phone for explanation of low price. Buyers collect. (Lichfield) 0543-672762.

COMMODORE 128D computer with 1900 monitor, as new: £300. AEA PK64 TNC Packet Amtor RTTY CW, perfect: £150. Both £400. CapCo SPC3000D ATU only used 2 months, cost £360 accept £250. Buyer inspects collects or pays carr. No boxes. GW4TUL (Cwmbran) 0633 871378.

COMMODORE CBM64C Computer, 2 cassettes, mouse, s/ware, joysticks, paddles, games included, vgc: £150. ERA MicroReader Mk2: £100. Pair CTVR40 40 channel radio telephones, FM easy conversion 50MHz, with mics: £100 Pentagon camera lens, 4/30mm, heavy tripod bracket: £100. Wanted PRO 2004 scanner , 934MHz Delta 1. Ian G7HXI. (Stalham) 0692 580201(day) 0692 581663(eve).

COMPLETE HF station in excellent condition. Little use. DRAKE TR7A (Late Model), DRAKE L-7 42KW linear both with Drake power supplies, MN2700 ATU, Shure 526 desk mic, Drake 2kw dummy load. All manuals. No splits, Total price £1,795 - Also superb tektronix digital oscilloscope model 222, List price over £2000. Mint condition £800 (see R.S. catalogue) Ultra-Portable. Ray, G3PCN (Pinner) 081 866 3300.

FT102 SSB narrow filter, CW, AM/FM board, mic: £475ono. Clive G4OMG QTHR (Nr Bath) 0761 72431.

FTDX150. Ideal first HF rig, 80-10m bands. SSB/CW, 150W PEP, incl mic, spkr, PSU, gwo: £160. G0FGS (Gloucester) 0452 528758.

COMPLETE 2m station comprising AMR1000 Navico 5W/25W FM plus Jaybeam Qw/2M antenna plus WA1 wavemeter plus 5/8 whip. Little used. Boxes & mans, ex cond: £225 the complete station. Mike G4XXY QTHR (Ashington) 0670 812028.

IC720AZ h/d PSU IC-AT-500 for £625 + carr. GM0EWF (Bathgate) 0506 55740.

ICOM 701 HF tcvr with PSU: £400. BARTG STSMC RTTY modem: £40.00. Philips monitor 80 (green): £40. Novex amber monitor (non worker): £20. Shibaden CCTV camera HV-40SK: £30. Printer stands 2 pairs: £2.00. Commodore CBM64 joystick: £5. Icom IC251E with base mic: £400. Philip G1LKJ QTHR (Croydon) 081-667 9585.

ICOM IC251E 2m m/mode with Mutek & mic: £420. Icom IC451E 70cm m/mode & mic: £400. Icom IC551 6m m/mode (no FM): £400. Yaesu FT290R1 2m m/mode Mutek helical .25-wave nicads case m-mount spkr/mic + Alinco ELH230E 20W linear: £320. Yaesu FT690R1 6m m/mode nicads m-mount spkr/mic + Nevada TC50DX 10W linear: £300. Microwave modules 144/23cm xverter Gasfet type: £150. (Ashtead) 0372 277945.

JAYBEAM tribander, half price, 2 yrs old: £200. Yaesu FT690II: £300. Linear (FT690): £65. Kenwood TM411, 25W 70cm mobile: £160. G3MSW QTHR (Harpenden) 0582 715549.

KENWOOD 721E 144/430MHz FM dual band: £300. Kenwood 75E 144/430MHz FM dual band hand held: £250. G4WFS (Tyneside) 091-415 3687.

KENWOOD TR751E bought April'91 £500. RN Electronics 50/144 MHZ transverter £120. BBC master compact + Green monitor £210. All ono G1TAI QTHR (evenings) (Towcester) 0604 864249

KENWOOD TS530S with CW filter, hand mic, orig packing: £475. Trio R600 gen cov Rx, ex cond: £175. G0JBR (Gtr Manchester) 0942 675765.

KENWOOD TS940S auto ATU 2x500Hz CW filters, AM filter, voice, mic, manuals, bxs, ex cond: £1400. GW4RLP QTHR (Caernarfon) 0286 5264.

MMT 144/28 tnsvtr, serviced by Microwave Modules and unused since, vgc: £70. G0GYX QTHR (Bognor Regis) 0243 821131 (after 6pm).

MODERN HF starter station FT747 with FM board FC757AT auto aerial tuner 25A power supply and hand mic, very clean, bxd. An ideal starter station or HF mobile: £700. G0MWO QTHR 081-206 0327, mobile 0831 491 564.

ONE 40ft and one 30ft Western ALU-mast towers in 10ft sections. Excellent condition £200 and £150 respectively ono G3FEV QTHR (Rossendale) 061 764 8845.

PACKET RADIO VHF modem cabled for handies and Baycom program (Dipicom for PC with no TNC), German manual: £50. I5XWW Crispino Messina, Via di Porto 10, 50058 Signa F1, Italy.

KENWOOD TS680S C/W PS-430 and SP-430 spkr: £800. Mutek TVVF144A 2m tnsvtr: £250. All above items in as new cond. Sharp MZ-80K computer, offers? Jaybeam 4Y/6m beam: £30. Jaybeam MBM48/70 beam: £30. G0OUS not QTHR (Reading) 0734 589803.

PYE A200 amplifier, would suit 4m/6m: £30. HF mobile amplifier 80-10m 10W drive for 100+W out Rx preamp: £60. Yaesu NC-29 desk top chrgr: £40. Yaesu bttries FNB22 (same as FNB12) 5W-12V packs suit FT23R FT470: £25 each or two for £40. BSX tnc bxd: £50. Jaybeam TB2 2-ele Yagi: £80. Jaybeam 18-ele Yagi for 70cm: £25. (Kilsyth) 0236 824167.

SMARTUNER computerised ATU the one PW used March issue, Ideal for long wire antenna. ETC. See current price G0OOB £195 ono. (Norfolk) 0493 751084.

TEN-TEC Corsair II with mic, all SSB/CW filters installed with Ten-Tec matching power supply model 960, h/book, mint cond, as new, bxd, receipts available: £899. Matching (Rare) remote VFO236G: £195. Matching 2KW ATU Ten-Tec model 4229 with internal balun installed: £220, mint cond, bxd. Marconi Apollo gen cov Rx with complete set Shipbourne Sparks h/book, twin VFO.'s 15KHz 28MHz: £350ono. G0AQL (Chippenham) 0249 655379.

TEN-TEC Titan 425E linear amp, mint cond, less than 2 yrs old, bxd and in mint cond, less than four hours use, genuine reason for sale: £1500ono. Butternut vertical HF5/V five bands: £95. 10-el crossed Yagi Jaybeam with circular phasing harness: £25. Icom 260E 2m m/mode: £170, h/book, bxd. Butternut 20m conversion kit for HF2V: £15. G0AQL (Chippenham) 0249 441686 (W). 0249 655379 (H).

TRIO TS520 SSB trans. Trio TV502 2m trans. Kenwood AT200 A/tuner. Kenwood SP520 loudspkr. Operating mans, spare o/p valves. Mic. CW filter. All vgc: £410. G1YFK (Stevenage) 0438 359427.

TS440S. Gen cov HF TX and RX. Includes PSU, automatic auto, narrow SSB and cw filters, immac: £850. Amstrad PPC IBM compatible mains/battery computer, 640K RAM. Co-processor colour monitor, useful software. Panasonic dot matrix printer. Complete system: £375. G3UGK. (Bournemouth) 0202 525740.

TS930S and CBM-64, AMT-2 complete for Amtor RTTY ASCII CW rig: £1000. Computer: £160. GM0EWF (Bathgate) 0506 55740.

TS930S plus internal ATU 500Hz filters as new: £1100. FL2100Z Amp, mint: £480. FT101ZD plus fan DC/DC filter, mint: £350. All items carr extra. G3RCU (Christchurch) 0202 475048 (after 6pm).

YAESU FT ONE gen cov tcvr, all mode 1.6-30MHz Tx/Rx. All filters fitted. AM/FM and memory boards. Service manual and orig box, including Shure 444 mic, suitable marine use, vgc: £925ono. G4IVB QTHR (Hull) 0482 811157.

YAESU FT707 HFTX RX. FP707 PU/spkr. FV707 digital VFO. FC707 ATU. YM35 mic. Hd/books, little use: £300. RON G0FGN (Bristol) 0272 276953.

132FT long wire possible! QTH 3-bed semi, cnsvtry, long gdn, urban setting, fertile soil, rotovator, gge, sea! G3DGT not QTHR (Portchester) 083483 369.

70CM 17-ele antennas: £10 ea. 4-way stacking frame and phase splitter. 75Ω UR67 type coax 25p p.m. 4 core rotator control cable. (Ely) 0353 741354.

800 Transistors 60 valves lists available: £15. J.Beam 6-el 2m Yagi, unused: £10. All plus carr. (Morden, Surrey) 081-540 2713.

ALTRON AQ6 mini-beam, 3-ele, 6,10,15,20m, ideal small garden: £100. Buyer collects. Eric G0DRG QTHR (Southampton) 0703 666133.

AMSTRAD 1640 ECG computer, double disk floppies 5.25: £500. G3DKO QTHR (Nr Kings Lynn) 0760 23897.

AMSTRAD PC1512 dual 5.25 + 40MB HD + NEC V30 + SW mono: £400ono. Steve G0KIO not QTHR (Leeds) 0532 747432.

AMSTRAD PC1640 computer dual drive ECD includes lococript, star, LC 200 printer colour. Under guarantee till November, sold as complete package: £695ono. Buyer must collect. (Bolton) 0204 50264.

ANTENNA tower 45ft plus. Tilt-over with ground post. Top bearing included: £220. G3NDC QTHR (Nth London) 081-954 1309.

ANTIQUE collectors choice item. Very early transistor, type GET 1 made by GEC, virgin cond, highest offer secures. GW3GWX QTHR (Llandudno) 0492 875172.

AOR 2002 VHF/UHF scanner receiver, 0-1300MHz, Mobile Bracket, Car adaptor, also aircastle scanning computer for above multiple logging facilities VOX record, offset, printer functions plus much more complete with RS 232 interface for spectrum computer. All hardware, software, complete monitoring station. Ready to go all items as new with manuals etc. Valued at £632 - Bargain at £450, Could deliver. (Worcestershire) 0386 443943.

AR1000 Hand held scanner, as new, with V1300 sky scan antenna, 30m low loss cable: £200. G6JOI. (Henfield) 0403 711639 anytime.

ATARI STFM510 Computer. 1MB internal RAM IMB Internal drive plus Ham software etc. All manuals: £165 Upgrading reasons. G3GZQ QTHR. (Buckfastleigh) 0364 43608.

ATU SEM Tranzmatch with Ezitune rated 1KW: £60ovno. Also G2DYM 8-trap multiband dipole rated 1KW: £60ovno. (Doncaster) 0302 841011.

AURORA. Don't miss the repeat event. 27 day calendar, A3 size, 2 year period. State start date. £1.25. G3TGL QTHR. (Birmingham) 021 458 3458.

BBC boxed as new single disc drive, books, games: £190 No offers. 2m FM good working cond. 5/2w: £75. (Ipswich) 0473 727440.

BBC-B computer fitted with VIGLEN Eprom socket and TTPL Rom/Ram expansion board. Roms installed include RTTY AMPROM DiscDoctor AD1 DSS,NET DAF Wordaid Spellcheck. Dual disk drive 40T SS (internal power supply). Tape cassette. PRISM modem, joysticks,light pen, loads of disks, tapes, games, utilities. Plus many manuals and magazines: £250ono Dave (London) 081 857 4062

BBCB Computer, with Acorn DFS and dual disk drives, solidisk 128K memory/Eprom expansion bd, 13in colour monitor, many books, disks and leads: £395ono. Belcom 2m h/held with spkr/mic and chrgr FM Simplex only hence: £75ono. Doug G1BWW QTHR (Hitchin) 0462 711722.

BEAM 4ELE dual band (50/70MHz) High quality construction (USA): £60. 26 ELE circular 23cm JVL N-feed: £15. Buyer collects. Kev G4BUW QTHR. (Bracknell) 0344 862874.

BENCHER ST1 paddle, black, bxd, as new: £50. G4ZPY single lever paddle, as new, bxd: £40. CW filter XF8.9HC 600Hz for FT101Z

FT901: £20. Hi-Mound Iambic paddle: £12. Collect or post extra. G2FDF QTHR (Oswestry) 0691 658422.

BUTTERNUT HF5B compact beam, unused: £175. Wanted Cushcraft R3 or R5 vertical. Andy (Bracknell) 0344 428369.

CLARK scam heavy duty 40ft telescopic pneumatic mast retracted 7ft 8in: £120. Bought from Anchor and never used. Buyer must collect or arrange transport. GM0FSW QTHR 0382 815173.

COLLINS "S Line" pristine specimen 75S3B 32S3 516F2PV new tubes all leads manuals restricted space forces sale: £800ono. Insured courier delivery. VHER professional portable stereo recorder model CR210 leather carrying case, service manuals, superb collectors item, ex cond: £225ono. (Kirkby-in-Furness) 0229 89635.

COMMODORE C128D lots of software including Geos, digicom. vgc: £350. Peter G0KUX.

COMMODORE 64 with Brother HR5C printer, 1541 diskdrive, Lots of software including many radio programs. All vgc: £200 the lot. Will not split. Peter QTHR G0KUX. 081 882 2351.

COMPLETE clean vol's RadCom 1975-1990: Single vol's £15 or £65 the lot. Plus P&P G4BLG QTHR. (S E London).

CREED 444 plus 45/50Bd gears, ST5 main board and service man: £30. RX400 telefax machine, unmodified with almost 100 shts paper: £15. Case valve tnsfrmr blower etc for VHF 6/40 amplifier, circuit in RSGB VHF/UHF manual: £15. Offers considered. G8NDN QTHR (S'hampton) 0703 872138.

CUSHCRAFT A3 Beam 20, 15, 10m. Ready to collect. Assembly and installation instructions complete: £150. Any evening.(Maidstone) 0622 670936.

DATONG AD370 Active antenna, never used outdoors: £49. DATONG woodpecker blanker: £45. Both like new, complete with instructions and PSU's. (Cardiff) 0222 465 463.

DEWSBURY Morse tutor £50 DRAE Power supply 6amps: £25. Contact G0PDF (Kinver) 0384 877726.

DRAGON 32 fitted RS232 G4BMK software for AMTOR, Packet, RTTY, CW plus assrtd other s/ware. Terminal unit for AMTOR, CW and RTTY: £70ono. Tim Stanley G4TXK (Leeds) 0532 873628 (after 6pm).

DRAKE TR7 tranceiver, PS7 PSU, RV7 VFO, MS7 speaker, microphone, filter boards, full set manuals, vgc. Fully operational plus 10m whip. New baby forces sale!: £550 ono. (Aylesbury) 0296 661386. G4JLV.

DRAKE TR7A, with drake power supply, Drake L-7 2KW Linear with PSU. Shure 526 desk mic. Drake MN2700 antenna tuning unit complete with all manuals, little use, ex condition. Sell as complete station:. £1,500 Ray G3PCN. (Pinner) 081 866 3300.

EDDYSTONE S740 with orig 'S' meter, ex cond: £70. Clark pump-up mast (short): £15. G4RWL (Carlisle) 0228 513227.

EIGHT 21-EZ Tonnas, computer optimized 4-EL 50MHz YAG1. Silly prices to serious DXers! DEC VT100 Terminal, £15 (collect). G3SEK, QTHR. (Abingdon) 0235 531559.

EPSON HX-20 portable computer including expansion unit: offers. GM4CXM QTHR. (Bearsden) 041 942 6657.

FL 2100Z 9 bands vgc: £450. Jaybeam 48 element 70cm nearly new: £30. 2m 6 element QUAD nearly new: £30. (Bristol) 0272 642867.

FLDX400 Tx, used daily, numerous spare valves, one owner, no mods, orig packing: £80. G3KAA QTHR (Luton) 0582 508370 (eves).

FT101B, perfect cond, plus all accessories: £225. PWR meter: £40. Junior trap dipole: £40 or £280 the lot including Morse key coax (50 yds) etc complete HF set up, genuine sale going QRT. (Sidcup) 081 309 1295.

FT101ZD fan, mic spkr: £350. Welz AC-38M tuner: £40. Welz SP-15M SWR/PWR: £30. Motorola 12V supply: £25. Transtel Comscribe printer: £20. Kent brass straight key: £20. Spectrum 48K leads: £20. (Nr Holyhead) 0407 860764.

FT101ZD Mark3, Fan, mic, 300Hz CW filter, WARC. Full workshop manual, 2 new spare 6146B plus Yaesu FTV250 144-146MHz Transverter purpose built for FT101 series. Two meter and HF station at turn of one switch: £425 or will split. Datong UC1 converts FT101ZD to general coverage all mode receiver: £75. A.E.A MM1 Morsematic keyer and trainer: £50. K9CW contest keyer: £50. Super CMOS ACS keyer: £50. G3BEX (Bucks) 0494 675 097.

FT101ZD mic fan CW filter DC-DC cnvtr FV101B Ext VFO and matching spkr all cables and manuals spare driver and PA valves. Buyer collects: £500. John G2FNK QTHR (Dorchester) 0305 889 608.

FT221R 2m m/mode VFO + xtals: £300. SEM Sentinel 2m 50W: £50. MMT144/432R tnsvtr: £120. 432/19ele Tonna: £25. Telequipment 551A oscilloscope: £50. Adonis MM-204H headband mic: £10. Seavoice RT100 Marine xtal: £100. Xitex MRS100 Morse reader: £Offers. 24V Marine w//t + info: £15. (Upminster) 04022 27059.

FT107M 160/80/40/20/15/10m AM/SSB/FM narrow CW, FP107E 12v-20A PSU/spkr; FC107 ATU all bands/ Longwire; Complete HF station mobile/base: £675. Dave G4NIP QTHR. (Reading) 0734 733626.

FT290 Mutek board, nicads, chrgr, leather case, bxd, manual, mint: £250. Standard C7800 UHF, mint, bxd, manual: £160. FV101DM VFO: £150. UHF Westminster 8 chnnls, packet frequency: £40. FC757AT auto ATU, mint, bxd, manual: £230. Uniden BC760XLJ scanner, 2 months old, bxd, mint, manual: £155. ERA microreader Mk2, mint: £100. FC902 ATU, mint: £150. Frequency counter to fit FT101 etc: £45. G0NMP (Dereham) 0362 691099.

FT290R m/mode TCVR, Nicads,CHGR, cases etc. Mint, boxed: £265. BNOS ANP LP144-3-50, mint boxed: £85. 2xVHF rotators: £20 each. 9ele Tonna: £20. 9ele XY Tonna: £30. Paul G0KPH QTHR. (Nr Warwick) 0926 429719.

FT290R nicads, chrgr, case, colinear vertical, HB9CV beam, vgc: £200. Zenit 35mm camera: £25. GW0FPY, 4 Bryn Deiniol, Valley Road, Llanfairfechan, Gwynedd, LL33 0SR.

FT290RI soft case + strap + rubber duck + manual + charger: £200. Robert GM1MWK QTHR. (Kirkwall, Orkney) 0856 4179.

FT480 2mt Multimode with mobile bracket: £220ono. Trio TR2200GX 12 channel 2mt FM: £50ono. G0JCN QTHR. (Telford) 0952 616166.

FT707, gwo: £299. Datong Morse Tutor: £30. Surplus to needs. Buyer inspects, collects. John GM0OGR (Glasgow) 041 883 2253 (day) 0659 74426 (eve).

FT730R 70cm + FP80 PSU: £100. PK88 + BBC ROM & cables: £70. Adonis AM308 desk mic: £30. Bencher paddle key: £25. L/W rotator: £25. HiMound straight key: £10. G0MTC (Northampton) 0604 415874.

FT757 HF All band, gen coverage RX, all modes. plus PSU and mic: £600 ring Keith (nights or weekends) (W Midlands) 0543 686516.

FT757GX HF tcvr, vgc, mic, manuals, boxes: £495. (Biggleswade) 0767 318882

FT757GX2 vgc with scanning mic, all with orig packing: £700. No offers. Andy G0NMI (Preston) 0772 774650.

FT767GX ALL modifications made perfect condition. Selling to make room for new equipment: £975. (Wadhurst) 0580 200542.

FT790R, complete, boxed: bargain at £170. Fairmate HP200E 0.5-1300MHz mint, boxed: £195. (Huddersfield) 0484 603963.

FTV 901R with 2m 6m 70cm modules: offers above £150. Will swop for 2m base station FTV 480R or similar. (Rugeley) 0889 584983.

HAMMOND X5 with 760 Leslie cabinet: £395.(Aylesbury) 0296 614128.

HEATHKIT HW101 tranceiver with power supply. GWO spares and manual: £150ono. Gordon G8AKB QTHR. (Wokingham) 0344 779135.

HEATHKIT HW9 WARC bands nicely built: £180. KW 204 SSB/CW TX GWO Mic. Spare valves: £80. Dewsbury star masterkey II: £35. Eddystone S640, gwo, H/book: £25. TET 20-15-10m vertical c/w loaded radials: £35. Alan G0KMC (Aylesbury) 0296 29342 Eves/weekends.

HEATHKIT SB104A HF CW?SSB TXCR, solid state, digital frequency display: £250. Eddystone 840: £35, also 19 set. G4DXO QTHR. (Hove) 0273 561616.

HF 6VX Butternut vertical ground and 12/17m attachments included. Mint cond: £140. Addonis AM 802 compressor desk mike £25. G4NQL. (Doncaster) 0302 782616.

HIGH power linear components. Rollercoaster, two variable capacitors, 2x813 heater transformer: £100 the lot. G3JFC (New Ash Green) 0472 872743.

HQ1 mini-beam salvaged parts available. Albert G4PYQ (Manchester) 061-366 0927.

HRO-M Rx, PSU, 5 coils: £45. Pye marine Tx/Rx: £45. KW2000B, mains PSU, VFO 4B, needs attn: £150. Daisywheel printer, needs attn: £15. Marconi 535 radiogram 1933: £175. Wanted 19/22 set bits; vehicle mounting base, headset/mic, spare rubber 5 pin snatch plugs and leads, remote control unit WHY. Chris G4RBR QTHR (Twickenham) 081-891 1263.

HW1100 tcvr complete, gwo, with Datong FL1 audio filter: £125ono. FT290R: £225. Buyer collects inspects. G4ZIY QTHR (Portland, Dorset) 0305 823898.

HYGAIN 18AVT/WB vertical antenna in good cond with manual. Hi-Mound HK.804 de-luxe solid brass Morse key. G3UQZ QTHR. (Birmingham) 021 373 8806.

IBM software available due to change to new products, All as new in orig packing. Quattro pro 2: £55. Wordstar 6: £50. Procomm 2 brand new unopened: £45. All plus £3 postage including C.O.D. Peter Crosland, G6JNS. (Worcester) 0905 620041.

ICOM 290D 144MHz all mode 25W: £325. G3CSE QTHR (Welwyn GC) 0707 328831.

ICOM 3200E Dual band: £250. KenRotor KR400: £60. SMC FU200: £60. All vgc, some cable with rotators. G1AAM QTHR. (Hove) 0273 727800.

ICOM 3200E dual band mobile. Up/down mic with tone burst. Mobile mount. Super condx, bxd, manual: £290. G4PHC. QTHR (Minehead) 0643 706936.

ICOM 720A gen cov Rx/Tx, PS20 supply, SM5 desk mic, SP7: £550. Icom 271E SM6 mic plus Icom supply: £450. All equipment immac cond with manuals and boxes, possible Part X complete station for Volkswagen Caravanette. Wanted Uniden 2830. Dave (Walsall) 0922 414796.

ICOM IC245E 2M Multimode: £210. MM 2m/70cm tnsvtr: £70. J-Beam 18 element parabeam: £10. Buyer collects. (Portsmouth) 0705 751585.

ICOM IC24ET dual band h/h low/high power. Receives tunes to over 1.3 GHz original packing: £220. Dave G4CGZ QTHR. (London) 081 677 9309.

ICOM IC47IE 70cms. M/mode base station 32 memories 25W output. Complete with 19-ele Tonna crossed antenna rotator and 10amp power supply: £425 the lot. Realistic PRO2005 scanner, 400 memories: £195. Both rigs bxd and perfect, as new. Buyer collects G0DGV QTHR. (Walsall) 0922 493994

ICOM ICR7000 VHF UHF RX 25-2000MHz, New price £1000 mint condition: £650. Portable Barograph: £250. G3VXZ QTHR. (Maidenhead) 0628 27350 or 045383 5510.

ICOM Micro 2E and 4E, 6 bttry packs, DC cnvrtr base charger, 2 wall charger spkr mic: £300 G0DGB QTHR. (Durham) 091 384 7306.

ICS Comm - Pakratt cartridge for C64 and PK232 enabling packet radio etc without s/ware: £35. PC - Pakratt 5.25 disks and C64/128 PK232 driver 5.25 disk: £5 each. (Ashtead) 0372 277945.

JAYBEAM Parabeam 144-146MHz six months old: £50. Yaesu SP102 spkr, reasonable offers. Both in ex cond. G7GCS (Kidderminster) 0562 68792.

JOHNSON KW match box: £200. Watkins Johnson signal monitor SM8512-6: £150. G3GBB. (Nr Bury St Edmonds) 0379 783657.

KANTRONICS KPC4 TNC: £175. Kenwood TR7625 2m tcvr: £115. Yaesu G400 rotator: £100. Altron SM30 mast: £295. DRAE 24amp PSU: £80. (Nailsworth) 0453 833411.

KENWOOD 440S auto ATU sideband filter, mobile bracket, spare power lead. manual and box very good condx: £825ono.

KENWOOD 751E 2m multimode, one month old, showroom condx: £450ono. After 6pm please. (Manchester) 061 330 8584.

KENWOOD TH215E H/Held 2m tranceiver, nearly new: £170. RASCAL RA17P Rx: £100. (Stevenage) 0438 813345.

KENWOOD TM701E 2/70 dual band 25W mobile, bxd, as new: £360. Malcolm G3TCG QTHR (Maidstone) 0622 813474.

KENWOOD TR9000 2m M/Mode TCVR complete station. PS20 PSU sp120 spkr BO9 base: £350. Microvave Modules 100/10 linear £80. SMC 2m 7/8 whip and gutter/mag mount £20 pw speech processor: £15. G6BTB (Oxford) 0865 250416.

KENWOOD TS-790E all-mode triband tcvr, 2m and 70cm, little used and mint cond: £1050. Matching PS31 power supply: £120. (Woking) 04867 4732.

KENWOOD TS440S: £750. Also Kenwood TS680S: £700, with manuals mics & boxes. G0EHQ QTHR. (Bromsgrove) 79636.

KENWOOD TS711E 2m m/mode base station, little used, mint cond: £625ovno. Boxed, buyers inspect and collect. Alan G4XTZ (Slough) 0753 574463 after 6.30pm wkdays, after 1.30pm wkends.

KENWOOD YG455cn 250Hz filter use in TS1405 TS9405 TS8505: £50. John, G4ECI QTHR (Stockport) 061 439 3831

KENWOOD-TRIO TX/RX line up consisting of TS180s tranceiver, VFO180, SP180, PS30. All excellent working order: £750 (£600 without PSU) G4HBU QTHR. Sony PRO-80 scanner hand held Rx L.W Thro'airbands with SSB cost £290 new, now £170. Commodore "Amiga" users make music with yamaha keyboard music-X software, midi interface, Bargain at £155 for all three - practically unused. G4HBU QTHR (Bristol) 0272 611093

KW1000 Linear amp. £300. KW107 ATU £75. Both immac condx: £350 the pair. Semco selectro 144 MHz m/mode, hand made in Germany: £75. Yaesu FT726R with all bands and satellite modules: £750. Versatower P60 with unused post and headunit: £500. (Cobham) 0932 863552.

KW2000B AC PSU mic, very good condition. Ideal first radio 100W: £220ono G0JIB QTHR. (Liverpool) 051 548 0452.

KW202 Rx KW 204 Tx, works well for me, mans: £210. FTDX 500 6KD 6's in PA Rx, lively Tx needs attn on 10 15 drive low: £110. Daytime collection please, or dely local 20 miles. Mick (Farnborough) 0252 518009.

LINNET modem V21/23 unused: £60. Spectrum tnsvrtr 6-10m 2-10m: £25 each. Micro modules tnsvtr MMT144 2-10m: £75. Howes 20m-2m tnsvtr: £25. G3LLL's FT101 FM discriminator: £15. FT221R mic amp bd: £15. Complete FT221R service manual photocopy: £2. G3ZIG QTHR (Dereham) 036288 430.

LOWE HF-225 general coverage receiver with FM/AM option fitted: £350. John G7JHX. (London) 081 740 7923 (eves).

LOWE HF225 keypad, Active whip, £325. FRG9600 scanner 60-950MHz: £350 includes GAREX pre-amp. Both receivers orig pack, manuals. as new. (York) 0904 658928.

MAG Mount, base only: £10. Gutter mount with 2 MT qtr wave whip: £10ono. Good cond, buyer collects. G8XNG (Swindon) 537622.

MFJ versa tuner 11 941D: £80. Katsumi EL Keyer EK150: £50. HiMound 708 Morse key: £5. Bug key: £5. (Southport) 0704 67436.

MICROWAVE Modules 2m linear with preamp 200W output 3, 10 or 25W input: £220ono. G4NTY QTHR (Manchester) 061-790 7673 (after 6pm).

MMT 144/28 tnsvtr: £100. MML 144/100-S linear and pre-amp: £175. MMC432/28-S cnvtr: £15. All vgc little used with manuals/diagrams. GM4ZRR QTHR (Aberdeen) 0224 826464 X 140 (day).

MORSE Tutor: £20. Kenwood TR 751E 2m Multimode: £450. 2m Linear 180W: £50. Tona 17-ele 2m YAGI new: £30. Kenwood SW200 PWR SWR Dual meter 1.8- 450MHz: £50. PSU 13.8v 7amp: £30. Collect or + post GW0LNE QTHR. (Pembroke) 0646 686112.

MOSELY TA33 jnr, 3-element beam: £80; Hygain 14AVQ vertical covers 10/40: £50. G3VLX QTHR. (Maidstone) 0622 831582.

MUTEK TVVF 144a Transverter re-aligned by MUTEK. Extended warranty to 31.6.92: £210. G4JCA (Luton) 0582 418942 (eve). 0628 486000 (day).

OFFERS T and R Bulletins April 38 June 38 March 39. Also from March 41 to June 60. Bound volumes from 1960 onwards. GM3CIX QTHR (Barrhead) 041-881 4440.

QTH London/Kent border. Good VHF location (17 countries on 70cm with 10w). Spacious Three Bedroom semi with 100ft back garden. Views across London and Kent countryside. Easy commute by train to London (City and West End): £125,000 GJ4TAW QTHR 0534 33942.

RACAL RA17L 0-30MHz vg condition. VALVED check aligned 1/7/91 plus matching soeaker plus Sony AN.1 active antenna: £250. RACAL automatic Morse sender MA4230 RACAL MA4231 automatic Morse decoder upto 160 words per minute with VDU and charger: £110. (Derby) 0332 372696.

RACAL RA17 Rx, gwo: £160. DECCA KW107 supermatch ATU unit: £110. Can deliver either for £10. (Bude, Cornwall) 0288 354963.

RACAL RA17 Rx: £100. G3AIO QTHR (Pembury) 089 282 2836.

RACAL RA17L in RACAL case cw manual and cct diagram: £200. G6BTB. (Oxford) 0865 250416.

RACAL RA37 cnvtr 12.5 to 980KHz for RA17 with book and leads: £25. Eddystone 358X comms Rx: £25. G3VXZ QTHR (Maidenhead) 0628 27350 or 045383 5510.

RACAL Rx RA17L 1-30MHz continuous, 6 filters. H/book. Ex working: £140. Steve G0ONR. (Bromley) 081 698 7793.

ROBOT 800c keybd self contained terminal transmits RTTY CW ASCII and SSTV in colour, can receive RTTY CW etc: £300. (Prestwick) 0292 79217.

ROTATOR Daiwa MR750 2 motors 30cm cable, 7m lattice tower section, mast hd unit. Moseley TA-33JR 20/15/10: £400. (Motherwell) 0698 62875.

RTTY/CW system comprising immac Dragon-32 computer with G4BMK RTTY/CW cartridge, manuals, leads, PSU, etc: £50. G4JLU, David QTHR. (Harrow) 081 954 9180.

SEM 2m Tranzmatch, as new: £30. TELCO XLP150, low pass filter, as new: £10. Roger G0KDR QTHR. (Saxmundham) 0728 78476.

SEM lambic keyer. £30 incl carr. Ted G0LMJ QTHR. (Horncastle) 0507 588219.

SILENT KEY sale G3BRL. TS830S, VFO-240, Lspkr SP-230, mic C-50: £800 Lot. TH205E, spkr/mic SMC31, spare batt PB-2: £130 Lot. FT230R, mic, brkt: £150. All above bxd, manuals. FT480R, mic: £250. Icom ICB1050: £15. MM T432/144R: £75. HRO, 9 coils, orig lspkr & PSU: £170. Drake 2-B +110V tnsfrmr: £90. BC221 +PU Type 3: £20. Sentinel Auto FET VHF preamp, dual-gate MOSFET VHF cnvtr & FET Top Band cnvrtr: £15 Lot. MFJ Filters CWF-2, S-2: £10 Lot. Daiwa CN460M: £45. 2m Polarphaser: £15. Burns Electronics wavemeter TC-101 0.8-480MHz: £20. Webb's Absorption wavemeter 3-35MHz: £5. Wind-

sor m/meter 77A: £30. Eagle RF Field Indicator RF-40: £5. Tronix PSU 13.8V 7A: £15. Offers for: TR220G +10W PA, Cossor Oscillograph 339A, GEC Miniscope BW464 in case, AVO All-wave Oscillator 95 kc/s-80 Mc/s, Marconi VVM TF428C, Heathkit VVM V-7AU, Mullard C/R Bridge GM104/1, Condenser Variable X6F WY0835 + chart, Lionel bug key J-36, Baumuster key, G4MH Minibeam, 2m 5XY J-Beam, rotator, 2-section tilt-over galvanized tubular mast. 100 books inc bound RadCom 1966-80 - SAE list. G4LWA (High Wycombe) 0494 531755.

SILENT KEY sale. Trio 9000: £250. FT290R: £200. MM 100S Lin Amp: £90. DRAE 24A PSU: £80. FT227R: £90. FRG 7000: £175. KW2000 + PSU: £150. Scopex 14D-10 'scope: £90. Solartron CX1441 scope: £30. Welz SP300 PWR meter: £40. Kenwood RD300 dummy load: £40. H-P audio osc: £15. Eddystone 880/2: £120. Racal RA17 Rx: £120. G3VEZ QTHR (Bournemouth) 0202 530436 (after 5pm).

SILENT Key sale. Yaesu FT102 tcvr FC102 antenna tuner SP102 spkr unit MD1B8 mic desk type HiMound Morse key, ex cond, with manuals: £700. HQ 1 Beam with G-400RC rotator and G-400RC rotator controller: £160. 2x10in b&w monitors, 2 photo scan cameras one with lens, all working: £40. (Worcester Park) 081-330 4029.

SONY 7600DS pocket size portable Rx SW MW LW FM AM SSB, manual, keypad and scan tuning, digital clock/timer, ten memories, mains PSU and spool wound wire antenna, h/book etc, ex performer: £100. G3XHX QTHR (Liskeard) 0579 43749.

SONY Air-7 scanner, LW, MW, Band 2, Air Band, very sensitive Rx, perfect nick, retails at £225, sell for £115. G4NVQ (Hastings) 0424 420608.

SONY SLC7UB Betamax VCR complete with infra-remote, dust cover, second machine for spares, spare belts, full wkshop and owners mans, 16 quality cassettes, all leads etc, in perfect wking order, with all you need to keep it that way!: £120, no splits. 20ft aluminium scaffold pole, 48mm o/d, 3.5mm wall: £15. Del poss Essex, E London, Herts. Graham G8URI QTHR (Billericay) 0277 657235.

STRUMECH versatower M100 30m H duty mobile mast. Complete with plumett power winch and neco magnetic brakes. Offers. G4KWL QTHR. (Reading) 0734 871330.

TEN-TEC Argosy 1, With 500HZ CW filter plus PSU (not Ten-Tec), vgc: £350. Wanted cabinet for Marconi 52 RX. Also front panel labels for R1155 RX. Peter G0DRT QTHR. (Kent) 0795 876277.

TEN-TEC Argosy 2 525D Digital readout 5/50W, 2 crystal filters, matching power pack model 225. Bxd with owners manuals, vgc. Ideal starter rig for newcomer to HF, mobile or base station: £400ono. G0IYE QTHR (Western Super Mare) 0934 631630.

TENTEC Corsair 2 HF tcvr: £895ono. AEA Morse machine MM-3: £135. Sampson dual paddle key ETM-SQ: £25. REVEX W520 200W 1.8-200 MHz swr/pwr meter: £55. REVEX W540 200W 140-525MHz swr/pwr meter: £50. THANDAR TF600, 600 MHz frequency pre-scaler: £30. TENTEC 705 desk-mic: £20. TENTEC 288 1.8KHz SSB filter: £30. IC-R100 receiver 500KHz - 1800MHz AM/FM/SSB: £375ono. Spectrum ZX+, TNC Interface + software: £85ono. (Glastonbury) 0458 34917.

TOKYO HI power tnsvtr HX240 144 MHz to HF: £210. Microwave Mmodules 2m linear with pre-amp 1-3W input 100Ww out: £120. (Stroud) 0453 766171.

TONO 5000E sender decoder CW/RTTY/AMTOR keybd terminal with built-in monitor, ex cond: £325. G3ADZ QTHR (Rugby) 0788 815222.

TOWER Westower FBP 50ft telescopic tiltover, as new, rotator triband beam, owner moving retirement home, must sell. Any offers, swop WHY (Sutton Coldfield) 021 353 1733.

TRIO 8305, immac condx, spare valves, MC60, mic, orig pck, man. Going mobile and QRP: £850ovno. (Cirencester) 0285 650656.

TRIO 9000 2m m/mode tcvr, vgc, C/W Adonis mobile mic and 7/8 mobile antenna with g/mount: £230 complete. G4OMJ QTHR (Nottingham) 0602 283144.

TRIO 930 with auto ATU and CW filters, immac: £1000. Mini beam 20m/15m/10m/6m 4-ele: £225. (Shrewsbury) 0743 367087.

TRIO 9R-59DG Gen cov RX and manual and spkr: £45. RTTY Interface suits Amstrad 464/6128: £10. B Allen. (Minehead) 0984 40576.

TRIO R1000 HF Rx, as new: £200. New solid brass hand made Swedish key: £60. (London Essex area). 0621 892755.

TRIO R1000 rX, bxd, vcg: £215. (Harrow) 081-907 0140.

TRIO R2000 gen coverage Rx complete with in-built VC10 VHF cnvtr 118-174MHz, bxd, hardly used: £425. Eddystone 770u UHF Rx, manual, needs attention: £50. Storno Vis-count boot-mount on 2m: £10. RadCom most years back to 1960's: £5 per year. Rob Thornton QTHR (Hassocks) 0273 842585.

TRIO TH205 as new, bxd, belt clip: £160. Tandy PC8 pocket computer: £25. Heathkit Mohawk Rx: £35. Conductivity meter, Eversheds circa 1907, vgc, - offers. Spectrum 48K D'ktronics keybd, twin Waffa drive: £60. Honda Camino moped, MOT: £80. Dave (Kings Lynn) 0553 761943.

TRIO TS4305 FM CW Filter+ free Adonis mic+box, manual: £595 ono YAESU FT726R fitted 2m 6m 70cm sat unit CW filter: £795 ono MML 144/100s linear: £85 ono STAR MASTERKEY MkII: £40. ANTENNA 50MHz 3 ELE MET: £20. Good gear but going QRT lack of time for radio. G4XEN QTHR (Wellingborough) 0933 677573.

TRIO TS520 SSB trans vgc one owner h/bk orig packing. Shure 444 solid brass key. Will deliver: £365. (Carmarthen) 0267 236242.

TS120S C/W PSU, vg condx: £350ono. Frank (Wellington, Soms) 0823 663367

TS530S fitted 500Hz filter mic/manual. Mint condition packing: £500. QUAD 6 element 144MHz: £20. BBC-B computer + disc s/ware: £150. SOLIDISK BBC-B 256K/RAM ROM Board: £50. Morse decoder/filter tutor: £25. ZX88 computer spellmaster 128K RAM/ROM parallel printer interface, mint: £140. G4PEY QTHR. (Horsham) 0403 69835.

TS530SP £350, Daiwa NS66OP PEP meter: £75, MFJ ATU: £25. HF mobile whips (set): £15. HK707 key: £5. GM4SVM QTHR. (Stirling) 0786 75834.

TS830S com/with DFC230 digital frequency controller, spkr, h/books and wkshop man: £800ono. (Cheltenham) 0242 673834.

TS940S both 500Hz CW filters, synthesizer mod, 16 months old. Perfect and unmarked, as new, bxd, with mic: £1430. Collectors item battery eliminator C1946, Amplion Convette model M2V. All complete and original since new. Any offers? (Glasgow) 041-772-7027.

VERSATOWER 30ft mini tower fixed base with rotator coax cables etc: £290. Buyer pays carr. Also Jaybeam minimax tribander beam: £125 for quick sale. GM3KJZ 0383 417976 (eves).

VIVITAR V2000 SLR ERC bxd fitted 28-70mm Vivitar PK fitting C/W optomax F2.8 135mm only used for five films all in pristine cond, awarded four stars in AP road test: £135. (London SE9) 081-857 8096 (eves).

YAESU Communication Rx FRG 8800 with VHF convtr, man, mint cond, bxd, bargain at £400ono. Len Willford (Plymouth) 0752 261269.

YAESU FC102 ATU with FAS14R Ant switch, vgc, bxd etc: £280ono. Philips 32 series 120MHz dual trace scope offers £140. (Epsom) 081-393 7271.

YAESU FC700, Diamond SX200 vswr meter. Kent Morse key. All items unused: £155. Buyer collects. G3FK QTHR. (West Moors) 0202 873 175.

YAESU FR101DD 25 bands incl 2m,6m 10,18 24.5MHz, new bands (xtals renewed). N-BL, marker, large ext, Yaesu spkr, superb amateur and marine Rx, all facilities links to sep Tx (ext VFO options etc). Buyer inspects collects: £300. G0KTT (Altrincham) 061-980 4357.

YAESU FRG7700, memory plus FRT7700 ATV and FRT7700 VHF cnvrtr, pristine condx, man, bxd etc: £300ono. G3SIP QTHR (Horncastle) 0507 527086

YAESU FRG7700, vgc: £230. FTDX150 Rx OK Tx 3.5 and 7.0 OK. Others need attn, hence £110. G0JQW QTHR (Bristol) 0272 712584.

YAESU FRG8800 Gen cov Rx with built-in VHF cnvrtr and matching ATU. Good cond; in orig pack: £495. (Chorley) 0257 262574.

YAESU FT221 complete and wking, but poor condx, hence £130. Needs loving care! Collectors items: Ships Radios: B41: £25. Marconi Guardian: £15. Marconi Mercury: £30., CR100 with 5 Meter: £50. Carr arranged at cost. G3MFW QTHR. (St Austell) 0726 73608.

YAESU FT-73R 70cm h/held, CTCSS, service manual, nicads, bxd: £160. Yaesu FRG-7 HF Rx: £105. Pye PF2UB 2m h/held, xtalled Raynet, nicads, chrgr: £30. Pye AM2FT 2m FM, S22, accessories: £10. QM70 70cm PA, 2C39, blower: £20. Jaybeam 2m 4-ele quad: £7. G0BSX Mk.1 tnc, cased: £50. Nascom 1 Z80 SBC, cased: £20. Buyer collects. (Birmingham) 021 747 2438 7-10pm.

YAESU FT101Z CW filter mic fan with FC902 antenna tuner: £475. PM-2000 power SWR meter: £30. Telequipment D65 oscilloscope: £50. G4IVP QTHR (Penzance) 0736 710819.

YAESU FT101ZD station complete with FT101Z Ext VFO, mic, key, SWR meter, spkr, ATU. Ex cond, bxd, manuals etc. Everything must go: £500. G4VHW QTHR (Croydon) 081-657 0688.

YAESU FT726 2m, 6m satellite boards, matching SP102 filtered spkr and MD1 base mic. Ex condx with orig mans, boxes etc: £700ono. Kenwood TM441E 70cm FM mobile tcvr, one month old, 5/10/35W output: £280. Unused mobile. MFJ versa tuner ii MFJ 945C 0-30MHZ Rx AM, SSB, FM stereo £85. Few months old. Ex cond. G7GCS (Kidderminster) 0562 68792.

YAESU FT480R 2m m/mode C/W mic mobile mount and DC leads: £275. Jaybeam LR1 2m colinear: £15. Dave (Northampton) 0327 842141 wkends or eves.

YAESU FT102 all modes, as new, swop for good PC or £499. Racal RA17 Rx, gd order: £120. Buyer collects. (Warrington) 0925 838331.

YAESU FT7: £220. Mobile G.Whip: £20. FORWORD reflect SWR meter: £20. Heathkit 10-18u scope: £25. G3AUZ QTHR. (Worksop) 0909 473893.

YAESU FT70G mobile/ptable HF tcvr 15W. 2-3MHz 345 Jaybeam 2 meter X-Y YAGI: £30. S/steel discone: £20. Nigel G4PJJ. (Gloucester) 0452 75542.

YAESU FT726R, gwo, with 2m 70cm & HF, 15,12,11 & 10, plus satellite unit, bxd & manual: £950ono. G1GSM (Stockport) 061-449 9176.

YAESU FT757 GXII FT757HD FC757AT complete with manuals boxes leads etc. Any test. No split: £850 ovno. G0JID (Merseyside) 051-931 1942 (eves).

YAESU FT767GX, fitted with 6m module, complete with mic, manual and orig pack. Ex cond: £1150. (Helsby) 0928 725153.

YAESU FT780R: £250ono. YAESU FT221R with YC221 digital display: £300. Also Tono 2m 100W, all mode linear amplifier: offers. (Blyth) 0670 354289.

YAESU FTDX401 with remote VFO, mic, manual, most spare valves, nice cond: £195. HiMound MK-702 paddle, marble base: £20. Rotator CDR TR-44 with lower bracket: £60. FET GDO G3WPO: £10. Kenpro KS-050 mast bearing: £10. SMC OSCAR 2 NOW 10FM, bxd: £25. G2AQJ (Salisbury) 0722 325929.

YAESU HF Rx FRDX 400: £60. Tektronix 545A dual beam scope, full info: £40. Olivetti WS584 ASYNC terminal, ideal packet: £25. AKAI 4000DS, vgc: £60. Sinclair QL with modem, trump card spare QL, 100+ microdrive cards, many books etc: £240. CENTRONICS GLP printer, serial/parallel, tractor/friction feed, spare ribbons: £120. DFM 150MHz homebrew: £10 Z80B ice :£25. Buyers collect. G4AZO. (Woking) 0483 721649.

WANTED

ICOM IC-32E wanted urgently, must be in mint cond and comp with all accessories as originally supplied when new, preferably bxd and not modified for extended receive coverage. Highest cash price paid for the right example. 0273 722955.

URGENTLY reqd: 10 or 210, 50, 71A and 47 UX valves. G4IMT QTHR (Chippenham) 0225 891 254.

WW2 covert radios incl MCR1, A3, B2, MK123. Also BC611 Handie, or WHY. G8BXO QTHR (South Molton) 0769 573382.

1296MHZ tnsvtr. SSB electronics or microwave modules considered. Also 1296MHz aerials required. (Ely) 0353 741354.

60FT Tower on mobile trailer. Must be in gd cond. G3YJH QTHR (Tamworth). 0827 284211.

AMSTRAD PC1640 Technical reference (NOT user guide, NOT service manual, but technical reference). G4AZO QTHR. (Woking) 0483 721649.

BAKELITE pocket watch holder for 52 set or R107 to complete project, also Drake CS7 coax switch. (Shrewsbury) 0743 884858.

BOOKS: Amateur Antenna tests and measurements - Hooton; Antenna Manual - Woodrow Smith (1948); AGARD Books; etc. Books on telecommunication, antennas and propagation. Can collect NW/Midlands/South, write G3REP 2 Saxon Road, Steyning, West Sussex, BN44 3FP.

CASE for WS18. Rotary PSU for WS19. Case for Eddystone 770R/Mk2 or poor set. Seeburg Jukebox Info. G4XWD QTHR (Kidderminster) 0562 823674.

CHIPS: can you please help with: 74C200; 5559; required for theatre organ. phone/write GM4AXS QTHR (Oban) 0631-71-442.

CIRCUIT diagrams for Redifon GR377. Your price. G3XKF (Aylesbury) 0296 614128.

CRYSTAL or mechanical filters. 465KHz LSB/USB or 7KHz AM. G3WOS QTHR or 0252 520354.

CUSHCRAFT R5 or similar vertical antenna in gwo. All bands 20-10m. G0ORD (Stockport) 061-427 1027.

DRAKE L7 Linear Drake CS7 coax switch bakelite watch holder from 52 set or R107 also Drake R4245 TR4310 or RR3. (Shrewsbury) 0743 884858.

EDDYSTONE Black fluted knob 1 3/8" diameter, cat. 592, and blank four pin coil former. Litherland, G4IMT QTHR. (Chippenham) 0225 891254.

FDK 750E boards. Yaesu 901DM RECT PSU boards wanted in good cond. Junk box 901DM/DE/D and FDK 750ES AVO test leads, good dummy load, home brew 400w for OAP. Gordon G4PDV (Sevenoaks) 454722.

FT727R base unit chrgr NC-15. Also NC18 B/C and MMB-21 mobile hanging brckt and FBA-5A dry cell bttry case for FT727R. (Towcester) 0327 52309.

HEATHKIT HW9 QRP tcvr must be first class cond. and vgwo; price, details to G4FMH QTHR (Burnham On Sea) 0278 714812.

HF module for FT726R, prefer to purchase but would consider swop with my 6m module in as new cond. (Motherwell) 0698 53394.

IC730 would consider IC740 FT707 FT&& prefer CW filter. Please telephone, can collect UK/Holland. (Brightlingsea) 0206 305851.

ICOM 751A. Sensible price please for pensioner. George (W London) 081 423 2329.

ICOM IC-μ2 type h/held tcvrs for 2m and 70cm. CDE Rotator 40/45. Bird Thruline Kit. Weather Satellite Receiving Kit. 0467 25365.

ICOM IC735, IC 751A, Kenwood TS4405 or similar HF tranceiver with gen cov in pristine condx with/without ATU/PSU. G0OPG. (Wilmslow) 0625 531154.

KENWOOD nicad pack or dry bttry box for TR2600 h/h and any paperwork for GEC RC660P-TR low AM portable ex Water Board. G0JBC QTHR (Halifax) 0422 359680.

KENWOOD TS130V if possible with YK88C filter. Must be in gwo. (Leeds) 0532 685792.

KW107 Supermatch ATU off-air frequency standard. Good price paid for mint equipment. Collection arranged. G3AAO not QTHR (Bournemouth) 0202 871903.

MARCONI instruments TF2171 synchroniser (lock box) C/W manual for use with TF2015 signal generator 10-520MHz, gwo essential. G4ETJ (Bideford) 0237 477301.

MORSUM Magnificat magazines. Back issues required. Any issues welcomed. Costs refunded. K Dickens 26 Knaves Castle Avenue, Brownhills, Walsall, W Mids, WS8 7PN. 0543 360372.

PUBLIC address folded horns 100V line preferred. Must be cheap - for primary school. Dave Morton G4LQT not QTHR (Stafford) 0785 663688.

RACAL communications equipment DA34000 RF amplifier ATU; power supply; remote control unit; tech man, also ancillary units for use with Racal RA117 and MA79. Interested in anything made by Racal in the 60's and 70's, mans, sales brochures etc. Nigel Boyd, 2 Church Close, Lower Willingdon, Eastbourne, East Sussex, BN20 9QY. Phone 0323 486822.

SET of coils or complete front end unit. Electroniques valve gen cov faulty unit would be fine so long as coils complete. (Belfast) 0232 692495.

TELESCOPIC trailer tower minimum height 45ft. Ring Melton Mowbray ARS 0664 60175 (day) 66802 (eve).

TENTEC Argosyll required for QRP use from work environment on North Sea production platform. Contact Stuart GM0CAQ. (MacDuff) 0261 33298

EXCHANGE

BAVER P6 double band 16mm film projector/recorder inc footage counter, LS spare lamps, wkshop manual, as new (used for 46 hours only). It is Rolls Royce of projectors and has a separate 16mm magnetic rec/replay section with three heads. Will exchange for suitable HF equipment etc WHY or sell. GW3BEF not QTHR (Cardiff) 0222 764797.

COMMODORE 64C pack as new plus extras. Sell/exchange WHY SWL. Wanted unmodified FGR7 or similar Rx. Buyer collects. RS93480. (Gainsborough). 0427 617319.

ICOM IC-551 50MHz tcvr, pristine cond, bxd, manual, mic, Also CBM 64C 2 Datassette: £300 + games, mouse, joysticks, paddles, full-size 61 key keybd and s/ware, all bxd. Also ERA microreader Mk.2, manual, all gear in ex cond Swap for FT757 + FC757 auto ATU + FP757HD PSU. Ian G7HXI (Stalham) 0692 580201 (W) or 0692 581663 and leave message.

R109AT R216 R1155B R1392E SX-28 BC778-E APN-1 HRO T3685. Hi-power Tele 'F'. Swap for any WW2 airborne radio radar items. (Derby) 0332 769404.

CLUB NEWS

DEADLINE - Items for inclusion in the November 1991 issue must be sent to HQ marked "Club News - DIARY", to be received by 13 September 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 - 4, annual general meeting; 25, exhibition of Calligraphy. Details Whitchurch 832222 on a Wednesday evening.

BEDFORDSHIRE

3, talk "Antennas & Coax" by Glen, G0GBI; 17, talk "Amateur Radio - Another View" by G3YUQ; Oct 15, annual general meeting. Details 02343 266443.

BERKSHIRE

MAIDENHEAD & DARC - 5, technical questions and answers; 17, talk "SSB Exciters" by Dave, G3SET; Oct 3, junk sale. Details 0628 25952

READING & DARC - 12, Autumn junk sale; 26, talk "Packet Radio Explained" by Paul Taylor, G1PLT. Details 0734 535310.

BUCKINGHAMSHIRE

AYLESBURY VALE RS - 18, club mini construction contest. Details 0296 382176 (daytime).

CHESHAM & DARS - 11, technical topic "PCBs" by Phil, G8BLB; 14, B-B-Q; 25, junk sale. Details from Liz, G0ETU 0923 283911.

GB3HZ RG - 26, meeting at 8pm at Chiltern Communications, Lincoln Road, Cressex Industrial Estate, High Wycombe. Details from G2DRT, tel: 0494 81 4240

MILTON KEYNES & DARS - 8, 5th annual car boot sale at Cranfield Airfield; 9, talk "Connecting RF Connectors" by Dave, G0EOW, Oct 14, AGM. Details 0908 501310 or 0908 315435.

CAMBRIDGESHIRE

CAMBRIDGE & DARC - 20, talk "Field Effect Transistors" by Tony, G0OEG. Details 0763 243570.

CHESHIRE

CHESTER & DARS - 10, documentary "Shetlands"; 17, visit to Ince Power Station; 24, construction skills and techniques. Details 051-608-3229.

STOCKPORT RS - 11, talk "Hiking" by Keith Ranger, G0KJK; 25, surplus equipment sale. Details 061 439 3831.

CLWYD

DELYN RC - 11, talk "The Art and Science of Photography" by Glyn Jones of G&G Photographers; 25, ladies' night; Oct 9, demonstration of wares by a major radio equipment manufacturer. Details 0745 336939.

RHYL & DARC - 2, annual dinner; 16, annual general meeting. Details 0745 336939.

WREXHAM ARS - ***NEW VENUE*** Maesgwyn Road Community Centre. 3, talk "Sounds Fantastic" by GW3HHF. Details 0978 261482.

CORNWALL

CORNISH RAC - 10, activities night; 9, computer section; Oct 8, activities night. Details 0209 820836.

DERBYSHIRE

DERBY & DARS - 4, junk sale. Details 0773 852475.

DEVON.

EXETER ARS - 9, talk/demonstration "Frequency Measurements"; Oct 14, AGM. Details 0392 78710.

SOUTH DEVON RC - 7/8, 144MHz trophy contest; 18, talk "Antennas" by Bill, G6ZRM; 29, 70MHz trophy contest.

TAUNTON & DARC - 6, talk "Amateur TV" by G4HMG and G8LES; 20, talk "Further Recollections of Amateur Radio in Pre-War China" by G0GTR. Details 0823 680 778.

DORSET

PLESSEY CHRISTCHURCH ARS - 12, talk "Raynet" by Chris Hampson, G8RXA. Details 0425 621982.

SOUTH DORSET RS - 3, activities evening; Oct 1, construction demonstrations. Details 0305 781164.

EAST SUSSEX

HASTINGS ERC - 18, talk on CELLNET. Details from G3YYF.

ESSEX

BRAINTREE & DARS - 2, talk "Packet Radio" by G8NPF and G6DFZ; Oct 7, junk sale with bring and buy. Details 0376 27431.

CHELMSFORD ARS - 3, Low Bit Rate Video lecture by M. Whytray of BT Research Centre, Martlesham; Oct 1, AGM. Details 0245 260831.

FIFE

DUNFERMLINE RS - 5, quiz night v Glenrothes ARC; 19, talk "Computers in Radio" by John, GM4ANB; Oct 3, AGM. Details 031 331 4340.

GLOUCESTERSHIRE

GLOUCESTER ARS - 4, annual general meeting; 11, Packet self help group; 18, construction group; 25, junk sale. Details 0452 528533 X 2722 (daytime).

GRAMPIAN

ABERDEEN ARS - 6, junk sale; talk "Unlucky for Some"; 20, annual building competition; 27, presentations by Building Comp Winners; Oct 4, junk sale; 11, demonstration of Mk 123 Radio by Ty Nicholson, GM0LNQ.

GREATER LONDON

ACTON, BRENTFORD & CHISWICK ARC - 17, talk "Wadley Loop System" by G0LZB. Details 071-938 2561.

COULSDON ATS - 9, talk "Linear Amplifiers" by John Stockley, G8MNY. Details 081-684 0610.

CRAY VALLEY - 5, talk "Communication Receivers" by G6WRP; 19, 4J1FS video; Oct 3, surplus equipment sale. Details 081-850 1386.

CRYSTAL PALACE & DRC - 21, talk "Wireless Before Radio" by G8CYE. Details 081-699 6940

ECHELFORD ARS - 9, talk "Key and Keyers"; Oct 14, talk "Basic Test Equipment for Construction". Details 0344 843472.

HAVERING & DARC - 4, talk by John Brown, G3EUR; 18, talk "Radio Controlled Model Aircraft". Details 04022 23310.

KINGSTON & DARS - 18, surplus equipment sale. Details 081 360 2847.

SUTTON & CHEAM RS - 19, talk "Radio Investigation Service" by Chris Winton (RIS District Manager). Details 081 644 9945 (H).

WIMBLEDON & DARS - 13, talk "Radio With Computers" by G3XTC and G4XLM; 27, surplus equipment sale; Oct 11, talk "Radio in Modern Aircraft" by Chris Volney, G0IPD. Details 081 397 0427.

GWYNEDD

DRAGON ARC - 2, construction night - bring along your project; 7/8, SES Seven Nations National Trust Event; 19, talk on "The National Trust" by Mrs Anne Harrison; Oct 7, AGM. Details 0248 600963.

HAMPSHIRE

BASINGSTOKE ARC - 2, talk " The Work The Radio Investigation Society are Involved In" by Mr A.S Hughes of the RIS. Details 0256 461967.

FAREHAM & DARC - 11, talk "/P Up Mountains"; 25, junk sale; Oct 9, talk "The GDO". Details 0705 321411/2 (daytime).

ITCHEN VALLEY RC - 13, talk on Photography by Bob Thomas; 27, talk on the Forestry Commission by Peter Clapham. Details 0703 736784.

THREE COUNTIES ARC - 11, talk "Wines of the World"; 25, talk "Royal Corps of Signals TA"; Oct 9, talk "Communications on the Battlefield, with Ptarmigan". Details 0420 83091.

WINCHESTER ARC - 20, talk "Marine Radio" by Rod Burnet, G0EUO.

HEREFORD & WORCESTER

BROMSGROVE ARS - 11, talk and demo "Jaybeam Antennas"; 25, talk and demo "Satellite TV" by Roy Williams, G4IUX; Oct 9, constructors' fair. Details 0527 503024.

HEREFORD ARS - 6, talk "Amateur PCB Production" by John Morris, G4BXS. Details G4MET.

KIDDERMINSTER & DARS - 3, annual general meeting; 7, presentation evening and dinner; Oct 1, RLO and Novice Instructor. Details 02993 79229.

VALE OF EVESHAM RAC - 5, talk "VHF Propagation" by Dr Geoff Grayer, G3NAQ. Details 0386 881497.

HERTFORDSHIRE

CHESHUNT & DARC - 2/3, SSB Field Day, Windmill Lane, Cheshunt combined with Fox Hunt and BBQ; 4, construction contest; 18, Test Equipment - Simon, G4EYR; Oct 2, talk "Filters" by John Armstrong, G8MVH from AKD Filters. Details 0992 464795.

STEVENAGE & DARS - 2, RAE enrolment evening; 3, talk "Mobile Operating" by Peter, G7HCL and Gary, G0ETA; 10, practical test equipment; 17, talk "HF Operating" by Jay, G3HEA; Oct 1, talk "Bio Engineering" by Richard Hartley; 8, practical test equipment usage. Details Stevenage 724991.

HIGHLAND

INVERNESS ARC - 18, talk "Poor Man's DTP" by Ron Macdonell, GM0CJT; Oct 2, construction night. Details 0349 61783.

HUMBERSIDE

GOOLE R&ES - 6, discussion "Novice Licence"; 13, constructors' competition; 20, annual general meeting. Details 0405 769968.

NORTH FERRIBY UNITED ARS - 13, construction competition; 20, The Way Ahead Meeting - Ken, G4VKK; 27, talk "Characteristics" by Norman, G3NJP; Oct 1, talk "Topic of the Day" by Tony, G4KHT; 11, RSGB video - Frank, G3YCC. Details 0482 650410.

ISLE OF WIGHT

BINSTEAD ARS - 2, surplus equipment auction. Details from G0ISB QTHR.

KENT

BROMLEY & DARS - 17, junk sale. Details Medway 271548.

DARENTH VALLEY RS - 11, construction night - Morse - 2m on air; 25, on the air at the Village Hall; Oct 9, construction night - Morse - 2m on air. Details 0689 876733.

DARTFORD HEATH DFC - 10, pre-hunt meeting at White Horse PH, North Cray Rd, Bexley from 9pm; 15, 2m 145.325 Foxhunt - 11am start at The Car Park, Heath Lane Upper, Dartford Heath; Oct 1, pre hunt meeting as above. Details 0689 854089. Details 0689 854089.

EAST KENT RS - Meetings held in Parkside Youth Centre, Kings Road, Herne Bay at 7.30pm on the first and third Thursday of each month.

MAIDSTONE YMCA ARS - ***NEW SECRETARY*** Colin L. Roberts, BRS93262, 16 Derby Road, Maidstone, Kent ME15 7JB - 13, satellite demo - Ian Weston, G4UAQ; 27, PL259 plugs and practical eve; 28, Maidstone Grammar Schools for Boys Grand Fete 2pm. G3YSC/P; Oct 11, operator and log keeping training. Details from Secretary.

SEVENOAKS & DARS - 16, talk "RSGB" by John Greenwell, G3AEZ.

LANCASHIRE

FYLDE ARS - 26, DF Fox Hunt. Details 0772 635464.

PRESTON ARS - 5, illustrated talk "The Lakeland Turnpike" by Mr Gregson; 19, illustrated talk "A Tour of Gibraltar" by Mr Watson; Oct 3, illustrated talk "The Golden Road to Samarkand" by Mr Yearsley.

ROSSENDALE ARS - 2, annual general meeting - members only. Details 0706 227182.

THORNTON CLEVELEYS ARS - 2, B-B-Q; 9, construction competition; 16, talk "Transverters" by G8KBH; 23, video "Club Year". Details from G4BFH.

LEICESTERSHIRE

LEICESTER RS - 16, talk "Crime Prevention" by John, G7GCK; 30, hands on test equipment evening. Details Leicester 762241.

LOUGHBOROUGH & DARC - 3, talk and slides "The Camera" by G8SNF; 10, construction; 17, last DF of the year; 24, talk by G8BUB. Details 0509 218259.

LINCOLNSHIRE

SPALDING & DARS - ***NEW SECRETARY*** David Johnson, G4DHF, 65 West Street, Bourne, Lincs PE10 9PA. Club meets weekly 8pm at The Riverside Centre, The Old Fire Station, Double Street, Spalding.

WELLAND VALLEY RC - now meets 1st and 3rd Tuesday each month at Abbey Stores Electrical, 18 Abbey Street, Market Harborough at 7pm.

LOTHIAN

LOTHIANS RS - 11, President's address; 25, open night; Oct 9, talk "Radio from the Munros" by David Gentles. Details from P.J. Dick QTHR.

MERSEYSIDE

LIVERPOOL & DARS - **3**, open night; 10, talk "Home Construction" by G0IFK; 17, surplus sale. Details from G4VYR.

NORFOLK

NORFOLK ARC - 11, talk "Flying Kites" by Kevin Appleton; 18, talk "Practical Troubleshooting" by Arnold Tomalin, G3PTB; Oct 2, talk "Oscillators" by Dick Bacon, G3WRJ; 9, talk "Castle Mall Archaeological Excavation" by Brian Ayres. Details 0603 747992.

YARMOUTH RC - 12, talk "Construction and Use of RF Chokes" by G3NHU. Details Yh 721173.

NORTHAMPTONSHIRE

KETTERING ARS - "CHANGE OF SECRETARY" Len Davies, G7EHM, 113 Headlands, Kettering NN15 6AB, tel: 0536 514544. Club meets at Electricity Social Club, Eksdale Street, Kettering. Tuesdays at 7.30 for 8pm. - 24, talk "Satellites" by Derek Slater, G3FOZ. Details from Secretary.

NOTTINGHAMSHIRE

AMATEUR RADIO CLUB OF NOTTINGHAM - 5, forum; 12, Le Mans Start Foxhunt - Rex, G1LRI; 19, 2m Foxhunt. Details 0602 733740.

MANSFIELD ARS - 5, talk "The Shortwave Broadcast Bands" by John, G4GYU. Details 0509 672734.

SOUTH NOTTS ARC - 6, construction (Fairham Coll); 15, Foxhunt, start 4.30; 20, talk by Jandek (7.30pm); 27, construction (Fairham Coll).

OXFORDSHIRE

OXFORD & DARS - 26, talk on QRP + Novice Licence by

Jandek (kits will be on sale). Details from Terry, G0LUQ.

NORTH YORKSHIRE

HAMBLETON ARS - ***NEW SECRETARY*** Nigel Robertshaw, G0NHM, QTHR, tel: 0609 776608.9, 'Gulf Gossip' by Nigel Robertshaw, G0NHM; 23, talk "Electronic Countermeasures" by Frank Peirson, G3HSG; Oct 7, talk "Raynet" by Nick Whelan, G7COC. Details from G0NHM.

SOUTH GLAMORGAN

CARDIFF RSGBG - 9, talk "A Home Brewed HF Receiver" by Jim Caulfield, GW31SJ; Oct 14, AGM. Details 0446 773212.

SOUTH YORKSHIRE

BARNSLEY & DARC - 2, proposed talk on Planning; 16, proposed talk on EMC; 30, proposed talk on Novice Licence. Details 0226 716339.

RAF FINNINGLEY ARS - 21, Battle of Britain Air Day. Details 0302 361238.

STAFFORDSHIRE

STAFFORD & DARS - 17, radio and electronics quiz - G3EHM; 24, construction evening. Details from Bernard, tel: 0785 662350.

SUFFOLK

FELIXSTOWE & DARS - 2, work night - prepare tower and aerials for winter; 16, quiz vs Leiston (home leg) (Orwell Pk Sch); 30, talk "Modern Commercial Data Networks" by Bob Baal, G7HXZ (Orwell Pk Sch); Oct 14, construction contest. Details 0473 642595 (daytime).

ISPWICH RC - 11, Marconi Museum (provisional); 25, talk "Antenna Tuning Units". Details Mrs. S.M. Elden, G8HYE QTHR, tel: 0473 742072.

WARWICKSHIRE

MID WARWICKSHIRE ARS - 10, talk by Simon, G0GWA on his trip to and DX from Sierra Leone; 24, indoor DF! George, G3TFA brings along his computer game; Oct 8, technical topics. Details 0455 552449.

RUGBY ATS - 24, presentation of awards and cups. Details 0455 552449.

STRATFORD-UPON-AVON RS - 9, open evening; 23, talk "Converting PMR Equipment" by Bill Mahoney, G3TZM; Oct 14, talk "Jandek Kits" by Derek Pearson, G3ZOM. Details 060 882 495.

WEST MIDLANDS

COVENTRY - 6, indoor DF final; 20. trip TBA. Details 0203 523629.

MIDLAND ARS - 17, talk "Beekeeping" by John Crane, G0LAI; Oct 15, AGM. Details 021 742 8712.

SOLIHULL ARS - 19, talk "40 Years of Aerials" by Leon, G3FGT. Details 021-783 2996.

WORDSLEY RC - 12, talk "Crowd Dynamics" by Mr F. Carlin (9pm); 26, talk "Simple TV Systems, Faults and Repairs" by Mr K. Willis - 9pm. Details 0384 873666.

WEST SUSSEX

CHICHESTER & DARC - 14, annual GB2NM SES TBA.

WEST YORKSHIRE.

BRADFORD ARS - 4&7, SES GB50ATC; 12, review of GB50ATC plus arrangements for GB0CBS; 26, talk "WAB Aims and Objectives"; Oct 10, junk sale. Details 0274 494694.

DENBY DALE ARS - 4, talk "Computers and Communications" by West Yorkshire Police. Details 0484 532371.

HALIFAX & DARS - 17, annual general meeting. Details Halifax 202306.

KEIGHLEY ARS - 26, quiz guests Northern Heights - pie and peas. Details from Kathy, tel: 0274 496222.

NORTHERN HEIGHTS AR&ES - 4, talk "Jacquard Computer Principles"; 18, Repeater update; 26, visit to KARS quiz night; Oct 2, talk "Electronics and Radio in the Fire Service," by Geoff Barber. Details 0274 673116.

TODMORDEN & DARS - 2, talk "Japanese Morse". (Repeat by request); Oct 7, surplus equipment/junk sale. Details Halifax 882038.

WAKEFIELD & DRS - 3, contest final preparations; 7/8, 144MHz Trophy Contest - Blakey Ridge; 24, surplus equipment sale; Oct 1, debate "The Future for Construction". Details 0924 260048.

WILTSHIRE

TROWBRIDGE & DARC - 4, talk "HF Beam Antennas and New Approach" by G0DAB; 18, open evening and planning for JOTA. Details 0380 830383.

SALISBURY R&ES - 3, video show: (a) club's station for VHF NFD (b) Ivan Casey, G7DNG, who is a locksmith, and the key he made for Salisbury Cathedral; 24, talk and demo "CW (Morse Operating)" by John, G4POF; Oct 1, by Ray Baldwin, G3WZ on his world travels and exotic DX. Details G7GWF QTHR, tel: 0722 330971 (wkends/eves).

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'.

1 SEPTEMBER

PRESTON ARS 24th Annual Rally - University of Lancaster. Opens 11am (10.30 for disabled visitors). Trade stands; Club stands; large bring & buy; snack bar; lunchtime restaurant and licensed bar. Free prize draw. Details from Godfrey Lancefield, G3DWQ, QTHR, tel: 0772 53810 or George, tel: 0772 718175.

TELFORD Radio Rally - Telford Racquet and Exhibition Centre, Telford Town Centre. One of the largest in the Midlands. Featuring a Novice corner together with an on-air station GB4TRG. Visitors leave the M54 junction 4. Details from Martyn, G3UKV, tel: 0952 255416 or John, G0GTN, tel: 0743 249943.

8 SEPTEMBER

LINCOLN SWC 10th Lincoln Hamfest which celebrates the 70th anniversary of G5FZ - Lincolnshire Showground. Entry £1; all the usual attractions; Caravans welcome. Details from Sue Middleton (XYL G8VGF QTHR), tel: 0522 525760.

MADLEY SATELLITE EARTH STATION ARG AR & Electronics Car Boot Sale - Madley Communications Centre, Madley, Hereford. Some traders, bring & buy, incorporating a conventional car boot sale, refreshments, toilets, ample parking. Opens 8.30. Talk-in on S22 by G7BTI. Details from David Butler, G4ASR, tel: 087 387 679.

MILTON KEYNES & DARS 5th Annual Car Boot Sale - Cranfield Airfield (South Side), Cranfield, Bedford, MK43 0AL. Opens 9.30am; refreshments available. Talk-in on S22. Details from Tony, G6WXM, tel: 0908 316435, Dave, G3ZPA, tel: 0908 501310 or Ray, G1LRU tel: 0908 660798.

VANGE ARS Annual Rally - The Laindon Community Centre, Laindon High Road/Aston Road, Laindon, Basildon, Essex. The Centre is only a short walk from Laindon station (BR) on the Fenchurch Street to Shoeburyness line. Doors open 10.30am, admission 50p. Many traders, bring & buy, refreshments and a free raffle. Talk-in on S22. Approach roads will be signposted. Details from Doris Thompson, tel: 0268 552606 or Mike Musgrave, G4NVT, tel: 0268 543025 (24 hour answering service).

13-15 SEPTEMBER

WACRAL CONFERENCE - Elim Bible College, Nantwich. Details from Geoff Peterson, G4EZU, tel: 0474 533686.

14 SEPTEMBER

BALLYMENA Annual Rally - Ballee High Community School. Details from GI4HCN, 154 Galgorm Road, Ballymena.

WIGHT Wireless Rally - CEM Wireless Museum, Arreton Manor, Nr Newport, IOW. Opens 11am. Talk-in on 2m G3IOW. Exhibition station GB3WM on 3700kHz. Details from Douglas, G3KPO, tel: 0983 67665.

15 SEPTEMBER

BARTG Rally - Surrey Hall, Sandown Park Racecourse. Opens 10.30am. Admission - adults £1, children under 14 free if accompanied by adult. Over 250 tables - many exhibitor and special interest groups will be attending. See the latest in radios, computers, computer peripherals, software, books and much more. Free parking for over 5000 cars. Easy access - well signposted. Talk-in on S22 and SU22. Details from Peter Nicol, 38 Mitten Avenue, Rubery, Birmingham B45 0JB, tel: 021 453 2676.

BRISTOL Radio Rally - Brunel's Great Train Shed, Temple Meads Station, Bristol. Doors open 10.30am; many trade stands; demonstrations including ATV; large bring & buy; refreshments; good access for disabled visitors; talk-in on S22; good parking facilities; venue is just 5 minutes from the M32. Details from David Farr, G4WUB, tel: 0272 839855.

EAST OF ENGLAND RADIO RALLY (Peterborough R&ES) - ICI Building, The East of England Showground, Oundle Road, Peterborough. Doors open 10.30am (10 for disabled visitors - toilet facilities available); admission £1; traders' main hall with bar and catering; traders' marquee with bring & buy, separate outside area with flea market plus radio and electronic car boot. Various other local attractions: Nene Park and Nene Valley Railway; golf driving range and Go-karts etc; acres of free parking. Details from Nigel, G1ARV, tel: 0733 78685 or Mike, G0CVZ, tel: 0733 222588.

PAKEFIELD Radio/Electronics Rally and Car Boot Sale is now solely a car boot sale.

22 SEPTEMBER

CENTRE OF ENGLAND Autumn Radio & Electronics Rally will be held at the British Motorcycle Museum, Bickenhill nr The NEC, Jct 6 M42. Doors open 10.30am; admission £1 (concession for RAIBC members and senior citizens); over 60 traders in 3 large halls, ample free parking, bring & buy, talk-in on S22, bar & restaurant facilies. Details from Frank Martin, G4UMF, tel: 0952 598173.

25 SEPTEMBER

LOTHIANS RS Open Night - Orwell Lodge Hotel, Polworth Terrace, Edinburgh. Commences 7.30pm. For all radio amateurs, short wave listeners and interested enthusiasts, and will feature a Fleamarket and a Bring'n'Buy for members and non-members of the Society. For details of tables and space available contact Mel Evans, tel: 031 664 5403. Also present will be our registered Novice Licence instructor with details of proposed Novice Licence and CW classes. We hope to have a couple of the local traders present and a display of home brew gear from our own membership. Details from Mel Evans.

28/29 SEPTEMBER

RSGB HF CONVENTION - The Friendly Hotel (previously called Penguin Hotel), Daventry, Northants. Talks and events as follows: Marti Laine, OH2BH; Peter Hart, G3SJX; Al Slater, G3FXB; Roger Western, G3SXW; John Allen, DTI Baldock; Roger Ballister, G3KMA; Packet Cluster Forum; Young Amateur of the Year Award; Presentation of RSGB HF Trophies; Novice Clinic; DXpeditions (provisional); Review of High Quality Transceivers; Contesting; Pile Up Operating; What's on 80m Tonight?; IOTA. Details from Bob Whelan, G3PJT, 36 Greenend, Comberton, Cambridge CB3 7DY.

29 SEPTEMBER

HARLOW AR&E Mobile Rally - Harlow Sports Centre. Doors open 10.30am; talk-in on 2m & 70cm by G6UT; bar; hot snacks; disabled facilities; giant bring'n'buy; special interest groups; free parking; admission £1. Details from: evenings & wkends: Liz, G0MDL, tel: 0277 364742; daytime: Ken, G0HRR, tel: 0279 426647.

7TH NORTH WAKEFIELD RC Rally - Outwood Grange School, Potovens Lane, Outwood, Nr Wakefield. Doors open 11am; admission £1; fully licensed bar; raffle; bring'n'buy; computer & electronics traders and repeater groups; talk-in on S22 club callsign G4NOK. Venue is 2 miles from M1 and M62. Details from Dick, G4GCX, tel: 0532 622139 or John, G4RCG, tel: 0924 362144.

6 OCTOBER

BLACKWOOD AR Rally - Oakdale Community College. Details from B. Matthews, GW0JWF, 25 Manor Park, Newbridge, Gwent.

GREAT LUMLEY Radio Rally - The Community Centre, Great Lumley, Nr Chester-Le-Street, Co Durham. Opens 10.30am for disabled visitors and 11am for other visitors. Varied trade stands; refreshments; bring & buy (value limit £200). Entrance fee 50p, children under 14 accompanied by an adult free. Details from Barry, G1JDP, tel: 091 388 5936.

HORNCASTLE AR Electronics & Computer Fair - Horncastle Youth Centre, adjacent to the A128 Lincoln/Skegness main road. Opens 10.30am ((10am for disabled visitors); admission £1 per person (negotiated discounts for organised groups). Range of computer, radio and electronic components plus second hand and surplus equipment sale; flea market/car boot sale in the outside sports area. Louth & DARS will be running a bring & buy stall. Details - sae to Tony Nightingale, G6CZV, Horncastle Youth Centre, Cagthorpe Building, Willow Row, Horncastle, Lincs LN9 6HW.

13 OCTOBER

ARMAGH & DUNGANNON Rally - Gosford House Hotel, Markethill, Co Armagh. Details from T.E. Hall, GI0MSJ, QTHR GI6UMR, tel: 0861 523454.

BLACKMORE VALE ARS - Annual Rally - Wincanton Racecourse, Somerset. Indoor event with unlimited free parking. Doors open 10am. Entrance 50p. Talk-in on S22. Details from Norman, G4YXX, tel: 0749-85432.

HORNSEA Rally (ELHOEX Electronic Hobbies Exhibition) - The Floral Hall, Hornsea, East Yorkshire. Doors open 11am, 10.30 for disabled visitors. Details from Jeff, G4IGY, tel: 0964 533331.

SOUTH DEVON RC Computer and Radio Rally - Hillhead Campsite, Dartmouth Road, Brixham, South Devon. Doors open 10am. Trade stands; bring & buy; raffle; refreshments; unlimited parking; overnight camping; car boot sale (weather permitting). Talk-in on S22.Details from W.T. Trezise, G6ZRM, tel: 0803 522216.

19 OCTOBER

G-QRP CLUB Mini-Convention. Details from G3RJV.

20 OCTOBER

WIRRAL RADIO & COMPUTING FAYRE - Masonic Hall, Manor Road, Liscard, nr Birkenhead, Merseyside. Details from D.G. Clifford, G0NVF, tel: 051-6395922 or Darren Roberts, tel: 061-476 3076.

25/26 OCTOBER

LEICESTER ARS Show - Granby Halls, Leicester. All usual facilities. Details from Frank Elliott, G4PDZ, tel: 0533 871086.

2/3 NOVEMBER

NORTH WALES 5th Radio & Electronics Show - Aberconwy Conference Centre, Llandudno. Opens 10am both days. Entrance fee £1 adults, 50p OAPs, children under 14 free. Details from N.B. Mee, GW7EXH, tel: 0745 591704.

3 NOVEMBER

ELEVENTH NORTH DEVON RALLY - Holsworthy Memorial Hall. Opens 10.30. Bring & Buy stand etc. Talk-in on 2m (S22). Details from K J Nicholls, G8MXI QTHR.

TYNE & WEAR REPEATER GROUP Auction - Fencehouses Community Centre, Fencehouses, nr Chester-le-St, Co Durham. Doors open at 11am for booking in goods. Auction starts at 12.30pm. Details from Ian, G4OCQ QTHR, tel: 091-3840827.

10 NOVEMBER

BARNSLEY & DARC Rally - Willowgarth Senior High School, Brierley Road, Grimethorpe, Barnsley. There has been a rush of traders wanting space and over 580ft of table space has been booked. Details from Ernie, G4LUE, QTHR, tel: 0226 716339 (between 6pm and 8pm please).

MARS/STOCKLAND Mobile Radio Rally - Stockland Green Leisure Centre, Slade Road, Erdington, Birmingham. Trade stands; bring & buy; free parking; admission 50p. Details from Norman, G8BHE, tel: 021-422 9787, Peter, G6DRN, tel: 021-443 1189 or Michael, G4OMP, tel: 021-382 3606.

24 NOVEMBER

WEST MANCHESTER RC Winter Rally - Bolton Sports & Exhibition Centre, Silverwell St, Bolton. All the usual trade stands, societis, bring & buy etc. All at pavement level, with facilities for the disabled. Refreshments available all day, plus bar. Details from Dave, G1IOO, tel: 0204 24104 (evenings only).

1 DECEMBER

BISHOP AUCKLAND Radio & Computer Fair. Details from Ernie, G4TYF, 64 Gurney Valley, Bishop Auckland DL14 8RW, tel: 0388 607500.

GB CALLS

The list below shows special event stations licensed for operation during this month and up to 28 September. It was taken from the HQ computer on 12 August. These callsigns are valid for use from the date given but the period of operation may vary from 1-28 days.

1 SEPTEMBER
GB0LMH Lower Meadow Home
GB0CDZ Coastal Defence Station Z
GB0ATC Air Training Corps
GB0NEW Newton
GB0PD Plymouth Dome
GB2CDY Coastal Defence Yarmouth
GB2HTR Holy Trinity Rothwell

2 SEPTEMBER
GB2SRC Strathclyde Regional Council

4 SEPTEMBER
GB50ATC Air Training Corps

5 SEPTEMBER
GB0CS Chichester Show
GB4RHR Romney-Hythe Railway

6 SEPTEMBER
GB0QRP QRP 'Low Power'
GB0QRP QRP 'Low Power'
GB2GAF Gloucester Air Force

7 SEPTEMBER
GB0RAF Royal Air Force
GB0WMF West Midlands Fire
GB8SPP St Peter & St Paul

8 SEPTEMBER
GB4FMF Friends of Moira Furnace
GB4VMR Vange Mobile Rally

9 SEPTEMBER
GB1BOB Battle of Britain

10 SEPTEMBER
GB0YEZ O'Yez Town Criers

13 SEPTEMBER
GB2BRM Birmingham Railway Museum

14 SEPTEMBER
GB4ATG Amateur Teledata Group

15 SEPTEMBER
GB50ATC Air Training Corps

19 SEPTEMBER
GB2RCC Radio Caravan Camping

20 SEPTEMBER
GB2HCF Hedgerley Country Fair

21 SEPTEMBER
GB0SCA Stakes Community Assoc
GB2FX Felixstowe ARS
GB2LSC Life Saving Centenary

22 SEPTEMBER
GB2BMS Battles Bridge Museum
GB50ATC Air Training Corps
GB8FC SE Version of G8FC

23 SEPTEMBER
GB50SB Shetland Bus 50th Anniversary

28 SEPTEMBER
GB50ATC Air Training Corps

SILENT KEYS

WE HAVE BEEN advised of the deaths of the following radio amateurs:

G0BFP	Mr GE Forge	Dec 90
G0BRD	Mr F Page	02.02 91
G0CIG	Mr WT Aldridge	07.06.91
G0CVQ	Mr PS Porter OBE	18.06.91
G0FCR	Mr JM Litchfield	24.05.91
G0GKM	Mr DC Buckland	15.03.91
G1FIW	Mr H Tonge	
G1OVF	Mr KC Chong	June 90
G1YGX	Mr LR Holloway	02.02.91
G2ASL	Mr E Line	20.05.91
G2BJT	Mr J Taylor	11.07.91
G2BJV	Mr NW Diamond	May 91
G2HDT	Mr T Crouch	29.06.91
G2QO	Mr ACF Dearlove	July 90
G3CDR	Mr G Scholey	23.06.91
G3DBZ	Mr B Pearson	
G3FGR	Mr P Wingrave	July 90
G3FS	Mr HG Whitmore	17.06.91
G3GNN	Mr RS Hollings	20.03.91
G3HSL	Mr S Bennett	
G3MWE	Mr RV Boyce	28.04.91
G3NXM	Mr WG Borland	29.05.1
G3URT	Mr FJ Corbett	05.05.91
G3WHQ	Mr J Kelly	22.06.91
G4AD	Mr W Ripley	
G4DID	Mr HE Thornton	20.06.91
G4GJO	Mr CH Alsop	31.03.91
G4HTA	Mr RN Cuthbert	25.11 90
G4JZ	Mr LF Coursey	
G4LEO	Mr G Finch	31.06.91
G4RJN	Mr JR Thompson	
G4VGV	Mr EE Jeans	
G6PJQ	Mr PJ Brewer	28.01.91
G6VBH	Mr H Newton	June 91
G8AVI	Mr HD Taylor	28.04.91
G8AXC	MR LJ O'Loughlin	05.06.91
G8BHZ	Mr TR Hardeman	
G8KXP	Mr PL Fidgeon	24.05.91
G8NF	Mr H Benson	26.05.91
G8NY	Mr L Luscombe	
G8WWL	Mr HD Kains	05.11.90
GD4XWH	Mr A Birchenough	18.06.91
GI3BTE	Mr R Hall	13.03.91
GM0HDT	Mr WL McArthur	20.06.91
GM3DVX	Mr J Gorrie	12.06.91
RS84879	Mrs MW Hummel	
RS92655	Mr RJ Yeo	19.06.91

CORRECTION

GI0EUW Mr AD Watson (not as printed in July 1991 *RadCom*)

The Last Word

MORSE

For many months, letters about the pros and cons of CW have appeared in *RadCom* and the other radio magazines. I believe that the Morse test should, of course, be kept for those wishing to use CW, but that it should no longer be the method of gaining the Class 'A' licence. I think that a further RAE type exam would be a genuine way of getting on to HF.

I have been an SWL since childhood, and a licensed amateur since 1985 and I enjoy the hobby very much indeed, being particularly interested in the practical side, such as conversion of ex-PMR etc. I would very much like to use HF, but do not have enough time or interest in CW.

I am 36, and I run my own small business, working six sometimes seven days per week. After a 10 hour working day plus one hour or more on the accounts, I've had enough; the last thing on my mind is playing with CW. I say playing because that is what it is, playing; it's only a hobby.

Mr McIntyre, GI3YDH, in his letter in the August issue of *RadCom* suggests that if I don't do the CW it is because I am too lazy and not fit to go out on HF. I find this deeply insulting. Introduce a genuine method of gaining a Class 'A' licence and I will be happy to go for it.

Mr O W Rogers G1FXD

In *The Last Word* of recent months there have been some interesting letters re Morse and, as a relative newcomer to ham radio, I feel that I must also comment.

I personally read the news of a codeless licence with dismay as I frankly cannot see which advantages would accrue. At least with Morse there is better radio discipline and much less of the vital frequency space occupied than by other modes on the already overcrowded bands.

Also, before people rush to write in, I wish they would check their facts first. I can assure G3ENV that the military do still teach and use CW and their operators are classed as *specialists*!

Furthermore, CW is an important means of communication for certain handicapped people. So I can't quite see what G3ENV and G8BZL are trying to say. If they don't want to use CW that's their prerogative, but please don't rubbish those who do. Having qualified for my 'A' I don't think I particularly want to rush back to 'voice'; I can do that by picking up a telephone.

Tom Shelley G0MFV.

ELITIST

I cannot help but contrast the views expressed by G3JDK and GI3YDH (*RadCom* August 1991). G3JDK believes that the use of HF AM will encourage people to hear and find out more about amateur radio.

GI3YDH, on the other hand, believes that unless one passes a 20WPM Morse test, one is not worthy of holding an amateur licence. I have just gone through the ordeal of the Morse test and have passed but I resent this sort of narrow, elitist idea. Doesn't he care about introducing newcomers to the hobby? If he doesn't, it is indeed sad for all of us.

*S A Slater BRS92755, soon to be G0P***

MORSE COSTS LESS

G8BZL asks why we "persist in maintaining such an archaic ritual" as the Morse test. Presumably the object of the Novice Licence is to encourage young people. If you were only 12 or 14, you would be unlikely to afford a commercial rig, but you could have a lot of fun making a simple QRP CW transmitter.

If Morse were excluded from the Novice Licence this option would be denied you and unless you had a generous uncle you might not get on the air at all.

M Lindsay G0IYY

NOT UNMANNED

As a user of all bands, I for one would like to continue to do so and not have to succumb to more noise coming from yet more *unmanned* transmissions.

I, and most one-to-one or group operators, enjoy the challenge of getting a contact at the time of being on-air, and not while asleep or at work. So, to the allocation of yet another frequency to packet radio on any band (UHF, VHF, HF, 2m or 6m), particularly to *unmanned stations*, I say "No, No, No!".

The VHF committee and the RSGB should try and keep an amateur band frequency for the amateur and not let it get lost in the noise of the 'commercial stations' which are getting more and more troublesome.

D G Still G0OOC

GAZUMPED!

The members of the North Cornwall/ Cousin Jacks Contest Group wish to apologise for their absence on VHF NFD to all stations who usually get a DX contact.

After many years of using the same field we found we had been gazumped by another group. Perhaps all clubs could include in their newsletters the Code of Practice printed in *Radio Communication* (p64 December 1990).

"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. Come to an amicable agreement before the event."

Where has the old spirit of Amateur Radio gone? Yours, in more sorrow than anger . . .

A E Warne G3YJX

A BIGGER CAKE?

The suggestion of VHF committee to allocate even more channels for use by packet is pushing the 144MHz bandplan a bit too far. The infringement of the FM simplex S11-S23 would mean a severe loss.

Now that 146MHz+ is being cleared, is there any pressure for an increase in the total frequency allocation, in which case the positioning of all digital or pulse type communications could be given a few discrete channels above 146. Most current sets can be modified to include 144 to above 146MHz.

It may be that in some parts of the country full use is not made of the existing channels, but in other parts these channels can be very busy. I am sure the average amateur would prefer to keep the speech channels clear of digital noise, so I would suggest that more thought and consideration be taken by the VHF communications before damage is done to the present channels.

C B B Farmer G1LDP

AFTERBYRNE

I note that you have seen fit to publish (*RadCom* August 1991 p 5) a cartoon of a beagle riding a space shuttle. I find it regrettable that you should consider printing something so trivial and flippant. Shame, sir! *Radio Communication* is a serious journal, not a comic.

In disgust, Paul Thompson G6MEN

[Sorry Paul, I obviously Byrnt my fingers there - Ed]

50P A QSO

Noting that Graham Layzell (G3AMM) has had 5000 QSOs with just one station (*Last Word*, August 1991) prompts me to mention that this is more than all the QSOs I have ever had world-wide since being licensed in 1947. I have this week logged no:4488 and wonder whether this is perhaps another sort of record?

Activity, though low, has been fairly evenly spread over the 44 year period using full licensed power, phone/CW, all bands 80m to 10m plus a short spell on 2m. At this rate, the average cost per QSO for equipment and licence fee is not insignificant and works out at around 50p! Any advances on that figure?

K B Tackley G3BRQ

Please note that the views expressed in 'Last Word' are not necessarily those of the RSGB.

We reserve the right to edit letters and regret that we can no longer acknowledge them individually but will pass them on to the relevant department.

PACKET BANDPLANNING

One understands that the demand for 2m packet radio is over-stretching the present allocation of frequencies, so it is not unexpected to read that the VHF committee suggests that further allocations should be made in the band, even to the extent of proposing a frequency outside the IARU band plan provisions. This confirms the mania for the mode and the self-importance of many of those who use it. Packeteers should realise that they are in the minority among radio amateurs.

The proposal to make inroads into precious FM channels and into the SSB/CW part of the band is absolutely unacceptable to many of us, and must not be allowed. The 2m band is the basic phone band for most amateurs, particularly B licensees, and in heavily populated parts of the country, very crowded, especially on FM.

By contrast, 70cm, 6m and 4m are under-used and highly suitable for packet. 430MHz is in dire need of a shot in the arm, and expansion of 70cm packet would help enormously.

The item on page 7 of August *RadCom* was probably the most important topic for all B licensees (and most other amateurs) that I have seen since I was first licensed . . . . and what was deemed to be the No:1 story? Incredibly, it was Snoopy. I can only assume that the packet frequency story was given less prominence in an attempt to push the proposals through with a minimum of fuss from the usually silent majority.

Laurie Bradshaw G0MRL

[Can one really describe a quarter-page RadCom item asking for the views of members as "an attempt to push proposals through"? - Ed]

THE ULTIMATE KEY

I thoroughly agree with Dave Ingram's, K4TWJ, review of the G4ZPY 'VHS twin paddle'. Gordon Crowhurst has produced the ultimate key. I was privileged to purchase one of the early keys and I treasure it. Keep up the good work Gordon.

Bob Daw G0MCE

FACT NOT FICTION

I am sorry to write to you on an unsavoury aspect of amateur radio. Late evening tuning 80m SSB, a group was suffering obvious strong interference. My usual disgust was felt listening to this unnecessary behaviour when a strange voice (not in the group) announced the interference "is coming from G3RHM in Greenford".

We must all surely deprecate deliberate interference. However, a far greater crime is to accuse a totally innocent party. If the misguided announcer had applied his callsign to his comment, he would have been robustly reminded of the laws of libel. I would remind inexperienced amateurs, do not guess.

G D Clarkson G3RHM

[Any evidence of deliberate interference should be reported to the Coordinator of the RSGB Amateur Radio Observation Service, Geoff Griffiths, G3STG, and never mentioned over the air - Ed]

SRI NO QSL

I notice in *The Last Word*, August, I am credited as having helped in the QSLing of the QSL Bureau. Somehow, someone has got completely muddled up and I cannot take credit for something I did not do!

The QSL Bureau certainly is a super organisation and long .nay it continue.

Constance Hall G8LY

EAR DAMAGE?

After watching a report on TV about how a personal portable hi-fi can damage your hearing with the music being played, I wonder how many radio amateurs and SWLs are damaging their hearing when they put on headphones and turn the volume up full to pick out DX in the QRM.

Colin Watson BR46598

PAY COLLECT

Re the letter from Ted Allen, G3DRN, (*Last Word*, August), whilst I have always appreciated the excellent work that he has performed during many years, I cannot agree with his suggestion that members who send large numbers of QSLs via the Bureau should pay a pro-rata fee. With respect, I would suggest that if more money is required for the service, then those who pay nothing at present - in other words non-members - should pay a fee for collecting their cards from the Bureau.

E J King G3DCC

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	(ARRL)	£13.54	£11.50
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**
Novice Antenna Notebook	(ARRL)	£8.65	£7.35
Practical Wire Antennas	**(RSGB)**	**£8.65**	**£7.35**
Radio Amateur's Antenna Handbook	(RPI)	£9.12	£7.75
Reflections: Transmission Lines and Antennas	(ARRL)	£14.71	£12.50
Simple Low Cost Wire Antennas	(RPI)	£9.12	£7.75
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**
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**
Tune in the World Kit	(ARRL)	£13.83	£11.75
Novice Student's Notebook	**(RSGB)**	**£4.65**	**£3.95**

CALL BOOKS

Callbook - RSGB 1991/92 (NEW)	**(RSGB)**	**£9.27**	**£6.95**
North American Callbook 1991	(RACI)	£21.78	£18.50
International Callbook 1991	(RACI)	£21.78	£18.50

CLOTHING (MEMBERS ONLY)

RSGB Tee Shirt - Actual size 30 inch	**Reduced to: £2.54**
RSGB Tee Shirt - Actual size 34 inch	**Reduced to: £2.54**
RSGB Tee Shirt - Actual size 36 inch	**Reduced to: £2.54**
RSGB Tie - Blue	**£4.73**
RSGB Tie - Coffee	**£4.73**
RSGB Tie - Green	**£4.73**
RSGB Tie - Maroon	**£4.73**

EMC BOOKS (BREAKTHROUGH)

Interference Handbook	(RPI)	£10.01	£8.50
Radio Frequency Interference	(ARRL)	£6.47	£5.50

EMC FILTERS

Ferrite Ring Toroid (pack of 2)	£5.09	£4.33
Filter 1 - Braid Breaker	£9.42	£8.01
Filter 2 - High Pass for FM Broadcast Band 2	£9.42	£8.01
Filter 3 - High Pass for UHF TV	£9.42	£8.01
Filter 4 - Notch Tuned to 145MHz	£9.42	£8.01
Filter 5 - Notch Tuned to 435MHz	£9.42	£8.01
Filter 6 - Notch Tuned to 50MHz	£9.42	£8.01
Filter 7 - Notch Tuned to 70MHz	£9.42	£8.01
Filter 8 - Six Section for UHF TV	£22.22	£18.89
Filter 10 - Notch Tuned to 28MHz	£9.42	£8.01
Filter 15 - Notch Tuned to 21MHz	£9.42	£8.01
Filter 20 - Notch Tuned to 14MHz	£9.42	£8.01
RSGB Filter Kit	OUT OF STOCK	

GENERAL - TECHNICAL BOOKS

Hints and Kinks for the Radio Amateur	(ARRL)	£5.86	£4.95
Radio Communication Handbook Vols.1+2	**(RSGB)**	**£14.07**	**£11.95**
Solid State Design for the Radio Amateur	(ARRL)	£11.18	£9.50
25 Fun to Build Projects for Learning Electronics	(TAB)	OUT OF STOCK	
ARRL Handbook 1991	(ARRL)	£20.60	£17.50
W1FB Design Notebook	(ARRL)	£6.88	£5.85

HISTORY BOOKS

The Bright Sparks of Wireless	**(RSGB)**	**£10.89**	**£9.25**
History of QRP in USA 1924-1960	(MB)	£10.30	£8.75
The Dawn of Amateur Radio	(G3FNJ)	£13.54	£11.50

HUMOUR

R F Byrne's Unpublished Masterpieces	**(RSGB)**	**£4.12**	**£3.50**

LICENCE EXAMINATION BOOKS

How to Pass the RAE	**(RSGB)**	**£7.65**	**£6.50**
Radio Amateurs Examination Manual	**(RSGB)**	**£7.65**	**£6.50**

LOG BOOKS AND LOG SHEETS

Log Book - Transmitting	**(RSGB)**	**£3.29**	**£2.80**
Log Book - Mobile	**(RSGB)**	**£2.09**	**£1.78**
Log Book - Receiving	**(RSGB)**	**£4.19**	**£3.56**
Log Sheets - HF Contest (100 sheets)	**(RSGB)**	**£5.38**	**£4.57**
Log Sheets- VHF Contest (100 sheets)	**(RSGB)**	**£5.38**	**£4.57**
Log Book Cover	**(RSGB)**	**£5.29**	**£4.50**

MORSE CODE BOOKS AND PRODUCTS

Morse instruction tape, 5 - 10wpm (2 cassettes)	(ARRL)	£11.40	£9.69
Morse instruction tape, 10 - 15wpm (2 cassettes)	(ARRL)	£11.40	£9.69
Morse instruction tape, 15 - 22wpm (2 cassettes)	(ARRL)	£11.40	£9.69
Morse Code the Essential Language	(ARRL)	£6.47	£5.50
Morse Code for Radio Amateurs	**(RSGB)**	**£4.12**	**£3.50**
Morse Code Stage1 - 5wpm	**(RSGB)**	**£5.31**	**£4.51**

MAPS/CHARTS/LISTS/ATLASES

List - Countries/Awards	**(RSGB)**	**£1.47**	**£1.25**
Great Circle DX Map (card for desk)	**(RSGB)**	**£1.47**	**£1.25**
Great Circle DX Map (wall)	**(RSGB)**	**£3.38**	**£2.50**
Locator Map of Europe (card for desk)	**(RSGB)**	**£1.18**	**£1.00**
Locator Map of Europe (wall)	**(RSGB)**	**£2.35**	**£2.00**
World Prefix Map in full colour (wall)	**(RSGB)**	**£3.53**	**£3.00**
Radio Amateur Map of North America	(RACI)	£3.83	£3.25
List - Beacon - Region 1	**(RSGB)**	**£1.47**	**£1.25**
List - Beacon - UK	**(RSGB)**	**£1.47**	**£1.25**
List - Repeater - UK	**(RSGB)**	**£1.47**	**£1.25**
World Atlas	(RACI)	£5.30	£4.50

MICROWAVE BOOKS

Microwave Handbook Vol.1	**Reduced to:**	**£11.06**	**£9.40**
Microwave Handbook Vol.2 (NEW)	**(RSGB)**	**£15.76**	**£13.40**

OPERATING BOOKS AND AIDS

ARRL Operating Manual	(ARRL)	£13.82	£11.75
Amateur Radio Operating Manual (3rd Ed)	**(RSGB)**	**£7.65**	**£6.50**
Complete Dxer	(IDIOM)	£10.00	£8.50
DX Edge (HF propagation aid)	(XANTEK)	£21.91	£18.62
Low Band DXing	(ARRL)	£9.36	£7.95
Meteor Scatter Data Sheets	**(RSGB)**	**£2.94**	**£2.50**
Operating an Amateur Radio Station	(ARRL)	£2.94	£2.50
International VHF-FM Guide	(B&P)	£5.60	£4.75

QRP (LOW POWER) BOOKS

G-QRP Club Circuit Handbook	**(RSGB)**	**£7.65**	**£6.50**
QRP Notebook	(ARRL)	£7.00	£5.95
QRP Classics	(ARRL)	£12.35	£10.50

BOOKS ON SPECIAL MODES

The ATV Compendium (replaces TV H/Book)	(BATC)	£6.47	£5.50
Am. Packet Rad. Link Layer Prot.	(ARRL)	£8.18	£6.95
Computer Net. Conf. Papers 1 - 4	(ARRL)	£18.54	£15.75
Computer Net. Conf. Papers Vol. 5	(ARRL)	£8.18	£6.95
Computer Net. Conf. Papers Vol. 6	(ARRL)	£8.18	£6.95
Computer Net. Conf. Papers Vol. 7	(ARRL)	£8.18	£6.95
Computer Net. Conf. Papers Vol. 8	(ARRL)	£8.18	£6.95
RTTY Awards	(BARTG)	£5.30	£4.50
RTTY The Easy Way	(BARTG)	£4.12	£3.50

continued on next column

Members visiting HQ are advised to telephone first to confirm availability of goods (0707) 49855

RSGB BOOKCASE

A SELECTION OF THE FINEST AMATEUR RADIO PUBLICATIONS DELIVERED TO YOUR DOOR

		NON-MEMBERS	MEMBERS
Slow Scan Companion	(BATC)	£4.12	£3.50
Teleprinter Handbook (2nd Ed)	**(RSGB)**	**£2.35**	**£2.00**
TV for Amateurs	(BATC)	£2.06	£1.75
Your Gateway to Packet Radio	(ARRL)	£10.00	£8.50

SATELLITE BOOKS

Satellites - the first 25 years	(AMSAT UK)	£5.30	£4.50
FO12 Operator's Handbook	(AMSAT UK)	£5.30	£4.50
Satellite Anthology	(ARRL)	£6.47	£5.50
Satellite Experimenters' Handbook	(ARRL)	£14.41	£12.25
Space Radio Handbook (NEW)	**(RSGB)**	**£13.34**	**£11.34**

SHORT WAVE LISTENER BOOKS

Complete SW Listener's Handbook	(TAB)	£19.42	£16.50
Introduction to Weather Satellite Reception	**(RSGB)**	**OUT OF STOCK**	

SOFTWARE PRODUCTS

DX Edge Software for the PC	(XANTEK)	£21.91	£18.62
Software Register	**(RSGB)**	**£1.47**	**£1.25**

VHF/UHF BOOKS

VHF/UHF Manual (4th Ed)	**(RSGB)**	**£12.36**	**£10.50**
Radio Auroras *NEW*	**(RSGB)**	**£7.65**	**£6.50**
All About VHF Amateur Radio	(RPI)	£10.54	£8.95

BACK ISSUES OF RADCOM

Radio Communication bound volumes (1977)	**(RSGB)**	**£22.88**	**£19.45**
Radio Communication bound volumes (1979)	**(RSGB)**	**£22.88**	**£19.45**
Radio Communication bound volumes (1981)	**(RSGB)**	**£24.88**	**£21.15**
Radio Communication bound volumes (1982)	**(RSGB)**	**£24.88**	**£21.15**
Radio Communication bound volumes (1983)	**(RSGB)**	**£24.88**	**£21.15**
Radio Communication bound volumes (1984)	**(RSGB)**	**£24.88**	**£21.15**
Radio Communication bound volumes (1985)	**(RSGB)**	**£24.88**	**£21.15**
Radio Communication bound volumes (1986)	**(RSGB)**	**£24.88**	**£21.15**
Radio Communication bound volumes (1987)	**(RSGB)**	**£24.88**	**£21.15**
Radio Communication bound volumes (1988)	**(RSGB)**	**£24.88**	**£21.15**
Radio Communication bound volumes (1989)	**(RSGB)**	**£24.88**	**£21.15**
Radio Communication bound volumes (1990)	**(RSGB)**	**£24.88**	**£21.15**
Back Issue RadComs	**(RSGB)**	**£3.66**	**£3.11**

CAR STICKERS

Car sticker 'Amateur Radio' (2 colours)	**(RSGB)**	**£1.19**	**£1.01**
Car sticker 'I Love Amateur Radio'	**(RSGB)**	**£1.19**	**£1.01**
Car sticker 'I'm monitoring .5, are you?' (2 col)	**(RSGB)**	**£1.19**	**£1.01**
Car sticker 'I'm on the air with amateur radio' (4 colours)		**£1.19**	**£1.01**
RSGB badge car sticker (members only)	**(RSGB)**		**£1.02**

MAGAZINE SUBSCRIPTIONS

QST Subscription - One year (Airmail)	(ARRL)	£88.24	£75.00
QST Subscription - One year (surface mail)	(ARRL)	£34.41	£29.25
QST Subscription - Two years (surface mail)	(ARRL)	£70.73	£60.12
QST Subscription - Three years (surface mail)	(ARRL)	£103.24	£87.75
QST Subscription - OAP one year (surface mail)	(ARRL)	£30.88	£26.25

(Please wait 90 days before expecting delivery.)
(OAPs please send proof of age with subscription.)

RSGB NEWSLETTER SUBSCRIPTIONS

DX News Sheet (weekly DX news)	**£28.24**	**£24.00**
Connect International (packet radio monthly)	**£11.05**	**£9.39**
Microwave Newsletter (10 issues per year)	**£9.40**	**£7.99**
Raynet News (6 issues per year)	**£7.02**	**£5.97**
6 Metre and Up DXer (monthly)	**£11.05**	**£9.39**

Rates for non-EEC and all other overseas subscribers are available on request from the Membership Services department.

RSGB MEMBERS SUNDRIES (MEMBERS ONLY)

Badge - Callsign - Standard	**£3.57**
Badge - Callsign - Deluxe	**£4.03**
Radio Communication Easibinder (Pre-1990 size)	**£5.59**
Radio Communication Easibinder	**£5.59**
Badge - Lapel - Mini	**£1.27**
Members' headed notepaper (100 sheets) octavo	**£3.05**
Members' headed notepaper (100 sheets) quarto	**£5.74**
Badge - Lapel - Standard	**£1.51**

RAYNET SUPPLIES

Raynet Badge Clip	**£1.50**	**£1.28**
Raynet Car Sticker - Circular	**£1.20**	**£1.02**
Raynet Badge - Embroidered	**£1.20**	**£1.02**
Raynet Manual, 1986 Edition	**£4.12**	**£3.50**
Raynet Badge - Lapel	**£1.50**	**£1.28**
Raynet Poster	**£1.49**	**£1.27**
Raynet Tie	**£6.60**	**£5.61**

SPECIAL MEMBERS' PRICES

★ **Radio Auroras £6.50**

★ **The Bright Sparks of Wireless £9.25**

MICROWAVE COMPONENTS SERVICE

PLEASE NOTE THAT ALL CHEQUES AND ORDERS FOR THIS SERVICE MUST NOW GO TO:

P. SUCKLING, 314A NEWTON ROAD, RUSHDEN, NORTHANTS. NN10 0SY.

TELEPHONE: 0933-411446

HOW TO ORDER

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

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

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

AVAILABILITY. Goods are available less postage and packing from RSGB Headquarters between 9.15am to 1pm and 2pm to 5.15pm Monday to Friday. However you are advised to confirm availability of goods by telephone before visiting Headquarters. We attempt to keep ample stocks of all our sales items, however as this list has to be prepared several weeks in advance we cannot guarantee that any item on this price list is immediately available.

PAYMENT. Payment may be made by post enclosing a cheque or postal order. These should be crossed and made payable to 'Radio Society of Great Britain'. If sending cash please use registered post. You may use your credit card for payment by post or by telephone. We accept Visa and Access (Mastercharge) cards. Our telephone number for orders is **(0707) 49855**. Our Giro account number is 533 5256.

DELIVERY. Goods will be despatched to UK destinations by 2nd class letter post or parcel post, or surface mail to overseas destinations. Please contact RSGB Headquarters for 1st class letter post or airmail rates. Please allow 28 days for delivery.

ORDER FROM:
RSGB SALES (CWO)
Lambda House, Cranborne Road,
Potters Bar, Herts, EN6 3JE

TELEPHONE:
0707-49855

CLASSIFIED ADVERTISEMENTS

Classified advertisements 50p per word (VAT included) minimum £7.00. Please write clearly. No responsibility accepted for errors. Latest date for acceptance — 5 weeks before 1st of issue month. Cheques should be made payable to RSGB.

All classified advertisements MUST be prepaid.

Copy and remittance to:— **Victor Brand Associates Ltd, 'West Barn', Low Common, Bunwell, Norwich, Norfolk, NR16 1SY.**

NB. Members' Ads must be sent to "Members' Ads," RSGB Hq.

FOR SALE

QSLS 1000 £25 (SWLS, Logos, Colour cards, Stamps, Patches. — S.A.S.E. for samples). Currie, 87 Derwent St, Consett, DH8 8LT.

"RAYNET" YELLOW REFLECTIVE TABARDS with "RAYNET" like Police, Ambulance. Medium £10.00, Large £10.50, XLarge £11.00. "RAYNET CONTROLLER" 50p extra. "RAYNET CONTROL" ROAD SIGN 900mm x 600mm tripod mounted £51.50. Non-reversible Battery Connectors Line/panel mounting (10 pairs/pack) £5.00. Mike Watson G8CPH, Ipswich (0473) 831448.

MOSLEY ANTENNAE — All the famous British Manufactured Antennae, direct from us including spares/replacements. Mustang, Elan, TA-33Jnr etc. Full Details shown in our Handbook, price £1.25 refunded upon purchase of Antennae. Mosley Electronics, 196 Norwich Road, New Costessey, Norwich NR5 0EX (Administrative address only).

ANTI-TVI MULTIBAND TRAP DI-POLE AERIALS, Traps, Baluns etc. Data 33p SAE. Aerial Guide £1. G2DYM, Uplowman, Devon EX16 7PH. (03986) 215.

QSL CARDS — Pictorial/Personal designs, single or multi-coloured, raised or flat print. For samples — send L.S.A.E. to Contact Cards, R289, Church Street Blackpool, FY1 3PE. Tel: 0253 752211.

G4TJB QSL CARDS. QSL CARDS printed to your specification including photocards and cartoons. ANTENNAS (whips to beams). SCANNERS, TRANSCEIVERS, POWER SUPPLIES, LINEARS, PREAMPS, CABLE, CONNECTORS. We can supply almost anything (phone and ask) Part exchange welcome. For samples and product list S.A.E. to 24 Portishead Road, Worle, Weston-Super-Mare. BS22 0UX. 0934 512757 & 0850 707257.

QSL CARDS. Gloss or tinted cards. SAE for samples to Twrog Press, Penybont, Gellilydan, Blaenau, Ffestiniog, Gwynedd LL41 4P.

"DISTINCTIVISE" your QSL with a personalised drawing £12. GW3COI, Penrhynbach, Abersoch, Gwynedd. Tel. 2675.

QSL CARDS PRINTED at competitive prices. SAE for samples. Capstan Press, 62 Newark Lane, Ripley, Woking, GU23 6BZ.

ALUMINIUM TUBE. Heavy-duty (scaffold) tube approx. dimensions 20' long, 2" dia, 11/64" (4.5mm) wall thickness. 20' and 10' lengths available @ £1.80 + VAT per ft. C.W.O. Rusper Hire (Crawley) 0293 87 1621 office hours only.

QSL CARDS. Try me for quality and price. SAE for samples. A. W. Bailey (G3YNI). Brean Down Press, 78 Alfred Street, Weston-Super-Mare, Avon BS23 1PP.

SOLAR PANELS. 100mm x 60mm 2.5V 0.2Wp £1.40, 6 for £8.00. 12" x 6" 12V or 6V 1.4Wp £8.50. 12" x 12" 12V 3Wp £15.00. 36" x 12" 12V 5-6Wp £23.50. Prices include UK P&P. Larger mounted panels available. Orders to Bob Keyes GW4IED, 4 Glanmor Cres, Newport, Gwent NP9 8AX.

DIY EASY TO MAKE radio projects. Sae details. G2VF 39 Parkside Avenue, Southampton SO1 9AF.

FERRITE INDUCTORS, toroids, baluns to your spec — SAE to G3PMJ, 11 Merefold, Worsley, Manchester M28 5SX.

FT990 ON DEM? First sample arrived its super. G3LLL's hols Sept/Oct? Phone before calling. Holdings Amateur Electronics, 45 Johnston Street, Blackburn BB2 1EF. (0254) 59595. Closed Thurs.

POLYPROPYLENE ROPE BARGAINS — 220 metre coils! 4mm — £12, 6mm — £17, 8mm — £25. Please add £3 p&p. — Cheques 'Rope-Link,' Cadence, Battle Road, Heathfield, Sussex TN21 9DR.

HANDS-KITS FOR RF CONSTRUCTORS. We produce a range of kits for swr/power meters at hf and vhf/uhf, a milliwatt power meter with integral 50Ω stripline load, and machined directional couplers. Our kits include front panel artwork, pre-calibrated meter scales, knobs and cases, for that professional finish. Please ring or write for our product summary. Hands Electronics, Tegryn, Llanfyrnach, Dyfed SA35 0BL. Tel: 023977 427.

REALISTIC SCANNER MANUALS £20 including P+P. Both new and secondhand scanners in stock. Link Electronics (0733) 345731.

ELECTRONIC PADDLE KEY. No moving parts, suitable for rigs with in-built or separate keyer, £39 + p&p. For further details ring Keith (G0PTT) 0590 673656.

VHF ANTENNA TUNING UNITS. 6m, 4m, 2m. Improve your VSWR! £39.75 each including post. Empcom Systems Limited. 7 Robinia Close, Waterlooville PO7 8HF.

SHORTWAVE-CENTRE. an Aladdin's cave. Amateur; marine; CB; testgear; (established 1952) G3EKX. 42 Halvarras Rd, Playing Place Village, Truro. (0872) 862291. 9-5pm closed Sundays.

RSGB AMATEUR RADIO INSURANCE SCHEME

ALL RISKS" INSURANCE for portable/mobile/base station amateur radio and ancillary equipment. A service for RSGB members only. Also public liability and equipment insurance for affiliated clubs and societies. Details and leaflets from Sarah Baylis or Jennifer Lawson. Amateur Radio Insurance Services Ltd. 4a Russell Hill Road, Purley, Surrey CR2 2LA. Tel: 081-660 0820 or Fax: 081 660 9222.

COMPUTER SOFTWARE HARDWARE

PC COMPATIBLE SOFTWARE. Large SAE to Charles Crane G4YFN, 2 Pimento Drive, Earley RG6 2GZ.

G4UXD's CELEBRATED MORSE TUTOR: BBCs, IBM-PC, compatibles. Adjustable speed, delay, letter frequency, 100 tests, attach your key, +++++! £8.95 disc. SAE details/free trial! D. Brandon, 1 Woodlands Road, Chester CH4 8LB.

G3WHO AMTOR/RTTY/CW MK II BBC B/Master. Full feature, split screen, memories, mailbox, selcall, etc. Eprom £27. P. J. Harris, 10 Appleby Close, Great Alne, Alcester, Warwickshire B49 6HJ. Tel. 0789 488377.

G4TYF LOGS, PC compatible, Amiga, Commodore, BBC. Try before you buy. SAE for free demo disk. State size. 64 Gurney Valley, Bishop Auckland, DL1 8RW. 0388 607500.

ATARI ST. AMTOR RTTY CW by G4BMK. Split screen transceive for hi-res mono ST and dumb TU like ST5. Plus ...

IBM PC CLONES. FAX SSTV RTTY AMTOR CW. Your selection of modes supplied in one comprehensive program. SAE for details. Grosvenor Software (G4BMK), 2 Beacon Close, Seaford, Sussex BN25 2JZ, (0323) 893378.

COMMODORE 64, AMIGA SSTV/FAX. L.S.A.E. catalogue. Electek, 41 Queensway, Soham, Cambridgeshire CB7 5BU.

HOLIDAY ACCOMMODATION

FLYING FROM GATWICK? Stay at Mill Lodge Guest House. 4 minutes from airport. Transport available. Telephone (0293) 771170.

CORNWALL. FARMHOUSE ACCOMMODATION. B&B, EM, six berth caravan. Set in a secluded location near Truro. Tel John (G4LJY) 0872 863849.

NORTH WALES. Elevated site, B&B, caravan, bunkhouse, camping, open all year, use of shack. "Tynrhos", Mynytho, Pwllheli, LL53 7PS, (0758) 740712.

SRI LANKA ideal for holidays, leisure and pleasure, honeymoon, anniversary, retirement, adventure and hobby. Beach hotels, bungalows, rented holiday houses, rooms, cabanas etc. Phone 081-570 9322 up to 9pm.

MISCELLANEOUS

COURSE FOR CITY & GUILDS, Radio Amateurs Examination. Pass this important examination and obtain your licence, with an RRC Home Study Course. For details of this and other courses (GCSE, career and professional examinations, etc) write or phone — THE RAPID RESULTS COLLEGE, Dept JT103, Tuition House, London SW19 4DS. Tel: 081-947 7272 (9am-5pm) or use our 24hr answerphone service 081-946 1102 quoting JT103.

HOME VIDEO CAMERAMEN — Send your friends overseas a videotape. We convert your videotapes between NTSC/PAL/SECAM. Details from GM8NVG, STABLE RECORDINGS, Lochend, BEITH, Ayrshire, KA15 2LN. 0505 85488.

HEATHKIT UK spares and service centre. Cedar Electronics, 12 Isbourne Way, Broadway Road, Winchcombe, Cheltenham GL54 5NS. Tel: 0242 602402.

THE ANTENNA EXPERIMENTER'S GUIDE by Peter Dodd G3LDO. Over 200 pages and 120 illustrations on: Designing antennas and optimising existing ones, building RF test equipment, antennas and masts, use of computers in measurement and modelling. £8.90 + p&p 78p UK, £1.20 overseas surface mail. Visa/Access. Available from 37 The Ridings, East Preston, West Sussex BN16 2TW (0903) 770804.

RAE IN 8 DAYS! Radio School (G3JMG), 33 Island Close, PO11 0NJ. Tel: 0705 462462 (eves), fax 461449.

PATENTS, TRADE MARKS AND DESIGNS. Literature on request. Kings Patent Agency Limited, established 1886. 73 Farringdon Road, London EC1M 3JB. Telephone 071-248 6161. Telex 883805 and Fax 071-831 9306 (G5TA, G3ZZE).

RAE COURSES. TAUNTON: Somerset College of Arts and Technology, Wellington Road, Taunton are offering the RAE Course for the May exam. It will be held on Tuesday evenings from 7.00 to 9.00 pm and the Tutor will be Peter Upton G7CCV. For enrolement details, please telephone: 0823 283403, Ext. 373 or Ext. 211.

WANTED URGENTLY Marconi 2951 RT Test Set or similar, plus any used two-way radio equipment. Tel: 0256 381528.

HOLIDAY ON RARE DX ISLAND

"If it is good enough for the Square bashers, it must be good enough for you!"

(See March '90 RadCom)

Work the pile-ups from the comfort of our Holiday Guest House situated on GOZO (JM76AB). Included in the price is use of *Fully Equipped Shack. All* travel and accommodation arranged. All paperwork included for your 9H Call Sign. For further details please phone or write to:

T. Menzies, GM/9H5LY, 31 Pentland Terrace, Edinburgh, Scotland, EH10 6HD. Tel: 031-447 3219 Fax: 031-229 3111

J. BIRKETT

25 The Strait
LINCOLN LN2 1JF
Tel: (0522) 520767

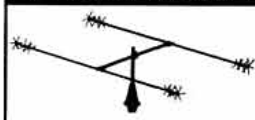
VALVEHOLDERS. B7G less skirt @ 25p. B7G with skirt @ 25p, B8G @ 40p, B9G less skirt @ 25p, B9G with skirt @ 25p, UX5 moulded @ 30p, UX5 ceramic @ 75p, Octal moulded @ 30p, B9D (PL504) ceramic @ 35p, VCR139 @ 50p, British 5 or 7 pin @ 35p.
LOW POWER RF TRANSISTORS. BFW16A @ 75p, 2N4427 @ £1.20, 2N3866 @ 85p, 2N3553 @ 85p.
TRANSISTORS. Similar to MRF455 with data @ £9.95, RF Power 2N4430 @ £5.95, BLY97 @ £3.
MOTOROLA RF TRANSISTORS. With house number similar to MRF455 with data @ £9.95.
VOLTAGE REGULATOR. MC78T12CK 12 Volt 3 Amp @ £1.65, LM39308 8 Volt 1 Amp @ 50p.
CERAMIC SWITCH. 3in dia. 1 pole 3 way plus 1 pole 7 way 3 bank will switch at least 1Kw @ £7.95.
GaAS FETS. 24GHz Red Spot @ £2.50, 18GHz Black Spot @ £1.85, Out of Spec. GaAS Fets. 18GHz @ 3 for £1.99.
FETS. 2N3819 @ 25p, J304 @ 20p, J230 @ 20p, 2N3823 @ 30p, 2N3824 @ 30p, dual gate, 3N201 @ 80p, 3SK88 @ 60p.
REDIFON BOOT MOUNTING TRANSCEIVER. FM with loudspeaker and control box, mid band @ £6.95 (p&p £4).
BURNDEPT HAND HELD TRANSCEIVER 428MHz with conversion data @ £28 (p&p £2).
MOTOROLA SINGLE CHANNEL UHF DASH MOUNTING TRANSCEIVER. Less mike @ £25 (p&p £4.)
VHF COAXIAL CHANGEOVER RELAY. Same as RS346-211 @ £7.95.
MITSUBISHI RF POWER MODULE. 12 volt 28 watt 156MHz with data @ £17.95.
ACCESS and BARCLAYS CARDS ACCEPTED. P&P 60p under £5, Over Free, Unless otherwise stated.
C.M. HOWES KITS Available By Post and For Callers.

"LOUDENBOOMER LINEAR"

400 watts output on all 9 HF bands. Internal mains PSU. Total weight 7kg. 14" wide, 10" deep and 5" high. Small size, compatible with modern rigs. FT747 etc. Drive with any 50-100 watt O/P rig. Dip C1 and Load C2 for the power gain of a beam, on all the bands and right up to the band edges. Now ex-stock and only £549 + VAT. For more details contact Steve Webb, G3TPW at

SRW COMMUNICATIONS LTD
ASTRID HOUSE, The Green, Swinton, MALTON, N. Yorks, YO17 0SY
Tel: Malton (0653) 697513

THE AMATEUR RADIO SHOP



Authorised dealers for Kenwood, Yaesu, Alinco, J. Beam, etc

THE G4MH MINI BEAM 20.15.10m
Sae for details

Selection of secondhand equipment

2/4 CROSS CHURCH STREET, HUDDERSFIELD
WEST YORKS HD1 2PT Tel: 0484 420774

VALVES VALVES VALVES

The following valves in matched pairs 6JS6/C, 6KD6, 6JB6/A, 6LQ6, 6HF5, 6146A, 6146B. **YES** the 6JS6/C is Japanese and works in the FT101. Most amateur radio valves including difficult to obtain types **EX STOCK.** Quotations without obligation. If we don't stock your type we may be able to import for you, PLEASE ENQUIRE, REMEMBER over 200 types **EX STOCK.** Sae for list. 'Phone for assistance re types suitable for your equipment. USA and Jap manufacture of popular types available.

DON'T DELAY 'PHONE TODAY 0457 836114, (2pm to 9.30pm)
Wilson G4AZM, Peel Cottage, Lees Road, Mossley, Lancs OL5 0PG

G4ZPY PADDLE KEYS

INTERNATIONAL

WORLD LEADERS OF HAND BUILT MORSE KEYS
WITH A SELECTION OF 32 FOR YOU TO CHOOSE FROM

Phone your Order or send SASE or 2 IRC's for our Brochure.
41 Mill Dam Lane, Burscough, Ormskirk, Lancs L40 7TG.
Phone No. 0704 894299.

EARLY WIRELESS WANTED

TOP CASH

FOR OLD RADIO EQUIPMENT, CRYSTAL SETS, HORN SPEAKERS, EARLY VALVES, CLANDESTINE RADIOS, EARLY DOMESTIC RECEIVERS, ANY CONDITION.

JIM TAYLOR G4ERU
5 Luther Road, Winton, Bournemouth. Tel: 0202-510400.

PROCOMM (UK)

Cash paid for used Amateur Equipment. Part exchange welcome.
SAE for stock list

9am-9pm, Mon-Sat. 0235 532653. 0860 593052.

Callers by appointment please: 102 Larkhill Rd, Abingdon, Oxon.

CASH — CASH — CASH — CASH

RECEIVER SPECIAL DEALS

EDDYSTONE MODEL 990S 230Mhz-880Mhz AM-FM

SPECIAL FOR 1 MONTH ONLY

AF-IF-RF gain controls, three switchable bandwidths 6Mhz-1Mhz-FM, fully tunable, inbuilt calibrator, AM and FM video outputs, IF output, tested and fully aligned in excellent condition. With 19in rack mounted adaptor plates. Supplied complete with service manual.

£135 INCL DELIVERY (UK MAINLAND ONLY)

EDDYSTONE 730/1A 480Khz-30Mhz

AM-CW-SSS (BFO control), switched selectivity, variable crystal phasing, inbuilt calibrator. Tested and fully aligned in excellent condition. Supplied complete with 730/4 manual.

£150 INCL DELIVERY (UK MAINLAND ONLY)

RA17 HF RECEIVERS

Fully refurbished and aligned. Excellent top spec receiver. Incl service manual.

£275 INCL UK MAINLAND DELIVERY

RACAL RA117 HF RECEIVERS

Up-rated version of 17. Added features, improved response, fully refurbished and aligned, excellent top spec ex MoD receiver.

£335 INCL UK MAINLAND DELIVERY

CLARK SCAM MASTS
FEW STILL AVAILABLE £275

ALL THIS AND MUCH MUCH MORE AT OUR 3 ACRE DEPOT IN NOTTINGHAM.
WE ARE OPEN 6 DAYS A WEEK. CALLERS ALWAYS WELCOME
MON-FRI 9am-6pm ... SAT 8am-4pm

Please Phone for up to the minute Details/stock info...
MAIL ORDER A PLEASURE

ACCESS ... VISA. ORDERS IMMEDIATE DESPATCH ON PRE 4PM ORDERS.

ANCHOR SURPLUS LTD
THE CATTLE MARKET
NOTTINGHAM NG2 3GY

TELE: (0602) 864902/864041 ... FAX: (0602) 864667

AMPLE FREE PARKING (EXC. SAT.) ... EASY ACCESS M1, J24, J25, J26.
BR STN & CITY CENTRE ½ MILE

CABLES & CONNECTORS

Westflex 103, low loss air spaced 50 ohm	95p/m
RG213U, (UR67), Mil spec, 50 ohm low loss	70p/m
UR43, 5mm dia, 50 ohm, single centre	25p/m
UR76, 5mm dia, 50 ohm, stranded centre	25p/m
RG58CU, 5mm dia, 50 ohm, stranded centre	25p/m
RG174U, 2.3mm, 50 ohm, miniature coax	30p/m
UR95, 2.3mm, 50 ohm, mini nylon coax	30p/m
UR111, 2.3mm, 75 ohm PTFE mini coax	40p/m
UR57, 10.3mm, 75 ohm low loss coax	70p/m
UR70, 6mm dia, 75 ohm transmitting coax	30p/m
Double screened, 75 ohm coax, 8mm dia	40p/m
UHF low loss TV downlead, 75 ohm	20p/m
75 ohm twin balanced feeder, 400 w PEP	20p/m
300 ohm standard ribbon	18p/m
RG62AU, 6mm dia, 95 ohm coax	50p/m
Single core screened cable, 2.3mm dia	12p/m
Two core screened cable, 5mm	25p/m
3 core mains, 5 amp, cable	20p/m
5 core rotator cable, medium duty	30p/m
6 core rotator cable, heavy duty	45p/m
8 core rotator cable, heavy duty	65p/m
14 SWG HD copper **25p/m** 16 SWG HD copper	20p/m
PVC coated AE wire, light duty	8p/m
Red/black DC power cable, 8 amp	30p/m
PVC coated AE wire, heavy duty	12p/m
NEW UR67 50 ohm HD with robust outer sheath	90p/m
NEW 75 ohm HEAVY DUTY TWIN Balanced feeder	60p/m
NEW 300 ohm HEAVY DUTY SLOTTED Feeder	60p/m
NEW 16swg stranded copper aerial wire	30p/m

Postage on cables up to 20m £2.50, over 20m £4.00

CONNECTORS

N plug, 10.3mm, GREENPAR	£2.60	ditto for 5mm	£2.60
N line socket, GREENPAR	£2.50	only in 10.3mm size	
N4 hole sq chassis socket			£2.00
BNC plug, GREENPAR 5mm	£1.20	ditto 10.3mm	£4.00
N SKT to N SKT line adaptor	£3.00	ditto N plug to N plug	£3.50
N socket to BNC plug adtr	£3.00	BNC plug to N socket	£3.00
PL259 plug, GREENPAR, PTFE/silver	£1.20	(P/P on connectors	75p)
Special N plugs for W103	£5.00	Polyprop egg insulators	70p
Self amalgamating tape	£3.80	4" dog bone insulators	70p
Dipole centre boxes	£2.50	Half kilo multicore solder	£5.00

N CONNECTORS FOR ANDREWS 4/50 and 5/50, Cellflex ⅞th cable etc — SAE for special surplus lists.

POSTAGE EXTRA ON CONNECTORS etc of 75p
30p stamps for complete lists. Trade Prices to Est. Retail Outlets.

W.H. WESTLAKE

WEST PARK, CLAWTON, HOLSWORTHY, DEVON EX22 6QN

PHONE 0409-253758

NOTICE TO OUR READERS

Although the staff of Radio Communication take reasonable precautions to protect the interests of readers by ensuring as far as practicable that advertisements in our pages are bona fide, the magazine and its publisher, The Radio Society of Great Britain, cannot give any undertakings in respect of claims made by advertisers, whether these advertisements are printed as part of the magazine, or are in the form of inserts.

While the publishers will give whatever assistance they can to readers having complaints, under no circumstances will the magazine accept liability for non-receipt of goods ordered, or for late delivery, or for faults in manufacture. Legal remedies are available in respect of some of these circumstances, and readers who have complaints should address them to the advertiser or should consult a local Tradings Standards Office, or a Citizen's Advice Bureau, or their own solicitor.

Readers are also reminded that the use of radio transmission equipment is subject to licencing and the erection of external aerials may be subject to local authority planning regulations.

ADVERTISERS INDEX

NEXT COPY DATE
The advertisement copy date for November is 16th September 1991

MEGA MULTIBAND!

IC-970E, 144/430MHz BASE STATION

Designed for the serious operator on the 144, 430 and 1200 MHz bands, Icom's new IC-970E has up-to-date technology for DX, digital and satellite communications. The IC-970E is supplied as an all mode dual-bander for 144MHz and 430MHz bands. Optional units expand its capabilities to 1200MHz or wideband receiving from 50-905MHz.

Communications via satellite has never been easier, the IC-970E automatically tracks uplink and downlink frequencies as the tuning control is rotated. There are also ten specific memory channels for satellite frequencies.

The dual-band watch allows you to receive both MAIN and SUB band audio simultaneously. There are multiple scanning systems on MAIN and SUB bands plus 99 memories, an easy to read central display and Icom's DDS system. Features that go together to make the 970E one of the most comprehensive multi-band transceivers available.

For more information and your local Icom dealer post to:
Icom (UK) Ltd. Dept RC Sea Street Herne Bay Kent CT6 8BR
Telephone: 0227 741741 (24hr). Facsimile: 0227 360155

Name/address/postcode.....

.....

Call sign:.....**Tel:**.....**Dept: RC**

ICOM

THE NEW

FT-1000 FOR DYNAMIC DX

YAESU

The FT-1000 is a new top of the range all mode h.f. transceiver that is the result of more than 25,000 hours of intensive research by Yaesu's top design engineers. They have adopted a completely new approach to the application of digital and RF technology. The extensive use of surface mounted components has allowed *six* microprocessors and *five* Direct Digital Synthesisers to be integrated with a simple to use operator interface to give a highly reliable full featured transceiver that has been optimised for serious h.f. applications. Please write or call SMC or your local authorised Yaesu dealer for the full specifications of this dynamic new transceiver and discover how you can open up the bands.

YAESU

UK Sole Distributor

South Midlands Communications Ltd
S.M. House, School Close,
Chandlers Ford Industrial Estate,
Eastleigh, Hants SO5 3BY
Tel: (0703) 255111

Prices and specifications are subject to change without notice