Radio Communication

The Journal of the Radio Society of Great Britain

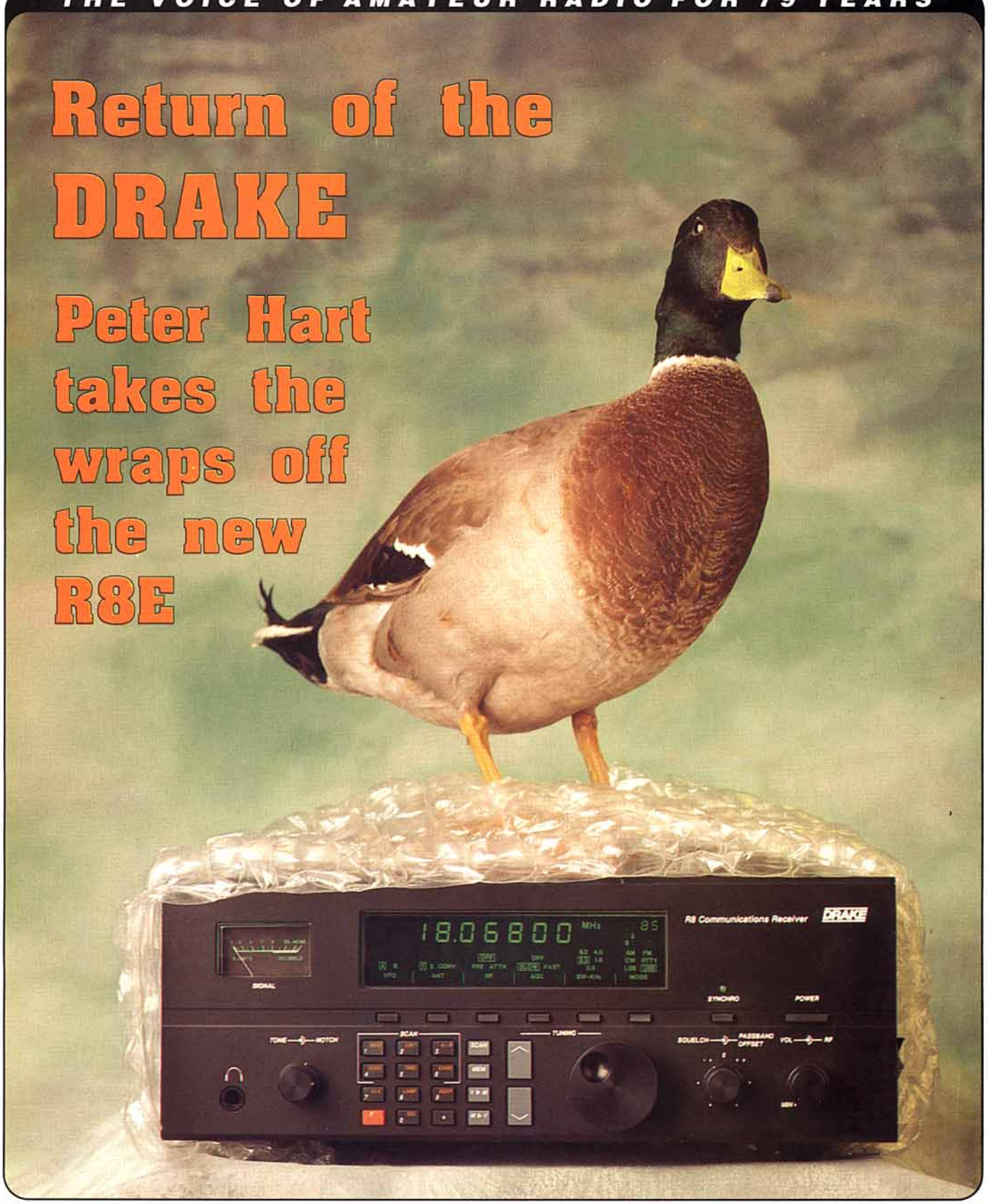
February 1992

Volume 68 No 2

THE VOICE OF AMATEUR RADIO FOR 79 YEARS

Return of the DRAKE

Peter Hart takes the wraps off the new R8E



KENWOOD

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

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

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

TS-450S Features

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

TS-450S £1,150

TS-690S £1,325

LOWE ELECTRONICS LIMITED

Chesterfield Road, Matlock, Derbysh[illegible] Tel: 0629 580800 Fax: 0629 580020

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

Sole Appointed UK Distributor for KENWOOD Amateur Radio

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.

Editorial Board

George Benbow, G3HB
Chairman, Technical and Publications Advisory Committee

Mike Dennison, G3XDV
Managing Editor

ADVERTISING
All display and classified advertising enquiries (excepting Members' Ads) should be directed to our advertisement agents:
Victor Brand Associates Ltd.,
'West Barn', Low Common,
Bunwell, Norwich,
Norfolk, NR16 1SY.
Tel: 095 378 8473
Fax: 095 378 8437

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

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

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

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

RSGB membership at 30 June 1991: 34,581

Radio Communication

Preserve Your RadComs by . . .

* **Buying an Easibinder to keep a year's-worth of magazines neat and safe, or**
* **Buying a bound volume. These are very smart, looking rather like an encyclopedia volume, and**
* **Adding the Annual Index which can be found in the centre of this month's edition.**

NEWS AND REPORTS

4 THE RADCOM LEADER - From the President
The new RSGB President Mr J T Barnes, GI3USS, explains how the Society will consult its members on the way forward.

5 NEWS AND REPORTS
A Drive for Life ● Operation Euro-Baby Gold Diploma Rules ● Net Frequency ● HQ News ● RMG Vacancy ● Stolen ● Third Party - Your Views needed ● Attn Repeater Keepers ● Good News for Affiliated Clubs ● Soviet Amateurs Against the Coup ● Thanks from the Lithuanian president ● Rail Crash ● London AGM ● Host the AGM

8 AMATEUR RADIO INSURANCE SERVICES
Insurance of amateur radio equipment via ARIS has been a benefit of RSGB membership for some time. This article explains what is available and answers some commonly asked questions about the service.

TECHNICAL FEATURES

30 A SOLID STATE HF LINEAR AMPLIFIER
Mike Grierson, G3TSO, concludes his article on the solid state linear which won't break the bank.

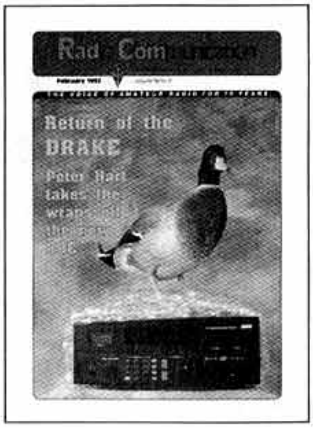
33 THE PETER HART REVIEW: The Drake R8E Receiver.
We welcome the Drake Company back to Amateur Radio by asking Peter Hart, G3SJX, to put their new receiver through its paces. A colour feature.

36 TECHNICAL TOPICS
Resonant Meander Antennas ● Toroidal Cores, Baluns and ATUs ● 50-Ohm "Quad Loop" Antenna ● More on G2DAF Linears ● Eddystone Users Group ● Elevated Radials versus Buried Earths ● Digital Communications Receivers ● Old Oscilloscopes and Two-tone Testing Again ● Tips and Topics.

45 AN IMPEDANCE DIAGRAM FOR TRANSMISSION LINES
The conclusion of Geoffrey Billington's, G3EAE, description of illustrating the complex impedances of transmission lines, and how to calculate them.

50 EUROTEK - ideas from abroad
Erwin David, G4LQI, presents edited highlights of two articles on frequency calibration, translated from the original Dutch and German texts in *Electron* and *CQ-DL*.

51 PLOTTING OF MAGNETIC DEVIATION AND AURORA
Predict the next aurora by using a jam jar! DJ Smillie, GM4DJS, explains how in the first of a two-part article. A colour feature.



COVER PICTURE:

It's a quacker! The new R8E receiver from Drake, available from Nevada Communications. See Peter Hart's comprehensive review on page 33.

REGULAR ARTICLES

15 HF NEWS

17 VHF/UHF NEWS

20 QSL

21 PROPAGATION NEWS

25 SWL NEWS

26 NOVICE NEWS

58 EMC

60 QRP

66 CONTEST NEWS

71 MEMBERS' ADS

74 CLUB NEWS

75 RALLIES AND EVENTS

75 GB CALLS

75 SILENT KEYS

76 RSGB BOOKCASE

79 THE LAST WORD

82 INDEX TO ADVERTISERS

CENTRE PAGES: INDEX TO VOLUME 67

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
Fax: 0707 45105. Telex 9312 130923 (RSGB)
Electronic Mail Via Dialcom/Telecom Gold: 87 CQQ083

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: J T Barnes, GI3USS
EXECUTIVE VICE-PRESIDENT: Vacant
IMMEDIATE PAST-PRESIDENT: E J Case, GW4HWR
HONORARY TREASURER: P D Tucker, FCA, ATII, GU4DWZ

ORDINARY MEMBERS OF COUNCIL
J Bazley, G3HCT
G L Benbow, Msc, CEng, MIEE, G3HB
N Roberts, BSc, C.Eng, MBCS, MIEEE, G4IJF
J D Forward, MBIM, G3HTA
G R Jessop, CEng, MIEE, G6JP
T I Lundegard, G3GJW
M H Claytonsmith, G4JKS
E J Allaway, MB, chB, MRCS, LRCP, G3FKM

ZONAL MEMBERS OF COUNCIL
Zone A: P R Shepperd, G4EJP
Zone B: J Allen, G3DOT
Zone C: R Horton, G4AOJ
Zone D: P E Chadwick, G3RZP
Zone E: C Trotman, GW4YKL
Zone F: I J Kyle, GI8AYZ
Zone G: I D Suart, GM4AUP

HONORARY OFFICERS
Observation service co-ordinator: Geoff Griffiths, G3STG
HF Awards manager: Bill Ricalton, G4ADD
VHF Awards manager: Ian L Cornes, G4OUT
Chief morse test examiner: Roy Clayton, G4SSH
HF manager: Martin Atherton, G3ZAY
Microwave manager: C W Suckling, G3WDG
Trophies manager: Bob Harrison, G4UJS
VHF manager: Dave Butler, G4ASR
Society historian: G R Jessop, G6JP
Intruder watch (IARUMS): David Owen, G0OES
Morse practice co-ordinator: Mike Thayne, G3GMS
Audio visual library co-ordinator: David Simmonds, G3JKB

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

ANNUAL SUBSCRIPTION RATES
Corporate Members: UK and Overseas (*Radio Communication* sent by surface post): **£30.00**
UK associate member under 18: £15.00. Family member: £12.00
Corporate (Concessionery): £25.00 over 65 or full time student under 25. (Applications should provide proof of age at last renewal date and/or include evidence of student status.
Affiliated club or society/registered group (UK): £15.00 (including *Radio Commmunication*). (Subscriptions include VAT where applicable.)

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

Membership application forms are available from RSGB HQ

Members Hotline and Book Orders:
0707-49855

The Radcom Leader

FROM THE PRESIDENT

AS I WRITE THIS some days before Christmas I am of course not yet President - only that person in limbo, the President Elect.

I consider it a great honour and privilege to have been elected President of the Society and am very conscious of the heavy responsibility which the position carries. It is some 25 years since a GI President was installed - Barney Patterson, GI3KYP, holding office in 1967. We in GI have had more than a passing interest in one other President: Willie McClintock, G3VPK, who hails from Ballymena in Co Antrim although he has been resident in England for many years. For a small geographical area with a smallish amateur population we have not been too badly represented in the Presidential Office.

The Society now stands at a cross-roads and has to decide which way is forward. Council has agreed that we require a plan to plot our way forward to decide where we should be going - and how best to achieve the desired goal.

For some time, I and others have been asking the question - "What exactly is the purpose of the Society and what is it in existence to achieve?" We are not merely in existence to produce, market and sell books, hopefully at a profit. We are not merely in existence to produce *RadCom*, provide an outstanding QSL Bureau, liaise with the DTI for increased privileges and reduced restrictions on operating and all of the activities which make up the operations of the Society.

Our *Memorandum and Articles of Association* lists as one of the Society's main objects "to promote general advancement of the science and practice of radio communication and to facilitate this exchange of information and ideas on these subjects among its members".

These we already do to a greater or lesser extent, although the almost universal use of 'black box' technology has limited the number who are actively engaged in experimentation and innovation. This is not a criticism, just a statement of fact; the hobby has become more of an operating than a building and developing hobby. As such it is necessary that, if we are to be mainly operators, we develop our operating skills and practices to fit in with the increasing difficult EMC environment which most of us find we have to live in nowadays.

To obtain guidance on the best way forward Council is seeking views from suitably qualified members and others, and proposes to employ various means leading up to a weekend seminar probably in late June or early July with the aim of producing a Corporate Business Plan.

A professionally produced survey form will be sent out to all RSGB members and possibly to non-members during the first months of 1992. This will be your opportunity to shape the future of the Society - your Society. It does not just consist of RSGB Council, RSGB HQ with its hard-pressed full-time staff; you, the members, *are* the *Society*.

Changes to the way Council is elected and its role are envisaged, with a real possibility of an Executive Board smaller in number than Council and meeting monthly effectively to manage the affairs of the Society and to implement policy laid down by Council. Council should concern itself more with broad policy and leave the detail and minutiae (which at present bog down its lengthy meetings) to the Executive Board.

There are great challenges and opportunities ahead. We must meet the challenges and grasp the opportunities.

J T Barnes, GI3USS,
President

NEWS & REPORTS

● ON SAT 29 Feb, GB1ECD will operate from Derby's Eagle Shopping Centre on 144MHz. The operators are associated with the hospital broadcasting charity *Radio Link* which receives sponsorship from the Eagle Centre's owners CIN Properties Ltd. Details from G1UJX, QTHR.

● GB2GM IS the permanent special event call issued to a group running a museum close to a site used by Marconi for transatlantic tests at Poldhu, Cornwall. GB2GM was first aired on 12 December, the 90th anniversary of Marconi first receiving signals from across the Atlantic.

● NEW CLUB calls G0PPS and G0PRU have been issued to the Prudential Amateur Radio Society, a club for those associated with the well-known insurance company. Details of membership from Publicity Manager John Wimble, G4TGK, QTHR.

● IARU REGION III Secretary Masayoshi Fujioka, JM1UXU, has been awarded the 4th Class Order of the Sacred Treasure by His Imperial Majesty the Emperor of Japan.

● SSL, WHICH takes over amateur licensing from the RALU in April, currently handles work for the BBC (TV licensing) and for the Driver and Vehicle Licensing Agency

● RSGB MEMBER Sir Brian Rix, CBE, G2DQU, was made a Life Peer in the 1992 new year honours list in recognition of his work for the mentally handicapped.

● IN INDIA, the Central Board of Secondary Education has introduced amateur radio as a "Socially Useful Producting Work" subject.

● AT 8 DECEMBER, the latest callsigns issued were in the G*0RF* and G*7LF* series, and Novice calls were in the 2*0AB* and 2*1AI* series.

● LOOK ON 14,282 and 21,282kHz, 0715 and 1700GMT, for ZS6NFA, a news programme aimed at promoting amateur radio in developing countries.

● GB0PF WAS operated on 29 Nov - 1 Dec by RAF Finningley ARS to commemorate the departure of one of the Pilgrim Fathers from Austerfield, nr Doncaster.

● 26-YEAR-OLD Bill Carter, KM5R, of San Antonio, died last November following a fall from his 60ft tower. He was not wearing a safety belt.

Operation Euro-Baby will raise £250,000 to save premature babies

A Drive For Life

RICHARD HOOK, G8LVB, will be spending part of this Spring on a whistle-stop tour of Europe. The aim of the 'Drive For Life' is to raise £250,000 for vital life-saving equipment needed to monitor prematurely born babies in the Neo-Natal Unit at St Mary's Hospital in Portsmouth. Each year over 700 babies are born prematurely in the Portsmouth area.

Early in the morning of 22 April, Richard and three of his colleagues will be waved off from St Mary's by the Lord Mayor of Portsmouth and head north on the first leg of their record-breaking journey. They will be met at the House of Commons by the Prime Minister and the Lord Mayor of Westminster.

From London, the four will drive to the other eleven European Community capital cities: Dublin, Brussels, The Hague, Copenhagen, Bonn, Luxembourg, Rome, Athens, Madrid, Lisbon and Paris. During the hectic sixteen-day 7,200-mile journey, they will be greeted by Mayors, Presidents, Prime Ministers and even Pope John Paul II. For the trip they have been loaned a Mercedes 300TD Estate by David J Sparshatts Ltd of Portsmouth.

The Operation Euro-Baby team: Travel Consultant Kevin Taylor; Police Communications Officer Richard Hook, G8LVB; and Police Officers Tony Sinclair and Alan Hartill. The furry chap in the middle is mascot Whitie.

Amateur radio activity is planned from as many countries as possible using an Alinco DJ-F1E 2m hand-held kindly donated by Waters and Stanton. In addition to being able to use this rig on the various repeaters on their route, the team will use it to receive the 'Volmet' weather using the in-built air-band receiver. Publicity has been under way for some months now using the callsigns GB8DFL and GB8OEB.

Operation Euro-Baby was the idea of Kevin Taylor who saw the hard work and dedication of the neo-natal unit staff when his son Daniel spent six weeks there, and he decided to do something to help.

Further information about the drive can be obtained from Richard on 0705 379328. The address for donations is 8 Chalkpit Road, Paulsgrove, Portsmouth, PO6 4EX.

Operation Euro-Baby Gold Diploma Rules

AVAILABLE TO ALL licensed radio amateurs and SWLs for contacts made since 1 January 1986.

To qualify for the Diplomas you require:- Class A - 60 points; Class B - 30 points; Class C - 10 points as follows:

Class C:- Work or hear at least one Portsmouth station and any two European Community (EC) countries.

Class B:- Work or hear at least two Portsmouth stations and any five EC countries.

Class A:- Work or hear at least five Portsmouth stations and all twelve EC countries.

Points can be made up:

By working G8LVB ..... 15 points

By working GB8OEB and GB8DFL ..... 10 points

Stations worked or heard in Portsmouth, London, Dublin, Brussels, The Hague, Copenhagen, Bonn, Luxembourg, Rome, Athens, Madrid, Lisbon and Paris ..... 5 points each.

Stations worked or heard in England, Ireland, Belgium, Holland, Denmark, Germany, Luxembourg, Italy, Greece, Spain, Portugal and France ..... 1 point each.

Application and Cost

THE COST of the diploma including post and packing is:

UK and Ireland £3.50

Rest of Europe £4.00

Other parts of the world £4.50

Cheques or postal orders should made payable to 'Operation Euro-Baby'. All money goes to the new neo-natal unit at St Mary's Hospital.

Send a certified copy of the log entries. All applications should be sent to:- Operation Euro-Baby Diploma, c/o 8 Chalkpit Road, Paulsgrove, Portsmouth, Hampshire PO6 4EX.

Net Frequency

IN NOVEMBER's Young Amateur Of The Year report, we mentioned possible young persons' net frequencies of 14.060 and 21.060MHz.The G-QRP Club has pointed out that these are internationally agreed QRP frequencies and, although Novices run QRP, these frequencies should not be used for nets. This highlights a common problem and anyone proposing a net or calling frequency is strongly advised to contact the appropriate RSGB spectrum committee (HF, VHF or Microwave) first to check for potential clashes.

HQ News

CHRISTMAS HAS come and gone and the Annual General Meeting was enjoyed by most who were able to attend. The detailed planning of that event proved worthwhile and I have received favourable comments about the pleasant ambience of the venue. AGMs by their very nature tend to be a backward-looking review of the year but next year I hope to move the emphasis to a more positive forward-looking exposition of future plans.

Back at the ranch, the re-wiring is complete and the renovation of the ground floor will be underway as you read this. The work is scheduled for completion by 31 March and will incorporate a large bookshop/reception, library and radio shack. The philosophy is designed to make the ground floor of Lambda House more member-friendly and the renovation work will further underpin the value of our freehold. We have already extended the size of our conference room by removing an end wall so that seminars, meetings and conferences can be catered for more effectively.

During the Christmas period, GB3RS was on the air and was welcomed enthusiastically by those who made contact. Once again the philosophy is to make arrangements so that amateurs have supervised access to the station during specified periods each week.

The Society's library is quite extensive and will now have a proper home with indexation and photocopying facilities provided. I do not expect we shall be inundated with visitors but I feel a society of our stature should have these facilities, given the size of our resources.

We have been researching the information technology scene for a replacement for our IBM main-frame computer and its proprietary software. Modern trends in IT are moving in the direction of Open Systems using micros and super-micros. Our present system uses software originally designed about twelve years ago, and despite updating the hardware we still have an inflexible system that costs a fortune in specialist programmers every time we need to amend it. We have decided to acquire new standard-package software and the bespoke elements will be written in a fourth generation language which is not proprietary. This means we shall no longer be tied to IBM as we are at present, unable to process quarterly direct debits because of the inflexibility of the IBM system software.

We hope to have the Unix-based software up and running in the next few months. However, deciding which Unix system to pick is a bit like choosing a car from a kit of parts. We shan't know how successful we have been until the system is built and installed. We are confident that we have made the right decision, however, because advice was sought from a great many sources.

We are at the beginning of a very exciting positive year and all at HQ wish you a happy and prosperous new year

Philip Smith,
General Manager.

RMG Vacancy

DUE TO the reorganisation of workload within the Society's Repeater Management Group, the present Zone G Repeater Manager, GM8LBC, is to relinquish this position to concentrate on the position of Proposals Coordinator.

Wanted: Repeater Manager Zone G (Scotland) to join the RMG. The successful applicant should have an active interest in repeaters and live in Scotland. S/he will be required, as a full member of the committee, to attend approx five meetings per year (usually held in London), as well as handle the vetting and processing of repeater proposals and site changes; this necessitates close liaison with the repeater groups.

Applications should be in writing and be sent before the end of 1991 to the Chairman, G4AFJ, QTHR, from whom further information can be obtained.

Manufacturer of PCBs for *RadCom* projects, John Badger, G4YZO, with his 5-week old grandchild Katie.

Stolen

● FROM A CAR in Cardiff last November: Yaesu FT-203R, S/N 2F.041377. Any information should go to Cardiff police on 0222 222111 ext 218.

● FROM ST ALBANS in November: Trio TS-930S S/N 3080073; AT230 ATU S/N 4020050; Trio TS500 with PSU and speaker unit. Information to G3NKA, QTHR.

● FROM BREDHURST Electronics Ltd in W Sussex: Icom IC-2SE S/N 018766; Icom IC-R1 S/N 057287; Yaesu FT-26 S/N 1H060594; Kenwood TH77E S/N 30306223.

● FROM FARNBOROUGH in December: Alinco DJ120 2m handheld, S/N 0000982, marked with the callsign G7HRB. Information to Farnborough Police on 0252 24545.

Third Party – Your Views Needed

FROM TIME to time, enquiries are received about allowing non-licensed persons to operate Amateur Radio Stations. Following a recent request for Phone Patch facilities, it was felt that we should seek members' views on this and other related issues. The matter is quite complex, and the following paragraphs attempt to outline some of the possibilities and the issues involved.

Issues involved:

1. *Is the operation within the scope of the Amateur Service?*

The ITU regulations define the Amateur Service as one for self-training, intercommunications and technical investigations carried out by amateurs, that is, by duly authorised persons interested in radio technique solely with a personal aim and without pecuniary interest. The transmission of international messages on behalf of third parties is absolutely forbidden except by special arrangements between the administrations involved.

2. *Is there a conflict with the Public Telecommunications Operators?*

Carriage of traffic for non licensed persons could be seen as competing with the Public Telecommunications Operators: BT and Mercury. Such operation would inevitably have commercial aspects.

3. *Is there any room in the spectrum for the increased traffic?*

4. *Is the type of operation desirable?*

Existing facilities

There are already cases where non Amateurs can make use of an Amateur Radio Station:

Greetings messages: Operators of Club and Special Event (GB) Stations, can allow a non-licensed person to send brief greetings messages under their direct supervision, subject to several restrictions. This originally applied only to Special Event Stations, and was used particularly during Jamboree On The Air. It is clearly aimed at encouraging people into amateur radio, and there is no element of competition with the network providers, or any commercial element.

Emergency communications: The licence permits the station to be used for sending messages on behalf of the various User services during any of their operations or related exercises. Raynet operation takes place under this category. It also allows the station to be used to send messages as part of international disaster relief operations.

New Facilities

Phone Patch: In phone patch operation as carried out by some American stations, amateurs in two different countries will patch a non-licensed person (who has dialled them via a local telephone call) into their radio link so that the two non licensed persons may communicate. This avoids the cost of an international telephone call. It is difficult to see how this differs from operating as a commercial competitor to the other national telecommunications operators: BT and Mercury. The government is currently reviewing its policy on the telecommunications duopoly, and may relax some of the restrictions, but it is hard to see how amateur radio fits in to this as a service provider. Indeed, there are many complex issues of standards, and commercial matters if we were to enter this arena. Amateurs in the UK used to have this facility in the post-war era, but it was withdrawn due to abuse. This type of operation would increase the load on the already congested HF bands.

Remote Control: A number of other situations have been suggested where connections to the PSTN might be of assistance to normal Amateur operation without raising third party aspects: eg remote control or operation of the station via the PSTN, or provision of dial in or out facilities from repeaters. Some of these are contentious, others not. In any case, there are a number of factors to consider.

If operation is limited to licensed persons, then there would seem to be two main constraints to satisfy:

1. The operation of the station is within the terms of the licence, particularly with respect to operation only by licensed persons and close-down procedures for unattended operation.

2. Connections to the PSTN must be by an approved barrier box.

The use to which the link may be put would have to be discussed with the Network operator.

The RSGB would welcome the views of members on these points. Letters should be addressed to the Chairman of the Licensing Advisory Committee, Mr J Bazley, G3HCT, Brooklands, Ullenhall, Solihull, Warks, B95 5NW.

Senior Morse Examiner, Capt Mike Briggs, G4SMB/DA1EK, took an RSGB pennant with him when he went 4000 metres up a Swiss mountain. To warm it up again he took it with him to Saudi Arabia, Iraq and Kuwait during the Gulf War. Mike, an Operations Officer, is pictured in the Operations Vehicle after the cease-fire was declared.

Attn Repeater Keepers

THE RSGB's newsletter *Repeater Report* has been posted to all known repeater keepers. If any keeper has not received his copy, it may be because the Society has not received the essential information about the repeater, including keeper details, requested some time ago. Anyone in charge of a repeater who has not received *Repeater Report* should write to Dave McQue, G4NJU, c/o RSGB HQ.

Good News for Affiliated Clubs

New sub rate

From 1 February, there will be only one class of RSGB Affiliated Society.

Instead of a subscription rate of £30.00 with *RadCom* and £17.95 without, all Affiliated Societies will pay a specially reduced single rate of £15.00.

What is more, all will receive a free *RadCom* each month with effect from this edition. The new rate will apply at the normal renewal date for each club.

Free books

To encourage clubs to recruit members to the RSGB, we are offering RSGB Book Vouchers worth £20 to any club recruiting ten new members to the Society in any 12-month period. The starting date is 1 January 1992 and vouchers are offerred for each ten new members, not just the first ten. To be considered 'new' the recruit must not have been a member of the RSGB for twelve months prior to joining. Good luck!

Soviet Amateurs Against the Coup

AS THE Soviet Union disolves, it is worth recording the part played by radio amateurs in maintaining communication between the Russian Parliament and the outside world. A new and fascinating independent publication *Soviet Ham Press Digest* (itself a sign of the times) reproduced the following from *Sovietsky Patriot* :

To hams of Russia, Soviet Union and all the World

Dear friends and colleagues,

We are happy that at the trial moment in our life our community found its place in the ranks of defenders of freedom and democracy.

When the night turned from August 18 to August 19, 1991 a coup d'etat was perpetrated in this country. The stooges of junta interrupted the broadcasts of free radio and television. Then hams came to the help of their people. All of us - those who were in the besieged Parliament of Russia and those who supplied the latter with the information on the disposition and movement of military equipment, received and relayed our messages - were united in their desire to help the Motherland. The radio stations of the Parliament of Russia, hundreds of radio stations operating on the amateur ranges did their best to bring to the citizens of Russia the truth about the situation in the country, decrees and orders of the lawful power.

There were moments when Amateur Radio was one of the few threads that connected the President and Government of Russia with the people who elected them.

Our small-power transmitters managed to break a noisy wall created by the professionals from the special services. People who struggled for their freedom worked on the radio stations, and it's impossible to win a victory over such people either on barricades or on the air.

All the time we felt the support of the friends from all over the world. Thanks everybody. We've held out together.

Moscow, Parliament of Russia, August 22, 1991.

Thanks from the Lithuanian President

RSGB MEMBER Des Kaylor, G4OBB, helped to alert the media to the plight of the Lithuanian people last August whilst their Parliament building was surrounded by soviet special troops and tanks. He received the following in recognition of his efforts: When Lithuania's government and people were in danger this year, you helped us cry 'SOS' to the world through emergency communications channels. We will never forget your dedication in helping us fight for our freedom. Sincerely yours, (signed) *Vytautas Landsbergis*, President of the Supreme Council of the Republic of Lithuania.

Rail Crash

FOUR RAYNET groups were called out on 7 December when two trains collided one mile inside the Severn Tunnel. Emergency links were set up for the Fire Brigade.

London AGM

THE RSGB's 65th Annual Meeting was held at the Royal Society for Chemistry. In a dramatic moment prior to the meeting, Geoff Griffiths, G3STG, alerted Raynet members to the rail crash which had just occurred in the Severn Tunnel. The 134 members present approved all nine resolutions at the AGM and EGM.

Awards were presented as follows: The **Founders Trophy** for services to the Society went to **Roger Ballister, G3KMA,** for his IOTA work; the **Courteney-Price Trophy** for the most outstanding technical contribution to amateur radio published during the year was awarded to **Mike Dixon, G3PFR,** for the *RSGB Microwave Handbook;* the **Raynet Trophy** for outstanding service to Raynet went to the **Romanian Relief Effort**; and the **G5RV Trophy** for outstanding efforts in dealing with EMC-related problems was awarded to **John McFall, G4HFX**. The Society's highest honour, an **Honorary Vice-Presidency** was bestowed upon **George Jessop, G6JP**.

The AGM/EGM Minutes, together with a report on the informal session, will be published in *RadCom* as soon as possible.

Host the AGM

FOR THREE of the last four years, the Society has held its Annual Meeting at venues outside London; at Manchester, Dunoon and Bristol. In 1991, the AGM was back in London but accommodation is sought for 1993, 94 and 95. Any Affiliated Society prepared to arrange a suitable local venue is asked to contact John Hall, G3KVA, QTHR. The '92 meeting will be held in London.

Amateur Radio Insurance Services

In association with Radio Society of Great Britain

A NUMBER of members presently insure their equipment under domestic contents policies and do not perceive that there is a need to make special arrangements. The limitations of household policies are not always fully appreciated and the table below summarises the main differences between the ARIS Scheme and the General Contents section of a home policy.

Most importantly, ARIS provides insurance on an 'All Risks' basis which covers just about everything you can think of, including accidental damage. There are, of course, some exclusions but these have been kept to a minimum and are detailed on the ARIS prospectus.

ARIS has recently moved to these offices in Outwood Surrey.

Some questions frequently asked about the Amateur Radio Insurance Scheme

Q What equipment is covered by this insurance?

A The lot. All your radio transmitting receiving and ancillary equipment, together with all masts, antennas and rotators. You can also add your home computers and peripherals. And, of course, if you select Scheme 1 all your equipment is covered when you are operating mobile and portable.

Q What will the insurance company pay me if I claim?

A You will be insured on a 'new for old' replacement basis if equipment is totally lost or destroyed. This means, for instance, that you will receive enough to buy new, either the same piece of equipment, or if it is no longer available, a piece of equipment of the same quality and capability. No deductions will be made for wear and tear. Alternatively the full cost of repair will be paid.

Q How is it possible to offer such good 'new for old' claims cover?

A This can only be done so long as you insure your equipment for its full replacement value at today's prices. Just list your equipment and values on the application form.

Q I have some 'home brew' equipment. How do I decide on the replacement cost?

A That's up to you. Either you can insure your home made equipment for the current cost of all the component parts and remake it yourself in the event of a claim. Or you can insure it for a sum equal to the current cost of replacing it with a piece of manufacturers equipment of similar specification and performance.

Q I operate my station from a radio shack in the garden. Does this make any difference?

A No, your insurance cover is not affected in any way.

Q Can my masts and/or antennas, as well as rotators, really be included too?

A Yes, these are insured too. However, because they can be so exposed the insurers will ask you to pay the first £50 of any claim.

Q Can I insure video recorders, cameras and dish aerials under my policy?

A Yes. But only if their main usage (at least 75%) is in connection with Amateur Radio.

Q I use a mobile and/or portable transmitter/receiver in the car. Is this covered too? (Scheme 1 only)

A Yes, this is fully insured in the same way as all your other radio equipment subject to an excess. But remember you cannot insure your mobile and portable equipment on its own.

Q Is mobile/portable equipment always the subject of the excess and limit? (Scheme 1 only)

A No. The excess and limit only apply to any equipment that is stolen from a motor vehicle. A claim for mobile/portable equipment in any other circumstances will not be subject to the excess or limit.

The cost of insuring through ARIS

. . . . compares very favourably with alternative insurances. For example, a policy holder living in the London N1 area with the equipment value of £5,000 could be paying as much as £75 a year with Eagle Star or Norwich Union but as little as £35 through the Amateur Radio Scheme. A saving of over 50% with much wider cover!

The Amateur Radio Insurance Scheme is specially designed as a benefit for members of the RSGB. Two schemes are available to insure all Amateur radio and ancillary equipment together with home computers and peripherals.

Scheme 1

Full cover including mobile and portable

To meet the needs of Amateurs who want the really wide protection needed for mobile and portable operation as well as extensive cover for equipment at home.

Scheme 2

Full cover for base stations

Low premium rates for amateurs who operate from home and want full, comprehensive cover for their Base Stations. Special automatic extensions are available to meet the unique need of RSGB members and to provide competitive premiums and wide ranging cover.

Comparison Between ARIS Policy and the General Contents Section of a Standard Home Insurance Policy

Cover	Home Policy	ARIS Policy
Fire & Theft	Yes	Yes
Accidental loss or damage	No	Yes
Storm damage to aerials	Yes	Yes
Automatic cover for newly purchased equipment	No	Yes (up to £2000)
At or in transit to/from:		
a) rallies, field days, club meetings etc	No	Yes
b) manufacturers or dealers for repair	No	Yes
On holiday in a building or caravan	No	Yes
World-wide cover on mobile & portable items	No	Yes (under Sch 1)
Claim Payments:		
'New for old' full replacement	Yes (usually)	Yes
10% inflation per item	No	Yes
Deduction for under-insurance	Yes (most policies)	No
Specialist claim handling service	No	Yes

At ARIS we believe our specially designed policies provide a unique level of insurance cover for the RSGB member. To apply please contact ARIS for further information on 034 284 4000, or write to Shepheards Hurst, Green Lane, Outwood, Surrey, RH1 5QS.

KW COMMUNICATIONS

Chatham Road, Sandling
Nr Maidstone, Kent ME14 3AY
Telephone: 0622 692773
Fax: 0622 764614

Instant credit available
Mail/telephone order by cheque or credit card (E & OE)

VISA

REOPENED!

Many amateurs and short wave listeners in London and the South East were saddened when KW was forced to close back in October. However, KW has reopened, under new ownership and management — breathing fresh life into the world of hobby radio.

We'll still be stocking a wide range of equipment and accessories, carefully preselected to give you quality and value for money — and to make sure if things do go wrong, WE CAN BACK IT UP! We'll have everything you need from morse keys to datacoms and can supply complete stations from mains plug to antenna.

Our policy is try before you buy and that is why all our demonstration equipment is up and running, waiting for you. If you really want to be sure, bring in your old rig for comparison! (We'll be happy to let you trade it in!)

By the time you read this, the show-room should be full of the latest HF transceivers, VHF mobiles and handhelds. We'll also have receivers, scanners, PSUs, SWR bridges, etc etc. A quick look at our brand list will show roughly what we do — if it's not there — ask! We're here to help! The map shows where we are, and we're easy to find, and we're open six days a week.

I look forward to seeing you very soon and to welcoming you to the biggest and brightest emporium in the country!

73 TOM CROSBIE G6PZZ

KENWOOD

TS 450S	**£1298**	TS 850S	**£1399**
TS 450SAT	**£1150**	TS 850SAT	**£1547**
TS 690S	**£1325**	TS 950SD	**£2995**

KW's PICK 'N' MIX!

Loads of goodies from the old KW's workshop. Thousands of components and bits of hardware at real bargain basement prices! Simply give us a fiver and we give you a carrier bag to fill up as you see fit. Diodes, resistors, capacitors, screws, nuts, bolts, knobs, feet switches, etc etc.

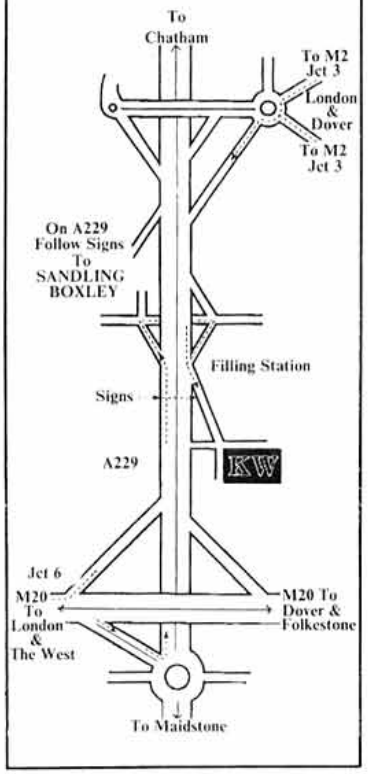
A bag full for a Fiver!

IN STOCK NOW!

ALINCO
ADONIS
AOR
ARRL
AKD
BENCHER
BNOS
BARENCO
DELCOM
DAIWA
DIAMOND
DEWSBURY
EMOTATOR
ERA
FAIRMATE
GLOBAL
HIMOUND
ICOM
JRC
KENWOOD
KANTRONICS
KENPRO
LOWE
MALDOL
NAVICO
OPTOELECTRONICS
PACCOM
RSGB
RF CONCEPTS
RF SYSTEMS
SONY
SIGNAL
SAGANT
TONNA
WIN
YAESU
YUPITERU

And much more to come!

How to find us!



OPENING HOURS: MONDAY-SATURDAY 9.30am-6pm (MON open 10am, SAT close 5pm)

For a rugged power supply at the right price
Look to Lowe

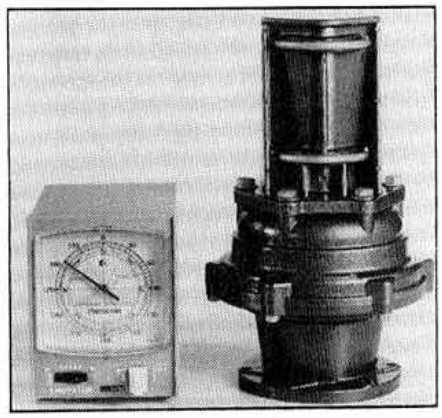
Take a good look at the EP-925 Bench Power Supply

. . .and you will find it is well designed, conservatively priced, conservatively rated and provides variable voltage output from 3 to 15Vdc.

Output voltage: 3-15Vdc variable
Output current: 25A at maximum output voltage
Max current: 30A at maximum output voltage (5 minutes max.)
Ripple/Noise: Less than 10mV
Cooling: Forced air, temperature controlled fan
Input voltage: 240Vac +/-5%.

£99 inc VAT

EMOTO ROTATORS



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

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

HOKUSHIN - The QUALITY Power/SWR Meters

MR-1000 HF/VHF

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

MR-2000 VHF/UHF

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

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

South Midlands Co

Southampton (0703) 255111 **Leeds** (0532) 350606 **Chesterfield** (0

Look after your radio with AMCARE

Through **AMCARE** you can now insure for breakdown and/or loss/damage for your amateur radio equipment. Optional cover is available for loss/damage from unattended vehicle. Breakdown cover on its own is the best way to extend the warranty after the initial twelve month period at a very reasonable cost.

Full details available on request.

Scheme administered by Communications Support Ltd.

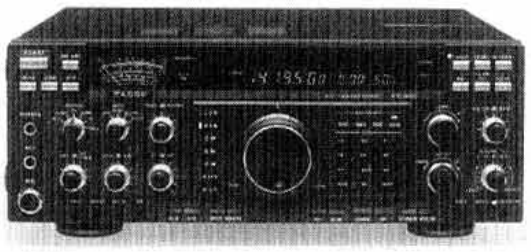
COMING SOON

THE NEW FT890

Preliminary specifications include the following:

- ★ All mode SSB, CW, AM, FM
- ★ All band TX general cover RX
- ★ 100W PEP output (25W AM carrier)
- ★ Matching FP800C P.S.U.
- ★ TCXO3 oscillator option
- ★ DVS2 speech recorder option
- ★ Computer controllable
- ★ Optional internal or remote A.T.U.
- ★ D.D.S. circuitry
- ★ Optional SSB narrow filter

FT-990 HF TRANSCEIVER



- ★ **Amateur bands 160-10m**
- ★ **General coverage receiver**
- ★ **100W output (25W AM carrier)**
- ★ **50 memories**
- ★ **Built-in iambic memory keyer**

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

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

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

You might just fall in love!

Southampton *(0703) 255111*
SMC HQ. School Close
Chandlers Ford Ind. Est.
Eastleigh
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–5pm Tues-Fri
9am–4pm Sat

Axminster *(0297) 34918*
Reg Ward & Co. Ltd
1 Western Parade
West Street
Axminster
Devon EX13 5NY
9am–5.20pm Tues–Sat

ommunications Ltd

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

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.

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
CH-6MX	2m/70cm/23cm + RX 120/300/800/900MHz	£23.50	A
CH1200WS	23cm 5.6dB	£TBA	A

MOBILE ANTENNAS

CA-7HR	40m monobander	£33.95	B
CA-14HR	20m monobander	£33.95	B
CA-21HR	15m monobander	£33.95	B
CA-50HR	6m monobander	£33.95	B
CA-285	6m/2m dualbander	£20.75	B
B22	2m/70cms dualbander (black)	£26.85	B
CA2x4MB	2m/70cm 4.5dB/7.5dB 2m/70cm	£38.50	C
CA2x4KG	2m/70cm 6.0dB/8.4dB 2m/70cm	£40.75	C
CX-702	6m/2m/70cms tribander	£46.95	B

DUPLEXERS

CF-305	50/144 duplexer UHF conn	£25.00	B
CF416B	144/430 duplexer UHF/N conn	£26.00	B
CFX-514	50/144/430 triplexer UHF conn	£36.75	B
CFX-431	144/430/1200 triplexer UHF/N conn	£36.75	B

MOUNTS

TBR	Adjustable trunk mount	£11.50	B
RS-9	Mini trunk mount (black)	£6.25	A
RS17	Mini trunk mount	£12.75	A
RS16	Mini gutter mount	£12.75	B
CKL-3LX	Mini cable assy for RS16/RS17	£16.25	B

MINI MOBILE ANTENNAAS

B10	2m/70cms mini dualbander (black)	£16.95	B
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
CA2x4MX	2m/70cm 8.5dB/11.9dB	£102.12	C
CX-725	6m/2m/70cm 2.15/6.2/8.4dB	£76.63	C
CX-902	6m/2m/7cm 6.5/9.0/9.0dB	£79.95	C

FILTERS

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

METERS SWR/PWR

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

COAX SWITCHES

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

ACCESSORIES

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

Prices for postage on all the above items are coded as follows:

A = £1.95 **D = £11.00**
B = £4.75 **E = £16.50**
C = £6.60

POWER SUPPLIES FOR ALL REASONS

The Daiwa range of power supplies is proving very popular for all types of applications, both for the professional user and the hobbyist alike.

From the smallest 9A continuous PS120MkII, via the extremely popular 24A PS304, to the top of the range 32A continuous RS40X. All the Daiwa range of PSU's feature variable voltage from at least 3-15V and switchable voltage & current metering. Both the PS304 and RS40X have a cigar lighter socket, convenient for powering your handheld.

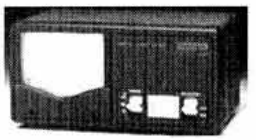
Also available from Daiwa are some good quality SWR/PWR meters and coax switches.

POWER SUPPLIES

PS120 M2	3-15v Variable	9A/12A max.	£69.95	C
PS304	1-15v Variable	24A/30A max.	£129.95	D
RS40X	1-15v Variable	32A/40A max.	£109.00	D

COAX SWITCHES

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



SWR METERS

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

LINEAR AMPLIFIER

LA208H	2m 1.5-5W in	30-80W out	£159.95	C

SECOND-HAND EQUIPMENT

Below is a selection of second-hand equipment available from our H.Q. showroom – contact individual branches for details of their current second-hand stock.

HF TRANSCEIVERS

					inc V.A.T.
FT1000	Shack	HF200W	General RX dual VFO	S/S	2650.00
FTONE	Shack	HF100W	General RX/TX ham	S/H	895.00
FTONE	Shack	HF100W	Comes with all options	S/H	1195.00
FT980	Shack	HF100W	General RX/TX ham	S/S	895.000
FT107 (12V)	Shack	HF100W	Transceiver	S/H	499.00
FL000	Shack	HF500W	L/amplifier	S/S	1299.00
FL2500	Shack	HF1KW	L/amplifier	S/H	299.00
IC275	Mobile	HF100W	General RX/TX ham	S/H	625.00
FT102	Shack	HF100W	Transceiver	S/H	639.00
FT70G	Mobile	HF10W	Transceiver	S/H	379.00
FT400C	Shack	HF100W	10ch xtal comm.	S/S	199.00

VHF/UHF TRANSCEIVERS

FT711RM	Mobile	UHF	70cm 25W	S/S	295.00
FT290R	Port	VHF	2mtr 3W nicads	S/W	249.00
FT2700RH	Mobile	VHF/UHF	dualband 25W	S/H	325.00
FT23R	Port	VHF	3/5W Handheld	S/H	169.00
HL1K/6	Tokyo	VHF	1KW Tube L/amp	S/S from	699.00

VHF/UHF TRANSCEIVERS *continued*

					inc V.A.T.
LPM144-3-100	Bnos	VHF	L/amplifier	S/S	235.00
MML432/50	M/modul.	UHF	L/amplifier	S/H	99.00
FTV107	Yaesu	Transvertor 2mtr 10W		S/H	169.00

RECEIVERS

FR101	HF RX	Comes with FM + VHF convertors		S/H	249.00
FRG9600	Scanner	VHF/UHF	60-905MHZ RX	S/H	379.00
NRD525	JRC	HF/SW	General RX m/mode RX	S/S	859.00
MX7000	Scanner	VHF/UHF	25-1300MHZ RX	N/O	349.00
FRG7	HF/SW	General RX 150KHZ-30MHZ		S/H	149.0
FRDX500	HF	Hamband RX		S/H	159.00

DATA/COMPUTER

FIF232C	Yaesu	RS232	Radio interface	S/S	59.00
FIF80	Yaesu	RS232	Radio interface	S/S	25.00
MMT4001	T/unit	RTTY, CW comes with keyboard		S/S	159.00
MM1000		ASCII to morse conversion		S/S	49.00
RM1	modem	RS232-TTL interface		S/S	69.00

- *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.*

THE ACCESSORIES COLLECTION

In addition to our main **Data Communications Over Radio** product range, we sell an outstanding range of station accessories and weather facsimile products. All offering excellent value for money.

MM-3. Simply the world's best Morse keyer. Superb training modes for the beginner, including Contest and QSO simulators. Try a QSO without ever going on the air. For the experienced contester, the MM-3 has every feature you ever dreamt of, including 20 memories, auto serial number generation, computer connection and more. Nothing else even comes close!

Isoloop 10-30. The only antenna you can use when you don't have room for an HF antenna. Only 43 inches in diameter, it covers 10-30 MHz at 150 watts. Performance similar to a dipole — even at low heights or in the loft. Extremely quiet on receive. Remote antenna tuner included. Low TVI potential. Ideal for data. Packs into a small space for storage or transport.

MET-2. Superb cloud cover pictures from the geostationary Meteosat satellite on IBM-PCs with VGA graphics. Automatic animation of sequential pictures, zoom, false colours. NOAA receive option. Everything included from the antenna to the software. All you need is a PC!

FAX-1. An economical means of obtaining high quality weather maps from an HF receiver and a computer printer. No computer required. Fully automatic operation. Thousands in use worldwide.

VC-300 and VC-300DLP. A 300 watt antenna tuner with built in SWR meter. 10-160 metres. Feeds coax and balanced antennas. Built in antenna switching. Internal dummy load in DLP version. Outstanding value.

Send for latest free catalogue and price list.

Our products are available direct and from dealers throughout Europe.

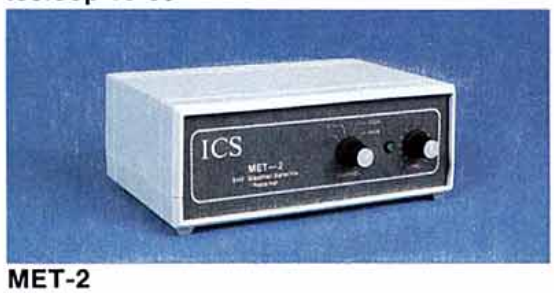
Callers by appointment. Office hours: 09.00 to 12.30 and 13.30 to 17.30

Specifications may changed without notice

VISA

MM-3


Isoloop 10-30



MET-2

FAX-1


VC-300 Antenna Tuner

ICS

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

HF NEWS

JOHN ALLAWAY G3FKM
10 Knightlow Road, Birmingham
B17 8QB

MORE LIGHT on the difficulties encountered by the Hungarian team in Albania reported in the December column: I received a FAX from Janos Bolyoczki, HA0NNN, in which he says that ZA1s HA, QA, DX, and ZA0DXC (Hungarian team) and ZA1s FD, MF, and ZA0RS (Albanian team) had obtained their licences from the Ministry of Culture, Youth and Sport of Albania. The police stopped their station on the first day of their operation (24 September). However, Janos says that Mr Omeri (ZA1TAA and member of ZA1A) sorted out the confusion the next morning and the police apologised. They were then on the air for a month without further problems and made many QSOs. This licence is not limited and can be used again in the future. The problem seems to have been caused by the fact that two different offices in Tirana were issuing licences! Note that operations by the Hungarian team *on and after* 25 September were quite in order.

I'm sure that you will share my delight to hear that an application has now come in from the Albanian Amateur Radio Association to join the IARU. On 12 December there were 12 licensed members and 20 others who have ZA licences but live outside Albania. The Baltic states are now independent and the Lithuanian Amateur Radio Society has also filed a membership application. Documentation has also been sent off to the Estonian society. Watch this space - with all the current political changes what *else* will happen in 1992?

DX NEWS

TWO ITEMS of interest from Japan - an updated survey collected by the Japanese Ministry of Posts and Telecommunications shows that at the end of June 1991 there were 1,124,018 licensed amateur stations! The other is that power output for Japanese stations on 28MHz has now been increased from 50W to 500W. The prefixes 7K2 to 7N4 have now been allocated to the Kanto area around Tokyo.

Mike Street, V85KX (G3JKX and ex-VP8BNW), has written to point out that sending an addressed envelope *without* two IRCs for his card is just hoping! Please send an 11.5 by 16cms envelope - not a small one. Mike says that V85s can usually be found on frequencies ending on 8.5 or 85 - for instance 3.508.5, 14.085Mhz etc. At weekends he is very active around 1000 and frequents 18.068.5 and 18.085MHz quite a bit as well as 24.898.5 and 24.908.5MHz but he will go to other bands on request in spite of some tvi problems on 21MHz. UK stations are heard from 0930 onwards. Please don't repeat the report he gives - and please call slightly off frequency where the copy is much better.

According to the *Long Island Dx Bulletin* OK1IAI/YA is on a long term assignment in **Afghanistan**. He is usually on 14.035MHz or a little higher from 2330. For 3.5MHz enthusiasts Sheridon, A92BE, in **Bahrain** operates on Thursday nights beginning at 2300 and continuing for three hours around 3.795MHz. He will QSY to 1.845MHz on request.

SM5DQC has reported that SM7NFB has been issued with the callsign XV7TH and will be on the air from **Vietnam** until August next year. He will have an IC-735, SB-200 linear, and a three-element tri-band beam. He is said to have permission to use 14.030, 14.195, 14.240, 21.030, 21.200, and 21.295MHz. Two stations have been active from **Qatar** recently - Khalifa, A71BS, (who has been found on 21.250MHz at 1700) and Khalid, A71CH, who has been on 28.460MHz at 1300. I think that there may be more activity from A7 in the future as I have received an enquiry from there about the formation of an amateur radio club.

XT2BW, in **Burkina Faso** was reported at the time of writing to be found very often near 14.210MHz from 2100. Similarly, TT8SA in **Chad** uses 28.4 to 28.45MHz almost daily from about 1300. 9X5PN, in **Rwanda**, likes 21.345MHz between 1800 and 2000. 3X0HNU in the **Republic of Guinea** is said to like 10.104MHz after 2100.

There are four licensed amateurs in the present crew at the S Pole station KC4AAA and according to *RSGB DX News Sheet* it might be an idea to look for them after 0500 near 14.280MHz. Note that *CQ* zones 12, 13, 29, 30, and 39 all converge on KC4AAA so that it can count for any of them!

If you hear TO5TRT it is a special station to mark the Winter Olympic Games taking place in Albertville, France. It will be operated by FE1LVL on 8 and 9 February on all bands 1.8 to 21MHz on CW and SSB and special philatelic covers will be available in exchange for a large SAE and US $1.00. Stations in Belgium are now able to apply for a special series of callsigns for use in major contests. These will consist of the OT prefix followed by a number to indicate the year (1 = 1992, 2 = 1993 etc) and a single letter suffix.

EXPEDITIONS

AT THE time of writing the **Clipperton Is** expedition was expecting to be leaving San Diego on the MV *Cherokee Geisha* with the intention of starting operations on 8 March. The callsign is FO0CI and the team includes WA2FIJ, N0AFW, N7QQ, N6VO, G0LMX/F1MBO, and possibly others. All band activity on CW, SSB, and RTTY on all bands (including WARC) is expected.

According to *RSGB DX News Sheet* HA9RE and HA8IB were due to start a Pacific tour on 22 January from **East Kiribati** as T32BW, and then go on to **Central Kiribati** (T31) and **West Kiribati** (T30). They were expecting to spend two weeks at each place and be on all bands with CW and SSB.

ZL1AMO is expected to visit the **Kermadec Is** next month.

According to *DX-NL* W5BOS and W5KNE intend to visit **Christmas Is** (VK9X) between 11 and 23 of this month.

Iris and Lloyd Colvin are reputed to be on an expedition to Asia and have been in **Thailand** as HS0ZAP. They are usually to be found near 3.505, 3.795, 7.005, 14.025, 14.195, 21.025, 21.295, 28.025, and 28.495MHz and this time will also use the WARC bands.

A major expedition to **Afghanistan** is being planned by UT4UX, UJ8JMM, and others to take place this month or in March. The callsign will be YA5MM and a two or three week stay is anticipated. They hope to make at least 25,000 QSOs. No QSL information was available at the time of writing. It seems also that UJ8JMM has a reasonable chance of visiting **N Korea** later in the year.

OM5MCP - IN MEMORY OF BRAVE MEN

G8PG HAS supplied this news item which says that during World War II the Czech Independent Armoured Brigade Group was formed in the UK. A number of its members were trained in clandestine radio operating work and forty of them were parachuted into Czechoslovakia by 138 Special Task Squadron, RAF. Of these twelve were killed by the Gestapo. It is in memory of these that OM5MCP will be operated during 1992. It will operate from club station OK1KBS and from some of the sites used by the original clandestine operators. On some occasions the original equipment will be used - this was Czech designed but built in the UK. The annual OK/G QRP weekend on 29 February - 1 March will also be dedicated to the memory of those who lost their lives. QSLs go to OK1HR with two IRCs please. All who send in a log for the contest will receive a special certificate.

CONTESTS

ARRL INTERNATIONAL DX CONTEST

0000 15 February - 2400 16 February (CW)

0000 7 March - 2400 8 March (Phone)

1.8 to 28MHz excluding WARC bands. Single operator, single or

Idrees Mohsin, AP2DM, the Secretary of the Pakistan Amateur Radio Society, at his station in Lahore. AP2DM visited RSGB Headquarters on 3 August to seek mutual co-operation between PARS and RSGB.

multi-band. Single-operator QRP (all band - *less than 5W output*). Multi-operator, single, two, and multi-transmitter sections.

Send RST plus a three digit number indicating your power output. W/VE stations send RST and state/province. Each QSO counts three points, and the multiplier is the sum of US states (excluding KL7 and KH6) plus DC, VE1-VE8, VO, VY1, worked per band (a maximum of 59 per band).

Stations may be worked on each band. Logs may be submitted on disk or using official ARRL contest forms and must be postmarked no longer than 30 days after the contest. They go to ARRL, 225 Main St, Newington, Conn, 06111, USA. If you are entering I can supply copies of the detailed rules (SASE please).

NINTH BYLARA CONTEST

1900 - 2200 13 February

1000 - 1300 15 February

These dates are *not* a mistake - and the first section *is* on a Thursday!

HF Phone section covers 3.72 -3.775, 7.05 - 7.09, 14.250 - 14.280, 21.350 - 21.400, 28.350 - 28.410 and 28.650 - 28.7MHz. YLs work all-comers - OMs only QSO with YLs. Copies of full rules available (SASE please).

AGCW SEMI-AUTOMATIC KEY EVENING

1900 - 2030 19 February

Only mechanical semi-automatic keys may be used - no straight keys, electronic keys or keyboards. 3.540 - 3.560MHz only. Send RST and the year in which you first mastered a semi-automatic key.

Each QSO counts one point - those who make more than 10 QSOs can award one other operator a bonus of five points for good keying. Logs should give time, call, report sent and received and also include details of key used (including serial number and year of manufacture). Logs must be posted before 15 March to Ulf-Dietmar Ernst, DK9KR, Elbstrasse 60, D/W-2800 Bremen 1, Germany.

In the **1991 CQ 160 Meter DX Contests, G0NAA** came seventh in the world DX entries in the CW section and GM3YOR tenth. In the multioperator section (phone) G0KPW was also tenth. Actual scores were G0NAA - 219,600, GM3YOR - 176,814, G3TXF - 81,111, G4BWP - 55,550, G3BBD - 36,652, GW3GWX - 18,725, and G3IGW - 15,600 points. In the phone section G0KPW scored 82,566 points

PROPAGATION

SMITHY (G8KG) managed to defeat the Christmas postal delays to send in his contribution to arrive in good time. It goes as follows: "The period under review falls into two distinct phases. It began with yet another major disruption on 9 November with the Boulder A index again topping the 100 mark and the HF bands in a rather sad state. Over the following fortnight the geomagnetic field continued to have an unsettling effect on conditions although there were some reasonably good spells. At the same time the 2800MHz solar flux fell steadily to a low of 130sfu on 24 November - less than half the value recorded 27 days earlier - in fact what had been a peak in the previous solar rotation was now a trough.

For the rest of November and the first half of December the solar flux rose steadily to values above 250sfu while the geomagnetic field became much quieter with the Boulder A index mostly in single figures. HF conditions were generally good throughout the period and a notable feature was the long path openings on 28MHz to the Pacific and Far East on a number of mornings at which times multiple 'round the world' echoes were much in evidence on signals from European stations".

AWARDS

16TH WINTER OLYMPICS AWARD - F92JO

Issued by Section 73 of the REF to all who make contact or hear stations located in Savoie who are using the special prefixes HX, or F92JO and other stations in France between 8 and 23 February.

For the Gold class you need three Savoie stations plus 10 other F's (or TK's), for Silver two plus six, and for Bronze one plus three respectively. Send a list of QSOs (or loggings) before 30 April 1992, accompanied by seven IRCs to F92JO, P.O.Box 5, F-73800 Coise, France.

SRAL 70 YEARS AWARD

Issued by the Finnish society, SRAL, to celebrate it's 70th anniversary. 70 points are needed from contacts with OH stations during 1992. For European appli-

continued on page 20 ▶

BAND REPORTS

Input rather diminished this month due to minds being focussed elsewhere before the Christmas holiday! Those who did get reports in included G2HKU, GM3CSM, G3s GVV, KSH, LPS, G4s NXG/M, OBK, G0s AEV, LJB, and the UK DX Packet Cluster via G4PDQ. Thank you to all of you.
Stations using CW are listed in italics:

7MHz
0000 *C56N, J6DX, JW8XM, KP2/OH6ZS, UZ0QWA, ZX2KF, 6W6/K3IPK, 7Q7TT.*
0100 *NB6U/7 (Nev), PJ9A, VP2EI, WA6AUE, OK1IAI/YA.*
0200 *UW1ZC/JW, VP25EI*
0800 *FJ5BL, JA1NUT, XE3PLV, ZA1TAC.*
0900 *J37ZF, JR1CFG, KL7Y, VK3AP, 8P6AU.*
1500 *K6DC, W6OV (Idaho), K7OXB (Utah), N7MC, WA7NIN (Nev), W7SX/6 (all LP), 5B4ADA.*
1600 *BV2TA, SU1DX, VS6/AG9A.*
2100 *KP5WW.*
2200 *J5AUA, OY2VO, VU2MTT.*
2300 *C42A, HI8A, J68AC, UA0WW, VK6LW, VU2PTT, ZS6QU, 5U7M, 6V6U, 7Z1AB, VK2DOI/9M2.*

14MHz
0800 FK8FI, *NL7DU, 5W1VJ.*
0900 *BV2A.*
1600 FR5CR, HS0ZAP, *NL7SA, VK6WT, W6, ZA1TAG, ZL1AH.*
1700 FK8CP, FT4WC, YI1RJ.
1800 *ZA1TAB,* ZL4OD.
2100 HF0POL, *V47NAM.*

18MHz
0900 *KL7AF,* ZLs.
1200 *FY5FA, T1CO, OK1IAI/YA.*
1600 TL8CK, *VQ9QM, W7EXR, 4K4POL, 9J2BO.*
1800 *J5AUA, TU4XM, 3B9FR, 5T5CJ, 5V7AK.*
1900 *C56/OH2BPW, PY0FF.*
2000 VP8CIB.

21MHz
0800 BY4BCS, JA, JT1CF, *SU1HV, UH8BBU,* 5V7RC.
0900 *VK9NS,* ZL1BNS.
1000 BZ4RBX, *J5AUA, OK1IAI/YA, ZA1TAC.*
1200 BV2JJ, VU2XX, YI1BDG, YI1RJ.
1600 *TA7KA,* YI0AFC.
1700 TJ1PI, TR8JWH.

24MHz
0800 *OK1IAI/YA.*
1100 *A45ZZ, J5AUA, TU4XM, VK6ASO,* ZB2AZ.
1300 A92BE, HF0POL, *J68AS,* PJ8AD, PZ1EL.
1500 VP8CGM, *VQ9QM, 3X0HNU, 9L1SL.*
1600 KP4LY, *P40V,* VP2EEE, 5V7AK, *8P9HT.*

28MHz
0900 BZ4SAA, KG6SL, KH0AC, TT8SM, XU8DX, *OK1IAI/YA, 7Q7TT,* 9M8ZZ.
1000 AP5HQ, BV2FK, JT1BS, TU4XM, ZL2ABF.
1100 KA2IMX/KH2, VS6DA, VU7/N6AR.
1200 A41KY, A61AD, A71CH, P40V, TJ1MR, VU2ANA, 9K0ZZ.
1300 *J5AUA,* ZA1TAC, 3X1AU.
1400 FH8CB, VA1S.
1500 FJ4JJ, FT4WC.
1600 *TZ6VV,* VP2SEI, Z21HJ, 5R8JS.
1700 *C56/G4ODV, P42KER, TY/FE1JDG,* VP8CIB, VY2SS, XQ0X, ZD9CO.

QTH CORNER

A71CH Box 11566, Doha, Qatar.
C56N via NZ7E, Rodney Mack, PO Box 2317, Minden, Nev 89423, USA.
HS0ZAP YASME Foundation, Box 2025, Castro Valley, Calif, 94546, USA.
KW2P, WA4DAN, K5MK, and N0TG all /KP1 via N0TG.
S92AA via F6AXX, 72 Chemin de Bellevue, F-83500 La Seyne sur Mer, France.
XV7TH via SK7AX, Box 2035, S-56102 Huskvarna, Sweden.
OK1IAI/YA Pavel Sneider, Plzenska 530, CS-33301 Stod, Czechoslovakia.
ZA QSL Bureau, Box 66, Tirana, Albania.
ZD9CO W4FRU, J Parrott, PO Box 5127, Suffolk, Va, 23435 USA.
7Q7TT N6ZZ, 11545 Andrasol Av, Granada Hills, CA 91344, USA.
9K2TC c/o Canadian Embassy, POB 25281, Kuwait City, Kuwait.

1991 28MHz COUNTRIES TABLE

G0OFE	224	(SSB)	G4CI	92	(SSB)
G0DOO	222	(SSB)	G4NXG/M	88	
G0AEV	207		G2FQR	86	(SSB)
G0JZA	202	(SSB)	G4YNG	76	
G0KDS	196		GM0CEI	55	
G4DXW	171		G0DUS/M	54	
LA0GC	170	(SSB)	G3ING	52	(CW)
G4MUW	167		G4XAH	43	(RTTY)
GM4CHX	106		G2AKK	31	(CW)

VHF/UHF NEWS

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

VERY FEW reports dropped onto the doormat this time. I imagine that most readers were busy with preparations for Christmas and were caught out by the earlier than usual deadline. The main event was the reasonable tropospheric propagation at the beginning of December.

THE TABLES

THE STARTING date for the Squares Table was incorrectly printed last month and should have read 1 January 1979. This date was chosen to coincide with the requirements of the Society's Squares Awards programme. Don't forget that from now on you may also include 70MHz squares worked from that date.

BEACON NEWS

THE ANGUS beacon, GB3ANG, on 144.975MHz was taken out of service for three weeks in early December for a complete refurbishment. This left mainland Britain with no 2m beacon north of Kent. The 70MHz GB3ANG was taken off air at the same time so that a new crystal for 70.020MHz could be installed. The service on 432.980MHz is operating normally.

PROPAGATION

THE IUWDS

Regular listeners to the *GB2RS* News Broadcasts on Sundays will be familiar with the Solar Factual Data section prepared by Charlie Newton, G2FKZ. Data for this are collected by the Meudon observatory in France, one of a worldwide network in the International Ursigram and World Data Service (IUWDS). It receives a mass of information each week in the form of Ursigrams from observatories all over the world which it collates and telexes to the Rutherford Appleton Laboratory at Chilton (OFE). The RAL then telexes it daily to British Telecom Gold.

Charlie and I download these data from our shared 76:MSX021 mailbox. On Monday evenings, Charlie wades through dozens of pages of figures, decoding them so that they can be turned into plain English. This resume is then E-mailed to the *GB2RS* news editor at Potters Bar for incorporation into the following Sunday's script.

Of particular interest to VHF operators are the FLARE and TENFLARE messages and the UMAGE Ursigram groups. The first gives the date, time, type and magnitude, position on the disk and duration of the flare. The second gives the date, time, magnitude and duration of a solar radio emission outburst at 10cm wavelength - hence TENflare - while the last gives magnetic data at a particular date/time, such as the A and K indices, by those observatories equipped to monitor such phenomena.

The IUWDS started in an era when most broadcasting, military and commercial radio communication relied on the shortwave frequencies. Governments then supported the network but, with so much traffic now carried by satellites, fewer organizations are professionally interested in the ionosphere. Consequently many of the original observatories no longer exist and funding for basic research is increasingly difficult to justify.

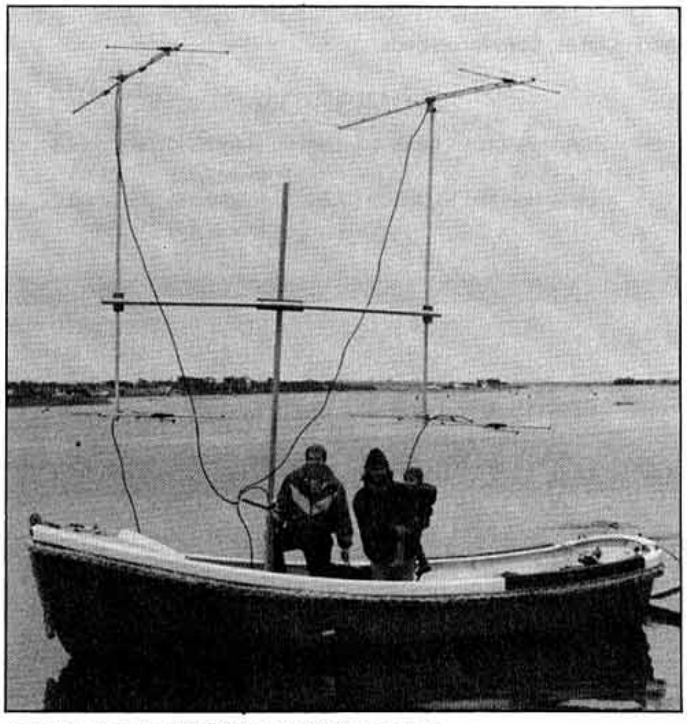
The *GB2RS* broadcast on 5 January included an extended propagation section with a detailed review of cycle 22 to date. This has been such an unusual one from several aspects, and I hope there will be room in *RadCom* to publish the review.

DECEMBER

Geomagnetic activity declined markedly from the last week in November. Not surprisingly, there were no reports of any significant auroras up to the beginning of the Christmas week. By the end of November a large anticyclone over western Europe began to dominate the British weather. It became a very static affair, the centre wandering back and forth across the North Sea till mid-December.

At first there were some obvious inversions with the large mass of cold air trapped under warmer air a few thousand feet up. This brought periods of enhanced tropospheric propagation towards the east during the first week of December. As usually happens, these inversions gradually sank. However, there was considerable fog to add the necessary water vapour to increase the radio refractive index of the air. Consequently, for those who took the trouble to listen for them, there were openings extending to Poland and Czechoslovakia on VHF and UHF.

Although geomagnetic activity remained quiet, the sunspot count and flare activity dramatically increased. Previously quiet regions became active with the spot count reaching 292 on 10 Dec and the solar flux averaging 243 in the period 9-15 Dec. There was so much restructuring taking place on the Sun that making predictions has been akin to guesswork. However it seems that the magnetic peak of cycle 22 has passed, so auroral activity should noticeably decline.



The EME station of G0KON and G4YRY (see text).

MOONBOUNCE

THE BEST weekend for EME tests in February should be 15/16. The Moon will be in the north at perigee, and with less likelihood of geomagnetic disturbances, conditions ought to be favourable. For a London QTH, moonrise on Friday, 14 Feb is at 1240 at 52° with an Asian window for an hour. Maximum elevation of about 62° occurs just before 2100 when the Moon is due south. A North American window exists from 0230 next morning for nearly two hours, with moonset just after 0500 at 306°.

Moonrise on Saturday is at about 1350 at 55° with a 75min Asian window. Maximum elevation occurs at 2200 and Sunday moonset is at 0545 at 300°; there is a North American window 0315-0500. The Moon rises again at 1520 at 64° with an Asian window till about 1630. At 2400 the az/el are 205/52° respectively. The Moon's declination is +24° at Friday moonrise, dropping to +15.6° by 2400 on Sunday.

ACTIVITY

John Hunter, G3IMV (BKS) has two 17-ele Yagis and has worked 47 different stations, or 'initials' as they are termed by the EME fraternity, on 144MHz. He reckons he should be able to complete with a few more. To accommodate the present system he had to remove antennas for 50 and 430MHz.

Howard Ling, G4CCH (LCN), took part in both legs of the ARRL EME Contest using 1.3GHz. His PA is a ring of six 2C39BA water-cooled triodes to a design by OZ9CR. The antenna is an 8ft dish driven by a home built auto-track system running on a CBM64 computer; an MGF1402 preamp is used.

In the first leg on 26/27 Oct he worked three new initials, F1ANH, K9KFR and OE9ERC. The other completions were with SM4DHN, ZS6AXT, DL9EBL, SM3AKW, SM6CKU, WB0TEM, WD5AGO, OE5JFL, SM0PYP, G3LTF, IN3HER, OK1KIR, HB9BM and K2UYH. In the second leg on 23/24 Nov, Howard contacted five more initials to bring his all-time score to 51 in 20 countries. They were OZ4MM, EA3UM, F1ELL, F6CGJ and K4QIF. Others worked were WB0DRL, OK1KIR and WB5LUA to bring his contest tally to 400 points - 25 stations in 16 call areas. He is looking for

RSGB NATIONAL VHF CONVENTION

Sandown Exhibition Centre, Esher, Surrey

SATURDAY 14 MARCH 1992

● One Day Exhibition and Lecture Programme ● Specialist Groups ● Full Lecture Programme on VHF, UHF and Microwave Subjects ● Morse Tests (by prior booking) ● Presentation of Trophies ● Comprehensive Trade Exhibition

PROGRAMME

1030	Convention opens. Enter through main entrance.
	Refreshments. Snack bar in the hall will be open from 1100 to 1800 and the licensed bar will be open throughout the convention.
1130	AGM 6m Group.
1330	Convention address and presentation of trophies by RSGB President J T Barnes, GI3USS.

LECTURE PROGRAMME

Detailed Arrangement for Lectures will be Notified on Arrival

	A	B	C
1415	VHF/UHF Propagation *Dr Geoff Grayer, G3NAQ*	DX Packet Clusters *John Clayton, G4PDQ*	Amateur Radio Observation Service *Geoff Griffiths, G3STG*
1515	Amateur Satellite Information Update *Ron Broadbant, G3AAJ*	Novice Licence — the First Six Months *John Case, GW4HWR*	47GHz Equipment *Arnold Mynett, G3HBW*
1615	VHF Contests Committee Forum	Remote Imaging Group AGM *Henry Neale, G3REH*	Linked 1.3 and 10GHz TV Repeaters — GB3TV/GB3TG *Dave McQue, G4NJU*
1715	Lecture Sessions End		
1800	Trade Exhibition Closes. Convention Ends.		

ADMISSION

Admission will be by payment on entry as follows:

Convention and Exhibition £2.00	(over 65s)	£1.50
	(under 18)	£1.00
	(under 14)	Free

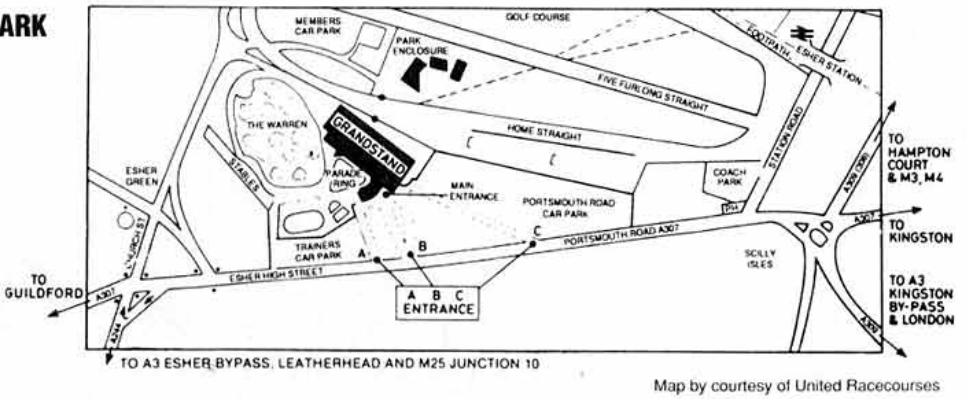
ACCESS MAP TO SANDOWN PARK

RAIL TRAVEL:
British Rail
WATERLOO TO ESHER

TALK-IN STATION:
GB2VHF:
Channels S22 SU22

STAND BOOKINGS:
Les Hawkyard G5HD
Tel: 040-928342

DETAILS:
Geoff Stone G3FZL
Tel: 081-699 6940



Map by courtesy of United Racecourses

South America and Asia to complete his WAC on the band.

Peter Blair, G3LTF (SXW), was very active in both legs of the ARRL contest on 144, 432 and 1296MHz. On 144MHz he uses a 2 x 4CX250B PA, four 15-ele home-made Yagis and an MGF1802 preamp. He worked nine stations for nine multipliers; all the familiar big stations such as W5UN, KB8RQ and SM5FRH.

His best effort was on 432MHz using a 2 x 4CX250B PA, 20ft dish and an ATF10135 preamp. He completed with 62 stations in all US call areas except 5, the pick of the rest including JA6AHB, JA9BOH, JL1ZCG, VK3UM and 4X4IF; 30 call areas in all. On 1.3GHz, with the same dish, a 6 x 3CX100A5 PA and ATF10135 preamp, Peter completed with 36 stations for another 20 multiplier figure. These included JH3EAO, ZS6AXT, JR4BRS, W7GBI and VE4MA. His overall score was 631,300pts.

Dave Cox, G8OPR (HPH), has built a new 432MHz antenna array comprising four rear-mounted, K1FO, 14-ele Yagis which are 3.6 wavelengths long. In the first leg of the ARRL Contest he worked K1FO, N4GJV and SM4IVE, the latter so loud that he could be heard with no preamp, through 45ft of UR67 feeder. In the November leg he completed with OE5JFL, DL9KR and F1FEN. K1FO and F1FEN brought his initials to 12.

Stuart Jones, GW3XYW (GNW), missed the October leg of the contest due to high winds but was QRV for the 23/24 Nov session. Conditions seemed very good with many signals peaking S4/5 (fair/good) and his own echoes to S3. Note that in EME work, S-reporting is different, ranging from S1 = barely perceptible to S6 = strong. He completed with 12 Europeans plus RB5LGX, UT5DL, K1FO and N4GJV. Stuart will be on 1.3GHz for the remainder of the winter, so please keep your reports coming, OM.

Fancy trying some EME/Maritime Mobile on 144MHz? Graham Peyman, G0KON, and Mark Holloway, G4YRY, did just that from a 20ft launch in Christchurch harbour (DOR) on 23 Nov. Using 250W and four 9-ele Yagis they completed with W5UN at 0804 and then SM5FRH at 0822. Others heard, with no preamp, were KB8RQ, DL8DAT, I2FAK, K2GAL, N1BUG and W0HP.

50MHZ

THE MONTHLY contribution from Ted Collins, G4UPS (DVN), was delayed in the Christmas mail so we resorted to the telephone. As expected, the OK stations gained access to the band from 2300 on 14 Dec. Using 6W to a 6-ele Yagi, OK2PZW's (JN89HI) first QSO was with YU3ZV. Zdeno's first UK contact was with GM3WOJ at 1316 on the 15th. His QSL address is the same as his father's, OK2VMK. Other OKs reported were OK1DIG, who worked ON4ANT via Es, and OK3LQ who also enjoyed some Es contacts into Scandinavia.

Lithuanian club station LY2WR, in Vilnius, has a 50MHz permit till April. The equipment consists of an IC-726 and dipole antenna with a Yagi to be put up later. It is likely that the band will be generally released to the LYs later. The latest count of legal 50MHz DXCC countries worked from the British Isles is 125. Others include EA and EA8, illegal; and IT9, not recognized by the ARRL.

Mike, VS6WV, popped up from Nepal recently from 9N1MM's station. QSLs should go to Father Moran, who may be QRV on the band himself some time.

A two weeks operation from South Sandwich Islands is planned for March; callsign VP8SSI.

The Gibraltar beacon ZB2VHF, on 50.035MHz, came back on air around 7 Dec having been QRT for quite a while.

Next some QSL information. Les Antrobus, 7Q7LA, now has G0IAS as his QSL manager; he is QTHR. QSLs for 9J2HN should *not* be sent direct to Peter. His manager is JH8BKL but he has been very busy lately so has not been replying very promptly. So patience please; no need to waste money sending duplicate cards.

Al Harvey, GU7DHI (GUR), telephoned that Bob Cooper, ZL4AAA, who worked into Europe on 10 Nov, is located in the extreme north of the North Island of New Zealand. His QSL address is PO Box 330, Mangonui. G4UPS regularly receives very detailed logs from Bob and confirmed this information.

ACTIVITY

G4UPS's record of daily activity shows that the period 1-12 Dec was pretty duff. On the 13th, from 1511, there was an opening to W1, W3 and VE1 till 1645. From 1647 on the 15th there was Es to DL, F, I, OE and YU. Ted contacted OK3LQ (JN88MK) at 1732. On the 16th there was a big opening to VE1-3, W1-4 and W8 from 1445 for 70min. At 1800 KM1H was audible for 16min.

Next day there was a feeble opening from Jersey to VE1 and on the 18th, 1530-1547, W1 was heard. VE1s and W1s were 'in and out' from 1320 on the 19th till 1650. On the 20th VE1YX made the first Canadian contact with Israel on 50MHz when he worked 4X1IF at 1407. At 1411 there was a major solar flare and all signals disappeared on 28 and 50MHz - an unusual instant effect?

4X1IF worked six stations in the Plymouth area from 0840 on the 21st. He was very loud for a while so double-hop Es seems to have been the mode. At 1200, P43FM in Aruba enjoyed his first opening to Europe. G4UPS described this as a "spotty opening" with HC2, PZ, KP2, VE1, W1-4 and W8 stations popping up.

LOCATOR SQUARES TABLE
Starting date: 1-1-1979

Callsign	50MHz	70MHz	144MHz	430MHz	1.3GHz	Total
GJ4ICD	490	-	264	119	59	932
G4DEZ	141	-	251	62	56	510
G4RGK	142	-	314	166	55	677
G3IMV	364	-	467	125	52	1008
G6HKM	326	-	232	114	51	723
GW4LXO	367	-	258	108	48	781
G4MUT	167	25	155	94	34	475
G6MXL	84	?	100	52	22	258
G8LHT	169	?	192	93	17	471
G0NFH	136	27	92	28	12	295
G1SWH	201	-	166	62	9	438
G4IJE	415	-	338	5	2	760
GM0EWX	404	-	211	18	-	633
G6HCV	355	-	241	-	-	596
G4TIF	231	-	204	111	-	546
G0EVT	187	-	222	60	-	469
G0CUZ	-	-	366	75	-	441
GW6VZW	279	-	143	6	-	428
G0JHC	371	-	48	-	-	419
G4PIQ	-	-	289	108	-	397
G1LSB	73	-	177	144	-	394
G6YIN	163	-	158	72	-	393
G8PYP	228	1	122	35	-	386
G4RRA	-	-	292	80	-	372
G4SSO	-	-	267	99	-	366
GJ6TMM	162	-	151	52	-	365
G0FYD	162	-	191	6	-	359
G4DHF	-	-	342	-	-	342
GU7DHI	244	-	87	-	-	331
G1SMD	206	-	112	-	-	318
G0GMB	-	-	202	103	-	305
GW8JLY	-	-	267	36	-	303
G0HVQ	219	-	71	-	-	290
GM4CXP	50	-	201	32	-	283
G0EHV	-	?	175	81	-	256
G8XTJ	130	-	121	-	-	251
G3FPK	-	-	246	-	-	246
GW4VEQ	-	-	241	-	-	241
GW4FRX	-	-	235	-	-	235
G1UGH	120	-	106	-	-	226
GM0GEI	224	-	-	-	-	224
G4DOL	-	-	223	-	-	223
GW4VVX	81	-	120	-	-	201
G6TTL	26	-	100	73	-	199
G4XBF	-	-	176	-	-	176
GM1XOG	169	-	-	-	-	169
G4TGK	-	-	139	-	-	139
GM1ZVJ	72	-	48	-	-	120
GM0CLN	-	-	116	-	-	116
G7CLY	-	-	100	2	-	102
G3FIJ	1	?	77	21	-	99
G7BXB	18	-	66	5	-	89
G6ODT	-	-	33	49	-	82
GM0GDL	-	-	55	-	-	55
GW7EVG	-	-	28	-	-	28

No satellite, repeater or packet radio QSOs.
'Band of the month' 1.3GHz.

144MHZ

THE EARLY December tropo lift caused by the big anticyclone and fog seems not to have produced such good propagation on 144MHz as on the higher bands. Paul Pasquet, G4RRA (SRY), is well sited to work to the east but found that the OKs and OEs, although workable, were quite weak. He heard no SPs. At G3FPK, poorly situated for easterly working, only a few OKs were heard in the noise.

G4YRY reported on the big aurora on 8/9 Nov which, at 2345 on the 8th, was visible between the north and north-east in Poole (DOR). He described it as "white to red, overhead." He made QSOs between 1620 and 1931, then 2336-0201 by which time a downwards Doppler shift of 2kHz was noted. Beam headings (QTE) were mostly 30-70° and Mark worked into DL, F, G, GM, I, LY, OK, PA, SP and UZ2FWA (KO04FT) for a new square and country (not UO2FWA, OM). The Italians were IK1MTZ, I1DMP and I1JTQ, all in JN35 at QTE 70-80° between 0042 and 0131 on the

QSL

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

With the situation in the USSR still confused we are receiving various messages to the effect that PO Box 88 Moscow will cease to be the central distribution point for QSL cards for the Soviet Union. Many requests have been received to forward cards direct to bureaux situated in the constituent republics, but at the moment we have suspended delivery of all cards destined for the USSR until we receive some concrete guidance from IARU, or the position becomes clearer. It may be that the cards already sorted and awaiting despatch will have to be resorted and we hope that members will understand that there may be considerable delays in receipt and despatch of QSL cards to that part of the world. We naturally apologise for any inconvenience and will do our best to keep you informed of developments as they are notified.

● Those members who are just about to obtain a new supply of cards should remember that the IARU recommended size is 5.5in x 3.5in. If they are bigger they get badly damaged in transit. If smaller, they are difficult for the sorters to handle and can get lost. It is sad to see beautifully printed cards creased and bent in transmission through the post but that is the inevitable result of using oversized cards.

● Latest on the GB1MIR card is that we have received some designs from the printer and we are in the process of selecting one. Then it's back to the printer for a final proof and colour selection. Once we reach that stage its over to the printer. We will try not to keep you waiting too much longer.

● Newly licensed members should appreciate that it will often be a year before they receive an overseas QSL card for a QSO. Longer times than that are not unusual and the Bureau is currently dealing with many cards from 1989. Only recently the sorters dealt with some cards acknowledging QSOs from the mid 1960s but that is unusual. However, the maxim to adopt is 'never give up hope'. It is also worth remembering that many overseas amateurs only send a card when they are in receipt of one.

● Visitors operating from the Isle of Man should deposit envelopes with the GD Sub-Manager, G W Ripley, Corlea Bungalow, Ballasalla, IoM. It is important to note that UK stamps cannot be used in the IoM, so local stamps for QSL envelopes should be purchased during the visit.

● For those many amateurs waiting for cards from the M0RSE operation, please be patient. David Evans, G3OUF, is dealing with the subject. He has all the incoming cards and will see that acknowledgements are despatched in due course.

● Does anyone out there know the origin of the letters 'QSLL' much used on the CW bands? Why the additional 'L'? If anyone does know perhaps they could enlighten me.

John Hall, G3KVA

GM0MJR received this QSL card from the Western Sahara.

9th. Tropo on 8 Dec brought a QSO with EA1BCB (IN63) at 2040.

Arlen Pardoe's, GM0HUO (FFE), report covered auroral, tropo and MS activity. On 21 Nov there was an aurora ". . . . on and off all evening . . . ." in which DL, EI, G, GI, GW, LA, ON, OZ and SM stations were heard but no contacts made. In a brief aurora on 23 Nov from 1303, he worked GM3UTA (IO87) and LA0FX (JP40) who said to QSL via SP9CSO.

Lunchtime tropo in the contest on 1 Dec brought QSOs with G0LIP (IO92), G4KUX (IO94) and G4NXO (IO82). There was another aurora 1930-1950 but nobody answered Arlen's CQ calls. On 3 Dec, 1818-1825, GB3LER and OY6VHF were tone A. On 14 Dec, random MS attempts with EA6FB on SSB and YT3ET on CW were not completed but at 2115-2150 he did complete his first CW contact with F8OP at 1,000LPM using his "computer-type data recorder." Other auroras were noted at 1606 on 16 Dec and 1505-1845 next day. Lyn Leach, GW8JLY (GNS), reported that the tropo on 2-4 Dec barely reached South Wales and only weak stations in JN17 and JN38 were heard. The DL, HB, OE and OK stations others to the east were working were inaudible in IO81JM. At 2038 on the 4th he worked F6IRF (JN35) but beacon HB9HB was inaudible. He contacted EA1BCB in the evening of the 9th but lift conditions ended on the 14th when Fs in JN09 and JN19 were all S9-plus. Since 9 Dec, Lyn has suffered S9 digital QRM all over the SSB part of the band, which precluded participation in the Geminids.

430/1296MHZ

RICHARD GIRLING, G4FCD (OFE), concentrated on these bands and found 2/3 Dec the peak days. Best contacts on 430MHz were HB9MIN/P (JN37), DH3NAN (JO50), DL6WU and DL3NQ (JN49), DK9RL (JN69), OE5VHL (JN68), OE5VRL/5 and OE5MKN (JN78), SP2DDV (JO93) and best DX to date, OK2BRS/P and OK2BFH/P (JN99FN). On 1.3GHz his best were HB9AMH/P (JN37), DL3NQ (JN49), DK2EG (JN59) and best DX to date, OE5VRL/P (JN78DK).

DEADLINES

PLEASE SEND all copy for the **April** issue to arrive by **Thursday, 27 February**. The **May** date is **Thursday, 26 March** and I won't need your 1992 Annual Table scores till then.

HF NEWS

continued from page 16

cants QSOs with stations with OH prefixes count two points, with OF, OG, or OI prefixes four and contacts with club stations count double points. There are special endorsements for CW, SSB, RTTY, and single bands. A station may be worked on more than one band and on more than one day for credit. The cost is 10 IRCs or US$4.00 and applications should be sent *before 31 January 1993* to SRAL Award Manager, PO Box 44, SF-00441 Helsinki, Finland.

KAUNAS AWARD

Sponsored by the Kaunas RC and needing ten QSOs with stations in the city of Kaunas after 1 January 1990 on any bands (but not WARC). Send certified list of contacts plus six IRCs to Petras Lepcys, PO Box 824, 3009 Kanuas, Lithuania.

DIPLOME DE WALLONIE

For those who have contacted (or heard) ten different stations located in the Walloon Region of Belgium since 1 October 1980. The area covers the provinces of Liege, Namur, Luxembourg, Hainaut, and the southern part of Brabant (note that Brussels is not included).

Send list of QSO details plus six IRCs to Pierre Aubry, ON6GB, Rue Emile Dewez 9, B-5030 Gembloux, Belgium.

SCARBOROUGH ARS DIAMOND JUBILEE AWARD

For one contact with club station G4BP plus five members of SARS during 1992. No repeater contacts accepted. Send log details plus two pounds to Awards manager, G4BP, c/o 10 Lowdale Av, Scarborough, YO12 6JW.

THANKS

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

Due to my very heavy personal involvement with WARC 92 in February the **Band Reports** section will have to be left out for the April *HF News* - it will be back to normal for the **May** issue and the closing date for that month will be **19 March**.

HF F-LAYER PROPAGATION PREDICTIONS FOR FEBRUARY 1992

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

Time / / GMT	28MHz 000001111122 024680246802	24MHz 000001111122 024680246802	21MHz 000001111122 024680246802	18MHz 000001111122 024680246802	14MHz 000001111122 024680246802	10MHz 000001111122 024680246802	7MHz 000001111122 024680246802	3.5MHz 000001111122 024680246802
** EUROPE								
MOSCOW	....69996...	....899981..	...1999993..	...3988896..	1..777778931	752654446887	986422123688	+53.....3++
MALTA	....798872..	....899994..	....9999971.	...19888993.	22.677678984	884754456899	998521124789	+++2.....4++
GIBRALTAR	....277662..	....499884..	....7999981.	....8988994.	11..87778983	673475556898	998842223689	+++52....3++
ICELAND	.....2665...	.....48872..	.....79995..	....1899981.	58788961	451.76557896	887553234688	+++52....35+
** ASIA								
OSAKA	....44......	....76......	...1881.....	...2873.....	...2653234.1	1...42114754	....1...1572	.........24.
HONGKONG	....8972....	...18984....	...278762...	...1676642..	1...3434662.	2....1.14775	1.......1576	243
BANGKOK	...28++96...	...379998...	...2587892..	...1276785..	1....4346832	4....1.14788	2.......1577	245
SINGAPORE	...278886...	...378898...	...3487892..	...1266785..	1....4346833	3....1.14787	1.......1576	243
NEW DELHI	...2++98....	...478982...	...446785...	...224677...	2....1346333	73.....14788	62......1578	4.........245
TEHERAN	...4++++6...	...6888981..	...7557893..	...63367861.	4114..346854	8641....14788	862.....1577	53........244
COLOMBO	...3++++7...	...4688992..	...3357895..	...11367871.	21....346854	72.....14788	61......1578	3.........245
BAHRAIN	...4+++971..	...6778982..	...6447896..	1..522568831	5222..246976	973....14798	861.....1577	53........244
CYPRUS	...2++++93..	...4999995..	...78889982.	1..877789942	642754567986	996521235899	8852...12688	++2......355
ADEN	...4++++83..	...57679961.	...633589841	3..411368974	7422...36898	984....13788	861.....1576	54........243
** OCEANIA								
SUVA/S	.....2561...	.....4773...	....177862..	....376775..	....6544671.	...2421145..	...11...12..	....
SUVA/L	1...532..163	21..75411374	22..87543663	111286545851	..156322672.	...341..34..	...11...11..	....
WELLINGTON/S	....16642...	....37865...	....687771..	....776783..	...27534661.	...2421144..	....1...12..	....
WELLINGTON/L	....1......1	11..31....12	22..631..133	121.74211343	..126321363.	...241..34..	....1....1..	....
SYDNEY/S	...186675...	...298787...	...4987881..	...3876784..	...16434782.	....31.1474.	....1...152.	.........2..
SYDNEY/L	....11....11	....231...22	....5631..54	76431274	64224662	....41..363.	....1....31.	....
PERTH	...388765...	...4888771..	...3687884..	...13667871.	2...13346853	1....1.14785	1573	.........24.
HONOLULU	.........1..	.........3..	.........61.	........172.	.11.3221461.	..43421133..	..252...11..	...2........
** AFRICA								
SEYCHELLES	...3567744..	...55678761.	1..433678841	31.3.1368974	741...136898	962.....3788	84......1567	5.........234
MAURITIUS	...3788995..	...46689972.	1..433689952	41.211368985	851...136899	951.....13799	72......1578	4.........245
NAIROBI	...28788862.	...466789841	2..633479974	53.511168997	9732...36899	984.....3798	872.....1476	54........244
HARARE	...167788841	1..266689963	32.543369996	64.511148998	9833...16899	985.....3799	872.....1578	54........245
CAPETOWN	67889862	2...76679985	53.254358998	861431127999	9944....4899	9861....1589	873.....378	54........4+
LAGOS	1...9++++963	21..97679985	64.174348998	871362126999	99673...3899	8995....1689	6773.....378	345.......45
ASCENSION Is	88767753	21..97667875	54..85334898	873.83112799	99746....589	98973....279	7775......58	4452......2+
DAKAR	....6++++962	11..88768984	431.96435998	763.85213899	998372...689	88974....379	76851.....58	4352......2+
LAS PALMAS	....5++9983.	79999951	.1..99889983	231.98778996	785386556899	999763223689	888731..1378	+5+4......4+
** S. AMERICA								
Sth SHETLAND	14778862	11..36888874	431.67766677	663.76543467	787274211135	466541.....2	23431.......	....
FALKLAND Is	....2688+862	1...48877774	331.78754577	653.87522357	8972742...26	688641.....3	46651......1	.342........
R DE JANEIRO	7756761	18755773	321.48533587	653.67211278	998264....58	999641....26	87851......4	5552........
BUENOS AIRES	25878851	47866773	21..77743466	543.87521257	8871742...26	899641.....4	67861......1	3553........
LIMA	......9++85.	876662	11753344	222.42631126	6761643....5	799542.....2	47762.......	.553........
BOGOTA	......+++85.	876661	753354	111..2631136	666.233....6	798541.....3	57662......1	2543........
** N. AMERICA								
BARBADOS	.....3+++85.	6876772	7743475	222..7621267	7661253...38	998542.....5	87662......3	+533........
JAMAICA	......8++84.	887661	763354	111..2641136	665.3431...6	788542.....3	57662......1	2543........
BERMUDA	.....19++84.	2887861	5764684	111..6642376	665.2531.147	888542....16	77762......3	4543........
NEW YORK	......69883.	......89885.	1786673	11...3664475	665.14331147	888442.1..15	67762......2	3543........
MEXICO	.......8873.	.......9864.	185332	11..1.263113	455.4133...2	488442.1....	16762.......	.353........
MONTREAL	......69983.	......79885.	1786772	11...3665575	664.15332257	888442.1..25	67762......3	3543........
DENVER	.......1761.	.......3873.	68651	11.....66443	453.2..43114	478441.11..1	26852.......	.352........
LOS ANGELES	........661.	........872.	18631	11.....27422	353.21.351.1	268442.12...	.4752.......	..42........
VANCOUVER	.........4..	........261.	........573.	11......7741	342.2..26433	367342.13111	13652...1...	..32........
FAIRBANKS	....	....	........121.	.....111352.	331.33235753	345342113533	12452...121.	...2........

The provisional mean sunspot number for November 1991 issued by the Sunspot Data Centre, Brussels was 141.4. The maximum daily sunspot number was 209 on 9 December and the minimum was 80 on 22 December. The predicted smoothed sunspot numbers for February, March and April, are respectively: (classical method) 126, 123, 121; (SIDC adjusted values) 134, 132, 130.

ANNOUNCING THE IC-2SRE A
NEW HANDHELDS WITH WID

Until now, you needed to carry both a transceiver and a wideband receiver to enjoy a QSO *and* wideband receiving.

Icom now offer two new handhelds, which combine a 144MHz or 430MHz transceiver with wideband receive capability.

Receive it all from 25-950 MHz*

VHF and UHF frequencies plus simultaneous 2-frequency receive capability are within your reach. Choose from a ham band signal and another from FM broadcasting, TV audio, VHF air band, marine band and more in the AM, FM or wide-FM mode.

This feature also enables simultaneous 2-frequency receiving on the ham band or cross-band QSO with a dual band FM transceiver.

*specification guaranteed: 50 - 905.

Complete and compact

These ruggedly-built, splash-resistant handhelds fit snugly into your hand.

Full 5 Watt output power

By connecting an external 13.5 ~ 16V DC power supply, a full 5 Watts of output power is available. You can choose 3.5W, 1.5W or 500 mW of low output power.

Product shown larger than full size.

Separate indications and controls

The large easy-to-see function display with lighting shows operating frequencies, S-indicators, and memory or call channels for both bands. Independent volume and squelch controls allow you to change settings in each band separately.

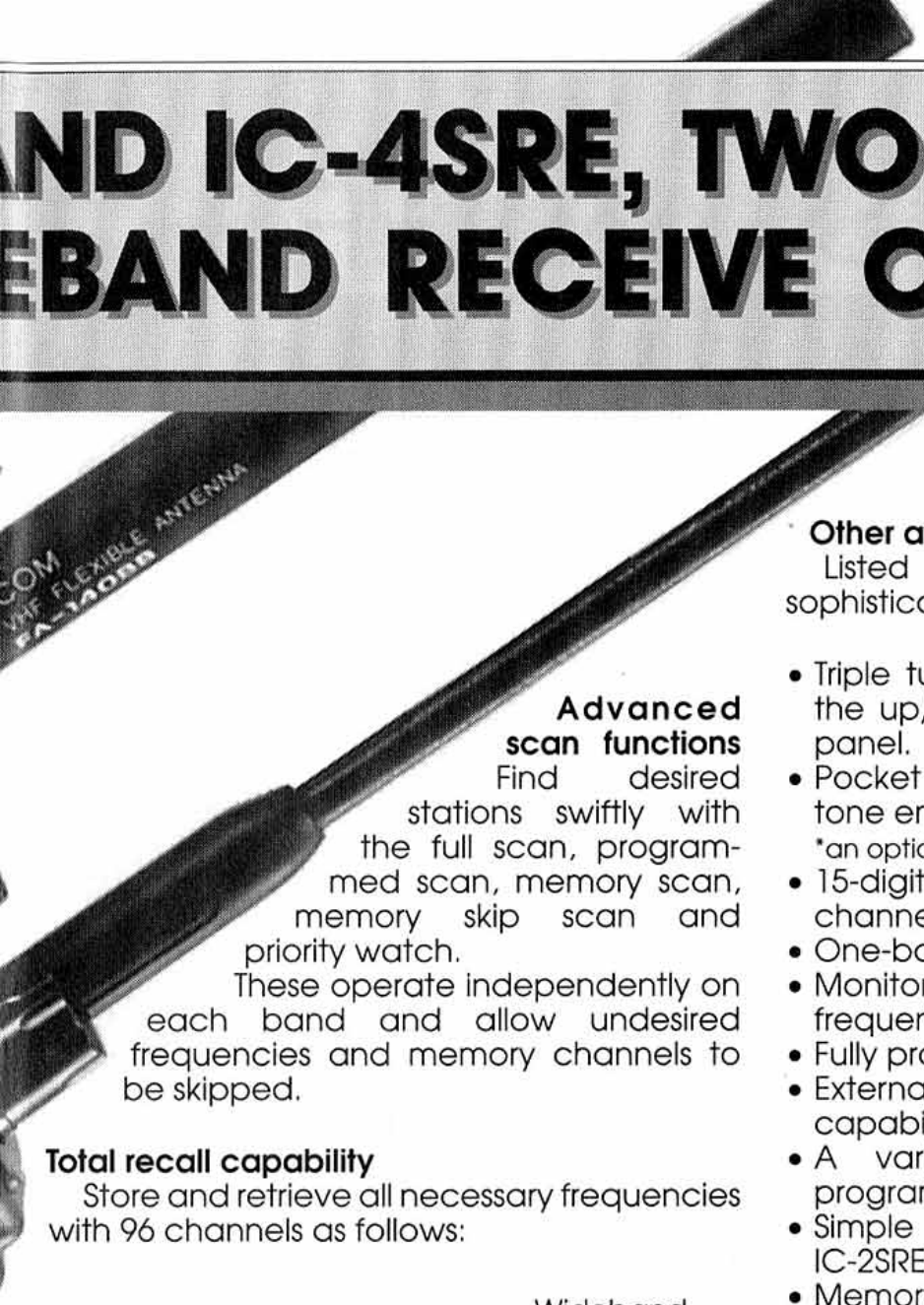
24-hour clock with an ON/OFF timer

This function can be used for convenient scheduled QSO and standby receiving, turning the transceiver ON and OFF as specified to conserve battery power.

Appearing simultaneously are the clock and transmit frequency for total monitoring capability.

ICOM

ND IC-4SRE, TWO EXCITING EBAND RECEIVE CAPABILITY



Advanced scan functions
Find desired stations swiftly with the full scan, programmed scan, memory scan, memory skip scan and priority watch.
These operate independently on each band and allow undesired frequencies and memory channels to be skipped.

Total recall capability
Store and retrieve all necessary frequencies with 96 channels as follows:

	Ham band	Wideband receiver
Memory ch.	30	60
Call ch.	1	1
Scan edge ch.	2	2

Ready to operate
A battery pack or battery case, wall charger, flexible antennas, hand strap and belt clip come with the transceiver.

Other attractive features
Listed below are a few of the other sophisticated features.

- Triple tuning system: direct keyboard entry, the up/down keys or main dial on the top panel.
- Pocket beep, tone squelch and subaudible tone encoder functions.*
  *an optional UT-63 Tone squelch unit is required
- 15-digit auto dialling with 4 DTMF memory channels for.
- One-band indication for simplified operation.
- Monitor function to check the repeater input frequency.
- Fully programmable offset frequency.
- External DC power jack with charging capability. (Except for the BP-85.)
- A variety of tuning steps separately programmable for each band.
- Simple 1750 Hz tone call transmission for the IC-2SRE and IC-4SRE.
- Memory masking function for first recall of often-used channels and hiding of seldom-used channels.
- Memory transfer function.
- PTT lock function.
- Lock function for the keyboard and main dial.
- Automatic power saver for longer operating times.
- Automatic power-off function.
- SET mode for critical settings.
- Transmit/receive indicator.
- Accepts all battery packs and battery cases for 'S' series transceivers.

VISA MasterCard

For more information and the location of your nearest ICOM dealer contact us at the address below.

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 741555 (24hr). Facsimile: 0227 741742

Name/address/postcode .....

.....

.....

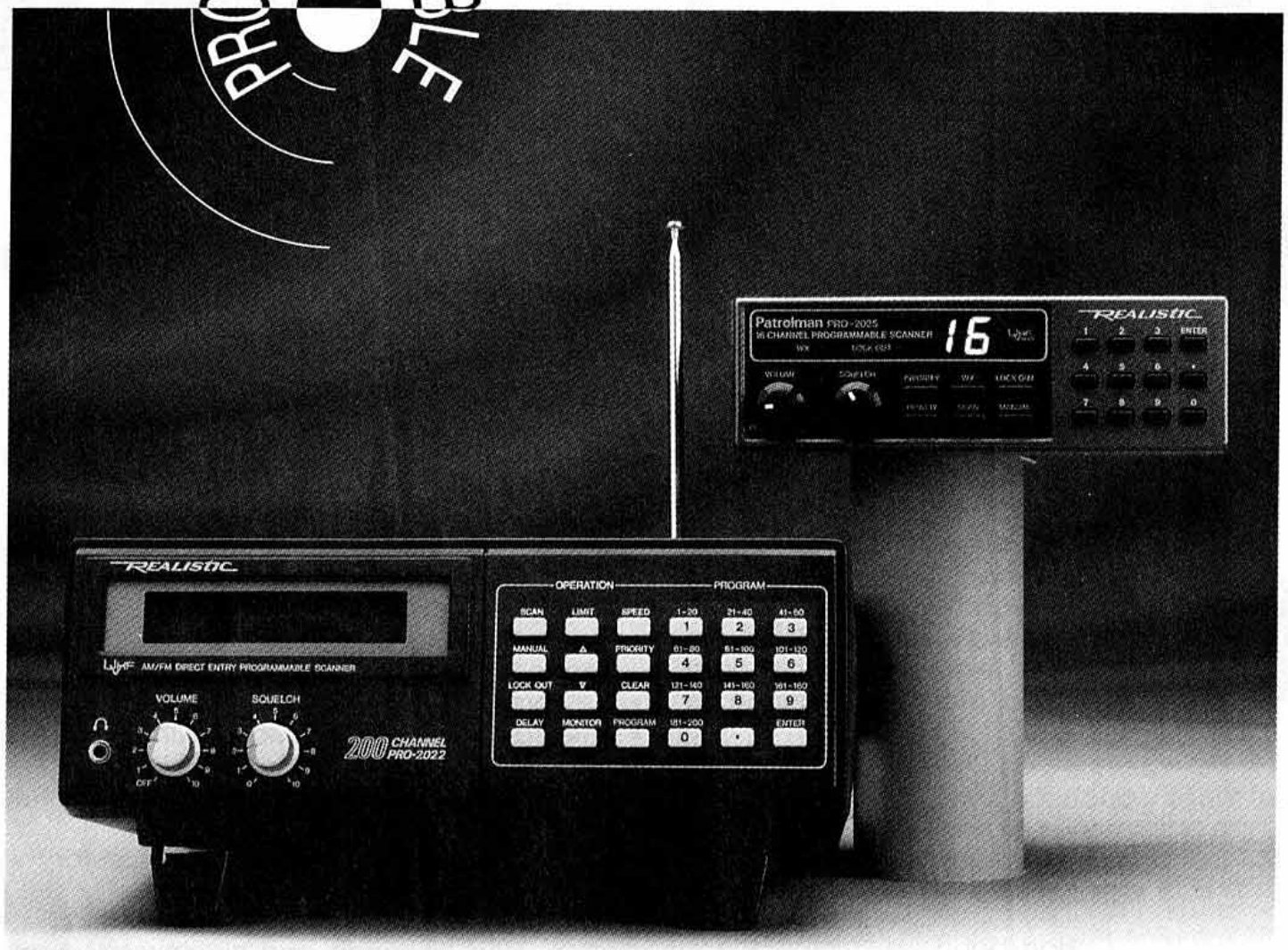
.....

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

REALISTIC®

PROGRAMMABLE

... SCANNERS ..

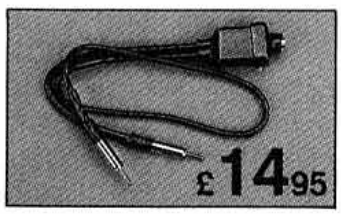


200-CHANNELS WITH 800 MHZ

£199.95

Realistic PRO-2022. Covers 68-88, 108-136 (AM), 136.005-174, 380-512 and 806-960 MHz. Selectable priority channel, two speed scan, lockout, scan delay. Jacks: 3.5mm headphones, external speaker, external DC power, BNC aerial input. Mains operation or 13.8 VDC neg. gnd. (Power cord extra). Memory backup requires 9v battery.
20-9127 ..... **£199.95**

AM/FM SCANNER COUPLER



Converts your AM/FM mobile car aerial into a full range monitor-scanner aerial, without harming AM/FM radio reception. Frequency range 25-1300 MHz.
20-9710 ..... **£14.95**

Tandy®

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

16-CHANNEL MOBILE SCANNER

£99.95

Realistic PRO-2025. Covers 68-88, 136-174 and 406-512 MHz. Select up to 16-channels to scan and change your selection at any time. Features automatic two-second scan delay, memory backup, priority channel, lockout function, squelch and volume controls. Jacks: power, external speaker and aerial. 12 VDC neg. gnd. only. Measures: 45 x 140 x 175mm. **20-9146** **£99.95**

SWL NEWS

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

DURING November, my Icom IC-R70 developed a fault and I took it to the Icom HQ at Herne Bay in Kent. Within hours it was as good as new. I must, through this page , express my sincere thanks for the speedy and efficient service shown. While I was there, I was pleased to meet Laurie Philip, BRS93270, who was interested in buying an Icom receiver. After a 'test drive' and some advice from Chris Ridley, G8GKC, and myself he bought it and he has told me since that he has really started to enjoy the hobby.

He referred to the current malaise amongst SWLs regarding contests and it transpired that the rules presented the main opposition to him entering, but he also said that preparing for a contest also presented a major stumbling block. He suggested that a fuller expose on contests in the column would help him and, probably, many others. So here goes.

CONTESTS - BEFORE, DURING AND AFTER

STARTING AT the beginning, the most important item is to read *RadCom* and find out the dates of the various contests. Then you have to ensure that you, or your partner, have nothing else planned for the day of the contest you plan to take part in.

For example, the rules for the Society's 21/28MHz contest usually appear in March/April, so note the diary then. Nothing else needs to be done until nearer the contest. If you intend taking part in an HF contest, it is important to see what conditions are like about a week beforehand. This will enable you to plan your strategy. Using the 21/28MHz contest as a guide, decide whether you are going to start on 28MHz or 21MHz. Making the right choice will ensure you that you maximise the band conditions. Of course, all this planning will do you no good if a major solar flare 'knocks the HF bands for six', but the odds on that happening ought to be fairly remote.

With that early look at the bands under your belt, follow up with a more detailed look the day before the contest. That should give you a far better idea of propagation paths - eg JAs on 28MHz at 0800, not until 1000 on 21MHz; Americans on 28MHz at 1130, but not until 1600 on 21MHz; a slot to Africa on both bands at 1100. With this planning, your multiplier score will be good. There is no doubt that multipliers win contests, so getting a feel of the bands is extremely important if you want to do well.

What else should you do before the contest? Make sure your antennas are functioning properly, Consider whether you need a different antenna just for the contest. For example, a couple of years ago, I decided to erect a 28MHz Inverted Vee and it so outperformed the usual antennas that I still have it today!

Unless you have a really good memory for callsigns, you will need to prepare a check log. Simply divide up a very large sheet of paper into columns so that you can put all the W1s in one column and all the W2s in another, and so on. Do *not* allocate each column a country/prefix. You can never second-guess band conditions. You might think you will hear a great many Russians as propagation opens up to the East, but conditions might be very good with the band full of JAs and you will only hear a few strong UAs and none of the Republics. So, fill in your check log as you go along. It is also helpful when writing up the log and scoring it if you have the checklog multipliers in the same order as you log them.

That's all the planning you need to do beforehand apart from making sure before you go to bed the night before that everything is A1 with the rig and the antennas. Also ensure you have enough paper, log sheets, pens, etc.

On the day, make sure the alarm is set well in advance of the Contest time. Leave enough time to have a wash etc, make a cup of coffee, have breakfast and, importantly, check the bands for any last minute adjustments to your action plan. For example, if 28MHz is 'dead', you will have to start on 21MHz, but be sure to check it at regular intervals just to make sure that propagation conditions have not provided an opening to VK or the Pacific. Another very important measure is to remind your partner that he/she has the kids (if you have any) for the next twelve hours, that you would like to have your lunch/dinner in the shack to cut down on the amount of time you are away from the rig, and that a few cups of coffee wouldn't go amiss either! Unfortunately, I have no tips (for this page) on how to combat trips to the loo!!

As I have said, it is important to have a plan and that should include when you plan to QSY to a different band, again using the 21/28MHz contest as a guide. Spending three hours logging JAs on 29MHz, for example, will cost you very dear in lost multipliers you still need. If you log 300 stations each worth 3 points, each lost multiplier is worth 900 points! If the multiplier count is down on one band take time out specifically to look for multipliers. There is a very thin line between logging one QSO per minute for 20 minutes and logging four new multipliers in that same 20 minute period. Towards the end of the contest you can decide to change your plan (if you haven't already done so!) to enable you to build a better score on, say, 21MHz.

After the contest has finished, you will have a very good idea of your score and whether you will either win it or have a chance of being awarded a certificate for all your planning and dedication. Once you have turned the rig off, spend some time away from the rig and just relax. Oh, by the way, don't forget to send the written-up log to the contest adjudicator. Good luck, and I hope that these few tips will help to encourage more listener participation in contests in 1992.

HAB NEWS

A GOOD deal of news from GW6JNE this time around. A new award is available to celebrate the 25th anniversary, in 1994, of the WAB/HAB movement. The initial purpose being to raise £12,000 to buy a D class lifeboat for the RNLI. A total of 25 points will get you the award, but there is too much detail to go into in this column. Anyone who requires further information should write to Dave Rogers, G4VID, at 5 Braemar Close, Kettering, Northants NN15 5DD, and for anyone who would like to help, the coordinator is Adrian Keeble, G4HPU.

Also for the RNLI appeal, a sponsored mobile trip from John O'Groats to Lands End is being planned for next summer activating as many WAB areas as possible in relays. For further details, please write to Kate Wragg, G0FEZ, at 30 Stafford Street, Long Eaton, Nottingham NG10 2ED.

There are also many listeners who have qualified for awards, but space prevents me from listing them, apart from mentioning Anne Hague who received a WABEMA award for navigating her husband into and out of 300 areas. This certainly proves that SWLs can get awards for more than just listening!

VHF NEWS

BRIAN UNDERDOWN, BRS93818, and Mick Toms, BRS31976, provide the only VHF reports this time around. Brian netted four new squares via Aurora during November. The 8th was the best day. Brian noted "echoey" signals from W6/7 in the morning on 14MHz and guessed an aurora was on the way. At 1455, he heard GM3JFG (I077) and after an evening at the local social club, returned home to log HE7SNR (JN36), a number of beacons including LA5VHF (JP77), and GB3LER (IP90). Best DX was a clutch of SPs on SSB, including SP3MFI (JO91) and SP5ACS (KO02). Mick mentioned a quiet month on 50MHz apart from a very good opening to South America on 2 November when he heard KP2A, PY5CC, HC5K, PY2DJC, PY2GR, PU2OZF, PJ4/WA3LRO, PP5WL, CX8BE, LU3DCA, LU8AJK, TI2HL, PZ1AP, PT9FH, PY2PD, PY2DSC and PY2ZS. Unfortunately, I was out!

HF FAYRE

BAND CONDITIONS matched the weather for much of November - gloomy - remarked Robert Small, BRS8841, but they were quite good for the CW leg of the *CQ* WW contest. Reports were not up to the usual standard this month and there was no good LF DX mentioned, so I have concentrated on the three main HF bands:

28MHz - A71CH, J68AP, TJ1PD, V21GC, V47NAM, V51/DJ7ZG, VS6GA, OK1IAI/YA, 3B8FG, 4U1UN, 5V7RC and 9K0JH.

21MHz - A92EV, BV2JJ, BY4RSA, V31DX and 9V1WW.

14MHz - A61AD, FR5AI/J, J73PB, P43DO, SU1FN, T3ZO, XW8KPL, ZA1TAB, 4S7AVR and 8R1K. The band is closing quite early most evenings.

FINALE

PLEASE KEEP writing and send in your HF table scores for 1991. Don't forget to include those photographs! Although we did not run a table, let me have the details for future use. Deadline for **April** is **Tuesday, 10 February**.

Novice NEWS

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

THANKS TO thirteen year old Joe, 2E1ABM, who wrote to say he is one of the first group of Novices to sit the NRAE. He has now had time to discover if the hobby really appeals to him, and it does.

Joe would like to thank all the radio amateurs who helped him to take his first steps and made him feel welcome in what may help him in a future career - it is never too early to think about the future.

He asks about the possibility of some basic construction projects in this column. Space does not allow this I am afraid, but I strongly recommend that a subscription to *D-i-Y Radio* [see opposite] is considered. The construction projects featured in there are not just aimed at the Novice trainee, but could be of great practical value to anyone taking the construction path who needs practice and experience without frustration, knowing that their efforts will be useful - and work.

I am grateful to all Novices who have written so that others can read their side of the story. There are more of you out there, all with opinions, and all with something to offer. How about telling me so that I can pass it on through this column?

WANT A DX CONTACT?

WHILE I realise that class 'A' Novices are still a bit thin on the ground and that most of them are occupied during the day, there is someone looking for you besides me. John G0NPI, gives you this invitation from afar.

Dick K2UTC, in White Plains, New York, remembers his excitement at working DX using low power when he was a Novice many years ago. He now wants to pass that pleasure on to you.

Almost every day, around 1300 GMT he puts out a directional call to all Novices in Great Britain - and hopes for a reply. Up to press he has worked 2E0AAM once and 2E0AAI three times.

If you would like an American callsign in your log book and can be around at that time, listen around 28.300MHz. Dick calls on the quietest frequency he can find near there using SSB. He uses 100 watts and a three element beam.

John is a QRP enthusiast and was working from his car when he heard him and gave a call, using 5W and a shortened CB coil-loaded whip antenna.

That *would* be something to boast about, but don't expect instant results. Patience and perseverance are needed. The excitement you feel will be well worth it - let me know if you succeed. Many thanks to John from all of us.

DX PILE-UPS

IMAGINE IT - you are listening on the bands and you hear a positive barrage of dots and dashes and wonder what is happening, so you stop and listen. It soon becomes clear that *everyone* is trying to contact a rare callsign. You may spare a thought for the operator and wonder how he is going to cope.

Jon, G0FJT, wrote an article for *Morsum Magnificat* explaining the technique. *MM* kindly gave me permission to pass it on to you, and on writing to Jon, he did the same and added some more comments. My grateful thanks to both.

A DX station may well start by calling and receiving on the same frequency, but if things get busy he will probably switch to split frequency working and this is how it is done.

Before making the first call, the DX operator will look for a space as wide as possible. After the first few contacts, as more stations call him, he will find it more difficult to pick out calls. Using the RIT control, he will listen *very* slightly outside his frequency where he will find it easier to resolve callsigns as some will be on the other side.

If his 'space' is wide enough to allow it, he may send "UP" at the end of his overs. This means that stations can call on anything up to, say, 5kHz above his frequency and he will have a better chance of picking out calls as they are wider-spread. Needless to say, he will constantly 'sweep' his 'slot' to make sure that it has remained free of other stations.

You could be that operator as Novice callsigns are still rare and you could be in great demand so that gives some useful hints. But what if you are the *receiving* station? How do you make yourself heard? A step by step guide gives the idea assuming the DX sends "UP" at the end of his overs.

1. Note the DX station's frequency.
2. Tune above him and listen to the calling stations.
3. When you hear a station send '599 TU', net your transmitter onto that station's frequency.
4. Tune your receiver (using RIT perhaps) back to the DX station and listen for a reply, eg '73 TU QRZ UP'.
5. Send your callsign once or twice.
6. If you get no response, repeat steps 2 to 5.
7. When you have succeeded don't leave immediately. There may be more information in other exchanges. Something about his location perhaps, QSL details - and it gives you the chance to check his callsign.

As Jon says, this only skims the surface. If you hear a busy station or two and *listen* to the techniques used, you will find it easier to put your own into practice - and keep your cool while others are diving blindly in and getting nowhere. The mere fact that your CW will probably be slower than the rest may be to your advantage. It will stand out as different and so will that 2E0. Happy hunting and Good DX!

CALLING SIX METRES

TO ALL amateurs - do you have 50MHz capabilities? If so, this is for you.

I discovered the hard way that the six metre band is very unpredictable - with wall to wall silence in my case. This was partly due to location, but others in a more favourable geographical position have been heard to grumble too.

Part of this band, of course, is permitted to Novices and they are having problems too. Mike G3OIL, has brought this to my attention and suggests that you are missing some interesting QSOs!

Countless amateurs have complained that they have not yet heard a Novice, let alone spoken to one - they have just been listening in the wrong place! I know there is a standard calling frequency, but . . . .NOVICE NEWS

Non-Novices: As often as you can, listen on 51.26MHz or even call Novices there.

Enthusiastic participants present at Denby Dale amateur Radio Society's highly successful Youth in Action Project.

Novices: Call on that frequency, and listen there.

A *Novice* calling frequency may be the answer. Please help before Novices become disillusioned and abandon six metres as I did. Perhaps by trying to make contact, you will succeed and everyone will be happy.

THINKING DAY ON THE AIR

THIS IS rapidly approaching and many stations are planned, callsigns at the ready, and volunteers counted. Will you be among them?

To make the event a huge success again, *you* are needed in one way or another.

Contact your local Guide or Brownie group - do they need any help at the station? Experienced amateurs, Novices and Novice trainees are required, not only as operators - sympathetic bodies are needed to deal with excited youngsters, answering their barrage of questions, and explaining the phonetic alphabet, foreign callsigns and all that is going on. For the Novice trainees, this is an excellent chance to see things happen, hear experienced operators and maybe get the chance to add your own greetings message.

All members of youth organisations are welcome to look in on their nearest station and see amateur radio in action. Contact your nearest group and ask if there is to be a station nearby, and make arrangements to call in for a little while.

You never know - after the event, you too could become a Novice - or a Guide or brownie! Remember 22 and 23 February - though not all stations operate on both days.

YOUTH IN ACTION

DENBY DALE Amateur Radio Society decided to follow last year's experiment with a second 'Youth in Action' to try to interest young people in amateur radio with the hope that some of them may perhaps take it up in the future. Guides, Scouts and the Air Training Corps were invited to participate.

The first requirement was a large enough location on which to hold the event and Goodalls, a local caravan company, kindly came to the rescue by allowing the use of a field which also had water laid on. The fact that it happened to be 1000 feet above sea level was a bonus.

The next requirement was electricity. An electrical contractor just happens to hold a G4 callsign and understood the need. He loaned enough generators to power the nearest town and they were in business.

On 15 August a small village grew with caravans, tents and marquees erected and the radio station installed. The official opening and 'Welcome' took place at 1400 the next day and the programme began.

A general talk, and explanation of how a radio works and a contact started things off, followed by a variety of activities. Various items were constructed by the youngsters and Novice trainees found the circuit tester quite easy, but the rest were quick to learn. The two metre DF antenna (*RadCom*, June 91 p38) was made, tested and used in a fox hunt. Proof of their constructing success came when the 'fox' was run to earth and DF loops were displayed with pride.

Morse code and phonetics were easily absorbed with many youngsters wanting to continue with Morse after the programme officially ended for the day.

In the 'Time on the Air' section, there were contacts with Australia, the USA, Japan and other countries with everyone given the chance to chat to foreign stations, who took the time to talk to and encourage them.

The next day one local amateur took along his kite collection, which was hugely successful due to the continuous wind current at that height. An antenna was attached and more stations were worked!

That same evening, a local pop group came and performed giving their services free at the specially prepared barbecue.

The 'weekend' ended at noon on Monday 19 August and the gear was packed away.

A lot of planning had gone into this event to make sure that everyone had a chance to sample all that was on offer, and everyone thoroughly enjoyed themselves.

I do not know if a third such event is planned for this year, but if it is, I hope I will be able to give advance notice so that you - and I - will be able to contact GB2YIA and collect their QSL card.

I am very grateful to Tony, G0DDB, for the information about the event and I am sure that quite a few of the youngsters who took part will want to know more. Instructors in the area may well find they are kept very busy in the future.

WATERS & STANTON

0702 206835
or 204965

UK's LARGEST SELECTION OF HAM RADIO PRODUCTS

Fast 24 Hour Mail Order . Phone Before 12.30 AM

Send for our free catalogue and Mail Order Price List

HF PACKAGE DEALS

YAESU — KENWOOD — ICOM

GENUINE UK STOCK! 12 MONTHS WARRANTY

	LIST		LIST
TS-950SD	2995.00	FT-990	1849.00
TS-950S	2299.00	FT-747GX2	659.00
TS-940S	1995.00	FT-757GX2	999.00
TS-850S	1399.00	FT-767GX	1599.00
TS-450S	1150.00	IC-765	2550.00
TS-140	880.00	IC-751A	1535.00
TS-690S	1325.00	IC-726	1015.00
TL-922	1495.00	IC-735	1000.00
FT-1000	2995.00	IC-725	779.00

Super deals on above!

TS-450S Super deal

PHONE!

END FED HF ZEPPS!

160M 46m	89.95
80M 40m	59.95
80M 20m	96.95
40M 20m	51.95
20M 10m	63.95

50 ohm 100W

TONNA BEAMS

VHF/UHF All with "N" connectors "THE BEST"

6M	Price
20505 5 el	59.00
2M	
20804 4 el	32.00
20808 4 el	41.00
20809 9 el	39.00
20089 9 el	39.00
20822 11 el	95.00
20813 13 el	55.00
20817 17 el	69.00
70cm	
20909 9 el	33.00
20919 19 el	40.00
23cm	
20623 23 el	39.00
20655 55 el	55.00

Ask for free Tonna colour catalogue & full technical specification

MFJ Products from Stock!

300W HF ATU

The MFJ-948 is a complete 300 Watt aerial matcher in one box. It will match coaxial, balanced feeder, and single wires. A dual needle VSWR/Power meter makes adjustment simple and a 3 way aerial switch completes the package. Fantastic value! **£129.00**

Other MFJ Products:

MFJ-949D	ATU as above but with 300W dummy load.	149.00
MFJ-901B	ATU less switch load and meter. Super!	69.95
MFJ-264	1.5kW dummy load. DC-650MHz	69.95
MFJ-260B	300W dummy load DC-160MHz	35.95
MFJ-816	HF 30/300 Watt power meter	31.95
MFJ-812B	144MHz 30/300 Watt power meter	31.95
MFJ-110	Fabulous world clock with map	29.95
MFJ-32	Packet radio handbook. Super guide!	8.95
MFJ-1286	Gray Line Graphics Programme for IBM	32.95
MFJ-1281	Easy DX logging programme	41.95
MFJ-1040	1.8-54MHz tx/rx preselector	99.95
MFJ-1020A	Indoor active antenna station. 0-30MHz	84.95
MFJ-1272B	TNC/Microphone interface	36.95
MFJ-722	Superb rx audio filter	89.95
MFJ-752C	Tuneable audio filter	109.95
MFJ-207	Antenna analyzer. Brilliant idea!	99.95
MFJ-557	Self contained CW practice key and oscillator	29.95
MFJ-407B	Electronic keyer. 8-5-WPM Self powered	69.95
MFJ-931	Artificial HF ground unit. Ideal for flats etc.	Phone
BY-1	Genuine Bencher Paddle. A precision product	69.95
MFJ-704	HF Low Pass Filter	Phone
MFJ-106B	Dual time deck top clock. LCD Display	Phone

NEW MFJ ANTENNA ANALYSER £99.95

Model MFJ-207 This self powered analyser will let you measure hf aerial resonance, 1.8-30MHz, and VSWR without the need for any transmitter power. Simply connect to coaxial cable to measure VSWR and resonance. Ideal for rapid aerial design and installation. Great club investment!

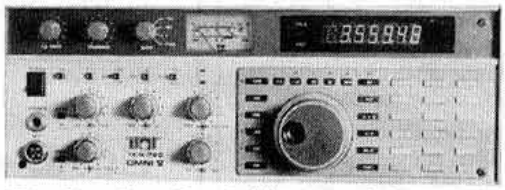
£99 (£4.50)

Mic/TNC Switch

A great idea! Lets you have both TNC and mic permanently connected to rig. Just press to switch over. Suitable for all major brands inc. Yaesu ICOM Kenwood ALINCO etc. Comes with 8 pin plug ready wired.

£36.95

Ten Tec Omni-V



The Ten Tec Omni-V is one of the most advanced hf transceivers available. Extensively used in the USA it has a superb front end design together with low noise mixers to make it one of the "quietest" receivers around. Its CW break-in performance is unsurpassed. A true DX machine for the purist! Ruggedly built using modular construction on a solid aluminium frame, it is designed to professional standards. It's a true, no compromise, amateur band only transceiver covering 160 - 10 metres. Fast switching and rugged thermally cooled PA makes it ideal for data communications. SAE for colour brochure.

£1995

DIAMOND

VSWR/POWER METERS

SX-100	1.6-60 MHz, 30w-300w-3kw 97.00
SX-200	1.8-200 MHz, 5-20-200 watts 69.00
SX-400	140-525 MHz, 5-20-200 watts 79.00
SX-600	1.8-525 MHz, 5-20-200 watts 125.00
SX-1000	1.8-1300 MHz, 5-20-200 watts 165.00
SX-2000	1.8-200 MHz, 5-20-200 watts AUTO 95.00
SX-9000	1.8-160 & 430-1300 MHz, AUTO 190.00

BASE STATION ANTENNAS

CP-4	10-15-20-40m vertical with radials 149.00
CP-5	10-15-20-40-80m vertical with radials 195.00
CP-6	6-10-15-20-40-80M vertical with radials 209.00
D-130N	Discone 25-1300 MHz. 50 FT cable 82.95
CP-22E	2m 2 X 5/8 6.5dB gain omni directional 45.00
D-707	Active rx. 1.5-1300 MHz 12V 99.00

FIBREGLASS VERTICALS

X-50	2m/70cms 4.5/7.2db gain 1.7m long 59.95
X-300	2m/70cms 6.5/9db gain 3.1m long 95.00
X-500	2m/70cms 8.3/11.7db gain 5.2m long 119.00
X-700	2m/70cms 9.3/13db gain 7.2m long 219.00
V-2000	6m/2m/70cms 2.15dbi/6.2db/8.4db 2.5m 95.00
X-5000	2m/70cms/23cms 4.5/8.3/1.7 db 1.8m 109.00

MOBILE ANTENNAS AND MOUNTS

NR-2000M	23cms/70cms/2m mobile whip PL259 49.95
D-505	Active rx. antenna 1.5-1300MHz 12v 69.00
NR-770R	2m/70cms whip PL-259 35.00
NR-790	2m/70cms 4.5/7.2 dB gain 100 Watts 48.00
SG-7900	2m/70cms whip 5.0/7.5 db supergainer 68.00
DP-2HE	2m 1/4 wave whip PL259 6.95
M-285	2m 5/8th whip PL259 15.95
EL-2E	2m 7/8th deluxe whip PL259 33.95
NR-07C	70cms mobile whip P1259 25.00
AM-L	Gutter mount fold over type 12.95
EC-H	PL259/SO239 cable kit for DP-GI 9.95
SP-M	Heavy duty magnetic mount with cable 25.95

NEW PRODUCTS

QRA Locator Maps. Just released! Covers Europe in full colour with lots of detail plus beacons and full instructions. The best we have seen! Folds flat in case. **£5.95** p&p £1.00

WORLD PREFIX Maps. Exclusively produced for us. Full colour with great detail. Prefixes both listed and embossed on map. Folds flat in plastic wallet for post. **£5.95** p&p £1.00.

Tri-Band Dipoles. Brand new German products superbly built and pre-tuned with baluns. **10-15-20m** or **12-17-30m** versions. **£79.00 p&p** £3.00.

ALINCO DJ-X1 Scanner. 500kHz-1300MHz. Half the size of the rest and probably twice as good! **£269.** p&p £4.00.

YAESU FT-990 A great new transceiver that offers many features. Customers are loving this one! **£Phone for deal.**

ALINCO DJ-162. A lovely keyboard entry 2m FM hand-held with airband reception for an amazing price of **£199!**

MFJ Morse practice kit. Comprise self contained key and oscillator with volume and tone controls. **£29.95.**

"The Secret of Learning Morse Code" A delightful book that is unique in the way it tackles the subject. Superb value and very entertaining! **£4.95** p&p £1.25.

Electronic Keyer £69.95

Model MFJ-407B is a budget price electronic keyer that is remarkable value. Operating from internal or external source it provides conventional or iambic keying at speeds from approx 5-50 WPM. Controls include tone, speed, weight and volume. (Needs paddle key).

QRP! NEW ARGONAUT HF Transceiver

Tentec Argonaut II HF 0.2-5 Watts 2.4-0.5kHz variable xtal filter etc. SSB/CW break-in	1295.00
Mizuho Single band 2 Watts	195.00
Models for 80/40/20M SSB/CW	
10 Watt linears single band	129.00
10 Watt dual band linears	199.00

AMERITRON HF LINEARS

NEW 600 Watts

£699! AL-811

This linear is incredible value. We have put it through its paces and it really stands abuse. 3 rugged 811A tubes provide up to 600 Watts output from 160-10m. A hunky mains transformer and full metering is included. Used by DX-peditions it has to be amazing value at

£699 inc VAT

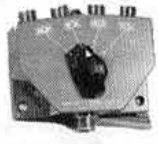
AL-80AX 1KW from 160-10m 3-500z tube. **£1099.00**

Other Ameritron linears are available. Send SAE today.

NEW! CX-401

GLOBAL 4 WAY SWITCH
SO239 + EARTH POSITION

£49



DC-500HMz

ALINCO

The Choice of Those
"With More Sense Than Money"

News Flash!

DJ-560E 2m/70cm
5 Watt Handheld

£299

UK "Gold Seal" Warranty
Now With Every Unit
Look for the sign on the box!

DJ-F1E 2m FM Hand held • 2.5 Watts • 5 Watts 12v DC • Keyboard entry • 40 memories • DTMF • Airband rx • Rotary dial • 6 steps • 8 scan modes • Battery saver • Reverse repeater • Auto power off • Priority • Call Channel • Ni-cad pack • AC charger.

£239.00 *(Far right)*

DJ-S1E 2m FM Hand held • 2.5 Watts • 5 Watts 12v DC • LCD Display • 40 memories • Airband rx • Rotary dial • 6 steps • Scan • Battery saver • Frequency Lock • PTT Lock • Priority • Call Channel.

£179.00 *(left)*

DJ-460E 70 cms FM Hand held • 2 Watts • 5 Watts 12v DC • Keyboard entry • Extended rx • DTMF • Coded squelch • 20 Memory channels • Scan modes • 6 steps • Reverse repeater • Auto power off • Battery saver • LCD display • rotary dial • Ni-cad pack • AC Charger • Superb value **£249**

DJ-560E Dual Band 2m/70cms Hand held • Full duplex • 2 Watts • 5 Watts 12v DC • Dual display • Tone squelch • DTMF • Reverse repeat • Group paging • 7 Scan modes • Battery saver • Extended receive • Auto Power off • Ni-cad pack • AC charger **£299**

DR-112EM 25 Watts 2m mobile • Rotary frequency control • 14 memories • 6 steps • Reverse repeat • Extended rx • scanning • memory skip • microphone and mounting hardware • extremely compact **£269**

DR-590E 2m/70cms dual band mobile • 45/35 W • Extended receive • dual watch • dual display • full duplex • detachable head unit • 6 steps • 38 memories • 8 scan modes • microphone and full mounting kit **£519**

Available direct
or through all good dealers

Phone or send for full colour brochure on any model

Head office: Retail and Mail Order: 22 Main Road, Hockley, Essex SS5 4QS. Tel: (0702) 206835/204965. Fax: 205843
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

RADCOM CONSTRUCTION FEATURE

A Solid State HF Linear Amp

by Mike Grierson, G3TSO

Part 2: Putting the amplifier into use

THERE IS ONLY ONE adjustment on the amplifier, making setting up relatively simple. Before connecting any power supplies, check and re-check the board for any possible errors. The first job is to test the bias supply. This must always be done before connecting the collector supply to the amplifier; a fault here could destroy the devices instantly. With +13V connected to the bias supply only, it should be possible to vary the base bias from approximately 0.5V to 0.9V. Set it to the lowest setting, ie 0.5V. Disconnect the bias supply from the 13V line.

When conducting any tests on the amplifier, always ensure that it is correctly terminated in a 50Ω resistive dummy load. Apply +13V to the amplifier and observe the collector current on a suitable meter: it should not exceed a few milliamps. If it does, something is wrong. Stop and check everything.

Assuming that your amplifier only draws 3 to 4mA, connect the bias supply to the +13V supply and observe an increase in current, partly caused by the bias supply itself and also by the increased standing current in the output devices. Check the current individually in each of the output devices and set to 100mA by adjusting R9. The current should be approximately the same in each device. If it is not, it could indicate a fault in either device or the bias circuitry to it.

Increase the standing current to ensure that it rises smoothly before returning it to 100mA per device. Once the total standing current is set to 200mA (100 + 100) the amplifier is ready for operation.

With a power meter in series with the dummy load, apply a drive signal to the input, steadily increasing the level. The output should increase smoothly to a maximum of about 160W. It will go to 200W, but will exceed the device specification. Observing the output on a spectrum analyser should reveal the primary signal, together with its second, third and higher harmonics. Check that there are no other outputs. Removal of the input signal should cause the disappearance of the other signals displayed. It is helpful during initial setting-up to monitor the current drawn by the amplifier. At full output, efficiency should be in the order of 50%, perhaps lowering slightly at the upper and lower frequency limits and increasing a little somewhere in the 20MHz range. The maximum current likely to be drawn by the 140W amplifier is in the order of 24A.

Building and setting-up the amplifier is undoubtedly a simple operation, and may lead one into a false sense of security. Before the amplifier can be used it must have a low pass filter added to the output to remove the harmonics generated in the amplifier. For single band operation only one filter would be required, but for operation on more than one band a range of filters is required with typically six switched filters covering the range 2 to 30MHz (**Fig 2**). Undoubtedly the best reference for filter design is the *ARRL Handbook*; recent editions have contained tables illustrating filters of all the commonly used types with data for scaling impedances and frequencies.

For most applications a five-pole Chebychev filter will provide all the rejection required but the majority of commercial designs now use the elliptic type of filter, providing peaks of rejection centred around the second and third harmonics. Such filters can be tuned to maximise the rejection at specific frequencies. An elliptic function filter was decided upon as it only requires two extra components over and above the standard Chebychev design, and setting up is not critical.

The construction of a suitable low pass filter may take the form of the inductors and capacitors mounted around a suitable wafer switch, or they may be mounted on a PCB and switched in and out of circuit using small low-profile relays. This makes lead lengths shorter and minimises stray paths across the filter. Unused filters may be grounded easily using relays, permitting only one filter path to be open at a time. The relays need only to be able to carry the output current; they are not required to switch it. 2A contacts are suitable in the 100 - 140W range. Amidon cores ensure the duplication of suitable inductors whilst silver mica capacitors should be used to tune the filters.

The voltage rating of the capacitors should be scaled to suit the power level being used. Ideally 350V wkg units should be used in the 100 - 150W range and 750V wkg ones for powers in the region of 400 - 600W. The latter are available from CCI (see part one).

The antenna changeover relay may be situated at either end of the low pass filter. If

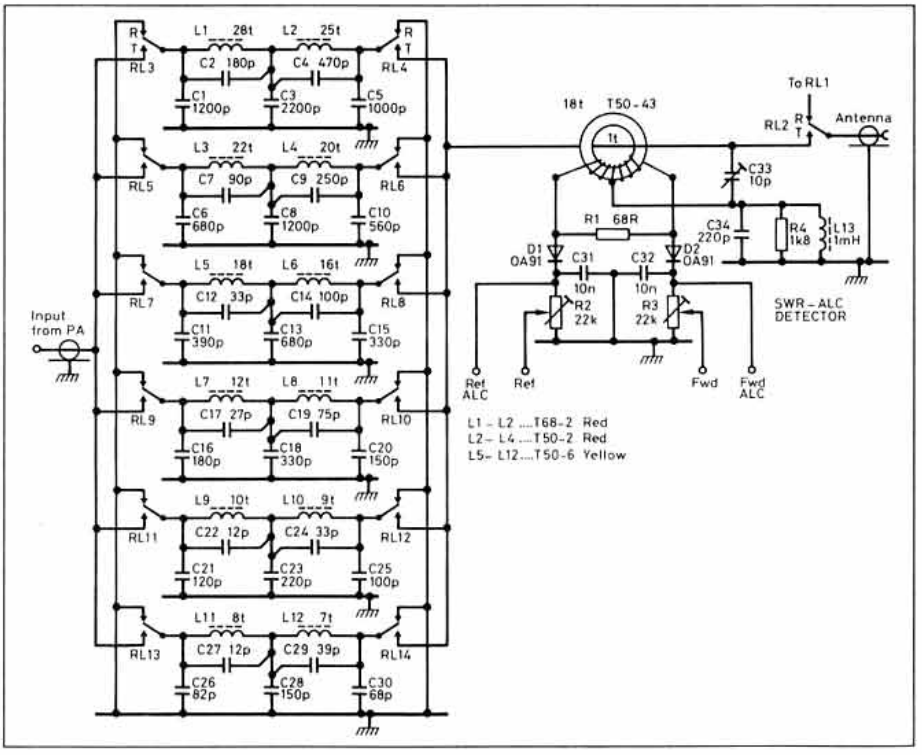


Fig 2: The amplifier is followed by six switched filters and a detector for SWR and ALC circuitry.

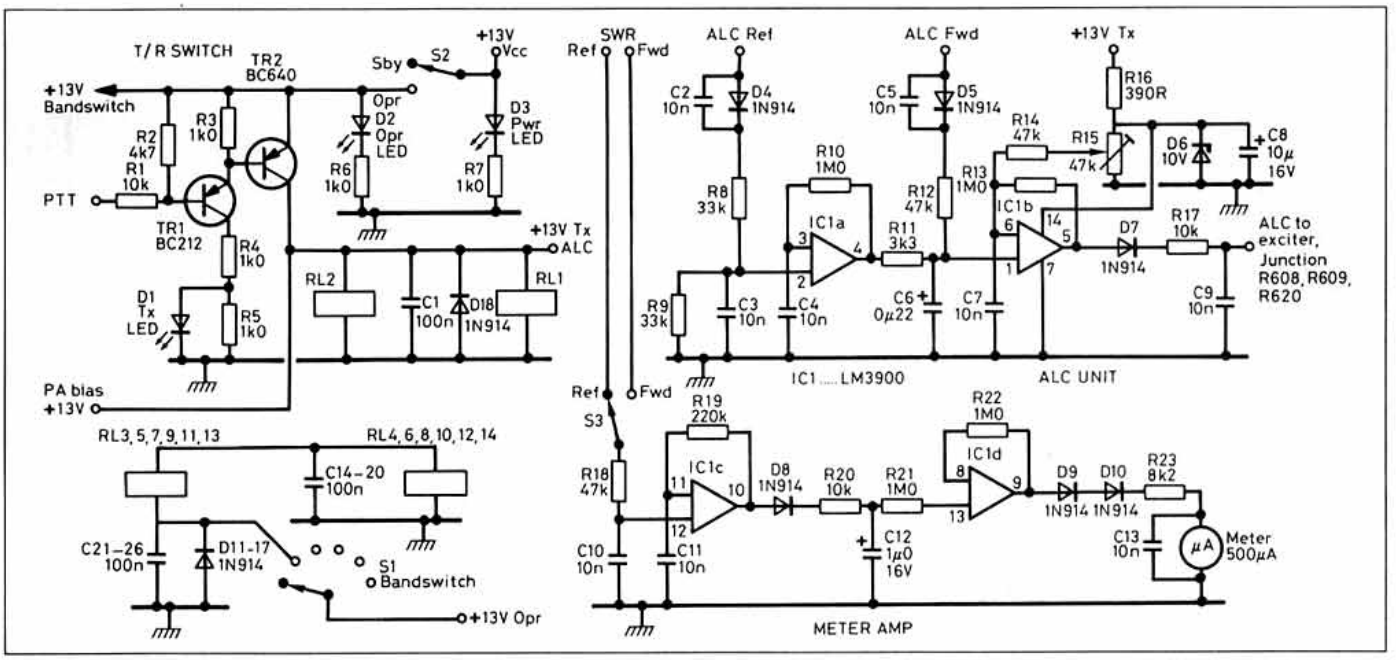


Fig 3: Transmit/receive switching, ALC and SWR circuits.

it is intended to use the filter on receive then the relay will be placed between the amplifier and the filter. If the amplifier is an add-on unit then it may not be necessary to use the filter on receive and the relay may be located at the output end of the filter. Filter performance is enhanced if the filter is mounted in a screened box with all DC leads suitably decoupled.

SWR PROTECTION AND ALC

ONE OF THE MAJOR shortcomings of early solid state amplifiers was PA failure resulting from such abuse as overdriving, short-circuited output, open-circuited output and other situations causing a high SWR. A high SWR kills transistors, either by exceeding the collector-base breakdown voltage for the device or through overcurrent and dissipation.

ALC (automatic level control) serves two functions in a modern transmitter: it controls the output power to prevent overdriving and distortion and can be combined with an SWR detector to reduce the power if a high SWR is detected. This reduces the voltages that can appear across the output device and so protect it. A conventional SWR detector provides indication of power (forward) and SWR which can be amplified and compared with a reference. If the forward power exceeds the preset reference an ALC voltage is fed back to the exciter to reduce the drive and hence hold the power at the preset level. A high SWR will produce a signal that is amplified more than the forward signal and will reach the reference level more quickly, again causing a reduction in the drive level. The circuit shown in Fig 1 (see last month) has been designed to work in conjunction with the ALC system installed in the G3TSO modular transceiver and produces a positive-going output voltage. The LM3900 IC used to generate the ALC voltage contains two unused current-sensing op-amps which have been used as a meter buffer with a sample-and-hold circuit, providing a power meter with almost a peak-reading capability. In practice it reads about 85% of the peak power compared to the 25% measured on a typical SWR meter.

T/R CONTROL.

THE BUFFER CIRCUIT comprising TR4 and TR5 switches the input and output relays from receive to transmit and provides a PA bias supply on transmit.

INTERFACING AMPLIFIER TO EXCITER

HAVING BUILT AN amplifier that worked correctly first time together with the appropriate filters, ALC, metering and T/R systems, the connection to a suitable exciter should be a mere formality, one might think, but here is where the learning curve began.

The G3TSO modular transceiver was unhooked from its valve linear and connected to the solid state replacement, 5W drive producing 140W output from the linear. A little more drive and 200W was produced. This was reduced by setting the ALC threshold. A look at the spectrum analyser showed the primary signal, together with some harmonics suitably reduced by the action of the elliptic low pass filter, but also a response at 26MHz and not many dB down on the fundamental. A quick check with the general-coverage transceiver revealed there really was something there whilst a finger on the 80m low pass filter showed quite a lot of heat being generated.

Investigations clearly revealed that this type of broadband amplifier cannot be operated with a capacitative input low pass filter at either end without it going into oscillation at some frequency, usually well above the cut-off frequency of the filter. The filter input impedance decreases with frequency. With two such filters one at either end of the amplifier there comes a point where the input circuit and output circuit resonate at the same frequency and a spurious oscillation occurs. Removal of either filter solves the problem.

A direct connection between the exciter and linear amplifier is the preferred solution, but is not always practicable in the case of add-on amplifiers, where there is already a low pass filter installed in the exciter. Another solution is to provide a resistive termination at the input of the amplifier: this is far simpler to effect and is used in a number of commercial add-on amplifiers. The network used comprises a 50Ω carbon resistor placed across the input of the amplifier; this effectively reduces the input impedance to 25Ω so a 30Ω resistor is placed in series with the drive source to present a near 50Ω impedance to the exciter. Power from the exciter will be absorbed in these resistors which must be made up from a number of lower wattage resistors in parallel, eg 5 x 150Ω make a 30Ω resistor with five times the power rating. In addition it was found necessary to add a ferrite bead to the input and output leads to the amplifier to effect a complete cure to the parasitic problem which was at its worst on 21MHz, the parasitics occurring above 40MHz. Another solution would be to redesign one of the low pass filters to an inductive input type: suitable design data is available in the 1988 edition of the *ARRL Handbook*.

CONCLUSION

IT IS HOPED THAT the author's experiences in building a solid-state linear may be of interest to others. The technical descriptions are readily available in the various Motorola applications notes and engineering bulletins, but very little is written on their application and use. There were a few surprises when it came to building the amplifier, but they were soon overcome and a number of lessons have been learned. Without the simple spectrum analyser I might never have known about the spurious outputs, and fortunately it helped to solve the problem.

Amplifiers are available for a number of different power levels, and can be combined to provide higher power levels. The use of 13V supplies practically limits powers to about 180W and below, whilst 28 or 50V facilitates higher power operation without the need for stringent PSU regulation. The full power solid state linear is now possible at a price, showing a considerable saving on the cost of a commercially made unit.

Introducing the *DRAKE R8E* Communications Receiver

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

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

£965

including VAT

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

DRAKE IS BACK!

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

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

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

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

DRAKE®

R. L. Drake Company, Miamisburg, Ohio 45342, USA

Sole UK Distributor: **NEVADA COMMUNICATIONS**

189 London Road, North End, Portsmouth, Hants PO2 9AE Tel: 0705 662145 Fax: 0705 690626

The following authorised dealers have the Drake R8E in stock:

AIR SUPPLY	Leeds	0532 509581
ALYNTRONICS	Newcastle-U-Tyne	091 276 1002
A.R. COMMUNICATIONS	Merseyside	0925 229881
HEATHERLITE	North Humberside	0964 550921
LOWE ELECTRONICS	Matlock	0964 580800
MARTIN LYNCH	London W5	081 566 1120
NEVADA COMMUNICATIONS	Portsmouth	0705 662145
RADIO SHACK	London NW6	071 624 7174
SOUTH MIDLANDS COMMS	Southampton	0703 255111
SRP TRADING	Belbroughton	0562 730672

The Peter Hart Review

DRAKE R8E

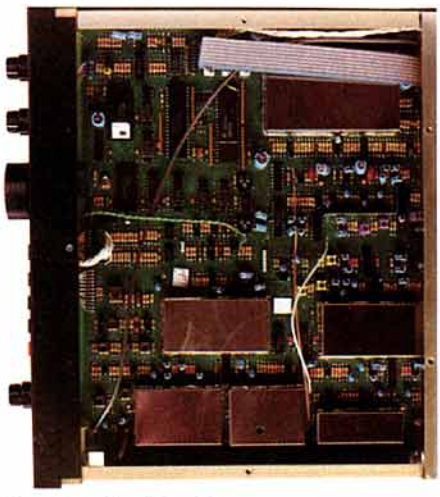
We welcome the Drake Company back to amateur radio with our review of the latest communications receiver.

THE R L DRAKE COMPANY of Miamisburg, Ohio, has been manufacturing HF communications equipment for the amateur since the early 1950s. Over the years Drake has achieved a reputation for excellence in RF performance and many of the top DXers have relied on Drake to give them a competitive edge. The R4C receiver dating from the mid 1970s, probably the finest receiver of its era, mixes valves and transistors to achieve an LF dynamic range virtually unsurpassed even today. The TR7 transceiver introduced in 1978 was one of the first to employ up-conversion with broadband frequency coverage. Unfortunately, during the early 80s, with increasing competition from Japanese set-makers, Drake withdrew from the amateur radio market to concentrate on the growing satellite TV business sector.

However, Drake has now returned with the launch of a new HF communications receiver, the R8, which was first unveiled in the UK at last October's Leicester Exhibition. The R8E is the version specifically intended for Europe, meeting the European safety specifications.

PRINCIPAL FEATURES

THE R8E IS A multimode HF communications receiver covering the frequency range 150kHz to 30MHz and can be powered either from the AC mains or from a 12V nominal DC supply. The modes covered are USB, LSB, CW, RTTY, FM and AM with either normal demodulation or synchronous demodulation on AM. Synchronous demodulation can give much reduced distortion when selective fading is experienced.



The underside of the R8E.

Tuning is via a 40mm diameter spin-wheel knob which tunes at a rate proportional to the speed of rotation. At low speeds, tuning step sizes are 10Hz (fine) or 100Hz (course) per step giving 1.27 or 12.7kHz per revolution of the knob. These increase by a factor of up to ten at high tuning speeds and by lesser amounts at intermediate tuning speeds. The fine or coarse step size is selected by context according to the resolution of the display which may be selected to be 1kHz (coarse steps), 100Hz or 10Hz (fine steps) and this applies to all modes. The last used display resolution is stored against each mode.

Apart from the rotary tuning knob, the frequency may be stepped up or down in increments of 100kHz or entered directly from a numeric keypad on the front panel. Twin VFOs are incorporated plus 100 memories. Each VFO or memory location stores eight separate parameters - frequency, mode, bandwidth, AGC setting, RF front-end setting, antenna, notch filter and noise blanker setting. Memories may be selected from the rotary tuning knob, up-down keys or directly from the numeric keypad. The usual memory operations may be performed. Memory locations may be locked against accidental erasure but there is no preview facility or direct VFO from a memory location.

Some very comprehensive scanning modes are included. Apart from scanning all memory locations, the memory is partitioned into blocks of ten locations (eg 10-19, 40-49 etc) and it is possible to scan any number of blocks in any order. Another mode is scanning from VFO A to VFO B in different selectable step sizes which includes 9kHz for the medium wave broadcast band. The scan rate seems quite fast and the scan criteria is programmable to stop on carrier, dwell for 5s on carrier or dwell until carrier drops for 5s.

Five IF bandwidth settings are included - 6.0, 4.0, 2.3, 1.8 and 0.5kHz. The last used bandwidth in each mode is automatically stored for initial recall. A notch filter is provided, as is a passband offset on all modes except FM. This shifts the IF filter across the passband of the signal and is also known as 'IF shift' in other radios. The AGC time constant may be switched between slow, fast and off and the front end with/without preamp or a 10dB input attenuator. The fitted noise blanker is switchable for wide or narrow pulses (woodpecker or ignition) and two different antennas may be selected from the front panel. Other functions include S-meter, tone control, front panel lock and all-mode squelch. A number of default settings are selectable at power-on such as beep tones, broadcast band scan step size etc.

> **'An interesting receiver... plenty of features'**

The display comprises an LCD panel with adjustable back lighting and has good visibility if viewed at the correct angle. A host of information is displayed including the frequency, memory number, mode, bandwidth, AGC and front-end status etc. Six push-buttons under the display perform dual selection functions according to the legend given on the display. The primary functions are

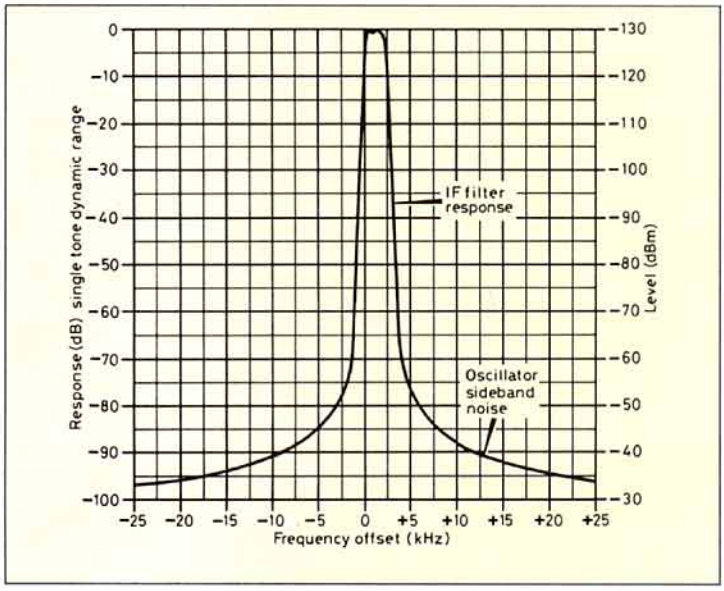
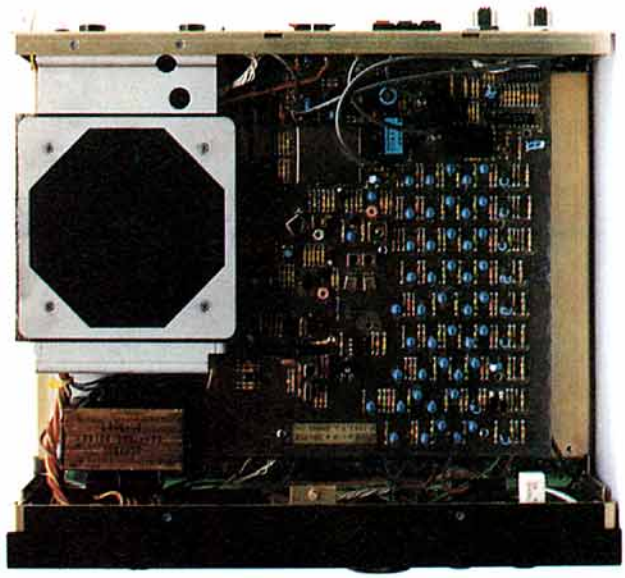


Fig 1: Effective selectivity curve.



Top view of the R8E. A 10cm speaker faces upwards.

normally enabled, with the secondary functions selected with the function key. Access to the secondary functions times out three seconds after the last key press and defaults back to the primary functions.

Clock and timer circuits are built-in. The clock allows for two time zones and the timer has one on and one off period. The timer may be used to switch on the radio and, via contacts on the rear panel, a cassette recorder or similar item. When the radio is switched off, the last accessed clock is continuously displayed as long as the power remains connected to the unit. Note that the clock and timer circuits are not battery backed and timing information will be lost if the power is removed for more than a few minutes.

An optional VHF converter is available covering the frequency range 35-55MHz and 108-174MHz. This mounts inside the case, has a separate antenna input on the rear panel and is controlled from the front panel. Other rear panel connectors include twin HF antenna inputs, DC and AC mains power, timer control, external speaker and twin low level audio outputs to data terminals, tape recorders etc. A ground to mute input is provided for use with transmitters and an RS-232C computer interface. The computer interface operates at 9600 baud, faster than most other radios, and allows computer control of all non-analogue functions. This does not include digitised S-meter which is now commonplace in many Japanese rigs.

I can only hope that the 27-page manual included with the R8E is temporary. The operation of the equipment is adequately described but there is no technical, circuit or service information included. The manual is unprofessionally presented as stapled sheets of paper. *[Nevada have advised us that from January, production models will include a printed fully comprehensive service manual - Ed.]*

DESCRIPTION

THE R8E IS HOUSED in a black crackle case and measures 33.4 (W) by 13.4 (H) by 33.0cm (D). The weight is 5.9kg. Inside, the circuitry is contained on three large PC boards mounted on a conventional chassis and panel arrangement with a fourth board supporting the display behind the front panel. The speaker is a good size measuring 10cm square and facing upwards.

The R8E is a double conversion radio on all modes except FM with IFs of 45MHz and 50kHz. On FM, the radio is triple conversion with IFs of 45MHz, 10.7MHz and 455kHz. Nine diode switched filters provide input filtering and the first and second mixers are double balanced diode types. The main selectivity is achieved at 50kHz using an 8-pole electronically switched filter and appears to comprise a number of high-Q LC resonators using pot cores. The passband offset shifts the frequency of both the 45.05MHz 2nd local oscillator and 50kHz carrier insertion oscillator in sympathy effectively to shift the position of the filter passband without affecting the signal frequency.

The notch filter is implemented at audio. Audio notch filters can achieve a narrower notch but have the major disadvantage that the interfering carrier will capture the AGC and reduce sensitivity. IF notches remove interfering signals before the AGC circuitry. Notches at 455kHz and above tend to be too wide and impair the wanted signal and the main reason why top performance receivers have a final IF in the 50-100kHz region is to implement an effective notch filter. It seems surprising that Drake, having provided such a low IF, has not implemented the notch at this frequency.

Unlike most radios, the R8E stores all control settings and memory locations in non-volatile EEPROM (electronically erasable PROM) which has the major advantage over a battery-backed memory system that there is no battery which needs replacing in the future.

MEASUREMENTS

THE MEASUREMENTS are detailed in the table opposite with additional comments as follows:

SENSITIVITY

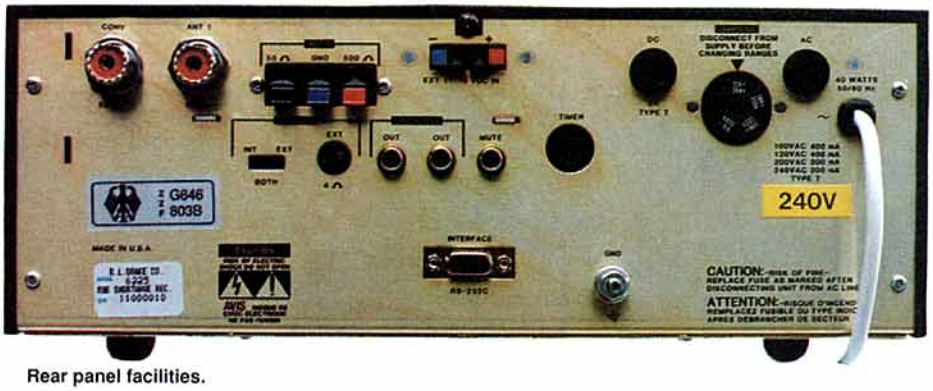
American HF receivers have invariably been slightly less sensitive than their Japanese counterparts but the measured sensitivity is entirely satisfactory.

S-METER CALIBRATION

SSB, CW, AM and RTTY gave the same results and the linearity was satisfactory. On FM, S2 to S9+60 represented 40dB which is poor but not as bad as some radios.

SPURIOUS REJECTION

Rejection of the 45MHz IF was around 90dB with the primary image rejection well over 100dB. The second mixer image occurs 100kHz below the on-tune frequency and rejection of this signal was close to 80dB on all bands. This is remarkably good, consider-



Rear panel facilities.

ing that the 45MHz filter is only two cascaded miniature monolithic dual filters as used in cellular telephones. The receiver was also remarkably clear of other responses and particularly good close-in where many rigs tend to show up problems. No other response was worse than about 100dB down.

AGC

The AGC started acting at a very low level.

STRONG SIGNAL PERFORMANCE

The third order intercept and dynamic range are reasonable and improve with the preamp out of circuit. The close-in dynamic range degrades but not as much as some other more expensive receivers and not until quite close-in. The reciprocal mixing performance is also reasonable. The limitation on all close-in measurements was the IF filter skirt selectivity. The inband linearity measured with 200Hz tone spacing was better with the slow AGC setting and improved markedly with the RF gain control turned down.

SELECTIVITY

The filter skirts are somewhat wider than can be achieved with higher frequency crystal filters. The passband offset control was slightly out of alignment: The optimum position was about "eleven o'clock" set by adjusting for similar tonal quality on background noise between lower and upper sidebands. The effective selectivity curve is shown in **Fig 1**.

DIAL CALIBRATION

Checking the display accuracy at the time of measurement, the receiver was 70Hz low in frequency on 28MHz reducing in proportion on the lower frequencies. On CW the indicated frequency is the zero-beat frequency. When set for the normal 700Hz beat frequency, the display will read 700Hz low.

ON-THE-AIR PERFORMANCE

IN TERMS OF RF performance, the receiver functioned well in all situations and modes, and sounded very clean. There was adequate sensitivity for weak signals on the higher bands and the receiver coped well with evening operation on the lower bands, particularly with optimum use of the input attenuator. On CW, true single signal reception was always achieved with the 500Hz filter but with the 1.8kHz filter, the audio image could be detected on the opposite side of zerobeat for stronger signals. The AM performance was excellent and on signals suffering from selective fading, synchronous detection mode made a big improvement. On some signals, the synchro mode would take some time to lock on. However; once in lock, it remained in lock.

The frequency synthesiser was smooth in operation but gave a slight click every 1kHz. This was not noticeable on SSB but just noticeable on CW and AM and there was a slightly unsteady sound to the tuning characteristic.

I often have problems with interference from a neighbouring electric fence. The noise blanker in the narrow position was particularly effective at eliminating this problem.

The radio is generally easy to use and has some nice features. However, I have a few criticisms with some of the panel ergonomics. The push-buttons are rubber and lack a positive action unless pressed firmly and squarely. The mode and bandwidth settings scroll in one direction only. To transfer from USB to LSB requires five key presses whereas LSB to USB requires just one. Keypad frequency entry times out after three seconds. If you hesitate in the process, you are liable to end up on an unintended frequency. Similarly other functions are also liable to a three second timeout. Auto speed-up can be helpful in speeding up tuning but does give rise to an apparent backlash.

CONCLUSIONS

THE DRAKE R8E IS AN interesting receiver for all HF uses and has plenty of features. All modes and bandwidths are fitted as standard. It has a good RF performance, but some areas of user ergonomics could be improved. The current price is £965 inc VAT.

ACKNOWLEDGEMENTS

I WOULD LIKE TO THANK Nevada Communications of Portsmouth for the loan of the equipment.

Peter Hart, G3SJX

DRAKE R8E MEASURED PERFORMANCE

FREQUENCY	SENSITIVITY SSB 10dB s+n:n		INPUT FOR S9	
	PREAMP IN	PREAMP OUT	PREAMP IN	PREAMP OUT
1.8 MHz	0.18µV (-122dBm)	0.28µV (-118dBm)	11µV	35µV
3.5 MHz	0.18µV (-122dBm)	0.28µV (-118dBm)	11µV	35µV
7 MHz	0.18µV (-122dBm)	0.28µV (-118dBm)	11µV	35µV
10 MHz	0.18µV (-122dBm)	0.28µV (-118dBm)	11µV	40µV
14 MHz	0.2µV (-121dBm)	0.32µV (-117dBm)	13µV	40µV
18 MHz	0.2µV (-121dBm)	0.32µV (-117dBm)	11µV	45µV
21 MHz	0.22µV (-120dBm)	0.35µV (-116dBm)	13µV	45µV
24 MHz	0.25µV (-119dBm)	0.35µV (-116dBm)	14µV	45µV
28 MHz	0.22µV (-120dBm)	0.32µV (-117dBm)	14µV	40µV

S-READING (14MHz)	INPUT LEVEL	
	PREAMP IN	PREAMP OUT
S2	0.3µV	1.1µV
S3	0.5µV	2µV
S5	1.3µV	4.5µV
S7	3.5µV	13µV
S9	13µV	45µV
S9+20	160µV	560µV
S9+40	2mV	6.3mV
S9+60	13mV	40mV

FILTER	BANDWIDTH	
	-6dB	-60dB
6kHz	6070Hz	10.8kHz
4kHz	4260Hz	7450Hz
2.3kHz	2510Hz	4860Hz
1.8kHz	1970Hz	3970Hz
500Hz	550Hz	1170Hz

AM sensitivity (28MHz): 1.3µV for 10dB s+n:n at 30% mod depth

FM sensitivity (28MHz): 0.4µV for 12dB SINAD 3kHz pk deviation

AGC threshold: 0.25µV

100dB above AGC threshold for +2dB audio output

AGC attack time: 5ms or less for all speed settings

AGC decay time: 0.25-0.4s (fast), 2-3s (slow)

Max audio before clipping: 1.6W into 8Ω, 2.4W into 4Ω

Distortion at above levels: 1%

Inband intermodulation products: -26 to -32dB (see text)

INTERMODULATION (50kHz TONE SPACING)				
	PREAMP IN		PREAMP OUT	
FRQUENCY	3rd ORDER INTERCEPT	2 TONE DYNAMIC RANGE	3rd ORDER INTERCEPT	2 TONE DYNAMIC RANGE
1.8 MHz	-1dBm	87dB	+9dBm	91dB
3.5 MHz	-1dBm	87dB	+10dBm	92dB
7 MHz	+3dBm	90dB	+10dBm	92dB
14 MHz	-3dBm	85dB	+10dBm	91dB
21 MHz	-1dBm	86dB	+8dBm	89dB
28 MHz	-1dBm	86dB	+10dBm	91dB

TONE SPACING (28MHz BAND)	3rd ORDER INTERCEPT	2 TONE DYNAMIC RANGE
4 kHz	-19dBm	74dB
5 kHz	-16dBm	76dB
10 kHz	-2dBm	85dB
15 kHz	-1dBm	86dB
>15kHz	-1dBm	86dB

FREQUENCY OFFSET	RECIPROCAL MIXING FOR 3dB NOISE	BLOCKING	
		PREAMP IN	PREAMP OUT
3 kHz	not meas	not meas	not meas
5 kHz	82dB	-18dBm	-9dBm
10 kHz	89dB	-6dBm	+4dBm
15 kHz	93dB	-6dBm	+4dBm
20 kHz	95dB	-6dBm	+4dBm
30 kHz	100dB	-6dBm	+4dBm
50 kHz	104dB	-6dBm	+4dBm
100 kHz	112dB	-6dBm	+4dBm
200 kHz	115dB	-6dBm	+4dBm

NOTE: All signal input voltages given as PD across antenna terminal. Unless stated otherwise, all measurements made on SSB with the receiver front-end preamp in circuit.

Pat Hawker's

Technical Topics

RESONANT MEANDER ANTENNAS

SPACE RESTRICTIONS in the average domestic environment have always resulted in amateur radio interest in methods of shortening the overall span of resonant HF antennas, as well as finding ways of the efficiency of loaded vertical whips: loading coils, capacitance hats, L- and T-antennas, ends dropping down, (**Fig 1(a)**) or bent sideways as in the VK2ABQ type of compact array. It is becoming increasingly difficult to think of a configuration that somebody has not already thought of and tried, often as long ago as the 1920s or 1930s. Even planar (linear) loading elements can be traced back some 60-plus years to the Franklin Uniform Antenna, although in this case used for phasing rather than loading 1.5-lambda dipole elements or 0.75-lambda monopoles.

TT, November 1984, p965, presented two relatively novel methods of shortening the overall span of half-wave dipoles without significant loss of efficiency or directivity: the zig-zag element and the meander-line element: **Fig 1(b) and (c)**. These came from a paper 'Shortening Ratios of Modified Dipole Antennas' by a team of Japanese engineers at Hosei University, Tokyo (*IEEE Trans on Ant & Prop*, April 1984, pp385-6). It was noted that a meander-line element can use up to about 0.7-lambda of wire to achieve 0.5-lambda resonance but can result in shortening the span by 30% compared with a conventional dipole and with a radiation resistance still as high as 43 ohms.

Soon afterwards (*TT*, March 1985, p190), Les Moxon, G6XN showed how a form of planar loading, attributed to VK5HA and using a string of one-turn loops as in **Fig 2(a)**, could be used to fold a half-wave dipole element into about one third of its normal length at the cost of only some 15-20% increase in total wire length. G6XN who used this technique in some of his 'Claw' antennas commented: "This is a big improvement over a helix (loading coil) or another alternative such as a form of 'meander' system shown recently in *TT* (see above) as means of reducing the overall span of dipole and which can be implemented as in **Fig 2(b)**".

While G6XN believes that VK5HA loading loops are near optimum, a detailed discussion of meander-type loading has recently been presented by Jalil Rashed (University of Seestan and Baluchistan, Iran) and Chen-To Tai (University of Michigan, USA) in 'A New Class of Resonant Antennas' (*IEEE Trans on Ant & Prop*, September 1991, pp1428-30). The abstract of this paper is as follows: "A new class of wire antennas called meander antennas is introduced as possible elements for size reduction. Efficiency is affected only by the ohmic losses in the wire, and cross-polarization is negligible.

"An increase in the number of meander sections introduces less size reduction in return for an improved bandwidth. These antennas can be used to reduce the size of the existing wire antennas such as Yagi-Uda antennas and log-periodic dipole arrays".

In view of the Japanese 1984 paper it seems a little strong to claim meander-type elements such as a new class of resonant antenna, particularly when implemented in the form that has been used for some years for 7MHz quad antennas under the term 'planar loading'. However the recent paper does provide new insights in to these forms of element shortening. It is noted that, in general, any attempt to reduce the physical size of a monopole (ie half a dipole) while preserving the same resonant frequency ends up with deficiencies such as bandwidth deterioration, pattern distortion and reduction in efficiency. The authors present theoretical and experimental data (UHF model antennas) on some special cases of meander antennas, as shown (in monopole form) in **Fig 3** and **Table 1**. N is in effect the number of meander sections, with N = 2 corresponding to half a meander section while N = 4 constitutes a complete section. In general the lower the N, the greater is the reduction property but at the cost of a lower resonant radiation resistance and bandwidth. The authors write:

"By means of a sleeve, one is able to match the antenna to any desirable impedance level. Unlike most of the size reduction techniques such as lumped loading and the use of dielectric materials, the efficiency of the meander geometry is comparable to that of a conventional monopole. Since meander dipoles have a resonant length less than half a wavelength, and the separation W is negligibly small, they have essentially a figure-of-eight pattern and unlike many size reduction schemes, the undesirable radiation for horizontal portions is negligible . . . . Meander antennas can be used in the existing wire antennas; especially large arrays with long elements. As an example, a log-periodic dipole array (LPDA) is compared with its meander version (LPMDA). A 35% reduction in element size is obtained with an average loss of 2.5dB in the gain of the antenna over a 5:3 band: J. Rashed-Mohassel 'A Miniaturised Log-periodic Dipole Array' presented at ICAP89 (IEE Conference Publication No 301, part 1 - *Antennas* pp403-406). A whip antenna with partial meandering in the base of the whip is another example with the advantage of higher efficiency in comparison to lumped loading . . . . The meander geometry can be applied equally to other existing wire antennas such as Yagi-Uda arrays".

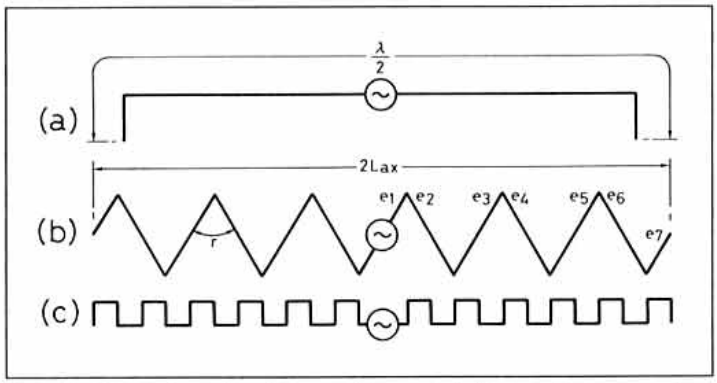


Fig 1: Significant shortening of the overall span of a half-wave dipole element can be achieved without significant loss of efficiency or directivity. (a) Ends dropped down or bent inwards. (b) Zig-zag element where el = e7 =0.0208λ and e2 = e3 . . . = e6 = 0.0416λ. (c) Meander-line element as discussed by Japanese engineers in 1984.

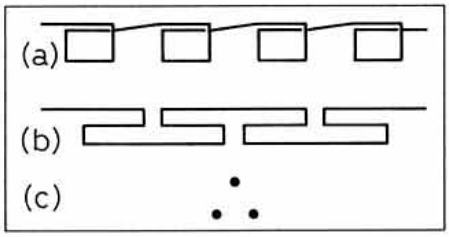


Fig 2: (a) VK5HA-type planar loading as recommended by G6XN in 1985. This involves a string of one turn loops which may be implemented using three cords as in (c) with appropriate spacers. With three loops each side of centre, he was able to fold a half-wave dipole into about one-third of its normal length, at the cost of an increase of only some 15-20% in total wire length, a big improvement in size reduction compared with a helix or meander elements as shown in (b).

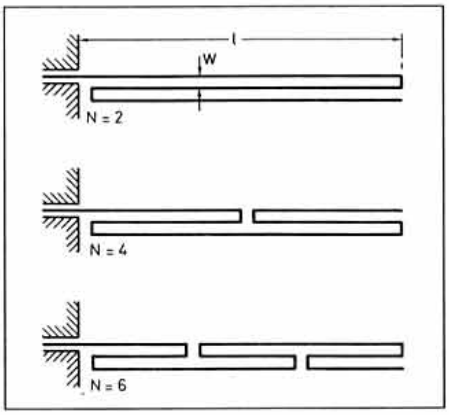


Fig 3: Some special cases of meander antennas (shown in monopole form) discussed by Rashed and Tai. N = 2 corresponds to half a meander section while N = 4 constitutes a complete section. See also Table 1.

Antenna type	N	Resonant frequency (MHz)	Bandwidth (%)	Efficiency (%)	Calculated Radiation Resistance (ohms)
Monopole	-	545	9.5	99.1	36.5
Meander	2	922	3.0	96.7	13.5
	6	1050	7.0	97.8	17.0
	10	1110	7.5	97.9	19.0
	14	1180	8.0*	98.0	21.5

*Approximation from extrapolation

TABLE 1: Experimental data based on model antennas made from a 13.5cm length of wire (diameter 0.8mm). The height of the meander antennas (ie l shown horizontally) is 4.5cm with a small separation W less than 0.3cm (W/l = 0.06).

TOROIDAL CORES, BALUNS AND ATUS

MANY YEARS AGO, *TT* noted that ferrite cores when used in wideband baluns could result in serious power losses - a fact made only too clear by the large heat exchanger fins fitted to professional baluns of this type. Indeed several readers advised against using ferrite-cored baluns at least with simple dipole antennas, although it was generally agreed that baluns not based on toroidal cores have a significant role to play in preserving the desired radiation patterns of multi-element beams and in overcoming some RFI problems where these result from radiation from the outer-braid of coaxial feeders.

Since then there has been increased use of coaxial-cable baluns and ferrite bead chokes to reduce outer-braid currents. The use of toroidal-core baluns has tended to decrease, although such components still turn up in antenna matching transformers and ATUs, as well as in end-of-feeder baluns.

It is some years since this subject has cropped up in *TT* but now George Moorfield, GW3DIX, suggests that the following notes could prove an educational surprise to those who still consider that the ubiquitous balun is a panacea for many ills. He writes: "The use of toroidal-cored baluns in antenna matching units has been progressively less popular in recent editions of the ARRL's *Radio Amateurs Handbook*. Indeed the ARRL now actively discourages such use of these devices, as may be inferred from the following notes that can be found on pages 28-18/19 of the 1992 (16th) edition of the *ARRL Antenna Book*:

"Broadband transformers of the type found in many transmatches are not suitable for use at high impedances. Disastrous results can be had when using these transformers with loads higher than, say, 300 ohms during high power operation. The effectiveness of the transformer is questionable as well. At high peak RF voltages (ie high-Z load conditions such as 600-ohm open-wire feeds or an end-fed random length antenna), the cores can saturate and the RF voltage can cause arcs between turns or between the windings and the core material. If a balanced-to-unbalanced transformation must be effective, try to keep the load impedance at 300 ohms or less. An air-wound 1:1 balun with a trifilar winding is recommended over a transformer with ferrite or powdered-iron material".

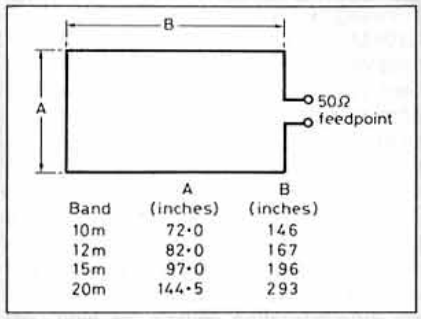
GW3DIX adds: "The most important fact, however, to be observed in connection with the use of these devices - and one which seems to have escaped those who manufacture some ATUs containing them, as well as home constructors, is the following note from the same source as above: The principles on which baluns operate should make it obvious that the termination must be essentially a pure resistance in order for the proper impedance transformation to take place. If the termination is not resistive, the input impedance of each bifilar winding will depend on its electrical characteristics and the input impedance of the main transmission line: in other words, the impedance will vary just as it does with any transmission line, and the transformation ratio likewise will vary over wide limits.

"From this, then, the observation may be made that the use of such toroidal devices should be confined to matching fixed impedance sources one to the other, say 50 to 75 ohms, or 50 to 300 ohms, bearing in mind that any transmission line involved must be a flat line.

"Finally" adds GW3DIX, "it is most encouraging to note that the ARRL have 'put their money where their mouth is' and altered all the circuits in their various new books in accordance with the above comments. And those comments also serve to reinforce the recommendation of the construction and use of a properly balanced matching unit, together with open-wire feeders, as the best way of feeding wire antenna systems, either small or large, from 1.8 to 144MHz".

50-OHM "QUAD-LOOP" ANTENNA

THE ONE-LAMBDA square-loop, mounted either in the vertical or horizontal plane, is a deservedly popular form of antenna. However, with a feed-point impedance of roughly 120-ohms it can present SWR problems when fed directly from 50 or 75-ohm feeder unless a quarter-wave matching transformer is interposed between feeder and element (eg an electrical quarter-wavelength of 75-ohm cable between 50-ohm feeder and the 120-ohm feed point). Bill Orr, W6SAI, in his *Radio FUNdamentals* column in *CQ* (November 1991, pp56-57) shows how by changing the shape away from a square into a rectangle it is possible to achieve a feed-point impedance very close to 50-ohm [or with less elongation of the square close to 75 ohms - *G3VA*]: **Fig 4**. A horizontal loop of this type retains the figure-of-eight pattern of a dipole but with some extra directivity resulting in slightly more broadside gain (at the cost of radiation off the ends). W6SAI points out that feeding a balanced element from unbalanced coax may benefit from slipping some ferrite-beads on the line at the feedpoint or by using a balun. But he adds that "The experimenter will hook the coax directly to the quad loop, see how it works, and then determine if he has to go to the bother of adding a balun or beads on the line".



Band	A (inches)	B (inches)
10m	72·0	146
12m	82·0	167
15m	97·0	196
20m	144·5	293

Fig 4: W6SAI's suggested oblong quad loop antenna providing a feedpoint of 50-ohms resistive, a roughly figure-of-eight dipole-type radiation pattern but with some extra directivity and gain.

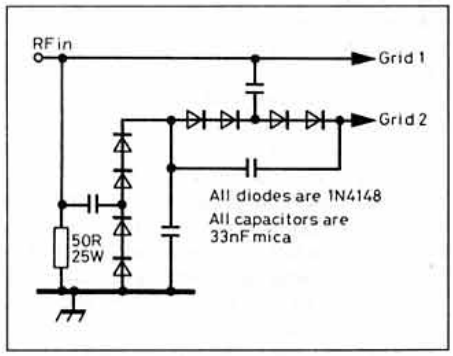


Fig 5: VK2ANO's drive/screen-voltage arrangement for a G2DAF-type linear amplifier using solid-state diodes in place of thermionic diodes. As reported by F6IDC (G4ZU).

MORE ON G2DAF LINEARS

DICK BIRD, F6IDC (G4ZU), notes with interest the ZS2PL/ZS6AOZ modifications to the 1960s G2DAF linear amplifier (*TT*, September 1991, p33). These make this amplifier, with passive-grid drive from which the screen-voltage is derived by means of a voltage-doubler circuit using two small EY81 diodes, more suitable for use with modern solid-state transceivers.

He writes "In 1990 I published a series of seven articles on linear amplifier design in the Australian magazine *ARA* and am now working on a linear amplifier booklet, part one of which is presently in the hands of *Practical Wireless*. This includes a description of my own linear amplifier which uses a circuit very similar to that of Fig 9 in the September *TT*.

"However, because of the voltage step-up from the added input, I was able to eliminate the complexity of a voltage doubler arrangement, with a simple thermionic diode proving more than adequate to provide the required screen voltage. There would be obvious attractions in replacing the EY81 with a solidstate diode since it would provide instant availability at switch-on. An HF power transistor

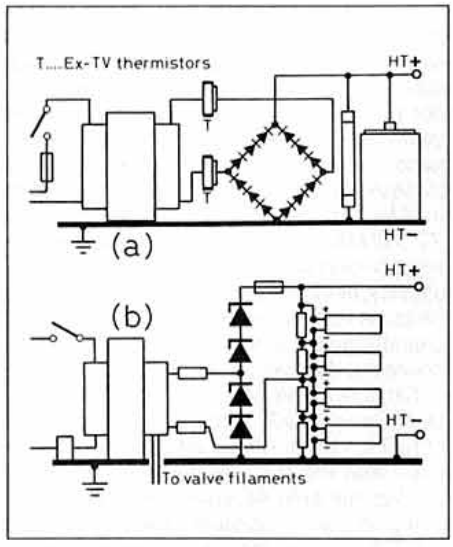


Fig 6: (a) Method of using ex-TV-set heater thermistors as inrush limiters to reduce switch-on stress on rectifier diodes and filter capacitor. (b) Typical arrangement used in commercial designs with series resistors rather than thermistors resulting in poorer voltage regulation on peak load. (F6IDC/G4ZU).

strapped as a diode would be a possible but rather expensive solution.

"A more attractive solution, devised by VK2ANO, is shown in **Fig 5** and uses eight low-cost 1N4148 diodes. I would recommend that if adopted it should be mounted in a position where it is not subject to a stream of hot air from the cooling system, and that the diodes be mounted on a copper-faced circuit board which then acts as a 'heat sink'".

F6IDC (G4ZU) also provides a hint for high-voltage power supplies: "Feed to a high voltage bridge is via a pair of 'inrush-limiting' thermistors, recovered from old, series-heater valve-type TV sets: **Fig 6**. The HT voltage rises slowly at switch-on, limiting stress on both the rectifier diodes and the smoothing capacitor. Elimination of the usual series resistors gives improved voltage regulation on peak load". F6IDC also prefers to use a separate filament transformer in a linear in order to permit precise adjustment of heater voltage - a useful precaution aimed at achieving a long operating lifetime for high cost power valves as mentioned a number of times in *TT*.

ELEVATED RADIALS VERSUS BURIED EARTHS

'USING ELEVATED RADIALS with ground-mounted towers' by Al Christman (KB8I and Grove City College) and Roger Radcliff (Ohio University) in *IEEE Trans on Broadcasting*, September 1991, pp77-82) reflects the continuing saga of the move to use a few elevated radials as a counterpoise in order to replace the extensive 120 (or more) buried radials which, for many years, have been standard for medium-wave broadcast installations. An earlier paper by KB8I on his computer studies was digested in *TT*, August 1988. For this further paper, computer-modelling studies (backed up by some full-scale experiments) were used to investigate several different methods of attaching radials to ground-mounted (insulated) towers, along with variations in radial height, radial length etc. Limited full-scale outdoor tests on several of these configurations have been carried out by William Culpepper, a consulting radio engineer. The preliminary results show good agreement between the measured data and the computer predictions although it is stated that Mr Culpepper plans to present the measured data separately soon.

The computer predictions, as with the earlier modelling, indicate that 'it is possible to use four elevated radials together with a conventional ground-mounted, base-insulated tower for MF broadcasting purposes, and achieve the same level of performance which is normally obtained from a classic 120-buried-radial system.'

Such an approach would clearly be most suitable for use by amateurs on the 1.8, 3.5 and 7MHz bands for verticals; on the higher frequency bands it is already conventionally adopted in the form of the popular ground-plane antenna (GPA).

The paper is based on MF broadcast systems with quarter-wave towers 75m or 84m in height, insulated at the base with the following elevated radials: radials with 45° sloping ends, at heights of 5m and 10m; radials with steeply-sloping ends at heights of 5m and 10m; and an elevated feed method (fed at 5m and 10m) with the radials horizontal over their full length. The four radials are similarly about 75m (quarter-wave) in length. There appears to be relatively little difference in performance between the different systems (**Fig 7**) but it is recognized that much more experimental verification work needs to be done.

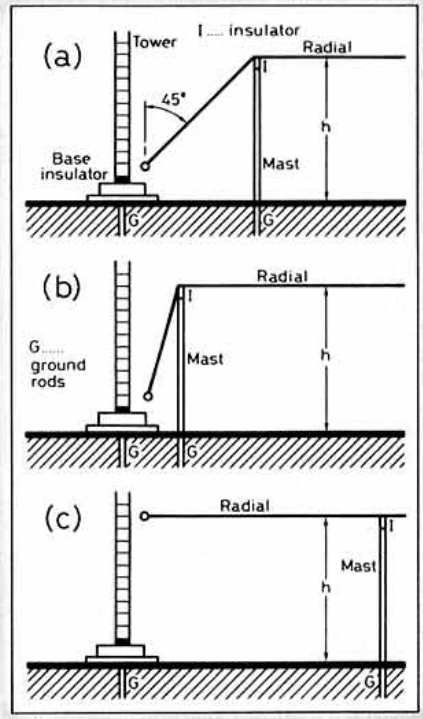


Fig 7: Elevated radial systems investigated by KB8I using computer-modelling to simulate a typical base-insulated broadcast quarter-wave tower antenna. Each of these configurations was modelled for radial heights of 5m and 10m above ground.

EDDYSTONE USERS GROUP

THERE IS A SOLID BODY of people (including myself) who have retained a liking for the classic valve receivers of the now fast-receding heyday of thermionic technology. This may be partly due to a dislike of paying out hard cash for a new solidstate receiver or transceiver while the older gear keeps functioning satisfactorily (aided by the ease of repair when the occasional fault occurs), partly due simply to nostalgia, and partly by the fact that like so many other modern appliances there was much less cost-saving (cost-effectiveness) and less skimping on the mechanical aspects of these older models, traditionally 'built like battleships'.

Admittedly, the technical specifications of modern solid-state receivers, at least on paper, have steadily improved from the days when solid-state front ends crumpled in the presence of strong signals, while even low-cost frequency synthesizers now result in less phase-noise that mars near-in selectivity. It would be rash to suggest that the best solid-state models are in any substantial way inferior to the valve models of twenty or more years ago. Perhaps that is why valve-aficionados or those with nostalgic memories tend to seize upon instances where solid-state may fail to make the grade. In the December *TT*, G2AHU noted that FET oscillators, although quickly reaching switch-on thermal stability, nevertheless in the long-term tend to be more vulnerable than valve oscillators to changes in ambient temperature - though he conceded that we cannot put the clock back.

Similarly, Ted Moore of the Eddystone User Group (EUG), with 22 years experience of radio in North Africa, was not surprised to learn that the US military, during the Gulf conflict, suffered severely from the effect of static on their solid-state radios and had to recall back into service the more resistant front-ends found in many of their 'antique' Collins valve-type equipments.

This seems a good opportunity to draw attention to the EUG and its bi-monthly newsletters which are crammed with information on the many Eddystone receivers produced since the 1930s. They were first produced by Stratton & Co Ltd and then from July 1965 by Eddystone Radio Ltd as a manufacturing-subsidiary of the Marconi Company (initially as part of the English Electric group of companies and then more recently as part of the GEC group). With over 250 members in 16 countries, EUG is by no means exclusively valve-orientated though it is clear that it is the older receivers (from the ECR in 1939 and wartime 358X) and particularly the 500/600/700/800 series of models that attract the most interest.

It is also evident that, at least for medium-wave DX broadcast reception, valve receivers with their double (or triple) tuned IF transformers and good pre-mixer selectivity still tend to outperform the current solid-state models available to SWLs and amateurs.

Ted Moore, himself, has a very large collection of Eddystone models (and hopes one day to initiate an Eddystone museum) and has assembled a substantial store of information not only on the long history of Eddystone from its entry into radio in 1922 (see *TT*, June 1988), but also technical/servicing/restoration information on this unique range of major British-made receivers. The non-profit-making newsletter has reached double figures, although experience has shown that it is difficult for user groups to keep going (it would appear that the former Collins and Racal groups are dormant). There must be many readers with a personal interest in Eddystone equipment and components; for information on EUG they should contact: Mr W E Moore, Moore Cottage, 112 Edgeside Lane, Waterfoot, Rossendale, Lancs BB4 9TR.

DIGITAL COMMUNICATIONS RECEIVERS

SOME SIX YEARS AGO I included a *TT* (May 1985, pp359-360) notes on the Rockwell-Collins receiver type HF2050, which was the first professional VLF/HF communications receiver to be based on digital signal process-

ing (DSP). The HF2050 was a hybrid analogue/digital receiver with the 2nd IF signal at 3MHz converted into digital form with quadrature processing on the bit stream after sampling the 3MHz signal using a 12MHz clock. Single-sideband selectivity was achieved at the direct-conversion 'OkHz' signal and thus the equivalent of analogue AF filtering in a phasing-type direct-conversion demodulator/filter arrangement.

In this form of digital signal processing, the final receiver bandwidth, ripple and selectivity are all determined by programmed data within the signal processors which consist of very large scale integrated circuits (VLSI). In the HF2050, two CW, two AM, SSB and ISB bandwidths were implemented within the two (I and Q) VSLI filter processors.

It was pointed out that the several major firms, American and European, were developing hybrid analogue/digital receivers, based on various architectures, with the eventual aim of having a fully digitized signal-path, with incoming signals at RF converted into a digital bit stream; although then (and now) this still seemed a fairly long-term ambition due to the limited dynamic range and the limited usable clock frequencies of VLSI A/D converters.

Nevertheless the hybrid receivers did seem to offer the attraction of the well-shaped selectivity curves of DSP at a lower cost than a full complement of analogue bandpass filters as commonly fitted in high-grade professional receivers. Digital technology was seen as offering a lower component count, an easier assembly and (potentially) the lower costs of digital designs based on standard devices. However, there has not been many signs of rapid progress being made in receiver digitization during the past six years, at least for high-grade HF receivers with their stringent requirements.

Richard Groshong (Collins Defense Communications) and Stephen Ruscak (Analog Devices Inc) have taken up the challenge in two articles in *Electronic Design* (May 23, 1991 and June 13, 1991) which have been brought to my notice by Rex Beastall, G1LRI. In their introduction they state: "Digital techniques offer some inherent advantages in communication receiver design. These advantages, however, have been offset by both the cost and dynamic range limitations of analogue-to-digital converters (ADCs). Consequently designers continued to use analogue circuitry despite its associated complexity and lack of flexibility. But recent introductions of low-cost, highly linear ADCs, combined with a technique known as undersampling, make digital processing the architecture of choice."

TECHNICAL TOPICS

The first article "Undersampling techniques simplify digital radio" is subtitled "By sampling below the Nyquist rate with a new type of ADC, designers can exploit the benefits of digital radio." The authors outline the requirements of a high performance HF receiver: it must be sensitive enough to receive a 0.5uV (-113dBm) signal at the receiver input (50-ohms) with a 10db signal-to-noise ratio (SNR) in a 3KHz bandwidth, adding "However, the receiver must also be able to receive a 1V signal (+13dBm) without significant distortion. Consequently, in-band dynamic range must be at least 126dB".

In a practical analogue/digital receiver, (**Fig 8**) with analogue front-end, the receiver's dynamic range is adversely affected by the fact that the bulk of the receiver gain must be ahead of the ADC in order that this should function satisfactorily, whereas a conventional analogue receiver the main gain normally occurs after the second IF bandpass filters. This means that for the digital receiver the designer must supply both analogue and digital gain control since the ADC cannot possibly support the required 126dB of dynamic range. In other words, much of the dynamic range will not be instantaneous dynamic range but depend on AGC control of the front-end - by no means a desirable characteristic when trying to copy a weak narrow-band signal immediately alongside a very strong signal.

The authors point out: "In the digital design, the positioning of the gain means that undesired out-of-band signals can pass through the wider-bandwidth front-end and saturate the amplifier and ADC. This must be avoided because ADC saturation generates many aliased in-band harmonic and intermodulation products that can block a weak signal. The solution lies in automatic gain control (AGC) and the use of large-wordlength, highly-linear ADCs."

Conventionally, for digital sampling, the sampling frequency must be at least twice the highest signal frequency as stated in the Nyquist law. However, a low sampling rate is a key factor in the overall performance of a digital receiver, the authors point out that in the case of a bandpass signal, designers can use undersampling which means sampling at a rate less than twice the highest frequency being converted (**Fig 9**) and this approach is described in detail, with particular reference to two Analog Devices sampling ADCs type AD679 and AD779.

In the second of the two *Electronic Design* articles 'Exploit digital advantages in an SSB receiver' - the authors cover the design of a receiver using undersampling linear ADCs in

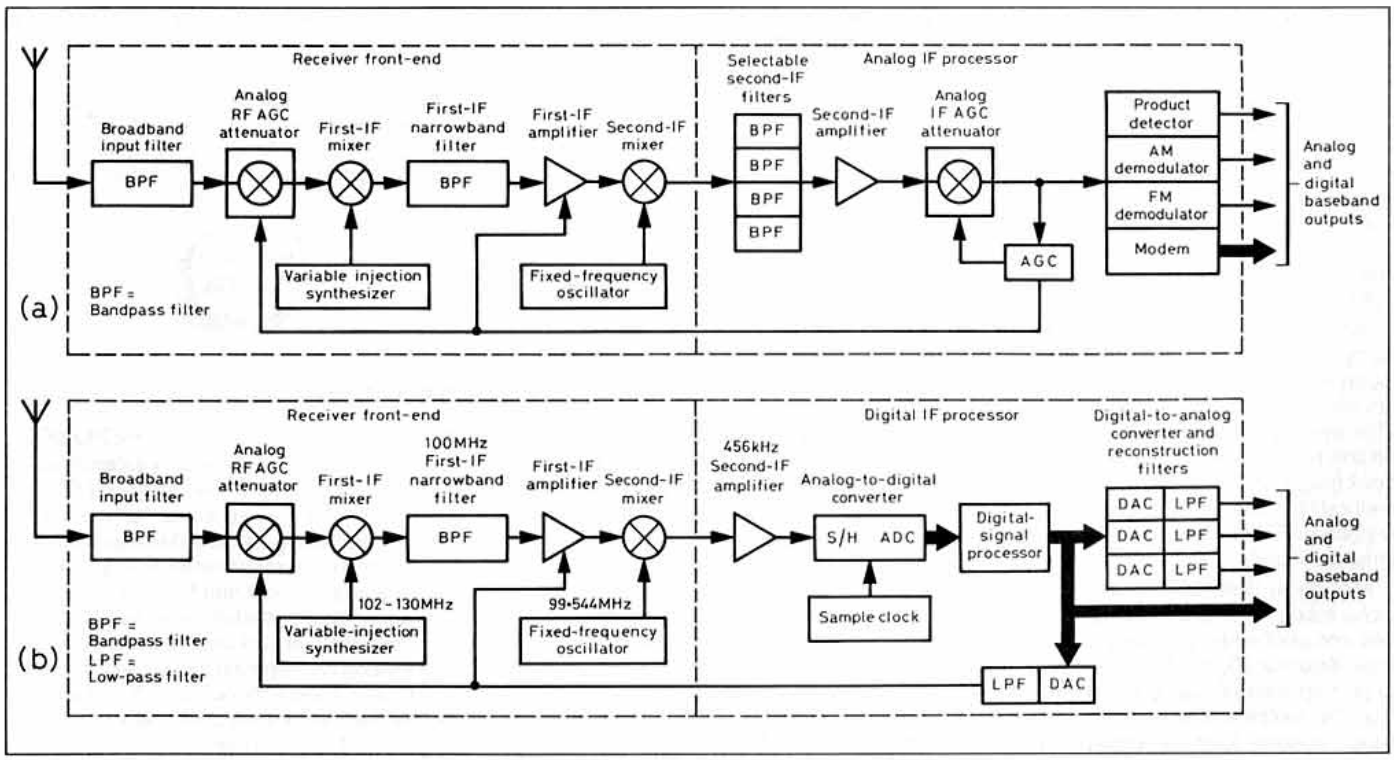


Fig 8: (a) Outline of typical 'professional' analogue communications receiver with several bandpass filters and demodulation circuits for the different modes. (b) Use of a software-reconfigurable digital signal processor at the 456kHz second IF potentially reduces cost by eliminating the multiple bandpass filters etc. (*Electronic Design*)

greater detail, although is not made clear whether such a receiver is (or will be) marketed by Collins as a military radio.

The authors consider that "The digital IF processor's high integration level is indicative of the future of SSB equipment. As the performance of the ADC improves, it will be placed close to the receiving antenna in the analogue front-end. The ultimate goal is to digitize the incoming signal directly from the antenna and implement the remaining digital functions in custom ASICs (Application Specific Integrated Circuits - see *TT*, August 1990)."

It seems rather unlikely that we will see this degree of digital signal processing in amateur-budget receivers in the near future - furthermore it is clear that there must be some risk of low-cost DSP degrading rather than improving the performance of good analogue receivers. But it is a technology we need to be aware of.

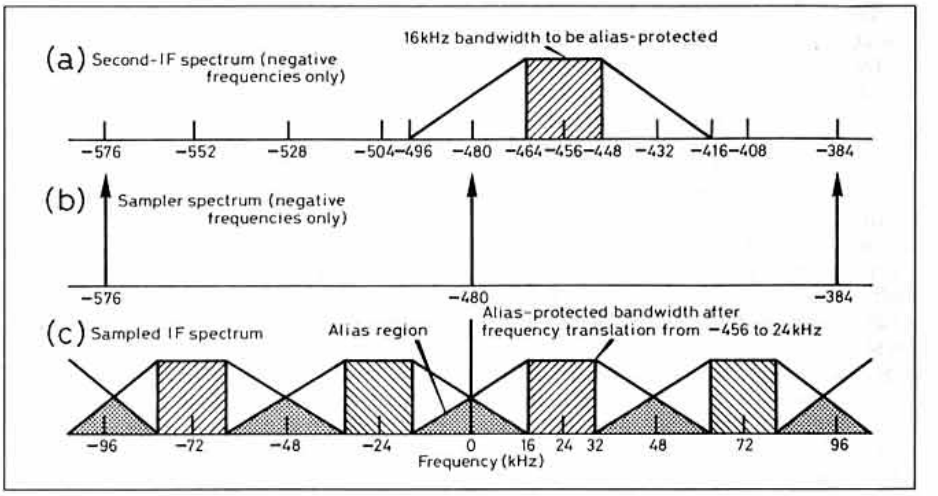


Fig 9: Undersampling the second 456kHz IF signal with a 96kHz sampling frequency to provide the full 16kHz bandwidth free of aliasing requires that the first IF filter must have no more than an 80kHz-wide stopband. (*Electronic Design.*)

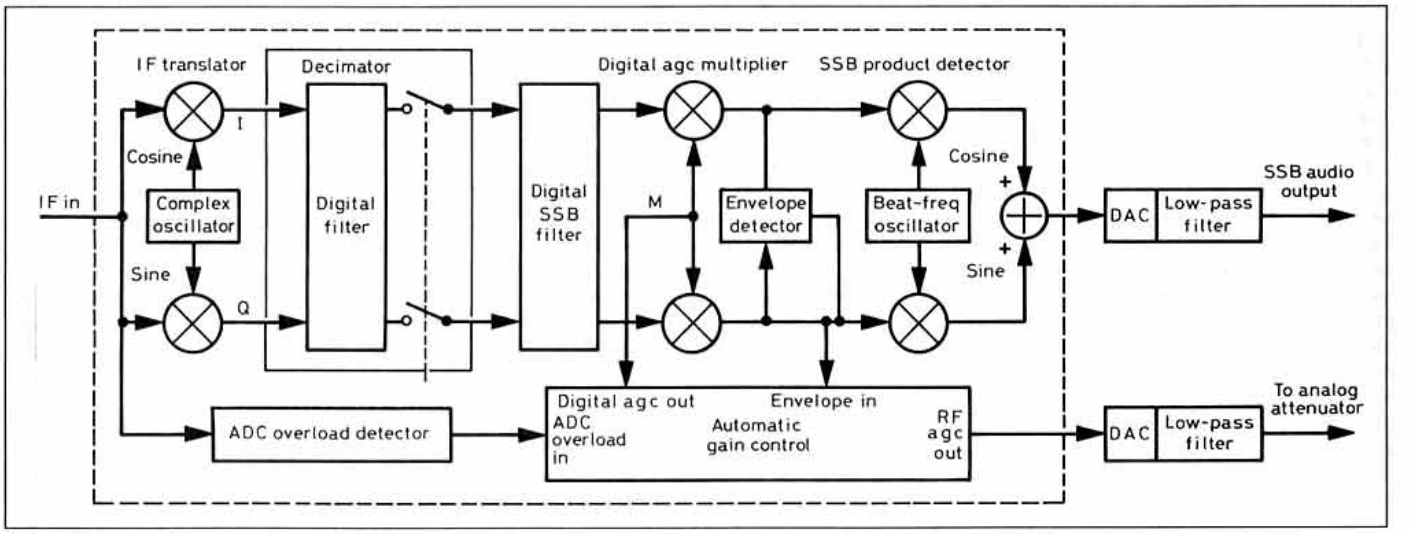


Fig 10: SSB filter, AGC and demodulator are implemented with the DSP VLSI chip. The system's sample rate is first reduced by a factor of ten in the decimator to produce enough instructions cycles between samples to perform the required algorithms.

OLD OSCILLOSCOPES AND TWO-TONE TESTING AGAIN

N P CHEASLEY, GM4RDB thoroughly agrees with G0DLN about the value of two-tone testing of linear amplifiers and the problem of doing this with older oscilloscopes having only limited frequency response (TT, August 1991, p30).

However, he draws attention to what is, in his opinion, a simpler solution which he has to found entirely satisfactory and which does not require any modifications to the 'scope. This approach was described in his 1981 edition of the *ARRL Radio Amateurs Handbook* (page 12-18) as follows: "An alternative method is to use an RF probe and apply the resulting AF signal to the vertical deflection amplifier input".

In his case, GM4RDB has arranged a small probe inside his antenna change-over switch-box and connected to a simple high impedance detector: **Fig 11**. The probe is arranged to pick up approximately equal RF voltages from the switch box when this is switched to either dummy load or antenna. With the 'scope's Y-amplifier on its 100mV/cm range a peak amplitude of about 2cm for a transmitter output of 100W is obtained.

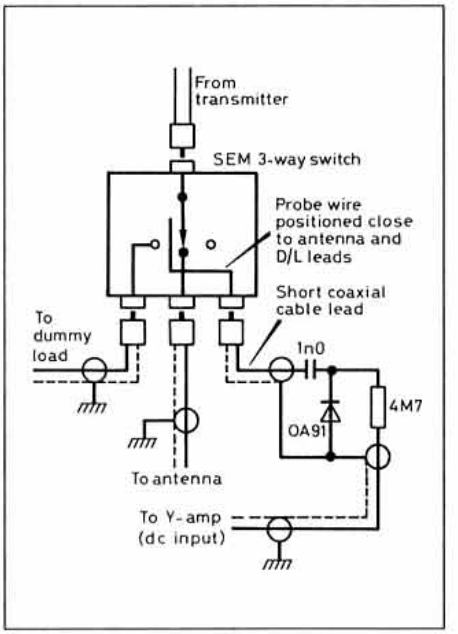


Fig 11: How GM4RDB arranges his RF probe inside his antenna/dummy-load change-over switch-box, with an external high impedance detector and output connection to the Y-amp socket of his 'scope of limited HF perfomance.

GM4RDB points out that the advantage of this arrangement is that no high RF or DC voltages are involved in connection to the unmodified 'scope, making it safer!

TECHNICAL TOPICS

TIPS AND TOPICS

NORMAN WILKINSON (G4HVT/LA0FG) adds to the hints on projecting antenna-support cords over the branches of trees (*TT*, November 1991, p31). He writes: "Like others, I was worried about possible damage to neighbours and their property when using the next-door-teenager's bow and blunted arrow and also found that I needed more weight to pull the cord over and down. My four-year-old granddaughter supplied the answer: a semi-hard, and heavy enough, 1.5in diameter 'super-ball'. With a suitable hole drilled halfway through, it was a tight fit on the arrow, and also gripped the end of the line. The only snag (my granddaughter considered it an advantage) was that the ball had to be replaced."

Radio Communication

The Journal of the Radio Society of Great Britain

INDEX TO VOLUME 67 JANUARY TO DECEMBER 1991

AUTHORS TO TECHNICAL ARTICLES

Case, John, GW4HWR: *First Steps in Home Construction* May (cover), May 38, Jun 42, Jul 40, Aug 41, Sep 36, Oct 42, Nov 34, Dec 32
Craighero, Roberto, I1ARZ: *A Magnetic Loop Antenna for the Low Bands* .... Feb 38
Dawson, Mike, G3TCL: *Using an Oscilloscope as a General Purpose Tester* .. Nov 52
Grierson, Mike, G3TSO:
A Digital Frequency Display for the Modular Transceiver ..... Apr 49
Grierson, Mike, G3TSO: *A Miniature 80 Metre SSB Transceiver* Jun 44, Jul 30, Sep 46
Hamilton, Nick, G4TXG: *Improving Direct Conversion Receiver Design* ..... Apr 39
Henk, A J, CEng, MIEE, G4XVF: *Loop Antennas - Facts, Not Fiction* .. Sep 51, Oct 47
Hossack, James, GM3DKW: *Textloader for Technical Software Morse Tutor* .. Dec 54
Marris, Richard Q, G2BZQ: *The TFH Antenna* ..... Apr 46
Moxon, Les, BSc, CEng, MIEE, G6XN: *All-band Beam Antennas* .... Aug 49, Nov 48
Plummer, Chris, BSc, C Eng, FIChemE, MSaRS, G8APB:
HF Direction Finding ..... Jun 38, Jul 72
Price, Steve, G4BWE: *CW Transmitter for the 3.5MHz Novice Band* ..... Dec 46
Price, Steve, G4BWE: *Sideband can be Simple!* ..... Sep 41
Smith, Clive, G4FZH: *Getting Started in Packet Radio* ..... Feb 48
Spaargaren, Klaus, PA0KSB: *The Fifth-Method Stabilised Oscillator* .. Mar 62, Apr 37
Stewart, Dr Paul, G7EAH: *A Simple Audio Notch Filter* ..... Jan 38
Sumner, David, G3PVH: *A Buzzer Noise Source .... and how to use it* ..... Jan 37
Sykes, B, G2HCG: *Controlled Feeder Radiation Revisited* ..... Jul 46
Wilson, Nigel, BEng, AMIEE, G4VVZ:
An Introduction to Meteor Scatter Operation (part 2) ..... Jan 46
White, Ian, G3SEK:
How to Lay Out RF Circuits .... and how to build them ..... Feb 36, Mar 60

AWARDS AND TROPHIES

(see also Contests, HF News, VHF News, SWL News and Microwaves)
Certificate of Merit ..... Dec 77
Calcutta Key ..... Oct 7
G3PSH Memorial Trophy ..... Nov 6
G8KW Trophy ..... Aug 8
Parchment Farm ..... Aug 45
Trophy Nominations Required ..... Jun 8
Trophy Winners ..... Jan 9, Jul 62, Oct 59, Dec 67
VHF/UHF Awards News ..... Jan 6, Jun 6, Oct 7
WAB ..... Aug 6
(See also HF News and VHF/UHF News Columns)

CLUBS

Club News ..... Jan 73, Feb 73, Mar 90, Apr 71, May 66 Jun 71, Jul 69, Aug 72, Sep 73, Oct 66, Nov 74, Dec 76
Keighley ARS and Children in Need ..... Mar 7
North Ferriby United ARS (photo) ..... Apr 73
Only Class A town in Britain (photo) ..... Oct 7
Trafford Club (photo) ..... Dec 77

CONFERENCES, CONVENTIONS, RALLIES, EXHIBITIONS & LECTURES

AMSAT-UK Colloquium ..... Mar 7, Jul 8
Christian Amateurs in Conference ..... Mar 6, Aug 8
Dayton Hamvention ..... Mar 10
Flying the Flag - NEPCON 91 ..... Jun 6
IARU Region 3 Conference ..... Oct 7
IEE International Conference on HF Radio Systems and Techniques ..... Jul 5
Leicester Show Guide Supplement ..... Oct i-xvi
Mobile Rallies and Events Diary Jan 73, Feb 74, Mar 90, Apr 71, May , Jun 71, Jul 70, Aug 73, Sep 74, Oct 67, Nov 75, Dec 76
RSGB HF Convention ..... Aug 15, Sep 16, Nov 7
RSGB National Convention (NEC) ..... Feb 28, Mar 16, Apr (i - xvi), Jul 44
RSGB VHF Convention ..... Jan 20, Feb 20, Mar 20,
VHF Round Table ..... Jun 6

CONTESTS - DF (RULES IN SQUARE BRACKETS)

144MHz Amateur Radio DF ..... May 42, Aug 7, Nov 5
ARDF Championships ..... Apr 5
Banbury Qualifying ..... [Jul 63], Oct 60
Colchester and Chelmsford Qualifying ..... [Apr 63], Aug 65
Does Your Club Do Direction Finding? ..... Oct 60
Geoff Peck Memorial Trophy ..... [Feb 65]
Mid-Thames Event ..... Jan 65, [Jul 63], Oct 60
Oxford Qualifying ..... [Apr 63]
Ripon and Dist Qualifying ..... [Sep 65]
Salisbury Qualifying ..... [Aug 65]
Slade Qualifying ..... [May 59], Oct 60
Slade Shield Night DF Event ..... Mar 87
South Manchester Quad Night ..... [Feb 65]
Torquay and Dist Qualifying ..... [Jun 62], Oct 60

CONTESTS - NON-RSGB (RULES IN SQUARE BRACKETS)

AGCW-DL QRP/QRP Party ..... [May 17]
AGCW Straight Key Parties ..... [Aug 16], [Sep 15]
ALARA ..... [Nov 13]
All Asian DX ..... [Jun 18], Jul 15
ARI International ..... [Apr 17]
ARRL 10m ..... [Dec 15]
ARRL 160m ..... [Dec 15]
ARRL DX ..... Jan 17, [Jan 17], Mar 17
Bermuda ..... [Mar 17], Sep 15
CQ M ..... [May 17]
CQ WW ..... Jan 17, Mar 17, [Oct 16], [Nov 13], Nov 13
CQ WW 160 ..... [Jan 17], Feb 18
CQ WW WPX ..... [May 17], May 17, Aug 16
DARC FAX ..... [Oct 16]
Dutch PACC ..... [Jan 17], Oct 16
East to West QRP Weekend ..... [Apr 17]
European DX ..... [Aug 16], Aug 16, [Sep 15]
IARU HF World Championship ..... [Jul 15], Nov 13
Ibero-Americano ..... [Sep 15]
JT-80 Anniversary ..... [Dec 16]
Jubilee Helvetia ..... [Mar 17]
LZ DX ..... [Sep 15]
Morse Memory Week ..... [Apr 17]
ON Contest ..... [Oct 16]
Portugal Day ..... [Jun 18]
QRP Winter ..... [Dec 16]
Scandinavian Activity ..... [Sep 15]
SEANET Worldwide DX ..... [Aug 16]
Spanish RTTY ..... [Jun 18]
UBA ..... [Jan 17], Jun 18, Jul 15, Oct 16, Nov 13, [Dec 16]
Vermont QSO Party ..... [Jan 17]
WAB Contests ..... [Apr 7]
World Radiosport Team Championship ..... Mar 8
World-wide Naval ..... Jul 15, [Dec 16]
VK-ZL-Oceania ..... Oct 16, [Sep 15], Dec 15
Yuri Gagarin ..... [Apr 17]

CONTESTS - HF RSGB (RULES IN SQUARE BRACKETS)

1.8MHz SSB ..... [Feb 64], Aug 64
21/28MHz SSB ..... Mar 86, [Apr 62]
21MHz CW ..... [Apr 62], Apr 62, [Jun 62]
28MHz Cumulatives ..... Feb 64
7MHz CW ..... [Oct 58], Oct 58
Address for Entries ..... Jul 62
Affiliated Societies Team (CW) ..... Jul 62, [Nov 67]
Affiliated Societies Team (SSB) ..... [Nov 75]
Bingo Table ..... Dec 66
Club Calls ..... Mar 85, [Sep 64]

County Code letters for use in RSGB Contests ..... Jan 64, Jul 62
County Round-Up ..... Mar 85, [Mar 85], Oct 59
First 1.8MHz ..... Jun 62, [Dec 66]
First 28MHz Cumulative ..... Oct 59
General Rules for RSGB HF Contests ..... [Jan 63]
General Rules for RSGB HF Receiving Contests ..... [Jan 64]
HF Contest Championship ..... [Feb 64], Jul 62
HF Contests Guide ..... May 58
IARU Region 1 CW Field Day ..... Feb 64
LF Cumulatives ..... Aug 65, [Nov 67]
Listener Contest ..... [Jul 19]
Low Frequency SSB ..... [Jan 64], [Aug 64], Aug 64
Low Power ..... [Feb 64], Oct 58
Low Power Field Day ..... Jan 64, [May 58]
National Field Day ..... [Feb 64], Nov 65
Ropoco 1 ..... [Jan 64], Aug 65
Ropoco 2 ..... [Jul 62], Dec 66
Second 1.8MHz ..... May 58, [Sep 64]
Second 28MHz Cumulatives ..... [Aug 64]
SSB Field Day ..... Mar 86, [Jun 62]
Summer 1.8MHz ..... [May 58], Oct 58
Trophies (see Awards and Trophies)
Your Comments and Suggestions Invited ..... Jun 62

CONTESTS - VHF/UHF/MICROWAVE RSGB (RULES IN SQUARE BRACKETS)

1.3/2.3GHz Cumulatives ..... [Mar 87]
1.3GHz and 2.3GHz Trophy ..... [Feb 65], Sep 65
10GHz Cumulatives (photo) ..... Jan (cover), May 59
1296MHz Fixed/SWL (1st) ..... [Feb 64], Oct 59
1296MHz Fixed/SWL (2nd) ..... [Mar 87]
144/432MHz ..... [Jan 65], Jan 65, Sep 64
144MHz and SWL ..... [Feb 64], Apr 63
144MHz CW ..... [Jan 65], Oct 59, [Dec 67]
144MHz CW & Marconi IARU ..... [Mar 87]
144MHz CW Cumulative ..... [Mar 87], Oct 59
144MHz Fixed, AFS and SWL ..... [Mar 87]
144MHz Low Power/SWL ..... [Mar 87], Apr 63
144MHz Trophy ..... [Mar 87], May 59
144/432MHz Low Power ..... [Jun 63]
24GHz Cumulative ..... May 59
3.4 - 24GHz Summer Cumulative ..... [Apr 63]
432MHz - 24GHz ..... [Feb 64], Feb 65, [Oct 7]
432MHz - 24GHz RSGB/IARU ..... [Mar 87]
432MHz Activity Contest ..... Mar 87
432MHz Cumulatives ..... [Mar 87], May 59
432MHz CW Contest ..... [Feb 65]
432MHz Fixed/SWL ..... [Jan 65], [Mar 87], Jun 63
432MHz FM ..... [Feb 65]
432MHz Low Power/SWL ..... [Mar 87], May 59
432MHz Trophy and SWL ..... Feb 65, [Feb 65], [Mar 85]
50MHz CW ..... [Mar 87]
50MHz Trophy ..... [Feb 64]
70, 144 and 432MHz Fixed ..... [Mar 87]
70MHz Cumulatives ..... [Jan 65], Feb 65, Sep 65, Nov 67, [Dec 67]
70MHz CW ..... [Mar 87]
70MHz Fixed ..... [Jan 65]
70MHz Trophy/SWL ..... [Mar 87]
General Rules ..... [Jun 63]
Trophies (see Awards and Trophies)
VHF Listener Championship ..... Jun 63
VHF NFD ..... [Mar 87], [Jun 62], Dec 35

CORRESPONDENCE

The Last Word ..... Jan 75, Feb 75, Mar 94, Apr 74, May 71, Jun 73, Jul 73, Aug 74, Sep 75, Oct 69, Nov 77, Dec 79

COURSES / EXAMINATIONS

RAE and Morse Courses ..... Aug 8, Sep 8
Report on May 1990 RAE ..... Jan 10
Report on NRAE (June 1991) ..... Aug 6
Report on NRAE (Sept 1991) ..... Dec 22

DATACOMMS

BARTG News ..... Jan 5
Datacomms column ..... Jan 54, May 7, Jul 8, Sep 59, Nov 58
DX Clusters ..... Apr 4
Guidelines for the Use of the Packet Network ..... Jul 71

EMC

EMC column ..... Feb 54, Apr 56, Jun 54, Aug 60, Oct 53, Dec 60
Is Your Own House in Order? ..... Jan 40

EUROTEK

Artificial Intelligence in Amateur Radio (*CQ-DL*) ..... Nov 49
Charger for Hand-helds (*CQ-DL*) ..... Jun 47
FT-1000 (*CQ-DL*) ..... Sep 38
Ham Radio '91, Friedrichshafen ..... Oct 39
Loudspeaker for Voice Communication (*Electron*) ..... Jan 42
Multiband Quad-plane (*Electron*) ..... Dec 55
Noise Cancelling Microphones (*Electron*) ..... May 54
Plumbers' Delight (W8JK) (*Megahertz*) ..... Jul 48
RFI-proofing the VCR in My Own Home (*CQ-DL*) ..... Apr 45
T-Antennas - Better and Smaller (*CQ-DL*) ..... Feb 45, Mar 64
VHF Noise Bridges (*Electron*) ..... Aug 39

EXPEDITIONS / SPECIAL EVENT STATIONS

£1,130,000 for MS ..... Jan 5
Amateur Radio in the Kingdom of Bhutan ..... Feb 1, Feb 8, Mar 5
Camel Mobile in Jordan ..... Jul (cover), Jul 42
Edward's Wild about Amateur Radio ..... Jul 5
Edwina Takes to the Air ..... Feb 5
Fastnet Force Seven ..... Jun 7
GB Calls ..... Jan 74, Feb 74, Mar 91, May 67, Jun 72, Aug 73, Sep 74, Oct 67
GB2IRC - the Bear Facts ..... Jan 6
GB4QRS - the Slow Train? ..... Aug (cover), Aug 7
GX2BQY ..... Jul 8
M0RSE ..... May 5, Aug 37
Quito's Quads ..... Dec 5

HELP WANTED

Helplines ..... Jan 74, Feb 72, Apr 73, May 64, Jun 70, Jul 72, Oct 65, Nov 73, Dec

HF

Bangladesh ..... Oct 7
HF News column ..... Jan 17, Feb 17, Mar 17, Apr 17, May 17, Jun 16, Jul 14, Aug 14, Sep 15, Oct 16, Nov 12, Dec 15
Straight Key Day ..... Sep 8
VK3 QSLs ..... Apr 6
Welcome Back Albania ..... Oct 5

HUMOUR

Antenna to Ionospheric Matching ..... Apr 36

LICENSING, BAND PLANS, SPECTRUM ABUSE

144MHz Bandplan, comments invited ..... Aug 7
Abuse on Amateur Radio ..... Dec 4
Amateur Radio Band Plans ..... Mar 45-55
CEPT licence: Czechoslovakia ..... Dec 8
CEPT licence: Hungary ..... Dec 8
CEPT licence: Sweden ..... Mar 7
CEPT licence: Italy ..... Mar 7
Codeless Licence in US ..... Mar 6
GB2CW frequency ..... Jul 8
Latest Callsigns ..... Aug 8
Licence Fee ..... Apr 6
Monitoring System (IARU) ..... Dec 6
Monitoring System (RSGB) ..... Dec 6
New reciprocals ..... Apr 5
Planned Bands ..... Mar 56
SSL Get Licensing Contract ..... Dec 8
RA Report ..... Sep 8, Oct 5
UK Licence Changes Effective 5 April 1991 ..... Apr 6
World Administrative Radio Conference ..... Dec 7

MICROWAVES

Microwaves column ..... Jan 56, Mar 70, May 52, Jul 58, Sep 60, Nov 60

MISCELLANY

Amateur Radio Insurance Scheme ..... Dec 61
Beware Strangers Bearing Gifts ..... Aug 7
Callsign number plates ..... Mar 7
Christian Amateurs (WACRAL) ..... Apr 6
Credit Card Holder Wins Holiday ..... Mar 5
Gulf War ..... Feb 7, Mar 6, Apr 7
In the Air and On the Air ..... Sep 7
Marconi and Morse ..... Apr 5
Missing Person ..... Nov 5
RadCom Christmas Quiz Answers ..... Mar 6
Radio Amateur Becomes Telecomms Minister ..... May 10
RAIBC Fund Raising Activities ..... May 7
Rajiv Gandhi, VU2RG (photo) ..... Jul 5
Radio Amateurs to the Rescue ..... Apr 7
Silent Key Sale ..... Sep 8
Stolen Equipment ..... Jan 6, Apr 6, May 7, Jul 8, Aug 7, Sep 8, Oct 5, Nov 5, Dec 8

NOVICE / PROJECT YEAR / YOUTH

(See also RSGB Affairs)
Instructors Needed ..... Mar 7
Jamboree On The Air (JOTA) ..... Oct 67
Lottery for Project YEAR ..... Feb 5 + insert, Mar 4, Mar 5, Apr (cover), Apr 8, Apr 10, Apr xv, Jun 5
Minister Presents First Novice Licences ..... Sep 5
Novice News column ..... Jan 23, Feb 23, Mar 25, Apr 23, May 22, Jun 23, Jul 20, Aug 22, Sep 23, Oct 22, Nov 20, Dec 21
Novice Licence ..... Apr xiv
Novice Licence (A) and (B) Schedule ..... Mar 56
Novice Prefixes ..... Sep 5
Novices go to the Palace ..... Dec 8
Project YEAR ..... Apr xiv
Project YEAR in Place ..... Mar 4
Project YEAR the Way Forward! ..... Jan 8
Radio-Electronics Studies at University ..... Nov 50
Thinking Day ..... Feb 7
Video is Here! ..... Mar 1, Mar 5
Wanted - More Instructors ..... Oct 7
Welcome Novices ..... Jul 4
Young Amateur of the Year ..... May (insert), Aug 5, Nov 5
Year of the Novice ..... Jan 4

OBITUARIES

Silent Keys ..... Jan 74, Feb 73, Mar 91, Apr 73, May 64, Jun 70, Jul 69, Sep 74, Nov 75, Dec 77

PRODUCT / TRADE NEWS

ICOM(UK) Rise to the Challenge ..... Jan 6
Kits * Kits * Kits ..... May 24
New Products at Leicester Show ..... Oct vi
New Products at RSGB National Convention ..... Apr viii
Product News column ..... Jan 58, Mar 73, May 26, Jul 50, Dec 58
That's Lowe Business ..... Mar 7

PROPAGATION

GAM1 ..... Jun 7
Propagation News column ..... Jan 19, Feb 19, Mar 19, Apr 19, May 23, Jun 19, Jul 16, Aug 17, Sep 18, Oct 18, Nov 19, Dec 19
Sporadic E Hotline ..... Jun 4

PUBLICATIONS

D-i-Y Radio

New RSGB Magazine ..... May 7
Pre-launch edition ..... May i - iv
Writers Wanted ..... Sep 8

Miscellaneous

Amateur Radio in Smiths ..... Oct 7
Ham Radio Today ..... Apr 7
New Publications ..... Jan 5

Radio Communication

Getting the Best out of the News and Reports Pages ..... Oct 7
Just What the Reader Ordered ..... Jan 7
RadCom's Different! ..... May 5
Write for *RadCom* ..... Jan 5

RSGB Newsletters

DX News Sheet ..... Jan 18

QRP

QRP column ..... Feb 57, Apr 58, Jun 56, Aug 59, Dec 62

RAYNET

Before the Mast ..... Nov 25, Dec 8
Raynet column ..... Feb 56, May 50, Aug 58, Nov 56
Raynet Independence ..... Jun 5, Jul 8

REVIEWS - EQUIPMENT, SOFTWARE

Aztex TVTX FM Tx: *Mike Wooding, G6IQM* ..... Sep 46
Butternut HF6V-X Multiband Vertical Antenna: *Peter Hart, G3SJX* ..... Mar 66
Challenger DX-VI Multiband Vertical: *Peter Hart, G3SJX* ..... Dec 51
G4ZPY Keys: *Tony Smith, G4FAI, and Dave Ingram, K4TWJ* ..... Aug 47
Kenwood TH26E and TH46E: *Peter Hart, G3SJX* ..... Jan 43
Landwehr Masthead Preamplifiers: *Peter Hart, G3SJX* ..... Nov 47
Mizuho MX-14S QRP Transceiver: *Rev George Dobbs, G3RJV* ..... Feb 46
Sagant 14 Portable Antenna: *Rev George Dobbs, G3RJV* ..... Feb 46
Technical Software Multimode Tx/Rx for BBC Micros: *Mike Wooding, G6IQM* .. Jul 37
Ulna 23-24 GaAsFET Pre-amp: *Mike Wooding, G6IQM* ..... Sep 46
Yaesu FT-1000: *Peter Hart, G3SJX* ..... Jun 49

REVIEWS - PUBLICATIONS

Setmakers, The: ..... Jun 52
UHF Compendium, Parts 3 and 4 ..... Apr 47
Wireless the Crucial Decade ..... Apr 47

RSGB AFFAIRS

Accounts for 6 months ended 31 Dec ..... Mar 57
Annual Meeting ..... Feb 5, Mar 43, Nov 5 + inserts, Dec 8
Appointments ..... Feb 7, May 6, Jul 5, Jul 8, Sep 8
Christmas Message from the President ..... Dec 5
Cost of Using a Repeater ..... May 6
Council Brief ..... May 7, Jul 8, Sep 5
Council Election ..... Jan 5, Aug 4, Aug 6, Sep 7, Oct 5
Council Resignations ..... Jun 6
Council Retirements ..... Dec 8
Credit Card ..... Aug 5
Do You Have a Query? ..... Apr 11
Financial Statements ..... Nov 39-43
From the President ..... Feb 4
G4AJJ Phone ..... Feb 7
GB2RS News Service ..... Jan 19, Apr 6, Aug 7, Sep 18
Honorary Trophies Manager ..... May 5
HQ News ..... Jan 5, Feb 5, Mar 5, Apr 5, May 5, Jun 5, Jul 5, Sep 4, Oct 4, Nov 5
HQ Staff Vacancies ..... Sep 5, Oct 5
Membership Liaison Committee Changes ..... Jan 6
New HF Manager ..... Jan 5
Observation Service ..... May 6
Planning Advisory Committee and Panel ..... Aug 7
Presidential Installation ..... Jan 5, Mar 7, Dec 8
President's 'Roof Fund' ..... Mar 7
Propagation Committee Vacancies ..... Apr 6
QSL Bureau (RSGB) ... Jan 5, Feb 6, Feb 7, Mar 7, Jul 8, Aug 5, Oct 6, Nov 7, Dec 8
Repeater charges ..... Apr 5
RSGB - An Open Society ..... Nov 4
RSGB Liaison Officers ..... Jan 6, Feb 7, Apr 5, Jul 8, Aug 5, Dec 8
QSL via the Bureau? ..... Mar 56
Special Subs Rates ..... Aug 5
Standing Orders and Direct Debit ..... Jul 8
VHF Contests Committee Members ..... Sep 65
Volunteer Vacancy ..... Nov 5
Year in Review ..... Nov 44-46
Zone A ..... Sep 5

SATELLITES & SPACE

AMSAT-UK ..... Jan 9
CQ Earth - How it all Started ..... May 9
G3ZCZ/W3 Wins NASA Award ..... Aug 5
First British Astronaut/GB1MIR ..... May 5, May 8, Jun 8 (photo), Jul 6, Jul 7

SAREX Flies At Last ..... Mar 7
Satellites column ..... Jan 55, Mar 72, May 51, Jul 57, Sep 58, Nov 57
Space Stamps Launched ..... Jun 8

SWL

SWL News column ..... Jan 24, Feb 24, Mar 24, Apr 22, May 21,Jun 22, Jul 19, Aug 24, Sep 21, Oct 21, Nov 18, Dec 20

TECHNICAL ARTICLES

All-band Beam Antennas: *Les Moxon, G6XN* ..... Aug 49, Nov 48
Buzzer Noise Source .... and how to use it: *David Sumner, G3PVH* ..... Jan 37
Controlled Feeder Radiation Revisited: *B Sykes, G2HCG* ..... Jul 46
CW Transmitter for the 3.5MHz Novice Band: *Steve Price, G4BWE* ..... Dec 46
Digital Frequency Display for the Modular Transceiver: *Mike Grierson, G3TSO* Apr 49
Fifth-Method Stabilised Oscillator: *Klaus Spaargaren, PA0KSB* ..... Mar 62, Apr 37
First Steps in Home Construction: *John Case, GW4HWR* ..... May (cover), May 38, Jun 42, Jul 40, Aug 41, Sep 36, Oct 42, Nov 34, Dec 32
Getting Started in Packet Radio: *Clive Smith, G4FZH* ..... Feb 48
HF Direction Finding: *Chris Plummer, G8APB* ..... Jun 38, Jul 72
How to Lay Out RF Circuits .... and how to build them:
Ian White, G3SEK ..... Feb 36, Mar 60
Improving Direct Conversion Receiver Design: *Nick Hamilton, G4TXG* ..... Apr 39
Introduction to Meteor Scatter Operation (part 2): *Nigel Wilson, G4VVZ* ..... Jan 46
Loop Antennas - Facts, Not Fiction: *A J Henk, G4XVF* ..... Sep 51, Oct 47
Magnetic Loop Antenna for the Low Bands: *Roberto Craighero, I1ARZ* ..... Feb 38
Miniature 80 Metre SSB Transceiver:
Mike Grierson, G3TSO: ..... Jun 44, Jul 30, Aug 33, Sep 46
Sideband can be Simple!: *Steve Price, G4BWE* ..... Sep 41
Simple Audio Notch Filter: *Dr Paul Stewart, G7EAH* ..... Jan 38
Textloader for Technical Software Morse Tutor: *James Hossack, GM3DKW* .. Dec 54
TFH Antenna, The: *Richard Q Marris, G2BZQ* ..... Apr 46
Using an Oscilloscope as a General Purpose Tester: *Mike Dawson, G3TCL* .. Nov 52

TECHNICAL TOPICS

Amplifiers

25W (1.8 - 7MHz) Push-Pull MOSFET Linear ..... Mar 31
50MHz PL519 Amplifier ..... Mar 33
Big Mouth, Linearity and Splatter ..... Dec 27
FETs as RF Amplifiers ..... Jul 28
Inrush Current and those Glowing valves ..... Jul 27
KISS 70W Power Amplifier using VHF Bipolar Transistors ..... Aug 31
Modified G2DAF Linear Amplifier ..... Sep 33
Parasitics Revisited, Revisited ..... Jul 25
Wideband Amplifiers and a Wartime NFD ..... Apr 32

Antennas and Earths

1.8MHz Helical Vertical Dipole ..... Jan 30
50.1MHz Yagi Dimensions ..... Mar 31, Apr 34 (erratum)
Analysing Ground-plane and Sleeve Antennas ..... Apr 29
Balanced Active Receiving Loops ..... Nov 29
Capacitive Bottom-loading of Antennas ..... Aug 29
Collinear Antennas for VHF/UHF Mobile Operation ..... Aug 28
Combatting Corrosion ..... Jun 31
Compact Loop Transmitting Antennas ..... Oct 30
Earths, Counterpoises and Radials ..... Aug 29, Nov 28
End Feeding a Windom and Related Topics ..... May 29
Ferrite-bead Choke Baluns ..... Sep 31
Gain Optimisation of Yagi Arrays ..... Dec 30
Home-Brew End-Fed Antennas for Handhelds ..... Jan 29
Horizontal Loops plus 1.8MHz ..... Dec 28
Lazy Man's Multibander ..... Jan 31
Low-resistance Earthing ..... Apr 30
Mininec - a Double-edged Sword ..... Aug 31
Off-centre-fed (Windom) Antennas ..... May 30
Sperrtopf Coaxial Sleeves ..... Jul 27
Those Loop Radiation Patterns ..... Feb 29
Tree-branch Antenna Supports ..... Nov 31
VHF DF Loop with Integral Sensing ..... Jun 29
Weather-Resistant Wire Arrays ..... Mar 30
Zapper II and Zapper III ..... Jul 26

Batteries

Avoiding Battery Hazards ..... Jan 30, Jul 29
Batteries and Safety Topics ..... Mar 30

Components

Cable Elbows - A Word of Warning ..... Mar 29
Crystal Oven ..... Nov 30
Different Way with Veroboard ..... Oct 33
Home Construction and the PCB ..... Jul 26
Loose Pins and Over-hot 3-500Z Valves ..... Aug 28
Marking Printed Circuit Boards ..... Oct 33
Mystery of the DAH50 ..... May 32, Aug 32
Space-charge 'Tetrode' Valves ..... Oct 32
Stable Inductances ..... Jan 31

EMC

Electromagnetic Field Exposure ..... Sep 29
New Induction Light Bulbs and their RFI Potential ..... Aug 32
RF Affects Test Meters, Electronic Regulators etc ..... Apr 34

Miscellany

Good Old Days? ..... Nov 28
Here and There ..... Jan 34, Mar 33, May 32
New Induction Light Bulbs and their RFI Potential ..... Aug 32
More Hostile Environment? ..... Nov 32
Natty Front Panels ..... Mar 30
New Technology and the Spectrum ..... Mar 32
Sad Story of an Electronic Hobbyist ..... May 29
Safe Soldering ..... Jun 29, Aug 30
Small May be Beautiful ..... Jun 32
Tips and Topics ..... Apr 34

Oscillators

Harris Cathode-Follower (Source-Follower) Oscillators ..... Feb 33
Oscillator Basics, Crystals and the VXO ..... Oct 7
Oscillator Stability with Valves and FETs ..... Dec 29
Q-gate VFO Stable to 39MHz ..... Nov 31
Universal VFO ..... Sep 31
Variable Ceramic-Resonator Oscillators ..... Feb 30
VFO Temperature Compensation with Thermistors ..... Apr 33, Sep 30
Wide-tuning-range VXCO ..... May 31

Power Supplies

10A PSU with Three-terminal IC Regulator ..... Oct 33
Danger High Voltages ..... May 31
Earth Loop Feedback ..... Sep 30
Heavy-Current 28V PSU ..... Feb 32
Simple Heater Voltage Stabiliser ..... Jan 30
Variac, Poor Man's ..... Feb 30
Variac, Medium Cost ..... Jul 28

Station Accessories

Add-on Speech Processor ..... Nov 28
Aural PCB Track-Tracer ..... Feb 32
Simple Logic Probe ..... Feb 30
Two-tone Testing with Old Oscilloscopes ..... Aug 30

Transmitting and Receiving

144MHz Doppler Direction-finder ..... Apr 31, Jul 28, Jul 29 (erratum), Dec 30
144MHz Sniffer DF Receiver / Field-Strength Meter ..... Mar 32
AGC - Still a Difficult Technique ..... Jun 30
Direct Conversion CW Receiver ..... Sep 29
Effective Super-Gainer ..... Feb 31
HF/VHF Scatter Communications ..... Jan 29
IF-Derived AGC with Plessey ICs ..... Apr 29
Improving Image Rejection - A 1940 Technique ..... Jan 33
Keying a QRP Transmitter ..... Apr 30
NVIS, Skybeams and New HF Beacons ..... Jan 32
Phasing-type SSB Generators/Demodulators ..... Jun 33
Shunt-type Crystal Ladder Filters ..... Sep 32
Simple HF Superhet Using the MC3362 Chip ..... Mar 29
Upgrade for the Simple Superhet ..... May 33
Variable Selectivity and Sidebands ..... Jun 32

VHF/UHF

50MHz - It Started with a KISS ..... May 4
CTCSS for Repeaters ..... Nov 5
Paisley VHF Repeater Stolen ..... Jul 8
Repeater Papers Wanted ..... Sep 8
VHF/UHF News column ..... Jan 21, Feb 21, Mar 22, Apr 20, May 19, Jun 20, Jul 17, Aug 18, Sep 19, Oct 19, Nov 14, Dec 17

RADCOM TECHNICAL FEATURE

An Impedance Diagram for Transmission Lines

Geoffrey Billington, G3EAE, concludes with some practical solutions to impedance matching problems

TO USE THE DIAGRAM to solve a specific problem there must be sufficient information available to draw the indicator of the correct length and in the correct position for one point on the line. To find the impedance at another point the indicator must be rotated to its new position and a diagram then constructed. The following problem illustrates some of the points which have been introduced.

An antenna has a feed-point impedance which is a pure resistance of 50Ω at the operating frequency of 7.1MHz. It is fed with a 15m length of 75Ω coaxial cable, velocity factor 0.66. Find the impedance presented to the transmitter.

As the termination is a pure resistance of 50Ω and the characteristic impedance of the line is 75Ω, we know:

(i) The antenna end of the line is a voltage minimum, and

(ii) The SWR is 75/50 = 1.5

This gives

$$k = (SWR - 1)/(SWR + 1)$$
$$= 0.5/2.5 = 0.2$$

As the antenna end of the feeder is a voltage minimum the initial position of the indicator is at 12 o'clock. The angle through which the indicator must be rotated is

$$2.4\ Lf/0.66 = (2.4 \times 15 \times 7.1)/0.66$$
$$= 387°$$

where L is the length of line (metres) between the antenna and the transmitter.

The direction of rotation is *clockwise* as we want to find the transformation produced by moving *towards the transmitter*. The diagram is shown in **Fig 8**.

OP is drawn any convenient length (say 100mm). Each half of the indicator is then 20mm long. A rotation of 387° is one full rotation of 360° plus a further 27°. All that need be done is to rotate the indicator through 27° (clockwise, from 12 o'clock). From the diagram

PV = 82.5mm
PI = 118.5mm

so PV/PI = 0.696 and θ = 11°.

Z = 0.696 x 75 = 52.2Ω

Resistive component R = 52.2 cos 11= 51.2Ω

Reactive component X = 52.2 sin 11 = 10.0Ω

The indicator arrowhead is on the *right* of OP so the reactance is inductive.

Note that the diagram may equally well be used to find the equivalent *parallel* combination of resistance and reactance. This is explained later in section (8) of the formula summary.

If the figures for the feeder and antenna had been reversed, ie if a 50Ω line had been used with a 75Ω resistive load, the load would have been greater than the characteristic impedance of the line so there would be a voltage maximum at the load, though the SWR and k would have the same values as before. The indicator would be the same length, but its initial position would be at 6 o'clock instead of at 12 o'clock.

When the method is going to be applied to open wire feeders, it may be possible to locate a maximum or minimum point at a measurable distance from the end of the feeder, using some sort of probe. The initial position of the indicator may then be set for this point if desired. If both a minimum and a maximum point are available, and if the probe has a linear response, the ratio of the maximum to the minimum reading gives the SWR, and you then have the information to find both the impedance presented to the transmitter and the antenna impedance.

DRAWING THE DIAGRAM 'IN REVERSE'

SOMETIMES THE RESISTIVE and reactive components of the line impedance at the transmitter end of the feeder may be determined using a bridge. It is still possible to draw a diagram in reverse which will fix the length and setting of the indicator at this point. Once this has been done, a rotation from this posi-

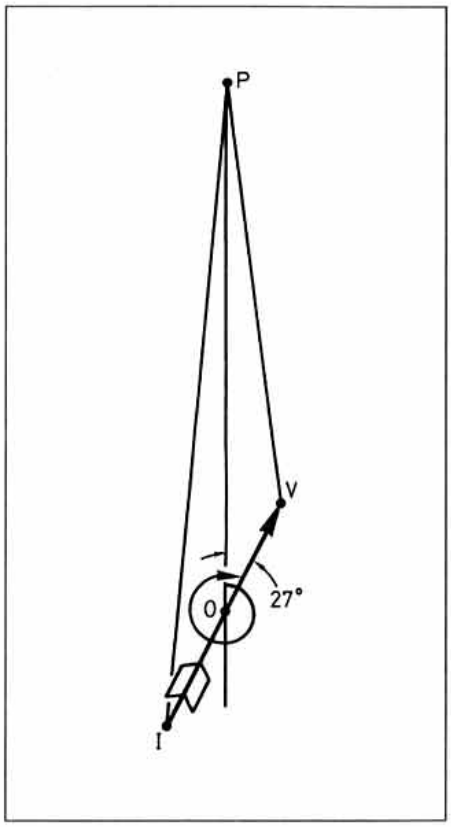


Fig 8: Vector diagram for first example.

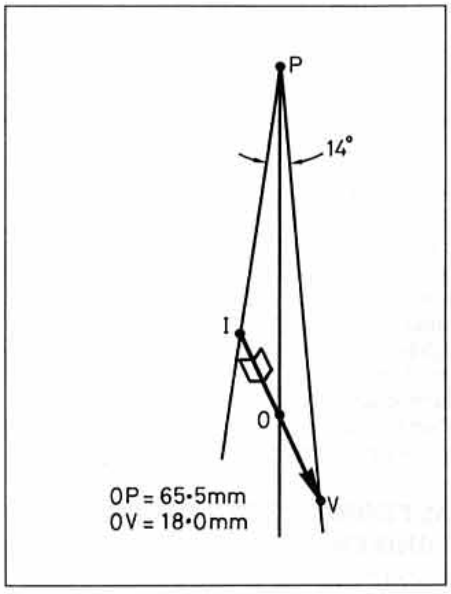


Fig 9: Alternative representation of line impedance.

tion allows the impedance at any other point to be found.

Two more formulas are required. They are standard AC formulas for series circuits with no special relevance to transmission lines. They are:

(i) $Z = \sqrt{(R^2 + X^2)}$
(ii) $\text{Tan } \theta = X/R$

(θ is actually the phase angle between the voltage and current.)

Suppose for example that the bridge measurements, made on 50Ω coaxial cable, were:

R = 80Ω
X = 20Ω (inductive)

First find Z:

$$Z = \sqrt{(R^2 + X^2)}$$
$$= \sqrt{(80^2 + 20^2)}$$
$$= 82.5\Omega$$

Next find θ:

$$\text{Tan } \theta = X/R$$
$$= 20/80$$
$$= 0.25$$

Enter 0.25 in the calculator and find the inverse tan.

$\theta = 14.0°$

PV and PI can now be drawn making the correct angle θ, and with their lengths adjusted so that $PV/PI = Z/Z_0$.

The simplest way of doing this is to make PV of length Z units, and PI of length Z_0 units. Proceed as follows (see **Fig 9**).

Mark a point 'P' near the top of the paper. Draw a line 'PV' inclined to the right of the vertical and of length 82.5 units.

Draw another line 'PI' of length 50 units to the left of PV and making an angle of 14° with PV. Note that if X had been capacitative, PV would have to be drawn on the left and PI on the right.

Join VI and mark the mid point 'O'. Put the arrowhead at V. Join PO. This gives the main axis. It will almost certainly be inclined to the vertical, but this is of no importance. Measure OP and OV.

k = OV/OP
k = 0.27

This gives an SWR of 1.7, which could have been checked if a suitable meter had been available.

It is not essential to make any measurements on this preliminary diagram. The aim of the exercise is to find the line impedance at some other point, probably at the junction with the antenna. All that matters is that the indicator is correctly drawn relative to the main axis. Providing PV and PI have been lightly drawn they can be erased, and the new position of the indicator put in after making the appropriate rotation. The second diagram is then constructed keeping OP and the indicator length unchanged.

ALTERING THE FEEDER LENGTH

MEASURING THE ANGLE between the indicator and the main axis on the preliminary diagram does give useful information about the position of the maxima and minima.

The indicator makes an angle of 155° with the main axis if measured from 12 o'clock, or 25° if measured from 6 o'clock. Thus moving down the line a distance equivalent to an anticlockwise rotation of 155° brings us to a voltage minimum. If the line could be cut at this point it would present a purely resistive impedance $Z_0/SWR\Omega$.

The actual length to be removed is L metres where

L = 155 v/2.4f
(v is the velocity factor)

Similarly, extending the feeder by a distance equivalent to a 25° rotation would present a voltage maximum and a purely resistive load to the transmitter. The length of the extension (using identical feeder) would be 25v/2.4f metres.

THE MEANING OF THE DIAGRAM AND ITS LIMITATIONS

THE DIAGRAM IS IN FACT a vector (phasor) diagram, which correctly shows the current and voltage, and the phase difference between them at any point on the line.

PV is the voltage vector. PI is the current vector - or to be precise, the current vector scaled up by a factor Z_0.

θ is the phase angle between voltage and current.

Looking at the diagram, and picturing what happens as the indicator rotates, it becomes clear why the line current decreases as the voltage increases and vice versa, and why current minima and maxima occur with voltage maxima and minima respectively.

It is also becomes clear why the ratio of maximum to minimum voltage (or current), which is defined as the SWR, is also equal to (1 + k)/(1 - k), as stated earlier.

There is one piece of information about voltage and current which the diagram does not supply. Without further modification it does not allow you to compare the phase of the voltage or current at one point on the line with the phase at another point. For instance, the phase of the voltage at any point on the line is in antiphase with the voltage at a point half a wavelength from it, and the same is true of currents. The diagram does not show this. According to the diagram everything repeats every half wavelength, whereas in fact the signs of the voltage and current reverse.

The reason for this is because of a simplification introduced into the drawing of the diagram. To draw the diagram in such a way as to preserve all the phase relationships, the indicator should only be rotated through an angle of $360(L/\lambda)$ to represent a distance L, whilst at the same time OP should be rotated through an equal angle in the opposite direction. This would preserve the correct phase relationship between voltages and currents at all points. However, it would be a needless and extremely inconvenient complication. The resultant angle between OP and the indicator would be exactly the same as in the standard method, and the diagram would be identical apart from being rotated on the paper. Reversing the sign of both voltage and current would have no effect on the impedance.

Two other simplifications have been made. First, it has been assumed that all lines are loss free. A lossy line will apparently have a lower value of k than the value at the termination. This effect increases with length of line.

Secondly, no account is taken of end corrections. These might cause slight errors in the case of wide-spaced lines.

SUMMARY OF SOME IMPORTANT FORMULAE

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

(2) $SWR = (1 + k)/(1 - k) = V_{max}/V_{min} = I_{max}/I_{min}$

(3) Rotation of indicator for a distance L = 720 (L/λ) degrees, or more conveniently:

(4) Rotation (degrees) = 2.4 Lf/Velocity factor

L in metres, f in Megahertz

(5) From the diagram $Z = Z_0(PV/PI)$
$R = Z \cos \theta$
$X = Z \sin \theta$

(6) $X/R = \tan \theta$

(7) $Z = \sqrt{(R^2 + X^2)}$

(8) In (5), (6) and (7), R and X are *series* components of Z. If the equivalent *parallel* components of the impedance Z are required, PV, PI and θ are measured and Z calculated as before.

The parallel resistive component = $Z/\cos \theta$
The parallel reactive component = $Z/\sin \theta$

The sign of the reactive component is the same for both the series and parallel cases.

APPENDIX

Deriving The Diagram

The potential at a point on a line may be represented as the resultant of two component potentials, one of V volts RMS due to a wave travelling from left to right (say), and one of kV volts due to a reflected wave travelling in the opposite direction.

Let there be a voltage maximum at some point 'A'. These two components are in phase at this point, giving a resultant of $V(1 + k)$ (**Fig A1** (top))

At a point distance 'L' to the right of A, the component due to the forward wave will lag on the voltage at A by an angle $a = 360L/\lambda$ degrees, whilst the component due to the reflected wave will lead the voltage at A by the same angle.

Fig A1 (bottom) shows the component and resultant voltages at the new point. The resultant magnitude of the voltage at any point on the line can be found in this way.

In what follows it becomes more convenient to keep the vector representing the forward voltage fixed and to rotate the other vector through the double angle 2a.

It is next necessary to find the magnitude of the current at any point, and also the phase angle between the voltage and current. The

current at any point may also be represented as the resultant of two components: the current due to the forward wave is of amplitude V/Z_0 and that due to the reflected wave is kV/Z_0. The forward wave current is in phase with the forward wave voltage.

The reflected wave current must be taken as being in antiphase with the reflected wave voltage.

This may be explained by considering a charged region moving to the right, and then a similarly charged region moving to the left. The potentials will have the same sign in both cases, but the currents must be given opposite signs due to the opposite directions of motion. It is now possible to draw a voltage parallelogram and a current parallelogram side by side (**Fig A2** (top)).

If the current parallelogram is scaled up by a factor Z_0, it becomes identical to the voltage parallelogram, except that the other diagonal is used (**Fig A2** (bottom)). The angle between the diagonals is the phase angle between the resultant current and voltage.

The diagram described in the main part of the article is derived directly from Fig A4, which is then inverted to give a closer similarity to a Smith chart.

SOLVING PROBLEMS WITHOUT SCALE DIAGRAMS

IF YOU ARE HANDY WITH a pocket calculator, it may be easier to calculate numerical results rather than draw a diagram accurately to scale. Even so, it is really essential to sketch rough diagrams to help you to monitor what you are doing.

Three new formulas are required in addition to those already introduced. These new formulas are slightly simplified by quoting them in 'normalised' or 'relative' impedance units. This means that impedances are given as multiples of Z_0.

Relative impedance = (impedance in Ω)/Z_0 (in Ω).

Thus a resistance of 100Ω has a relative resistance of 2 'zednoughts' when using 50Ω feeder.

These 'normalised' quantities are here denoted by the appropriate small letter, whilst capital letters denote the same quantities measured in ohms.

$$z = Z/Z_0;\ r = R/Z_0,\ x = X/Z_0$$

These 'relative' or 'normalised' units are also employed by the Smith chart.

The three formulas are:

$$\text{(i)}\ k = \sqrt{\frac{(1-r)^2 + x^2}{(1+r)^2 + x^2}}$$

$$\text{(ii)}\ \tan\theta = x/r = \left(\frac{2k}{1-k^2}\right)\sin\phi$$

$$\text{(iii)}\ z = \sqrt{\frac{1 + k^2 - 2k\cos\phi}{1 + k^2 + 2k\cos\phi}}$$

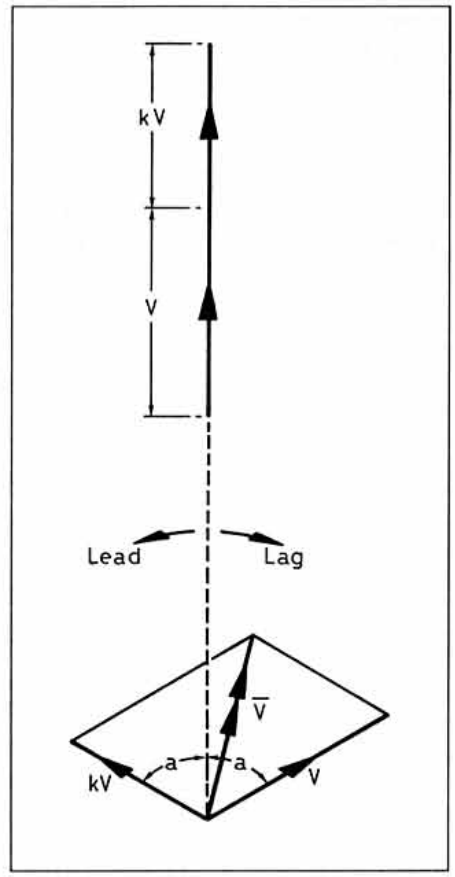


Fig A1: Forward and reflected voltages.

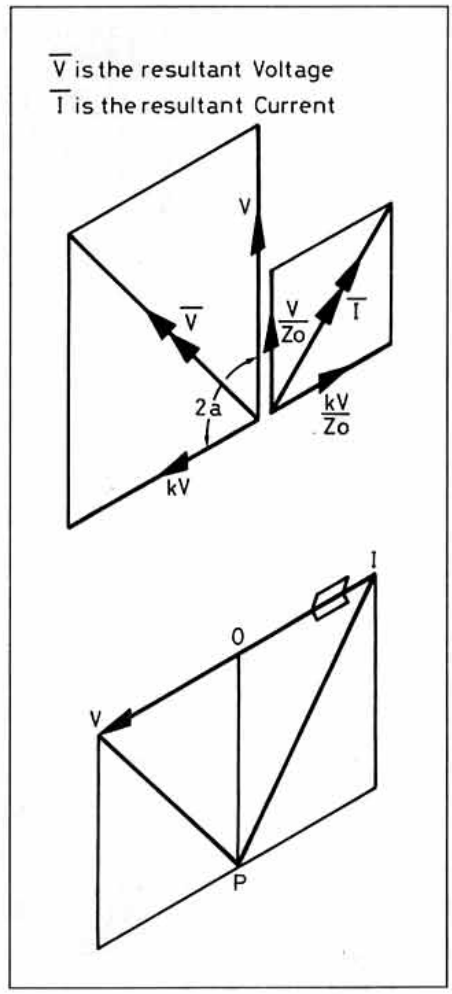


Fig A2: Voltage and current components.

Rearranging gives $\cos\phi = \left(\frac{1+k^2}{2k}\right)\left(\frac{1-z^2}{1+z^2}\right)$

The angle ϕ is the angle between the indicator and the main axis and should be measured from 12 o'clock, not from 6 o'clock.

As an example, equations (i) and (ii) can be applied to solve the problem in the section 'Drawing the Diagram in Reverse'.

Use (i) to find k.

$r = 80/50 = 1.6$
$x = 20/50 = 0.4$

$$k = \sqrt{\frac{(1-1.6)^2 + 0.4^2}{(1+1.6)^2 + 0.4^2}}$$

$k = 0.274$

Use (ii) or (iii) to find ϕ.

$$\text{Sin}\ \phi = x/r\left(\frac{1-k^2}{2k}\right)$$

$= 0.422$
$\therefore \phi = 25°$ (using 'inverse sine')

There are in fact two significant values of ϕ corresponding to a given value of sin ϕ, one less than 90° and the other greater. To obtain the latter value, the smaller angle must be subtracted from 180°. The calculator only gives the smaller value, 25° in this case, so the other possible value is 155°.

This ambiguity does not arise when looking up inverse cosines. Luckily it is easy to find the correct answer. Simply evaluate z using:

$$z = \sqrt{(r^2 + x^2)}$$

If z is greater than unity the greater angle is the correct one; if z is smaller than unity choose the smaller angle. If you sketch one or two diagrams, remembering that ϕ is defined as measured from 12 o'clock, the reason should become clear. Applying the rule to the present case we see that Z is greater than Z_0, z is greater than unity, so $\phi = 155°$ is the correct answer.

The impedance z at any other point at a distance L metres from the first may be found.

The angular rotation must be calculated using

angle in degrees = 2.4 Lf/v

The new value of ϕ must then be found by rotating the indicator from its present position through the above angle in the appropriate direction. A rough sketch is a help here.

The new value of z is found using the equation (iii).

The resistive and reactive components of z are obtained by using equation (ii) to find the new value of θ and then using

$r = z\cos\theta$
$x = z\sin\theta$

Again you will need your rough sketch to see whether x is inductive or capacitative.

DEWSBURY ELECTRONICS

SUPA-TUTA

To teach you morse quickly

£69.95

SUPA-TUTA PLUS

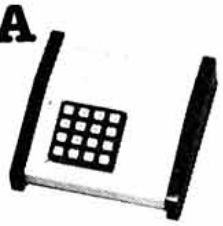
To teach you morse with keyer

£75.00

SUPA-KEYA

The most friendly keyer around

£99.95



PRICE LIST

Bencher BY-1 Black Base	£59.95
Bencher BY-2 Chrome Base	£69.95
Vibroplex Original Deluxe	£96.88
Vibroplex Iambic Deluxe	£90.89
Star Masterkey MkII	£59.95
CMOS Memory Keyer	£95.00
Easy Reader DM-1000	£199.95

SUPA-TUNA

Makes selecting frequencies easier

£67.50

Post & Packing £3.50
VAT included on all items at 17.5%

Stockists of DIAWA - VIBROPLEX - ICOM - YAESU - KENWOOD - JRC - WAVECOM

DEWSBURY ELECTRONICS,
176 LOWER HIGH STREET,
STOURBRIDGE,
WEST MIDLANDS DY8 1TG
Tel: (0384) 390063/371228
Fax: (0384) 371228

DEWSBURY ELECTRONICS

AOR (UK) Ltd. Adam Bede High Tech Centre,
Derby Road, Wirksworth, Derbys. DE4 4BG.
Tel: 0629 - 825926 Fax: 0629 - 825927

AR3000A - AOR Evolution

The New AR3000A is an evolutionary step onward from the highly acclaimed AR3000, many improvements have been implemented at the requests of enthusiasts. The AR3000A still covers an extraordinarily wide range from 100 kHz - 2036 MHz without gaps and offers ALL MODES: AM, NFM, WFM, USB, LSB & CW.

The LCD is larger and carries all information such as BANK, 2ND function etc. The display viewing angle is now 12 o'clock to further improve visibility. SCAN and SEARCH speed has been increased to approx **50 INCREMENTS PER SECOND** (that is fast... the earlier AR3000 offered approx 20!).

New programmable search / scan DELAY, PAUSE and PRIORITY facilities have been added.

The rotary tuning control is now 'free running' to further increase user friendliness for SSB/CW listening. Additional push buttons have been added to change step size by X10 increase and x5 decrease, the step size is also programmable from a smooth 50 Hz to a huge 999.95 kHz. PASS frequencies have been increased to 100 per memory bank.

Memory clear and microprocessor reset are now available from the front panel. The microprocessor uses a more efficient programming language offering added facilities such as faster search / scan and great stability.

A switch has been added on the rear cabinet to switch the RS232 facility in / out.

This is one of a number of great new products for 1992, others include a hand-held receiver with SSB (AR1500). For a complete set of leaflets, prices and dealers please send a large S.S.A.E. (34p) - thank you.

McKNIGHT

QUARTZ CRYSTALS 1.5 - 70 MHz

IN A WIDE RANGE OF COLD WELD QUALITY HOLDERS

OUR SERVICES AND PRICES ARE THE BEST YET. WE OFFER TWO CHOICES:

1) If an order is received before 10.00am, we can despatch the crystals on the SAME DAY for a FIXED PRICE OF £13.50.

2) *New* If you are happy with a delivery of 7 - 10 working days maximum, then we offer a FIXED PRICE OF £5.50.

All prices include VAT and first class postage

VISA Access

OR CASH WITH ORDER
TEL 0703 848961
McKnight Crystals Ltd,
Hardley Ind Estate, Hythe,
Southampton SO4 6ZY

McKnight

Telephone for our catalogue on close tolerance crystals, filters and oscillators

YAESU
ICOM
STANDARD

MARTIN LYNCH

G4HKS

THE AMATEUR RADIO EXCHANGE CENTRE

ALINCO
KENWOOD
AMSTRAD

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

THE SALE OF THE CENTURY

continues . . .

This month I want to build up the second hand stock. If you wish to update your existing station, (including accessories) I will pay you top money for your part-exchange equipment. Phone today or call in. Remember we are only 1 mile from the M4 motorway and just across the road from Northfields underground on the Piccadilly Line.

YAESU		
FT-1000	Sold more than any other UK retailer- unbeatable trade-ins!	£PHONE
FT-890	The latest HF Mobile/Base the successor to the FT-757	£PHONE
FT-990	I've got another delivery of ten in stock. Competitors not invited	£PHONE
FT-736R	Quad band base with 2/70+6m fitted, just how many are left??	£PHONE
FT-767GX	A complete Ham Shack in one box, HF/2/6/70, ATU/PSU	£PHONE
FT-5200	Remote head dual-band mobile	£PHONE
FT-26R	Successor to the FT-23 series. Wide band receive included!	£PHONE
FT-76R	As above, but on 70cm FM. Wide band receive included!	£PHONE
FT-470R	Dual band handie, FNB10 NiCad/charger special offer	£319
KENWOOD		
TS-950SD	Top of the range HF base station from Kenwood	£PHONE
TS-850S	The budget alternative to the 950	£PHONE
TS-450S	Still using an FT-707? Forget it! I'll give you £350 TRADE-IN!	£PHONE
TS-690S	The same modern design HF all mode Gen. Cov. But with 6m	£PHONE
TM-741E	Five pages of super mods for this one - only from Martin Lynch	£PHONE
TM-241E	50W on 2m with modified wide band receive	£299
TH-77E	Dual band handie very compact	£PHONE
ICOM		
IC-970E/H	The best 2m/70cm/23cm Base station	£UNPRINTABLE
IC-735	Several immaculate trade-ins available, save over £250! ONLY	£749
IC-725	The tough alternative to "BUDGET" HF operating	£PHONE
IC-726	As with the IC-725 but with 6m fitted	£PHONE
IC-R7100HF	Latest wide band receiver - with Icom approved HF conversion	£1120
IC-W2E	New dual-band Handie, December prices were good, but January?	£UNBEATABLE
IC-2SRE	2m + scanner, expensive, but usual ICOM technology and build quality	£PHONE
IC-4SRE	As the IC-2SRE but this time on 70cm transceiver and W/B scanner	£PHONE
IC-P2E	The latest sub-miniature 2m handie from Icom in stock	£PHONE
IC-P4E	As per the IC-P2E but on 70cm	£PHONE
IC-R1	Sub miniature pocket scanner. Ex-demo's from only	£PHONE
ALINCO		
DJ-560E	Dual band handie with NiCads/charger/CTCSS/DTMF W/B RX	£299
DJ-F1E	2m Pocket TCVR with AM Airband RX! FREE case	£PHONE
DJ-S1E	As above without K/B or NiCads and charger	£PHONE
DJ-X1E	Latest miniature wide band scanner - in stock!	£PHONE
DR-599E	New dual band mobile remote head high power	£PHONE

IC-735

FT-767

TS-850

FT-1000

IC-R7100HF

TS-950SD

IC-725

FT-736R

Latest 1992 computer generated second hand list available FREE!!
Updated twice a day - not every other week like most - PHONE FOR YOUR COPY!

73 MARTIN G4HKS

Martin Lynch is a Licensed Credit Broker.
Full written details upon request. Typical APR 32.9%

PHONE 081-566 1120

For fast mail order Tel: 081-566 1120.
Please add £10.50 for 48 hour delivery.
SHOP OPENING HOURS: Tuesday - Saturday 10 - 6pm.
24 hour Sales HOT LINE 0860 339 339 (after hours only.)
FAX order line open 24 hours.

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

In addition to new transceivers and accessories, don't forget I still have the largest selection of used equipment available in the UK. I am very willing to take your equipment in part exchange – Phone with your requirements NOW!

IDEAS FROM ABROAD

TRANSLATED AND EDITED BY ERWIN DAVID, G4LQI

FREQUENCY CALIBRATION of your transceiver against a crystal calibrator (itself calibrated by zero-beating against Droitwich or WWV) just is not accurate enough for that HF AMTOR or microwave SSB sked. **Hans Kreuzer, DL1AN** in *CQ-DL* Sept 90 and **Harry Grimbergen, PA0LQ** in *Electron* Dec 86, both with recent updates, describe better yet inexpensive calibration methods.

IN MODERN frequency-synthesised transceivers, both the transmit/receive frequencies and their digital display are derived from the same crystal oscillator. If that single crystal has drifted, the display does not provide a warning that something is amiss.

DL1AN describes how to calibrate a transceiver and, if found necessary, to adjust its reference crystal oscillator.

As a frequency standard he uses a strong HF station known to maintain frequency accuracy beyond question. Currently he prefers the standard station RWM on 14,996 or 9,996kHz because from 30 to 40 minutes after each hour this station sends an easy-to-use uninterrupted, unmodulated carrier (followed by CQ DE RWM in CW), but when writing his article he used the BBC World Service on 9410kHz. On 7325kHz there is another BBC station, and it falls within a half-megahertz range containing an amateur band; it can be used in case your rig has no general coverage receiver; the following examples refer to that frequency.

If you have an audio frequency counter, connect it to the headphone jack of the transceiver. Tune the receiver to display 7,326.00kHz, lower side band. The counter now should read 1000Hz. On a new TS440, at normal operating temperature, the reading was 1030Hz, ie 30Hz off. On 29MHz, the error would be approx. 120Hz, as it is proportional to frequency. *[That statement is valid for the TS440 but not for all receivers - as an example, in an FT757 the error is virtually independent of frequency - G4LQI].*

If you have no frequency counter but your rig has two digital VFOs, select USB and set VFO-A for a low beat note, eg approximately 500Hz below the calibration frequency. With LSB selected, tune VFO-B to the same beat note, comparing tones while switching back and forth between A and B. If you read VFO-A/USB 7,324.50kHz and VFO-B/LSB 7,325.60kHz, your rig is precisely tuned in to your 'standard' station when indicating half way between the two readings, ie when reading 7325.05kHz; 50Hz high.

The first of the foregoing methods is best for tracing warm-up drift. DL1AN tested two transceivers: a TS430 and a TS440, at 28MHz. They drifted 120Hz before stabilizing three hours after switching on cold; all but 30Hz occurred in the first hour.

To access the mail box of DK0MTV on 28MHz with a cold rig, DL1AN has to tune 120Hz low and then correct as the rig warms up. Again, because drift is proportional to signal frequency, the warm-up drift at 3.5MHz would be eight times less.

Adjustment of the crystal trimmer should be undertaken only after complete warm-up, here three hours. Modern top-of-the-line rigs have a temperature compensated crystal oscillator (TCXO). If yours does not, recalibrate only when the shack is at its average temperature.

Hitting a fixed-frequency packet or AMTOR station with any degree of certainty requires not only spot-on frequency calibration but also tuning steps and read-out resolution no courser than 10Hz.

YOUR TV IS A FREQUENCY STANDARD

PA0LQ EXPANDED ON a method, devised by PA0YG, to check the calibration of crystal marker oscillators and digital frequency counters. *[Regarding the latter, it should be remembered that their accuracy frequently bears little relation to their resolution of, typically, eight digits. The cheaper models do not contain a TCXO or crystal oven, or even a pre-aged low-temperature-coefficient crystal and therefore require frequent verification if not adjustment. - G4LQI].*

PA0YG originally wanted to calibrate his frequency counter by letting it count the 4.433,618,75MHz colour-burst frequency in his CTV receiver, which is phase-locked to that frequency contained in the received signal. With a 10s count, an accuracy of approx. 25×10^{-9} would be achieved. The problem is how to get the signal out of the TV and into the counter, particularly in view of the safety implications of the circuitry of most TV sets not being insulated from the mains!

PA0LQ's method requires an oscilloscope with facilities for external triggering and uses the easier-to-extract horizontal synch frequency of 15.625kHz (=1/64MHz) instead of the colour=burst frequency. Using the German equivalent of Rugby as a reference, PA0LQ found that BBC TV maintain 15.625kHz to within one part in 10^9, better than most amateurs need.

The reference crystal in most crystal calibrators and frequency counters operate on, or on a multiple of, 1MHz, ie on a harmonic of 15.625kHz which can be tapped without intruding upon the innards of the TV; the stray field of the deflection coils can be easily picked up behind the set.

Take a loop-stick (ferrite rod) antenna of an ordinary AM radio; connect across its long-wave coil a 1kΩ carbon resistor (not critical) and across that a coax or shielded wire long enough to reach from the TV to the 'scope in the shack. 20m or more does no harm. Hang the loop-stick vertically on the back of the TV and connect the other end of the cable to the external trigger input of the 'scope.

Select a fast sweep rate, eg 0.5µs/cm and External Sync. Feed a signal from, say, the 1MHz oscillator to be adjusted into the vertical input and set the vertical sensitivity for best viewing of the trace.

If the signal frequency is an exact multiple of 15.625kHz, the 'scope trace will stand still. If it travels to the right, the oscillator frequency is too low, if travelling to the left, the oscillator frequency is too high. Before adjusting the oscillator trimmer, observe the precautions about warm-up and ambient temperature mentioned above. On some makes of TV receiver this method is unsuitable for signal frequencies much above 1MHz because of jitter on the trace resulting from a certain pin-cushion correction scheme used in them.

Merely to verify the calibration of a digital frequency counter, a 'scope is not essential; it may be replaced by patience! Simply let the horizontal sync pulses from the TV be counted through the 10s gate. Though one correct count of 156250 implies an accuracy of no better than approx 6ppm (parts per million or Hz/MHz), 64 consecutive correct counts make for 0.1ppm or 1Hz/10MHz, as good or better than the stability of most frequency counters likely to be found in a ham shack. It does require 11 minutes of constant watching, or printing out if your counter is that sophisticated. Make sure that during those 11 minutes no change of programme or studio occurs, as the switching phase-step could spoil the count. *[A test-pattern transmission seems your best bet - G4LQI].*

For adjustment of a wayward frequency meter this method is not very practical but if the well-aged commercial instrument in G4LQI's shack is typical, most verifications show no need for corrective action.

Not all TV synch frequencies are as accurate as those of BBC-1 and -2. Of the channels measured by PA0LQ and available in the UK, Sky-channel weighed in with a good 5×10^{-9} but the test pattern on his local cable TV was worse than 10^{-5}, inadequate for our purposes. ❑

RADCOM TECHNICAL FEATURE

Plotting of Magnetic Deviation and Aurora

by D J Smillie, GM4DJS

Part One:

How the humble jam-jar can help you predict the next aurora.

MANY AMATEURS derive a great deal of pleasure and satisfaction by working, via auroral propagation, stations and countries that would otherwise be difficult by tropospheric means. It also presents a challenge and appeals to those who are prepared to pursue the mechanism and phenomena of auroral propagation. This can be done using simple magnetometer equipment and a pen recorder to observe the daily deviations and instabilities of the earth's magnetic field. These deviations can be compared and correlated to radio propagation conditions, including aurora.

If records are kept of magnetically disturbed days and plotted on a solar rotation base map such as shown in the call book, this can provide a guide to future magnetic storms and potential radio auroral events. High quality tape recordings of auroral signals can also be played via a high speed pen recorder, thus enabling detailed characteristics to be observed.

RADIO PROPAGATION

Radio signals provide a useful means of observing solar emissions and ionospheric disturbances. Geomagnetic storms may result in loss of radio signals in the HF bands, yet give an enhanced mode of communication for long distance VHF propagation where signals can be reflected or 'backscattered' from intense ionised regions in the E layer. Flares occurring in the sun can produce electromagnetic waves covering a wide spectrum which can penetrate the earth's atmosphere, affecting the ionospheric layers in the sunlight region. Initially this may result in complete or severe absorption of the HF band frequencies, with either partial or total loss of communication. Flares, if energetic enough, can also cause the emission of solar particles which some 20 to 40 hours later can enter the ionosphere. This results in geomagnetic storms and severe ionospheric disruption with the probability of radio and visual auroras.

On 16 March 1989, when I was in communication on 7MHz with GI0ACE (Belfast), I suddenly found that the good quality signals declined rapidly and completely disappeared in 60 seconds. Scanning through the band it was found that it was almost all signals had disappeared. This condition lasted from 1526 to 1540GMT when signals gradually returned to normal. This was a typical *sudden ionospheric disturbance* (SID) caused by X-ray radiation from the solar flare resulting in the lower ionosphere, particularly the D region, becoming intensely ionised resulting in absorption of the radio signals. Approximately 25 hours later (17 March) a weak radio aurora occurred when the slower-moving solar-emitted plasma reached the earth.

PHOTOGRAPH: UNIVERSITY OF ALASKA

"Flares occurring in the sun . . . . if energetic enough . . . . result in geomagnetic storms and severe ionospheric disruption with the probability of radio and visual auroras."

RECORDING THE EARTH'S MAGNETIC FIELD

IT IS NOT POSSIBLE for most people to monitor for SIDs daily and to guess when the aurora may turn up, and not all SIDs give rise to an aurora. A better warning system is therefore required.

Magnetic deviation seemed to me to offer promise, if a suitable simple device could be made. Having previously designed and constructed a number of simple 'jam-jar magnetometers' using Hall devices [1] it was found that these suffered badly from temperature effects. So I looked at other sensors which could still maintain the simple jam-jar principle. The general arrangement now used is shown in **Fig 1**. This magneto-resistive magnetometer is much more stable than the Hall type and consists of a bar magnet suspended on a cotton thread within a partly oil-filled clear plastic cylinder. Level with the magnet poles, in close proximity to the outer walls of the cylinder, are the magneto-resis-

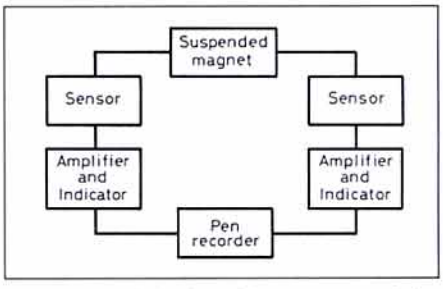


Fig 1: The basic design of the magneto-resistive magnetometer.

tive sensors which convert horizontal and vertical deviation of the suspended magnet into an electrical signal.

MAGNETIC DEVIATION AND AURORA SIGNALS

VARIATIONS IN THE recorded trace amplitude provide a useful indication of impending magnetic activity. Large amplitude swings or a recognisable pulse indicate a possible magnetic storm with likely aurora. A good example of impending magnetic storm is shown in **Fig 2** recorded on 5 June 1991; a large number of saw-toothed pulses were recorded in the early morning hours followed by increasing deviation, leading up to the auroral commencement at 1405GMT.

During the aurora itself, considerable magnetic deviations occur which coincide with very strong radio auroral signals. As the magnetic intensity declines and the trace drifts back to nearer the daily mean level the auroral signals also decline. Fig 2 shows this suddenly ceasing at 1820GMT with the passage of the Harang Discontinuity period [2]. It is interesting to note the continual eastward declination drift after the afternoon aurora, finally resulting in a second auroral phase at 2230 - 2300 with considerable eastward deviation. The storm continued to be active up to 0430 before quieter conditions prevailed once again.

As it was not known just how a thread-suspended magnet reacted with the earth's magnetic field variations, I tested the accuracy of my recorder, by comparing it with the official data issued by the Geomagnetism Group of the British Geological Survey. The Eskdalemuir observatory is reasonably close to me so I have that data available. **Fig 3** shows the full Eskdalemuir data.

Unfortunately, Eskdalemuir record easterly 'declination' movements. They may be swings like the compass needle. or tilts of the magnet up or down or any combination of these, with east going down the chart. In order to show the comparison easily, I have inverted my trace, the comparison of the Eskdalemuir declination trace with my recording is extremely good, showing that the magneto-resistive jam-jar magnetometer mainly relates to eastward and westward variation movements of the earth's magnetic field, and that the simple magnetometer, if properly set up, can be a reliable indicator of the earth's magnetic field changes and an auroral warning indicator.

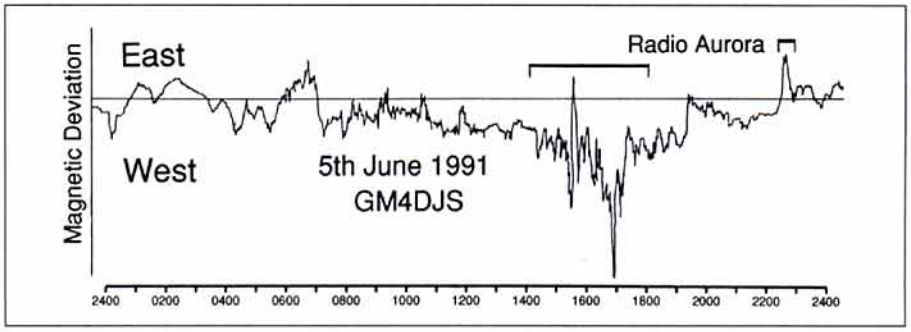


Fig 2: The deviation magnetogram for 5 June 1991. Chart speed is 1cm/hour.

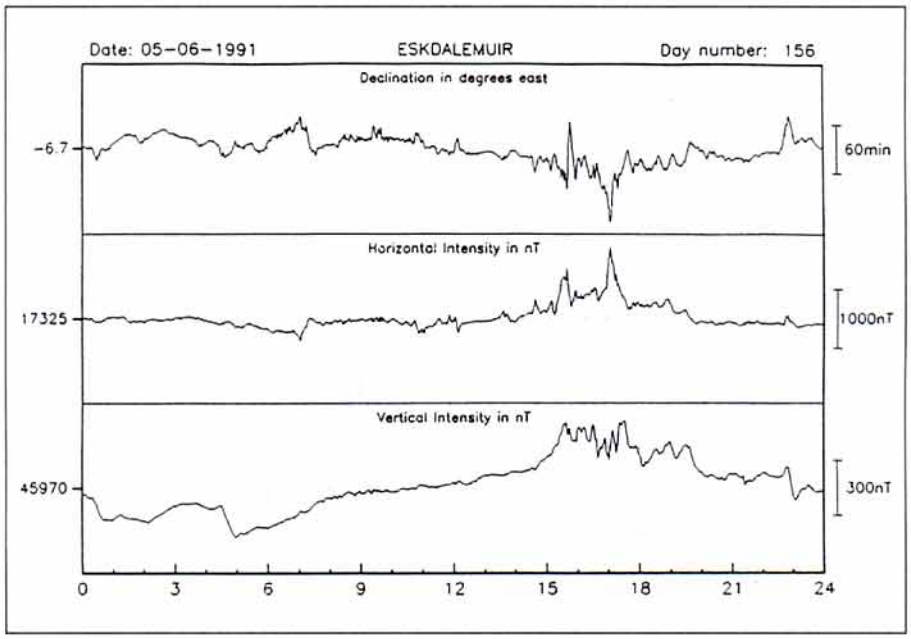


Fig 3: The D, H, Z data recorded at Eskdalemuir by the British Geological Survey for 5 June 1991.

CONSTRUCTION AND SETTING UP OF THE MAGNETOMETER

THE COMPLETE UNIT is contained within an aluminium box 440 x 300 x 130mm for interconnecting with the chart recorder as shown in the photo. All ferrous parts should be kept to a minimum and as far from the magnet as possible. Nuts, bolts and washers should be brass. As in **Fig 4**, cotton thread is wrapped around the magnet, tied and secured with superglue.

The magnet needs to be level and have clearance to rotate and tilt. Pass the thread through the cylinder top cover and fix to a copper pin for raising or lowering the magnet to give best sensitivity. Plastic shims are used between the pin and spool case to allow

The magnetometer front panel with jam-jar unit protruding through the lid.

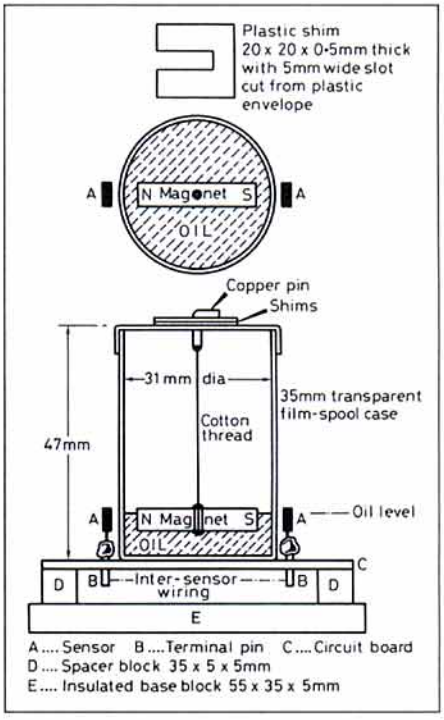


Fig 4: Plan and elevation views of the magnet and sensor unit.

minor height adjustments. Mount the sensors in the vertical position facing one another. These are soldered to copper pins fitted into a piece of plain circuit board, spaced the diameter of the cylinder. Allowance should be made for minor bending and positioning so that maximum sensitivity is obtained during the later setting up. The sensor circuit board is glued to insulated spacers which in turn are glued to an insulated base block capable of slight east-west rotation. The unit should be positioned so that it protrudes through a cut-away section of the box lid for ease of access and adjustment, see photo.

The complete circuit diagram is shown in **Fig 5**. The signal from each sensor is connected through a polarity changeover switch with the output voltage being measured with a digital millivoltmeter. These provide direct observation of the continuously varying magnetic field before being fed into the differential inputs of the operational power amplifiers. This is useful in setting up but not essential for operation. The output voltmeters provide the essential monitoring for setting up and observation of day to day operation.

The 759 amplifiers were chosen for their ability to give adequate signal drive compatible with a variety of pen-recorders and are connected in a push-pull configuration, mounted on plain circuit board and hard wired to their adjacent components. Each output is monitored to ensure equal balance. The resulting signal is fed, via attenuation and smoothing, to a pen-recorder with a chart speed of 1cm/hour.

Power supplies consist of encapsulated units with a current rating of 200mA. The output is connected, via current limiting resistors, to rechargeable batteries ensuring stability against mains supply variations. Fig 5 shows the approximate voltage levels that should be obtained at the points indicated.

SETTING UP THE MAGNETOMETER

FOR THE SUSPENDED magnet I use a Maplin type FX (25 x 6 x 6mm) because it is a good compromise. Longer magnets will give more 'gain', but being heavier are slower to respond. The magnet will be self-aligning in the earth's magnetic field. It is important to suspend the magnet partially in a very light oil such as *3-in-One*, or preferably a penetrating fluid such as *Free Way* from Applied Chemicals. This prevents extreme sensitivity and damps vibration.

The base block containing the north and south sensors should be gently rotated initially to align the sensors with the magnet's poles. Exact alignment will be observed when the output signals from the sensors and the amplifiers are of equal value, but opposite in polarity during quiet geomagnetic conditions; the amplifiers being driven positive and negative respectively, but maintaining balance. The differential output voltage from the amplifiers may be increased or decreased by slight east-west rotation of the sensor block. A mid-range setting is optimum and it will take a day or so to get this correct.

Final adjustments of the magnet cylinder requires very careful positioning to ensure a balanced output voltage of opposite polarities, so only minute adjustments are recommended at any one time. As sensors can flip polarity, the changeover switches can quickly restore an inadvertent flip when setting up. During twelve months of operating in a domestic environment no operational flip has occurred.

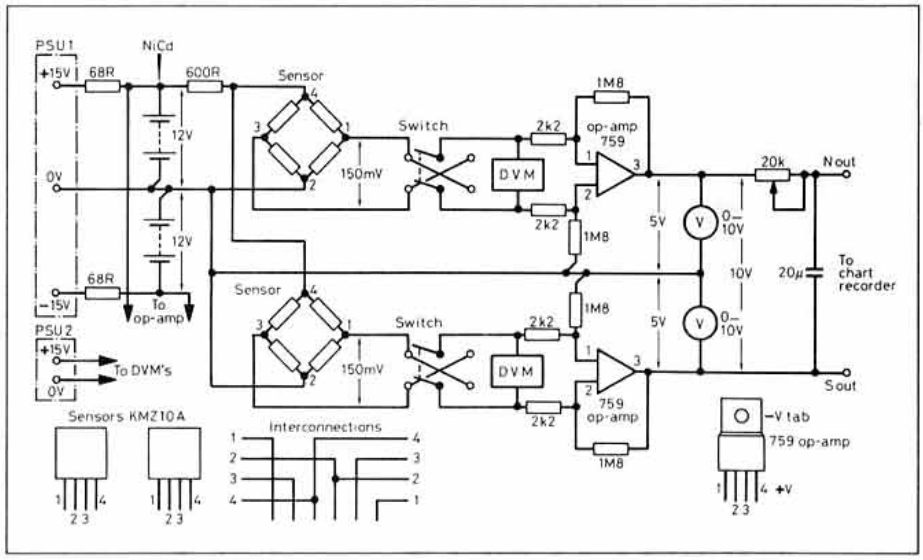


Fig 5: Circuit diagram and power unit arrangement for the magneto-resistive magnetometer.

A simple test to determine the response and direction, is to place a slightly magnetised object, varying from about 12 to 24 inches away, first to the north-east, then to the north-west of the magnet unit and observe the changes in output voltage. These changes should be of equal value: one being additive, the other subtractive from the initial value. At times the outputs may not always remain precisely equal and opposite as changes in the vertical may occur. In practice this does not result in any noticeable impairment or performance.

The magnetometer needs to be located as far from a road as possible and where it will not be disturbed. I use a very rigid shelf near to ceiling level in an upstairs room, with the recorder about 2ft below. The sensitivity is such that I will detect (apart from the earth's magnetic field) the following events:

- Raising or lowering the venetian blind, the bottom of which is weighted by ferrous metal.
- Opening or closing of an up-and-over steel garage door.
- RF from my transmitters.
- Domestic appliance interference, particularly hair dryers.
- Any test equipment using magnetics such as moving coil meters, or magnetised screwdrivers etc.
- Passing motor vehicles within 30 - 40ft.
- The moving carriage of a local chart recorder.
- Vibration.

Because of this, careful interpretation of the recorded trace is obviously essential.

Two instruments, as described here, have been operating for over 12 months and have given very satisfactory service, providing a record of magnetic waveforms that can be related to both radio and visual auroras. They also checked each other's accuracy and reliability.

REFERENCES

[1] 'Building a Jamjar Magnetometer', *Astronomy Now*, January 1990.

[2] *Radio Auroras*, RSGB (page 35).

. . . to be continued

In Part Two, GM4DJS shows just what he has achieved using this simple magnetometer.

S.E.M. Q.R.M. ELIMINATOR MK II

Our Q.R.M. Eliminator becomes more popular all the time as people worldwide realise how well it works. It cures local interference from any source, no matter what or where it is without reducing the wanted signal.

Thermostats, TVs, Computers, often it is your own gadgets that cause the problem. Connect it in your aerial lead and you can transmit through it.

PRICE £98.50 including VAT and delivery

NEW PRODUCT

S.E.M. COSMIC IAMBIC KEYER

This is the best CMOS Keyer you can buy, nothing has been forgotten in the micro's programme. It has 4 x 48 character memories and the price is low because it does not have an expensive keypad but receives its instructions and tells you its status (over 40 states) via the key.

PRICE £117.50 including VAT and delivery.
Twin Paddle Key £35.00

HI Q RECEIVER AERIAL MATCHING UNIT. Provides a high selectivity impedance match for wire or co-ax aerials to your receiver £66.50 incl. Ex-stock.
S.E.M. TRANZMATCH MKIII. The only Aerial Matcher with UNBALANCED and TRUE BALANCED OUTPUTS. 1kW 1.8-30 MHz, £165.00 Built-in EZITUNE (see below), £55. Built in Dummy Load, £10.90.
EZITUNE. Allows you to TUNE UP on receive instead of transmit. FANTASTIC CONVENIENCE. Stops QRM. Boxed unit, £59.50 PCB and fitting instructions to fit in any ATU, £55.00.
FREQUENCY CONVERTERS. VHF to HF gives you 118 to 146 MHz on your HF receiver, Tune Rx, 2-30 MHz, £77 ex stock. HF to VHF gives you 100kHz to 60 MHz on your VHF scanner, £66.50 ex stock. Plug in aerial lead of any receiver. Tuning from 100 MHz up.
2 or 6-METRE TRANSMATCH. 1kW, will match anything, G2DYM or G5RV on VHF. £55.00 ex stock.
DUMMY LOAD. 100W THROUGH/LOAD switch, £38.00 ex stock.
VERY WIDE BAND PRE-AMPLIFIERS. 3-500 MHz. Excellent performance. 1.5 dB Noise figure. Bomb proof overload figures. £45.00 or straight through when OFF. £55.00 ex stock.
R.F. NOISE BRIDGE. 1-.170 MHz. Very useful for aerial work measures resonant freq and impedance. £59.50 ex stock.
IAMBIC MORSE KEYER. 8-50 w.p.m. auto squeeze keyer. Ex stock. Ours is the easiest to use. £59.50. First class twin paddle key, £35.00 ex stock.
TWO-METRE LINEAR/PRE-AMP. Sentinel 40: 14x power gain, e.g. 3W-40W (ideal FT290 and Handhelds), £125.00. Sentinel 60: 6x power, e.g. 10W in, 60W out, £135.00; 10W in, 100W out, £165.
HF ABSORPTION WAVEMETER. 1.5-30 MHz, £55.00 ex stock.
MULTIFILTER. The most versatile audio filter. BANDPASS Hi Pass, Lo Pass and two notches. £95.00 ex stock.
HIGH PASS FILTER/BRAID BREAKER. Cures TVI £8.95 ex stock.
CO-AX SWITCH. Three-way + earth position. DC-150 MHz, 1kW. £39.50 ex stock.

12 MONTHS COMPLETE GUARANTEE INCLUDING TRANSISTORS
SEND FOR OUR CATALOGUE

We also make Aerial Matching Units both transmit and receive, Audio Filters, Noise Bridges, Morse Keyers, TVI filters, 2M Power/Pre Amps, Freq converters, Pre-Amps, Absorption, wave meters etc.

Prices include VAT and delivery. CWO or phone your CREDIT CARD No. Ring or send coupon for further data or catalogue. Orders or information requests can be put on our Ansaphone at cheap rate times.

☐ Please supply a SEM QRM Eliminator MK II
☐ Please supply a SEM Keyer
☐ Please supply Twin Paddle Keyer

I enclose cheque for £.....
Charge to my credit card Access/Visa/Mastercard (tick)
Number.....Exp. Date .....

☐ Please send catalogue

Name ..... Call .....
Address .....
.....
Postcode ..... Tel:.....

UNIT R, UNION MILLS
ISLE OF MAN
Telephone (0624) 851277

S.E.M.

DEE COMM

AMATEUR RADIO PRODUCTS

UNIT 1A
CANAL VIEW IND. EST.
BRETTELL LANE
BRIERLEY HILL
WEST MIDLANDS
DY5 3LQ.

A SMALL SELECTION OF OUR MASTS NOW AVAILABLE BY POST

MAST SETS IN STEEL OR ALUMINIUM
OUR STANDARD MASTS ARE SUPPLIED IN 4 x 5' INTER-LOCKING SECTIONS IN THE FOLLOWING DIAMETERS:

	Steel	Ally	P&P
1¼" dia.	£10.00	15.00	3.50
1½" dia.	12.00	20.00	3.50
2" dia.	18.00	36.00	4.00

Guy Rope Kits
1 x 3 way guy ring
6 x thimbless
12 x wire rope grips
3 x turnbuckles
30 metres wire rope
STD £15 p&p £4
H/DUTY £18 p&p £4

***NEW* FIBREGLASS COLINEAR — 2 mtrs £39.95 p&p £3.50**
70 cms FIBREGLASS COLINEAR £39.95 p&p £3.50
***NEW* CERAMIC 813 BASES £10 inc carr**
***NEW* 813 VALVES £25 inc carr**

We also stock HB9CV's, ZL Specials, Slim Jim's 2 Mtr & 6 Mtr Halo's, trap dipole kits, SWL aerials and ATU's, discones, traps, baluns, copper wire, insulators, dipole centres, rope, spreaders.
Winches 400lb **£13.50** 800lb **£17.50** 1000lb **£20.50** 1200lb **£23.50** 1400lb **£26.00**
Wall brackets, fixing bolts, u bolts and mast clamps guy rings, thimbles, turnbuckles and rope grips and large range of tuning caps & roller coasters etc.
As you can see all our products are too numerous to mention. Send £1 refundable against any purchase for our full catalogue and price list.

TEL: 0384 480565 FAX: 0384 481330

PROFESSIONAL WEATHER MONITORING AT A GLANCE

FEATURES (depending on model)
- WIND DIRECTION
- WIND SPEED
- GUST ALARM
- GUST SPEED
- RAINFALL
- SUNSHINE
- OUTSIDE TEMPERATURE
- MIN-MAX TEMPERATURE
- RELATIVE HUMIDITY
- BAROMETRIC PRESSURE
- WOODEN CABINET
- MAINS & 12-24V DC

IDEAL GIFT!

★ ★ All main readings at a glance ★ ★

SEND FOR COLOUR BROCHURE

Prices from only **£179** inc. VAT

R&D ELECTRONICS, UNIT 19, THE ST JOHN WORKSHOPS, MARGATE, KENT CT9 1TE. TEL: (0843) 221622

GMFA 144e – the *ultimate* masthead amp!

This is the ULTIMATE masthead preamplifier for the 2m band. The GMFA 144e has been designed for the highest possible performance. The amplifier will handle transmit powers up to 1kW, and maintains a noise figure of less than 1dB. The amplifier will meet the most exacting demands for linearity due to the two stage low noise negative feedback amplifier design employed. The 1 dB gain compression point is better than −5 dBm with the input third order intercept point at +10 dBm. Transmit losses are minimised to reduce the power dissipated in the preamplifier in transmit mode. The insertion loss in the transmit path is less than 0.2 dB. The preamplifier is isolated from the transmit path by two relays and special isolation circuitry to ensure the GaAs fet is not damaged during transmission. The amplifier is capable of RF switching to power levels of 250W, at higher power levels further protection can be gained by use of the ATCS 500 sequencer, which will control both the preamplifier and the linear amplifier.

Prices: GMFA 144e £180 ATCS 500 £40
p&p (UK): £5.50 £2.75

muTek limited – the rf technology company
Dept. RC. P.O. Box 24. Long Eaton. Nottingham NG10 4NQ 0602 729467

ICOM

SUPER HAMSTORES

ICOM (UK) Ltd. have opened two excellent ham retail stores in Birmingham and Herne Bay, Kent and we don't think you will find anything to beat them!

Our Birmingham store is under the management of Gordon **G3LEQ** ably assisted by John **G8VIQ**, the Herne Bay store is managed by Chris **G8GKC**. All have years of experience in Amateur Radio sales and will give a friendly service and a good supply of coffee.

Both stores have a full range of amateur products. We also have liquidated stock from the old KW Communications Ltd available at rock bottom prices. This includes such top brand names as Kenwood, Yaesu and Tentec. We have taken over the retail side of Ray Withers Communications who continue to trade in commercial and broadcast radio systems.

The Birmingham Store is in the same location as Raycom - just off Junction 2 on the M5. Our Herne Bay store is at ICOM headquarters.

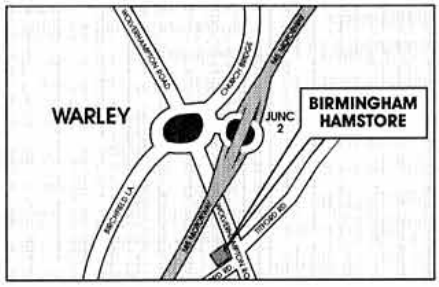
Part exchanges are welcome and all major credit cards accepted. There are also certain Privilege Member Cards which will be honoured!

Opening times for both stores: 09:00 - 17:00 Tuesdays to Saturdays

HERNE BAY

Unit 8, Herne Bay West Industrial Estate, Sea Street, Herne Bay, Kent CT6 8LD
Telephone: (0227) 741555, Fax: (0227) 741742

BIRMINGHAM



International House, 963 Wolverhampton Rd. Oldbury, West Midlands B69 4RJ
Telephone: 021 552 0073, Fax: 021 552 0055

MasterCard ICOM VISA

HEATHERLITE

Phone/Fax 0964 550921

AUTHORISED DEALER FOR KENWOOD, YAESU, ALINCO, R&D, BENCHER, AEA, DIAMOND, CUSHCRAFT, TONNA, DRAKE, DAIWA ETC.

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

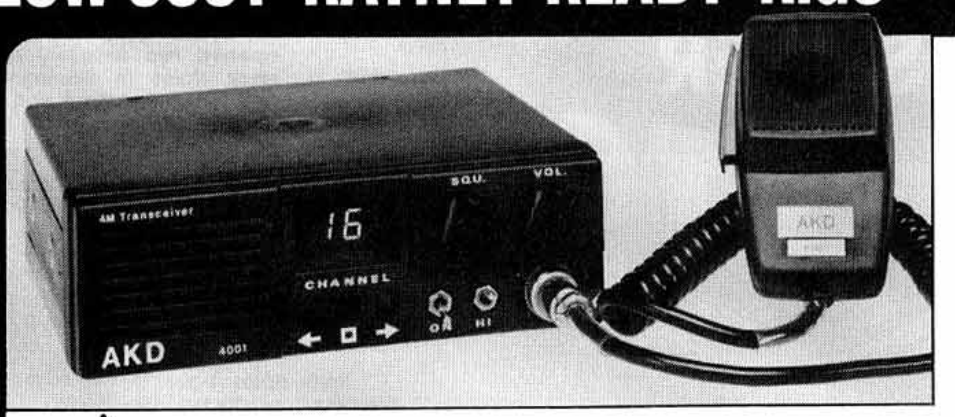
With earphone **£20.50**
Without earphone **£16.00**
p+p **£1.50**
(NB all Trio/Kenwood must have earphone)

HEATHERLITE VALVE AMPLIFIERS

HF EXPLORER	**£1250**	80m-10m inc WARC 2x3-500Zs 1Kw CW 2Kw PEP o/p ALC control
HF HUNTER	**£925**	80m-10m inc WARC 1x3-500z 700W CW 1200W PEP o/p ALC control
VHF DISCOVERY	**£1150**	144Mhz-146Mhz 1x3cx800A7 800H RMS 1K PEP o/p

HEATHERLITE COMMUNICATIONS
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

LOW COST 'RAYNET-READY' RIGS — UNDER £200



INTRODUCING the new

AKD 70MHz TRANSCEIVER

ONLY

£193.75

inc vat (plus p&p £5)

Call 0438 351710

to order or for leaflet

- ★ **6M MODEL Ring for latest info**
- ★ **NOVICE Low Power Model Coming Soon**
- ★ **2M MODEL now available from stock**

CAIRO

ATTENTION RAYNET & CAIRO USERS!

2, 4 & 6M models now available, fully converted to Cairo-8 standard, from stock. Easy to operate, user friendly, especially in emergency conditions.

£199.75 inc VAT
(add £5 p&p & ins)

BRIEF SPECIFICATION

- ★ 20 switched channels from 70.250 to 70.500MHz (12½KHz spacing)
- ★ Covers FM calling, FM, packet and Raynet channels
- ★ RF output 25 and 5 watts for 13.2V supply
- ★ Rx sensitivity better than 0.25uV
- ★ Audio output 2 watts
- ★ Packet — phone for up to date info on facilities available

AKD Unit 5, Parsons Green Estate
Boulton Road, Stevenage, Herts SG1 4QG

Manufacturers of amateur radio equipment and the world famous TVI filters

VISA Access

GAREX ELECTRONICS

METEOSAT WEATHER SYSTEM

The complete basic METEOSAT system, no computer, just a plug-in and go package that can be up and running in 10 minutes. Antenna, receiver, frame store, all cables through to 12" mono monitor: **£813.25**
(or less monitor: £612.00)

GAREX VHF PREAMPLIFIERS

Miniature (only 34x9x15mm), any frequency in the range 40-200MHz, up to 25dB gain. Stock versions: 6m, 4m, 2m, 137MHz (W-Sat) **£12.21**
Airband 118-136MHz (reduced gain): **£12.21**
Other frequencies in the range 40-200MHz to order: **£14.56**

TONE BURST GENERATOR

Miniature (38x18x10mm) xtal controlled 1750Hz: **£18.34**

GAREX DC/DC INVERTERS

A popular line for many years. Economy package: chassis section cut from commercial R/T gear, re-wired & tidied up to make free-standing unit, no expensive cabinet, just basic value for money.
12v DC input, 250v 150mA DC output: **£11.19**
12v DC input, 400v 200mA DC output: **£12.21**

4 METRE RX CONVERTER

High quality PMR front end by famous manufacturer, modified to make a 4m converter. 10-11MHz output. Full data. Requires xtal, approx 15MHz. **£17.32**

4 METRE 0.5 WATT FM TX

Tx Low Power driver unit matching above Rx, with modulator, fully aligned, with data: **£16.30**
(or + xtal for 70.45MHz £20.35). Suitable PTT fist microphone: **£4.04**

PYE ANTENNA RELAYS

12v operation, handles 50 watts up to 200MHz: **£1.99**
5 or more **(each) £1.53**

WESTMINSTER FM BANDWIDTH CONVERSION KITS

Converts 50kHz or 12.5kHz FM Westminsters (UHF or VHF) to Amateur band 25kHz spec. Comprises 2 x 1F filters + squelch board **£15.28**

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

SUREDATA

AMSTRAD REPAIRS AND SECOND USER SALES

UPGRADING YOUR AMSTRAD PC

This month we are featuring upgrades to Amstrad PCs. We can supply new and second user 5.25" and 3.5" disk drives, hard drives, hard cards, controllers, cables, memory etc. to fit yourself or we can fit them for you.

We can now fit memory upgrades to Amstrad 2286/3286 to give you 2Mb or 4Mb onboard memory as well as fitting extra disk drives in the 3000 series PCs.

A quick phone call will get you a price and if you want second user equipment a list will arrive by return.

Well we hope that we've spurred you on to increase your computing power this month and look forward to seeing you at Picketts Lock next month. **73 John G3TLU**

SUREDATA
Tel/Fax: 081-902 5218
Second User HOT LINE
0831 616519 (after hours)

DEPT RC, UNIT 5, STANLEY HOUSE,
STANLEY AVENUE,
WEMBLEY, MIDDX HA0 4JB
(Opposite Dorothy Avenue)

J.F. HARDING COMMUNICATIONS

Authorised distributor for Antenna Products Ltd

COMPLETE MOBILE AND PORTABLE ANTENNAS MADE IN UK

2m
- 3db moulded coil, whip, base, black, hinged with 4m RG58 **£18.95**
- 3db open coil, whip, base, black, hinged with 4m RG58 **£21.95**
- Unity gain whip, base, black, hinged with 4m RG58 **£15.95**

70cm
- 3db moulded coil, whip, base, black, hinged with 4m RG58 **£17.95**
- 3db moulded colinear, whip, base, black, hinged with 4m RG58 **£17.95**

All above with magnetic mount instead of moulded base ..... Add extra **£12.00**
2m and 70cm ½ wave G/P independent for fibreglass vehicles etc **£27.95**
Glass mounts for 4m, 2m, 70cms, 100W max with 5m RG58 **£48.95**
Rubber helicals for 4m, 2m, 70cms, handportables, BNC, TNC or threaded connectors **£6.25**

Antennas for cellular and other applications. Phone for details

Prices include post, packing, VAT. Cash/cheque with order please payable to:
J. F. HARDING
19 CARRINGTON CRESCENT
WENDOVER, AYLESBURY, BUCKS HP22 6AW
Phone 0296 623802 or 0831 261748

RSGB NATIONAL CONVENTION - 1992

National Exhibition Centre, Birmingham

Saturday 30 May and Sunday 31 May 1992

Make sure you don't miss Britain's *only* Amateur Radio *Exhibition*. Apart from all major manufacturers and distributors being represented, this is the only place you can:

- **get help with your planning and EMC problems**
- **receive specialist advice from RSGB Committees**
- **enjoy a full lecture programme**
- **meet RSGB Council Members and HQ staff — on hand to answer queries**

Definitely a great day out for the whole family. Make sure to mark your diary well in advance.

Organised by the RSGB Exhibition & Rally Committee. Trade stand information from Norman Miller, G3MVV, 178 Warley Hill, Brentwood, Essex, CM14 5HF (tel: 0277 225563).

PCB AND KIT SERVICES FOR *RADCOM* PROJECTS

PCBs

G3BIK BATTERY OPERATED AF OSCILLATOR AND WAVEFORM GENERATOR (September 1990)

PCB Layout	93990	£4.70
Full Kit (including box)		£25.85

G4WIM 50/70MHz TRANSCEIVER (May/June/July 1990)

Complete set of boards	567WIM90	£67.56

G4PMK SIMPLE SPECTRUM ANALYSER (November 1989)

RF Board	118946	Prices on request
Video/sweep board	118947a	
Marker generator/PSU	118947b	
Complete set of 3 boards	1189SSA	£17.62

G3TXQ TRANSCEIVER (February/March 1989)

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

BRS54049 DUAL CONVERSION MULTIMODE RECEIVE IF/AF STRIP (May/June 1985)

PCB LAYOUT	643585	£12.75

All prices include VAT, postage and packing

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

KITS

THE FOLLOWING KITS ARE AVAILABLE AS ELECTRONIC PARTS ONLY.
PCBS ARE AVAILABLE FROM BADGER BOARDS.

G3TSO	Multiband Transceiver	POA
G3TXQ	3 Band (Excl PA)	£165.55
G3TSO	Frequency Display	£27.50
G3TSO	80m SSB Transceiver	£87.00
G4WIM	Dual Band Project	£457.35
G4PMK	Spectrum Analyser	£53.00
G3RVM	Ultimate Keyer	£18.00
G3TDZ	White Rose Rx (Main Board)	£29.95
G3TDZ	White Rose Converters	POA
Technical Topics 144MHz Doppler		£4.00
First Steps. John Case PSU		£32.80

Prices shown are inclusive of P&P.

The above prices are for full component kits. The bigger kits are produced in module form if the constructor wishes to spread the cost. Please telephone for a full list.

Available from:-
J.A.B. Electronic Components
The Industrial Estate
1180 Aldridge Road, Great Barr
Birmingham B44 8PE
021-366-6928

EMC

MEGAN SMITH, G0MEG
EMC Committee Secretary

SINCE I STARTED writing the EMC Column I have received several letters with interesting advice, tips and comments. At least I know someone else reads it apart from the Editor! Anyway I would like to thank people who have written and explain that because of deadlines it may be some time before you see your efforts mentioned. For example, I am writing the February column at the beginning of December.

Following the mention of Spread Spectrum Technology in the August issue, James Vincent, G1PVZ, wrote to me about his final year degree project to examine the feasiblity of amateur use of this technique. The RA granted authority for his low-power tests on 70cm and he thinks that field tests in January 1991 may have been a 'first' for a UK amateur. Technical details may well appear in Pat Hawker's *Technical Topics* column if space allows. Anyone who wishes to read more about the subject could refer to *The Spread Spectrum Sourcebook* from ARRL.

WORKING MOBILE

NOT TO BE OUTDONE by the computer industry, the Motor Industry Research Association has also invested in EMC test facilities, in Warwickshire. A more conventional anechoic chamber location than the salt mine mentioned in the December issue, but almost as huge, capable of taking up to 10 tonne loads and equipped with rolling road dynamometer to simulate actual road conditions while testing. Individual manufacturers such as the Rover Group have also built their own facilities.

As an example of why all of this expensive testing is needed, an article in *Test* magazine (August 1991) referred to a report by an independent EMC consultant, Tim Williams, who had been measuring RF field strengths near the Fylingdales Early Warning System in Yorkshire. He found field strengths of 30 volts/metre on the A169 Pickering to Whitby Road, between Ellerbeck Bridge and Widow Howe, with a peak of three times that value. These levels, although they are well within current safety limits, could pose a threat to sophisticated in-car electronics like engine management systems and anti-lock brakes if manufacturers were not able to test their vehicles at sufficiently high field strengths.The MoD has denied that there is any risk as power levels at Fylingdales are constantly monitored. Obviously the main concern is for safety, and information from amateurs is only a small part of the overall picture, but your contributions such as those mentioned below are passed on to the motor manufacturers. The EMC Committee has collected a small database of contacts in various industries who are interested in EMC matters and who are often able to help, but have requested that contact be made through the Committee.

WHAT'S YOURS CALLED?

WELL, RF SEEMS TO BE no respecter of age, price or nationality! Your car problems range from the humble Fiat Panda to the 'go-faster' Ford Sierra Cosworth. Two examples of emissions from cars were sent in by G1OSP and G7HLU. A clock fitted to a 4x4 C reg Fiat Panda produced a strong signal on S20 on the 2 metre band when the car was new. The problem was eliminated using two chokes, but as the writer said, he should not have had to take a new car dashboard to bits. One as yet unsolved emission has been found in a 1991 Vauxhall Cavalier 1.8GL which appears to be related to the built-in burglar alarm, and causes interference on both 144 and 433MHz bands. Annoyingly, this occurs at all times whether or not the car is parked and alarm enabled. If the Committee has any success solving this or the other items mentioned it will be mentioned in a future column.

G0NDB reported an unusual EMC problem with a Blaupunkt car radio on an imported VW Golf. AM transmissions from nearby vehicles such as taxis can be heard on the car radio speaker even when the radio is switched off!!

HF is responsible for some odd 'happenings', although the majority of letters were concerning VHF or UHF, probably because these frequencies are more widely used in cars. G0CNR used to use a converted CB rig for 10 metres in a 1981 Volvo 240GLE Estate Automatic. He found that with a 25W amplifier, transmitting caused the seat belt warning to flash. Low power operation was no problem, and disabling the warning system effectively eliminated it altogether! The central locking system of the Citroen BX has also been found to be susceptible to HF.

A much more worrying effect of RF was mentioned by G0CNR. The use of a 70cm handheld in 'low-power' mode (400mW) near the unshielded wiring loom connected to the Engine Management System (EMS) of a 1986 Ford Sierra RS Cosworth caused the engine to misfire momentarily, then resume running with the 'EMS Fail' warning light on. However, use of the handheld near the screened aluminium box containing the EMS itself did not cause any malfunction, and neither did a 2 metre handheld. By coincidence, engineers involved in EMC use the term EMS to mean 'electro magnetic susceptibilty'!

By far the most common effect of transmitting while motoring seemed to be misbehaving flashers (nothing to do with old raincoats!). The flasher units speeded up while transmitting, with sometimes an accompanying buzzing noise. Frequencies in use at the time ranged from 70MHz on VW and Mercedes cars through 144MHz in a D reg Ford Sierra Estate to 433MHz in a 1991 Vauxhall Cavalier, at power levels ranging from 25 watts down to two and a half watts. Fortunately, or unfortunately depending on your point of view, one of the EMC Committee members had the same problem. Details and a solution for his particular car were given in December, but I am sure that the general principles would apply to many other cars.

MORE ABOUT FILTERS AND CAPACITORS

IN OCTOBER 1991 *EMC* I included some diagrams for simple suppression filters. I have been taken to task about these by G3MJW and G2BTO, in particular Fig 1 (Page 53), the 'thermostat' shunted by a resistor and capacitor. They pointed out that if the capacitor were to go short-circuit, it is possible that the current flowing could prevent the release of a relay or valve controlled by the thermostat, which could have dangerous consequences, and they advised that the circuit should be used with care. The October article stressed that the capacitors should be suitable class 'X' type to BS2135 - if they fail at all, these would fail to an 'open circuit' condition. I will diverge from the subject of EMC slightly to expain how this 'fail-safe' process comes about as such capacitors are also widely used in mains RFI filters. Many thanks to EMC Committee Member G3GVM for providing the following information:

Back in 1969, BSI replaced the 1949 edition of BS415, the standard relating to the safety of consumer radio and television. About the same time the British Electrotechnical Approvals Board (BEAB) came into being to independently assess product safety by submitting products for independent testing to BS415 by BSI. The new BS415 required product safety to be maintained when individual components like capacitors etc. were short circuited. Ah, now we are getting somewhere! The product could be safe if for example a fuse blew, but this was not an acceptable solution as fuses do not always blow for fault conditions; they are a very unreliable component in the first place. One solution is to use two capacitors in series, but from an equipment manufacturer's point of view this costs more and increases production time. So if it could be shown that a component was adequate by design and unlikely to fail and cause a hazard then this would be deemed to meet the standard.

Technology came to the rescue - around 1969 new plastic materials like polyester and polypropylene foil became available. They had good dielectric strength and, though very thin, replaced paper as a dielectric in capacitor manufacture. These new materials found widespread use in capacitors below 1µF in value; both plastics could be metallised or

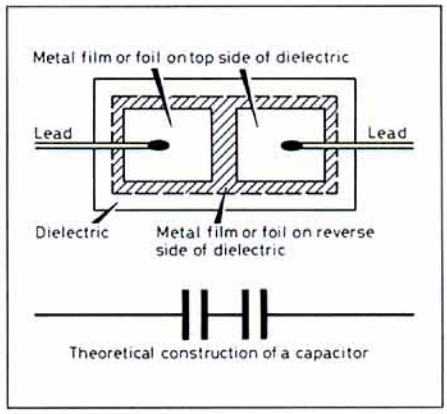


Fig 1: A reliable method of reducing the possibility of a capacitor going short-circuit.

interleaved with metal foil, each also had specific advantage in safety terms when they eventually wore out or failed. The need to recognise the type and failure mode of components became more important as colour TV expanded. Thinner materials allowed a re-think of component construction; component reliability by design resulted in newer forms of capacitor construction. Better components could be produced occupying no more space than earlier 'paper' types. Metallised film capacitors can be 'self-healing', that is, if there is a breakdown in the insulation of the dielectric the energy stored in the capacitor causes the metallised film to vaporise around the point of breakdown, thereby clearing the fault.

A third metallised or foil layer, insulated from both conventional 'plates' within a single capacitor but having capacitance to both, proved to be one answer (**Fig 1**). Effectively two capacitors in series within a single unit but having greatly increased dielectric strength, this apparently simple solution resulted in greatly increased reliability. This is because of the extremely low probability of both halves of the capacitor failing short-circuit at once.

Now back to that suppression circuit - capacitors for critical 'X' and 'Y' class operation carry the approval marks of test houses like SEV, VDE, SEMKO, NEMKO etc. A 350V AC working capacitor may well be proof tested at 5000 volts and must withstand factory high-voltage safety testing when built into equipment. For suppression purposes, some are available with inbuilt series resistors. The factors concerning capacitor choice are: firstly an understanding of the circuit operating conditions under both normal and fault operating conditions, and secondly the correct choice of capacitor having due regard for its failure mode. Film and foil capacitors normally fail to a 'short-circuit' condition, metallised film type fail to 'open-circuit' - provided the right capacitor has been chosen in the first place.

NEW LEAFLET FROM RADIOCOMMUNICATIONS AGENCY

MANY OF YOU MAY BE familiar with a colour booklet *How to improve your TV reception* which is free and used to be available from Post Offices. Lately it has only been available direct from the Radiocommunications Agency, but it is a useful booklet to give neighbours and includes the form for requesting a visit from the RIS (Radio Investigation Service) if things get to that stage! The cost of a visit is now £31 from 1 Jan 1992. I understand that the old booklet has been withdrawn and replaced by a leaflet called *Advice on TV and Radio Reception - A Guide for Householders* and should be available by now from the Radiocommunications Agency direct by telephoning 071-215-2352 or the answering service on 071-215-2072. At the time of writing, I had not seen a copy, but I gather that it is shorter than its predecessor, and not colour printed. I expect it is still a useful item to have around the shack, together with the RSGB leaflets for helping to explain EMC to neighbours. However, by far the best ally for the amateur is still an EMC-problem-free TV installation in his/her own house.

SNEAK PREVIEW

I HAVE BEEN LUCKY ENOUGH to have a sneak preview of a new book which should be published later on this year. Apart from the excitement of seeing a book in the making, I have enjoyed reading it. The book is the new RSGB manual about EMC which has been written by one of the EMC Committee members, G3JWI. It brings together many years of experience in dealing with EMC problems related to amateur radio and explains some of the principles behind both the problems and possible cures. There is almost no maths in the book and it is in a very readable style. There are appendices which can be useful to 'dip into' for specific examples. I hope that it is not too long before it appears in print.

STATISTICS

NOT AS BORING AS it sounds, I hope, but an indication of what the EMC Coordinators have been up to in 1991. As you probably know, the Coordinators are volunteers who are your local point of contact for EMC matters and their telephone numbers are published in the EMC section of the Callbook and updated from time to time in *RadCom*. They are your first port of call if you have an EMC problem - after making sure you have checked your installation as much as possible yourself of course. One obvious point which I shouldn't need to state is to be sensible about the time that you do call them, as they are volunteers and have work, families etc. as well as EMC to cope with!

Anyway here are those statistics:- Questionnaires were returned by 18 coordinators - many thanks- and these covered 196 cases.

Telephone

BT	41
Other	10
Radio	15

TV

UHF	74
Cable	1
Satellite	9
Hi-Fi	19
Cars	5
Alarm Systems	8
Others	14

The Radio Investigation Service was involved in 29 of these cases.

On the other side of the coin, Amateurs were affected by the following emissions:

- Fax machines
- Power lines
- Alarm systems
- Satellite TV systems
- Computers
- Digital phone systems
- Fluorescent lighting
- Thermostats
- TV masthead amps
- Radio teleswitches
- Gaming machines in hotels and pubs.

A number of Coordinators brought out the point that a great many complaints are really due to 'social' problems, and EMC is just one area of complaint used by neighbours against each other when the underlying relationship is poor, possibly to do with reasons which are nothing to do with radio. This emphasises the need for good relationships from the outset, so that if any EMC problems do arise they can be tackled in a reasonable atmosphere.

The EMC helpline is intended for the more serious problems, or for example where a higher level contact with a manufacturer might be required. The EMC Committee Chairman, Bob Peace, G8SOZ, received a wide mixture of helpline calls during the year, 52 of which involved bad social problems as a result of the amateurs 'less than ideal' approach. Altogether there were 149 helpline calls on subjects as diverse as - how to join the RSGB, licensing regulations, planning problems and, of course, EMC problems - so, if you are thinking of phoning the EMC helpline, consider if there might be someone more appropriate to provide the information you are seeking, for example your RLO. In addition to the Coordinators and Committee there are the Corresponding Members who have areas of particular expertise and are called in to assist in appropriate cases by the Chairman. Around 600 hours were spent on EMC-related matters by the Chairman in 1991, and eight site visits were made by members of the Committee representing the RSGB. A number of lectures to radio clubs around the country were also given by Committee Members. Phew - that's quite enough statistics for now but at least it gives you an idea of what the Committee is about, and is one aspect of what you get for your money when you pay your subs! The Committee also keeps an eye on EMC Standards activities, eg the new EC Regulations and briefs the RSGB where submissions are necessary in relation to amateur radio.

HOME BREW?

A LOCAL VHF REPEATER near the South Coast was suffering severe electrical interference resulting in a continuous crackle on all moderate signal levels. One intrepid EMC Committee Member who lived in the area did a bit of DF'ing and traced the source to a seaside pub over a mile away. It appeared that the electric fly killer in the kitchen was the problem, and after the owners had had it explained to them that it might also be affecting nearby shipping it was switched off. The manufacturer of the unit agreed to supply a free replacement and has arranged to have the faulty unit investigated. It would be nice if all cases ended as well as that!

DID YOU HEAR IN 1977?

THE FOLLOWING WAS SENT to me by G2BTO from an August 1977 edition of the *Daily Telegraph*:- "Overheard in a Surrey electrical shop on Saturday - 'Have you got anything I can plug into my television to make it interfere with my neighbour's power mower?'". Nothing changes does it?

Q R P

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

SURVEY OF COMMERCIAL QRP EQUIPMENT

PART 2: LATER TEN TEC EQUIPMENT

Of all the small range of commercial QRP transceivers, the Ten Tec Argonaut is probably the best known and the most loved. I remember well reading an article in the American *CQ* magazine which announced the appearance of the first Argonaut transceivers. Checking up on that article, I was surprised to find that the Argonaut goes back 20 years. *CQ*, November 1971, ran an article 'The Second Coming of the Argonaut' by Jack Birchfield, K4DCD, and Albert Kahn, K4FW. These two gentlemen were the designers of the transceiver, and the 'second coming' refers to an earlier construction project, a hybrid SSB transceiver bearing the same name.

The original Model was the Argonaut 505, a five band (80, 40, 20, 15 and 10 metres) SSB/CW transceiver with a power output in the 2 to 5 Watt range. The normal power output was stated as 2W but my 505 acquired in the mid 1970s gave considerably more output power on every band except 10m. The 505 followed the VFO and crystal mixer format for multi-banding and had full break-in facilities on CW. The receiver input tuning used a series of cores mounted on a plate controlled via a worm drive from a front panel knob, rather after the style of some car radio tuning controls. It also had a case styled along the lines of domestic hi-fi equipment of the era, with a wood grain effect top panel, a cream front panel and black plastic end cheeks. A large black analogue tuning scale with built in SWR / S-meter dominated the front panel.

The Argonaut 505 was the first full-feature QRP transceiver and its popularity was proved by the fairly rapid introduction of the improved Argonaut 509. In the 509, the crystal mixing arrangement was changed which enabled 10m to be covered in several segments. An optional active audio peak and notch CW filter was offered which plugged into a link provided on the back panel. The 509 had the longest production run of all the Argonauts and several thousand are still in everyday use and sought after by QRP operators.

The later model 509s replaced the changeover relay system with solid state full break-in which is a real delight to use on CW.

The 509 was replaced with the Argonaut 515. This model looked different, well at least its colour was different. The 515, following the fashion of the day, was housed in a black case. The permeability-tuned front-end was replaced by switched bandpass filters but apart from a few minor changes the circuit was much as the 509. The 515 only covered the five HF bands, 80, 40, 20, 15 and 10 metres as its production pre-dated the WARC bands. The production run of the 515 was much shorter than that of the 509 and these transceivers now change hands at price equal to, if not above, the original selling price.

I have owned all three Argonaut models and enjoyed them all. The receiver is good, the break-in is superior and the circuits are understandable on fully serviceable boards. Much of the success of the Argonaut is shown by the fact that very few modifications exist for the transceiver. QRP operators are keen 'fiddlers' with equipment and some models of second hand transceivers are almost impossible to find without previous owner modifications. With the exception of adding a CW crystal filter and designs for audio active filters to use instead of the commercial Ten Tec filter, I have seen very few modifications for these transceivers. Owners seem very satisfied with them as they are.

Ten Tec followed the Argonaut 515 with the Argosy, a 50W SSB/CW transceiver with a 10W option and including the 30m band. The Argosy I has an analogue dial; the later Argosy II included full digital readout. The Argosy range appears to have been aimed at the HF mobile market, although many QRPers use it 'throttled back' on the QRP range. Ten Tec also produced the 'no frills' Century range of transceivers. The Century 21 is a direct conversion transceiver with a valve final amplifier. The Century 22 is a neat compact basic CW transceiver, with an advanced direct conversion receiver and full break-in.

For over 20 years Ten Tec has served the QRP market well and has gained the favour of many QRP operators. This year Ten Tec has produced a new QRP transceiver, the Argonaut 535. A fully synthesized transceiver with all the HF bands and general coverage receiver, the 'Argonaut II' is beginning to appear in the UK, although the price is probably higher than many QRP operators are used to paying for their equipment.

QRP WEEKEND

The G-OK QRP WEEKEND 29 February to 1 March 1992 is a joint event between the G QRP Club and the OK QRP Club

RULES

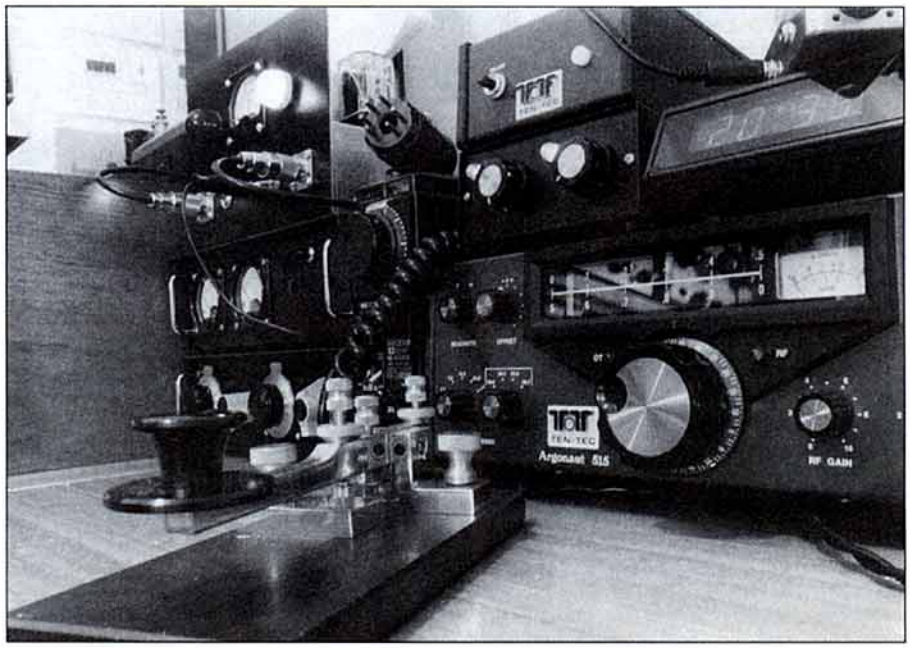
1 Contacts: These must be between G and OK QRP stations.
2 Power: The limit is 5W RF CW.
3 Exchanges: RST and power must be copied.
4 Scoring: The score is the total number of OK/G contacts on the bands used. One contact per station per band only to count.
5 Frequencies and times: 3560kHz 0400-0700 and 2100-2400GMT, 7030kHz 0500-0700 and 1800-2100GMT, 10106kHz 0600-1000 and 1700-2000GMT, All +/- QRM. Use best band open to you.
6 Logs to G8PG by 15 April for G entries. OK to OK1CZ.
7 Awards for leading stations will be certificates.

THE EIGHTH YEOVIL QRP CONVENTION

THIS IS ON SUNDAY 10 May (Doors open 9am) at the Preston Centre, Monks Dale, Yeovil, Somerset, which is accessible via Preston Road and Larkhill Road. Maps are available from G3CQR, QTHR.

Entrance costs £1.50, including programme with lucky draw number and talk-in is by GB2LOW from 8.30am on channel S22.

The event includes a full programme of lectures with trade stands, a bring and buy stall and construction display with a chance to test home-built equipment on a spectrum analyser. The Lunch Time Diversion is a receiver construction challenge. The pre-convention Fun Run Contest begins on the Monday before the event. Food and soft drink is available all day. Further details are available from Peter Burridge, G3CQR, (QTHR); tel: 0935 813054.



An unusual shot of the Argonaut 515 taken by G0HTR with some of his other homebuilt QRP equipment.

practical Wireless

HAVE YOU SEEN OUR NEW FRONT COVER LOGO

It's appropriate that as *Practical Wireless* enters its 60th anniversary year, that we're making sure that we do so in style. We're all very proud of the magazine's heritage, and there's a new logo starting with the January issue.

Along with the new logo, one of the biggest improvements will be a change to a higher quality glossy paper. There will be full colour and two colours available throughout the magazine. There will also be much higher quality photographic reproduction, with advantages to be had for everyone.

The new printing system will enable our art editor Steve Hunt to use his artistic expertise and the second colour to full effect. As a result technical articles with circuit diagrams, p.c.b. designs and appropriate overlays will be more attractively designed, providing a much easier read.

Rob Mackie, our photographer and technical artist, in conjunction with Steve, will be able to use many more of the production and presentation aids to produce an even better magazine for our readers.

So, we'll be entering the new year in style. There are some interesting projects under way, and I hope to be letting you have news of one or two of them very soon. In the meantime, everyone on the *Practical Wireless* team is looking forward to sharing the enjoyment of a wonderful hobby with the support of our new technology and most importantly, you the reader.

73 DE Rob Mannion G3XFD

- ✔ Practical Wireless 60th Anniversary Year
- ✔ Look out for our new logo starting from the January issue
- ✔ Higher quality glossy paper
- ✔ New two colour editorial style
- ✔ Higher quality photographic reproduction
- ✔ Attractively designed and more clearly defined p.c.b. overlays in two colours

PW Publishing Ltd. Enefco House, The Quay, POOLE, Dorset BH15 1PP
Tel: (0202) 678558 Fax: (0202) 666244

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

AMDAT is EXPANDING

ICOM YAESU ALINCO AOR

AMDAT has added YAESU to the range of equipment that we are stocking in our recently enlarged shop

The Digital Superstar

The DSP-12 uses State Of The Art technology to give all the major satellite data modes and HF/VHF packet in one box. Coming very soon will be AMTOR and CW which will be available as free upgrades.

Send for a data pack TODAY

Send 3½ PC disk + SAE for a copy of the complete manual

THE TNC FOR YOUR PC

The DRSI PC* Packet Adapter plugs directly into your PC mother board and provides 2 TNC ports.

Type 1 — 1 VHF port/1 external modem £139.00
Type 2 — 2 VHF ports £169.00

TNCs + Data Terminals

Pac-Comm Tiny 2 — VHF packet.....£149.00
Pac-Comm TNC320 VHF + HF Packet £199.00
Kantronics KAM Multimode £291.00

The IDEAL gift for all occasions

Send an SAE for our full list of JUNGHANS Radio Controlled Clocks/Watches. Ideal presents for Him or Her.

Prices subject to change.
Prices shown include VAT. Carriage extra.

AMDAT

4 Northville Road, Northville
Bristol, BS7 0RG
0272 699352

Credit Available

Stephens-James LTD
COMMUNICATION ENGINEERS

NORTH WEST STOCKISTS FOR MOST LEADING BRANDS OF AMATEUR EQUIPMENT WITH ACCESSORIES AND BACK UP SERVICE.

KENWOOD - CUSHCRAFT
JAYBEAM - KLM - TONNA
GLOBAL - MALDOL - MFJ
G WHIPS - DAIWA - AOR - JRC
REVEX - DIAMOND - WELZ

Baluns - Insulators - Plugs - Power Supplies - Clamps - Brackets - Aluminium Tubing - Cable - Connectors - G5RV Antennas - Verticals - Mobile Accessories - Rotators - Mail Order Service HP Terms - SAE for enquiries.

47 Warrington Road, Leigh, Lancashire WN7 3EA
Tel: STD (0942) 676790
Shop Hours Mon-Fri 9.30-5.00
Sat 9.30-4.30

CONTEST NEWS

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

HF RULES

1.8MHZ SSB CONTEST 1992 RULES

Please note that rules 3 and 4 have been changed since the 1991 event.

1. Date & Time. 2100GMT Saturday 28 March to 0100GMT Sunday 29 March 1992.

2. Sections. UK, Overseas, and Receiving. Overseas entrants may work/report only UK stations for points. Multi-operator entries are welcome in the transmitting sections.

3. Band and Mode. 1.8MHz band, SSB only.

4. Exchange. RS + serial number beginning at any desired figure (to enable simultaneous entry for this event and CQ-WPX). UK stations also send County Code.

5. Scoring. Three points per QSO.

5.1 Multipliers. UK - One for each UK county and one for each country *outside the UK*. Overseas - One for each UK County.

6. Address and Closing Date for entries as specified in General Rules.

7. Awards. Certificates of merit to the first three entrants in each section.

LOW POWER CONTEST 1992 RULES

1. The general rules for RSGB HF contests (as published in Radio Communication) will apply.

2. Date and Time. 0700 - 1100GMT, Sunday 19 April, 1992.

3. Frequencies, mode and power. 3.510 - 3.560MHz and 7.010 - 7.040MHz, CW only. Maximum power: 5W RF output.

4. Exchange. RST + serial number (commencing at 001) + output power eg:- 559001 3W

5. Scoring. Fifteen points for each contact with another QRP station; five points for all other contacts. The same station may be worked for points on both bands.

6. Equipment. The transmitter or final power amplifier stage shall not be capable of RF output power in excess of 15 Watts. A description of any method of power reduction to comply with the contest rules, and of the equipment used to measure power MUST accompany each entry.

7. Awards. The 1930 Committee Cup will be presented to the winner. Certificates of merit will be awarded to the second- and third-placed stations and also to the highest-placed entrant using completely 'home-brew' equipment. A further certificate will be awarded to the highest-placed entrant using 1 Watt (or less) RF output power.

LOW POWER CONTEST 1991 - REVISION OF RESULTS

Due to an unfortunate oversight, the entry from G4KLQ was omitted from the published results of this contest.

He scored a total of 760 points from 21 QSOs on 80m and 32 QSOs on 40m, which places him in 11th position. Accordingly, all those placed 11th or lower in the original listing will move down one position.

Please accept our sincere apologies for this error.

NATIONAL FIELD DAY 1992 - RULES

1. The General Rules as published in the January 1992 edition of Radio Communication will apply.

2. Notification. Each group intending to compete must send details of the site to be used to: **J C Burbanks, G3SJJ, Southlands, 16 Cotgrave Road, Plumtree, Nottingham NG12 5NX**, to arrive no later than Saturday 2 May 1992. Details must include the name and address of the person responsible for the entry and to whom contest stationery should be sent; section to be entered; name of group; callsign(s) to be used; national grid reference and sufficient access information for an inspector to be able to locate the site. Contest stationery will be sent in May to the person making the notification.

3. Date and Time. From 1500GMT 6 June to 1500GMT 7 June 1992.

4. Sections. All sections are multi-operator.

(a) Open. One transmitter and one receiver (or one transceiver).There is no restriction on the number or type of antennas, but the maximum height must not exceed 20m. Power is limited to 100W output from the final stage.

(b) Restricted. One transmitter and one receiver (or one transceiver) with one antenna which must be a single element such as a dipole, vertical, end-fed wire etc, having not more than two elevated supports and not exceeding 11m above ground at its highest point. Power is restricted to 100W output from the final stage.

(c) Low Power. Same equipment and aerial limitations as the restriced section. Power is further restricted to 10W DC input to, or 5W output from the final stage.

Notes:

(i) Stand-by equipment is allowed on site, but it may not be connected to a power source when the main equipment is in use.

(ii) All stations are subject to inspection by representatives of the HF Contests Committee. The inspector's brief will be to ensure that the rules and spirit of the contest are being observed. Should the inspector be unable to locate the site to due inadequate or incorrect information, the entry will be disallowed. In the event of a late change of site, it is the responsibility of the members of the group to make suitable arrangements for the inspector to find the new site. The inspector must be given immediate access to all parts of the site with the right to stay as long as desired, and the ability to return at any time during the contest. The inspector may also visit in the 24 hours before the start of the contest. The presence on site of any amplifier or modified commercial equipment capable of excess power may result in the entry being disallowed, and in the event of such an infringement being proven, all operators listed as being associated with the group in operating the station may be disbarred by the HF Contests Committee from entering any RSGB contest for five years.

5. Frequencies and mode. CW (A1A) only in the 1.8, 3.5, 7, 14, 21 and 28MHz bands. Contest preferred segments as recommended by the IARU should be used ie 3510-3560 and 14010-14070KHz.

6. Exchange. RST and serial number starting from 001.

7. Scoring. Each station may be worked once on each band, but points must not be claimed for contacts made by a competing station with members of its own group. Points will be scored as follows:

for contacts with -

Fixed stations in Europe (including UK) ..... 2 pts

Fixed stations outside Europe .. 3 pts

Portable and Mobile stations in Europe (including UK) ..... 4 pts

Portable and Mobile stations outside Europe ..... 6 pts.

Contacts on 1.8MHz and 28MHz should be scored as above and the totals multiplied by two to obtain the band score for the RSGB listing. An IARU Region 1 listing will be collated by the Region 1 contest manager, and the totals in this list will not include the above factor.

8. Address for entries. As in 'Notification' above. Entries should be postmarked no later than Monday 29 June 1992.

9. Awards.

(a) The National Field Day Trophy to the station having the highest overall checked score, regardless of section.

(b) The Bristol Trophy to the station having the highest overall checked score in the other section.

(c) The Scottish Trophy to the Scottish station having the highest overall checked score.

(d) The Gravesend Trophy to the runner-up in the section having the highest number of entries.

(e) The G6ZR Memorial Trophy to the runner-up in the other section.

(f) Certificates of merit to the stations having the three highest overall checked scores in each section.

(g) The Frank Hoosen G3YF Trophy to the station having the highest checked score on the 14MHz band.

(h) Certificates of merit to the groups in each section with the highest checked scores on each band.

10. Check logs. While overseas stations are not eligible to enter NFD, checklogs are very welcome. A certificate will be awarded to the overseas station in each continent whose checklog shows the most points contributed to competitors.

ROPOCO-1 1992 - RULES

1. The General Rules for RSGB HF Contests, as published in the January 1992 issue of Radio Communication, will apply.

2. Date & Time. 0700 - 0900GMT, Sunday 5 April 1992.

3. Band & Mode. 3520kHz - 3570kHz, CW only.

4. Exchange. RST only, do NOT send Serial Number. **Other Data:** For the first QSO, the entrant's own postcode. For each subsequent QSO, the postcode received from the previous contact.

5. Scoring. Ten points per QSO. Contacts with stations outside UK will not score.

6. Address and Closing Date for logs as per General Rules.

7. Awards. Certificates to the leading three entrants. The Verulam Silver Jubilee Trophy to the highest-scoring entrant with a perfect (or the most accurate) log. The G5MY Trophy to the entrant with the highest aggregate score in this event and ROPOCO-2 (August 1991).

HF CONTESTS CALENDAR - 1992.

1 Feb	LF Cums 7MHz (Nov 91)
1/2 Feb	LF SSB (Aug 91)
1/2 Feb	*YU DX CW*
2 Feb	LF Cums 3.5MHz (Nov 91)
7 Feb	LF Cums 1.8MHz (Nov 91)
8/9 Feb	1st 1.8MHz CW and BINGO (Dec 91)
15/16 Feb	*ARRL DX CW* (Feb92, p15)
22/23 Feb	7MHz CW (Oct 91)
22/23 Feb	*CQWW 160 SSB* (Jan 92, p16)
22/23 Feb	*REF & UBA (SSB)*
7/8 Mar	*ARRL DX SSB* (Feb 92, p15))
14/15 Mar	Commonwealth (BERU) (Jan 92)
21/22 Mar	*Bermuda*
21/22 Mar	*BARTG Spring RTTY*
28/29 Mar	*CQ WPX SSB*
28/29 Mar	1.8MHz SSB (Feb 92)
4/5 Apr	*SP DX (SSB)*
5 Apr	RoPoCo1 (Feb 92)
19 Apr	Low Power (Feb 92)

HF RESULTS

LOW POWER FIELD DAY 1991 - RESULTS

LOW POWER SECTION - 3W RF Max

1	G4ARI/P	1190	3W
2	G6KQ/P	1170	2W
3	G3UFY/P	1091	2W
4	G4BUE/P	1072	3W
5	G4OGB/P	972	3W
6	G3HJF/P	963	3W
7	GI3PDN/P	954	3W
8	G4EXQ/P	900	3W
9	G3CQR/P	886	3W
10	G3YRC/P	875	3W
11	G4HUV/P	814	3W
12	G3BPM/P	764	2W
13	G4EKT/P	656	3W
14	GW3SB/P	505	3W
15	G3NFC/P	482	3W
16	G0LTO/P	455	1W
17	G4AHG/P	437	3W
18	G3OEP/P	395	3W
19	G3IIU/P	340	2W
20	G0ADH/P	304	2-3W
21	G0MFR/P	294	3W
22	G4XFD/P	112	2.5W

HIGH POWER SECTION 10W RF MAX

1	G4JKS/P	1346	9W
2	G4FOX/P	1141	10W
3	G0HIN/P	1081	9W
4	G3VHB/P	1044	10W
5	G3JKS/P	860	9W
6	G3WRR/P	720	10W
7	GJ0GNF/P	459	10W

Checklogs gratefully recieved from: G0LRD/P, G0OGN/P, G2HLU, G3VIP, G4CZP/P, G6UQ/P AND GM3UM.

Congratulations to Tim Raven, G4ARI, and Hilary Claytonsmith, G4JKS, on winning their sections of the contest. Tim used a Sugiyama F850 with dipoles at 35ft to gain 100 QSOs, and Hilary a TS120V with dipoles to make 119. Ten Tec and Heathkit dominated the low power rigs and the TS120V was king of the 'QRO' rigs. The standard of logkeeping was high and most stations lost very few points; G4EXQ/P and G3WRR/P were the only logs with no deductions. Only one station had an unmarked duplicate and so lost 150 points! About 250 stations were on the two bands handing out points but most of the portables seemed to find 7MHz a struggle, particularly in the early afternoon. The checklogs proved invaluable in sorting out the first places in the low power section. Few logs contained comments and those relating to the scoring system etc have been passed to HFCC for consideration.

G3PDL / G3RXP

VHF RESULTS

1991 50 MHZ CW CONTEST

This event suffered from all the usual attributes of 50MHz under flat conditions - especially the lack of activity. If there had been a major sporadic E opening, I'm sure that things would have been different - but there wasn't and they weren't. With the level of activity, the length of the contest has been shortened for 1992, and the date has been moved into the Sporadic E season - we look forward to seeing an increased entry. Remember that if you enclose an SAE with your entry you can receive a placement certificate wherever you are placed in the final table. Congratulations and certificates go to Martyn Vincent, G3UKV, and Dave Powis, G4HUP on this occasion.

G4PIQ

Pos	Callsign	Score	QSO	Loc	Ant	Best DX	km
1	G3UKV	113	22	82RR	5Y	G4HUP	267
2	G4HUP	92	11	02PD	5Y	GW0MDO	319
3	G3XWZ	62	16	93JD	2x4Y	G4AHN	
4	G0HVQ	42	10	81UT	3Y	G3KNU	224

70 MHZ CW CONTEST 1990

The comments from the participants varied from "Terrible" to "Most enjoyable as always". Despite the change of date this year, there was no increase in activity. 12 entrants this year as well, no SWL entry. No check logs this year either.

Logging errors increased as time went on and some stations lost their high scoring contacts due to these errors.

Does anyone have any suggestions on how we can increase the activity ?

On behalf of the VHFCC I would thank you all for your considerable efforts and add congratulations to EI9FK/P and G3VIP who are the certificate winners.

G3ZXX

Pos	Callsign	Score	QSO	Loc	Pwr	Ant	Best DX	km
1	EI9FK/P	298	22	IO63WC	100	5 ELE	G4ZTR	497
2	G3VIP	166	19	IO93XM	40	4 ELE	GM4ZUK/P	412
3	G4ASR	151	25	IO81MX	35	6 ELE	G3JYP	289
4	G3JYP	146	16	IO84SN	30	8 ELE	G3TCU	403
5	G3HYH	132	24	IO92KP	40	DIPOLE	EI9FK/P	339
6	GM4ZUK/P	103	7	IO86RW	40	4 ELE	G4ZTR	604
7	G3TCU	97	17	IO91QE	50	7 ELE	G3JYP	395
8	G4FOH	93	15	IO83QC	25	5 ELE	G3TCU	254
9	GW4HBK	91	15	IO81KP	40	6 ELE	G3MPN	309
10	G3LVP	88	21	IO81WV	40	3 ELE	G3JYP	305
11	G4BVY	64	12	IO82TD	40	DIPOLE	EI9FK/P	274
12	G4OUT	60	12	IO92AT	8	HB9CV	EI9FK/P	280

70 MHZ TROPHY 1990

Propagation during this event, which occured coincidently with good 2m and 70cm tropo benefited to some degree, however, conditions were not spectacular.

Congratulations to Mr McSheppey and the Northern Lights as winners and runners-up of the Open Section, and to Andy Cook, G4PIQ, and David Butler, G4ASR, as the certificate winners of the Single Operator Section. The VHF Manager's Trophy was therefore awarded to the Sheppey Exiles Group.

Adjudicator : G3ZXX

MULTI OPERATOR SECTION

Pos	Callsign	Score	QSO	Loc	Pwr	Ant	Best DX	km
1	GM8TFI/P	83655	100	IO85DJ	140	2 x 5 Y	GJ4TAW/P	689
2	GM4UJS/P	74281	108	IO74NV	130	2 x 8 Y	GJ4TAW/P	652

3	GW4MGR/P	55022	112	IO83JA	100	6 Y	GM3WOJ	531
4	GM3CKR/P	52530	81	IO85PT	120	8 Y	GJ4TAW/P	728
5	G3UAX/P	49184	92	IO80LW	120	4 x 5 Y	GM4AFF	678
6	GM4SIV/P	41520	73	IO74TQ	160	8 Y	GJ4TAW/P	621
7	G3TCU/P	37948	90	IO91SF	200	2 x 6 Y	GM3TAL/P	605
8	G4LCQ/P	28728	88	IO92FM	70	8 Y	GM4AFF	501
9	EI9FK/P	27648	60	IO64VB	100	5 Y	G4PIQ	543
10	GJ4TAW/P	25818	53	IN89WG	150	4 Y	GM3CKR/P	728
11	G4WSM/P	25344	71	IO81PH	100	12 Y	GM3CKR/P	500
12	GI4SJB/P	25133	47	IO74CO	20	5 Y	GJ4TAW/P	563
13	G1SAS/P	23322	74	JO02BA	40	4 Y	GI4SJB/P	486
14	GW4ZTR/P	20874	71	IO81LR	60	2 x 5 Y	GM3CKR/P	454
15	G7APD/P	18427	76	IO91EX	10	7 Y	GM3CKR/P	432
16	G8EIK/P	18102	60	IO90RU	40	8 Y	GI4SJB/P	464
17	G8DDY/P	17062	54	IO90JO	10	10 Y	GM3CKR/P	588
18	GI4TVV/P	15232	37	IO74BI	10	3 Y	G4PIQ	538
19	G4SAT/P	11248	49	IO91NU	10	4 Y	GM3CKR/P	456
20	G4ADV/P	10528	34	IO70JH	50	2 x 7 Y	GM3CKR/P	633
21	GM4ZUK/P	7347	32	IO85NN	80	4 Y	G3UAX/P	514
22	GM3TAL/P	2114	13	IO75IU	20	4 Y	G4PIQ	620

SINGLE OPERATOR SECTION

Pos	Callsign	Score	QSO	Loc	Pwr	Ant	Best DX	km
1	G4PIQ	40300	84	JO01MU	160	8 Y	GW3WOJ	736
2	G4ASR	31164	78	IO81MX	100	6 Y	GM4AFF	562
3	G3UKV	26850	84	IO82RR	100	5 Y	GM3WOJ	569
4	G1SWH	26050	66	IO83QO	100	5 Y	GJ4TAW/P	483
5	G3HYH	17820	66	IO92KD	130	DIPOLE	GM3CKR/P	422
6	G4FOH	15132	56	IO83QC	25	5 Y	GJ4TAW/P	428
7	G4BVY	14965	53	IO82TD	100	4 Y	GM3CKR/P	408
8	G0EHV	11280	36	IO94FW	50	3 Y	G3UAX/P	455
9	G4NBS	9408	40	JO02AF	40	4 Y	GI4SJB/P	467
10	G3VIP	9262	36	IO93XM	40	4 Y	EI9FK/P	409
11	GW4HBK	8778	41	IO81KP	40	6 Y	GM3CKR/P	464
12	G3NKS	8687	43	IO81XU	20	3 Y	GM3CKR/P	442
13	G4BIK	4488	23	JO02AI	10	4 Y	EI9FK/P	457
14	G6MXL	4117	25	IO80XR	10	3 Y	GM8TFI/P	530
15	G0MGI	3401	23	JO02DL	50	4 Y	EI9FK/P	467
16	G8IZY	2877	25	IO91VC	70	DIPOLE	G4ADV/P	362
17	G4SJH	2288	24	IO91PI	15	3 Y	GJ4TAW/P	252
18	GM4AFF	2261	14	IO87VA	10	7 Y	G4PIQ	611
19	G8PNN	1949	16	IO95EF	130	3 Y	G4BVY	346

SWL SECTION

Pos	Callsign	Score	QSO	Loc	Pwr	Ant	Best DX	km
1	BRS52543	7230	35	IO83LT	HF125	HB9CV	G4PIQ	350
2	BRS28198	1554	15	JO00HX	FRG7	TA31	GW4MGR/P	340

Disqualified : G3IKR (general rules 2 & 3), G3ZJY (general rule 3)

144 MHZ CW & MARCONI CONTEST, NOVEMBER 1990

Some comments from the participants were "Mediocre"; "Rather Poor"; "Average"; "Flat"; "A definite lack of Activity"; "Extremely Windy" through to "Better Than Average".

Bearing in mind the comment about the flat conditions, it was interesting to see the DX distances achieved by the participating stations. (Perhaps this SSB operator will re-think about CW.)

It is quite clear that all of the participants in this years contest would like to have seen more activity, especially during the 24 hour section.

Of the participants who wished their entries to be forwarded to IARU for the 24 Hour Marconi Contest, only 3 entrants seemed to be aware of the need for separate/additional cover sheet for IARU and RSGB contests. The logs have, however, been forwarded with the cover sheets as supplied and a covering letter. Let's hope that this will be acceptable. Logging errors effected some entrants although logs were generally good.

On behalf of the VHFCC I would thank you all for your considerable efforts and add congratulations to the Certificate winners. G3ZXX

24 HOUR SINGLE OPERATOR SECTION

Pos	Callsign	Score	QSO	Loc	Pwr	Ant	Best DX	km
1	G4WKN	32297	123	92OG	100	2 x 19 Y	FD1OEG	691
2	G4OUT	16974	61	92AT	30	1 x 12 Y	DF4ZK/P	830
3	G3JJZ	4119	25	01AJ	25	1 x 8 Y	DJ5BV/P	491
4	G4XEN	3885	20	92PH	90	1 x 16 Y	DK0BN/P	646

6 HOUR SINGLE OPERATOR SECTION

Pos	Callsign	Score	QSO	Loc	Pwr	Ant	Best DX	km
1	G3XBY	24412	94	92DG	100	2 x 17 Y	DL0EJ/P	704
2	G4ASR	23959	88	81MX	100	1 x 18 Y	DL1YAP/P	762
3	GM4AFF	14890	35	87VA	100	4 x 17 Y	G0KON	704
4	G4ARI	11616	61	92IQ	100	1 x 10 Y	F6APE	596
5	G3VIP	10842	33	93XM	80	8/8 Slot	DK0BN/P	667
6	G4HVC	9454	48	93QA	100	1 x 9 Y	DJ5BV/P	598
7	GI4KSO	5911	17	64XK	100	1 x 13 Y	G4APA/P	552

24 HOUR MULTI-OPERATOR SECTION

Pos	Callsign	Score	QSO	Loc	Pwr	Ant	Best DX	km
1	G4XBF/P	69686	201	01OI	100	4x9Y+14Y	OK1KYY/P	847
*	G4APA/P	87587	262	01MU	100	4x17Y+2x19Y	OM5KIM	875

6 HOUR MULTI-OPERATOR SECTION

Pos	Callsign	Score	QSO	Loc	Pwr	Ant	Best DX	km
1	G0FBB/P	24913	91	01EI	80	4 x 9 Y	DJ3XK/P	726
2	GX3PRC/P	19925	70	80CL	100	1 x 17 Y	FE1MEO	1180
3	G5RS/P	17389	71	91TF	100	2 x 17 Y	DF8XB/P	615

* G4APA/P have entered the IARU event only because 2 members of the VHFCC were operating within that team.

1991 144MHZ CUMULATIVE CW CONTEST

The number of entrants in this contest did not do justice to the actual stations on the air. Conditions during the various sessions varied. Session 1 saw good tropo to over 800km, sessions 2,3,and 4 fairly flat, but with reasonable band occupancy despite the football on TV! Session 5, a superb aurora with most people working excellent DX, however some found trying to work a contest during an aurora too much and gave up. Those that stuck at it found some of the best contest conditions for some years. Many thanks to all entrants for the good standard of log keeping. It is felt however that some entrants did not understand how the contest was scored and submitted their own judgement of the three best days,(this was not always the right thing to do).

Brian Sheepwash GI4KIS.

Note: If on session two you worked 30 stations and felt that you were amongst the band leaders on that day, scoring say 180 pts, and the final winner scored 200 pts on that session, then your normalised score would have been 900. 180X1000/200= 900. If on session 5 you worked 50 contacts and scored 800 pts, but the winner on that day worked 60 contacts and scored 1600 pts, then your normalised score for that day would have been 800X1000/1600= 500. Which day would you choose to be part of your 3 out of 5? This is a simplification but shows that the highest score is not neccessarily the best.

G4DEZ

Psn	Call	Pts	Active	Loc	Best DX	Km
1	G4PIQ	3000	1,2,3,5	01MU	RB5WAA	1647
2	G4HUP	2261	1,2,3,4	02PD	OK1JKT	849
3	G0AFH	1548	1,2,3	01EI	DL9GKA	933
4	G4WKN	1539	1,2,3,4,5	92OG	YU1WP	1700
5	G4ZTR	1145	1,2,3,4,5	01IV	OK1HAG	1016
6	G4OUT	1048	2,3,4,5	92AT	HB9BZA	938
7	GI4KSO	964	1,2,3,4,5	64XK	OK1HAG	1538
8	G4ZVS	922	1,2,3,4,5	92BK	DL7AKA	1030
9	G0ADH	751	1,2,3,4,5	91KO	DL9OAB	1065
10	G2AFV	411	1,2,5	93GN	DH2OAA	730

Checklogs: G0DJA, G4XPE, many thanks.

Welcome to G2AFV, first VHF contest. Certificates to G4PIQ and runner up G4HUP. To those who didn't enter and were not on the band, look at the DX you missed.

Bryn G4DEZ.

432 MHZ CW JUNE 1991

This contest was held the same weekend as the FM contest. QSO distances worked were appreciably up, and good for the propagation conditions. This clearly showed some advantage of the CW mode. Congratulations to the section winners and runners up. *G8HHI*

OPEN SECTION

Psn	Call	Pts	QSO's	Loc	Pwr	Best DX	Km
1	GW4TTU/P	201	22	81LQ	400	GM4ZUK/P	584
2	G4ZTR/P	192	20	01PU	400	GM4ZUK/P	616
3	GM4ZUK/P	127	9	86RW	100	G4CVI	670
4	G4WKN/P	51	11	91NV	40	G3UVR	218

SINGLE OPERATOR FIXED

Psn	Call	Pts	QSO's	Loc	Pwr	Best DX	Km
1	G3UVR	138	14	83KH	100	F6HPP/P	631
2	G1HSK	64	6	93MQ	12	GM4ZUK/P	366
3	G4BRK	56	10	91DP	100	G1HSK	240

432 MHZ TROPHY 1991

Strong winds and rain caused havoc and damage to several portable stations. Lack of activity did not help morale and many stations said they would prefer the Trophy Contest to be put back to the May UHF/SHF weekend. Congratulations to the Northern Lights CG in retaining the 70cm Trophy, and to all other section winners and runners-up. *G8HHI*

As G8HHI was placed 2nd in the Fixed station section, ALL logs were passed to me for verification and check adjudication. On checking I found that one Suffolk station had logged a complaint, the other station in Essex did not log any reference to the said complaint on their log. If you receive a complaint, however trivial or massive it might be, LOG it. You could lose points if you don't. G8HHI's log checked out OK as did the poor logging of a station which could have taken 2nd place if their logging had been more accurate, 56 points were lost due to incorrect callsigns and locator information. A contact is not valid if you have either the call or locator wrong!

Bryn Llewellyn VHFCC Chairman,G4DEZ

OPEN SECTION

Psn	Call	Pts	QSO's	Loc	Best DX	Km
1	G4GCM/P	1501	132	94RJ	DL9YBJ	665
2	G8KQW/P	1196	144	01KJ	DJ9BV	660
3	GW8TFI/P	946	110	81LQ	DL2KBB	644
4	G4VIX/P	888	105	01PU	GM4ZUK/P	616
5	G4WKN/P	198	47	91NV	GM4ZUK/P	570

SINGLE OPERATOR PORTABLE

Psn	Call	Pts	QSO's	Loc	Best DX	Km
1	G3UAX/P	516	90	91GI	GM4ZUK/P	624
2	GM4ZUK/P	377	21	86RW	G8DDY/P	709
3	G8DDY/P	174	27	90JO	GM4ZUK/P	710
4	G4APD/P	66	17	92LJ	G4GCM/P	224

SINGLE OPERATOR FIXED

Psn	Call	Pts	QSO's	Loc	Best DX	Km
1	G4PIQ	787	94	01MU	DJ9BV	630
2	G8HHI	327	58	91OH	GM4ZUK/P	636
3	G8FBG	313	51	91SG	GM6BIG	529
4	G8DQK	246	38	83RK	GM4ZUK/P	389
5	G1OGY	240	54	01GR	PA0EZ	324
6	G0EIY	92	14	82OR	GM4ZUK/P	468
7	G6GAU	27	7	02MB	GW8TFI/P	283

No SWL entries. G8HHI

VHF Contests Calendar 1991/92

19 Jan	144MHz CW (Dec 91)
26 Jan	70MHz Cumulative (Dec 91)
1 Feb	*Winter Field-Day (DL), 1296MHz, 0900-1100*
1 Feb	*Winter Field-Day (DL), 2320MHz - 47GHz, 1100-1300*
2 Feb	*Winter Field-Day (DL), 432MHz, 0900-1300*
2 Feb	*Winter Field-Day (DL), 144MHz, 1100-1300*
2 Feb	432MHz Fixed/AFS (Jan 92)
9 Feb	70MHz Cumulative
23 Feb	70MHz Cumulative
1 Mar	70MHz Cumulative
7/8 Mar	144/432MHz
15 Mar	70MHz Cumulative
29 Mar	70MHz Fixed/SWL
5 Apr	50MHz Trophy
12 Apr	1296MHz Fixed

For details of rules for European contests, contact G4PIQ, QTHR.

VHF FIELD DAY CORRECTION

Apologies to Dorking Radio Society. In 70MHz Low power section, Total should read 724 which puts them in 12th place. Overall placing now should be 14th.

CONTEST ADJUDICATORS

The VHFCC have had problems with committee members either not adjudicating logs or failing to submit the results to committee, this has caused no end of problems for other members of the committee, but not least to you the competitors.

All logs from G3ZXX have now been adjudicated and are about to be published, (Dave resigned due to pressure of work, VHFCC wish to thank him for all the work he did for us).

However any logs which were sent in for adjudication to G8XVJ are proving difficult to get hold of (as of 15/12/91), the committee is still trying to resolve the matter.

If it is at all possible, please send duplicate logs to me G4DEZ, 110 South Avenue, Southend, Essex. SS2 4HU., so that I can proceed with the adjudication.

Bryn LLewellyn. G4DEZ.

DIRECTION FINDING

SOUTH MANCHESTER QUAD NIGHT

Date: 29 February

Map: 109 (Manchester)

Assembly: 19.00 GMT for start at 19.20 GMT

Location: Lay-by on A57, approx. half kilometer south of junction with M63 - use far end of lay-by. NGR 748972.

Competitors requiring supper should notify Dave Holland, 32 Woodville Drive, Sale, Cheshire, M33 1NF (tel: 061 973 1873) no later than 24 February.

FREE PC-PAKRATT II software with every PK-232/PK-88 this month

PACKET/DIGITAL RADIO

EXCITING NEW PRODUCTS FOR 1992!

Over the past year we have spoken to many of you at radio rallies and telephone to find out the sort of products you want to see in 1992. As a result we have come up with what we feel are interesting new additions to our already extensive range (the UK's biggest).

OUR NEW "MINI-PAK" SYSTEM.....

By the time you read this ad we should be launching our new PC based "Mini-Pak" stand alone PC packet system. Mini-Pak simply plugs into the serial port of your PC (no PSU required) and straight into the radio mic socket.

The good news is that Mini-Pak sells for under £80 built & tested with software.
The even better news is that the whole think is a built into the inside of a standard 9 way D plug using the latest surface mount techniques and an especially modified licenced version of the German Baycom PC software.

Available late January 1992.

ICS FAX II....
Once again this module plugs directly into a standard PC serial port offering amazing on screen fax with up to 16 grey scales in VGA mode. Don't worry if you only have CGA,EGA or Hercules, you may still take advantage of this product. ICS FAX II now also supports RTTY, NAVTEX and FEC receive. Great for SWLs, Schools and radio amateurs alike! Available today.....£129.95 (Send a disk/SAE for free PC demo disk).

A FEW OF OUR OTHER PRODUCTS..

AEA
PK-232MBX+AMTOR MAILBOX £319.95
PK-88 VHF/HF TNC + new MBX...£149.95
PCB-88 PC internal card TNC.....£149.95

KANTRONICS
KPC2 HF/VHF with Wefax £168.50
KPC4 VHF/VHF dual port £247.25
KAM all mode with Wefax..... ..£291.00

PACCOMM
HANDIPACKET as used on MIR...£199.00
PC-320 dual port PC card .....£ 159.00
TINY-2 with PMS version 3.0.....£ 149.00
TNC-320 dual port.HF/VHF.....£199.00

SOFTWARE & LEADS
We supply software for most computers FREE of charge with all TNCs & Multimodes. We also stock leads for just about any combination of TNC/Computer and radio.

CONFUSED NEWCOMER?
Don't be shy, we are here to help. Call or write for our latest catalogue/price list. We also stock good books and demonstration tapes. Call anytime from 8am-8pm Mon-Sat.

If it's in stock (and it usually is) we will despatch it the same day.

NOTE: Prices include VAT, carriage extra.

Siskin Electronics Ltd
2 South Street,
Hythe, Southampton,
SO4 6EB. **Tel: 0703-207587,207155**
FAX: 0703-847754

KITS & READY BUILT PRODUCTS

Individually handcrafted products & qualified technical support

NEW LINEAR WITH PREAMP, 2 or 4 or 6 metre versions, RF switched, all mode SSB/FM/CW/DATA. 2.5W input 25W output. Ideal for FT290, FT690 etc. RX gain 20dB, noise figure <1dB typical. Types TA/RP2S, TA/RP4S, TA/RP6S. BOX KIT £72.75, BOX BUILT £95.

NEW LINEAR AMPLIFIER, 2.5W in 25W out switched, suits FT290 & FT690. Other powers available eg., 5 in 50 out, 10 in 50 out, 5 in 25 out. State requirements when ordering. Types TA2S1, TA4S1, TA6S1. BOXED KIT £56.25. BUILT £68.75.

TRANSVERTERS from 10 metres to 2, 4 or 6 metres. 500mW output, low noise & 15dB gain Rx side. Types TRC2-10, TRC4-10, TRC6-10. PCB KIT £55.50. PCB BUILT £83. BOXED KIT £78. BUILT £110.50. Add £7.50 to kit or £10 to built prices for repeater shift.

TRANSVERTERS for <1mW 10 metre drive. Buffered versions of above types TRC2-10B, TRC4-10B, TRC6-10B. PCB KIT £64.25, PCB BUILT £94, BOXED KIT £85.75, BUILT £127.

TRANSVERTERS from 2 metres to 4, or 6 metres. 500mW-5W 2 metre drive. Includes an interface for RF sensed switching and attenuation. Types TRC4-2i (built only). TRC6-10i, prices as buffered versions above.

LINEAR AMPLIFIERS 500mW in 25W out switched, suit transverters above. Types TA2S2, TA4S2, TA6S2. BOXED KIT £71, BUILT £89.25.

RECEIVE PREAMPS low noise, 20dB gain adjustable, 100W handling. Types RP2S, RP4S, RP6S, RP10S, BOXED KIT £28.50, BUILT £39.00. Masthead versions RP6SM, RP2SM, BOXED KIT £46.50, BUILT £59.

RECEIVE CONVERTERS add 2, or 4, or 6 metres to receiver tuning 28-30MHz, low noise, 26dB gain, Types RC2-10, RC4-10, RC6-10. Or add 4, or 6, or 10 metres receive to a 2 metre transceiver, low noise, 15dB gain, Types RC4-2, RC6-2, RC10-2. PCB KIT £22.50, PCB BUILT £31.75, BOXED KIT £38.25, BUILT £49.50.

REPEATER TONEBURST 1750Hz auto-toneburst type AT1750, PCB KIT £5, BUILT £7.

VAT & P&P inclusive prices
Send SAE for free Full Catalogue

SPECTRUM COMMUNICATIONS

Unit 4 Grove Trading Estate, Dorchester, Dorset. Tel 0305 262250
Shop times: 9-1, 2-5, Tue-Fri, 9-1 Sat. Closed Sun & Mon.

WISE BUY BARGAINS!

ALL PRICES INCLUDE P&P + VAT

PYE F414 UHF base stations, slim, modern, 230V, C.K. 70cms + info **£35**
PYE PC1 controller + "Tulip mike" **£35**
PYE F30 F.M. Solidstate 230V base station O.K. 2m packet **£35**
T1154 ex RAF, morse keys, as new, wrapped **£15**
PYE M293 A band. A.M. + Mic + L/S **£78**
PYE MF6AM E band A.M. **£35**
PYE MF5AM Motafone A band A.M. **£28**
PYE M212 Olympic 'T' band 1 channel O.K. 70cm + circuits **£30**
Storno 4000 UHF h/held, LCD display + batt — No info or ant **£25**
RACAL Tacticom morse key, USA manufacture, new, boxed **£15**
RACAL Clansman head/mic sets, NATO No. 5965-99-649 8166 .....**£21**
RACAL MA675 9m fibreglass mast + accessories, new **£145**
PLANTRONICS International head/mic sets type Starset Supra, as new ...**£15**
RECEIVERS — Racal RA17, Eddystone 730/4 available, please call for details.

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 234897 FAX: 0903 239050

HATELY ANTENNA TECHNOLOGY GM3HAT

1 Kenfield Place, ABERDEEN AB1 7UW, Scotland, G.B.
Credit Card Orders may be telephoned any day 8.30am to 9.30pm on **0224 316004**

DUAL MODE LOOP - DML 3.6/21

Just 3m x 3m (10ft sq). Price inc Vat & Postage — £35.00

Experience efficient radiation from a restricted site with this handy sized product on EIGHTY metres and on FIFTEEN metres. Achieve world-wide DX contacts on 21 MHz and as well the familiarity of G and near-European contacts on 3.6 MHz. No ATU necessary even with the most fussy transceiver.
This recently developed HAT product will take up to 1 kW DC input power, and is called a "Dual Mode" loop because it operates on the two bands in two methods. On 21 MHz it employs the patented CAPACITOR BALUN made popular in the Capacitor Dipole which we have been selling for eight years as the Dipole of Delight. On 3.6 MHz the same loop goes into resonance (like the magnetic loop) but is of sufficient size to work efficiently with low Q and fairly wide bandwidth. In fact it covers the upper half of Eighty Metres without an ATU or any adjustment. To go to the lower part, the user may simply add an additional 5 metres of coaxial cable in the shack.
Figures from a Typical Production model are given below (standard length of cable 50 Ohms):

f in MHz	21.0	21.1	21.2	21.3	21.4	21.45		3.65	3.70	3.75	3.80
SWR to 1	1.08	1.01	1.03	1.10	1.18	1.28		1.55	1.35	1.15	1.10
Adding extra 5 metres of 50 ohm cable:							3.5	3.55	3.60	3.65	3.70
(21 MHz as before)							1.8	1.55	1.35	1.20	1.85

For full Technical details on these and any other antenna send 4 First Class stamps (or 3 IRC's).
Proprietor:— Maurice C. Hately, M.Sc FIEE Chartered Electrical Engineer. Licenced in 1950 as G3HAT

QUARZ CRYSTALS

QuartSLab MARKETING LTD

P.O. Box 19 Erith Kent DA8 1LM
Telephone: 0322 330830
Fax: 0322 334904
Telex: 8813271 GECOMS-G
(Attention QUARTSLAB)
An SAE with all enquiries please

STOCK CRYSTALS

CRYSTALS FOR 2 METRES
HC25 **£3.00** FOR ONE CRYSTALor **£2.75** EACH FOR TWO

TX CRYSTALS	RX CRYSTALS	
12MHz 30 & 40pF	44MHz Series Res	
	14/15MHz 30pF	RO-R7, S8-S23
	Scanner Crystals	
	SR9 Crystals **£4.00**	

HC6 **£3.30** FOR ONE CRYSTAL or **£3.00** FOR 2 OR MORE

TX CRYSTALS	RX CRYSTALS	
4MHz 30pF	44MHz Series res	RO-R7, S20-23

4 METRE CRYSTALS FOR 70.26 IN HC6/U at £3.60 each or £7.00 per pair
TX 8.78250 RX 29.7800
70CM CRYSTALS 7.00 pair or £3.60 each
For Pye PF2 & PF70 series and FDK MULTI U11 SU20 RB0 RB1 RB2 RB3 RB4 RB5 RB6 RB7 RB8 RB9 RB10 RB11 RB13 RB14 RB15
Also for MULTI U11 ONLY SU16 SU18
CONVERTER CRYSTALS IN HC18/U AT £3.70 each
22.000, 38.666, 42.000, 96.000, 116.000
FREQUENCY STANDARDS £3.70 each
HC6/U 1000kHz 10.00MHz
HC18/U 7.00MHz 10.00MHz 10.70MHz 48.00MHz 100.00MHz
TONEBURST, I.F. & MPU CRYSTALS IN HC18 £2.60 each
7.168MHz (for 1750 HZ Tone), 10.245 (for 10.7 I.F.)
3.2768 4.000 5.0688 10.245MHz 15.00000
YAESU CRYSTALS FOR FT101's etc £5.00 each
Many available ex stock (A list is available on request–please send S.A.E.)
Full list available on request, please send S.A.E.

MADE TO ORDER CRYSTALS

FUNDAMENTALS

FREQUENCY RANGE	PRICE
1.5 TO 2.0MHz	**£7.00**
2.0 TO 4.0MHz	**£6.00**
4.0 TO 6.0MHz	**£5.50**
6 TO 22MHz	**£5.35**
22 TO 26MHz	**£7.65**

DELIVERY: Approx. 2 weeks

OVERTONES

FREQUENCY RANGE	PRICE
3rd OVT 21.00 TO 60MHz	**£5.35**
3rd OVT 60.00 TO 75MHz	**£5.50**
5th OVT 60 to 116MHz	**£6.00**
5th OVT 110.00 TO 126MHz	**£8.75**
7th OVT 125.00 TO 175MHz	**£12.00**
9th OVT 170.00 TO 225MHz	**£12.20**

Unless otherwise requested fundamentals will be supplied for 30 pf load capacities and overtones for series resonate operation
HOLDERS – supplied for crystals above 2MHz

HC6/U & HC33/U 1.5–175MHz
HC18/U & HC25/U 2–175MHz
HC45 Add £3.75

DISCOUNTS: Price on application for 10+ units to same frequency spec. or bulk purchases of mixed frequencies.
COMMERCIAL CRYSTALS: Available on fast delivery and at competitive prices.
Add 50% to the cost of made-to-order crystals for 5-day service.
CRYSTAL SOCKETS HC25 £0.35 each MINIMUM ORDER CHARGE FOR SOCKETS £2.00 unless ordered with crystals.
TERMS: Cash with order post inc. to UK & Northern Ireland.
Cheques & PO's to QSL LTD.

PRICES INCLUDE P&P and VAT

Members' Advertisements

RSGB Members wishing to place an advertisement in this section must use the official form incorporated on the label carrier of Radio Communication. This will prove membership and must be for the current month. No acknowledgment will be sent. Ads not clearly worded, or which do not comply with these conditions will be returned. If an ad is cancelled no refund will be due. An advertisement longer than 60 words will be charged pro rata. Trade or business ads, even from members, will not be accepted. Traders who wish to use this facility must send a signed declaration that the items for sale are part of, or intended for, their own personal amateur station. The RSGB reserves the right to refuse ads, and accepts no responsibility for errors or omissions, or for the quality of goods for sale or exchange. Ads for CB equipment will not be accepted. Each advertisement must be accompanied by the correct remittance, as a credit card payment, cheque or postal order made payable to the Radio Society of Great Britain. Please note that because this is a subsidised service to members, no correspondence can be entered into. Licensed members are asked to use their callsign and QTHR, provided their address in the current edition of the RSGB Amateur Callbook is correct. RS members will have to provide their name and address or telephone number. Please include your town and phone number in the free boxes provided to assist readers.

Warning: *Members are advised to ensure that the equipment they intend to purchase is not subject to a current hire purchase agreement. The 'purchase' of goods legally owned by a finance company could result in the 'purchaser' losing both the goods and the cash paid.*

FOR SALE

1000 item bargain. I will fill my 4' x 3' trailer and car with electronic components and equipment and deliver to your door: £75 within 50 mile radius. Includes test gear, components, transformers, valves, semiconductors, relays, connectors, switches, cable, PCB, storage boxes. (Birmingham) 021 472 3688.

ABSOLUTELY immac and almost indistinguishable from new. Yaesu FT101E and FT101Z. Both with mics and h/books. Spare JAP valves with the 101E: £325 and £375 respectively. I would like to keep one of them so take your pick! Bird elements 5A and 5E: £35 ea, 5W Bird dummy load: £45. Carr at cost or you collect from Liverpool area. (Liverpool) 051 236 1694.

BARGAIN Sale - VHF/HF equip. FT290R Tx/Rx 143.5-148.5MHz (extended cov by SMC), vgc, bxd, strap, man, nicads, chrgr. Cirkit 2m/80m tnsvtr, mint, man, circuit. 2x25W 2m linear amps (Alinco, Howes models), mint, manual, circuit. Numerous 2m antennas - fixed stn and mobile ants (coax incl). All above equipment is in PWO and must be sold as a complete package: £250. G-whip HF mobile ants, 80/10m, mint: £60. (Gloucester) 0452 380294.

COMPLETE station. Kenwood TS520SE, Nevada TM1000 ATU, DAIWA CN520 SWM, G5RV antenna, used: £350. G3EFK QTHR. (Dorcester) 0305 852134.

ERA Microreader: £85. SEM QRM Eliminator: £45. Skyband Discone with Howes mast-head preamp, CTE freq counter 10Hz to 1.3GHz, 10m Tx/Rx with DTI cert: £45. 3-30MHz linear amp 200W PEP: £45. Andy GM0GON QTHR (Argyll) 0586 552496.

FT101B ex cond. tcvr, new bands fitted. 250V or 12/13.5 volt, microphone and spkr: £210. G3AIV QTHR (Swindon) 0793 814280.

FT101ZD FM fan FC902 ATU SP901 spkr spare valves AM board, instruction man, service maint man: £425. (Norwich) 0603 745460.

HF-LINEAR legal limit compact reliable 2x813GG inc PSU spare 813s(4): £220. York (Cybernet) 10FM mobile inc antenna: £25. DNT 10FM mobile: £12. Dewsbury Supa-TVTA, as new: £40. DX-TV Antennas Antiference X-Yagi: £20. Triax grid x 2 with Combiner: £35. Masthead preamp inc PSU: £20. HiFi: Sansui direct drive turntable: £20. Hitachi Dolby-C cassdeck: £20. Pioneer Dolby-CHxPRO cassdeck: £40. Technics tuner: £18. All ono. (Sheffield) 0246 414995.

HW100 h/bpsu: £100. Nascom I (280) computer + many extras: £25. Also surplus computer PCBs incl UART chips 74TTL etc: £1.50 ea. Heathkit Q-Multiplier for Rx 110v: £10. Sinclair QL with twin 3.5 floppy: £50. CST THOR QL clone inc hard disk 20MB colour monitor: £200 + lots of s/ware incl PC emulator. Softy 2 Eprom programmer as new: £40. G3ZLX QTHR (Newton Longville) 0908 644244

ICOM 720A solid-state compact HF transceiver with general coverage: £550. Icom AT500W fully automatic ATU: £395. FT290RII: £295. Kam M/Mode TNC with weefax manuals leads etc: £235. All boxed, very little used. SEM lambic keyer: £28. HF mobile amplifier 80-10m 10W drive for 100+Watt out RX pre-amp: £60. Daiwa PS120 II power supply, as new: £60. G0OPG. (Wilmslow) 0625 531154.

ICOM 760: £1150. KW Ten-Tec Titan 1600W AM: £1300. SM10 mic: £70. Bird thru line, 2 elements PEP board: £300. TH7 DX + tail-twister rotator, only 1 yr old: £600. Altai dip meter, bxd: £35. Tenatest noise bridge, bxd: £30. (Fakenham) 0328 710872 (after 6).

ICOM IC211E multimode base station Mutek, recently serviced: £350. Icom IC251E Mutek excellent condition, boxed: £450. G4HXE. (Dover) 0304 824505.

KENWOOD TS140S, clean, bxd, mostly used for gen coverage receive: offers around £600. Also FP107 PSU with matching plug for above!: £80ono. Steve G4YGA QTHR (Norwich) 0603 406234.

QTH Lake District coast, Four-bed semi, solid fuel CH, large dble gge with internal access, large ground floor w/shop/shack, rear garden, greenhouse, 70ft span between masts, secondary DG, two separate toilets. Large stock well-sorted radio h/ware incl free. Need to give up driving and move to smaller town house forces sale: £49,000. G3APV QTHR (Seascale) 09467 28449.

RADCOMS. 100 in good condition from 1983: Offers. Heavy duty aluminium ladder, 18' x 33': £350 new. Bargain: £150. G4HRT QTHR. (Leeds) 0532 665568.

RETIREMENT in Devon? Detached 3-bed bungalow in lane at edge of village. Gas CH, Aga cooker. Shops 10 mins walk. Buses 300 yds. Sidmouth 3.5 miles, Exeter Exmouth M5 A30 9 miles. Rural area, grazing fields front and rear. Smallish gdn accommodates 80m half-wave aerial. G6DZ, QTHR 0395 68779.

SILENT KEY SALE: G0AMA. TS940S A/ATU IF10B interface: £1350. MC85 mic: £50. SO940 speaker: £40. SM220 monitor: £220. Hansen FS200 SWR/PK-PWR meter: £40. Hansen FS50 interval PWR/SWR: £45. Datong processor: £35. Drae 24amp PSU: £80. FP707 PSU: £120. Shure 44D mic: £45. Icom SM5 mic: £30. FF501 lowpass filter: £15. Homebrew lambic squeeze keyer: £30. Tokyo HX-240 transverter: £210. Manuals all mint. Versatower EP45 tilt over tower winches, bearing: £275. TET HB33SP tribander: £150. Daiwa rotator and controller VGC: £80. Amstrad PC2286/40 colour VDA (12MHz) IMB-RAM 40 MBH/D software: £700. Star NB2410 24 pin printer: £300. BBC Micro, much software two five and a quarter inch disc drives: £120. Phillips personal monitor CM8833 (colour): £100. AEA Pakratt PK232 MBX multimode terminal: £270. Tono I-5000 CW/RTTY amtor terminal: £250. Mint manuals. G0MZI. (Salisbury) 0722 337711.

SUMMERKAMP FTDX 500 tcvr. Unmarked condition 500W input, handbook: £130. Racal RA117A USA version. Good alignment and mechanical condition, work shop manual in case: £160. KW Valiant mobile AM/CW TX: £30. G0AQH QTHR. (Brighton) 0273 454108.

TENTEC Corsair 2, ext VFO, ext RF Compressor, 1.8/500/250 additional filters, mans, orig packing, ex condx: £650. Band Edge Dx Tristar Groundplane incl radials 20/15/10: £45. Hateley dipoles DD14/21MP: £15. DD7/28HP: £40. Bob Rylatt G3VXJ QTHR (Worthing) 0903 231466.

THE FOLLOWING all for £399!! 1940s projection television with screen, receiver AR88, receiver CMX 46159, AF signal generator x2, chart recording voltmeter, Marconi "vintage" RF signal generator plus one other "unspecified" item. Also for sale, Yaesu FT290R11 plus J-Beam antenna (new) and rotator (new) with controller. All amaz condx and £499 the lot. G0MPS. (Bournemouth) 0202 291548.

TEN TEC Corsair with matching pwr supply, model 260, additional SSB and 250Hz CW filters. Only transmits on SSB when speech processor switched in, so offering at only: £280ono. Purchaser to collect. G3BDQ QTHR (Hastings) 0424 812262.

TRANSFORMER 2500-0-2500 500m/A, 2x813 heater tnsfrmr, HV oil/paper capacitors, high pwr linear amp components, some HD Chokes: Offers. Brian (Kent) 0474 872743.

TRIO TS515 tcvr, 80-10m, SSB/CW, 180W, 500Hz, C.W.F. CW, PS515, PSU, handbook: £150. Matching remote VFO, VFO-55, handbook: £50. (Kent) 0474 872743.

TS940S auto ATU filters fitters, mint: £1390ono. Might PX R5 Cushcraft HF vertical: £150. G0HOG. (Ruislip) 0895 676919.

YAESU FRDX400/FLDX400 HF separates linked tcvr with 2m 6m cnvrtrs, bxd, mans, pair: £250ono. Prefer buyer collects. G2XM QTHR. (Aldeburgh) 0728 453603.

YAESU FT101ZD, WARC bands: £375. Also KW1000 linear: £325. Both items in ex cond. GW3YKZ QTHR. (Newport) 0633 821411.

YAESU FTL100Z linear amp with spare electron tube, all new bands and boxed: £400. No offers, buyer collects. (Wickford) 0268 560734.

1.3GHz High power water cooled 2C39A amplifier. Very well built with sequencer and timers, in compact 19" rack unit: £500. (Northampton) 0604 862803.

101ZD Mk III used daily: £400. Yaesu FR50B FL50B tx/rx, useful reserve rig, 50W I/P: £100. Mick (Farnborough) 0252 518009 (day).

132FT long wire possible! QTH 3 bed semi, conservatory, long garden, fertile soil, rotovator garage, near sea: £65,000. G3DGT. (Portchester) 083 483 369.

1KW HF linear 80-10M serarate PSU tested OK by Elect engineer, made with quality components, new 813s, needs slight attn, damaged in post, no offers: £175. G0FFB after 6pm. (Kettering) 0536 760026.

2 BED semi-det bungalow on private bungalow estate. Fully modernised and decorated. GCH, DG, parking, gdns, convenient, all amenities: £69,995. (Basildon) 0268 727355.

4CX1000. Complete with bases and chimneys 3 off: £250. G3NOH QTHR. (London) 081 997 4756.

ALINCO ALR22E 2m mobile GC: £125ono. President HR2600 10m all mode (same as Uniden 2830) vgc: £200ono. Kantronics KPC-4 dual port TNC C/W leads and mans: £160ono. Pye M294 High Band. GWO: £55ono. BBC-B C/W green monitor, data recorder: £135ono. Daiwa PS30M XII 30A PSU: £120ono. Daiwa CNW419 160-10m ATU: £95ono. SMC-29 1 Hr chrgr for Yaesu batts FNB-22: £40ono. Butternut HF6V-X 80-10m Vertical, VGC: £100ono. GM0BRJ QTHR (Kilsyth) 0236 824167.

ALINCO DJ/F1E 2m tcvr, extended receive coverage 108-174MHz, unwanted gift, boxed as received, recipient HF/CW only: £200. G3HNP QTHR (Gt Yarmouth) 0493 393560.

AMPLIFIER Wood and Douglas 144LIN30 VHF 2m output, 30w for 3w input, 25w for 1w input: £45. Buyer collects. (Esher) 081 398 5696.

AMSTRAD 9512 with printer: £200. MM 2m tnsvrtr: £60. KW102 SSB TX: £60. Or exchange for test gear, monitor, T.V. (Derbys) 0332 834228.

AMSTRAD PC 1512 IBM compat s/ware AMTOR RTTY Packet Fax etc, Wordstar Gem mans and mouse: £200. Peter, G3JXR (Bletchley) 0908 642398.

AMSTRAD PC2086, 32MB HD VGA colour display 8MHz, ex cond: £700. Possible PX with Amstrad laptop 286-386SX ALT. Peter G0OJX. (Exeter) 0392 432675.

ASTRONOMICAL Telescope, 75mm refractor, on equitorial mount, selection of eyepieces, sturdy wooden tripod, finder telescope in wood case, used once: £190 (Banstead) 0737 350622.

ATU Kenwood AT250 auto ATU, immac cond: £175. Buyer collects. (London) 081 764 6767(eves/wkends).

BBC-B with sidewise expansion board, 32k RAMcard, 2x40/80 cumuna disk drives, teletext adaptor, fax/SSTV software plus lots more, ring for details. Buyer collects. Ray G0JAR. (Medway) 0634 242327.

BBCB 5.25in switchable 80/40 disk drive: £165. Buyer collects or pays post. G0GLB QTHR (Abingdon) 0235 530058.

BRONICA ETRS 75mm lens: £310. 2x120 film magazines: £80 each. Bronica ETRC 75mm: £255. Also accessories. Consider PX HF tcvr. (Somerset) 0278 760552.

BUTTERNUT HF5B. 5 band beam, gd condx: £140. G4NVY. (Glos.) 0452 864727.

BUTTERNUT HF6VX vertical incl WARC bands and ground plane: £110. Butternut HF5B yagi incl WARC bands: £130. Both items as new and bxd, carr extra. G3RCU. (Dorset) 0202 475048 after 6pm.

BUTTERNUT HF6VX: £70. Hygain TH3JRS tribander: £120, both with manuals. Lake's DTR3 QRP rig perfect: £75. Luis G0KJV. Carriage extra. (Blackpool) 0253 22987.

CAPCO SPC 300 or swap for FC902: £110ono. (Lowestoft) 0502 730521.

COLLECTOR has for sale or exchange USA PRC77 B/pack Tx/Rx 30-76mcs FM. Argentinian B/pack Tx/Rx 27-70mcs. Argentinian B/pack Tx/Rx 30-76mcs. Israeli PRC77. Wireless Set 11 (Australian) complete with 2 power packs, mic etc. 18 set MkIII. Mike. 0273 508573.

COLLINS S-line, 75S-3 + 200HZ xtal filter, 32S-1, 516F-2 + RF pwr meter, 312B-4, SM2, massive toroidal tfmr, 115V: £450. Icom IC4GE, 70cm h/held, 2xBP3, 1xBP8, immac: £150. KW2000 + PSU/LS, orig condx, h/bk: £130. Eddystone 740: £40. Kenwood DFC-230 Ext VFO TS-830: £50. (Bath) 0225 810621.

COMPLETE Icom HF Rig. IC735 all-band tcvr, AT150 tuner, PS55 power supply, SM8 mic, Tx unused, all virtually new condx: £1000. (Nr Bristol) 0272 864673.

COMPLETE station in ex condx. Kenwood TS-520SE CW filter fitted, AT230 ATU, SP230, MC-50, Drake 3300LP filter: £460 complete. Eddystone 840C SW Rx: £85. Two Stornophone 500 UHF h/helds xtalled SU22 chrgr, spare batts: £55. Buyer collects. G0NVM (Witham) 0376 84649.

COMPUTER Commodore C64. Tape deck, 1541 disk drive, MPS803 printer, joysticks, paddles, Commodore business s/ware four packages, 100+ games, 40+ spare disks, large holdall to carry it all: £300ono. No splits. G4WQS QTHR. (Windsor) 0753 868070.

COMPUTERS AND PARTS. 10MHz PCTX clone, 640K ram, 360K floppy, 20Mb ST225 hardisk, 2 serial 1 parallel port, mono graphics, mono monitor: £230. Epson RX80 printer: £50. BBC-B computer, APTL romboard, twin discdrives, mono monitor, lots of s/ware: £150. Quendata printer suit BBC-B: £40. 8MHz XT motherboard 640K ram: £35. XT floppy controller: £10. Herc graphics card: £10. Julian G6LOH. (Towcester) 0327 857766.

COMPUTERS dumb terminals without key/bds, FM spars, 1 no "crusader" and 1 no CADO systems model C-300 with mans: £10. Buyer collects or carr extra at cost. (Weston S. Mare) 0934 832736.

CREED 7B Teleprinter with spare ribbon and paper: £15. Buyer collects. G0MVB QTHR (Oxfordshire) 0993 831124.

CUBICAL quad (2 element) 10/15/20. New and unused. Partially erected, but space and good will inadequate, offers to GM4LZK QTHR. (Ayr) 0292 41737.

CUSHCRAFT R5 HF vertical antenna, complete and unused, bxd with instructions: £130. Phone Martin G0HRZ. (Essex) 081 597 0234.

DAIWA 120m PSU, as new: £70 + p&p. Daiwa AF606K all mode active filter, as new: £75 +

p&p. As new 1989 ARRL handbook, little used: £12 + p&p. WIFBs Antenna Notebook ARRL: £4 + p&p. RTTY Today by Dave, K4TWJ: £3.50 + p&p. (Bristol) 0272 828586.

DATONG automatic RF speech processor CW nicads and charger: £60. Star masterkey MKII: £40. All as new. Little used. G4COY. (Liverpool) 051 546 3235.

DRAKE L4B linear, 10-80M, mint, h/book: £450. Yaesu FT230R 2m, FM tcvr, mint, h/book: £150. Yaesu FT690 mkII + linear 6020, new, h/book: £350. Viceroy III super TX SSB/CW, h/book: £80. Vic 20 Commodore computer, interface, complete SSTV, RTTY etc: £40. G3OSH QTHR. (Ilminster) 0460 53349.

DRAKE R4B, T4XC, MS4/AC4 and FS4 (synthesiser for gen cov). All in gd condx, C/W, mans and spare valves (incl PA): £425. Drake MN2000 2kW ATU/SWR/PWR meter: £120. SEM Z-match: £40. Burns crystal calibrator CC10: £20. Burns wavemeter TC101: £20. David G4ERW (Surbiton) 081-399 0922 (eve/wkend).

DRAKE TR7 tcvr, PSU7, VFO7, MS7, service mans, extender cards, fully operational, VGC. (Aylesbury) 0296 661386. After 6pm and w/ends.

DRAKE TR7: £350. TS5: £400. PS7:£100. R7A: £900. Desk mic: £20. AUX7: £50. SL300: £40. SL500: £30. SL1800: £40. SL6000: £30. TR7 hb: £30. R7A hb: £30. Collins 75A3: £250. KWM2A: £350. 30L1: £350. CC2: £30. R390: £350. CV157: £300. 3TF7'S (new): £10 ea. 26Z5W's (new): £10 ea. 811A's (new RCA): £60 set of four. Sundry: Eddystone 880/2 HF SSB Rx: £250. Marconi HR22 HF SSB rare Rx: £60. SPC super transmatch: £200. FL3: £80. Avantek AMG502B 5-500MHz amplifier G=+27dB, NF=2.8dB, Po=+20dBm:£40. Solartron 0-99dB 50R pad: £30. HP626A 10-15.5GHz gen: £25. HP628A 15-21GHz gen: £10. 2kVA variac: £25. R&S SMDH DC-50MHz synth: £250. Ferrograph RTS2 recorder testset: £50. R&S USU2 30-1000MHz Rx: £350. TM6221 AF balun: £10. Feedback VPO230 variable phase osc: £30. TF1073 0-100dB 50&75R pads: £5ea. Levell TM3A microvoltmeter: £30. Hatfield 3151 0.5-50MHz 50R hybrid: £10. 4D32: £50. PX4: £10. PX25: £10. KT66: £10. Hill 455kHz posh xtal filter set USB, LSB & AM: £40. Wanted: TF1247, 7360's, 75A4 filters, h/b for HP181A, 1804A, 1801A and 1812A. Chris, G8JFJ (Portsmouth) 0705 596836.

DX302 Realistic 0-30MHz communication Rx, as new: £75. SEM QRM eliminator: £40. MME 1691 metroset preamp: £20. Contact Jim G0ONS. (Northampton) 0604 713394.

EQUIPMENT of the late G4GIM. Black Star freq counter, 600MHz, mint condx: £80. MM freq counter 500MHz: £50. Osker SWR power meter: £25. Daiwa CN650 VSWR output meter for 23cm and 13cm: £75. Sivers 23cm RF relay 24v: £15. Westlake W103 cable 100m unused reel: £60. G3DNR QTHR (Broadstairs) 0843 63641.

ERA micro-reader MkII decoded Morse and RTTY plus its a Morse tutor: £100. PCPA packet adaptor card, plugs into pc and rig to provide full packet station. Includes full instructions and software: £75. All above in perfect working order. (Bristol) 0454 201728.

FT102 with FM/AM plus FC102 as new: £550, also FT221R, MUTEK front end, eleven crystals, orig packing: £385. G3GRX QTHR. (Cumbria) 0768 64890.

FT102 Yaesu tcvr, mint cond: £475. Prefer buyer collects. (Somerset) 0934 742327(day) 0934 743636(eves).

FT200 revalved GWO, but without PSU: £75. Spectrum analyser 150MHz by Beech Electronics: £60. (Hertford) 0992 582307.

FT290R 2m, all mode tcvr. Excellent condition complete with charger, nicads, case, flexi antenna: £226. G0GHL QTHR. (Nantwich) 0270 662075.

FT730R 10w 70cm FM mobile, lovely cond, bargain at: £125. (Huddersfield) 0484 603963.

FT75B HF tcvr, mobile, 100W, 10-80m, battery/mains, PSU: £110. G4ZEQ. (Malmesbury) 0666 822388.

FT767GX + 2m module Shure, 526T mic bencher, chrome paddle key, MH1B8 scanning mic, SP767: £1150, all less than 1 year old. Jaybeam TB element tribander: £150. 40ft crank up tilt over all aluminium tower with head unit top bearing KR400RC rotator: £120. 48 element 70cm beam: £25. Yaesu headphones: £10. Or £1500 the lot. (Bristol) 0272 642867.

FT790R 70cm m/m with Tokyo 20W lin, vgc: £275ono. Yaesu FR50B, FL50B, FV50B, 10-80m CW/SSB tcvr, vgc, inc mic/accs: £150ono. G4HGM (Leamington Spa) 0926 881164.

FT790R 70cm m/mode, bxd, man and nicads, ex cond: £225. (Treorchy) 0443 775949.

FT902DM FM fitted, WARC, 160/10, Fan, Electronic keyer, Mic, Matching spkr, audio filter, all leads, h/bk, bxd, 12/240V: £525. (Nottingham) 0602 602634.

FTDX401 plus Shure mic: £230. PK232MBX, new: £250. Commodore plus 4: £45. RM1 modem: £50. Cheetah telex: £150. Dumb terminal: £45. (Prescot) 051 493 1975.

G5RV Possible in attic. 2 bedroom flat. Sheltered housing, North Norfolk coast. All electric: £65,000ono. Phone Peter. (Sheringham) 0263 821003.

GENUINE QRT sale on behalf of G0HXD (not QTHR) including TS440S and many station accessories at fair prices. Please send SAE to G0EOL (agent) QTHR or telephone. (Cheshire) 0606 554857.

GOING QRT. Icom 761: £1300, mint condx. Trio TS711E: £525. Icom 3200E dualbander mobile: £265. Yaesu FL2100Z HF amplifier: £400. Microwave Modules 2m amplifier 10/100W: £80. Jaybeam TB3: £150. All ono. Plus heavy duty rotator. G0BLR (Wilmslow) 0625 535644.

HEATHERLITE Explorer 2m linear amp 4cx35OA: £330. Collins KWM2A 115V Ex, USAF mars freq. fitted. Needs finishing: £250. 2 Pye PFX 99 channel VHF. One converted to 70cm with bttry and spkr mic: £120. One to convert: £80 inc battery. Icom IC125 25W H.B. FM mobile: £120. G8MFV QTHR. (Ashford) 0233 74397.

HEWLETT Packard 100MHz scope. Solid state double beam: £200ovno, buyer collects. GW3UMD. (Cardiff) 0222 761813.

HIGH voltage capacitors 400 to 8KV, working, suitable DIY valve Tx's or Traps. Also hundreds resistors including wire wound. (Atherstone) 0827 712348.

IC251E 2m m/mode: £525ono. FT780R 70cm multimode: £250ono, both with mic and manuals. Contact C Vernon. (Wolverhampton) 0902 372339 eves.

IC402 70cm SSB/CW portable, orig packing, man, vgc, fully xtalled: £225. Microwave Modules 70cm linear MML432/30L 30W output, suit above: £75 or both for £280. Carr extra. Wanted EIMAC SK620/SK630 valve bases to complete project. G4RUL QTHR. (Eastbourne) 0323 503618.

IC701 C/W IC701 PSU, desk mic, ICRM3 remote. All bxd and immac: £500. Wanted FT726R C/W 70cm, Sat unit. Can collect. (Yeovil) 0935 23873.

IC725 mint HF tcvr: £585ono. FT101 mint HF tcvr: £245ono. 2m h/held DJ160 (new): £120ono - charger. G0FDV anytime. (Dunstable) 0582 606173.

ICOM 290D 144MHz, all mode tcvr: £250. Welz RS1100 DC power supply: £40. Welz SP15M SWR and power meter 1.8W to 200W: £20. Icom SM8 desk mic: £30. Buyer inspects and collects. G0EIJ QTHR (North Tyneside) 091 2527552.

ICOM 505 6m tcvr: £380. Spectrum 128+2, PSU, joystick, games, etc: £65. Thermal printer S8056: £30. G7HNY QTHR. (Weymouth) 0305 773860

ICOM 575H 28MHz/50MHz (100W) Tx/Rx, absolutely mint, bxd: £75. Kantronics KPC4 dual port TNC: £150. Kenwood TM231E 2m mobile 45W, mint, used base only: £190. Welz X50 2m/70cm f/glass colinear, mint: £30. Paul G4XHF QTHR (Crawley) 0293 515201.

ICOM 735 with matching PS55 20A PSU, both items bxd, HM12 Scan mic, mobile power lead: £750. No offers. May PX 2m m/mode rig. G0OKR (Grtr Manchester) 061 442 4540.

ICOM 751 complete station. keypad, voice, dipole. Buyer collects: £1000. Tel 0722 780396.

ICOM IC-R71E Rx, fitted FM board, remote control handset & Yaesu FRT7700 ATU, as new, bxd: £690. Technics GX3 organ with stool, new condx, Hardly played, cost £3400 sell: offers. Can deliver. GW4WBT (Llandudno) 0492 878107.

ICOM IC701 HF tcvr inc. PSU (100W solid state PA): £450. A good first HF rig. Mike Willis G0MJW. (Guildford) 0483 300800 ext 2310 office hours.

ICOM ICR100 scanner, new condx: £385. Kenwood MC50 mic: £37. GM0JKF. (Banchory) 03302 3324.

ICR70 gen cov Rx 50kHz-30MHz, fitted FM, FL44 NCW, 12v DC. Remarkably gd performer. Mint. Manual. Bxd: £395ono. Derek, G4GVM. (Langport) 0458 252848.

KENWOOD AT200 ATU, 10-16m less WARC bands, as new, bxd with man. Prefer cash buyer. Inspect collect: £100. G2BUJ QTHR. (Swindon) 0793 613610.

KENWOOD DM-81 dip meter kit, brand new: £60. ERA Mk 2 micro reader, little used: £90. SEM trans-match with built in ezitune: £50. Sony ICF - 7600DS ptable Rx, perfect condx: £90. All items postage extra. Jim (Hitchin) 0462 457687(evenings only).

KENWOOD h/held 2m tcvr, model TH215E, mint, bxd: £120. Upgraded ERA microreader: £115. G0KXI QTHR. (Highcliffe) 0425 278359.

KENWOOD R5000 cnvrtr. All filters, VGC: £700ono. ATU SPC300D, mint: £200. AVO valve tester, C/W, man: £25. GM0KMG QTHR (Glasgow) 041-6494345.

KENWOOD TL922, ex cond, very little use, bxd, man, buyer collects: £1150ono. G4VOT QTHR. (Witham) 0376 515017.

KENWOOD TM241E with Heatherlite mobile mic, tone burst etc. Ex cond: £265. (Largs) 0475 675967.

KENWOOD TS140S HF tcvr, VGC fitted 500Hz CW filter mic, handbook box, prefer buyer collects: £625. G4ECI. (Stockport) 061 439 3831.

KENWOOD TS440S with auto ATU, CW SSB filters, mic, recent Lowe service: £725. SEM double paddle: £15. Single keyer: £10. (Manchester) 061 998 2921.

KENWOOD TS520SE, CW filter, remote VFO520, mic, manual, all bxd as new: £500 cash. G4YRF QTHR (Beds) 0767 316294.

KENWOOD TS790E 2m/70cm with PS31 PSU and SP31 spkr. All boxed: £1350. BNOS LP144-10-50 amplifier: £75. STE 10m/2m Rx AM/FM SSB/CW 12v DC: £40. Denon DRM12HX cassette deck, bxd: £125. Revox PR99/1 pro R-R balanced 1/P-0/P. Offers. Thurens TD150/11 turntable with SME 3009/11 tone arm: £50. G6DBX QTHR. (Burgess Hill) 0444 248767(eves 6-9).

KENWOOD TS830S, new 6146s, h/book, man, realigned, also DFC230 digital freq controller, h/book, spkr, both together: £725. QTHR (Cheltenham) 0242 673834.

KW203 100W Tx LSB/USB integral PSU, mic, h/book, spare 6146s, 1.8-30MHz. Current station. On-air demo. WHY Buy kit/ linear: £100. (Saffron Walden) 0799 30763.

LINEAR DL1000. Collins - FV101DM digital ext VFO with all memories etc. Heathkit scope mag loop 160 & 80m for sale or exchange or WHY. (Scarisbrick, Southport) 0704 880345.

MACPAC Mk 2 CW-1D boards fully assembled with programmed Eprom. Five at £18 ea. Steve G3ILO (Nailsworth Glos) 0453 833411.

MANUALS Pye, Reece, Mace Rx. Scopes, 5235/2 CD1400 mass of info for AR88 D/LF also for AR88 main dial, gearbox, knobs. Wide spaced variables 22OPF QTY3. (Derby) 0332 671536.

MOSLEY TA32 Jnr Two ele tribander 10,15,20m, gd condx: £50. 1989 Intern'l callbook: £5. (Braintree) 0376 26577.

NRD-515 Rx with NDH518 memory unit, matching l/spkr and mans. Little used and in pristine condx: £600. G4UOX QTHR (Ilford) 081-590 7499.

OPUS PCIII turbo IBM compatible, 360KFDD, 40MBHDD, MSD053.3 and basic Hercules, mono Epson FX804 printer: £650. Epson MX100 printer: £50. Part exchange considered for 2m base station equipment. G3IHR QTHR. (Swindon) 0793 696937.

PACKET station: PK88 controller plus 25W 2m Navico AMR100 with leads, mans etc. gd condx: £150. (W Sussex) 0444 242797.

PLESSEY 1553 30 band 0-30MHz, digital readout, VGC, table top model, man: £375. Icom CR-100, new Atana power pack, accessories: £280. (Southall) 081 571 5759.

QRT sale. FT767GX, as new, bxd, with man:£1000. FT102 + FC102, bxd, mans + 300Hz CW Filter new spare PAS & Driver: £650. IC3210E dual bander 2m/70cm, as new, bxd, man: £300. TS120V + VFO120 + 160m tnsvrtr, ex condx: £300. Heathkit HW8 - offers. RA17, VGC + man: £150. G4PPG QTHR (Wigan) 0257 421442.

RACAL RA17L Rx C/W Racal cabinet, man, circuit: £200. Buyer collects. G3RDG QTHR. (N W London) 081 455 8831.

RACAL RA17L Rx in Racal cabinet, 500kHz to 30MHz. Effective scale length 145ft, C/W, man and circuit: £200. Also Epson LQ500 printer 24 pin, with extra 'Script' font and tractor unit, Centronics input: £200. G3RDG QTHR (NW London) 081-455 8831.

RADCOM 15 bound volumes 1966-80, weight 28kg, so buyer collects! Harrier PSU 13.2V, 2A. Mullard RC bridge GM4140/1. G4LWA QTHR. (High Wycombe) 0494 531755.

RETIRING to Home for Bewildered. Spectrum 48 Plus with Microdrive HR5 printer HW/SW for Word Processor RTTY Morse Weather Astronomy etc: £150. Collect or deliver reasonably. Carr at your risk. G6TPQ not QTHR (Oldham) 061 633 3895.

ROBOT 800 Super, RTTY CW slow scan, mark suppression, RS232 boards, OPC monitor, man, accessories: £125, ex cond. (Aberdovey) 0654 767367.

SAMSON ETM8C Morse keyer with built in key, very reluctant sale: £100. No offers. Nevada TM1000 2kW ATU with balun: £100. Paul. (Jersey) 0534 71233.

SEM freq converter, VHF to HF 118MHz-146MHz input tune Rx 2MHz-30MHz unused in new condx: £35ono. G7IBU. (Bracknell) 0344 360113.

SHACK CLEARANCE. FT757DX, CW filt: £525. FT102 CW FM: £650. FL2100B one hour since new valves: £395. Yaesu FT290MkII FL2025 linear spkr mic nicads VGC: £250. Kenwood TM231 50W mobile VGC: £250. SB102 working, needs TLC: £125. FT75 ACPSU DCPSU: £125. HW9 ATU SWR PSU speaker VGC: £325. Mizuho MX3.5S 80m h/h nicads: £75. AR88: £60. RA17L VGC: £150. Diawa CN620 SWR: £50. Heath HM102 SWR: £15. Heath antenna: £10. Heath SB600 L/S: £10. Yaesu L/S SP901: £15. Lodestar GDO: £25. Heath valve GDO: £15. Ian G3ROO. (Dover) 0304 821588.

SILENT KEY sale. Trio TS830S AT230 VFO230 SP230 MC50 mic, all bxd as new. Prefer not split: £750ovno. G8SFU (Skegness) 0754 73283.

SILENT KEY Sale: G0AMA. TS940S A/ATU IF10B interface: £1350. MC85 mic: £50. SO940 spkr: £40. SM220 monitor: £220. Hansen FS200 SWR PK/PWR meter: £40. Hansen FS50 interval PWR/SWR: £45. DRAE 24amp PSU: £80. FP707 PSU: £120. Shure 44D mic: £45. Icom SM5 mic: £30. FF501 Lowpass Filter: £15. Himound key: £15. Homebrew lambic squeeze keyer: £30. Tokyo HX240 tnsvrtr: £210. Mans, all mint. Versatower EP45 tiltover tower, winches, bearing: £275. TET HB33 SP tribander: £150. Daiwa rotator and controller, VGC: £80. Amstrad PC2285/40 colour VGA (12MHz) IMB-RAM 40 MB H/D, s/ware: £700. Star NB2410 24 Pin printer: £300. BBC Micro, much s/ware, two 5.25 diskdrives: £120. Philips personal monitor CM8833 (colour): £100. AEA Pakratt PK232 MBX m/mode terminal: £270. Tono I5000 CW/RTTY Amtor terminal: £250. Mint, mans. G0MZI (Salisbury) 0722 337711.

SIRIUS 1 computer, 256K MS DOS 1/CPM-86 two double sided, double density floppy drives, monitor, keybd, mans, spare 5" diskettes, some s/ware, Wordstar, Supercalc 2, plus few games. Marketed by ACT/Victor, gwo: £100ovno. Wanted mains plug for Eddystone 5870A Rx. (Basingstoke) 0256 469682.

SOMMERKAMP TS288A HF tcvr, beautiful cond: £250 with mic power lead and h/book. (Glasgow) 041 556 6985 (early eves. or Sat/Sun mornings).

SST-V interface for BBC-B complete with man and s/ware, cost £99 will accept: £50. Frank G4OSN. (Rugeley) 0889 586354.

TEKTRONIX 547 50MHz oscilloscope with 1A4 four-chnnl plug-in plus mans. In wking order: £55ono. G4KHU QTHR (Templecombe) 0963 70045.

TEN TEC Corsair 2: £695. Matching PSU/spkr: £135. TR751E 2m Base: £435. TR851E 70cm Base: £450. PK88: £95. FT290 Mk 1 case nicads/chrgr: £230. P40 tower: £325. KR600 rotator: £250. C58 mobile mount linear: £40. Howes 20/40m Rx: £40. Apple II: £20. Spectrum+2, TNC interface, s/ware: £65. (Glastonbury) 0458 834917 (after 5pm).

TEN TEC Paragon CW filter, immac condx, bxd: £1000. G4OBK not QTHR (Stoke/Chorley) 0782 201001 or 0257 272561.

TEN-TEC Corsair 2, 500Hz filter PSU recent service: £800. G3JLB QTHR (Gravesend) 0474 534694.

TENTEC Century 22, T/RX, CW, QRP ex cond. No mods: £200. Contact Mike G0JXX QTHR. After 7pm or w/ends. (Southampton) 0703 443781.

TRIO 120V HF 10/15W man: £260. TR9000 2m, m/mode, m/mount, manual, boxed: £260. Both excellent condition. G1LCI QTHR. 0628 22352.

TRIO 9130 all mode tcvr with BO 9A system base mobile mount, bxd with man: £380ono. Phone Reg 0533 889903.

TRIO R1000 gen cov Rx, 0-30MHz sidebands and AM modes, 12/240V operated, built-in timer and clock: offers around £275. (Whitby) 0947 810263.

TRIO R1000 HF Rx. NBFM, 12V and mains. Operators man with circuit diag, bxd: £220. (Croydon) 081-686 8630.

TRIO R1000 Rx, vgc: £230ono. KW202 Rx vgc: £60ono. KW EZEE match rx use only: £50. G4MQX QTHR. (Axbridge) 0934 732 655.

TRIO R2000 HF Rx, gd condx, no mods: £280. (Telford) 0952 610408.

TRIO SM220 Station Monitorscope, as new: £275. G4IOF QTHR. (NW London) 071-722 7040.

TRIO TS430S, CW/SSB filters, FM, PS430, SP430, AT230, MC60, MC42S: £850. May split. Trio TW4000A dual bander with VSI, fist mic and Heatherlite: £300. Yaesu FT221 2m m/mode with MD2: £220. Yaesu FT707 with YM35: £350. AEA PK88 TNC: £80. All for sale due impending job loss, possible halfway meet. GM0MGE QTHR (Livingston) 0506 416 365.

TRIO TS700G in gd cond. with 5 ele X Yagi and rotator or exchange Swan 350: £300. (Nottm) 0773 605004.

TRIO TS830S with CW filter, MC35 mic, instruction man and circuit diags and service history. An excellent performer with an exceptionally clean signal. Bxd: £575. Mutek TVHF230C tvtr 2m>HF all nine bands 10W output, with man. Suit FT290R or similar up to 10W input: £150. FT790R, nicads, chrgr, case, spkr mic, instruction man and box, mint: £190. Wanted Icom IC-W2E. (Wembley) 081 902 5995.

TS120V 10W HF transverter, ex cond: £275. VFO 120 matching external VFO: £50. Both in 1st class condition. Postage extra. QTHR G4SLG. (Lincoln) 0522 751920.

TS770E, boxed, service manual: £600. TS700S, VF)700S, MC50, extra xtals, boxed, service manuals, Belcom 100W valve linear: £600 all immac. (Yeovil) 0935 23873.

TS830S fitted 250Hz CW filter, SM220 fitted B38 pan display scope, AT230, SP230, Mics. electronic audio filter, PSU, aerials, other accs. All mint, bxd etc: £1500ono. (Nottingham) 0602 625047.

VIVITAR V2000 SLR ERC 28mm-70mm zoom standard lens plus optomax x2.8 135mm lens and pouch plus Tamron seven element 2x converter and case bxd with manual. All mint condx, less than half price: £120. John. (SE London) 081 857 8096.

WELLER PU-2D soldering station with TCP iron: £30. Tektronix 555 dual beam scope: £35 with PSU. Buyer collects. Les (Maidstone) 0622 687275.

WELTZ SP220 SWR/PWR: £20. SEM Z-Match 1.8-30MHz: £50. Kenwood LF30A low pass filter: £15. RAF brass key: £15. H/B memory keyer: £20. H/B digital freq meter (30MHz): £10. White Rose Rx 80,40,20: £25. 2-8W PA: £10. G4MYX QTHR (Tadcaster, N Yorks) 0937 832061.

YAESU 101ZD Mk 1, fitted FM and fan, instruction bk: £380. FDK 750E 2m m/mode tcvr, bxd, instruction bk: £180. (W Midlands) 021-745 3429.

YAESU FRG7 communications rcvr, good cond. as original, boxed with owners manual: £90. (Dorset) 0747 52039.

YAESU FRG8800 gen coverage RX with built in VHF converter and matching ATU. Good cond. in original pack: £450. (Chorley) 0257 262574.

YAESU FT-290 Nicads Chrgr case VGC BNOS 50W linear: £300. Yaesu FT-790 Nicads Helical antenna 30W Microwave Modules linear, wking order: £250. G-QRP book: £3. Antenna Impedance Matching: £4. All in ex condx (FT-790 case damaged). Martin, G7JCJ QTHR (Broadstone) 0202 600097.

YAESU FT102 AM/FM CW/SSB filters desk mic FTV-901R TVTR with 2m 70cm 6m and SAT Tokyo Hy-Power HC-2000 ATU: £800 or PX A PC with colour monitor. (Bristol) 0272 649257.

YAESU FT23-R batt packs, spkr mic, DC adapt etc: £180. Yaesu FT727 dual bander, base chrgr, spkr mic, 12v pack, DC adaptor: £200. Sony 7600D digital S-wave Rx,scanning, memories, mains unit: £80. GW bass Morse key on slate base: £25. PRO2003 VHF/UHF scanner, 60 memories, usual features: £120. Wanted Icom IC24ET - swap? or PX? Garry (Wilmslow) 0625 530200 (after 8pm).

YAESU FT23R with FNM10 and FNB11 Batts, PA6 DC Adaptor, NC29 spkr/mic, NC28C quick chrgr, soft case, flexible .25 wave whip: £190. YAEU FT690 Mk II, bxd (never used in anger): £240. Welz SP620 SWR and Pwr Meter: £40. Microwave Modules MML 144/30 linear with preamp: £60. LAR VHF omni match: £15. All plus carr unless collected. Henry Dudley, G1DLR, QTHR (Falmouth) 0326 40246.

YAESU FT290R, bxd, soft case, nicads chrgr, spkr mic, recent service: £250. G1BFS QTHR. (Heathfield) 0435 830448.

YAESU FT480R 2m m/mode tcvr, as new: £230 plus carriage. G3LNW QTHR. (Bath) 0761 432248.

YAESU FT726R with 2m, 6m, 70cm and Sat Modules. Recently o/hauled by SMC: £750. FT230R 2m mobile rig: £180. Both mint condx, bxd. G3ABA QTHR (Southampton) 0703 732997.

YAESU FT757GX II. As new, little use: £750ono. (Luton) 0582 34053.

YAESU FT757GX: £525. FC757AT auto ATU: £200, prefer no splits. Yaesu 727R dual band h/h with accessories: £230. MM Modules 2m amplifier 3-1W in, 30W out: £35. Heil mike insert HC3: £13. All items postage extra if required. (Stoke on Trent) 0782 395017.

YAESU FT767GX, no modules, ex condx, in orig pack: £950ovno. G4LPL (Boston) 0205 480843 (after 7pm).

ZX SPECTRUM 48K, mains adaptor, computer data recorder thermal printer, leads, boxes, instructions, mans, 26 games incl. scrabble, monopoly: £60. (Orpington) 0689 831908.

ZX SPECTRUM, interface 1, microdrive, microdriver joystick interface. All mans: £100ono. Samsung SM430 amber flat monitor, new: £60. G4XQD QTHR. (Colchester) 0621 819113.

WANTED

AP1086 issue one 1938/1952 (RAF Radio Stores Ref Nos). Also air publications relating to radio, radar equipment. Excellent prices offered. Would purchase post-war to current magnetrons, klystrons, T/R cells, TWTs, photomultipliers, microwave and CV types, required unmodified Gee R/X type R1355. M Gee, 6 Verbena Close, Pretoria Road, Canning-Town, London E16 4NU. 071 511 4786 or 071 790 2846 anytime. Many thanks.

DAIWA rotator motors MR75000 for rotator MR750PE. As I am in Cyprus (ZC405). Please contact G0OIF QTHR - URGENT please. (London) 081 360 2847.

DRAKE 4310 commercial tcvr. HRO 500/600. Orig HRO spkr. AR88 S meter. Drake MN2700 ATU. Vibroplex bug key. G4GEN QTHR (Nutley) 082 5712205.

DRAKE R4C PTO and main tuning assembly complete with dials in gd condx. Steve G7JCF (nr Woodbridge) 0986 798524.

EDDYSTONE EA12. Must be excellent, unmodified condx. Can travel approx 100 miles to test/collect. John G4FDD QTHR. Evenings. (York) 0904 794305.

FOR TX/RX project valves type 7360. Also professional looking S and power meter. John G7JIP. (Diss) 0379 642941.

PACKET RADIO. TNC required, prefer KPC2 or WHY? Reasonable price paid. G0EVH Tony. (Birmingham) 021 329 2305.

SWITCHED mode power supply, Icom IC-P520 or similar 13.5V 25amp, must be mint condition, lightweight unit required for travelling abroad. (Tewkesbury) 0684 296769.

4 METRE tnsvtr 2m IF. Also Jaybeam 4/6m duoband beam and lightweight rotator. 6m linear 10 in 50/100 out and PWR/SWR meter for 50MHz up. Cash waiting for clean equipment. Neil G1HSG (Bolton) 0204 594235.

40 METRES of LDF 4-50 cable and N type connectors to suit. (March) 0354 741168.

BIRD Thruline Wattmeter G3WDY QTHR (London) 081 653 4738.

BOOKS. Can anyone help with the following: complete sets or individual volumes. Harmsworth's Wireless Encyclopedia (3 vols) Wireless Telegraphy and Broadcasting (2 vols Dowsett) Radio! Radio! (J Hill). Ron G4VBK QTHR. (Hastings) 0424 428428.

CC-1 CASE for Collins KWM-2/PM-2, also ancillaries for MK 123 set. G4TMO (Kingston) 071 218 0834 (day) 081 549 1427 (eves/weekends).

COLLINS 6515-1 receiver parts required including flat pack intergrated circuits, Texas 74W series and Motorola MC500 series. valves required, 5718, 5840, nuvistors required 8058, 7587, ceramic valves required 7486, 7077. Any help greatly appreciated. All costs will be paid. Please contact Allan Langer. (Warrington) 0925 727160.

COLLINS S-Line wanted 32S3B, 32S3C, 32S.3, 312B4, 32S1 filters 3.1, 4.0, 6.0 kHz for same. Part ex. KWM2. G0AQH QTHR. (Brighton) 0273 454108.

COLLINS tuning knob/gear for 75A-4. 50kHz IF coil for Drake 2C RX. Scrap RX. 4CX 1000A needed. Drake 2B wanted; also quad amplifier. Circuit needed for Heathkit HW32A 20m TX/RX. Brian GI4GNZ QTHR (Ballymena) 0266 880740 (eves).

COLOUR TV camera, must be wking, with manual. Also b&w 1" vidicon tube 9677P for Pye Super Lynx. G3MFW QTHR. (St Austell) 0726 73608.

DRAKE MSR2, DSR2, R4245, RR3, TR4310, L75 and CW75 keyer also NB5 blanker. Thanks G3YFK. (Shrewsbury) 0743 884858.

DRAKE RX'S. R4C, R7, R7A etc WHY? G4MIB QTHR (S London) 081 674 6452.

ERA micro reader, Mk 2, gd condx, with instructions. G3MLH (Yeovil) 0935 862919 (pm).

FT221 FT225, FT726, TS700, IC251E, wking or faulty. Cash waiting. Circuit diag for Racal 836 counter. G3TA QTHR (Cirencester) 0285 82571.

HEATHKIT HW100/DX100, 80-10m, xmtr in GWO. Will collect, reasonable distance. Reg. (Southampton) 0703 449916.

HELLSCHREIBER required, any condx but should be complete mechanically. Robert Kerr, GM4FDT QTHR. (Invergordon) 0349 852332.

HF MINIBEAM for 10,15,20. Must be in GWO and not too expensive. May collect. G0NWX QTHR (Birmingham) 021-326 6487.

HY-GAIN 105BAS 10m Yagi, Bird HF elements: 25,250,2500W. G4ZOW (Harpenden) 0582 461952. (If out, please leave message).

IC2A H/H bttry pack, dead or alive and BC30 chrgr. G4RAW QTHR. (Halifax) 203062.

MANUALS, circuits, spares for Nems Clarke Rx type R2074 or similar (Eg R1037 R1074). Plug-in RF tuners for same (RFT-100 series). Also mans, circuits, spares for RCA HF Rx R503/FRR23. G8LIU QTHR. (Uxbridge) 0895 230006.

NOISE blanker and calibrator for Drake SPR4. G3MRS QTHR. (Bexhill) 04243 3668.

OLD TYPE resistors and capacitors for valve rigs. G3BPE QTHR. (Westbury) 0373 826939.

PAIR output transistors for Icom 271H 25C2694 also Canon B T catridges BC 01 also desk mic with amplifier. G4IZW (Bellingham) 0434 220636.

PRE-WAR BOOKS, magazines, catalogues, Philips video cartridges, Lissen valves, Pilot radios, 8-track cartridges, mics, keys, Galaxy Xcvr PU. Douglas G3KPO. (Ryde IOW) 0983 67665.

PSION organiser XP or LZ/64 and comms link for IBM PC. (Wimborne) 0202 695370.

RACAL TA349 and TA99 linear amplifiers. Any condx considered. Interested in anything made by Racal Radio in the 60s and 70s, including mans and sales brochures. Please write to Nigel Boyd, 2 Church Close, Lower Willingdon, Eastbourne, East Susses, BN20 9QY.

RECEIVER BC453, wking or not, but complete, or set of IF Transformers for same. G3NMJ QTHR (Bexhill-on-Sea) 0424 215556.

REQUIRED: Bell and Howell 606 standard 8 projector. Good price paid or good alternatives for exchange. G4IMT QTHR. (Chippenham) 0225 891254 anytime.

REQUIRED: Eddystone four pin plug in coils. Good price paid, alternatives for exchange. G4IMT QTHR. (Chippenham) 0225 891254 anytime.

ROTATOR. Yaesu G4OO RC with 360° control box. G1ZNX. (Harlington) 0525 2933.

SATELLITE board for Yaesu FT726. Graham G6OOX QTHR. (Rugby) 0788 823043.

SINGLE sideband adaptor for Racal RA17 Rx. G3AUB QTHR. (Macclesfield) 0625 425910.

TECHNICAL information for RTTY use - Puma Merlin teleprinter No 74 (Trend Communications Ltd). Also orig Vibroplex Super Bug key, mint condx essential. G0KWS QTHR (Whitley Bay) 091 2527141.

TS940S with auto ATU. Must be excellent condx, will collect. (Manchester) 061 439 4952.

TWO 110v DC servo motors, 2.5amp cont rating, 450rpm, split series wound. G4EGB. (Scarborough) 0723 362537.

WANTED. Trio TS700 GNRD515 memory unit optional filters and loudspkr unit. Contact at QTH G1POJ.

YAESU FT101ZD or Trio TS820 TS830 with mans in clean condx please. John G0GUL (Coventry) 0203 450476.

EXCHANGE

ICOM IC-551 50MHz tcvr, mint condx, bxd, man, mic, for FT-757 GX. Also Yashica TL electro 35mm camera outfit, 1.1.4 50mm lens, Pentagon 4/300mm lens, Chinon 1.2.8 135mm lens, with case. All VGC for FC-757 Auto ATU. Also have IC-451E, 70cm. Wanted: FT-780R and SC1 console and/or FT-680R 50MHz radio. Ian G7HXI (Norfolk) 0692 580201.

BBC Master 512 plus BBC compact with 2 microntek monitors, one working, one needs attention. Master needs basic ROM, otherwise all OK. Exchange for FT101ZD in gwo or equivalent/WHY. Can deliver M25 area. G6HVY QTHR. (London) 081 472 6160.

DRAKE SPR4 RX complete with 23 accessory crystals and orig h/book for RCA AR88LF in gd condx and h/book. (Nr Woodbridge) 0986 798524.

EXCHANGE or for sale FT707. I'm after a gd PC colour computer for it, gd condx, will consider anything decent. G0OCK, QTHR.

AMSTRAD COMPUTER PROGRAMS

Can anyone help two Russian amateurs UA0QX and UA0QDT with amateur radio cassette programs for the Amstrad CPC464 computer or let Peter Lumb, G3IRM, know where they can be obtained. Programs for sending and receiving CW and RTTY are urgently required. Copies will be paid for. Peter's telephone number is 0284 754318.

KEY COLLECTION

Henry Franciosi, IK2HSW, is a collector of telegraph keys and would like to contact other radio amateurs with a view to exchange or purchase keys. His address is Via Marco D'Agrate 10, 20139 Milano, Italy.

CIRCUIT DIAGRAMS

Mr P Tate, BRS41838, requires circuit diagrams for the Narco (National Aeronautical Corp) transceiver, simplexer Model VC27a, the General Radio Co unit oscillator, Type 1209B, modulating power supply Type 1264A, and the IF Amp Type 1216A.

Replies to 32 The Orchards, Kingswood, Bristol, BS15 2UF (expenses reimbursed).

David Morrison, GM4VJY, is trying to locate an instruction manual/circuit diagram for a Tektronix L-C meter type 130. He also requires a pair of Amperex display (Nixie) tubes type ZM1000 for his Heathkit frequency counter type IB-1100. All expenses will be reimbursed. Tel: 0786 85 376 (after 6pm).

Mr B Hepburn, G8BGI, is looking for a circuit diagram for an ultrasonic receiver covering the 40-140kHz band. He needs a component list etc to enable him to build a bat (flying mammal type) detector. The receiver would need to be portable with a loudspeaker and/or earphone socket. His telephone number is 0420 475698.

We have received a request from the National Deaf Children's Technical Information Centre for assistance in the design of a switch that automatically hops from text to voice answerphone when both units are plugged into the telephone line. This would not necessitate in having two separate 'phone lines. This would assist the deaf community considerably, so if there are any budding inventors out there - please contact Mr Anderson, G6ZCI, at 4 Church Road, Edgbaston, Birmingham, B15 3TD, tel: 021 454 5151 (voice/supercom), fax 021 454 5044.

CALLING GORDON CUMBERLEDGE, G3CK

Tony Crake, G0OVA, is trying to contact Gordon Cumberledge, G3CK, with whom he lost contact in 1962. He would like to get in touch with him again - he was in the Birkenhead area in the 1960, but efforts to trace him have been unsuccessful. Anyone who can help please ring Tony on 0344 425716.

Helplines is designed to help put people in touch with each other. If you have a problem, it's more likely there's someone out there who has the solution; if you are looking for an old colleague or amateur friend, there could be a reader who has some news of their whereabouts; if you have solved a particular problem, write and tell the rest of us. 'Helplines' is there to help you and to give you the opportunity of helping others. Write to us marking your envelope 'Helplines' and we'll do what we can to get the message out.

CLUB NEWS

DEADLINE - Items for inclusion in the April 1992 issue must be sent to HQ marked "Club News - DIARY", to be received by 21 February 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

BRISTOL ARC - ***NEW SECRETARY*** Lance Whitelegg, G0CCU, 30 Chatsworth Road, Brislington, Bristol BS4 3EY, tel: 0272 721744.

SOUTH BRISTOL ARC - 5, computer evening; 12, microwave evening; 19, bring your QSL cards - boast to your friends!; Mar 4, PC software - share with your friends. Details Whitchurch 832222 on a Wednesday evening.

THORNBURY & DARC - 5, talk and demonstration 'Global Positioning Systems (GPS)' by Mike, G0KZP; 19, technical topic - rig testing equipment - Phil, G1USW; Mar 4, grand junk sale. Details Thornbury 411096.

BEDFORDSHIRE

DUNSTABLE DOWNS RC - 7, Annual General Meeting; 21, junk sale. Details 0582 451057.

BERKSHIRE

BURNHAM BEECHES RC - 3, surplus equipment sale; 15/16, Winter Dx picnic; 17, talk 'TCP/IP' by Paul, G1PLT; Mar 2, AGM + Whyne! and nibbles. Details 0628 25720.

MAIDENHEAD & DARC - 6, talk 'Making Printed Circuits Boards'; 18, talk 'EMC'; Mar 5, quiz at home v Reading ARC. Details 0628 25952.

NEWBURY & DARS - 26, junk sale at the Memorial Hall, Upper Bucklebury. Details 0635 863310.

READING & DARC - 13, Briefing on '3 Towers Hike' by J Linford, G3WGV plus club construction project discussion with J Carter, G0LHZ; 27, open forum 'The Way Ahead' - Nick Challacombe, G0LGG; Mar 5, club quiz at Maidenhead Club. Details 0734 722489.

BUCKINGHAMSHIRE

AYLESBURY VALE RS - 5, talk 'Home Counties 23cm ATV Repeater' by G Shipton, G4CRJ; Mar 4, talk and demonstrations by AKD Products. Details 0296 81097.

CHESHAM & DARS - 12, tuning club rig; 19, talk 'The BBC World Service'; 26, open discussion; Mar 11, talk 'Check your Linear is Linear' by G0KZP. Details 0923 283911.

CAMBRIDGESHIRE

CAMBRIDGE & DARC - 7, Rally preparation and briefing; 14, talk 'Digital Audio Techniques' by Nick, G6ASH; 21, talk 'The ARRL Noise Bridge and Its Use' by Tony, G0OEG. Details 0763 243570.

CHESHIRE

CHESTER & DARS - 4, Radio ideas and discussion; 11, talk 'BT International' by G4LU; 18, talk 'Oscilloscopes' by G4BDM; 25, talk 'Construction, Part 2' by Phil, G3SES. Details 051-608 3229.

CLWYD

RHYL & DARC - 3, talk 'Marine Radio Licence' by Barrie, GW7EXH; Mar 2, viewing video of club activities. Details 0745 338276.

WREXHAM ARS - 4, junk sale; 18, talk 'Magnetic Loops' by John, GW3RBM. Details 0978 266887.

CORNWALL

CORNISH RAC - 6, talk by member of St John Ambulance Brigade; Mar 5, talk 'Aerials' by David Blackford, G8NPB. Details 0209 820836

SALTASH & DARC - 7, talk 'Inside your VCR'. Details 0752 844321.

DERBYSHIRE

DERBY & DARS - 5, junk sale; 12, visit to Drakelow Power Station near Burton-on-Trent. (Numbers limited - 7.45 start); 19, illustrated talk 'Building a Motorway' by Mr S C Black of Tarmac Construction; Mar 3, junk sale. Details 0773 852475.

DEVON

PLYMOUTH RC - ***NEW SECRETARY*** Mrs R Harper, G3PRC, 24 Cunningham Road, Tamerton Folliot, Plymouth PL5 4PS.

TORBAY ARS - 21; Annual General Meeting. Details 0803 526762.

DORSET

POOLE RAS - 14, talk 'Radio Astronomy' by Peter Werba, G7FXO; Mar 13, talk 'Introduction to Satellites' by Peter Biggs, G7AZP. Details 0202 760231.

SOUTH DORSET RS - 4, talk 'More Adventures of a Wartime RAF Radio Operator' by Ted, G3ETA; Mar 3, bring & buy sale. Details 0305 781164.

EAST SUSSEX

BRIGHTON & DARS - ***SECRETARY*** Harold T Lunson, G3WR, 17 Tongdean Rise, Brighton, East Sussex BN1, 5JG, tel: 0273 501100. Society meets 1st & 3rd Wednesday of month at the Roast Beef Bar, Brighton Racecourse, Elm Grove, Brighton, starting at 7.45pm.

ESSEX

CHELMSFORD ARS - 4, Shack First-Aid lecture; Mar 3, talk 'Marine Radio Equipment' by Eric Lawley, G8ADX. Details 0245 260831.

VANGE ARS - 6, junk sale; 13, talk 'Dyno Rod' by G1MPG; 20, talk 'Firearms' by G3IUC; 27, Annual General Meeting. Details 0268 762496.

FIFE

DUNFERMLINE RS - 13, talk 'All About WAB' by W Shackleton, GM0GNT; 27, talk 'Getting Started in Packet Radio' by L Thomas, GM7KHQ. Details 031 331 4340.

GLOUCESTERSHIRE

CHELTENHAM ARA - 7, talk 'Vintage Radios' by G3XMM. Details 0242 242336.

GREATER LONDON

ACTON, BRENTFORD & CHISWICK ARC - 18, talk 'Astronomy' by G0IIP. Details 071-938 2561.

BROMLEY & DARS - 18, talk 'Satellite Broadcasting'. Details 081-462 2689.

CLIFTON ARS - 7, computer evening; 21, Field Day discussion; Mar 6, Packet Radio demonstration by S Fletcher, G4RFC. Details 081 691 2341.

CRAY VALLEY - 6, talk 'Servicing VCRs' by G0GIR; 20, talk 'RadCom' by M Dennison, G3XDV; March 6, construction contest. Details 081-850 1386.

CRYSTAL PALACE & DARC - 15, Annual General Meeting. Details G3FZL, QTHR.

HAVERING & DARC - 5, talk 'Gliding and Motor Gliding' by Eric Couzens, G0PGO; 19, talk by John Brown, G3EUR; Mar 4, talk and video 'A Solent Tide Mill and other matters' by Roy Harris, G4KTN. Details 04022 23310.

SOUTHGATE - 27, club visit and lecture 'The Hazards of RF Energy' at Kings College, London; Details 081 360 2453.

SUTTON & CHEAM RS - 20, talk 'Keys and Keyers' by T Mansfield, G3ESH. Details 081 644 9945.

WIMBLEDON & DARS - 28, talk 'Packet Radio for Beginners' by P Burton, G3ZPB. Details 081 397 0427.

GREATER MANCHESTER

SOUTH MANCHESTER RC - 7, talk 'Monomers, Polymers and Plastics - Part 1' by G3VIW; 14, talk 'Transformers' by Harry, G2HW; 21, talk 'Monomers, Polymers and Plastics - Part 2' by G3VIW. Details 061 969 1964.

STOCKPORT RS - 12, Ladies' night; 26, talk 'Raynet - As Was, As Is' by G3MBQ; Mar 11, visit by G3ZOM of Jandek Kits. Details 061-439 3831.

GWYNEDD

DRAGON ARC - 3, talk 'Electrical Distribution and Earthing' by Tony Rees, GW0FMQ; 17, A Technical Demonstration by S Rolfe, GW0ETF; Mar 2, talk 'The Great Welsh Wireless Station' by Dr D Last, GW3MZY. Details 0248 600963.

PORTHMADOG & DARS - ***NEW SECRETARY*** P E W Allely, GW3KJW, 'Dwyfor', Rhiw, Pwllheli LL53 8AE.

HAMPSHIRE

HORNDEAN & DARC - 6, talk 'Hampshire Fire Service Communications'; Mar 5, junk sale. Details 0705 472846.

ITCHEN VALLEY RC - 28, quiz night. Details 0703 736784.

HEREFORD & WORCESTER

BROMSGROVE & DARC - 14, questions & answers by team; Mar 13, AGM.

VALE OF EVESHAM RAC - 6, talk 'Video Recording' by Nigel Cook, G0MQV. Details 0386 881497.

HERTFORDSHIRE

STEVENAGE & DARS - 5, Round Robin, VHF mobile/base station aerials; 19, talk 'Contest Operating and Awards'; 26, construction projects. Details 0438 724991.

VERULAM ARC - 25, talk 'Pile-Ups' by Mr R K Western, G3SXW. Details 0727 59318.

HUMBERSIDE

GOOLE R&ES - 14, junk sale - 8.30pm; 21, talk 'Raynet Up to Date' by G0FRX; 28, social evening; Mar 13, talk 'European Radio' by G8ZCS. Details Goole 769130.

KENT

DARENTH VALLEY RS - 12, talk 'Packet Radio' by R Cains, G7GLW; 26, construction project; Mar 11, video 'Slow Scan TV' by Ivor Harwood. Details 0689 876733.

MAIDSTONE YMCA ARS - 28, talk 'Introduction to Computers' by G4AXD. Details 0622 670936.

WEST KENT ARS - 21, talk 'The BBC World Service', 'Sighting of Transmitters' and 'Propagation'. Details G3OHV, QTHR.

LANCASHIRE

ECCLES & DARS - 4, discussion 'Club Stand at the Norbreck Rally'; Mar 3, demonstration 'Measuring SWR' by G0KLF. Details 061-773 7899.

ROCHDALE & DARS - 10, Crystal Set Night; 17, talk 'Airband Communications'; 24, construction night. Society meets Monday evenings at T S Frobisher, Greenbank Road, Rochdale. Details from Brian (Secretary) 061-653 8316.

THORNTON CLEVELEYS ARS - 10, talk by Arthur Parr, G3IWP; 24, talk 'Surface-Mounted Components. Details from G4BFH, QTHR.

LEICESTERSHIRE

LEICESTER RS - 17, talk 'The Novice Licence' by G4WYN; 24, HF Contest review, HF NFD preliminary planning; Mar 2, open meeting. Details Leicester 762241.

LOUGHBOROUGH & DARC - 11, quiz evening; 18, talk 'Green Radio' by G7HZZ; 25, club aerials/construction. Details 0509 218259.

RAF WADDINGTON ARC - ***SECRETARY*** D Robinson, G0NPB, 69 Ferry Road, Fiskerton, Lincoln LN3 4HW.

MERSEYSIDE

LIVERPOOL & DARS - 4, talk 'Mr Marconi' by G0KCT; 11, open night; 18, talk 'RST' by G0IFK; 25, surplus sale. Details from Gordon, G4VYR, QTHR.

WIRRAL & DARC - 5, D&W Ring o'Bells, West Kirby. Details from Andy, G7HUD, tel: 051-677 4448

NORFOLK

AMATEUR RC OF FAKENHAM - 4, Display of 10th Anniversary Stations QSL Cards of 1991 for GX4LSF; Mar 3, AGM. Details 0485 528633.

NORFOLK ARC - 5, talk 'Construction Techniques (PCBs etc)' by G Parkhurst, G3TOZ; 12, talk 'Novice Licence' by D Buddery, G3OEP; 19, talk 'Science for All' by A Tomalin, G3PTB; Mar 4, talk 'Simple HF Antennas and ATUs by Stuart Line, G3XYO. Details 0603 747992.

NORTHAMPTONSHIRE

KETTERING ARS - 4, talk 'BBC Transmitters and Transmissions' by Mike Higgins, Senior Transmission Engineer BBC (Radio). Details 0536 514544.

NORTH YORKSHIRE

HAMBLETON ARS - 10, talk 'Callsign History' by B Escreet, G4SPC; Mar 9, visit to RAF Leeming Weather Centre. Details 0609 776608.

SCARBOROUGH ARS - 3, surplus equipment sale. Details 0723 514767.

NOTTINGHAMSHIRE

AMATEUR RC OF NOTTINGHAM - 6, forum; 13, series of mini-talks on Receivers; 20, construction evening; 27, talk 'Fuses' by Simon, G0IEG; Mar 5, forum; 12, talk 'Packet Radio for Beginners By a Beginner' by Mike, G2SP. Details 0602 733740.

MANSFIELD ARS - 6, talk and slide show by Mick, G8EHX on his recent visit to China. Details 0623 755288.

SOUTH NOTTS ARC - 7, open forum; 14, construction (at Fairham College); 21, talk on GB3NM by M Mansfield, G2SP. Details 0509 672734.

POWYS

SOUTH POWYS ARC - 4, talk 'CTCSS' by GW3FKO; Mar 3, talk 'Simple Valve Circuits' by GW3ECH. Details 0874 84266.

SOMERSET

TAUNTON & DARC - 7, talk 'Power Measurements in the Shack' by G Wills, G0GTR; 21, talk 'Artificial Intelligence' by G Dean, G6ABV. Details 0823 680 778.

SOUTH GLAMORGAN

CARDIFF RSGBG - 10, talk 'Wireless 1920-1939' by Bill Turner, GW6MNC. Details 0446 773212.

SOUTH YORKSHIRE

MALTBY & DARS - ***NEW VENUE*** Prospect House, Muglet Lane, Maltby. Meetings held Friday evenings. Details from G1PQW, QTHR, 0709 814135.

STAFFORDSHIRE

STAFFORD & DARS - 18, talk 'Cellnet' by G8VPR; 25, construction evening; Mar 3, AGM. Details from Bernard, tel: 0785 662350.

STRATHCLYDE

WEST OF SCOTLAND ARS - 14, talk 'Operating from the Arctic/Antarctica' by Laurence, GM4DMA; 20, visit to CAA Atlantic House, Prestwick (maximum of 16 people); 28, talk 'Building Your Own Test Equipment'; Mar 13, debate 'Does Our Present Band Plan Scheme Work or Require Change!'. Details 041 776 4181.

SUFFOLK

LOWESTOFT DISTRICT & PYE ARC - 13; lighthearted 'Meet the Members' night, or 'This is What Interests Me'; 27, illustrated talk 'DXing in the Andorran Mountains'; Mar 12, illustrated talk 'Voyage to the Sun' and 'Electricity from the Wind' by G2UK. Details G4KDL, QTHR.

SURREY

DORKING & DARS - 25, talk 'Radio Investigation Service' at the Friends' Meeting House (provisional). Details 0306 77 236.

ECHELFORD ARS - *CHANGE* All meetings now take place on Thursday evenings - 2nd & 4th Thursday in month. 13, talk 'Linear Amplifiers' by John Stockley, G8MNY; 27, construction contest evening - bring your latest project; Mar 12, talk 'When the Balloon Goes Up' by Ian Jackson, G8RWH (Raynet). Details 0344 843472.

TAYSIDE

DUNDEE ARC - 4, construction night; 11, talk 'EMC' by D Morris, GM3YEW; 18, construction night; 25, talk 'Police Control Room' by Neil Harvey, GM0NLU. Details from GM4FSB, QTHR.

WARWICKSHIRE

STRATFORD-UPON-AVON RS - 10, test equipment evening; 24, talk 'Cable Television' by G Blakeman, G6OOX; Mar 9, open evening. Details 060 882 495.

WEST GLAMORGAN

SWANSEA ARS - ***NEW SECRETARY*** Mr G R Steele, GW3SIY, 5 Golden Close, West Cross, Swansea SA3 5PE.

WEST MIDLANDS

COVENTRY ARS - 7, Indoor Direction Finding Challenge with Alan and George; 21, members' slide show/video evening. Details 0203 311468.

STOURBRIDGE & DARC - 17, annual constructors' competition; Mar 16, AGM. Details from G0HTJ, QTHR.

WEST SUSSEX

HORSHAM ARC - 6, talk 'Navigating Across the Reich' by G3GDU. Details 073784 2150.

WEST YORKSHIRE.

BRADFORD ARS - 13, display and discussion - bring your homebrew equipment; 27, quiz night. Details 0274 494694.

DENBY DALE ARS - 5, talk 'Power Supplies' by S Thompson, G4RCH; 19, talk 'Planning' by G Bond, G4GJB. Details 0484 532371.

HALIFAX & DARS - 18, junk sale. Details Halifax 202306.

KEIGHLEY ARS - 13, talk 'Scout Tour of America' by G7HHD; 27, talk 'The HF Spectrum and Its Inhabitants' by G3LEQ. Details from Kathy, tel: 0274 496222.

NORTHERN HEIGHTS AR&ES - 5, video evening; 19, Mr Dougherty's lecture - Always a Must; Mar 5, talk 'History of Computing' by Colin Chadburn. Details 0274 673116.

WAKEFIELD & DARS - 11 & 18, Rally preparation. Details 0924 260048.

WILTSHIRE

AXE VALE ARC - 7, talk 'Around the World' by George, G8AOG. Details 0297 33756.

TROWBRIDGE & DARC - 5, surplus equipment sale; 19, open evening and social. Details 0380 830383.

RALLIES AND EVENTS

This is a list of all rallies, hamfests, exhibitions and conventions notified to HQ (as at press date). Items are given in detail for the next three months inclusive and in brief thereafter. Please send detailed information, including contact callsign and telephone numbers direct to HQ and marked 'Rally News - DIARY'.

2 FEBRUARY

SOUTH ESSEX ARS Radio Rally - Paddocks Long Rd (A130), Canvey Island, Essex. Doors open 10am. Trade stands, bring & buy, RSGB book stall, home-made refreshments, free parking plus parking outside the main door for disabled visitors. 2m talk-in on S22 (G4RSE).The Paddocks is at the end of the A130. Details from Dave Speechley, G4UVJ, tel: 0268 697978.

9 FEBRUARY

CAMBRIDGE & DARC Mobile Rally and Boot Sale - Ambulance Station, Addenbrooke's Hospital, Cambridge. Doors open 10.30. Trade stands; bring & buy; refreshments. Talk-in on S22. Easy access from M11/A45. Ample parking. Details George, G0OEL, QTHR, 0954 719273.

16 FEBRUARY

WELSH Mobile Radio Rally - Barry Leisure Centre, off Holton road, Barry, S Glamorgan. Doors open 10.30am (10am for disabled visitors). Traders; bring & buy; refreshments. Details Peter, GW0BAH, QTHR, tel: 0656 788502.

23 FEBRUARY

BIDEFORD BAY ARC 5TH TAW & TORRIDGE Rally - BAAC Halls, Bideford. Doors open 10.30am (10am for disabled visitors). Trade stands, bring & buy, refreshment room, licensed bar. Talk-in on S22. Details from John, G0GFK, 0237 476402.

EAST COAST AR & Computer Rally - Clacton Leisure Centre, Vista Road, Clacton-on-Sea. Details from Terry, G7DNS, tel: 0255 222207 or Tony, G0MBA, tel: 0255 422843. This event is organised by the Packet Radio User Group of Clacton ARC.

KIDDERMINSTER & DARS Rally - Harry Cheshire School, Habberley Road, Kidderminster. Doors open 10am. Normal trade stands, bring & buy, car boot sale, refreshments available, free admission and car parking. Talk-in on S22. Details from G4HFP, 16 Marlborough Drive, Stourport-on-Severn, Worcs. DY13 0JH, tel 02993 3818.

WAKEFIELD & DARS NORTHERN CROSS Rally - Rodillian School between Leeds and Wakefield (at junction M1/M62). Open 11am (10.30am for disabled visitors). Parking for 1000+ cars. Dealers, Groups and Craft stands, bring & buy, Morse test, RSGB Propagation Studies Stand, Car crime prevention demo, Wakefield & DRS stand, bar and refreshments. Talk-in on S22. Entry 50p (programme draw prizes). Details from G0FLX, tel: 0532 827883.

29 FEBRUARY

BREDHURST R&TS Rainham Radio Rally - Parkwood Community Centre, Parkwood Green, Gillingham, Kent.(Exit 4 on M2 Motorway). Bring & buy, traders, cafe and bar, free parking. Talk-in on 2m. Details from G0LKE, tel: 0634 362154.

TYNESIDE ARS - Temple Park Leisure Centre, South Shields. Usual traders; catering facilities including bar. Free parking. Details from Jack, G0DZG, 091 265 1718. (This Rally was previously scheduled for 7 March).

1 MARCH

TRAFFORD Rally - G-Mex, The Greater Manchester Exhibition & Events Centre, City Centre, Manchester. Doors open 10.30 (with disabled visitors' priority queue). All usual traders, RSGB stand, Bring & Buy and new traders. Morse Tests (apply via RSGB HQ). Free cash draw, licensed bar, refreshments, ample car parking. Admission £1.50. 2m talk-in on S22 via GB1GMX. Details from Graham Oldfield, G1IJK, tel: 061-748 9804.

7/8 MARCH

LONDON AR Show - Picketts Lock Centre, Picketts Lock Lane, Edmonton, London W9. Details from B Godfrey, Secretary 0923-678770.

14 MARCH

RSGB VHF CONVENTION - Sandown Park Exhibition Centre. Stand booking to Les Hawkyard, G5HD, tel: 040-928 342. Details from Geoff Stone, G3FZL, tel: 081-699 6940. Please note this is on a Saturday this year (see p18).

15 MARCH

NORBRECK ARE&C Exhibition, organised by NARSA - Norbreck Castle Exhibition Centre, Blackpool. Details from Peter Denton, G6CGF, tel: 051-630 5790.

TIVERTON SOUTH WEST RC 1992 Mid Devon Rally - Pannier Market, Tiverton. Easy access, only minutes from Jnct 27 M5. Doors open 10am. Two halls of trade stands; bring & buy stall; mobile snack bar. Talk-in on S22. Free parking. Details G4TSW, Mid Devon Rally, PO Box 3, Tiverton, Devon.

WYTHALL RC Rally - Wythall Park, Silver St, Wythall, (near Birminghham, on the A435 2 miles from Jnct 3 on M342). Doors open 11am. Usual traders in three halls; bar and refreshment facilities. Bring & Buy stall run by the club. Talk-in on S22. Admission 50p. Details from G0EYO, 021-430 7267.

22 MARCH

MAGNUM Radio Computer Rally (Cunningham & DARC) - Magnum Leisure Centre, Irvine, Ayrshire. Doors open 11am (10.30 for disabled visitors). Trade stands, Bring & Buy, Raffle, Lucky-programme prize. Details from Peter, GM0FCI, 0294 72253.

PONTEFRACT & DARS 12th Annual Components Fair and Spring Rally - Carleton Community Centre, Carleton, Nr Pontefract. Admission by Prize programme; 3 prizes plus free prize draw for lady visitors. Traders; bring & buy; bookstall; licensed bar; hot & cold snacks. Extra car parking. 2m talk-in. Car Boot spaces. Details from Colin Mills, G0AAD, 0977 643101.

29 MARCH

BOURNEMOUTH RS 5th Annual ARE&C Sale - Kinson Community Centre, Pelhams, Millhams Road, Kinson, Bournemouth. Doors open 11am. Admission 50p including prize draw ticket. Light refreshments. Talk-in on S22 (G2BRS). Details from Vic, G4PTC, 0202 516593 (after 6pm).

5 APRIL

LAUNCESTON 6th AR Rally - Launceston College. Doors open 10.30am. Large bring & buy; well-known traders, official Morse test (applications through RSGB usual channels). Hot snacks from 7am. Talk-in on S22. Details from Maggie 040921-219 or Rodney & Joy, 0566-775167.

25TH WHITE ROSE Rally - Leeds University. Doors open 11am. Major exhibitors, bring & buy; refreshments. Details from Tony, G4DXA, PO Box 73, Leeds LS1 5AR.

19 APRIL

CENTRE OF ENGLAND Easter Radio & Electronics Rally - National Motorcycle Museum, Bickenhill, near the NEC, Jcn 6 M42. Doors open 10.30am (10am for disabled visitors). Admission £1 (reduction for RAIBC members and concessionaries). Over 60 traders in three large halls; ample free parking; bar and restaurant facilities. Talk-in on S22. Easter Special - 'Spot tho Egg' on many of the trade stands to win an Easter egg. Details from F Martin, G4UMF, 0952 598173.

24/25/26 APRIL

DAYTON HAMVENTION 1992 - Details ARRL.

25 APRIL

MARCONI Birthday Exhibition Transmitting Station GB3WM at the Wireless Museum, Puckpool Park, Seaview, Isle of Wight. Special showing of early Marconi photography and valves, crystal-sets with cats-whiskers, and early television receivers. It will be recalled that Marconi built the first wireless transmitting station in the world at Alum Bay on the Isle of Wight in 1897. Details from G3KPO, 0983 67665 or 616503.

26 APRIL

BURY RS Hamfest - Castle Leisure Centre, Bolton St, Bury. Details from L H Jones, G4KLT, 061-762 9308.

MARSKE-BY-THE-SEA Radio Rally (East Cleveland ARC) - Marske Leisure Centre, High Street, Marske-by-the-Sea, near Saltburn. Details from Mike Tennent, G7ION, tel: 0473 610030.

SWANSEA ARS Rally - Swansea Leisure Centre, on Swansea-Mumbles Coast Road A4067. Trade stands; bring & buy; bookstall; HF/VHF demo stations; licensed bar and full catering. Talk-in on S22 via GB2SWR. Details from Roger Williams, GW4HSH, 0792 404422.

3 MAY

9TH ANGLO-SCOTTISH Rally - Tait Hall, Kelso. Details from Bruce, GM4UIB, QTHR.

BATC Rally - Harlaxton Manor, near Grantham. Details Paul, G8MJW, 0522 703348.

4 MAY

MID CHESHIRE ARS Rally - Civic Hall, Winsford. Details from David G4XUV, 0606-77787.

10 MAY

MARS/DRAYTON MANOR Radio Rally. Details from Peter, G6DRN, tel: 021-443 1189. Trade stand bookings - Norman, tel: 021-422 9787.

YEOVIL ARC 8TH QRP Convention - Preston Centre, Monks Dale, Yeovil. Details from Peter Burridge, G3CQR, QTHR.

16 MAY

SWINDON & DARC Radio Rally - Oasis Leisure Centre, Swindon. Details from G0LTP, tel: 0793 852855.

17 MAY

RIPON & DARS 35th NORTHERN MOBILE RALLY - Flower Show Hall, Great Yorkshire Showground, Harrogate. Details from Mike, G0MKK, 0423 564353/507653.

24 MAY

EAST SUFFOLK Wireless Revival (organised jointly by Ipswich RC and Martlesham RS) - Maidenhall Sports Centre, Maidenhall Approach, Ipswich. Send SAE for free maps. Details from G7HZV, QTHR, 0394 271257.

30/31 MAY

RSGB NATIONAL CONVENTION - NEC Birmingham. Details from Norman Miller, G3MVV, QTHR (see p57).

7 JUNE

NORTHAMPTON RC Radio Computer and Electronics Rally - Red Lion public house (500 yards from Jct 16 of M1). Details from Paul Young, G0HWC, 0327 41267.

14 JUNE

ELVASTON CASTLE Mobile Rally. Details from John, G4PZY, tel: 0332 767994; trade enquiries Peter, G3WFU, tel: 0332 700265 (evenings).

RNARS Annual Mobile Rally. Details from Cliff Harper, G4UJR, 0703 557469.

21 JUNE

DENBY DALE & DARS Annual Mobile Rally. Details from Philip, G4FSQ, 0484 644827.

NEWBURY & DARS Annual Car Boot Sale. Details from N Jaques, G0HFU, 0635 63310.

27 JUNE

BRENTWOOD INTERNATIONAL AR & Computer Rally (run in conjunction with Southend ARC) - Brentwood International Centre, Doddinghurst Road, Brentwood, Essex. Details from CLPK, 18 Litchfield Close, Clacton-on-Sea, Essex CO15 3SZ.

28 JUNE

BROMSGROVE ARS Mobile Radio Ham Rally & Boot Sale - Lower Wick Country Fair, on Worcester/Malvern Road. Details from Dave Edwards, G4ZWR, 0527 546075.

LONGLEAT AR Rally. Details from Shaun, G8VPG, QTHR, tel: 0225 873 098.

5 JULY

KINGS LYNN ARC Rally - Corn Exchange, Kings Lynn Tuesday Market Place. Details from G0MQL 0553 841189.

YORK Radio Rally - York Racecourse. Details from David Moreland, G7FGA.

11 JULY

CORNISH RAC Rally - Penair School, St Clement, Truro. Details from Mr B Thomas, tel: 0872 862046.

12 JULY

SUSSEX AR & Computer Fair. Details from Ron Bray, G8VEH, QTHR, 0903 763978 (H) or 0273 415654 (W).

19 JULY

COLCHESTER RA Radio & Computer Rally. Details from G3FIJ, QTHR, 0206 851189.

9TH McMICHAEL Rally & Car Boot Sale - Haymill Youth & Community Centre, Burnham Lane, Slough. Details from G8XYN, 0628 25952.

SILENT KEYS

WE HAVE BEEN advised of the deaths of the following radio amateurs:

G3ZZE	Mr B King	Nov 91
G1VGJ	Mr G Barnett	18.10.91
G8EVK	Mr P Cullen	03.11.91
GJ6JKV	Mr L Jarron	June 91
G3FRO	Mr M Hudson	05.12.91
G4RBT	Mr W Broadbent	Sept 91
G4TDJ	Mr D Hosking	
G3HXQ	Mr J Jackson	02.12.91

25/26 JULY

Norfolk ARC & Hewett School Rally. Details M J Cooke, 4 Geddes Way, Mattishall, Norfolk NT20 3RE.

30 JULY-2AUG

AMSAT-UK Colloquium - University of Surrey. Details from G3AAJ, tel: 081 989 6741.

2 AUGUST

RSGB NATIONAL MOBILE RALLY - Woburn Abbey. Details N Miller, G3MVV, QTHR.

9 AUGUST

DERBY & DARS Mobile Rally - Details from G3SZJ, QTHR, 0332 556875.

6 SEPTEMBER

BRISTOL Radio Rally - Details from G4WUB, QTHR, 0275 839855.

PRESTON ARS Mobile Rally - Details from G Earnshaw, 0772 718175.

VANGE ARS Rally - Details from G4NVT, 0268 543025 or Doris Thompson, 0268 552606.

13 SEPTEMBER

BARTG Rally - Sandown Park Exhibition Centre, Esher, Surrey. Details from Peter Nicol, G8VXY, tel: 021 453 2676.

20 SEPTEMBER

EAST OF ENGLAND Radio Rally (Peterborough R&ES) - ICI Building, East of England Showground, Peterborough. Details from G0CVZ, tel: 0733 222588.

11 OCTOBER

HORNSEA ARC Rally (ELHOEK) - Details from G4IGY, 0964 533331.

28 NOVEMBER

GREATER LONDON AR & Computer Show - Harrow Leisure Centre, Christchurch Ave, Harrow. Details from CLPK, 18 Litchfield Close, Clacton-on-Sea, Essex CO15 3SZ.

GB CALLS

The list below shows all special event stations licensed for operation during this month and up to 29 February. It was taken from the HQ computer on 6 January. These callsigns are valid for use from the date given but the period of operation may vary from 1-28 days.

1 FEBRUARY

GB0LTD	Leukaemia Thinking Day.
GB2MSR	Manx Scout Radio.
GB2SCB	Scouts Communication Badge.
GB4RAR	Royal Air Force Regiment.

8 FEBRUARY

GB5TT	PACC Contest 1991.

16 FEBRUARY

GB2BUH	Barton-Upon-Humber.

22 FEBRUARY

GB0CDA	Coastal Defence 'A'.

26 FEBRUARY

GB1ECD	Eagle Centre Derby.
GB2MSR	Manx Scout Radio.

RSGB BOOKCASE

A SELECTION OF THE FINEST AMATEUR RADIO PUBLICATIONS DELIVERED TO YOUR DOOR

ANTENNA BOOKS

		NON-MEMBERS	MEMBERS
All About Vertical Antennas	(RPI)	OUT OF STOCK	
Antenna Compendium Volume 1	(ARRL)	£12.35	£10.50
Antenna Compendium Volume 2	(ARRL)	£12.35	£10.50
Antenna Book 16th edition	(ARRL)	£19.41	£16.50
Antenna Notebook, W1FB	(ARRL)	£7.99	£6.79
Beam Antenna Handbook	(RPI)	£8.70	£7.40
All About Cubical Quad Antennas	(RPI)	£7.17	£6.09
HF Antennas for All Locations	**(RSGB)**	**£9.35**	**£7.95**
HF Antenna Collection - *NEW*	**(RSGB)**	**£10.65**	**£9.05**
Novice Antenna Notebook	(ARRL)	£8.65	£7.35
Practical Wire Antennas	**(RSGB)**	**£8.65**	**£7.35**
Radio Amateur's Antenna Handbook	(RPI)	OUT OF STOCK	
Reflections: Transmission Lines and Antennas	(ARRL)	£14.71	£12.50
Simple Low Cost Wire Antennas	(RPI)	£9.12	£7.75
The Antenna Experimenter's Guide	(DDP)	£10.68	£9.61
Transmission Line Transformers	(ARRL)	£14.71	£12.50
Yagi Antenna Design	(ARRL)	£11.89	£10.10

AWARDS BOOKS

Amateur Radio Awards Book (3rd Ed)	**(RSGB)**	**£10.89**	**£9.25**

BEGINNERS AND NOVICES

Amateur Radio for Beginners	**(RSGB)**	**£4.56**	**£3.88**
DIY Radio (pilot issue)	**(RSGB)**	**£2.23**	**£1.90**
DIY Radio (2nd pilot issue)	**(RSGB)**	**£2.23**	**£1.90**
DIY Radio (colour) Subscription (6 per year)	**(RSGB)**	**£9.00***	**£7.65***
First Steps in Radio	(ARRL)	£6.47	£5.50
Novice Licence Proposal by the RSGB	**(RSGB)**	**£7.17**	**£6.09**
Training: Novice Licence Instructor's Manual	**(RSGB)**	**£7.30**	**£6.21**
Tune in the World Kit	(ARRL)	£13.83	£11.75
Novice Student's Notebook	**(RSGB)**	**£4.65**	**£3.95**

* Rates for non-EC and all other overseas subscribers are available on request from the Sales Department.

CALL BOOKS

Callbook - RSGB 1991/92 (NEW)	**(RSGB)**	**£9.27**	**£6.95**
North American Callbook 1992	(RACI)	£21.78	£18.50
International Callbook 1992	(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)	OUT OF STOCK	

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

		NON-MEMBERS	MEMBERS
Hints and Kinks for the Radio Amateur	(ARRL)	£5.82	£4.95
Radio Communication Handbook—5th Edition	**(RSGB)**	**£14.07**	**£11.95**
Solid State Design for the Radio Amateur	(ARRL)	£11.18	£9.50
Amateur Radio Techniques - 7th edition	**(RSGB)**	**£8.76**	**£7.45**
ARRL Handbook 1992	(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)	OUT OF STOCK	

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 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**
Grid Locator Atlas	(ARRL)	£4.12	£3.50
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**
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**
Grid Locator Atlas	(ARRL)	£4.12	£3.50

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**
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)	OUT OF STOCK	

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

QRP (LOW POWER) BOOKS

		NON-MEMBERS	MEMBERS
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 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
Computer Net. Conf. Papers Vol. 9	(ARRL)	£8.18	£6.95
Computer Net. Conf. Papers Vol. 10	(ARRL)	£8.18	£6.95
Packet Radio Primer NEW	**(RSGB)**	**£8.00**	**£6.80**
RTTY Awards	(BARTG)	£5.30	£4.50
RTTY The Easy Way	(BARTG)	£4.12	£3.50
Slow Scan Companion	(BATC)	£4.12	£3.50
Teleprinter Handbook (2nd Ed)	**(RSGB)**	**£2.35**	**£2.00**
TV for Amateurs	(BATC)	OUT OF STOCK	
Your Gateway to Packet Radio	(ARRL)	£10.00	£8.50

SATELLITE BOOKS

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**
The MIR Spacecraft	(AMSATUK)	£5.00	£4.25

SHORT WAVE LISTENER BOOKS

Complete SW Listener's Handbook	(TAB)	£19.42	£16.50
Short Wave Communications	(PW)	£10.53	£8.95

SOFTWARE PRODUCTS

DX Edge Software for the PC	(XANTEK)	£21.91	£18.62

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 (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 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**
Microwave Newsletter (10 issues per year)	**£9.40**	**£7.99**

Rates for non-EC and all other overseas subscribers are available on request from the Sales 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

PLEASE NOTE THAT RAYNET SUPPLIES ARE NOW AVAILABLE ONLY FROM:

MRS BARBARA SLATER, G6XYX
47 BROOM ROAD, LAKENHEATH, BRANDON, SUFFOLK IP27 9EZ.
TELEPHONE: 0842-860475

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; 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, but 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

ACCESS VISA

TELEPHONE:
0707-49855

The Last Word

January's letter from Mr Blake, G3MWV, concerning the Novice scheme lowering standards of both amateur radio and *RadCom*, provoked a huge response. This month's *Last Word* is devoted to a representative selection:

GONE OVERBOARD

I agree totally with the sentiments expressed by G3MWV regarding the Novice Licence. The Society has gone completely overboard in the promotion of a scheme which, so far as its appeal to young people in general is concerned, promises to be even less sustainable than the skateboard or the hula-hoop! The Novice Licence is as appropriate to the aspirations of the average modern pre-adolescent as archaeology or world-class chess!

How can the majority of young people possibly survive in - let alone enjoy - a hobby which, of its very nature, is demanding of time, mental concentration and money, is the object of suspicion by parents and a potential source of annoyance to neighbours?

I am not attempting to undermine the efforts of those youngsters who have attained their Novice Licence, but in the modern world there exist far more appropriate, appealing and, some would argue, more healthy pursuits for young people, These, sooner or later and quite understandably, will turn them away from our hobby.

The stark reality which disciples of the Novice Licence obstinately refuse to acknowledge is that amateur radio is a hobby best suited to those in their more mature years. Such people comprise the vast majority of the present amateur population and, despite the Novice Licence, it is predominantly members of that age group who are currently entering the hobby through the more traditional route.

The long-term interests of amateur radio would have been served far better had the RSGB directed its 'new blood' campaign towards a reduction in the age at which it is possible to acquire a Class 'A' or a Class 'B' licence, rather than to have trivialised our hobby for the sake of quantity rather than quality.

T E O'Neil GM4PRO

TOO EARLY TO TELL

The Novice Licence is so new and operators as yet few in number, I cannot accept that it can possibly have already affected standards one way or the other. It provides a structured course of study including practical elements, introduction to Morse and operating procedures, and eventually controlled access to bands with low power. On the other hand, the *theoretical* RAE and Morse Test do not *necessarily* involve a supervised learning process, yet passing them allows access to all relevant bands up to legal power levels. In my view, therefore, the Novice Licence is an ideal feeder for the RAE, though time will prove its effectiveness and it requires careful monitoring.

The Editor's comment about articles purely for Novices is, in my mind, correct. While it is not possible to please all the people all the time, in this case it is probably because the subject is new that it tends to stand out. Novice operators, after all, are ordinary folk like the rest of us and need the mix of simple and complex articles in order to grow in knowledge and understanding.

Clearly we need to work together, pooling the wealth of competence contained within the membership. I am glad Mr Blake has decided to remain a member. We need people with his type of experience and skills if we are to improve.

P B Goodman G4LKT

TOO SIMPLISTIC

I whole-heartedly agree with the opinions expressed by G3MWV in his concise and pertinent letter. Any so-called 'technical' articles in *RadCom* during 1991 were too simplistic, and of little interest to the majority of licensed amateurs. They were printed to fulfil a statistical demand for more technical pages. There was also a 'novice bandwagon' rolling. I wonder how you will justify this next year?

Far more can be done to increase our numbers by eliminating the frustrations that surround the examination and licensing process, rather than by lowering already minimal standards. The process is a revenue-raising cycle for RSGB, C&G, colleges and others, making it impossible to obtain a licence in less than 6 months, given the ability and knowledge. During this period, or longer, hopefuls are subjected to a welter of universal incompetence (I exclude the RSGB Morse team). I worry that the same applies to the Novice arrangements.

D F Elkington G0PAN

KEEP IT SIMPLE

Like G3MWV (*The Last Word*, Jan 92), I too have to think long and hard as to renewing my membership of the Society. The fee of £30 may be only 58p a week, but in these difficult times that may be the straw that breaks the weekly housekeeping money's back!

I also had reservations initially about the Novice Licence, but after talking to some of the younger generation, I have changed my opinion somewhat. Not everyone wishing to be an RSGB member is on a high salary, and neither are they all brilliant mathematicians or electronic geniuses with the ability, or indeed the opportunity, to romp through the RAE. Some of us ordinary mortals have had to struggle through our learning at school, for our jobs and for our hobbies, amateur radio included.

I would have been able to enter this hobby many years ago if the Novice Licence had been in existence, instead of waiting until I was over 40. Some of us 'A' Licence holders are very pleased to think that the younger enthusiast can be ensnared into the hobby by a little easier route.

Don't forget, today's Novices will be the amateur radio operators, and possibly designers and engineers in industry, long after we, the G3s and G4s are pushing up daisies. No, G3MWV, the Novice Licence will surely not lower the standard of radio; at its worst it will stay the same, and hopefully the standard of operating will rise.

Thank you, Mr Editor, for the very interesting and educational articles that have appeared lately. It is nice to have articles sometimes for which we do not need a Master's Degree or a Doctorate.

David Porter G4NF

ENCOURAGE AND SATISFY

It can be difficult for the immediate post-war fraternity, many whom were weaned on radio/radar work, to understand the need for 'basic' educational items. Nevertheless we older types must harbour the desire for the hobby, which has afforded us much pleasure, to continue to thrive long after our demise.

To this end the RSGB has recognised the need to encourage young persons into our hobby, bearing in mind that many youngsters have not had the advantage of our educational bias. This is the essence of the new format of *RadCom* and its determination to encourage and satisfy the younger element. Hence, if the existing balance of articles is maintained, ie providing sufficient interest to the whole range of radio amateur skills met within our hobby, then I for one will continue to support and encourage our hobby through being a member of the RSGB, providing the membership costs are reasonable.

Ken Darby G3MLD

Please note that the views expressed in 'Last Word' are not necessarily those of the RSGB.

We reserve the right to edit letters and regret that we can no longer acknowledge them individually but will pass them on to the relevant department.

BALANCE CORRECT

I think the new format is excellent! The balance of Novice news and 'Novice' constructional articles is better than expected. I did think that the 'old format' tended to exclude the newcomer; the new actively encourages and leads them into the hobby. Just one small comment - could you please try to ensure that all authors show in full, at least once in their articles, the meanings of any abbreviations used?

A Ainger G1ZYJ

COMPARES WELL

Being a Novice instructor and also a regular operator on the HF and VHF bands, I am well-informed enough to be able to compare standards. I would confidently put any Novice Licensee against a new G7 or G0 when it comes to operating procedure. I was amazed during a recent 2m contest when three G7s called and were unable to give even a basic signal report correctly.

I believe that G3MWV has got it completely wrong. Far from lowering standards the Novice Licence is *at least* raising operating standards. To all fellow Novice Instructors - "Keep up the good work".

Mike Butler G4UXC

MORE YOUNGSTERS NEEDED

I write as ex-chairman of the RSGB Training and Education Advisory Group, as a teacher of physics in a comprehensive school and as an RAE lecturer with some years' experience. I have successfully taught RAE candidates aged from 15 to 76, and with very varied backgrounds and experiences, some with no prior knowledge of amateur radio or electronics.

Recently I have observed Novice classes in operation and I have been party to the experiences of many Novice instructors. At present I preparing students for the May 92 RAE; of these, three successfully sat the Novice RAE in Sept 91, two of them obtaining passes with credit.

I would take issue with G3MWV as follows: Firstly, I support the statement that very little in *RadCom* is exclusively aimed at the Novice. G3MWV ignores the fact that a large number of entrants to the hobby have very little previous experience and also must benefit from the more basic articles which, thankfully, have been appearing lately.

Secondly, I can offer an observation from one of my RAE students: "If I hadn't followed the Novice course and taken the examination, I would not have become involved in an RAE course". The Novice course gives would-be RAE candidates a sound basis for further studies. Novices should be encouraged to become involved in such studies rather than being told that they are "lowering the standards".

Thirdly, if the Novice system and other activities recently promoted by the Society have the effect of increasing the number of people, particularly younger people, coming into our hobby, this should be applauded by all UK amateurs - RSGB members or not. The future of amateur radio depends on the increase in the younger entrants especially.

Lastly, I am firmly convinced that, in general, successful candidates in the Novice RAE who have followed a quite strict training course, are more likely to be better prepared to go on the air than many RAE candidates who can take the examination without there being any necessity to *see* a radio, never mind knowing how to use a receiver, set up a transmitter into a dummy load, use an SWR meter etc.

David Jackson G4HYY

MOST DIFFICULT

I think that being the editor of *RadCom* must be the most difficult job on this planet. How *does* one plan a balanced monthly publication when its readers' interests are so diverse? Publish a 'difficult' constructional project and you receive whingeing letters from the 'bulb and battery' fraternity. Publish a Novice project and you get moans from the 6V6/807 membership. Woo them with an interesting solid state digital device and half of the membership threatens to resign!

Personally I am reasonably happy with the monthly mix, but I must admit that should Pat Hawker ever sheath his pen for good, I would have some deep thinking to do. In other words Mr Editor, you do a damn good job - but you just can't win!

N Kirk G3JDK

CLASSIFIED ADVERTISEMENTS

Classified advertisements 52p per word (VAT incl) minimum 14 words (£7.28). 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

POLYPROPYLENE ROPE BARGAINS — 220 metre coils! 4mm-£17+£3 postage=£20, 6mm-£21+£3 postage=£24, 8mm-£29+£3 postage=£32 — Cheques 'Rope-Link', Cadence, Battle Road, Heathfield, Sussex TN21 9DR.

FT101E/B OWNERS 500 Hzs 8 pole CW filters £45 inc — 6JS6C NEC £52 pair — 12BY7A NEC £26 each, GE £11 each — double balance mixer for quieter RX £21.50 — 18, 24 and 10 MHz 3 band kit DIY, its simple (not for 101ZD) £21 — also new and S.H. Black Star Counters — Yaesu/FT990 test drive one at home? enquire. Holdings Amateur Electronics (G3LLL), 45 Johnston Street, Blackburn BB2 1EF. (0254) 59595. Closed Thursdays.

CHOKE BALUNS, HF & VHF ferrite sleeved, best available, see Display ads in July/Sept/Dec Rad Coms or send SAE for full details. Ferromagnetics. P.O. Box 577, Mold, Clwyd, CH7 1AH.

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 36p 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 and 0850 707257. Fax: 0934 512757.

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.

AMIDON/MICROMETALS TOROIDAL CORES, Ferrite, Beads, Rods etc. Send 50p for catalogue. Ferromagnetics, P.O. Box 577, Mold, Clwyd, N.Wales CH7 1AH.

QUALITY QSL CARDS; Your design, matt, gloss or plastic, many colours. Bexable Ltd, 10 The Drove, Amesbury, Wilts SP4 7AG.

PMR RIGS. Handhelds, mobiles, basestations, chargers, nicads. Lowband, highband, UHF. FM, AM. 0435 830888.

AERIAL WIRES, strong PVC coated £6.50, hard drawn 14swg £14, 16swg £11.50, all per 50 metres post/VAT paid, 30p stamps for full list of cables, etc — W. H. Westlake, Clawton, Holsworthy, Devon.

SUPERIOR BRASS MORSE KEYS. Presentation quality! Send £27.95 + £1.55 p&pkg: L-E-M, 'Springfield', Staynall Lane, Hambleton, Lancashire FY6 9DR. (SASE — enquiries).

RACAL RA17: AR88s; CR100s; HROs; Eddystones; Electra; Mercury; 1155s; Sony; BC348; Lafayette; all overhauled. Sets part exchanged. SSB Products, 0872 862291.

ANTENNA EXPERIMENTER'S GUIDE by G3LDO. £8.90 + p&p 80p UK, £3.00 overseas airmail, £1.20 Europe. Available, Peter Dodd, 37 The Ridings, East Preston, West Sussex BN16 2TW. Or send for free synopsis.

ELECTRONIC LAB EQUIPMENT for sale due to owner moving abroad. BC221 freq meter 20KHz-20MHz £56; Eddystone EC10 MkII receiver £95; Sig Gen 10HZ-100KHz £29; Sig Gen 100KHz-100MHz £36; Electronic thermometer -80° C to 1000° C £29; PCB ultra violet exposure unit £48; DC power supply 0-60v at 3A £49; DC power supply 0-50v at 20A £96; transistor/diode tester £48; model 8 Avometer £48; insulation tester/ohmeter £46; variable transformer 0-240v, 0.6A £28; DC power supply 0-100v at 1A £46; DC power supply 0-1KV at 30mA £86; various transformers, heat sinks and components. Tel: 0707 54245.

PYE WESTMINSTERS M BAND tested £15. Fully converted to 2mtrs, front panel, knobs, 6 channel switch, re-painted case, connector for TNC etc £35 less xtals. £5 postage. MDX Communications, 3rd Floor, Goyt Mill, Marple, Stockport SK6 7HX. Tel/Fax 061-427 8090 or 0772 717919 (conversion details if required).

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 Jennifer Lawson, Amateur Radio Insurance Services Ltd, Shepheards Hurst, Green Lane, Outwood, Surrey RH1 5QS. Tel: 034-284-4000. Fax: 034-284-4554.

COMPUTER SOFTWARE HARDWARE

PC COMPATIBLE SOFTWARE. Large SAE to Charles Crane G4YFN, 2 Pimento Drive, Earley RG6 2GZ.

G4UXDs CELEBRATED MORSE TUTOR. "IBM-PC's, BBC's," compatibles. Adjustable speed, delay, letter frequency; 100 tests, attach your key, +++++! £8.95 disc. SAE details; 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, DL14 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.

PCs. Secondhand PC XTs, ATs and printers. Free friendly advice. Free software. Tel 061-655 3250 Ron G4SHC.

HOLIDAY ACCOMMODATION

FLYING FROM GATWICK? Stay at Mill Lodge Guest House. 4 minutes from airport. Transport available. Telephone (0293) 771170.

NORTH WALES. Elevated site, B&B, caravan, bunkhouse, camping, open all year, use of shack. "Tynrhos", Mynytho, Pwllheli, LL53 7PS, (0758) 740712.

ORLANDO, FLORIDA. Luxury detached three bedroom, two bathroom villa with own private swimming pool. 30 minutes drive from Disney and airport. £365 per week. Tel: (0707) 330419.

TORQUAY GOOD QUALITY HOLIDAY APARTMENTS for couples only. Swimming pool, sun terrace, private parking, sea views, quiet location, Rad-Com readers discount. G4NOA. Telephone 0803 607333.

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.

TUTOR REQUIRED for would-be ham to help pass RAE. £10 per 2 hour session. Close to Quadrant, Hendon, NW4. 081-203 5522.

TABLES, STORAGE, BOOKCASES. Any combination/dimension/layout. Made to exact requirements. Send sketch for quote by return or phone (0235) 816958. Gordon Foote (RS93194), 3 Humber Close, Ladygrove, Didcot, Oxon OX11 7RU.

NOTICE TO ADVERTISERS

To incorporate the VAT increase to 17.5% (absorbed by the RSGB since April) the new rate for Classified advertising from the January 1992 edition will be 52p per word (VAT incl.).

J. BIRKETT

25 The Strait
LINCOLN LN2 1JF
Tel: (0522) 520767

Suppliers of Electronic Components

DIE CAST BOX size 110 x 60 x 25mm. with 4 off N Type Sockets Fitted in Lid @ £1.50. (P&P 60p)
SPECIAL TRANSMITTING TYPE COMPRESSION TRIMMER. 250 To 1000pf @ 65p each
LOW POWER 50 ohm DUMMY LOAD Fitted in N Type Plug @ £1.85
OXLEY CERAMIC COIL FORMERS. 10mm Dia. x 20mm Long Wound @ 10 for £1.00
POWER R.F. FET. 41109 (VM1201) D.C. To 175MHz. 20 watt 28 volt with circuit and Data @ £7.95. £15.00 Matched Pair
COAX LEAD fitted with 2 Type Plugs 1m @ £1.50
MAINS TRANSFORMERS. 240 Input 13.8 Volt 3.6 Amp out @ £3.60 (P&P £2.00)
HIGH VOLTAGE WIRE ENDED CAPACITORS. 1000pf 10 Kv w. @ 50p each
X BAND GUNN DIODES. @ £1.65. **X BAND DIODES** Like IN23 @ 45p. SIM 2 @ 45p. 1501E @ £1.65
POWER TRANSISTORS. 2N3055 @ 5 for £2.00. BDY90 @ 5 for £2.00
MITSUBISHI R.F. POWER MODULE. 12 volt 25 watt 156MHz with data @ £17.50
WIRE ENDED R.F. CHOKES. 0.15uH. 0.47uH. 1 uH. 1.2uH. 1.5uH. 1.8uH. 15uH. 39uH. 82uH. All at 20p each
GaAS FETS. 24GHz Red Spot @ £2.50. Black Spot 18GHz @ £1.85. Out of Spec GaAS FETS 18 GHz @ 3 For £1.99
R.F. POWER TRANSISTOR. 2N5590 @ £5.95. BLY97 @ £3. BFR64 @ £4. PH8533 @ £12.95. 2N3866 @ £1. BFW16A @ 75p
WIRE ENDED CAPACITORS. 0.1uf 400v w. @ 10p. 0.1uf 1.5Kv w. @ 15p
NUT FIXING FEED THRUs. 500v w. 500pf. 1000pf. 4700pf. All at 65p each
CRYSTAL FILTERS. 68.545MHz @ £2.50. 21.4MHz @ £2.95. 1.4MHz @ £2.95. 10.7MHz @ £2.95
SPECIAL WIRE ENDED CAPACITORS. 0.022ut 5Kv w. @ 50p each
AIRSPACED VARIABLE CAPACITORS. 10+10+20pf @ £1.50. 125+125pf @ £2.50. 150 + 150pf @ £2.50. 200+350pf @ £2.50
FETS. 2N3819 @ 25p. DUAL GATE 3N201 @ 80p. BFW11 @ 30p. BFW12 @ 30p. 2N3824 @ 30p. J304 @ 30p. VN10KN @ 3 for £1.00
CQCL CRYSTAL OSCILLATOR. 5.6MHz @ £1.50

ACCESS and BARCLAYCARDS ACCEPTED. P&P 60p under £5. Over Free. unless otherwise stated.
C.M.HOWES KITS. Available by post and for callers

AJH ELECTRONICS

Est. over 20 years

RACAL RA17 RECEIVERS from £280.00 with 3 months warranty.
RACAL RA117 RECEIVERS £325.00 with 3 months warranty, carriage £20.
RACAL MA150G FREQUENCY SYNTHESISERS, valve type less power unit, as new in original crates £45.00, carriage £20.
COSSOR CDU150 35MHZ dual beam scopes all solid state with delay size 10"x10"x16" with all leads ex. cond. with manual £170.00, carriage £20.00.
PYE M293 AM LOW BAND MOBILE TWO WAY RADIOS with speaker, mic. & mounting bracket. ex condition & tested £75.00. p&p £4.00 some in portable packs with 12v 7Ah. battery pack £100.00, carriage £15.00 ideal rally teams, St John Amb. React. etc. crystalled £25.00 per ch.
TS175/U FREQUENCY METERS with cal. charts to 1GHz. WW2 collectors item £35.00 (callers only).
SARBE AIR-SEA RESCUE RADIOS for 243MHz. emergency frequency (less battery pack) last few 2 for £15.00. p&p £4.00.
STORNO CQP612 FM HIGH BAND TRANSPORTABLE two way radios ideal for conversion to 145MHz. Supplied with battery pack & mains power supply. With circuits £36.00 carriage £5.00.

151a BILTON ROAD, RUGBY, WARWICKSHIRE CV22 7AS
Ph 0788 576473, eve 0788 571066
Shop hours 9.30 to 1pm, 2.30 to 5pm, closed Wednesdays

Strikalite

Laurel Drive, Rugeley Road, Burntwood
Staffs WS7 9BL. Tel/Fax: (0543) 683122

Rechargeable batteries and chargers.
Sealed lead, acid and nickel cadmium.
Battery packs to customers specification.
Full range of chargers available.
EMERGENCY LIGHTING fittings, modules and battery packs.

NEW TRADE CATALOGUE NOW OUT!

1962 ▶ G3RCQ ELECTRONICS ▶ 1992

30 YEARS BUYING, SELLING, P/EXCHANGING
Top Quality — Amateur Radio Equipment — Top Quality

Please phone **04023 74043** or **0850 320134** any time for the best CASH deal. Phone NOW!! — Ask for information about LIST-A-RIG advertiser. We advertise your equipment FREE.
Want a list? — sae:

G3RCQ ELECTRONICS
9 TROOPERS DRIVE, HAROLD HILL, ROMFORD RM3 9DE
SEND TODAY — IT'S FREE!!

Glass Fibre Aerial Masts

Self-supporting, HBS glass fibre poles. Sizes up to 60ft! Non-conducting — no interaction! NEW

* Economical * Very strong * Lightweight, hollow construction
* Hinged base or ground socket mounts * Easily demountable * Maintenance free

For more information call
0325 355433
or write to
HARRISON BROTHERS
Borough Road, Darlington DL1 1SW

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:
37 Mons Way, Abingdon, Oxon OX14 1NJ

CASH — CASH — CASH — CASH

"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 CI 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

G4ZPY PADDLE KEYS

INTERNATIONAL

WATCH THIS SPACE NEXT MONTH

Phone your Order or send SASE or 2 IRCs for our Brochure
41 Mill Dam Lane, Burscough, Ormskirk, Lancs L40 7TG.
Phone No. 0704 894299

THE AMATEUR RADIO SHOP

EST 1961

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

F.J.P. KITS & COMPONENTS

63 Princess Street, Chadsmoor, Cannock, Staffs WS11 2JT, England
Telephone 0543-506487
KIT MANUFACTURERS & RADIO COMPONENTS
KITS, KITS, HF, VHF, NOVICE
Please note all kits include p/p & ins. Items marked * add ins p/p
Illustrated comp cat now £1 post paid. Technical assist if required

ITEMS MARKED ** NO PCB as yet
SAE PLEASE INC FILTER/XTALSx
CLASSA PUB RC DEC 1988
** G3TSO 1.8-10m HF TX/RX KIT
Fully boxed kit with just about all ** inc £195 *£10
Modules available sep SAE refunded
G7TXQ published FEB 1989 **
A FULLY BOXED KIT with specially made box. Suitable CLASS B novice. KIT less 15 watt PA & PCBs.....£129.00 *£10
KIT LESS box.....inc £120
but inc hardware. Tun cap/SM DRIVE. Modules available sep SAE PLEASE PA AVAIL SOON
← G3 TSO mini TX/RX pub JULY £1
A FULLY BOXED KIT WITH PCB TUN CAP and all NEW COMPONENTS, FILTERS, at a special

NOVICE PRICE £87.50 inc p/p over lays via RSGB
DIGITAL COUNTER PUB APRL 91 G3TS. All components inc LED display ** SAE. Box if required kit price with LED data £33
NOTE: .3in od .5in leads sup with data PCB.
RADCOMM MAY 85 M/md IF/AF strip kit SAE
NOTE: PCBs are at present avail RSGB
PCB SERVICE AT TIME OF ADVERT.
AND FOR THE YOUNG & OLD NOVICES kits with full instructions PCB at prices the youngs uns will like. Assistance is available.

TERMS ACCESS/VISA/RSGB CARDS
CHEQUES. POs to F. POWELL. PROP
DELIVER ASSURED SMALL ITEMS KITS 3-14 days
LGE KITS 7-28 days subject to availability

B. BAMBER ELECTRONICS

Manufacturers Surplus Stocks

Digital Computer Terminal, Type VT101 with Keyboard, Manuals, etc	£100
H.P. Instrumentation Recorder, Type 3960, 4 Channel	£350
H.P. Correlator, Type 3721A	£120
Philips Oscilloscope, Type PM3232, 0-10MHz	£150
Telequipment Oscilloscope, Type D61, 0-10MHz	£95
Marconi Signal Source, Type 6070A, 400-1200MHz	£300
Marconi RF Power Meter, Type 6460 with Power Head Type 6422	£400
Polarad Microwave Signal Generator, Model MSG-2A, 2000MHz-4600MHz	£75
Rohde & Schwarz Test Receiver, Type USVB-BN15241, 0.17-4.4GHz	£200
Rohde & Schwarz Decade Signal Generator, Type SMDH-BN41103, 0-50MHz	£200
Pye Mobile Radio, type M293AM, Low Band/High Band, Complete and in Good Condition	£70
Pye Mobile Radio, Type M296, UHF, 'U' Band, Complete and Good Con	£70

All prices exclude VAT and P.P.
Callers welcome by appointment only, Mon-Fri 9am-5pm

5 STATION ROAD, LITTLEPORT, CAMBS CB6 1QE
PHONE: ELY (0353) 860185

PROFESSIONAL SERVICES

*A number of amateurs are engaged in the provision of services to **RF PROFESSIONALS** and this new column will seek to provide occasional support for their firms.*

To advertise, please contact Victor Brand G3JNB on 0953 788473.

ADVERTISERS INDEX

Aerial Techniques 62
AJH Electronics 81
AKD.....56
Amateur Radio Shop, The.....81
AMDAT.....63
Amateur Radio Comms Ltd....68
AOR (UK) Ltd.....48
B. Bamber Electronics 81
Christopher Bartrum RF Design.....82
J. Birkett 81
Bredhurst Electronics Ltd 69
Castle Electronics 69
Chevet Books.....64
Datong Electronics Ltd 63
Dee Comm Amat. Radio Products 54
Dewsbury Electronics.....48
Eastern Communications.....65
ERA Ltd 61
F.J.P. Kits.....81
Garex Electronics.....56
GCHQ 82
G.W.M. Radio Ltd 70
G3RCQ Electronics 81
G4ZPY Paddle Keys International 81
Ham Radio Today.....64
J.F. Harding Communications 56
Harrison Brothers.....81
Hately Antenna Technology...70
Heatherlite Communications 55
Hesing Technology 78
ICOM (UK) Ltd ...22,23,55 & IBC
ICS Electronics Ltd.....14
IFW Technical Services.....82
Intertan (UK) Ltd 24
R. A. Kent (Engineers) Ltd 62
Klingenfuss Publications.....64
KW Communications Ltd.....9
Lake Electronics.....78
London Amateur Radio Show 68
Lowe Electronics Ltd .....10, 11 & IFC
McKnight Crystals Ltd 48
Martin Lynch G4HKS.....49
Midland (Europe) Ltd.....82
Mutek Ltd.....54
Nevada Communications.....32
NORBRECK.....61
Procomm (UK) 81
PW Publishing Ltd 62
Quartslab Marketing Ltd 70
Radio Bygones.....64
Radio Shack Ltd.....65
R&D Electronics.....54
R.F. Engineering Ltd.....62
RN Electronics 82
S.E.M. 54
Siskin Electronics Ltd.....70
South Midlands Comms. Ltd .....12, 13 & OBC
Specialist Antenna Systems Ltd 78
Spectrum Communications....70
S.R.P. Trading.....61
S.R.W. Communications Ltd 81
Stephens-James Ltd.....63
Strikalite 81
Suredata 56
Syon Trading 65
Technical Software.....78
Tennamast Scotland.....65
Waters & Stanton 28,29
Colin Wilson.....81

NEXT COPY DATE

The display advertisement copy date for our April 1992 issue will be **14th February 1992.**

VERSATILITY AND SOPHISTICATION

THE ICOM IC-R7100 WIDEBAND RECEIVER

• Continuous coverage from 25 to 2000 MHz
The IC-R7100 allows you to receive signals on VHF or UHF including amateur, air, marine, citizens and utility bands plus FM and TV broadcasts.

• All mode capability
The IC-R7100 includes SSB (USB, LSB), AM (Normal, Wide), FM (Normal, Narrow) and WFM (Wide FM) modes to catch a wide range of signals. Using an optional TV-R7100, you can view TV broadcasts on your CRT monitor and listen to FM broadcasts in stereo.

• 5 basic scans
These search for signals over a wide range and skip undesired frequencies and unmodulated signals.

• Window scan
To select and specify the frequency, memory channel, mode, and more, the IC-R7100 is equipped with a 2-window system, a technological breakthrough. Window scan can select one window and then another alternately on the function display for a programmed duty cycle.

• Dual scan
Combines a basic scan with the window scan function. Each basic scan appears in its window and two can be combined to operate alternately. with over 40 possible combinations; only Icom's high-speed scanning can realise dual scan operation

• 900 memory channels
A total of 900 memory channels store frequencies, modes and tuning steps. Memory channels are grouped in 9 memory banks for ease of handling and editing

• 20 scan edge memory channels
The IC-R7100 features an additional 20 scan edge memory channels to store 10 sets of frequencies for programmed scan.

Additional outstanding features

- High sensitivity and reliable frequency stability
- 0.1, 1, 5, 10, 12.5, 20, 25, 100 kHz and 1 MHz tuning steps available.
- Built-in 24-hour system clock with 5 ON/OFF timers.
- Automatic recording so important programmes can be caught when away from receiver.
- Noise blanker circuit for eliminating pulse type noise.
- Effective 20dB attenuator for strong signals.
- Noise squelch and S-meter squelch
- CI-V system for computer control through an optional CT-17.
- Frequency announcement in English with an optional UT-36.
- Large function display with selectable LCD backlighting brightness.
- Easy-to-read S-meter plus FM centre indicators.
- Dial lock function.
- AC and DC power operation.

ICOM

VISA MasterCard

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

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

Sensational 6m!

Noisy, crowded frequencies are about as productive as motorways at rush hour. Now you can skip the jams and head for the wide open spaces with the FT-650 from Yaesu.

The three frequency operation lets you win the battle of the bands and communicate clearly on 6m, 10m and 12m frequencies. These less crowded bands put your transmission high in the sky and above the noise.

The FT-650 packs substantial communications power in a streamlined, compact case. A flip-out handle makes it the perfect portable, while an optional power supply lets it function as a base station. Broadcast from anywhere - mountain tops, remote islands, boats, vehicles or just the suburbs - and hear the difference with the FT-650.

FT-650

With 6, 10 and 12m frequencies you can avoid the crowds

- **100 Watts On All Modes:** 25 Watts carrier on AM.
- **DDS:** Direct Digital Synthesis.
- **Low-Noise:** (NF 1.2dB) RF preamp with switched 5MHz bandwidth BPF, veractor tuned.
- **Extended Receiver Coverage:** 24.5 to 56MHz.
- **Automatic Seeking IF Notch Filter.**
- **100% Continuous Operation Duty Cycle.**
- **105 Memory Channels:** 99 channel memories, 4 programmable scan memories and 2 priority channels.
- **All-Mode Operation:** SSB, CW, FM and AM.
- **Selectable Scan Skip:** For busy channels.
- **Optional Accessories:** DVS-2 Digital Voice Recording System, MD-1C8 Desktop Microphone, SP-5 External Speaker with AF Filter, FP22 240V AC Power Supply.

FT-690RII

- The choice radio for the serious field operations enthusiast
- All-mode 6 meter (690RII)/2.5 watt mobile
- Convenient FM performance
- Three selectable FM scanning steps
- Analogue S/PO meter
- One-touch reverse split button.
- **Selectable SSB and CW Tuning Steps:** 25/100/2500Hz
- **Full Featured Microproccessor Operation**
- **10 Memories**
- **Simplex or Duplex**
- **2 Independant VFOs**
- **All-Mode Noise Blanker**
- **Optional CTCSS Tone Squelch (FTS-7)**
- **Semi Break-In CW Keying and Side Tone.**

Call today for complete information about this and other Yaesu products.

Performance without compromise

YAESU

UK Sole Distributor
South Midlands Communications Ltd, S.M. House,
School Close, Chandlers Ford Industrial Estate,
Eastleigh, Hants S05 3BY.
Tel: (0703) 255111.